

# **LOCAL AIR QUALITY MANAGEMENT PROGRESS REPORT**

**Part IV of the Environment Act 1995**

**2008**

**Prepared by:**

**Crawley Borough Council  
with assistance from the  
Sussex Air Quality Partnership**





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## Summary

The 2008 Progress Report provides an update on the air quality issues affecting Crawley, including the results of pollutant monitoring and information on new residential, industrial and transport developments that might affect air quality in the borough.

The review of air quality monitoring data indicated that it was unlikely there will be exceedences of the National Air Quality(NAQ) Objectives in Crawley in 2008 for most pollutants with the exception of nitrogen dioxide (NO<sub>2</sub>). Exceedences of the annual mean NO<sub>2</sub> objective were identified at two of the monitoring sites in Crawley:

- Tinsley Close, adjacent to the A2011 Crawley Ave dual carriage way,
- Crawley High Street, Bar Med, at the roadside site

No relevant Public exposure was is expected at Crawley High Street as there is no residential accommodation at this site and the short term, 1hr objective is not estimated to be exceeded. However, the report recommends that a Further Assessment of the Tinsley Close site should be undertaken in 2008 to determine whether an Air Quality Monitoring Area(AQMA) should be declared for this location.

Although the review of the monitoring data for NO<sub>2</sub> and Particulates(PM<sub>10</sub>) in 2007 and projected 2010, showed no exceedences of the NAQ Objectives for the most sensitive receptors around Gatwick Airport, the report did highlight one location (Lynhurst Cottage) where concentrations were approaching the annual mean limit for NO<sub>2</sub>. The report recommends that the Council should continue to monitor for NO<sub>2</sub> and PM<sub>10</sub> in order to maintain a record of air quality trends in the borough and monitor areas with the potential for exceedence.

A review of the major planned developments for the Crawley area highlighted a number of sites with potential for air quality impacts. These included sites where the development itself may be the source of the air quality impact, for example developments that result in increased traffic flows to the area. As well as developments being built close to busy road junctions or roads with very high traffic flows, which could potentially expose the residents to air quality exceedences.

As a result of this review, the Council has a clear indication of those new developments and planning schemes that will require further air quality monitoring. In response, the Council has expanded its monitoring network to accommodate these potential hot spots and applied to West Sussex County Council for updated traffic counts to assist in the forthcoming DMRB assessments that will be required for the Updating and Screening Assessment in 2009. The findings of the report can also provide information to assist in other policy areas such as Transport and Land use Planning.

**Table 1: Summary of pollutants measured in 2007 at Crawley (or Sussex) to show compliance with the UK air quality objectives**

Pollutant	NAQS Objective	Measured as	2007 measured Conc at Crawley or Sussex AQMS	Exceedence
Benzene	5 µg/m <sup>3</sup>	Annual mean	1.01 µg/m <sup>3</sup> (Hove)	No
1,3 Butadiene	2.25 µg/m <sup>3</sup>	Running annual mean	Not measured	Not likely
Carbon monoxide	10.0 mg/m <sup>3</sup>	Maxi daily running 8-hour mean	1 µg/m <sup>3</sup> (Hove)	No
	10.0 mg/m <sup>3</sup>	No. hours rolling 8hr mean >10µg/m <sup>3</sup>	None	No
Lead	0.25 µg/m <sup>3</sup>	Annual mean	Not measured	Not likely
Nitrogen dioxide	200 µg/m <sup>3</sup> (not > 18 times a year)	1 hour mean	155 µg/m <sup>3</sup> (Max) No exceedences	No
	40 µg/m <sup>3</sup>	Annual mean	34.79 µg/m <sup>3</sup> Gatwick East continuous monitor	No
			42.64 µg/m <sup>3</sup> Tinsley Close Diff Tube	<b>Yes</b>
			44.53 µg/m <sup>3</sup> Bar Med Diff Tube	<b>Yes</b>
		36.63 µg/m <sup>3</sup> Lynhurst Cottage Diff Tube	No (approaching limit)	
Particles (PM <sub>10</sub> ) (gravimetric)	50 µg/m <sup>3</sup> (not > 35 times a year)	24 hour mean	18 exceedences	No
	40 µg/m <sup>3</sup>	Annual mean	26.20 µg/m <sup>3</sup>	No
Sulphur dioxide	350µg/m <sup>3</sup> (not>24/yr)	1 hour mean	32 µg/m <sup>3</sup> (maxHove )	No
	125µg/m <sup>3</sup> (not>3/year)	24 hour mean	9 µg/m <sup>3</sup> (maxHove)	No
	266µg/m <sup>3</sup> (not>35/ yr)	15 minute mean	37 µg/m <sup>3</sup> (maxHove)	No

## 1. Introduction

Under the Environment Act 1995, local authorities are required to review and assess air quality on a regular basis. A *review* of air quality means a consideration of the levels of pollutants in the air for which objectives are prescribed in Regulations, and estimations of likely future levels. An *assessment* of air quality is the consideration of whether estimated levels for the relevant future period are likely to exceed the levels set in the objectives.

The first round of review and assessments was completed in July 2000. The conclusion was that the National Air Quality Objectives were not likely to be exceeded in Crawley. This first round constituted a bench mark against which the Council could measure future progress in making improvements to the local air quality.

Guidance issued by the Department for Environment, Food and Rural Affairs (DEFRA) requires local authorities, who found exceedences of the air quality objectives in their Updating & Screening Assessment (USA) to undertake a Detailed Assessment (DA) in the following year 2007 and a Progress Report (PR) in 2008.

This Progress Report is intended to identify those aspects that have changed since the last round of review and assessment, the USA 2006 and DA 2007. The report concentrates on the progress on implementing local air quality management and achieving or maintaining concentrations below the air quality objectives. These aims are demonstrated by reporting on updated monitoring data and new local developments that might affect air quality.

The Progress Report provides a summary of all available monitoring data, indicating monitored pollutants at specific locations within the Borough and surrounding areas for comparison with the National Air Quality Objectives.

## 2. National Air Quality Objectives

The air quality objectives set out in the Air Quality Regulations provide the statutory basis for the system of Local Air Quality Management (LAQM). The recently published UK Air Quality Strategy (2007) did not remove any of the objectives set out in the previous strategy or its addendum, apart from replacing the provisional 2010 PM10 objective in England, Wales and Northern Ireland with the exposure reduction approach for fine particulates PM<sub>2.5</sub>.<sup>1</sup>

For each objective, local authorities have to consider present and likely future air quality, and assess whether the objectives are likely to be achieved in time.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	5 µg/m <sup>3</sup>	Annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m <sup>3</sup>	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m <sup>3</sup>	Maximum daily running 8-hour mean	31.12.2003
Lead	0.25 µg/m <sup>3</sup>	Annual mean	31.12.2008
Nitrogen dioxide	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
Particles (PM <sub>10</sub> ) (gravimetric)	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
Sulphur dioxide	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



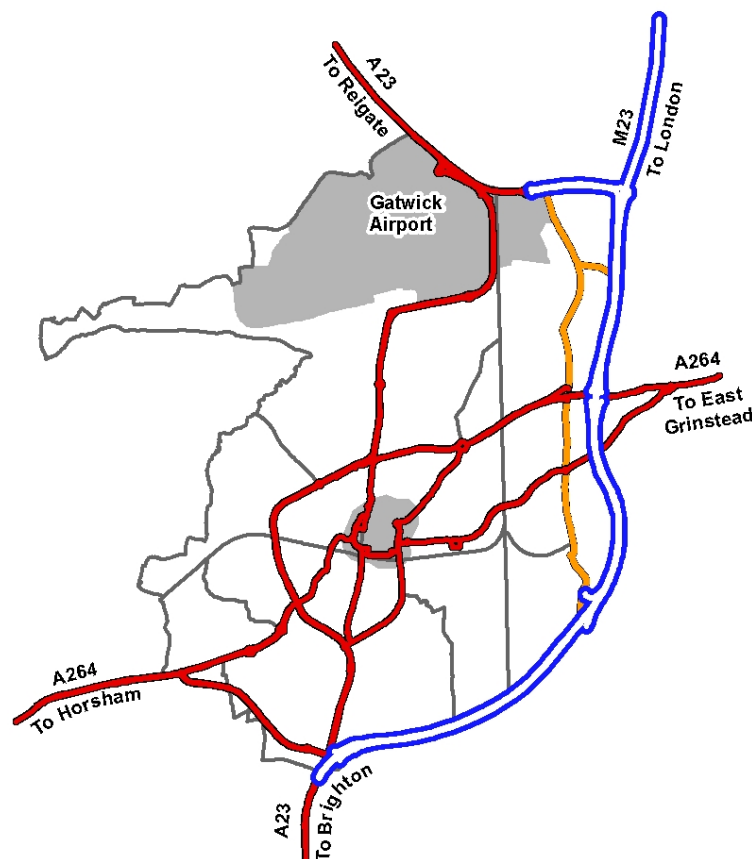
### 3. Information about Crawley Borough Council

Crawley is situated in the north eastern part of the county of West Sussex, mainly urban in character, covering approximately 4500 hectares, it is surrounded by countryside and has excellent transport links, being adjacent to the M23 and close to the M25 motorways, as well as having good railway links to London and the south coast. Gatwick Airport, one of the world's major international airports is located at the northern edge of the Borough.

Since its designation as a New Town in 1947, Crawley's growth has been rapid. In 1951, the population was approximately 10,000; by 1961 it had increased to amount 54,000. At the last national census (2001), the population was approximately 100,000, with 40,382 households, representing a population density of 22.2 persons per hectare. Around 80% of households have at least one car.

The major employment areas within the borough remain Airport related industries, Hotel, Retail and Leisure, the Business/Professional sectors and Advanced Manufacturing.

**Fig 1: Map of Crawley Borough Council**



<sup>1</sup> UK Air Quality Strategy (2007) (<http://www.defra.gov.uk/environment/airquality/strategy/index.htm>)

## **Industrial Sources**

Industrial sources of air pollution are currently controlled under the Environmental Protection Act 1990, and are classified into either Part A (large industries such as power stations and chemical works) or Part B/A2 processes (such as crematoria, petrol stations, cement works, etc.) for guidance and control. Part A processes fall under the jurisdiction of the Environment Agency, whilst control of Part B/A2 processes is a duty carried out by local authorities. Those small industrial processes that fall outside of Part B/A2 Process control are also of concern and are regulated using other parts of the Act, such as Statutory Nuisance, or other primary legislation, such as the Clean Air Act 1993.

Lists of Part A/A(1), Part B/A2 and other processes of potential concern from within the Borough or from neighbouring areas are given in **Appendix 6**. Any significant or new changes to these sources of emissions are referred to in the relevant pollutant section. A survey of neighbouring authorities has confirmed that there are no new or significantly changed sources which could affect air quality in Crawley

## **Transport/ Road traffic**

Whilst occupying only 2% of the land in West Sussex, Crawley has a strong economic base and is responsible for 22% of employment in the County. This generates 30,000 in-commuters each day placing huge demands on the towns transport infrastructure.

Gatwick Airport generates large amounts of vehicle movements everyday. Increased through put at the airport needs to be addressed and sustainably managed. The Gatwick Airport Transport Plan has set a target that 40% of surface journeys by non-transfer air passengers will be by public transport when the airport's annual throughput reaches 40 million(forecast for 2015).

Given the employment and development pressures that Crawley faces, it is important to ensure that the existing town's transport infrastructure is utilised efficiently and effectively and to ensure that new infrastructure is provided where necessary. Travel mode is dependent on choices and the Council is committed to enhancing public transport services within the town and improving the cycling and walking network:

The approach reflects the need for a co-ordinated approach to reducing the reliance on the car and to sustainably manage anticipated growth in the demand for travel. Transport policies and plans for Crawley are discussed further in **Section 8**. Details of road traffic numbers and trends in Borough are shown in **Appendix 5**.

### **Other Significant Sources of Air Pollution**

Gatwick Airport is a significant source of a range of pollutants from aircrafts and the many thousands of vehicles (cars, taxis, buses, servicing vehicles, freight lorries etc.) travelling to and from the airport each day. The main pollutants of concern from the airport are nitrogen dioxide and particulate matter.

Pollution modelling up to 2010 has shown that the total amount of NO<sub>2</sub> emitted from aircrafts is predicted to continue to increase despite the introduction of newer planes between now and 2010. However the predicted improvements in road vehicle emissions until 2015 means that emissions from airport related road traffic within the study area will fall without the airport needing to do anything, and could mask growth in some of the other airport emissions sources.

After 2015, the benefit from reduced vehicle emissions will no longer be felt and therefore, in the longer term ever increasing aircraft emissions from the airport are not sustainable. Reducing, or at least stabilising, airport related emissions is a key measure of the action plan published by BAA in 2008 to tackle air quality issues at Gatwick. Aircraft NO<sub>2</sub> emissions at altitude are also considered a net contributor to global warming, and thus any reduction in aircraft NO<sub>2</sub> emissions has wider benefits in addition to local air quality improvements in the vicinity of Gatwick.

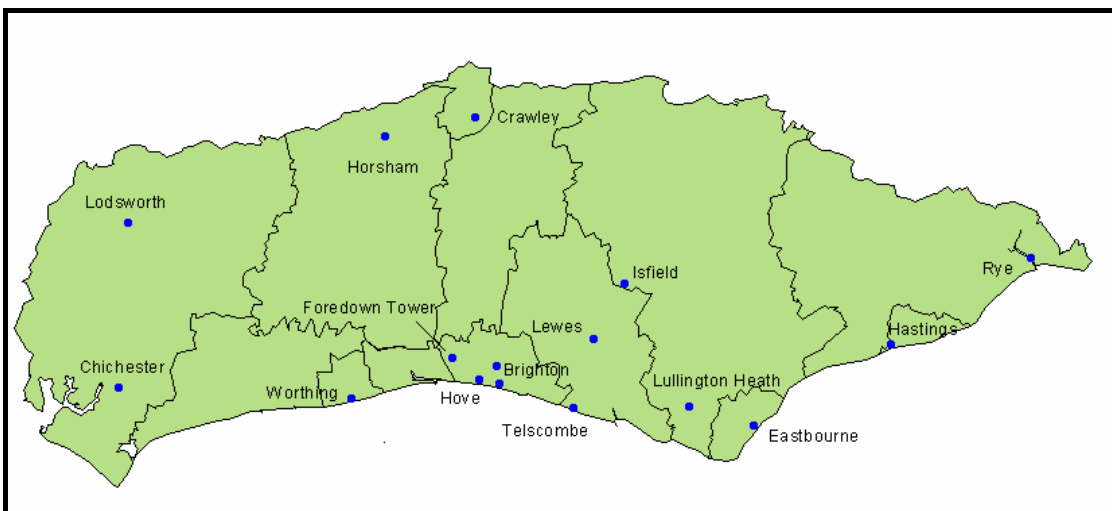
Modelling the emissions from aircraft taking off or landing at Gatwick has indicated that much of the emissions are dispersed in the general atmosphere of the region, and emissions from ground based sources are diluted by the time they reach the airport boundary. However, exceedences of the air quality objectives for NO<sub>2</sub> have been measured on the Horley Gardens Estate, which adjoins the airport along its northern boundary. Consequently, Reigate and Banstead Borough Council, has declared an Air Quality Management Area in that area.

