



# **Sussex Air Pollution Monitoring Network**

## **Annual Report, 2008**

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## EXECUTIVE SUMMARY

The Sussex Air Quality Monitoring Network provides a central source of information on air pollution issues of a defined and robust quality and can be used with confidence by members of the public, researchers and local authority officers. The network currently has 21 members, including all districts and boroughs in the two counties.

Only four of the analysers operating for the full year during 2008 failed to meet the 75% target capture rate threshold due to reasons outlined in Chapter 1, most achieved the higher target of 90%.

There were no incidences of 'moderate' carbon monoxide, 'moderate' sulphur dioxide or 'moderate' nitrogen dioxide recorded at network sites during the year.

As seen each year there were many days of 'moderate' ozone recorded at most network sites monitoring for this pollutant during the summer of 2008. The first widespread incident occurred at the beginning of March, the last at the end of September.

'Moderate' PM<sub>10</sub> levels were recorded at all network sites that were operating for the full year. There was also a widespread episode in January where 'high' PM<sub>10</sub> levels were recorded at four of the monitoring sites. There was one further day where 'high' PM<sub>10</sub> were recorded at the Hastings roadside site. 'Very high' levels of PM<sub>10</sub> were recorded on two days in April at the Eastbourne background site due to local building works.

All network sites met the carbon monoxide, sulphur dioxide and nitrogen dioxide air quality strategy objectives. The provisional ozone objective was exceeded at all sites with the exception of the Brighton Roadside site.

There was an overall decrease in the running annual mean PM<sub>10</sub> concentrations during 2008 recorded at all sites apart from Hastings roadside. Only two sites monitored for carbon monoxide during the early months of 2008. Concentrations decreased at one site, but increased slightly at the other site but from very low starting levels. Both sites no longer monitor for carbon monoxide. The Brighton roadside site recorded the highest network levels of nitrogen dioxide. At most other sites there was a downward trend in concentrations of nitrogen dioxide during the year, although Chichester roadside and Lewes 2 roadside showed slight increases. There was an increase in ozone levels during the year.

The air quality sustainability indicators background PM<sub>10</sub> remained relatively stable from 2007 and showed a slight decrease for roadside PM<sub>10</sub>. The air quality indicators for urban and rural ozone showed an increase during 2008 when compared with 2007.

The progress of each individual Local Authority's Review and Assessment process are reported in Chapter 3.

## INTRODUCTION

Since its formation in 1995, the Sussex Air Pollution Monitoring Network has developed into a comprehensive regional monitoring network with 21 members and 20 continuous monitoring sites. The Network Database provides a central source of information of a defined and robust quality and can be used with confidence by members of the public, researchers and local authority officers.

Network sites are placed in a range of locations according to local monitoring requirements and resources. As a network, these individual sites allow an overall view of pollution levels in rural, industrial, urban and roadside parts of Sussex. As all sites are operated to defined network quality standards, each district or borough can augment their own monitoring results with comparable data from other network sites.

This report aims to make the data more accessible by describing the air pollution trends, episodes and standards across Sussex, and providing a freely available source of information for the public, local authorities and those in education.

The network's Internet site contains peak daily readings from each site, updated each day as well as historical data from the continuous monitoring carried out across the region. There are many other features and data tools to aid interpretation and more detailed information about the network and the individual monitoring sites. Also a general information section on the health effects of air pollution can be found.

Network Home page: <http://www.sussex-air.net>

## CHAPTER 1: Results of Continuous Monitoring, 2008

This chapter describes the extent and frequency of pollution episodes recorded during 2008 and gives some background as to the causes of each.

The results of continuous monitoring are also presented in comparison to national and international standards and guidelines.

Statistics from three London Air Quality Network sites are included at the base of each table for comparison purposes.

'Marylebone Road' is a kerbside site located on a busy six-lane road in central London. 'Kensington & Chelsea' is a background site in central London and 'Greenwich' is a background site in outer London.

Further information on these sites can be found at:

<http://www.londonair.org.uk>

### Network performance

Table 1.1 shows data capture rates for each network analyser during 2008. Low capture rates may be caused by repeated or prolonged analyser or logging system breakdown, on-site communications problems or interruptions in power supply to the monitoring stations.

- Overall the data capture was good across the network during 2008 with most analysers still achieving at least the target of 90% valid data capture. However, the following sites failed to meet the 90% target:
- The Isfield site had no maintenance contract throughout 2008. As a result of an over reading analyser which could not be checked with a photometer the full year's data had to be excluded.
- The Hove Background site had an ozone analyser fault in March 2008 and a communications fault from October to November 2008.
- The Lullington Heath AURN sulphur dioxide data was had a data capture of 32%. This is a national monitoring network site ratified by a third party (AEA Technology) and the reasons for this data loss were not known at the time of writing this report.
- The Telescombe Cliffs ozone analyser suffered with a faulty pump during October 2008 and also a faulty valve from November 2008. The TEOM data had to be excluded from January 2008 to February 2008 while awaiting a new sensor head from the equipment maintenance unit. The instrument suffered further losses due to a modem fault in April and noisy data following filter changes throughout the year.
- The Lewes 2 roadside site suffered a power cut for over a week in July 2008. There were also data losses from the TEOM due to noisy data following filter changes throughout the year. In addition the site unfortunately experienced a gradual drift in the logger time stamp, this could not be corrected for resulting in the exclusion of data from November 2008 to the end of the year.
- The Rother 2, De La Warr Road site had no power supply from February 2008 to April 2008. There were further power problems at site from July 2008 to September 2008.
- A few analysers also fell below the 75% threshold, however, apart from the Isfield site described above, these were not operational for the full year. For these sites annual statistics are generally considered unrepresentative of the full year and results in the following tables may be replaced with 'n.a.'

## **A statistical overview of 2008**

Annual mean concentrations are shown in Table 1.2. These statistics are based on hourly mean data. Where a site has a capture rate of less than 75% over the year the value is shown in parentheses or as 'n.a.', as the result may not be representative of the full year.

Chapter 2 describes trends in running annual mean concentrations in detail.

Tables 1.3, 1.4 and 1.5 show the number of days in which 'moderate', 'high' and 'very high' air pollution was measured at each site.

These bands have been set by the Government to help describe pollution levels and their associated health effect.

More information on the Air Quality Standards can be found at:

<http://www.airquality.co.uk/archive/standards.php>



Capture Rate (%)	Carbon Monoxide	Nitrogen Dioxide	Ozone	PM <sub>10</sub> Particulate	Sulphur Dioxide
Chichester, Lodsworth	-	-	99	-	-
Isfield	-	-	0	-	-
Brighton Roadside	21 <sup>1</sup>	98 <sup>2</sup>	10 <sup>3</sup>	-	-
Hove Roadside	1 <sup>4</sup>	97	92	-	-
Hove Background	-	-	89	-	-
Crawley, Gatwick Airport	-	98	-	-	-
Chichester Roadside	-	97	-	-	-
Chichester Roadside (FDMS)	-	-	-	97	-
Chichester Orchard Street	-	8 <sup>5</sup>	-	-	-
Eastbourne Background	-	100	97	79 <sup>6</sup>	-
Eastbourne Background FDMS	-	-	-	19 <sup>6</sup>	-
Horsham Roadside (Park Way)	-	97	-	98	-
Hastings Roadside	-	100	-	97	-
Hastings 2, Fresh fields <sup>7</sup>	-	69	-	65	-
Lullington Heath <sup>2</sup>	-	97	98	-	32
Telscombe Cliffs Roadside	-	99	79	83	-
Lewes 2 Roadside	-	83	-	78	-
Rye Rural	-	-	92	-	-
Rother 2, De La Warr Road	-	69	-	73	-
Sussex Mobile, Newhaven <sup>8</sup>	26	37	38	31	-
Sussex Mobile, Crawley <sup>9</sup>	38	38	40	41	-

<sup>1</sup>analyser switched off March 2008

<sup>2</sup>AURN

<sup>3</sup>AURN analyser switched off February 2008

<sup>4</sup>analyser switched off January 2008

<sup>5</sup>site installed November 2008

<sup>6</sup>TEOM was upgraded to FDMS (Eastbourne Background FDMS) October 2008

<sup>7</sup>Site installed March 2008

<sup>8</sup>data collected from February 2008 to July 2008

<sup>9</sup>data collected from August 2008

Table 1.2 Annual means 2008					
Mean concentration	Carbon Monoxide	Nitrogen Dioxide	Ozone	PM <sub>10</sub> Particulate	Sulphur Dioxide
Chichester, Lodsworth	-	-	60	-	-
Isfield	-	-	n.a	-	-
Brighton Roadside	(0.4)	38	(37)	-	-
Hove Roadside	(0.2)	31	45	-	-
Hove Background	-	-	59	-	-
Crawley, Gatwick Airport	-	31	-	-	-
Chichester Roadside	-	36	-	-	-
Chichester Roadside (FDMS)	-	-	-	27 <sup>1</sup>	-
Chichester Orchard Street	-	(38)	-	-	-
Eastbourne Background	-	18	59	19	-
Eastbourne Background FDMS	-	-	-	(21) <sup>1</sup>	-
Horsham Roadside (Park Way)	-	29	-	20	-
Hastings Roadside	-	24	-	24	-
Hastings 2, Fresh fields	-	(15)	-	(25)	-
Lullington Heath	-	10	59	-	(2)
Telscombe Cliffs Roadside	-	22	59	19	-
Lewes 2 Roadside	-	33	-	21	-
Rye Rural	-	-	54	-	-
Rother 2, De La Warr Road	-	(27)	-	(21)	-
Sussex Newhaven Mobile,	(0.1)	(26)	(66)	(20)	-
Sussex Mobile, Crawley	(0.2)	(35)	(24)	(22)	-
Greenwich 4	-	26	40	19	5
Kens and Chelsea 1	0.3	33	38	18	3
Marylebone Road	0.7	116	15	36	7