Crawley's 2007 air quality review concluded that the public in Crawley would not be exposed to pollutants above the air quality objectives. This is mainly due to the prevailing wind direction taking pollutants away from the Borough into neighbouring Horley, and the distance from the airport boundary of residential properties in Crawley which ensures adequate dilution has occurred to reduce the risk of air quality exceedences at the façade of the dwelling.

## 4. New Monitoring Results

Crawley Borough Council is a member of the Sussex Air Quality Partnership which benefits from the co-ordinated monitoring of air pollutants across the region. The partnership has access to monitoring stations data and is able to make comparative and comprehensive assessments for the different pollutants required under LAQM. The Sussex Air Quality Network is managed and co-ordinated by King's College London ERG, on behalf of Sussex-air and they provide data calibration and ratification of results. Figure 2 shows the location of stations in Sussex (Jan 07).

**Figure 2: Sussex Air Quality Network (Jan. 2007)**



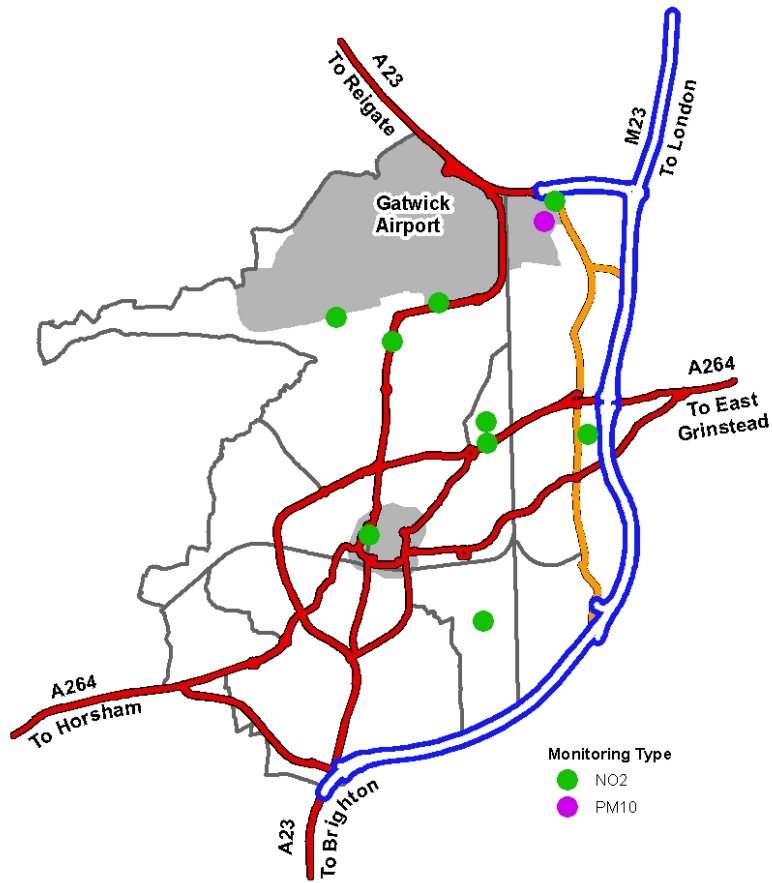
The Sussex Air Quality Network is comprised of local authority air quality monitoring stations and has integrated data from national air quality stations (AURN - Lullington Heath, Brighton, Preston Park (Brighton) and Hove). The main pollutants monitored with automatic analysers are shown in Table 3 below.

<b>Table 3: Air Quality Monitoring Stations in Sussex</b>		
<b>LA</b>	<b>POLLUTANTS</b>	<b>LOCATION</b>
Adur	NOx	Shoreham High St
Brighton & Hove/AURN	CO, NOX, O3 , PM10	Brighton Pavilion
Brighton & Hove/AURN	CO, NOX, O3 , PAH	Hove Roadside
Brighton & Hove CC	O3	Foredown Tower
Chichester D.C.	PM10(grav), NOx,O3	A27 Ring Road
Chichester D.C.	O3	Lodsworth( ARMO)
Crawley B.C.	NOx	East Gatwick
Eastbourne B.C.	PM10, NOx, O3	Devonshire Park
Hastings B.C.	PM10, NOx, O3	Hastings/Bexhill (A259)
Horsham D.C.	PM10, NOx,	Horsham centre
Lewes D.C.	PM10, NOx, O3,	Telscombe Cliffs
Lewes D.C.	PM10, NOx	Lewes Town Centre
Rother D.C	O3	Rye Harbour
Rother D.C.	NOx, PM10	Bexhill (A259)
Worthing B.C.	NOx	High St, Worthing
Wealden D.C.	O3	Isfield (ARMO)
Sussex County Lab.	PM10, NOx,O3, CO	Mobile unit
DEFRA - AURN	NOx, O3	Preston Park, Brighton
DEFRA - AURN	NOx, O3, SO2	Lullington Heath, Wealden

<b>Key:</b>	
<b>Brighton &amp; Hove/AURN</b>	Affiliated /part-funded by Brighton CC and AURN (DEFRA)
<b>AURN</b>	Automatic Urban and Rural Network(DEFRA owned AQ stations)
<b>Sussex County Lab.</b>	Mobile lab part owned by East and West Sussex County Councils
<b>DEFRA</b>	UK Govt. Department for Environment, Food and Rural Affairs

Crawley also monitors locally, using NO<sub>2</sub> diffusion tubes across the borough and Continuous analysers for NO<sub>2</sub> and PM<sub>10</sub> at the eastern boundary of Gatwick Airport. The monitoring site network is shown on the **Fig 3** below, and the monitoring data for 2007 are presented in the **Sections 4.5 and 4.7** and **Appendix 2 and 3**.

Fig 3: Crawley Borough Council Air Quality Monitoring Site Network 2008



#### 4.1 Updated data for carbon monoxide (CO)

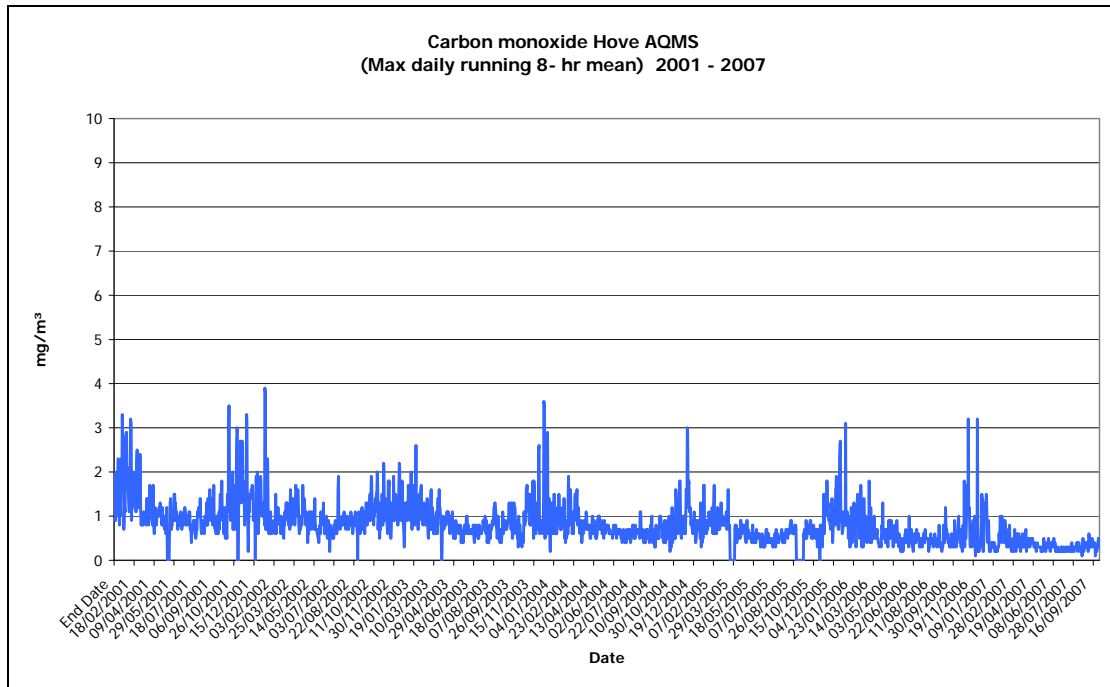
Carbon monoxide is an asphyxiating pollutant that reduces the ability of blood to carry oxygen to the different organs. The main source of carbon monoxide in the UK is road transport, which accounted for 67% of total releases in 2000 (the most recent year for which estimates are available). Annual emissions of carbon monoxide have been falling steadily since the 1970s, and are expected to continue to do so. This is mainly due to improvements in vehicle technology and the fitting of catalytic converters. Current projections indicate that road transport emissions will decline by a further 42% between 2000 and 2005 (LAQM.TG03).

Crawley Borough Council does not carry out any carbon monoxide monitoring. LAQM.TG03 advises that if exceedences for carbon dioxide were to occur, they would be close to very busy roads or junctions. The screening criteria for "very busy" are single carriageway roads with daily average traffic flows of more than 80,000 vehicles; or dual carriageways having more than 120,000 vehicles; or motorways with more than an average flow greater than 140,000 vehicles per day. None of the roads or traffic junctions in Crawley meet these criteria.

The closest automatic monitoring site to Crawley is at the junction of Marlborough Pl. and Church St., in Hove (Grid ref. E 531300 N104300). Monitoring data for 2007 from this site (obtained with automatic infrared analysers) showed no exceedence of the 10mg/m<sup>3</sup> Objective indicating that the carbon monoxide objective is unlikely to be exceeded at any location in Sussex.

Pollutant	Air Quality Objective		2007 Measurements	
	Conc.	Measured as		Exceedence
Carbon monoxide	10.0 mg/m <sup>3</sup>	Max daily running 8-hour mean	1 µg/m <sup>3</sup>	No
Carbon monoxide	10.0 mg/m <sup>3</sup>	No. hours rolling 8hr mean >10mg/m <sup>3</sup>	None	No

**Figure 4: Carbon Monoxide (Hove) 8 hr running Mean 2001-7 results**



**Conclusion for CO:** It is unlikely that the air quality objective for carbon monoxide will be exceeded in 2008 or in future years in Crawley.



## 4.2 Updated data for benzene (C<sub>6</sub>H<sub>6</sub>)

Benzene is a known human carcinogen (cancer causing substance), and also contributes to the formation of ground-level ozone (summer smog). The main sources of benzene emissions in the UK are petrol vehicles, petrol refining, and the fuel distribution from petrol station without vapour recovery systems. National benzene concentrations have declined in recent years, mainly due to the increasing use of three-way catalytic converters and the introduction of vapour recovery systems in petrol stations (Stage 1 and 2 control). Since January 2000, EU legislation has reduced the maximum benzene content of petrol to 1%, from a previous upper limit of 5%. The European Auto-Oil programme will further reduce emissions for cars and light-duty vehicles, and emissions of benzene from the storage and distribution of petrol (LAQM.TG03).

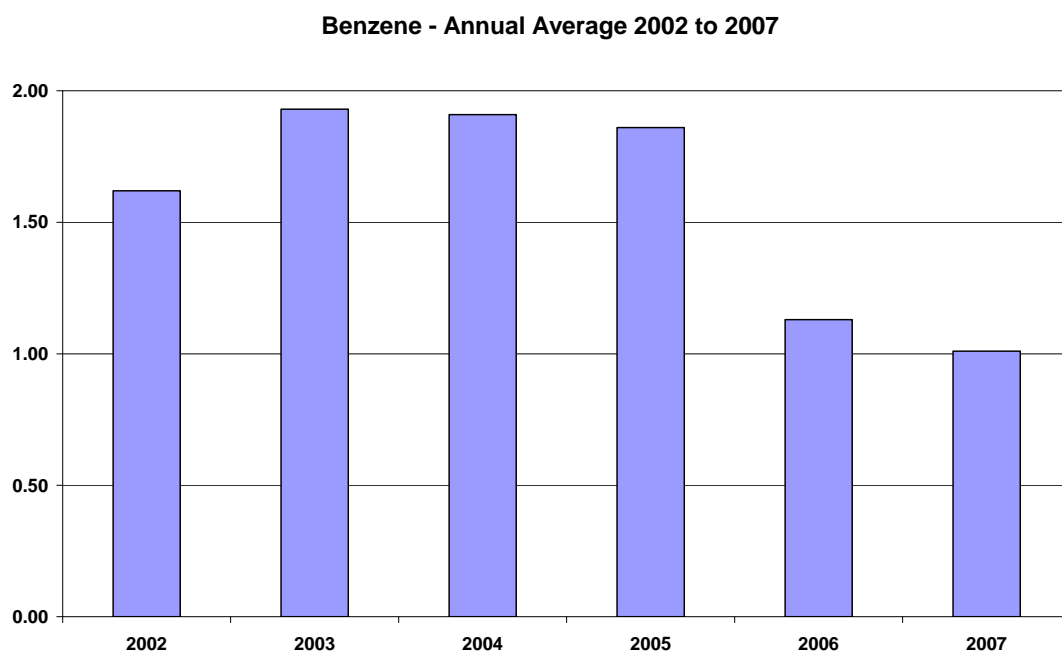
An assessment carried out by DEFRA for the 2010 objective (5µg/m<sup>3</sup>) for benzene suggests there may be a few locations close to busy roads, in areas with high background concentrations that may be at risk of exceeding the objective. However, none of the roads or junctions in Crawley have traffic flows of sufficient volume to be at risk of exceeding the objective, and there are no road traffic schemes planned for the near future that would meet these criteria.

There are no major industrial sources in or close to Crawley, which store handle or emit benzene and none are planned for the near future. There are no major petrol storage depots in the area, the fuel storage facility at Gatwick Airport is for aviation fuel, which does not emit benzene.

Although Crawley Borough Council does not carry out monitoring for benzene, there are a number of sites in Sussex that monitor at both roadside and background locations, using diffusion or pumped tubes. The nearest site to Crawley is the AURN roadside site in Hove. Monitoring data from the pumped diffusion tube survey at Hove (**Table 5**), undertaken as part of the national PAH monitoring network shows that the air quality objective has not exceeded the 5µg/m<sup>3</sup> annual average objective in the preceding 5years and is unlikely to be breached in 2008

Table 5: Benzene (Hove) Annual Mean Monitoring Data 2002-2007						
Site:	Hove	Hove	Hove	Hove	Hove	Hove
Year:	2002	2003	2004	2005	2006	2007
Units:	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$
<b>Annual Average Benzene: (Annual limit value = 5 <math>\mu\text{g}/\text{m}^3</math>)</b>	1.62	1.93	1.91	1.86	1.13	1.01

Fig 5 Benzene (Hove) Annual Mean 2002-2007



**Conclusion for Benzene:** It is unlikely that the air quality objective for benzene will be exceeded in 2008 or in future years in Crawley.

#### 4.3 Updated data for 1,3 butadiene(C<sub>4</sub>H<sub>6</sub>)

No local monitoring of 1,3-butadiene is currently being carried out in any of the local authorities in Sussex. However, concentrations of 1,3-butadiene are measured at a limited number of UK national network sites. Maximum running annual mean concentrations of 1,3-butadiene measured at all urban background/centre and roadside locations are already well below the 2.25 µg/m<sup>3</sup> running annual mean objective.

No industrial sources handling, storing or emitting 1,3-butadiene were identified during the first round of review and assessment as likely to give rise to exceedences of the running annual mean objective. New sources introduced into the Borough or existing sources with substantially increased emissions have not been identified. This suggests that the 1,3-butadiene objective is unlikely to be exceeded at any location in Crawley

**Conclusion for 1,3-butadiene:** It is unlikely that the air quality objective for 1,3-butadiene will be exceeded in 2008 or in future years in Crawley.

#### 4.4 Updated data for lead (Pb)

There is currently no local monitoring of lead in any of the local authorities in Sussex. Measurements of lead in air concentrations at UK national network sites for the period 1997 to 2007 show that levels at all background, kerbside and industrial sites are well below the 2008 objectives of 0.25 µg/m<sup>3</sup>. The 2007 annual average for all Industrial metal sites across the UK in 2007 was 15ng/m<sup>3</sup>.

No industrial sources were identified during the first round of review and assessment as likely to give rise to exceedences of the annual mean objective for lead. No new sources have been introduced into the Crawley area and no existing sources with substantially increased emissions have been found since the last round of review and assessment. This suggests that the lead objective is unlikely to be exceeded at any location in the Borough.

**Conclusion for lead:** It is unlikely that the air quality objective for lead will be exceeded in 2008 or in future years in Crawley.

## 4.5 Updated data for nitrogen dioxide (NO<sub>2</sub>)

Nitrogen dioxide is the pollutant for which there is the most local monitoring. This is because of the availability of cheap and relatively simple monitoring equipment such as NO<sub>2</sub> diffusion tubes. The council maintains a network of passive diffusion tubes throughout Crawley, as well as an automatic chemiluminescent NO<sub>2</sub> monitor at a site on the Gatwick Airport eastern boundary (Gatwick East). The distribution of diffusion tubes and automatic monitoring sites in Crawley are detailed in Fig 3. In addition to our own local NO<sub>2</sub> diffusion tube monitoring, the council takes part in the National NO<sub>2</sub> Diffusion Tube Survey.

### NO<sub>2</sub> Diffusion Tube Monitoring

The NO<sub>2</sub> diffusion tube analysis for Crawley is carried out by Bristol Scientific Services. All diffusive monitoring data have been ratified following the methods described in LAQM.TG(03) and outlined in **Appendix 1**. A quality assurance/quality control (QA/QC) programme including field duplicates and blanks, and instrument calibration with standard gases has been followed (AEAT, 2000).

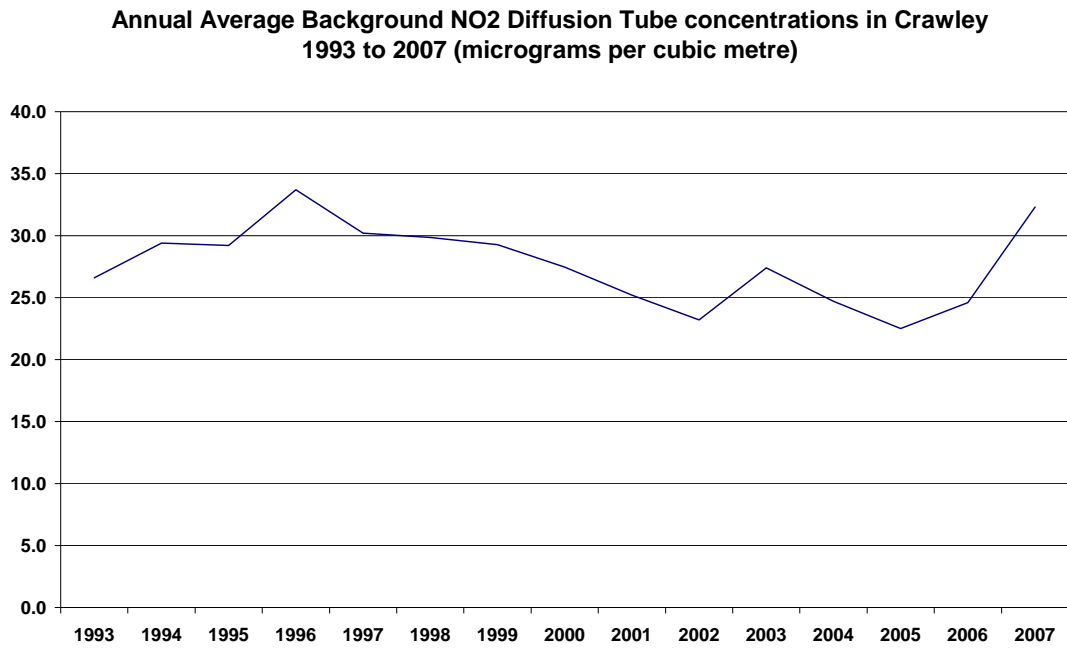
Diffusion tube monitoring has inherent errors. In order to minimise these, a bias-adjustment factor is applied to the results. This factor is obtained by collocating three diffusion tubes for a year at a continuous monitoring site that follows strict quality control/quality assurance. The average values from the monthly exposed tubes are then compared directly to the corresponding continuously monitored values. The bias correction factor calculated from our collocated study at the Gatwick East Site was determined to be 1.03. The University of West of England (UWE) gathered together the various UK collocation study results, and from these calculated the mean value, to arrive at the bias adjustment factor of 0.77 for 2007 data.

Following advice from the NETCEN Monitoring Helpdesk the diffusion tube monitoring results presented in this report have been bias corrected using both bias correction factors. Any conclusions drawn from the monitoring data has been based on the results calculated using the bias correction calculated from our own collocation study. These values are locally derived from fully ratified data, they present the more pessimistic set of results, and therefore our conclusions are based on figures representing the worse case scenario. The results with bias correction are given in **Table 6** below.

<b>Table 6: Crawley Annual Men NO<sub>2</sub> Diffusion Tube Data 2003-2010 (<math>\mu\text{g}/\text{m}^3</math>) Bias Adjusted</b>							
<b>SITE</b> (Reference No. and name of receptor property)	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b> BSS bias adjustment factor 0.77	<b>2007</b> Local bias adjustment factor 1.03	<b>2010</b> laqm yr adjustment calculator (2007 data)
<b>1</b> <b>BarMed The High Street</b>	<b>38.12</b>	<b>34.29</b>	<b>30.76</b>	<b>33.15</b>	<b>32.95</b>	<b>44.53</b>	<b>39.98</b>
<b>99</b> <b>Furnace Farm Rd</b>	<b>21.01</b>	<b>19.64</b>	<b>17.87</b>	<b>20.53</b>	<b>20.25</b>	<b>27.09</b>	<b>24.56</b>
<b>3</b> <b>Birch Lea</b>	<b>24.65</b>	<b>22.08</b>	<b>21.26</b>	<b>21.45</b>	<b>25.02</b>	<b>33.48</b>	<b>30.35</b>
<b>4</b> <b>Headley Close</b>	<b>25.98</b>	<b>23.40</b>	<b>20.08</b>	<b>22.79</b>	<b>24.49</b>	<b>32.75</b>	<b>29.70</b>
<b>52,53,54</b> <b>Gatwick East</b>	<b>19.53</b>	<b>No site</b>	<b>-</b>	<b>25.05</b>	<b>26.10</b>	<b>34.92</b>	<b>31.66</b>
<b>44</b> <b>Tinsley Lane</b>	<b>24.47</b>	<b>No site</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>45</b> <b>Three Bridges rd</b>	<b>26.13</b>	<b>No site</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>46</b> <b>Filbert Crescent</b>	<b>34.78</b>	<b>No site</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>47</b> <b>Tinsley Close</b>	<b>42.60</b>	<b>37.99</b>	<b>34.68</b>	<b>No site</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>48</b> <b>Lynhurst Cottage</b>	<b>No site</b>	<b>26.04</b>	<b>23.82</b>	<b>25.96</b>	<b>27.18</b>	<b>36.36</b>	<b>32.97</b>
<b>49</b> <b>Charlwood Nursery</b>	<b>No site</b>	<b>18.44</b>	<b>17.34</b>	<b>20.79</b>	<b>18.40</b>	<b>24.61</b>	<b>22.32</b>
<b>50</b> <b>Rowley Cottage</b>	<b>No site</b>	<b>27.16</b>	<b>24.62</b>	<b>29.4</b>	<b>22.02</b>	<b>29.46</b>	<b>26.72</b>
<b>51</b> <b>Balcombe Rd</b>	<b>No site</b>	<b>25.67</b>	<b>23.16</b>	<b>25.58</b>	<b>24.64</b>	<b>32.96</b>	<b>29.89</b>
<b>55</b> <b>Fence at Tinsley Close</b>	<b>No site</b>	<b>-</b>	<b>30.48</b>	<b>33.87</b>	<b>31.88</b>	<b>42.64</b>	<b>38.66</b>
<b>56</b> <b>Steers Lane</b>	<b>No site</b>	<b>-</b>	<b>-</b>	<b>24.75</b>	<b>21.41</b>	<b>28.63</b>	<b>25.97</b>

The annual average NO<sub>2</sub> diffusion tube concentrations at background site in Crawley are presented in Fig 6 for 1993 -2007 to indicate the trend since records began. Between 1997 and 2005 the overall trend was a reduction in NO<sub>2</sub> concentrations (with the exception of 2003 which was an exceptionally hot year). Since 2005 background levels appear to be rising.

**Fig6: Annual Mean Background NO<sub>2</sub> diffusion tube concentrations in Crawley 1993-2007**

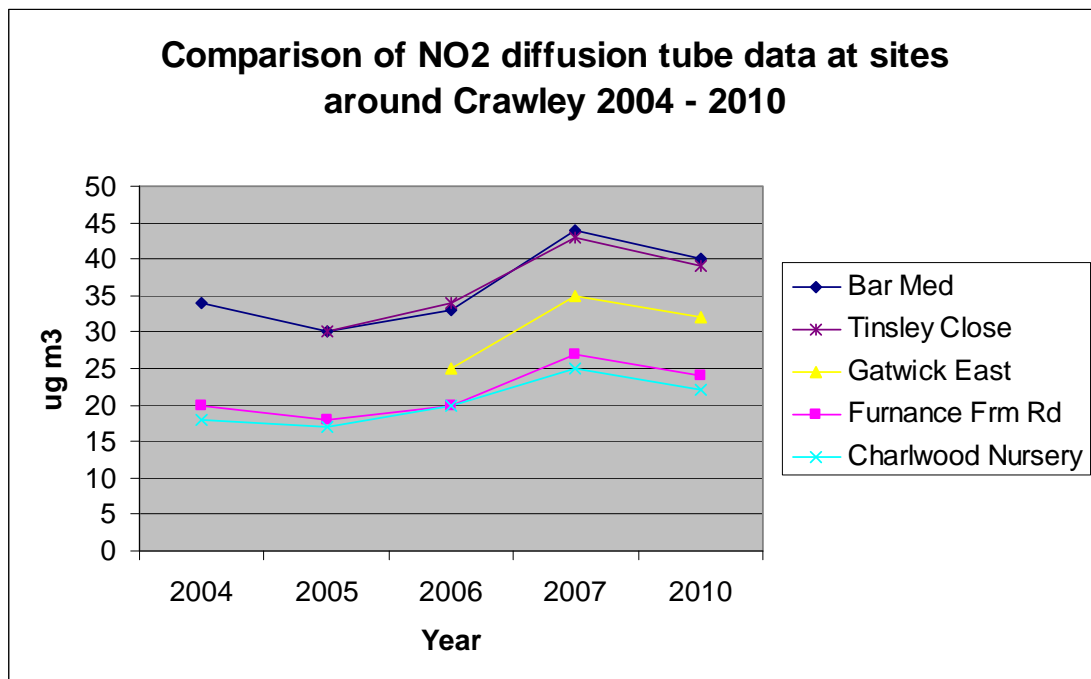


**Fig 7** below compares annual average NO<sub>2</sub> diffusion tube concentrations from a number of sites around Crawley for 2004-2010 using the measured and projected data from **Table 6** above.

Five sites were chosen for comparison:

- Roadside Site – Bar Med
- Potential AQMA Site – Tinsley Close
- Gatwick Airport Site – Gatwick East
- Background Site – Furnace Farm Road
- Sensitive Receptor Site for Gatwick – Charlwood Nursery

**Fig 7: Comparison of Annual Mean NO<sub>2</sub> at Sites around Crawley 2004-10**

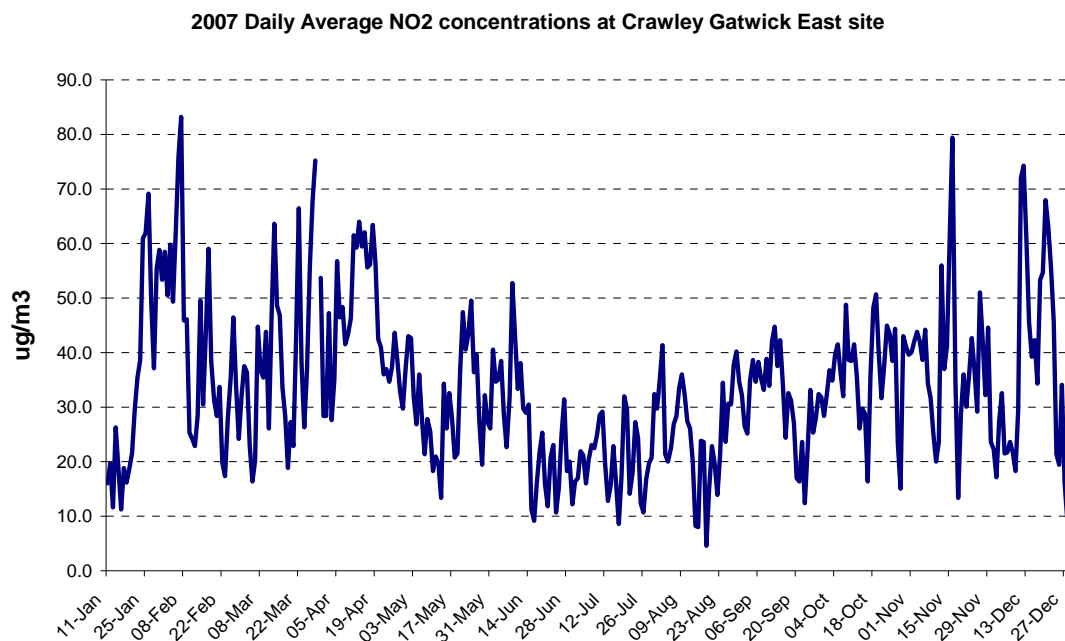


Two of the monitoring sites show exceedences of the NAQS objective(40µg/m<sup>3</sup>) for annual average NO<sub>2</sub> in 2007. These site were the roadside site at Bar Med on Crawley High Street and Tinsley Close Site which is located close to the busy A2011.