<sup>1</sup> Gravimetric

Table 1.3 Number of days 'moderate' air pollution during 2008 (Air Quality Index 4-6)					
	Carbon Monoxide	Nitrogen Dioxide	Ozone	PM <sub>10</sub> Particulate	Sulphur Dioxide
Chichester, Lodsworth	-	-	60	-	-
Isfield	-	-	0	-	-
Brighton Roadside	(0)	0	(0)	-	-
Hove Roadside	(0)	0	31	-	-
Hove Background	-	-	62	-	-
Crawley, Gatwick Airport	-	0	-	-	-
Chichester Roadside	-	0	-	-	-
Chichester Roadside (FDMS)	-	-	-	5*	-
Chichester Orchard Street	-	(0)	-	-	-
Eastbourne Background	-	0	66	5	-
Eastbourne Background FDMS	-	-	-	(0)*	-
Horsham Roadside (Park Way)	-	0	-	4	-
Hastings Roadside	-	0	-	7	-
Hastings 2, Fresh fields	-	(0)	-	(12)	-
Lullington Heath	-	0	51	-	0
Telscombe Cliffs Roadside	-	0	53	4	-
Lewes 2 Roadside	-	0	-	5	-
Rye Rural	-	-	44	-	-
Rother 2, De La Warr Road	-	(0)	-	(4)	-
Sussex Mobile, Newhaven	(0)	(0)	(55)	(0)	-
Sussex Mobile, Crawley	(0)	(0)	(0)	(2)	-
Greenwich 4	-	0	26	2	1
Kens and Chelsea 1	0	0	30	4	0
Marylebone Road	0	28	4	63	0
*Reference equivalent FDMS					
Values shown in brackets have less than 75% data capture rate					

Table 1.4 Number of days 'high' air pollution during 2008 (Air Quality Index 7-9)					
Annual Mean	Carbon Monoxide	Nitrogen Dioxide	Ozone	PM <sub>10</sub> Particulate	Sulphur Dioxide
Chichester, Lodsworth	-	-	0	-	-
Isfield	-	-	0	-	-
Brighton Roadside	(0)	0	(0)	-	-
Hove Roadside	(0)	0	0	-	-
Hove Background	-	-	0	-	-
Crawley, Gatwick Airport	-	0	-	-	-
Chichester Roadside	-	0	-	-	-
Chichester Roadside (FDMS)	-	-	-	0*	-
Chichester Orchard Street	-	(0)	-	-	-
Eastbourne Background	-	0	0	1	-
Eastbourne Background FDMS	-	-	-	(0)*	-
Horsham Roadside (Park Way)	-	0	-	1	-
Hastings Roadside	-	0	-	2	-
Hastings 2, Fresh fields	-	(0)	-	(0)	-
Lullington Heath	-	0	0	-	0
Telscombe Cliffs Roadside	-	0	0	0	-
Lewes 2 Roadside	-	0	-	1	-
Rye Rural	-	-	0	-	-
Rother 2, De La Warr Road	-	(0)	-	(0)	-
Sussex Mobile, Newhaven	(0)	(0)	(0)	(0)	-
Sussex Mobile, Crawley	(0)	(0)	(0)	(0)	-
Greenwich 4	0	0	0	0	0
Kens and Chelsea 1	0	0	0	0	0
Marylebone Road	0	0	0	4	0
*Reference equivalent FDMS					
Values shown in brackets have less than 75% data capture rate					

Table 1.5 Number of days 'very high' air pollution during 2008 (Air Quality Index 10)					
Annual Mean	Carbon Monoxide	Nitrogen Dioxide	Ozone	PM <sub>10</sub> Particulate	Sulphur Dioxide
Chichester, Lodsworth	-	-	0	-	-
Isfield	-	-	0	-	-
Brighton Roadside	(0)	0	(0)	-	-
Hove Roadside	(0)	0	0	-	-
Hove Background	-	-	0	-	-
Crawley, Gatwick Airport	-	0	-	-	-
Chichester Roadside	-	0	-	-	-
Chichester Roadside (FDMS)	-	-	-	0*	-
Chichester Orchard Street	-	(0)	-	-	-
Eastbourne Background	-	0	0	2	-
Eastbourne Background FDMS	-	-	-	(0)*	-
Horsham Roadside (Park Way)	-	0	-	0	-
Hastings Roadside	-	0	-	0	-
Hastings 2, Fresh fields	-	(0)	-	(0)	-
Lullington Heath	-	0	0	-	0
Telscombe Cliffs Roadside	-	0	0	0	-
Lewes 2 Roadside	-	0	-	0	-
Rye Rural	-	-	0	-	-
Rother 2, De La Warr Road	-	(0)	-	(0)	-
Sussex Mobile, Newhaven	(0)	(0)	(0)	(0)	-
Sussex Mobile, Crawley	(0)	(0)	(0)	(0)	-
Greenwich 4	0	0	0	0	0
Kens and Chelsea 1	0	0	0	0	0
Marylebone Road	0	0	0	0	0
*Reference equivalent FDMS					
Values shown in brackets have less than 75% data capture rate					

### **Carbon Monoxide (CO)**

There were no incidents of 'moderate' carbon monoxide recorded by any network site during 2008.

### **Nitrogen Dioxide (NO<sub>2</sub>)**

There were also no incidents of 'moderate' nitrogen dioxide recorded by any of the network sites during 2008.

### **Ozone (O<sub>3</sub>)**

As seen each year there were many days of 'moderate' ozone recorded at all network sites monitoring for this pollutant throughout the summer of 2008, apart from the Isfield site, Brighton Roadside and the Sussex mobile site when it was located in Crawley. At these locations data for all the summer months was either not collected or invalid.

The first widespread incident occurred at the beginning of March, the last at the end of September.

### **PM<sub>10</sub> Particulates**

The air quality banding system has previously been set assuming that TEOM analysers are used to measure PM<sub>10</sub> particulates. The Chichester Roadside (FDMS) and the Eastbourne Background FDMS sites use a different type of particulate analyser; the Filter Dynamic Measurement System (FDMS). The banding system has recently been updated to include data from reference equivalent analysers including the FDMS.

Moderate PM<sub>10</sub> levels were recorded at all network sites, apart from at the Sussex mobile site where it was located in Newhaven. This site had valid PM<sub>10</sub> data for only a short time during 2008.

There was a widespread episode on the 24<sup>th</sup> January where occurrences of 'high' PM<sub>10</sub> were recorded at four of the monitoring sites. There was a further episode on 20<sup>th</sup> February where the Hastings Roadside recorded 'high' PM<sub>10</sub> site. The Eastbourne background site measured 'very high' PM<sub>10</sub> on 25<sup>th</sup> and 26<sup>th</sup> April due to building works taking place near the monitoring site.

### **Sulphur Dioxide (SO<sub>2</sub>)**

There were no incidents of sulphur dioxide pollution recorded by any of the network sites during 2008.

## **Significant episodes occurring during 2008**

### **Particulate Episodes**

The main PM<sub>10</sub> events of 2008 were recorded during January and February with four of the sites recording 'high' PM<sub>10</sub> on 24<sup>th</sup> January.

There were several further moderate episodes recorded at the Hastings Fresh Fields site due to the resuspension of particulates on the road leading to a waste transfer site during April to July.

The Eastbourne background site also recorded two days of 'very high' PM<sub>10</sub> during April which were reported by the LSO as being related to building works being carried out in close proximity to the monitoring station.

The daily mean PM<sub>10</sub> levels for 2008 are illustrated in Figure 1.1

### **Summer Photochemical Episodes**

Summer photochemical episodes occur annually in Sussex. Their development are due to the complex set of reactions involving nitrogen oxides and hydrocarbons in the presence of sunlight.

Figure 1.2 illustrates the distribution of photochemical episodes (defined here as 'moderate' ozone pollution) during 2008.

The first widespread ozone episode of the year occurred at the beginning of March, and the last towards the end of September.