## NO<sub>2</sub> Continuous Monitoring

The automatic NO<sub>2</sub> monitor permanently located at a site on the eastern boundary of Gatwick Airport at Schlumberger House, Balcombe Road(Gatwick East) gives 15 minute readings of nitrogen dioxide concentration. All automatic monitoring data is managed under contract with by Kings College London Environmental Research Group (ERG). Data validation and ratification is carried out by ERG (**Appendix 1**). The daily mean NO<sub>2</sub> concentrations for the Crawley Gatwick East Site are shown in **Fig 8** below. The annual mean for this site was 34.7µg/m<sup>3</sup> which is below the NAQS annual mean objective of 40µg/m<sup>3</sup> and there were no exceedences of the 200µg/m<sup>3</sup> hourly mean.

**Fig 8**

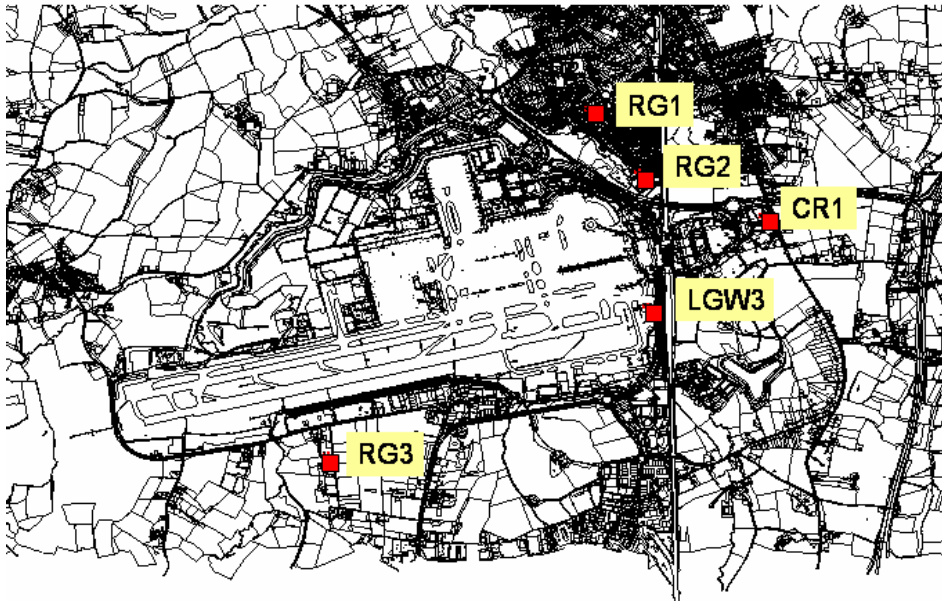


Continuous monitoring data from three sites operated on the periphery of the airport by Reigate and Banstead Council and one site on airport operated by BAA are presented alongside the Crawley Gatwick East site to give a comparison of air quality across a transect of the airport. The location of these five sites is shown in **Fig 9** below, and the 2007 and projected 2010 annual mean concentrations for these five sites surrounding the airport are presented in **Table 7** and **Fig 10** (also see **Appendix 2 Tables A2.5**)



Fig 9

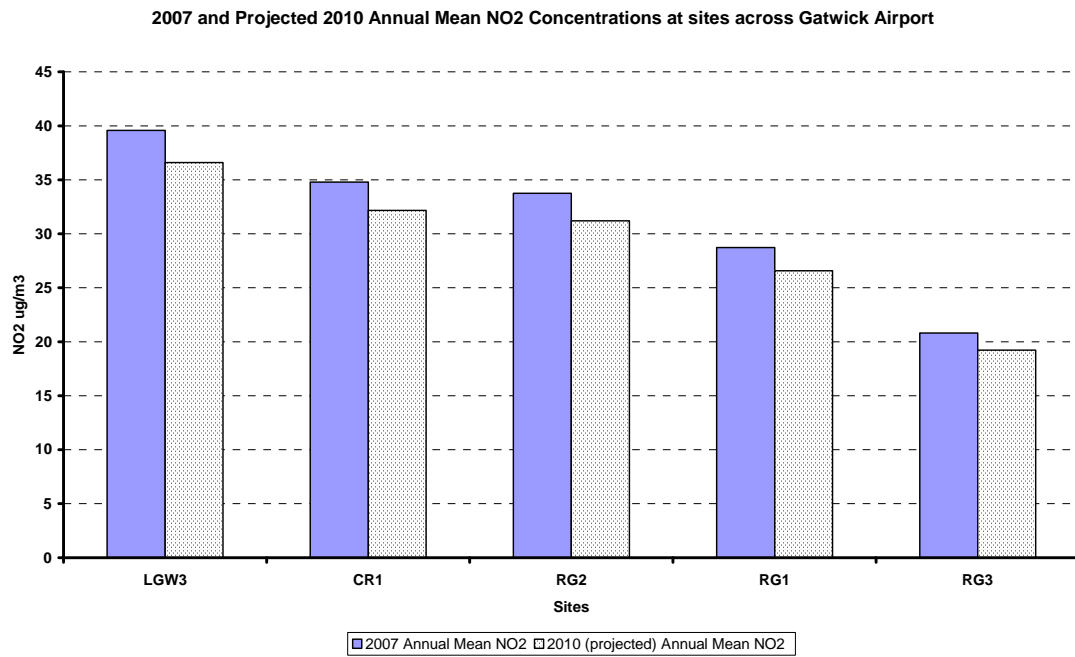
## Real Time Monitoring Sites around Gatwick



**Table 7: NO<sub>2</sub> Continuous Monitoring Data for Sites Across Gatwick Airport (µg/m<sup>3</sup>)**

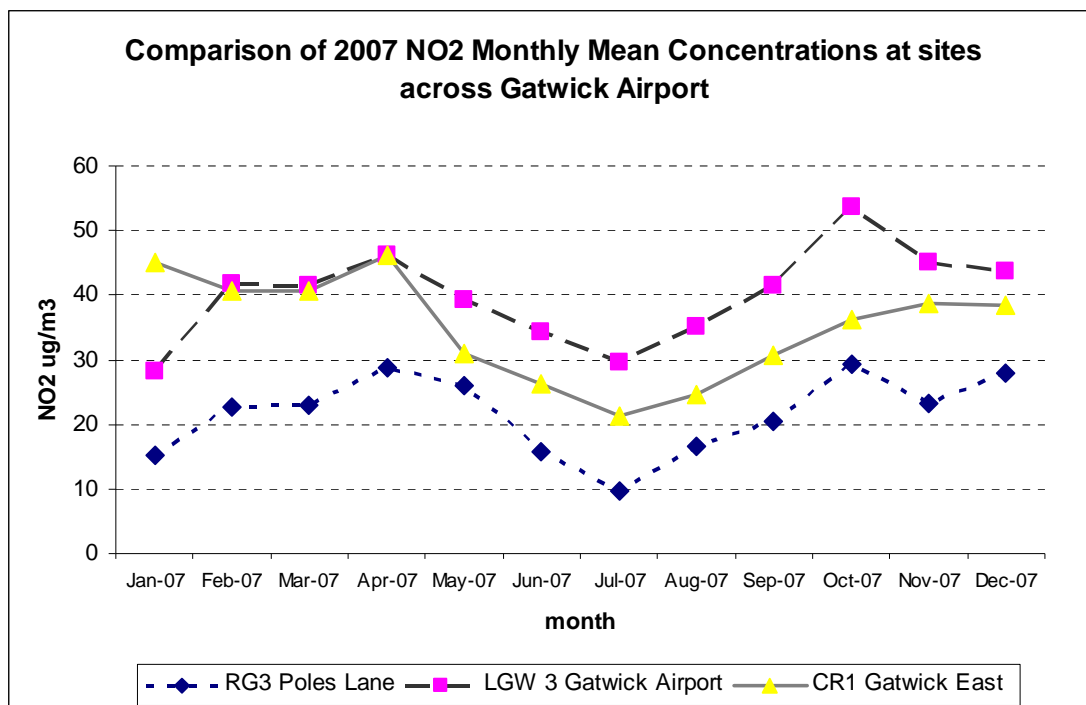
SITE	Data Capture	2007 Annual Mean	2010 Projected Annual Mean (using updated laqm year adjstmnt calculator with 2007 data)
<b>CR1 Gatwick East (Schlumberger Hse Balcombe Rd)</b>	95%	34.79	32.17
<b>LGW 3 Gatwick Airport (Perimeter Road East)</b> data supplied by BAA Gatwick	95%	39.58	36.60
<b>RG 1 Gatwick North (Michael Cres Horley Gdn Est)</b> data supplied by Reigate and Banstead Council	99%	28.73	26.57
<b>RG 2 Gatwick North (The Crescent Horley Gdn Est)</b> data supplied by Reigate and Banstead Council	96%	33.75	31.21
<b>RG3 Gatwick South (Poles Lane)</b> data supplied by Reigate and Banstead Council	99%	20.80	19.23

**Fig 10: Annual Mean NO<sub>2</sub> at Sites Across Gatwick 2007 and 2010**



The monthly mean concentrations for three of these sites in 2007 (Appendix 2, Table A2.6) are shown for comparison in Fig 11 below. The three sites (Fig 9) demonstrate the pollution profile across the airport. The lowest concentrations were recorded to the south of the airport at the Poles Lane site (RG3) in Crawley, the highest concentrations were recorded at the BAA on airport site (LGW3) to the north east of the runway, and the median concentrations recorded at the Gatwick East site (CR1) demonstrating a gradation in pollution concentration from south to north across the airport corresponding to the prevailing South westerly wind direction as well as a dilution effect with distance from the airport.

Fig 11: Comparison of 2007 Monthly Mean NO<sub>2</sub> at Sites Across Gatwick



Exceedences of the annual mean NO<sub>2</sub> objective were identified at two of the monitoring sites in Crawley: Tinsley Close, adjacent to the A2011 Crawley Ave dual carriage way, and at the roadside site on Crawley High Street, Bar Med.

- Tinsley Close is a residential site located close to a busy stretch of the A2011 dual carriageway between Hazelwick roundabout and junction 10 of the M23. The monitoring data for the site at Tinsley Close shows exceedences of the annual mean NO<sub>2</sub> objective of 40µg/m<sup>3</sup> in 2007. The projected levels for future years (2010) indicate that concentrations at this site are expected to remain high, approaching the limit, but not exceeding the objective. However, it is likely that the NO<sub>2</sub> objective will be exceeded at this site in 2008.

- There is no residential accommodation at the roadside site on Crawley High Street, therefore no relevant public exposure was expected at for the annual average NO<sub>2</sub> objective at this site. The indicator level at which a 1-hour NO<sub>2</sub> exceedence may occur is estimated to be 60µg/m<sup>3</sup> annual mean (Laxen and Marnier, July 2003). No exceedences of this level were recorded in 2007, the short term 1hr objective is not, therefore expected to be exceeded.

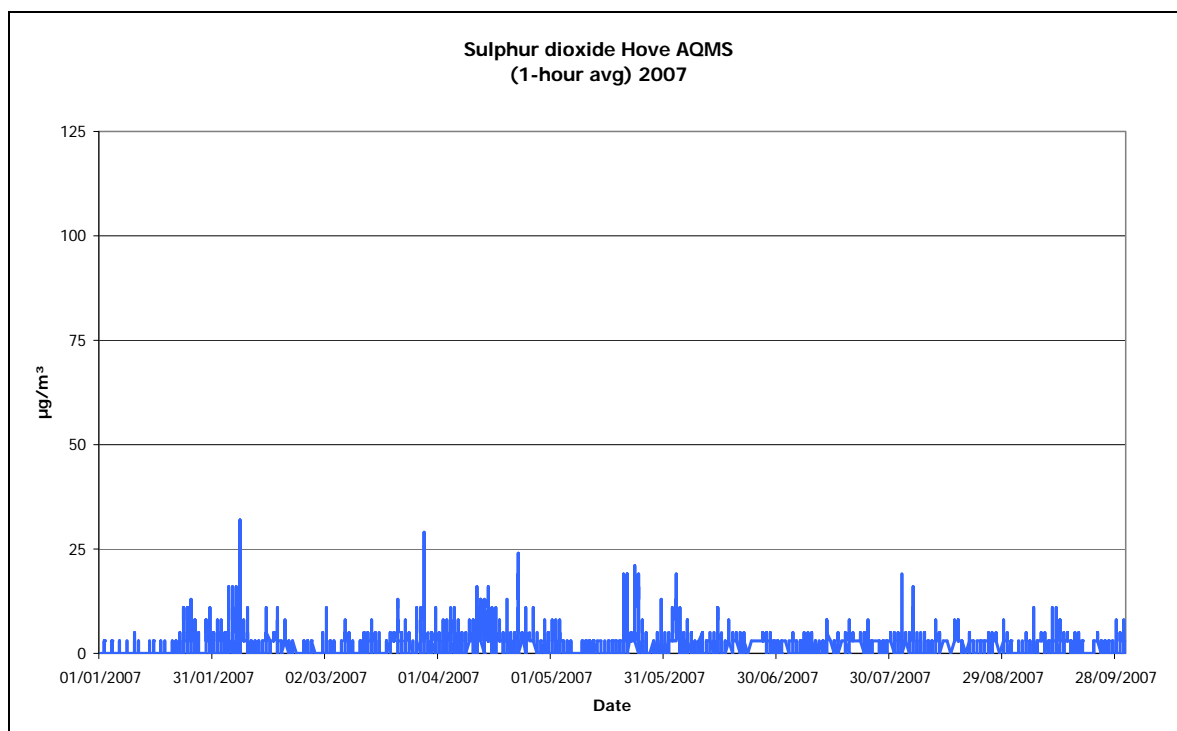
**Conclusion for Nitrogen Dioxide:** It is likely that the air quality objective for Nitrogen Dioxide will be exceeded in 2008 at the Tinsley Close Site. Since it is likely that there will be relevant public exposure at this site, it is recommended that a Further Assessment be undertaken in 2008 to determine whether an Air Quality Monitoring Area (AQMA) should be declared for this location

## 4.6 Updated data for sulphur dioxide (SO<sub>2</sub>)

Sulphur dioxide is an acute respiratory irritant, hence the short averaging time for its objective. The main source of sulphur dioxide in the UK is power stations, which accounted for more than 71% of emissions in 2000. There are also significant emissions from other industrial combustion sources. Domestic sources now only account for 4% of emissions, but can be locally much more significant. Road transport currently accounts for less than 1% of emissions (LAQM.TG03). Lists of major industrial processes, including combustion facilities, are given in **Appendix 6**.

Automatic sulphur dioxide monitoring is undertaken at two permanent stations in Sussex located in Hove (roadside) and Lullington Heath (rural). The 2005 - 06 data from the Hove AURN air quality station does not indicate any exceedence of the national objectives. The Hove AURN station was closed on 30<sup>th</sup> October 2007, therefore data is not complete for 2007.

**FIG 12: Sulphur Dioxide (Hove) 1 hr Mean 2007**



The guidance LAQM.TG03 asks local authorities to consider a number of different sources of sulphur dioxide: including domestic fuel burning, industrial combustion activities, road and rail transport and power stations.

No significant changes were identified in areas of domestic coal burning (areas of about 500 x 500 m with more than 100 houses burning solid fuel as their primary source of heating) in Crawley since the 2006 USA, and there has been no significant change in rail and road transport or in industrial sources of SO<sub>2</sub> since the last review.

In December 2006 Gatwick Airport was issued with a Permit under Section 1.1 of the Pollution Prevention and Control Regulations 2000 for a Part A installation to operate a power station(s). Large boiler plant (>5 MW<sub>thermal</sub>) can give rise to high short-term concentrations, with the risk that the 15-minute objective may be exceeded, however, although 5 out of the 22 combustion plant have a rated thermal input of >5MW, none of the boiler plant burns coal or fuel oil or has relevant public exposure. There are 20-30 standby generators located throughout the airport site that are used intermittently to generate electricity in the event of power fluctuations or failure. These appliances use diesel but none of these exceeds 1MW thermal input and none are associated with relevant public exposure.

**Conclusion for Sulphur Dioxide:** There are no significant Industrial domestic or transport sources of SO<sub>2</sub> in the borough and the Hove AURN air quality station has shown no exceedences of the air quality objective for sulphur dioxide in 2007 or the last 5years. It is therefore unlikely that the air quality objective for sulphur Dioxide will be exceeded in 2008 or in future years in Crawley

## 4.7 Updated data for Particulate Matter (PM<sub>10</sub>)

Particulate matter is of major health concern, as it has been linked with both increased morbidity and premature mortality. There is a wide range of emission sources that contribute to PM<sub>10</sub> concentrations in the UK. Research studies have confirmed that these sources can be divided into 3 main categories

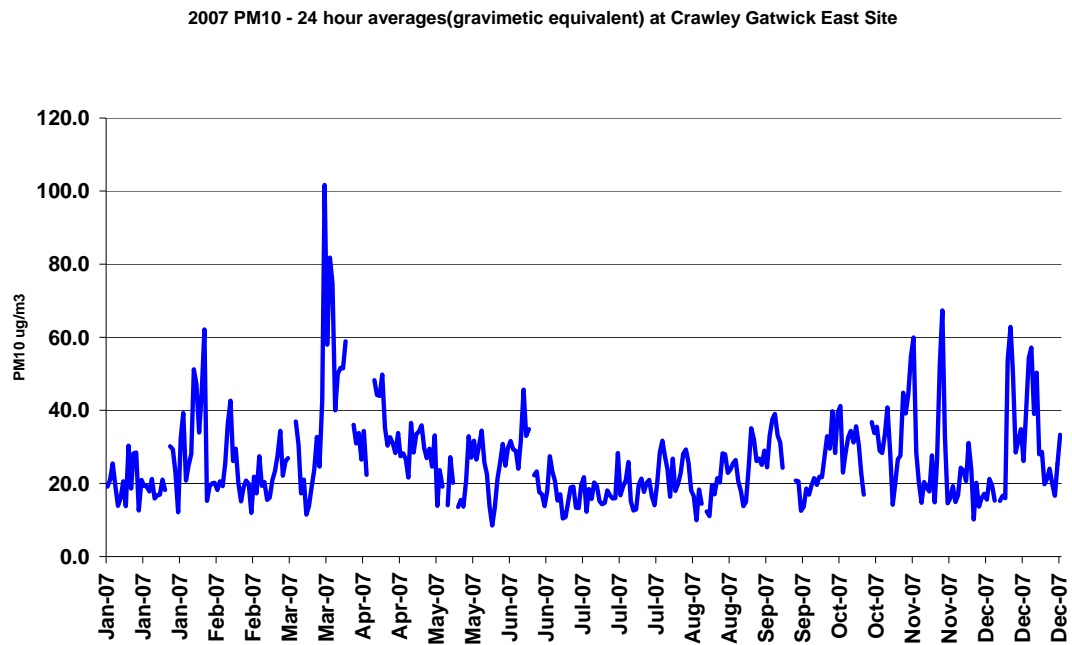
- *Primary particles:* these emissions are derived directly from combustion sources, including road traffic, power generation, industrial processes etc.
- *Secondary particles:* are formed by chemical reactions in the atmosphere, and comprise principally of sulphates and nitrates.
- *Residual particles:* previously referred to as the Coarse component, comprise of emissions from a wide range of sources, including re-suspended dusts from road traffic, construction works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles.

The guidance in LAQM.TG03 requires local authorities to consider a range of potential sources of PM<sub>10</sub>. In Crawley, there are only two known sources of PM<sub>10</sub> which could potentially result in exceedences of the air quality objective:

- One is the Railway Goods Yard on the industrial estate off Gatwick road, where there is the potential for dust fallout from aggregate stock piles. Modelling carried out by AEA Technology advised that housing (including domestic gardens) should not be developed within 80meters of the railway line (eastern border).The possible future North East Sector residential development of the land to the east of the goods yard was investigated during 2006/7, and in order to avoid future relevant public exposure at this location, it was agreed, with planning and the developers, that residential development would be restricted within 125 metres of the eastern border of the railway, adjacent to the goods yard. Following a public enquiry the plans for the development of the North East Sector were rejected and therefore at this stage there is no risk of relevant public exposure from this source of PM<sub>10</sub>.
- The other potential source of PM<sub>10</sub>, likely to result in relevant public exposure, was identified as being aircraft emissions from the Gatwick airport. A TEOM PM<sub>10</sub> monitor was relocated to the monitoring site on the eastern boundary of Gatwick Airport in 2005. There have been no exceedences of the AQ objectives at this site since monitoring began in 2005, or for the previous five years when monitoring was carried out at a background site in Crawley. The projected levels for 2010 PM<sub>10</sub> are also well below the annual mean AQ objective of 40µg/m<sup>3</sup>.

The 2007 24hour mean PM<sub>10</sub> concentrations for the Gatwick East TEOM monitoring site are shown graphically in **Fig 13** below.

**Fig 13: 2007 Daily Mean PM<sub>10</sub> concentrations at Gatwick East Site**

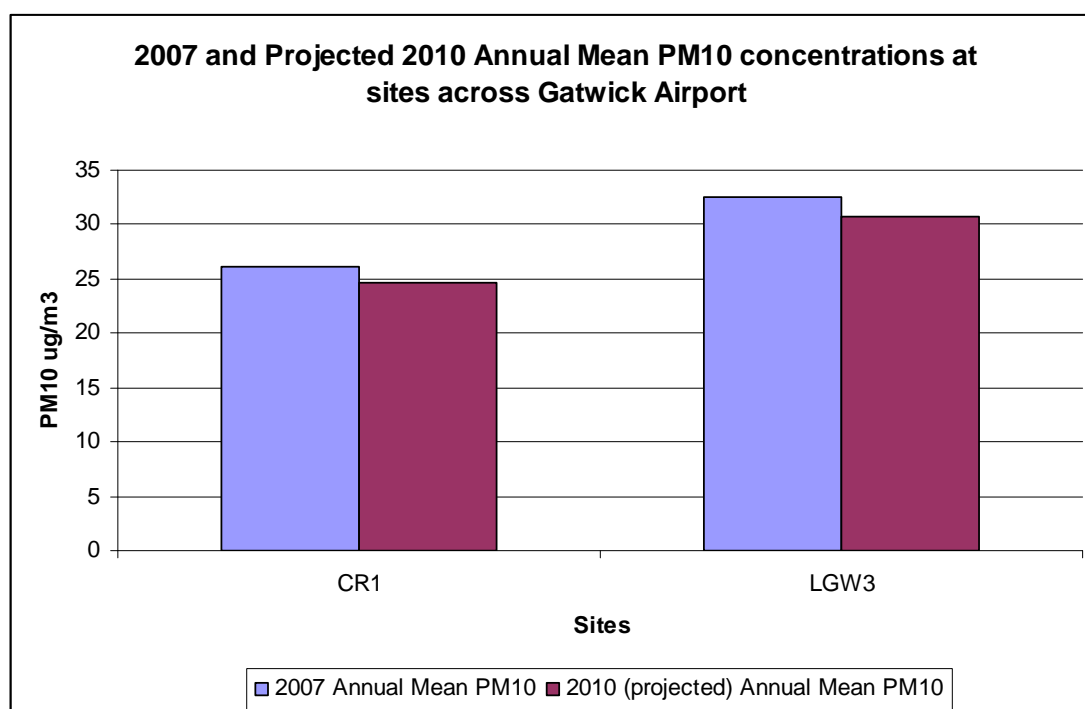


The annual mean 2007 and projected 2010 PM<sub>10</sub> concentrations for the TEOM continuous monitoring sites at Gatwick East (CR1) and the Gatwick Airport (LGW3) are presented in **Table 8** below. PM<sub>10</sub> concentrations are projected to 2010 using the updated laqm year adjustment calculator methodology (**Appendix 3 Tables A3.2 and A3.3**)

<b>Table 8 : 2007 and Projected 2010 Annual Mean PM<sub>10</sub> at Gatwick Sites</b>		
<b>Annual Mean µg/m<sup>3</sup></b>	<b>Gatwick East,Crawley (CR1)</b>	<b>Gatwick Airport, BAA (LGW3)</b>
2007	26.20	32.60
Projected 2010	24.71	30.71



**Fig 14: 2007 and Projected 2010 Annual Mean PM<sub>10</sub> concentrations at Gatwick Sites (CR1 and LGW3)**



The Sussex network contains 8 permanent automatic PM<sub>10</sub> monitoring stations (TEOM) For comparison, **Table 9** shows the averages for the PM<sub>10</sub> monitoring stations measured in gravimetric equivalent (TEOM x 1.3). No exceedences were shown at any of these sites during 2007

**Table 9 : 2007 Annual Mean PM<sub>10</sub> (gravimetric) for Sussex Sites**

Monitoring location	2007 Annual mean (40 µg/m <sup>3</sup> )	Exceedences of 24 hour mean (50 µg/m <sup>3</sup> not to be exceeded 35 times a year)
Crawley (Gatwick East)	26	18
Chichester	31	22
Eastbourne	25	12
Hastings	31	20
Horsham	27	11
Telscombe Cliffs	29	18
Lewes Town	31	25
Rother D. C	27	9

**Conclusion for PM<sub>10</sub>** : The annual mean air quality objective (40µg/m<sup>3</sup>) for PM<sub>10</sub> was not exceeded in Crawley in 2007 and the 24hr mean air quality objective (50µg/m<sup>3</sup>) was only exceeded 18 times (maximum allowable 35 exceedences per year). Projected PM<sub>10</sub> Concentrations for 2010 also showed no exceedences of the air quality objective. Measured values in Crawley were 26.20µg/m<sup>3</sup> well below the limit and were typical of other locations throughout Sussex. It is therefore unlikely that the air quality objective for PM<sub>10</sub> will be exceeded in 2008 or in future years in Crawley.

## 5. New Local Developments

New local developments, and any development changes with a potential to affect air quality in the Crawley area, are listed in **Table 10** below, so that they can be considered more thoroughly during the next full round of review and assessment. They include only those developments that are currently under construction or that have been granted planning permission or issued with a permit to operate under the Pollution Prevention and Control Regulations 2000.

The development itself may be the source of the air quality impact eg an industrial process which emits pollutants into the atmosphere or a development which results in increased traffic flows to the area. Alternatively, the development, once built, may be exposed to an air quality impact - for example housing developments that are built very close to busy road junctions or roads with very high traffic flows, resulting in poor air quality affecting the residents.

Future developments that have been identified in the West Sussex Structure Plan or the Local Development Framework, which may potentially impact on local air quality, or for which an Environmental Impact Assessment is being provided, are listed in **Table 11**

<b>Table 10: New Local Developments with Potential to Affect Air Quality in the Crawley</b>		
<b>New Development Type</b>	<b>Currently under development/planning permission granted</b>	<b>Potential Air Quality Impact</b>
<b>New Part A Process★</b>	Combustion Facility: Gatwick Airport	×
	Oil Storage Facility: EDF Energy Three Bridges	×
<b>New Part B Process★</b>	Dry Cleaning Premises in Crawley X 9	×
<b>New Retail/commercial Development</b>	Public Library: Crawley Town Centre	×
	New Fire Station Cheals Roundabout, Crawley Ave	×
<b>New Road Scheme</b>	×	×
<b>New Mineral Development</b>	×	×
<b>New Landfill Development</b>	×	×
<b>New Mixed Use Residential/Commercial Development</b>	Ifield Community College – redevelopment of site (to include 170 res units)	✓
	Pegler Way/Ifield Rd (to include 55 res units)	✓
<b>New Residential Development</b>	Telford Place, Southgate Ave Flats(350 units)	✓
	Woodfield Road/Northgate Ave/ Hazelwick Roundabout Flats (150 units)	✓
	Haslett Ave East/Old Leisure Centre Site flats/town hses (800units)	✓
	LucernDrive/Balcombe road Maidenbower – flats/town Hses (250units)	✓
	Stone Court, Balcombe Rd – flats/houses (120 units)	✓
	Old Forge/Balcome Rd mini roundabout – 3 houses	×
	Crawley Avenue/Tushmore Roundabout flats	✓
	Apple Tree Farm/Ifield Ave houses and flats 200 Units?	✓
	St Annes Close/St Catherines Rd - Houses	✓
	Rathlin Road, Bewbush Houses/flats (50 units)	×

★Part B/A2 Processes: The current list of Part A/B in Crawley are given in **Appendix 6**

<b>Table 11: Planned Local Developments that may affect Air Quality in the Crawley Area</b>			
<b>Development Type</b>	<b>Planning Framework</b>	<b>Location</b>	<b>Potential Air Quality Impact/EIA</b>
Retail	LDF(2007-2016)	Cross Keys East of High Street, Crawley	✓
	LDF(2007-2016)	Traders Market, High Street	✗
	LDF(2007-2016)	Town Centre North	✓(EIA)
Employment	LDF(2007-2016)	Manor Royal North Expansion	✓
	LDF(2007-2016)	County Oak Retail Park Westward Expansion	✓
	LDF(2007-2016)	Brunel Place, Southgate Ave – allocation for employment redevelopment	✓
Mixed Use(retail/ employment/ residential)	LDF(2007-2016)	Town Centre North	✓(EIA)
Mixed Use(commercial/ employment/ residential)	LDF(2007-2016)	Station Way,	✓
Mixed Use(station/ commercial/ retail/ residential)	LDF (20072016) (Due before 2011)	Three Bridges Station/ Three Bridges Corridor	✓(EIA)
Mixed Use (library/retail shops/housing)	LDF(2007-2016)	Telford Place(Comet ), Haslett Avenue	✓
Mixed Use (university/commercial/ residential)	LDF(2007-2016) (Not due before 2011)	Sussex University, Tilgate Park Site	✓(EIA)
Mixed Use (commercial/ employment/ residential)	LDF(2007-2016)	Dorsten Sq, Bewbush	✓
Residential	LDF(2007-2016)	North East Sector Neighbourhood (rejected –pending appeal)	✓(EIA)
	LDF(2007-2016)	Thomas Bennett School Site - houses/flats (200 units)	✓
	LDF(2007-2016)	West of Pegler Way (Southern Counties Garage Site) – flats (250 units)	✓
	LDF(2007-2016) WSSP(2001-16)	Joint Crawley/Horsham New Neighbourhood West of Bewbush houses/flats(2500 units)	✓(EIA)
Road Schemes	LTP	Relief road to serve new neighbourhoods	✓(EIA)

## **Gatwick Airport**

The Council currently does not support the growth of the airport beyond its single runway, two terminal capacity. However, in accordance with the Aviation White Paper, the Council has been required by BAA Gatwick to safeguard land for a wide-spaced second runway.