Figure 1.1 Daily mean PM<sub>10</sub> levels across the network during 2008

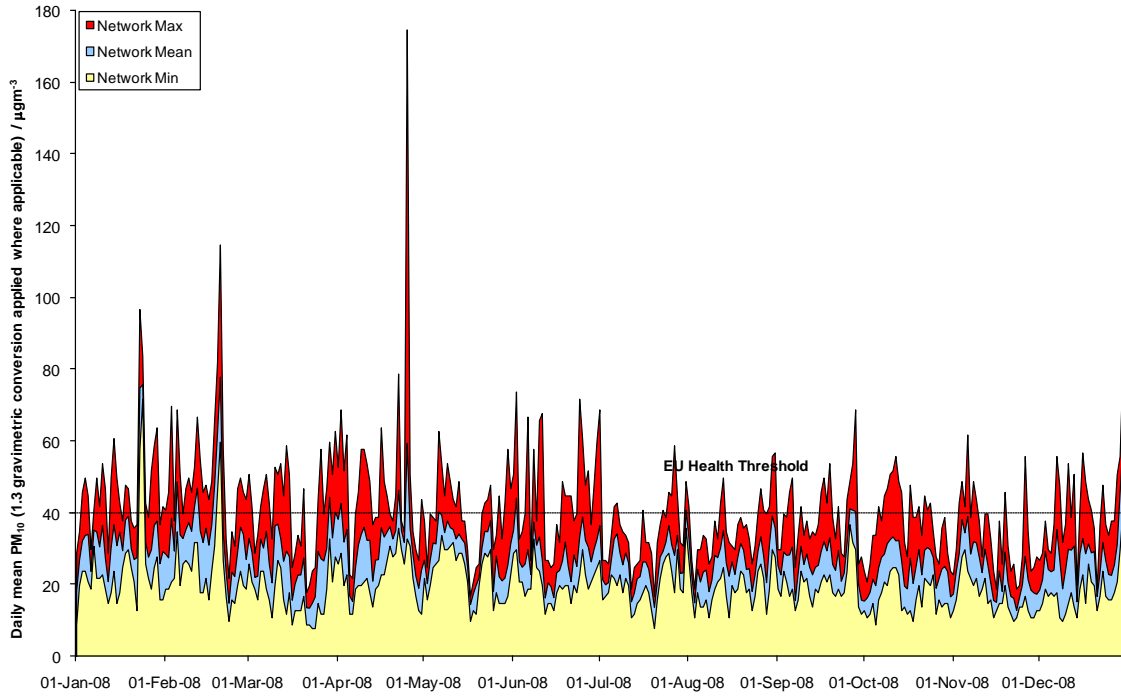
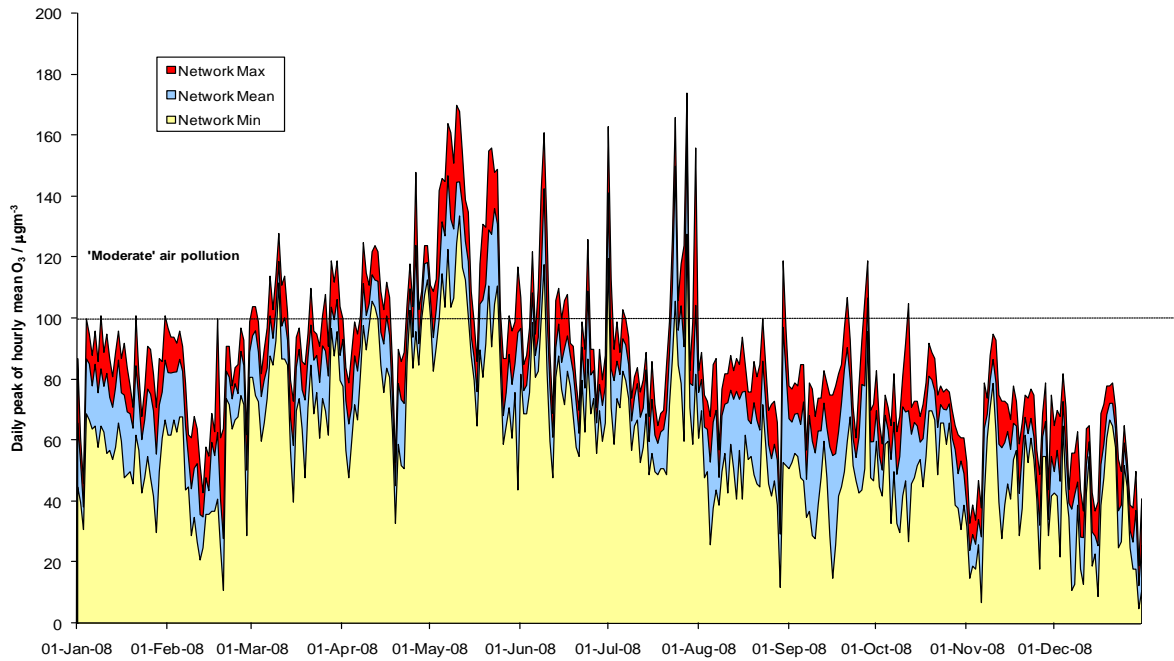


Figure 1.2 Daily peak hourly mean ozone levels across the network during 2008





## 2008 in Comparison with the Air Quality Strategy Objectives

Tables 1.5a and 1.5b compare results of monitoring in 2008 to the Government's Air Quality Strategy Objectives. There is often more than one objective per pollutant reflecting the differing health effects of short and long term exposure. Each objective had an achievement date, between 2004 and 2006 depending on the pollutant. Where a site did not achieve a minimum of 75% data capture for the year, the statistic cannot be accurately calculated and is entered as 'not applicable'.

A revision to the Strategy has proposed a tighter PM<sub>10</sub> objective to be achieved by 2010. This objective, not yet in environmental regulations, decreases the number of permitted exceedence days from 35 to 10. All network sites met the current objective and only Hastings Roadside failed to meet the more stringent 2010 objective.

The distribution of these exceedences (equating to the EU Health Threshold) across the network during 2008 is shown in Figure 1.1.

Following the 2005 Defra comparison of particulate monitors, PM<sub>10</sub> objectives can be applied to the TEOM analysers by multiplying the results by a conversion factor of 1.3. FDMS analysers were shown to be equivalent to the reference method (gravimetric) and so no conversion factor is required for the Chichester Roadside and Eastbourne Background FDMS results.

The provisional ozone objective was exceeded at all network sites apart from the Brighton Roadside site.

The daily peak hourly mean ozone levels across the network during 2008 are shown in Figure 1.2.

All network sites met the carbon monoxide and nitrogen dioxide objectives

Table 1.5a Comparison with Air Quality Strategy Objectives – Achieved ('yes') or Exceeded ('no')						
	CO	PM <sub>10</sub>	C	SO <sub>2</sub>		
	A	B		D	E	F
Chichester, Lodsworth	-	-	-	-	-	-
Isfield	-	-	-	-	-	-
Brighton Roadside	Yes (0)	-	-	-	-	-
Hove Roadside	Yes (0)	-	-	-	-	-
Hove Background	-	-	-	-	-	-
Crawley, Gatwick Airport	-	-	-	-	-	-
Chichester Roadside	-	-	-	-	-	-
Chichester Roadside (FDMS)	-	Yes (8)	Yes (27)	-	-	-
Chichester Orchard Street	-	-	-	-	-	-
Eastbourne Background	-	Yes (7)	Yes (24)	-	-	-
Eastbourne Background FDMS		n.a	n.a			
Horsham Roadside (Park Way)	-	Yes (8)	Yes (26)	-	-	-
Hastings Roadside	-	Yes (18)	Yes (31)	-	-	-
Hastings 2, Fresh fields	-	n.a	n.a	-	-	-
Lullington Heath	-	-	-	n.a	n.a	n.a
Telscombe Cliffs Roadside	-	Yes (8)	Yes (25)	-	-	-
Lewes 2 Roadside	-	Yes (6)	Yes (27)	-	-	-
Rye Rural	-	-	-	-	-	-
Rother 2, De La Warr Road	-	n.a	n.a	-	-	-
Sussex Mobile, Newhaven	n.a	n.a	n.a	-	-	-
Sussex Mobile, Crawley	n.a	n.a	n.a	-	-	-
Greenwich 4	-	Yes (5)	Yes (24)	Yes (0)	Yes (0)	Yes (1)
Kens and Chelsea 1	Yes (0)	Yes (8)	Yes (23)	Yes (0)	Yes (0)	Yes (0)
Marylebone Road	Yes (0)	No (154)	No (47)	Yes (0)	Yes (0)	Yes (0)

A: 10mgm<sup>-3</sup> measured as running 8 hour mean.

B: 50µgm<sup>-3</sup> not to be exceeded more than 35 times a year measured as 24 hour mean. Gravimetric conversion factor of 1.3 applied to TEOM results.

C: 40µgm<sup>-3</sup> measured as annual mean. Gravimetric conversion factor of 1.3 applied to TEOM results.

D: 350µgm<sup>-3</sup> not to be exceeded more than 24 times a year measured as 1 hour mean.

E: 125µgm<sup>-3</sup> not to be exceeded more than 3 times a year measured as 24 hour mean.

F: 267µgm<sup>-3</sup> not to be exceeded more than 35 times a year measured as 15 min.

n.a.: Not enough data for statistic (annual capture rate less than 75%).

Table 1.5b Comparison with provisional Air Quality Strategy Objectives – Achieved ('yes') or Exceeded ('no')			
Annual Mean	O <sub>3</sub>	NO <sub>2</sub>	
	A	B	C
Chichester, Lodsworth	No (57)	-	-
Isfield	n.a	-	-
Brighton Roadside	Yes (0)	Yes (0)	Yes(38)
Hove Roadside	No(16)	Yes (0)	Yes (31)
Hove Background	No (48)	-	-
Crawley, Gatwick Airport	-	Yes (0)	Yes (31)
Chichester Roadside	-	Yes (0)	Yes (35)
Chichester Roadside (FDMS)	n.a	Yes (0)	Yes (32)
Chichester Orchard Street	-	n.a	n.a
Eastbourne Background	No (46)	Yes (0)	Yes (18)
Eastbourne Background FDMS	-	-	-
Horsham Roadside (Park Way)	-	Yes (0)	Yes (29)
Hastings Roadside	-	Yes (0)	Yes (24)
Hastings 2, Fresh fields	-	n.a	n.a
Lullington Heath	No (34)	Yes (0)	Yes (10)
Telscombe Cliffs Roadside	No (33)	Yes (0)	Yes (22)
Lewes 2 Roadside	-	Yes (0)	Yes (33)
Rye Rural	No (35)	-	-
Rother 2, De La Warr Road	-	n.a	n.a
Sussex Mobile, Newhaven	n.a	n.a	n.a
Sussex Mobile, Crawley	n.a	n.a	n.a
Greenwich 4	No (16)	Yes (0)	Yes (26)
Kens and Chelsea 1	No (18)	Yes (0)	Yes (33)
Marylebone Road	Yes (2)	No (830)	No (115)

A: 100 $\mu\text{g}\text{m}^{-3}$  not to be exceeded more than 10 times a year measured as the daily max of running 8 hour mean.

B: 200 $\mu\text{g}\text{m}^{-3}$  not to be exceeded more than 18 times a year measured as 1 hour mean.

C: 40 $\mu\text{g}\text{m}^{-3}$  measured as an annual mean.

n.a.: Not enough data for statistic (annual capture rate less than 75%) or analyser type not applicable.