The Crawley Local Development Framework Core Strategy (2007) policies for Gatwick are based on the objectives:

- To ensure that the growth in business at the airport is associated with measures which limit its impact on the surrounding area.
- To ensure that land which may be required for future development at the airport is protected from development in accordance with Government policy

Crawley's local planning policies have, in recent years, linked growth of the airport to a Sustainable Development Strategy and associated legal agreement. These documents provide for a range of environmental and transport measures which, whilst supporting growth of airport business, are required to be undertaken to limit, and where appropriate, improve the adverse environmental impacts around the airport, such as air quality, noise and traffic congestion.

In the 2007 LDF Core Strategy, the airport development policy states:

Within the airport boundary, as set out on the proposals map, the Council will support the development of facilities which contribute to the safe and efficient operation of the airport as a single runway, two terminal airport subject to satisfactory environmental safeguards being in place. In assessing whether or not particular uses are appropriate within the airport, the Council will have regard to the advice in PPG13(Annexe B)

The Government White Paper: The future of Air Transport creates uncertainty over the long term future of Gatwick by identifying the need for additional runway capacity in the South East in the form of a second runway at Stanstead and, subject to environmental issues being addressed, a third runway at Heathrow. In the event that environmental issues at Heathrow cannot be resolved, then Gatwick is identified as the alternative airport for an additional runway. However, the White Paper accepts that action should not be taken to overturn the 1979 agreement between West Sussex County Council and BAA preventing construction of a second runway at Gatwick before 2019.

**Conclusion for New Local Developments:** Recent residential developments along busy commuter routes and within the town centre have been identified as having potential for air quality impacts and will need to be more closely examined during the next stage in the review and assessment process in 2009.

New diffusion tube monitoring sites for NO<sub>2</sub> will be established at these potential hot spots and updated traffic counts from West Sussex County Council will be needed to assist in the forthcoming DMRB assessments for the Updating and Screening Assessment in 2009.

## 6. Local Air Quality Strategy

The National Air Quality Strategy recognises that every local authority can make a contribution to continued improvements in air quality by the development of their own strategies. By developing and implementing local air quality strategies an integrated approach to air quality can be obtained.

The Sussex Air Quality Strategy (May 2007) sets out the current understanding of air quality in Sussex, describing the tools used to assess and monitor air quality, and how our actions affect air quality both beneficially and adversely. The document explains policies and actions currently in place to protect air quality and the possible “threats” to our current levels of air pollutants (housing allocations and associated infrastructure).

The aim of the document is to act as an Air Quality Strategy framework allowing each authority to adopt it and modify it according to their authority circumstances and role. The strategy will be reviewed and updated regularly to ensure it is in-line with current local, regional, UK and EU policy.

The guiding principles, Aims and Objectives are presented in **Tables 12-14** below:

### Table 12: Sussex Air Quality Strategy Guiding Principle

To promote and encourage the improvement of air quality throughout Sussex, to protect public health, quality of life and the environment.

### Table 13: Sussex Air Quality Strategy Aims

- To maximise the opportunities for improving air quality throughout Sussex.
- To engage in and respond to the development of local, regional, UK and EU air quality related legislation and strategies.
- To provide a framework for dealing with Sussex air quality issues in partnership with regional stakeholders.
- To ensure air quality is fully considered by public authorities when carrying out their functions and duties.
- To encourage air quality to be considered by residents, businesses and organisations when making decisions about their behaviour.
- To promote the importance of air quality as a determinant of public health and well being.
- To integrate air quality more widely into sustainability and climate change policies.



#### **Table 14: Sussex Air Quality Strategy Objectives**

In line with these aims, the Partnership has adopted the following objectives.

- Sussex-air will support local authorities in their duties under LAQM by:
- Continuing to engage the services of a suitably qualified and experienced project officer.
- Providing, through the project officer, air quality information, technical consultancy, project support and training,
- Continuing to negotiate centralised contracts for services, such as air quality data, forecasting, quality control and assurance of data,
- Developing and maintaining an Emissions Inventory for Sussex .
- Sussex-air will promote air quality by:
- Maintaining the Sussex-air website to a recognised high standard.
- Responding to national and regional consultation on air quality issues.
- Improving and expanding the “airALERT” system for persons sensitive to air pollution episodes.
- Developing an annual business plan of the Partnership's activities to be presented before and agreed by the Sussex Chief EHOs.
- Providing an air quality perspective on issues of national policy, such as climate change.
- Organising an annual seminar on air quality-related topics.
- Sussex-air will provide a framework for partnership working by:
- Arranging at least 6 meetings for member's throughout the year.
- Exploring and developing opportunities for air quality projects and funding involving members and other organisations, including those from the EU.
- Representing the Partnership at relevant meetings, seminars and conferences.

## 7. Planning and Policies

The land use planning system is recognised as playing an integral part in improving air quality [LAQM.PG (03)]. Crawley Borough Council has developed its planning policies and procedures to help ensure that planning applications that may have impacts on air quality are assessed appropriately against these policies.

The Crawley Local Plan covered the period from 2000 – 2006. One of the key issues this document addressed was that of the environment. It outlined the authority's approach to the relationship between planning and air quality and the ways of reducing pollution through its land use and transportation policies.

The Local Plan was replaced in 2007 by the Crawley Local Development Framework Core Strategy (LDF). However, as an overarching spatial document, the Core Strategy does not contain detailed development control policies. These remain as saved policies in the existing Local Plan 2000 or are covered elsewhere in the West Sussex Structure Plan.

These Aims, Objectives and Policies are presented in **Tables 15-17** below to demonstrate the Council's commitment to improving air quality through its Land use planning system:

### **Table 15: Crawley Local Plan Policy Aims**

In all its decisions as local Planning authority, the borough Council will attach great weight to protecting and improving the natural and built environment.... In particular, it will seek to protect environmental resources, minimise pollution and energy consumption.

### **Table 16: Crawley Local Plan Objectives**

#### **Local Plan Objective 3**

To promote, where necessary, the improvement of the environment

#### **Local Plan Objective 4**

To protect the overall quality of and standards in Crawley's environment

In order to achieve these aims and objectives the Crawley Local Plan outlines a number of General Design Policy Statements:

**Table 17: Crawley Local Plan General Design Policies:**

**Policy GD 16**

Whenever proposals are made for new developments in areas which suffer from:

- (i) Environmental pollution in excess of national standards
- (ii) Serious problems of fumes, dust and smells such that they greatly reduce the amenity of, or ability to use a development
- (iii) Serious hazard to health and public safety

The Council will, having regard to the latest advice, require measures to reduce or eliminate the effect of pollution or hazards on the development. If satisfactory measures cannot be taken and maintained, the proposed development may not be permitted.

**Policy GD 20**

The Council will not permit proposals which would lead to a significant increase in the level of pollution or hazards. Where necessary the Council will require details of the environmental implications of the development. If a proposal will have a material impact upon pollution levels or hazards which cannot be controlled or eliminated by other means, it will not be permitted

**Policy GD 21**

When considering proposals to extend or alter premises which are an existing source of environmental pollution or hazards to health and safety, the Council will, if it is appropriate, seek to ensure that any changes to the premises reduce pollution to, at least, nationally recommended standards.

**Policy GD 22**

The Council will follow the latest available statutory guidelines regarding the requirement for full, Environmental Impact Assessments of any development. The Council may, however, request details of the environmental implications of a development if it is deemed:

- (i) Appropriate, having regard to the possible impact a development may place upon the environment or infrastructure, on site or in the surrounding area; and
- (ii) Necessary to enable full and proper consideration of the proposal and whether it should receive consent.

## 8. Local Transport Plans and Strategies

West Sussex County Council is the Highway Authorities for the Crawley area and as such has responsibility for producing separate Local Transport Plans (LTP) which cover all roads, except the trunk roads. The first stage LTP covered the period April 2001 to 2006. The second cycle, LTP: The West Sussex Transport Plan was Published in March 2006 and covers the period 2006-16. The West Sussex Transport Plan set out the following key Objectives:

**Table 18: West Sussex Transport Plan Objectives**

- Reducing pollution
- Tackling congestion
- Achieving safer roads
- Delivering better accessibility to services and improving public transport

Protecting the environment includes reducing the growth in unsustainable travel and improving air quality. The LTP is designed to integrate transport planning with land use planning, health and social needs, which includes air quality. In doing this they outline how air quality considerations are taken account of in the wider plan and in the assessment of individual transport schemes. A more extensive list of strategies, policies and actions from the LTP, that contribute to air quality improvements is given in **Appendix 4**

Area Transport Plans have been developed within the context of the overarching West Sussex Transport Plan 2006-16. The Crawley Area Transport Plan ([www.westsussex.co.uk](http://www.westsussex.co.uk)) looks at all ways of travelling in the Borough. It explores the key issues and highlights the actions needed to make travelling in the borough easier, safer and better for the environment. The Plan looks at five key issues for Crawley:

**Table 19: The Crawley Area Transport Plan Key Issues**

- Public Transport
- Cycle and Pedestrian Network
- Congestion
- Parking
- Road Safety and Speeding

There are a number of key proposals for Crawley that are aimed at reducing pollution through reducing congestion and encouraging public transport:

- Further expansions to Fastway bus service to East Grinstead, with possible links to Park and Ride facilities.
- New major developments would be expected, where appropriate, to incorporate further extensions and connections to the Fastway bus service.
- A study of the A23 Gatwick/Crawley corridor for possible high quality public transport services.
- Major interchange improvements at Crawley Three Bridges and Gatwick railway stations.
- Environmental access controls
- Further development of the Crawley Cycle Network to include other vulnerable users eg walkers/equestrians where possible.
- Achievement of the Gatwick Airport Transport Strategy targets through working with BAA (Gatwick) and other transport agencies and authorities.
- Provision of suitable road network to support major residential development to the west of Crawley. Relief road to be constructed which will accommodate the transport generated by the new planned neighbourhood.

Transport plays a key role in everyday life, and properly planned transport can make a huge difference to an area and help achieve significant improvements in air quality.

Details of road traffic movements in Borough are collected by West Sussex County Council. Each district in the County has its own growth factor which can be used to convert traffic flows into predicted future flows, assuming that there is no local development nearby likely to increase traffic flows before this date. All councils within the County have been advised to use the high growth factor, which represents the worst case scenario. **Appendix 5 Table A5.1** lists the predicted traffic data for major road links in Crawley for 2005, 2008 and 2010. Traffic growth is presented graphically in **Fig A5.1** to show trends in growth from 1990 - 2008.



## Glossary

AADT	Annual Average Daily Traffic (vehicles per day)
AEOLIUSQ	Screening model for street canyons (Met Office)
APEG	Airborne Particles Expert Group
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CO	Carbon monoxide
COMEAP	Committee on the Medical Effects of Air Pollutants
DA	Detailed Assessment
DEFRA	Department for Environment Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges Screening Model
ESCC	East Sussex County Council
HDV	Heavy Duty Vehicles
LTP2	Local Transport Plan (Round 2, 2006 – 2011))
LAQM	Local Air Quality Management
mg/m <sup>3</sup>	Milligrams of the pollutant per cubic meter of air
µg/m <sup>3</sup>	Micrograms of the pollutant per cubic meter of air
ppb	Parts per billion
ppm	Parts per million
NAEI	National Atmospheric Emissions Inventory
NAQS	National Air Quality Strategy
NO	Nitrogen monoxide
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Oxides of nitrogen
PM <sub>10</sub>	Particles with diameter less than 10µm
PM <sub>2.5</sub>	Fine particles with diameter less than 2.5µm
QA/QC	Quality Assurance / Quality Control
R&A	Review and Assessment
SAQP/Sussex-air	Sussex Air Quality Partnership
SO <sub>2</sub>	Sulphur dioxide
TEOM	Tapered Element Oscillating Microbalance
USA	Updating and Screening Assessment
WSSC	West Sussex County Council

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- The Environment Act (1995)
- The Environmental Protection Act (1990)
- Local Transport Plan: The West Sussex Transport Plan 2006-2016
- The Crawley Area Transport Plan 2006
- Crawley Borough Local Development Framework Core Strategy 2007



## **Statutory Consultees**

Under Part IV of the Environment Act 1995, all Local Authorities are required to consult on their air quality review and assessment with the Environment Agency and the local Highway Authority. Through the Sussex Air Quality Steering Group both of these bodies have been involved since the early stages of the air quality management process, and will be made fully aware of Council's air quality review and assessment. Crawley Borough Council will send out full or summarised copies of this Detailed Assessment to:

Department of the Environment, Food and Rural Affairs  
Government Office for the South East  
Sussex Air Quality Steering Group  
Neighbouring Local Authorities  
The Local Health Authority  
Environment Agency  
Highways Authority  
West Sussex County Council

Comments on this report are welcome and can be sent to the contact details listed below:

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## APPENDIX I

### Monitoring Data – QA/QC and Ratification

#### NO<sub>2</sub> Real Time Data (Chemiluminescent Analyser)

The Gatwick automatic monitoring station has been operating an NO<sub>2</sub> chemiluminescent analyser since June 2004 and a PM<sub>10</sub> TEOM monitor since April 2005. All automatic monitoring data is managed under contract with Kings College London Environmental Research Group (ERG) and validated against local site operators calibration results, in addition ERG ratify the data sets after 6 monthly services and provide SAQP members with fully QA/QC ratified data set. For the TEOM, an adjustment factor of 1.3 has been applied to estimate the gravimetric equivalent concentration.

The analysers used for review and assessment are of the approved type as recommended in LAQM TG1 (00) Review and assessment; Monitoring air quality and LAQM TG4 (00) Review and assessment; Pollutant specific guidance. The Council's continuous analysers are operated and run by officers trained to carry out routine site operations and field calibrations. Data ratification is carried out by ERG.

The QA/QC methodology for the equipment servicing and maintenance regimes for the continuous analysers at the Gatwick East site is shown in **Table A1.1** below:

**Table A1.1 QA/QC Equipment Servicing and Maintenance NO<sub>2</sub> Analyser Gatwick East Site**

- The Council's continuous analysers have a planned maintenance schedule that broadly follows those assigned to the AURN and affiliated site network.
- All analysers are maintained following manufacturers' instructions and have six monthly full service and re-calibration conducted under servicing contract. Results of the servicing, calibrations and repairs are fully documented and stored centrally.
- Routine maintenance of equipment is also conducted during regular two-weekly site visits where all associated equipment such as sample lines, modem, electrical system are examined and sample inlet filters are changed. Any faults, repairs or changes made to the equipment are also recorded and stored centrally.
- The calibration procedures for the Council's continuous analysers, includes a two point zero/span calibration check being performed at regular intervals of two weeks.
- The methodology for the calibration procedure is derived from the manufacturers' instruction handbooks and from the AURN Site Operator's Manuals.