## Indicators of Sustainable Development

The UK Government is required by European Union law to publish a number of indicators that can be used to assess whether its aims of sustainable development are being met. The UK Sustainable Development Strategy was released in 1999 and one of the Headline Indicators was air quality. The strategy was updated in 2005 and included two new air quality indicators designed to better reflect the effects on health of long term exposure to lower levels of pollution.

The three indicators are:

Annual average urban PM<sub>10</sub> particulate concentrations (roadside and background),

Annual average ozone concentrations (rural and urban background) measured as the daily maximum 8-hour running mean,

Total number of days in which one or more of the specified pollutants were recorded as 'moderate' or worse air pollution (the old headline indicator) in urban and rural locations.

The third indicator is the most complex and has a number of site requirements to ensure that monitoring data are representative:

- Rural sites should be included if they at least monitor ozone (ideally PM<sub>10</sub> should also be monitored but this criterion would exclude almost all sites from the Indicator),
- Urban Background sites should be included if they monitor at least PM<sub>10</sub>, ozone and sulphur dioxide,
- Roadside sites to be included if they monitor at least PM<sub>10</sub>.

Due to the small number of exceedences, it was decided that the absence of monitoring for nitrogen dioxide and carbon monoxide would not result in a significant under-reporting of episodes.

Analysers must record an annual data capture rate of at least 75% to be included in any of the indicator calculations.

Sites demonstrated to be far outliers as a result of local factors in a particular year should be excluded from the analysis.

### Air Quality Sustainability Indicator for Sussex

The following sites meet the criteria for inclusion in the Indicator calculation for 2008, assuming a capture rate of at least 75% for the year:

- Rural AQ Indicator: Chichester Lodsworth, Isfield, Rye rural, Lullington Heath rural
- Urban AQ Indicator: (*background*): Hove Background (ozone only), Eastbourne background (no sulphur dioxide), Eastbourne Background FDMS (PM<sub>10</sub> only)
- Urban AQ Indicator (*roadside*): Rye 2 De La Warr Road, Telescombe Cliffs roadside, Lewes 2 roadside, Hastings roadside, Hastings 2 Fresh Fields, Horsham roadside (Park way), Chichester roadside (FDMS).
- Figure 1.3 plots the first Sustainability Indicator for long-term monitoring sites in Sussex. Figure 1.4 shows a similar plot for the second indicator. Table 1.6 shows the third indicator updated from last year's annual report.

The air quality sustainability indicators for background PM<sub>10</sub> remained relatively stable from 2007 and showed a slight downward trend for roadside PM<sub>10</sub>. This is in contrast to the UK urban PM<sub>10</sub> with UK roadside PM<sub>10</sub> remaining at similar levels to 2007 and background PM<sub>10</sub> decreasing.

The air quality sustainability indicators for urban and rural ozone in Sussex showed an increase compared to 2007 reflecting the dryer and brighter summer than that in 2007

Table 1.6 Third (original) Air Quality Sustainability Indicator for Sussex								
Indicator	2001	2002	2003	2004	2005	2006	2007	2008
Chichester, Lodsworth	-	-	-	-	-	71	43	76
Isfield	-	-	-	-	-	78	24	-
Chichester Roadside	-	-	11	3	-	9	-	-
Chichester Roadside (FDMS)	-	-	-	-	-	-	9	5
Eastbourne Background (FDMS)	-	-	-	-	-	-	-	-
Horsham Roadside (Park Way)	-	-	-	-	4	5	5	5
Hastings Roadside	-	17	34	7	7	14	7	9
Hastings 2 Fresh Fields	-	-	-	-	-	-	-	-
Lullington Heath	50	40	94	56	64	64	27	51
Telscombe Cliffs Roadside	5	9	8	-	12	23	27	57
Lewes 2 Roadside	-	-	-	-	10	20	13	6
Rye Rural	-	47	107	37	26	59	24	44
Rother 2, De La Warr Road	-	-	-	-	-	-	5	-
Sussex-Rural	50	44	101	47	45	68	30	57
Sussex-Urban-(Background)	-	-	-	-	-	-	-	-
Sussex-Urban-(Roadside)	5	13	18	5	8	14	11	16
UK-Rural-Indicator	34	32	64	45	40	55	30	45
UK-Urban-Indicator	23	19	48	22	21	38	23	26

N.B. The UK Rural and urban indicators have been revised from that reported in previous years to reflect where Defra have updated the provisional results and also the removal of sites that were found to have caused unrepresentative results due to local influences.

Figure 1.3 First Air Quality Indicator for Sussex 2001 to 2008 (annual mean PM<sub>10</sub>)

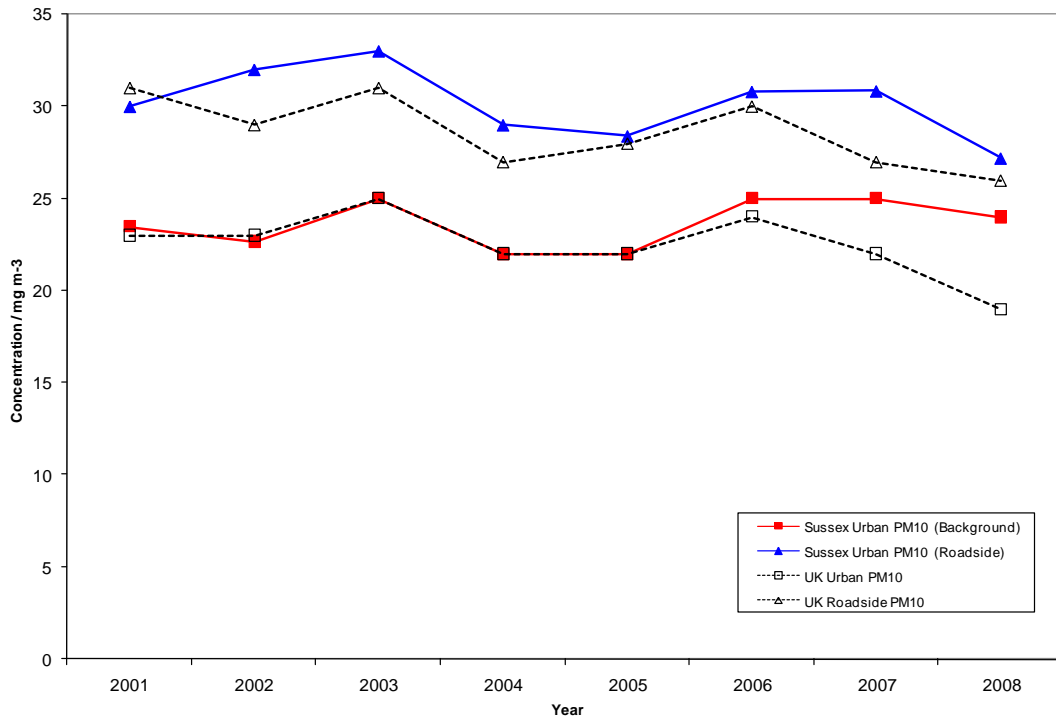
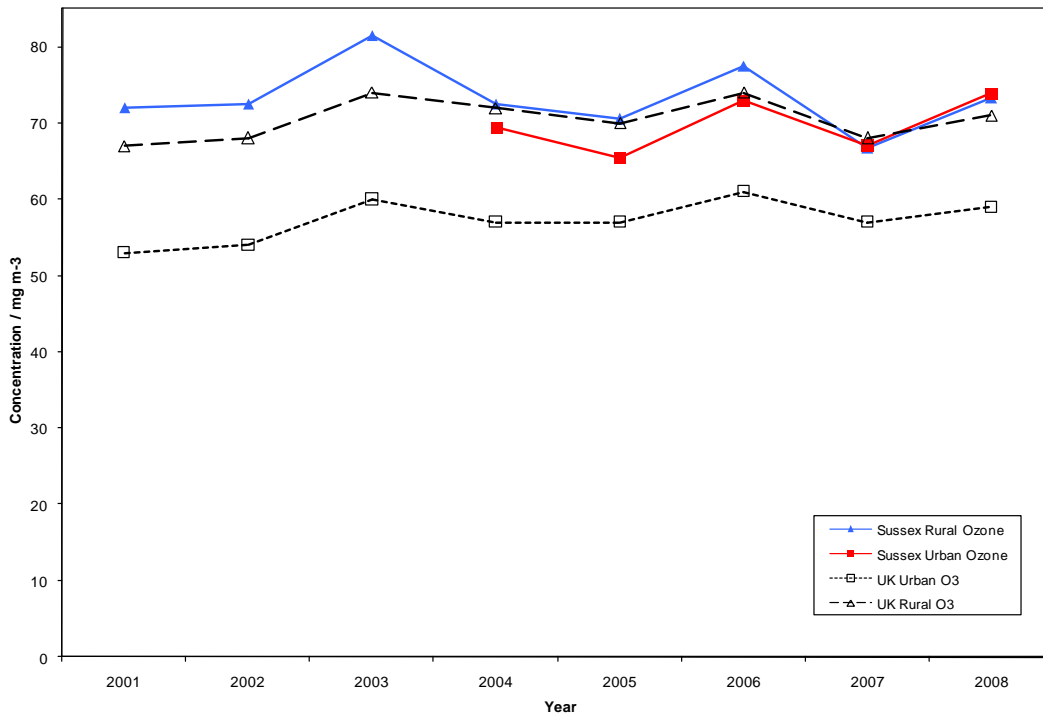


Figure 1.4 Second Air Quality Indicator for Sussex, 2001 to 2008 (mean daily max running 8hr ozone)



## CHAPTER 2: Trends in Pollution Levels, 2001 – 2009

This chapter uses running annual mean calculations to illustrate trends in pollution levels as recorded by each continuous monitor in the network (see the 'How the charts work' section below for an explanation of running annual means).