### **NO<sub>2</sub> Diffusion Tube Data**

All diffusive monitoring data have been ratified following the methods described in LAQM.TG(03). A quality assurance/quality control (QA/QC) programme including field duplicates and blanks, and instrument calibration with standard gases has been followed (AEAT, 2000). The NO<sub>2</sub> diffusion tube analysis for 2007 was carried out and analysed by Bristol Scientific Services. The NO<sub>2</sub> tube preparation method used is 20% triethanolamine (TEA) in water.

A diffusion tube/automatic analyser collocation study was carried out at the Gatwick East site in Crawley. Triplicate tubes (prepared and analysed by Bristol Scientific Services) were located next to the inlet of the analyser during 4-week periods throughout 2007. Using the results of this study the 2007 bias correction for Crawley (Gatwick East) was calculated using the LAQM.TG(03) method described in Box 6.4 (Table A2.1) to be 1.03.

The QA/QC methodology and criteria for Bristol Scientific Services analysis of the NO<sub>2</sub> diffusion tube data is shown in **Table A1.2** below:

**Table A1.2 QA/QC Bristol Scientific Services Diffusion Tube Analysis**

- Bristol City Council Scientific Services participates in the Workplace Analysis Scheme for Proficiency (WASP) for nitrogen dioxide. The latest WASP report for nitrogen dioxide for the laboratory indicated a performance classification of “Good” and ranked the laboratory first from thirty- one other laboratories.
- In the case of nitrogen dioxide analysis the laboratory also analyses a solution supplied by AEA Technology Environment as part of the QA\QC scheme that they run. Results are returned to AEA Technology on a monthly basis. The laboratory also participates in occasional field comparison exercises again run by AEA Technology Environment.
- Reference materials and equipment are obtained from suppliers who are approved to BS EN 9001. All reference materials are of at least analytical grade or equivalent. Standards are prepared using equipment that is all within the normal quality system.
- Each nitrogen dioxide tube is prepared by pipetting 30µl of a solution of 20% triethanolamine in water onto the metal grids in the end cap, then assembling the tube components. A fresh batch of tubes is prepared each month ready to dispatch in time for the required exposure date.
- Laboratory blanks are retained so that at least one is run alongside each batch of samples.
- Travel blanks are supplied three-monthly as required by the U.K. Survey procedure.

## APPENDIX 2

### Air Quality Monitoring Data For NO<sub>2</sub>

Diffusion tube monitoring has inherent errors. In order to minimise these, a bias-adjustment factor is applied to the results. This factor is obtained by collocating three diffusion tubes for a year at a continuous monitoring site. The average values from the monthly exposed tubes are then compared directly to the corresponding continuously monitored values. The University of West of England (UWE) gathered together the various UK collocation study results, and from these calculated the mean value, for each laboratory. The Bristol Scientific Services and the locally derived bias factor are shown in **Table A2.1** below.

<b>Table A2.1 LAQM TG(03) Box 6.4: Bias Correction Factor for NO<sub>2</sub> diffusion Tube data</b>	
<b>D<sub>m</sub></b> Co-location Diffusion Tube Annual Mean	D <sub>m</sub> = 33.90 µg/m <sup>3</sup>
<b>C<sub>m</sub></b> Chemiluminescence Annual Mean	C <sub>m</sub> = 34.79 µg/m <sup>3</sup>
<b>A</b> Bias Adjustment Factor (C <sub>m</sub> /D <sub>m</sub> )	C <sub>m</sub> /D <sub>m</sub> = 34.79/33.90 <b>A = 1.03</b>
<b>Bristol Scientific Services Bias Correction Factor for 2007</b>	
<b>A = 0.77</b>	
<a href="http://www.uwe.ac.uk/aqm-review-diffusiontube230408.xls.url">http--www.uwe.ac.uk-aqm-review-diffusiontube230408.xls.url</a>	

In order to project monitored NO<sub>2</sub> concentrations to the year 2010 the annual average value for the 2007 data is multiplied by the correction factor for that year divided by the correction factor for the year 2010

<b>Table A2.2 Updated LAQM (Tools website 2006) Correction Factors to Estimate Annual Average NO<sub>2</sub> Concentrations in 2010 from Measured data at Background Sites</b>	
Year	Correction Factor
2000	1.14
2001	1.10
2002	1.05
2003	1.02
2004	1.00
2005	0.98
2006	0.96
2007	0.93
2008	0.91
2009	0.88
2010	0.86

Using this methodology, the projected 2010 Annual Average NO<sub>2</sub> for the monitoring sites throughout Crawley were calculated. The results are shown in the Tables A2.3 – A2.5 below.

<b>Table A2.3 NO<sub>2</sub> Diffusion Tube Data Projected to 2010 (LAQM TG) for Sensitive Receptors for Gatwick</b>			
<b>Site</b>	<b>Annual Average NO<sub>2</sub> 2007(Bias Corrected) µg/m<sup>3</sup>.</b>	<b>Correction Factor for 2010</b>	<b>Projected Annual average NO<sub>2</sub> for 2010 (µg/m<sup>3</sup>)</b>
Lynhurst Cottage	36.36	0.86/0.93	<b>33.62</b>
Charlwood Nursery	24.61	0.86/0.93	<b>22.75</b>
Rowley Cottage	29.46	0.86/0.93	<b>27.24</b>
Balcombe Road	32.96	0.86/0.93	<b>30.48</b>
Steers Lane	28.63	0.86/0.93	<b>26.48</b>

<b>Table A2.4 NO<sub>2</sub> Diffusion Tube Data Projected to 2010 (LAQM TG) for Background sites in Crawley</b>			
<b>Site</b>	<b>Annual Average NO<sub>2</sub> 2007(Bias Corrected) µg/m<sup>3</sup>.</b>	<b>Correction Factor for 2010</b>	<b>Projected Annual average NO<sub>2</sub> for 2010 (µg/m<sup>3</sup>)</b>
Birch Lea	33.48	0.86/0.93	<b>30.96</b>
Headley Close	32.75	0.86/0.93	<b>30.28</b>
Bar Med High Street	44.53	0.86/0.93	<b>41.18</b>
Tinsley Close(fence)	42.64	0.86/0.93	<b>39.43</b>
Furnace Farm Road	27.09	0.86/0.93	<b>25.05</b>

<b>Table A2.5 NO<sub>2</sub> Data 2007 and Projected to 2010 (LAQM TG) for Sites across Gatwick</b>			
<b>Site</b>	<b>Annual Average NO<sub>2</sub> 2007(Bias Corrected) µg/m<sup>3</sup>.</b>	<b>Correction Factor for 2010</b>	<b>Projected Annual average NO<sub>2</sub> for 2010 (µg/m<sup>3</sup>)</b>
Gatwick East Diffusion Tube Data			
Tube 1	33.68	0.86/0.93	31.14
Tube 2	34.30	0.86/0.93	31.72
Tube 3	36.77	0.86/0.93	34.00
Mean T1+T2+T3	34.92	0.86/0.93	<b>32.29</b>
Gatwick East CR 1 (Schlumberger Hse, Balcombe rd)	34.79	0.86/0.93	<b>32.17</b>
Gatwick Airport LGW3 (Perimeter Road East)	39.58	0.86/0.93	<b>36.60</b>
Gatwick North RG 1 (Michael Crescent Horley Gdns Est)	28.73	0.86/0.93	<b>26.57</b>
Gatwick North RG 2 (The Crescent, Horley Gdns Est)	33.75	0.86/0.93	<b>31.21</b>
Gatwick South RG 3 (Poles Lane)	20.80	0.86/0.93	<b>19.23</b>

<b>Table A2.6 Comparison of 2007 Monthly Mean NO<sub>2</sub> Data for Continuous Monitors across Gatwick</b>			
<b>Month</b>	<b>Gatwick South (RG3)</b>	<b>Gatwck Airport(LGW3)</b>	<b>Gatwick East (CR1)</b>
January	15.28	28.33	44.99
February	22.68	41.64	40.68
March	22.85	41.42	40.53
April	28.70	46.30	46.23
May	26.09	39.35	30.84
June	15.89	34.31	26.36
July	9.62	29.67	21.16
August	16.65	35.23	24.67
September	20.52	41.39	30.62
October	29.37	53.57	36.21
November	23.33	45.02	38.80
December	27.92	43.71	38.40



## APPENDIX 3

### Air Quality Monitoring Data For PM<sub>10</sub>

An approach to adjusting measured annual mean PM<sub>10</sub> data forwards to 2010 is set out in LAQM TG(03) **Boxes 8.6**. This method has been updated to use the new fixed residual component value of 5.8 µg/m<sup>3</sup> (previously described as the coarse component) and **box 8.7** is no longer valid having been replaced by a new Year Adjustment spreadsheet tool available on the laqm/tools web site:

The contribution from different PM<sub>10</sub> sources will not remain constant between the current year and 2010. It is therefore not appropriate to apply a single correction factor to measured data in the current year, to estimate concentrations in the future year.

The data must first be divided into the separate source categories (“primary”, “secondary” and “residual”) and treated separately. Only the primary component is important in terms of local emissions – the secondary and residual components can therefore be removed and added back once future predictions from local primary sources have been performed.

**Table A3.1 Correction factors to estimate secondary PM<sub>10</sub> and primary combustion PM<sub>10</sub> concentrations in future years (Updated 2006 laqm/tools website)**

Year	Correction factor to be applied	
	Secondary PM <sub>10</sub> <sup>(a)</sup>	Primary combustion PM <sub>10</sub>
2004	1.00	1.00
2005	0.98	1.02
2006	0.95	1.00
2007	0.93	0.98
2008	0.90	0.96
2009	0.88	0.94
2010	0.85	0.92
2011	0.84	0.91
2012	0.82	0.90
2013	0.81	0.89

Background PM<sub>10</sub> monitoring data was available from the Crawley, Gatwick East (CR1) site and the BAA Gatwick Airport (LGW3) site for calendar year 2007. This was used to project forward to calculate the background levels of PM<sub>10</sub> in 2010.

The method for calculating the PM<sub>10</sub> concentration in future years is given in Box 8.6 (updated by laqm/tools website FAQ 2006). Tables A3.2 and A3.3 below present each step of this methodology for calculating 2010 PM<sub>10</sub> concentrations using data from the PM<sub>10</sub> TEOM monitors at the Crawley, Gatwick East (CR1) and the BAA Gatwick Airport (LGW 3) sites.

<b>Table A3.2: Estimated 2010 Annual Average PM<sub>10</sub> for Gatwick East Site(CR1)</b>	
<b>Method</b>	<b>Calculation</b>
<b>Step 1:</b> Adjust the TEOM data to estimate gravimetric values by multiplying by 1.3	<b>[CG<sub>2007</sub>] = [CT<sub>2007</sub>] × 1.3 = 26.20 µg/m<sup>3</sup></b>
<b>Step 2:</b> Derive the local secondary PM <sub>10</sub> concentration from the updated internet maps for base year 2004[Csec <sub>2004</sub> ]	<b>[Csec<sub>2004</sub>] = 10.80 µg/m<sup>3</sup></b>
<b>Step 3:</b> Estimate the local secondary PM <sub>10</sub> concentration in 2007 [Csec <sub>2007</sub> ] using the updated correction factors from laqm tools	<b>[Csec<sub>2007</sub>] = [Csec<sub>2004</sub>] × 0.93 = 10.04µg/m<sup>3</sup></b>
<b>Step 4:</b> Estimate the local primary PM <sub>10</sub> concentration in 2007 [Cprim <sub>2007</sub> ] by subtracting the 2007 secondary concentration and the PM <sub>10</sub> residual component( assumed to be 5.80µg/m <sup>3</sup> gravimetric) from the measured PM <sub>10</sub> concentration	<b>[Cprim<sub>2007</sub>] = [CG<sub>2007</sub>] - [Csec<sub>2007</sub>] - 5.8 = 10.36µg/m<sup>3</sup></b>
<b>Step 5:</b> Adjust the local primary PM <sub>10</sub> concentration in 2007 to the future year of interest using the updated correction factors from laqm tools	<b>[Cprim<sub>2010</sub>] = [Cprim<sub>2007</sub>] × (0.92/0.98) = 9.73µg/m<sup>3</sup></b>
<b>Step 6:</b> Calculate the secondary PM <sub>10</sub> in the same future year using the updated correction factors from laqm tools	<b>[Csec<sub>2010</sub>] = [Csec<sub>2004</sub>] × 0.85 = 9.18µg/m<sup>3</sup></b>
<b>Step 7:</b> Calculate the total estimated PM <sub>10</sub> concentration 2010 by adding the components together	<b>[CT<sub>2010</sub>] = [Cprim<sub>2010</sub>] + [Csec<sub>2010</sub>] + 5.8µg/m<sup>3</sup> = 24.71µg/m<sup>3</sup></b>
<b>Projected PM<sub>10</sub> Concentration in 2010 at Crawley Gatwick East Site</b>	<b>2010 PM<sub>10</sub> Concentration = 24.71µg/m<sup>3</sup></b>

<b>Table A3.3: Table A3.2: Estimated 2010 Annual Average PM<sub>10</sub> for BAA, Gatwick Airport (LGW 3)</b>	
<b>Method</b>	<b>Calculation</b>
<b>Step 1:</b> Adjust the TEOM data to estimate gravimetric values by multiplying by 1.3	<b>[CG<sub>2007</sub>] = [CT<sub>2007</sub>] × 1.3 = 32.60 µg/m<sup>3</sup></b>
<b>Step 2:</b> Derive the local secondary PM <sub>10</sub> concentration from the updated internet maps for base year 2004[Csec <sub>2004</sub> ]	<b>[Csec<sub>2004</sub>] = 10.80 µg/m<sup>3</sup></b>
<b>Step 3:</b> Estimate the local secondary PM <sub>10</sub> concentration in 2007 [Csec <sub>2007</sub> ] using the updated correction factors from laqm tools	<b>[Csec<sub>2007</sub>] = [Csec<sub>2004</sub>] × 0.93 = 10.04µg/m<sup>3</sup></b>
<b>Step 4:</b> Estimate the local primary PM <sub>10</sub> concentration in 2007 [Cprim <sub>2007</sub> ] by subtracting the 2007 secondary concentration and the PM <sub>10</sub> residual component( assumed to be 5.80µg/m <sup>3</sup> gravimetric) from the measured PM <sub>10</sub> concentration	<b>[Cprim<sub>2007</sub>] = [CG<sub>2007</sub>] - [Csec<sub>2007</sub>] - 5.8 = 16.76µg/m<sup>3</sup></b>
<b>Step 5:</b> Adjust the local primary PM <sub>10</sub> concentration in 2007 to the future year of interest using the updated correction factors from laqm tools	<b>[Cprim<sub>2010</sub>] = [Cprim<sub>2007</sub>] × (0.92/0.98) = 15.73µg/m<sup>3</sup></b>
<b>Step 6:</b> Calculate the secondary PM <sub>10</sub> in the same future year using the updated correction factors from laqm tools	<b>[Csec<sub>2010</sub>] = [Csec<sub>2004</sub>] × 0.85 = 9.18µg/m<sup>3</sup></b>
<b>Step 7:</b> Calculate the total estimated PM <sub>10</sub> concentration 2010 by adding the components together	<b>[CT<sub>2010</sub>] = [Cprim<sub>2010</sub>] + [Csec<sub>2010</sub>] + 5.8µg/m<sup>3</sup> = 30.71µg/m<sup>3</sup></b>
<b>Projected PM<sub>10</sub> Concentration in 2010 at BAA Gatwick Airport Site</b>	<b>2010 PM<sub>10</sub> Concentration = 30.71µg/m<sup>3</sup></b>