Long-term pollution trends may be caused by changes in local emissions, i.e. fewer or cleaner vehicles or industrial processes, or changes in how these emissions are dispersed, i.e. weather patterns. For example, an unusually wet summer can lead to decreased levels of ozone, a cold settled winter can lead to increased levels of nitrogen dioxide. These effects can obscure actual changes in emissions due to traffic management schemes or increased use of a particular road.

The longer a dataset is, i.e., the longer a site has been monitoring for, the more effective a trend analysis is. The effects of unusual weather conditions are smoothed out and sustained patterns due to changes in local emissions become clearer. Many years of monitoring data are required before firm conclusions can be made as to whether pollution levels are increasing or decreasing. For this reason sites that have been in operation for less than three years are not included in this chapter, but will become integrated into the analysis in the future.

### How the Charts Work

The charts appearing in this chapter show running annual mean values (based on monthly mean concentrations) from a specified start date to January 2009. Running annual means are used so that gradual changes can be identified throughout the year, which are not apparent from a single annual figure.

For example, in Figure 2.1 the line for Hastings roadside is calculated in the following way;

- The first data we have for this site are from June 2001, so the first annual mean concentration can be calculated one year later on the 1<sup>st</sup> June 2002.
- The first mean is calculated from 1<sup>st</sup> June 2001 to 1<sup>st</sup> June 2002. The second is calculated from 1<sup>st</sup> July 2001 to 1<sup>st</sup> July 2002 and so on. This is what is meant by a running mean.

A chart showing percentage change is often more informative than simply showing changes in concentrations. In these charts, all sites start at zero, then concentrations are shown as the percentage change since the start date. As a common start date is required for this type of chart, they may show a shorter time period than the concentration charts.

Data from an inner London background site have been included in some charts to provide comparison with the Sussex network data.

### PM<sub>10</sub> Particulates

Running annual mean particulate trends at all continuous monitoring sites since 2001 are shown in Figure 2.1.

Sites are shown one year after they joined the network, i.e., when the first annual mean calculation is possible. Sites that have not run for a complete year prior to January 2008 do not appear on the graph.

There was a overall decrease in the running annual mean concentration during 2008 recorded at most sites, although Hastings roadside did record a slight increase.

The overall trend is highlighted further when the percentage change rather than actual change in concentration is traced, as shown in Figure 2.2.

There are a number of sites that are not included in the percentage change plot as it is necessary for all included sites to have a common start date, in this case June 2002, and the analysers that were introduced into the network later than this date are not included.

The data are split, as would be expected, with the roadside sites recording higher levels than those monitoring at background locations due to their proximity to the local emission source that is mainly traffic related.

### **Carbon Monoxide (CO)**

A plot of running annual mean carbon monoxide concentrations at the network sites monitoring carbon monoxide (CO) is shown in Figure 2.3.

Concentration levels for carbon monoxide decreased during 2008 at Hove Roadside and increased slightly at Brighton Roadside. However it is worth noting that the levels of carbon monoxide are so low in these locations that they are very sensitive to analyser inaccuracies.

Both sites stopped monitoring for carbon monoxide early in 2008.

### **Sulphur Dioxide (SO<sub>2</sub>)**

There has been a national downward trend in sulphur dioxide concentrations for several years.

Currently only the Lullington Heath site monitors for sulphur dioxide, but unfortunately very little data were available for 2008.

### **Nitrogen Dioxide (NO<sub>2</sub>)**

Nitrogen dioxide is the most commonly monitored pollutant in the network. Charts of running annual mean concentrations are shown in Figure 2.4. Percentage change over a shorter period at longer-running sites is shown in Figure 2.5. Trends from the inner London background site are included in each chart for comparison.

The Air Quality Strategy objective for annual mean NO<sub>2</sub> is 40 µg m<sup>-3</sup> (21 ppb).

The Brighton roadside site recorded the highest network levels but remained below the objective of 40 µg m<sup>-3</sup> during 2008.

There was a downward trend in concentration during the year at most sites apart from Chichester roadside and Lewes 2 roadside which showed slight increases.

Lullington Heath and Eastbourne background remained relatively stable with concentrations at the end of the year being similar to those recorded at the end of 2007.

As expected the levels recorded at the roadside sites are higher than those at background sites.

The overall trend in decreasing concentrations becomes clearer when the annual means are shown as percentage change since May 2002 (Figure 2.5).

Annual mean NO<sub>x</sub> concentrations shown as percentage change since May 2002 follow a similar pattern to NO<sub>2</sub> but generally with less variation between sites (Figure 2.6).

The longer-term trends illustrate that there continues to be a greater decrease in the levels of NO<sub>x</sub> than is seen as reduction in levels of NO<sub>2</sub>. This may be linked both to the increasing ozone levels and direct NO<sub>2</sub> emissions and is seen as a major cause for concern.



## **Ozone (O<sub>3</sub>)**

Ozone concentrations at most sites have continued to show an overall increase.

Ozone levels are highly dependent on the weather and a series of warm sunny summer periods can cause a sharp increase in mean levels. Furthermore, it is known that a proportion of the ozone experienced in Sussex is transported from continental Europe.

There was an increase in ozone levels throughout the year at most of the sites. This is highlighted in the percentage change plot (figure 2.8).

Figure 2.1 Trends in running annual mean PM<sub>10</sub> concentrations, 2001 to 2009

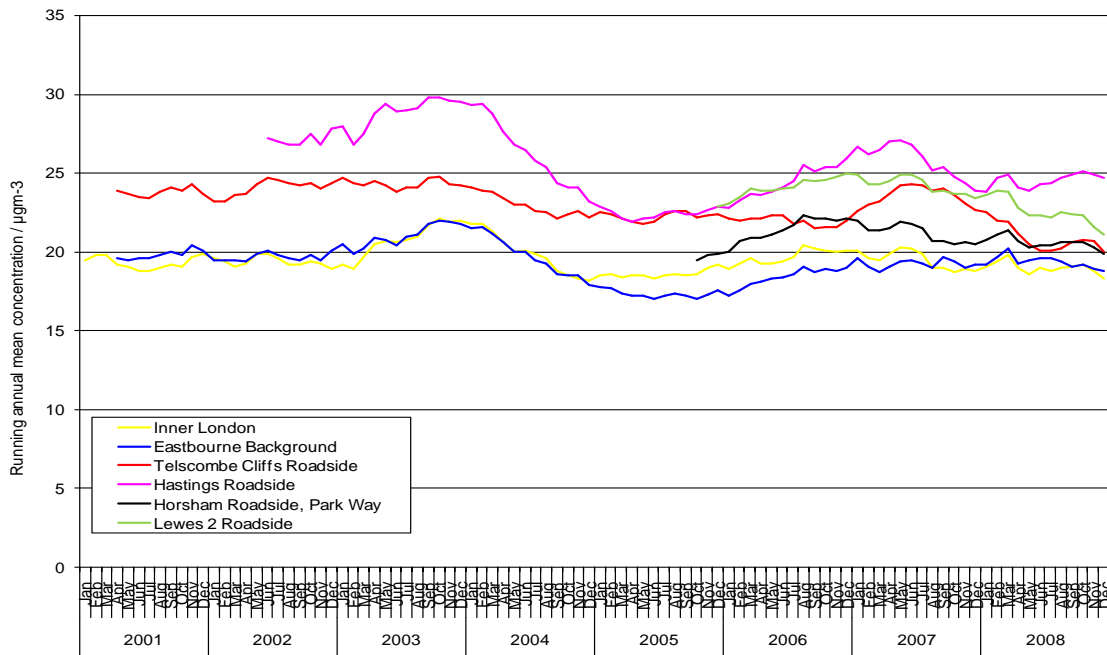


Figure 2.2 Percentage change in running annual mean PM<sub>10</sub> since June 2002

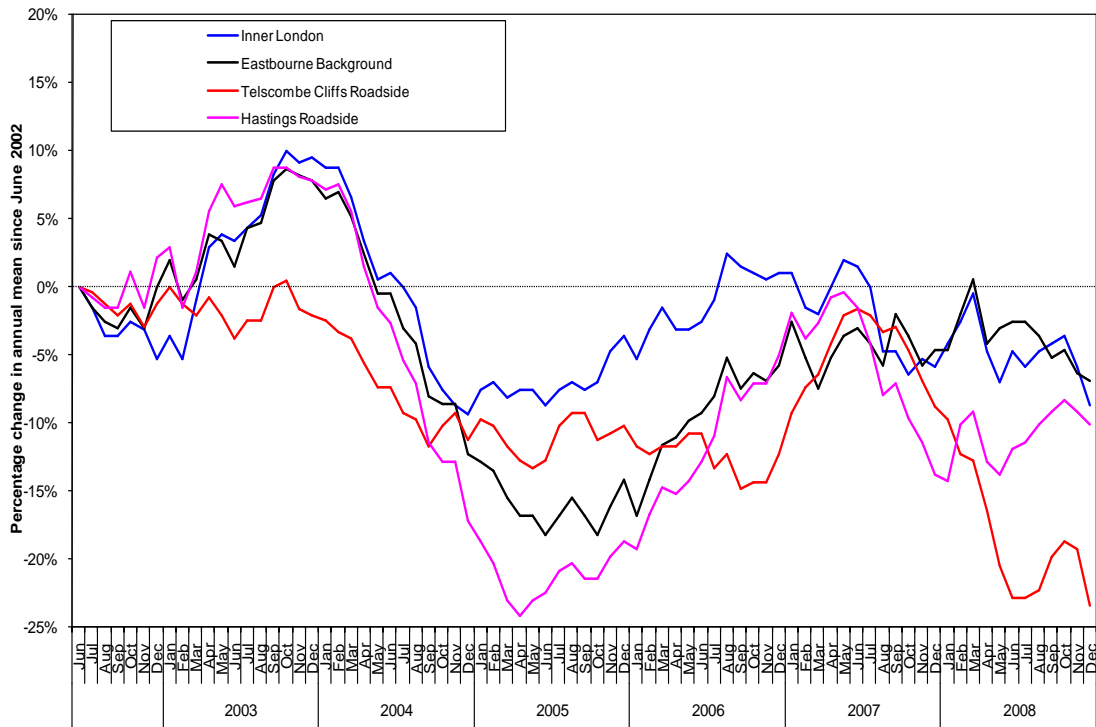


Figure 2.3 Trends in running annual mean CO concentrations 1999 to 2009

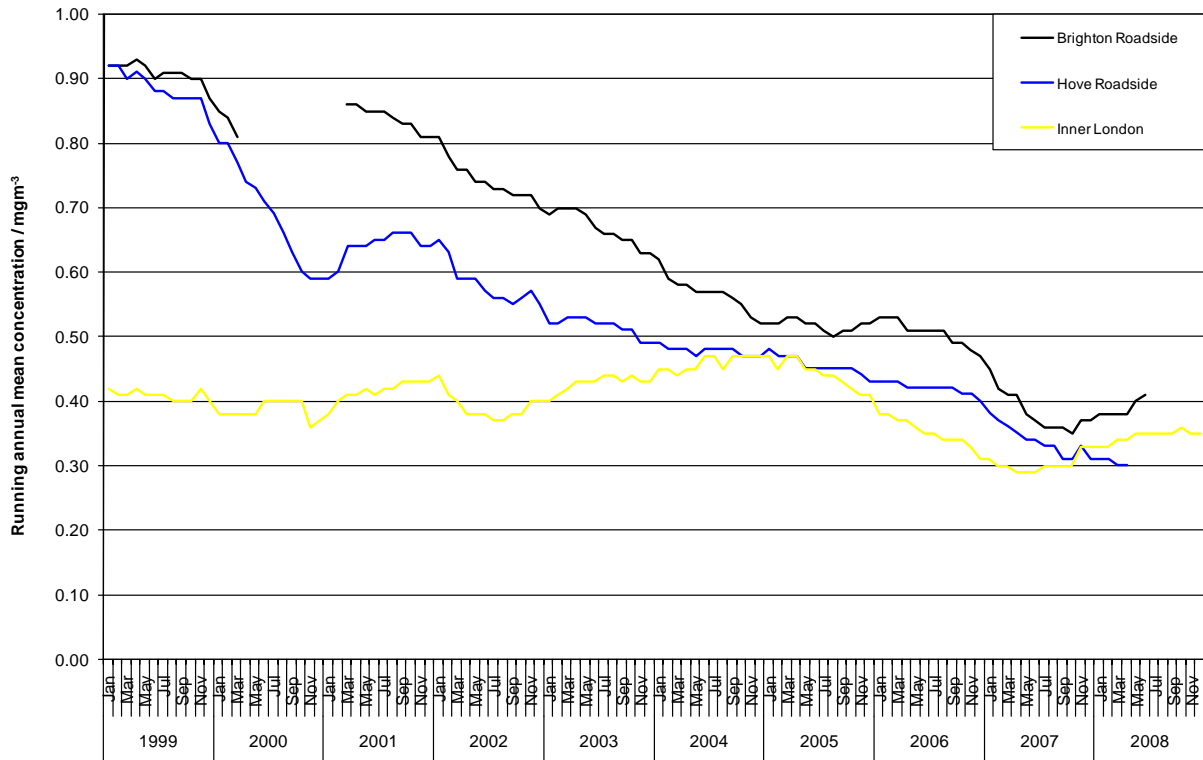


Figure 2.4 Running annual mean NO<sub>2</sub> concentrations, 1999 to 2009

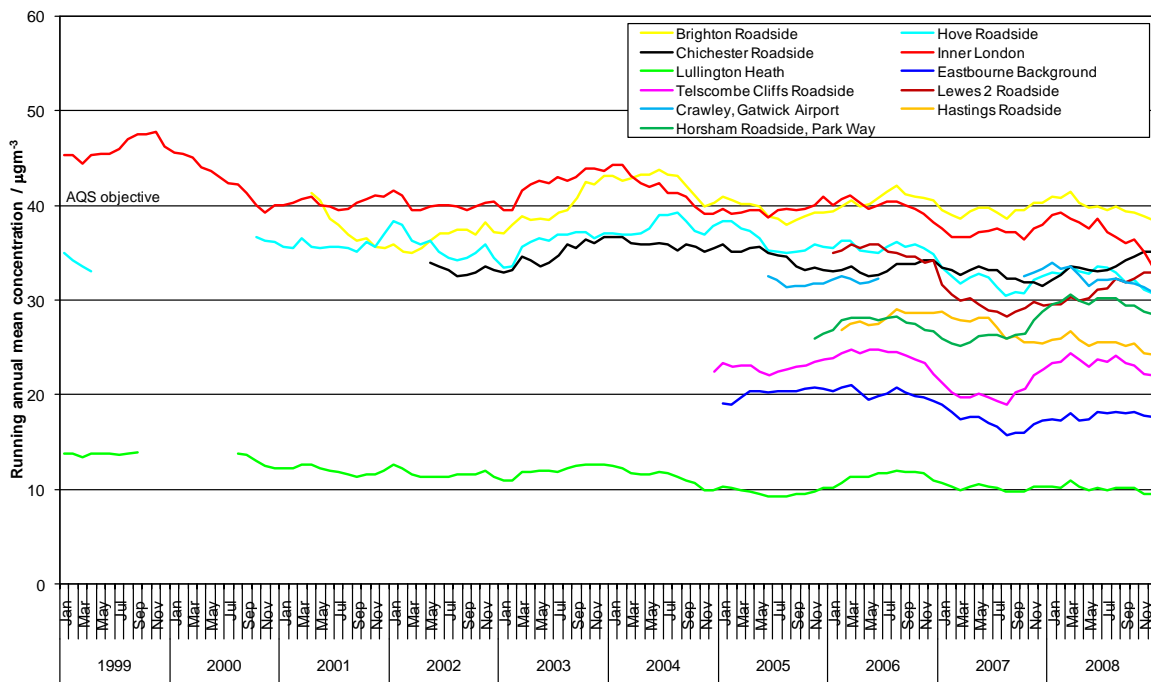


Figure 2.5 Percentage change in running annual mean NO<sub>2</sub> concentrations since May 2002

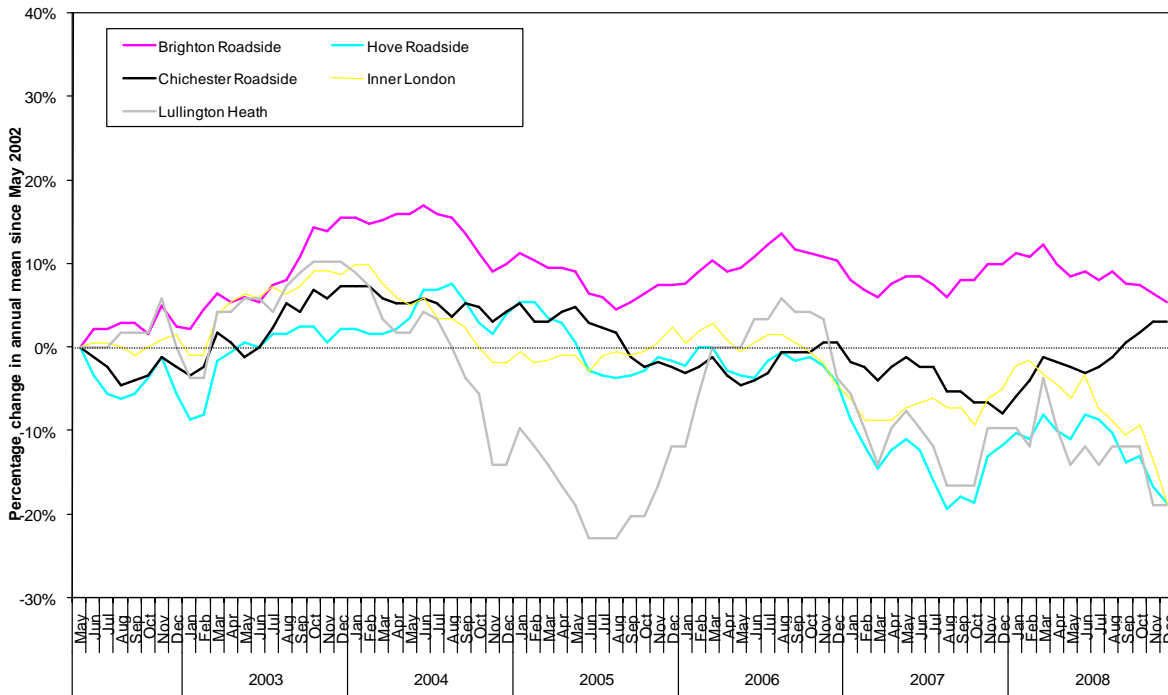


Figure 2.6 Percentage change in running annual mean NO<sub>x</sub> concentrations since May 2002