## APPENDIX 4

### Local Transport Plans and Air Quality Improvements

**Table A4.1 Local Transport Plans Contribution to Air Quality Improvements (Other Than Specific Air Quality Strategy/Air Quality Action Plan actions).**

- Encourage higher levels of walking & cycling
- Reduce speed limits through villages
- Improving air quality through reducing congestion & promoting sustainable transport choices
- (Achievement of AQ standards – see AQ Strategy)
- Promotion (internally & externally of cleaner fuels
- Promotion of sustainable travel through school and business travel plans (encouraging walking, cycling, public transport use and car sharing)
- Health promotion & links with “Healthy Schools” programme
- Provision of transport to access health facilities

*(Main 2006 LTP p16)*

- Developing pedestrian routes that are more pleasant & safer
- Cycle schemes
- Walking schemes & better pedestrian access to facilities etc.
- Safer routes to school
- Maximise environmental contributions from schemes (though design etc.)
- General travel awareness schemes (Travelwise)
- Improve accessibility for people to local services, rail stations, bus stations & bus stops
- Encourage use of local facilities such as shops & post offices especially in rural & suburban locations
- Reduce the need to travel and transport goods by encouraging the purchase of local products

*(Main LTP p82)*

- Gatwick Transport Strategy
- Demand Management measures – town centres
- Increasing travel choice

- Efficient use of the transport network e.g. Intelligent Transport Systems (VMS etc.) Traffic information centre (inc. real time info)
- Freight strategy - delivery & transport innovations
- Coastal Expressway and enlarged Crawley Fastway
- Parking Strategies and controls
- Additional bus and rail services
- Demand responsive bus & taxi services expanded
- Accessibility by non car modes
- Accessibility for walkers cyclists/horse riders directly from built up areas avoiding need to travel first.
- Personal journey planning & marketing
- Motorcycling (PTW) policy on reducing congestion – cleaner PTWS coming forward
- Safer roads, safer routes to school, pedestrian & cycle training at schools (improves confidence in walking/cycling), speed management, separation of pedestrian from road traffic (inc. other non parallel routes), traffic management benefiting non polluting modes
- Accessibility and disadvantaged communities (air quality traffic congestion and road safety are closely linked to this)
- Congestion reduction on major routes and town centres (measured - see targets LTP2, LTP4, and LTP6 on area wide and urban traffic in flow and mode share of journeys to school and work)
- Rights of way improvement plan. (Improvements that will allow easy attractive access to local destinations by foot in urban or rural areas.

Integrated Transport Measures which will benefit Air Quality in West Sussex (*from LTP table 7.10*)

- Minor Network Efficiency Schemes (indirectly)
- Shoreham Harbour Access Schemes (minor)
- Pupil concessionary fare scheme (indirectly)
- Pilot School Bus Scheme (indirectly)
- All schools to have stage 1 Travel Plan
- School travel advisory scheme (indirectly)
- Purchase of vehicles (indirectly)
- Traffic & air quality data collection

- Coastal Expressway
- Public transport marketing
- Personalised travel planning
- Travel plan development and promotion
- School travelwise programme
- AQMA remedial schemes (action plans – set up & development)
- AQMA actions – running and maintenance

**Other measures which could make a difference (*in table - appendix 7*)**

- Environmental Access Control (Chichester initially)
- Decriminalised Parking Enforcement Programme
- Car park VMS – Chichester (reduces drive round pollution)
- Rail improvements
- Horsham Park & Ride improvements
- Chichester Park & Ride
- Worthing P&R
- Traffic & information control centre
- Real time bus information
- Bus priority measures (Worthing, Chichester)
- Bus/Rail major interchange improvements
- Completion of major cycle networks (Removal of small gaps to produce through routes increased cycle use significantly & encourages modal shift)
- Haywards Heath, Worthing & Shoreham town centre pedestrian enhancements (plus other locations), Also footway, lighting and pedestrian signing improvements all of which will encourage walking and modal shift & reduced pollution.
- Accessibility improvements to existing non-private car mode schemes.

## APPENDIX 5

### Traffic Flows and Traffic Growth in Crawley

Busy roads or junctions, with more than 10,000 vehicles per day, or high proportion of buses/HGVs (a possible significant source of NO<sub>2</sub> and PM<sub>10</sub>) need to be considered alongside new residential developments in the vicinity. Those road sections that fall into the above categories are listed in Table A5.1 below.

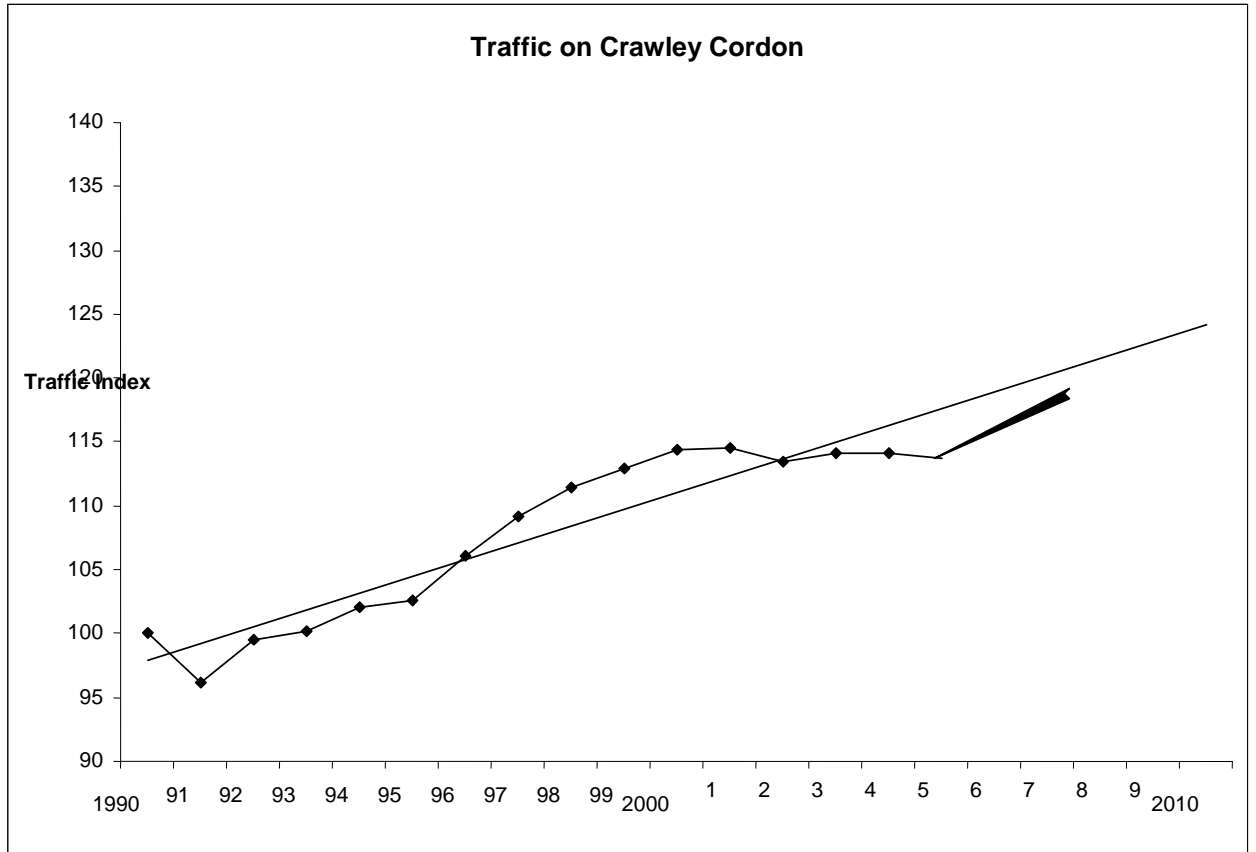
<b>CBC Description</b>	<b>2005 Traffic Count (Two way flow)</b>	<b>2008 Traffic Count (adjusted using WSCC TEMPRO growth factors 4% since 2005)</b>	<b>2010 Traffic Count (adjusted using WSCC TEMPRO growth factors 6.7% since 2005)</b>
M23 Spur Link to Gatwick Airport	56,360	58,614	60,136
M23 between Junctions 9/10	101,421	105,478	108,216
M23 between J10 and J10A	86,498	85,958	92,294
M23 between J10A and J11	77,680	80,787	82,885
A2011 Crawley Ave, East of Hazelwick Roundabout	32,373	33,668	34,542
A264 South West Bypass	38,340	39,874	40,909
A264 Horsham Road, west of roundabout with SW Bypass	40,380	41,995	43,085
A23 Crawley Ave, Gossips Green Stretch, north of A2220	28,792	29,994	30,721
A2011 Crawley Ave, west of junction 10 of M23	31,772	33,642	33,901
A23 Crawley Ave, west of Tushmore Roundabout	29,597	30,781	31,580
A23 Crawley Ave, north of Tushmore Roundabout	31,300	32,552	33,397
A23 Brighton Road, Pease Pottage to Broadfield Stadium	21,214	22,062	22,635
A2220 Horsham Road, east of Bewbush Roundabout	21,556	22,418	23,000
A23 London Road, north of County Oak Roundabout	24,488	25,468	26,129
A2004 Southgate Avenue	18,854	19,608	20,117
A2011 Crawley Ave, Between Tushmore/Hazelwick R'bouts	19,065	19,828	20,342
A23 Crawley Ave Broadfield Playing Field Stretch	17,486	18,185	18,657
B2036 Balcombe Road – North of Worth Park Avenue	16,700	17,368	17,819
A2220 Haslett Avenue East	24,165	25,132	25,784
A2219 London road, south of Tushmore Roundabout	19,554	20,336	20,864
A2204 Northgate Avenue	13,344	13,878	14,238
A2219 Pegler Way	8,986	9,345	9,588
A2219 The High Street	8,197	8,525	8,746
Gatwick Road, Beehive, north of roundabout	16,052	16,694	17,127

The traffic flow data presented below in Table A5.2 is based on estimation using TEMPRO growth factors on previous years data (rather than new traffic counts). It is provided to indicate trends only and should not be taken as accurate current traffic counts.

<b>Table A5.2 Growth Factors for AADT Flows in Crawley 1990-2008 (estimated) (All Flows are 24hr, two-way, AADT)</b>		
<b>YEAR</b>	<b>INDEX</b>	<b>AADT</b>
1990	100	158956
1991	96	152830
1992	99	158150
1993	100	159208
1994	102	162260
1995	103	163173
1996	106	168667
1997	109	173437
1998	111	177173
1999	113	179444
2000	114	181926
2001	115	182117
2002	113	180339
2003	114	181354
2004	114	181511
2005	114	180719
2006	114	181160
2008	118	187948



**Fig A5.1 TRAFFIC GROWTH IN CRAWLEY 1990 - 2008** (WSCC Transport Strategy: Traffic Growth in West Sussex 1990 -2010)



## APPENDIX 6

### Industrial Processes

**Table A6.1 Part A Processes in Crawley**

Process Type	Operator	Address
Oil Storage Facility	EDF Energy Networks Ltd	Three Bridges Grid Substation, Stephenson Way, Crawley RH10 1GD
Combustion Facility	Gatwick Airport Ltd	Gatwick Airport, Crawley, West Sussex, RH6 0NP

**Table A6.2 Part B Processes in Crawley**

Process Type	Operator	Address
Timber Treatment	Komfort Systems Ltd	Units 1-10 Whittle Way, Crawley
Bulk Handling of Cement	RMC South East	Tinsley Lane Goods Yard, Gatwick Road, Crawley
Roadstone Coating	Aggregate Industries UK Ltd	Gatwick Road Industrial Estate, Crawley
Crematoria	The Crematoria Company	Surrey and Sussex Crematorium, Forge Wood, Balcombe Road, Crawley
Bulk Handling of Cement	Hanson Aggregates Ltd	Stephenson Place, Three Bridges, Crawley
Coating (Respraying of Road Vehicles)	Crawley Down Ltd	37-45 East Park, Crawley
Coating (Respraying of Road Vehicles)	UK Assistance Accident Repair	Site B, Maidenbower Business Park, Balcombe Road, Crawley
Service Station	Sainsbury's Supermarket Ltd	Crawley Avenue, Crawley
Service Station	BP Oil UK Ltd	County Oak, London Rd, Crawley
Service Station	TCS Total Oil Great Britain Ltd	Ifield Drive, Crawley
Service Station	Tesco Stores Ltd	Hazlewick Ave, Three Bridges, Crawley
Service Station	TCS Total Oil Great Britain Ltd	Pelham Place Broadfield, Crawley
Service Station	BP Express Shopping Ltd	Ring Rd North, Gatwick, Crawley
Service Station	BP Express Shopping Ltd	Longbridge Way Gatwick, Crawley
Service Station	Somerfield	Balcombe Road, Crawley
Service Station	Southern Counties Garages	27/43 Ifield Rd, Crawley
Service Station	Tate Brothers	Fleming Way, Manor Royal, Crawley
Service Station	ROC UK Ltd	Povey Cross roundabout, Brighton Rd, Horley
Service Station	BP, Boxtone Crawley Ltd	Crawley Ave, Gossops Green, Crawley
Service Station	BP Tilgate express	Ashdown Drive, Tilgate, Crawley
Service Station	ANC Rental Ltd	Car Rental Bldg, South Terminal, Lower Forecourt Road, Gatwick
Waste Oil Burner	Kirkham Motors	13 Priestley Way, Manor Royal,
Waste Oil Burner	Kirkham Motors	10 Priestley Way, Manor Royal
Dry Cleaners	Apex Dry Cleaners	2 Parkside, Crawley RH10 1EH
Dry Cleaners	Bendix Launderette and Dry Cleaning Services	18 Tilgate Parade Crawley RH10 5EQ

Dry Cleaners	Johnson Cleaners UK Limited	53 High Street Crawley RH10 1BQ
Dry Cleaners	Spencer Dry Cleaners	69 Gales Drive, Three Bridges, Crawley RH10 1QA
Dry Cleaners	Gatwick Laundries	5 Gossops Parade, Gossops Green, Crawley RH11 8HH
Dry Cleaners	Quality Dry Cleaners	10 Pound Hill Parade, Crawley, RH10 7EA
Dry Cleaners	Kleenest Dry Cleaning	9 Furnace Parade, Furnace Green, Crawley, RH10 6NX
Dry Cleaners	Airline Services Ltd	Building 583 D, Perimeter Road South, Gatwick Airport RH6 0PQ
Dry Cleaners	Airbase Interiors	Gatwick Gate, Charlwood Road, Lowfield Heath RH11 0TG

(Last updated April 2008)