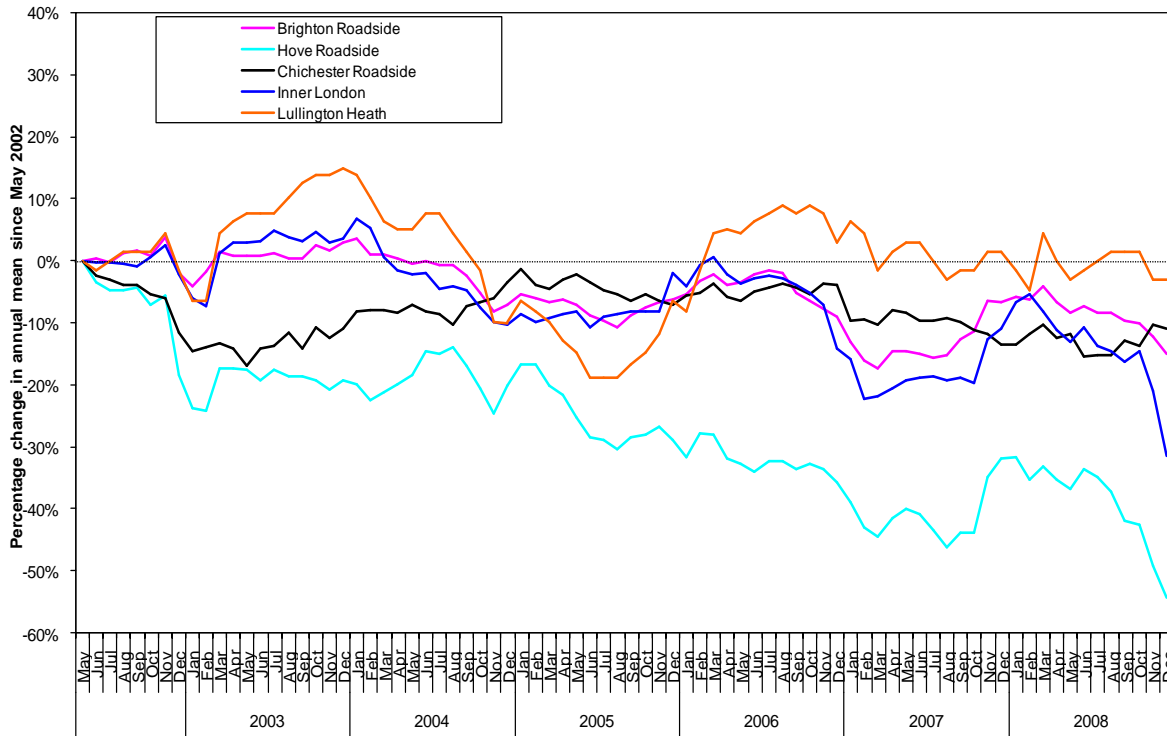


Figure 2.7 Running annual mean O<sub>3</sub> concentrations, 1999 to 2009

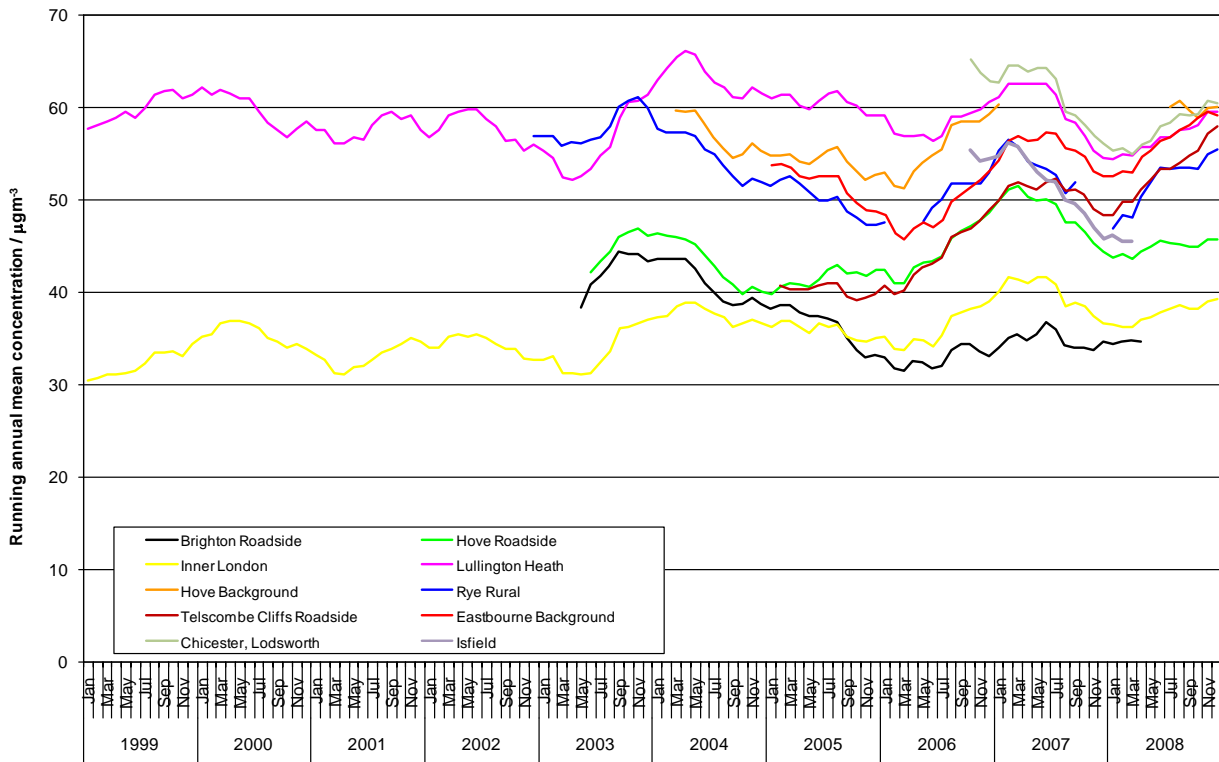
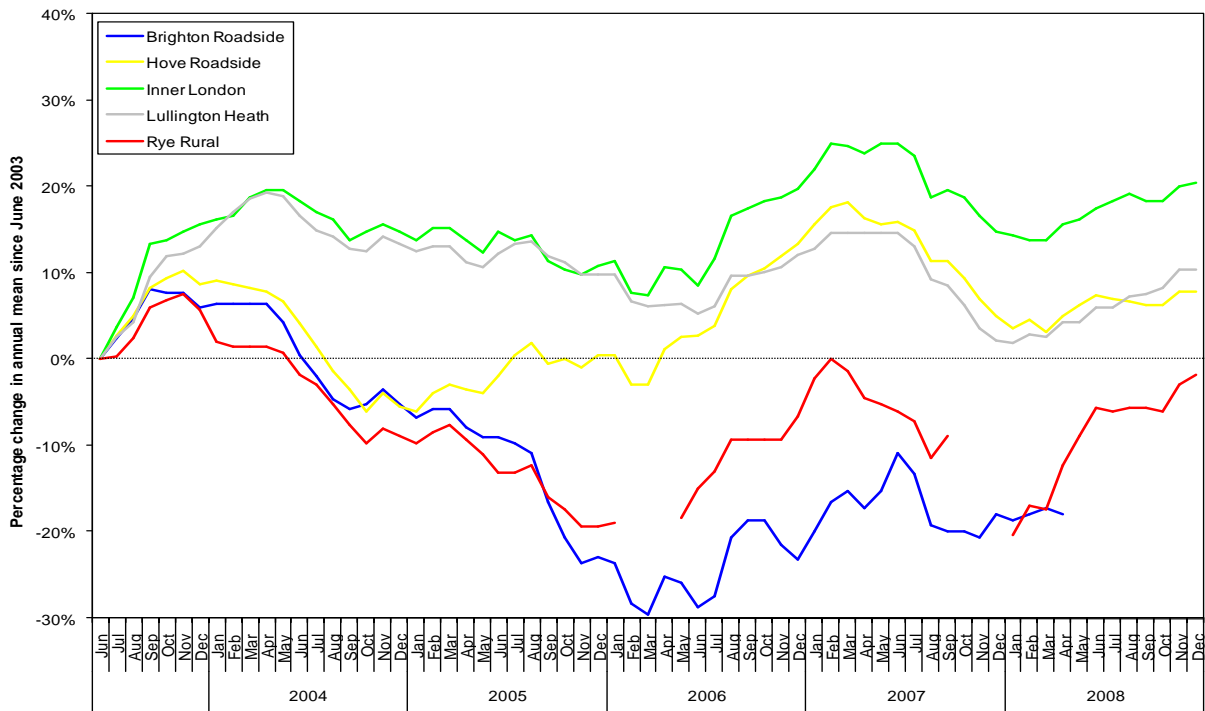


Figure 2.8 Percentage change in running annual mean O<sub>3</sub> concentrations since June 2003





## CHAPTER 3: Review and Assessment Update

This chapter details each Local Authority's progress in the Review and Assessment process. For more information concerning the responsibilities of Local Authorities with regard to local air quality management contact the council direct or visit Defra's web site at

<http://www.defra.gov.uk/environment/airquality/laqm.htm>

A number of acronyms are often used in relation to the Review and Assessment process:

Defra	Department of the Environment, Food and Rural Affairs
APR	Annual Progress Report
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
HA	Highways Agency
USA	Updating and Screening Assessment

### Air Quality in Adur District

The Review and Assessment of air quality was carried out at the end of December 2000, followed by an Updating and Screening Assessment (USA) in May 2003. The USA concluded that a further Detailed Assessment (DA) was to be carried out on certain parts of the District.

The DA, completed in October 2004, found that the Air Quality Objective for nitrogen dioxide was likely to be breached in two areas of Adur, High Street, Shoreham-by-Sea and Old Shoreham Road, Southwick, in the vicinity of Kingston Lane. Two Air Quality Management Areas (AQMA) have been declared and the Council, in conjunction with West Sussex County Council produced an Action Plan in 2005 aimed at reducing levels of nitrogen dioxide in these areas.

The last Updating and Screening Assessment was completed in April 2009 and recommended that the AQMA should remain in place until further improvements in air quality have been produced by the Action Plan

The Review and Assessment reports are available on the Council's web pages at:

[www.adur.gov.uk/environmental-health/airquality.htm](http://www.adur.gov.uk/environmental-health/airquality.htm)

### Air Quality in Arun District

Arun published Stage 1 of its review and assessment in December 1998. It was found that nitrogen dioxide and PM<sub>10</sub> from a number of sections of the A259 and A27 roads, and sulphur dioxide from a permitted roadstone coating process, required detailed assessment.

The combined Stage 2 and 3 assessment involved the use of models to predict future concentrations of the three pollutants. The results showed that concentrations were likely to meet the objective levels, therefore it was not necessary for Arun District Council to declare any Air Quality Management Areas.

Since that time Updating and Screening Assessments have been undertaken in 2003, 2006 and 2009 with annual progress reports in the intervening years. All the assessments to date have concluded that national air quality objectives are unlikely to be exceeded at any location within the Arun District. However, a close watch is being maintained on nitrogen dioxide levels along the A27 (The Causeway) in Arundel.

The reports can be downloaded from:

[www.arun.gov.uk/cgi-bin/buildpage.pl?mysql=75#LAQM](http://www.arun.gov.uk/cgi-bin/buildpage.pl?mysql=75#LAQM)

### **Air Quality in Brighton and Hove City**

Brighton and Hove City Council have declared an Air Quality Management Area (AQMA) related to the annual average and short-term hourly objective for nitrogen dioxide (NO<sub>2</sub>) being exceeded. The area of the AQMA extends from Arundel Road near Black Rock in the east to Adur District Council in the west, the sea in the south and Preston Park and the Old Shoreham Road to the north.

For further information on air quality in Brighton and Hove and the review and assessment reports go to:

<http://www.brighton-hove.gov.uk/index.cfm?request=b1000293>

### **Air Quality in Chichester District**

Chichester District Council (CDC) has declared three traffic pollution related AQMA's for exceedence of the annual mean NO<sub>2</sub> objective. One AQMA is at Stockbridge Roundabout on the A27 and the two additional ones on the inner city ring road at Orchard Street and St Pancras. The Council published an Air Quality Action Plan in December 2008 and has subsequently installed a new NO<sub>2</sub> monitoring station on Orchard Street to add to an existing station on the A27 (monitoring particulates and NO<sub>2</sub>) and a rural ozone station at Lodsworth. Diffusion tubes are used to monitor an additional sixteen locations.

Through the AQAP an Air Quality Working Group has been formed. This Group has officer and member participation from both county and the district council. DEFRA have awarded CDC £20K for delivery of the AQAP. A Cycling Partnership Group has also been formed from officers across both councils and including sports and health development to reflect the cross-cutting nature of tackling air pollution. An initial meeting has been held with the Highways Agency which will lead to a bid to them for travel planning support in the near future. More generally the AQAP has lead to stronger engagement with the community which we hope to capitalise on in delivering future initiatives.

Rural ozone is proven to be an additional issue for Chichester District. As such the Council continues to be an active member of the Sussex Air Quality Partnership and in particular promotes AirAlert.

Further information can be found at:

[www.chichester.gov.uk/index.cfm?articleid=5131](http://www.chichester.gov.uk/index.cfm?articleid=5131)

### **Air Quality in Crawley Borough**

Following the 2006 review and assessment the 2007 detailed assessment recommended the continuation of monitoring at Gatwick airport and Tinsley close.

The progress report in 2008 recommends further assessment of the Tinsley close site to determine whether an air quality management area should be declared here.



The 2009 Updating and Screening Assessment (USA) identified that there would not be a requirement to proceed to a Detailed Assessment for any of the regulated pollutants and there was no requirement to declare an AQMA for Tinsley Close.

The USA found that, although the monitoring data for 2008 showed that there was a reduction in NO<sub>2</sub> and PM<sub>10</sub> concentrations during that year, trends over the past 4 years have not significantly improved. Crawley Borough Council will therefore continue its monitoring programme at background sites and at locations where there is the potential for exceedences.

The reports can be downloaded from:

[www.crawley.gov.uk/stellent/idcplg?IdcService=SS\\_GET\\_PAGE&nodeld=320](http://www.crawley.gov.uk/stellent/idcplg?IdcService=SS_GET_PAGE&nodeld=320)

### **Air Quality in Eastbourne Borough**

The council completed Air Quality Updating and Screening Assessments for Eastbourne in 2003 and 2004, following an initial Review and Assessment completed in June 2000.

The initial work in 2000 identified that the air quality objectives of the National Air Quality Strategy (NAQS) were likely to be met in the required timescales and that no further work was required at that stage.

The reports can be downloaded from:

[www.eastbourne.gov.uk/environment/pollution/air/review/](http://www.eastbourne.gov.uk/environment/pollution/air/review/)

### **Air Quality in Hastings Borough**

In December 2003 the Council created an Air Quality Management Area (AQMA), due to the higher than normal levels "particulate" (PM<sub>10</sub>) along the A259 (Bexhill Road). This was the first AQMA declaration in Sussex. For further information on Hastings Air Quality progress or reports, please select the following link:

[www.hastings.gov.uk/airquality/airqualityactionplan.aspx](http://www.hastings.gov.uk/airquality/airqualityactionplan.aspx)

### **Air Quality in Horsham District**

The review and assessment in 2000 concluded that the national air quality objectives were not likely to be exceeded at any location in the District. In May 2003 the Updating and Screening Assessment (USA) concluded that there was no evidence that any of the national air quality objectives were being exceeded within the Horsham District Council area.

The 2008 progress report states that further monitoring is required at the Storrington and Cowfold sites as part of the detailed assessment.

The reports can be downloaded from:

[www.horsham.gov.uk/council\\_services/council\\_services\\_5660.asp](http://www.horsham.gov.uk/council_services/council_services_5660.asp)

### **Air Quality in Lewes District**

The first review and assessment round for Lewes District Council was completed in July 2000 and concluded that the national air quality objectives were not likely to be exceeded at any locations in the District.

The second round of review and assessment was commenced in 2003. The first stage of review and assessment - known as an Updating and Screening Assessment ("USA") - aimed to determine whether there have been any significant changes in air quality since the first

round of review and assessment, and also to compare the current position with likely future air quality targets.

The USA concluded that we had to progress to a more detailed assessment of air quality within Lewes town centre. We undertook a Detailed Assessment in 2004, focusing on two pollutants, nitrogen dioxide and PM<sub>10</sub> at locations beside busy roads and in the centre of Lewes, where streets are narrow and traffic can be congested.

The Detailed Assessment (September 2004) concluded that pollution levels in Fisher Street (Lewes town centre) were likely to exceed the annual mean air quality objective for nitrogen dioxide and an Air Quality Management for nitrogen dioxide was declared in June 2005 in the town centre.

A Progress Report (August 2005) confirmed that the AQMA in Lewes town centre should be maintained.

A Further Assessment was carried out a year later (August 2006) to provide a detailed understanding of the sources of emissions contributing to the nitrogen dioxide pollution in the Lewes town centre AQMA area and consider a series of scenarios that were based on changing conditions. This additional information enabled us to devise an air quality action plan that was formally adopted in June 2009.

In 2007 a further USA was carried out and it concluded a more detailed assessment of air quality was needed in the Newhaven town centre. This detailed assessment was carried out in November 2008 and identified marginal exceedence of the annual mean for nitrogen dioxide. DEFRA required the model to be re run using 2007 meteorological data rather than worst case data. When re run the air quality objectives were no longer exceeded and no AQMA will be declared in Newhaven at this time.

Reports can be downloaded from:

<http://www.lewes.gov.uk/environment/824.asp>

### **Air Quality in Rother District**

An Air Quality Management Area (AQMA) does not need to be designated at present. However, the Review and Assessment process for air quality will continue.

Further information can be found at:

<http://www.rother.gov.uk/index.cfm?articleid=760>

### **Air Quality in Wealden District**

Following Stage II of the review and assessment it was concluded that air quality objectives are being met. The updating, screening and assessment report of 2006 indicated there was no requirement to complete a detailed assessment.

The reports can be found at:

[www.wealden.gov.uk/Environment%5Fand%5FTransport/Air%5FQuality/](http://www.wealden.gov.uk/Environment%5Fand%5FTransport/Air%5FQuality/)

## **Air Quality in Worthing**

An Updating & Screening Assessment in 2006 concluded that a Detailed Assessment was required at two sites on the A27, due to measured high levels of Nitrogen Dioxide (NO<sub>2</sub>).

A Progress Report and Detailed Assessment was duly completed in June 2008. This showed that air quality for the vast majority of the Borough was compliant with the National Air Quality Objectives.

The result of a Detailed Assessment at Grove Lodge (A27) was that the NO<sub>2</sub> Annual Mean Objective was being exceeded at a site of relevant exposure.

The result of the Detailed Assessment further along the A27 at Downlands Parade was that whilst there was no exceedence measured at that time, the levels adjacent to residential properties were very close to the air quality objective. Modelling predicted a potential future problem at the eastern end of the Lyons Farm Junction.

A Detailed Assessment was also carried out for a site close to the Town Centre. - Teville Gate. This confirmed that there were no problems at the time, but that there is a need for ongoing scrutiny to ensure that current and future developments do not make a negative impact on air quality.

The Progress Report and Detailed Assessment concluded that an Air Quality Management Area (AQMA) would need to be declared regarding NO<sub>2</sub> levels along the A27. The boundaries of that area will be a matter for consultation and discussion, but that the area between the two detailed assessment sites at Grove Lodge and Lyons Farm will be considered for inclusion.

An Air Quality Action Plan will need to be prepared in consultation with all relevant stakeholders, to set out measures that could bring about improvements in air quality.

Further information may be obtained at

<http://www.worthing.gov.uk/worthings-services/environmentalhealth/airpollutionandquality/localairqualitymanagement/>