



**LOCAL AIR QUALITY MANAGEMENT  
PROGRESS REPORT – 2008.**

**Part IV of the Environment Act 1995**

**Prepared by:**

**Arun District Council  
with assistance from the  
Sussex Air Quality Partnership**

**April 2008**



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## SUMMARY

The assessment undertaken for this Progress Report for Air Quality in Arun District has identified no exceedances of the UK air quality objectives for the year 2007-08.

**Table 1: Summary of pollutants measure in 2007 relative to the UK air quality objectives in Sussex and Arun District**

Pollutant	Air Quality Objective		2007 Measurements (Local or Sussex AQMS)	
	Conc.	Measured as		Exceedance
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>	-Max 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 >10mg/m <sup>3</sup>	None	NO
Lead	0.25 µg/m <sup>3</sup>	-Annual mean	Not measured	Not likely
Nitrogen dioxide	40 µg/m <sup>3</sup>	- Annual mean	30.6 µg/m <sup>3</sup>	NO
Particles (PM <sub>10</sub> ) (gravimetric)	40 µg/m <sup>3</sup>	- Annual mean	31µg/m <sup>3</sup>	NO
Sulphur dioxide	350 µg/m <sup>3</sup> not to be exceeded more than 24 times a year	- 1 hour mean	32 µg/m <sup>3</sup> (max) (Hove)	NO
	125 µg/m <sup>3</sup> not to be exceeded more than 3 times a year	- 24 hour mean	9 µg/m <sup>3</sup> (max) (Hove)	NO
	266 µg/m <sup>3</sup> not to be exceeded more than 35 times a year	- 15 minute mean	37 µg/m <sup>3</sup> (max) (Hove)	NO

## 1. Introduction

Under the Environment Act 1995, local authorities are required to Review and Assess (R&A) 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<sup>1</sup>, 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 review and assessment round was completed in 2003. The main conclusion was that the national air quality objectives were not likely to be exceeded at any locations in Arun District.

This first round of R&A constitutes a benchmark against which Arun District Council can measure future progress in making improvements to the local air quality.

Guidance issued by the Department for Environment, Food and Rural Affairs (DEFRA) requires those local authorities, who found no exceedence of the air quality objectives in the last Updating and Screening Assessments (USA), to undertake a Progress Report (PR) of local air quality by the end of April 2007 and 2008(LAQM.PRG03).

This Progress Report is intended to identify those aspects that have changed since the last round of review and assessment, the USA and PR. 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 will provide a summary of all available monitoring data, indicating monitored pollutants and specific locations within Arun District.

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<sup>1</sup> Air Quality Regulations for England (2000; Amendment Regulations 2002)

## 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>2</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.

**Table 2: National Air Quality Objectives**

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

<sup>2</sup> UK Air Quality Strategy (2007) (<http://www.defra.gov.uk/environment/airquality/strategy/index.htm>)

### 3. Information about Arun District Council

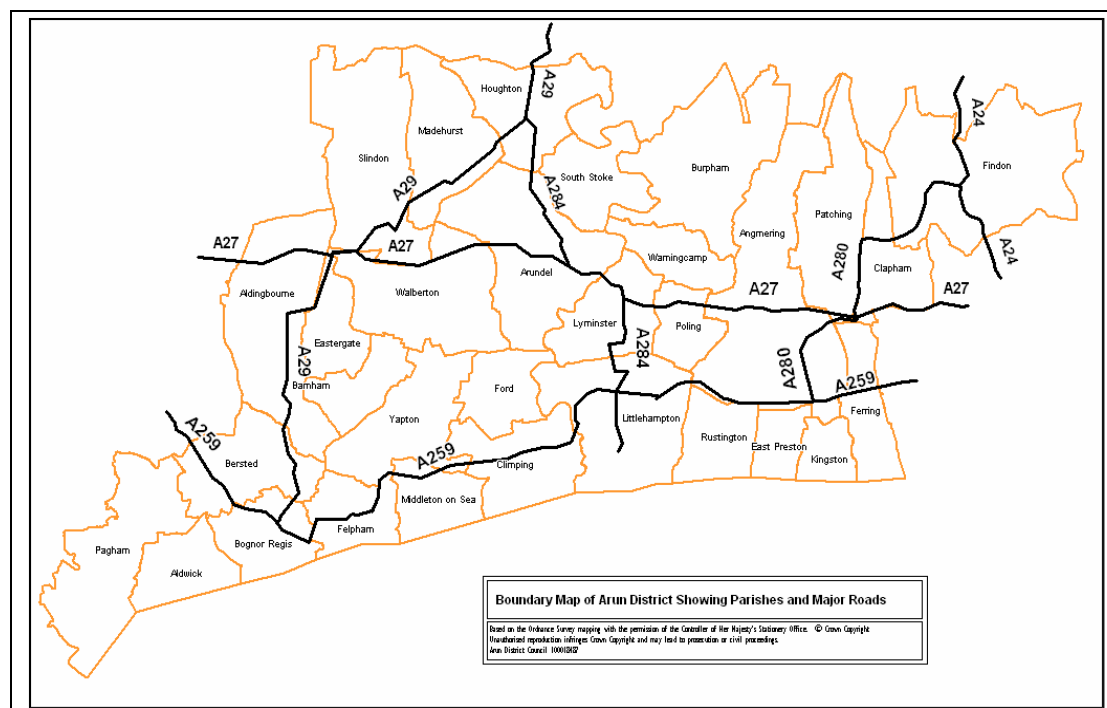
Arun District is a mixed urban / rural area covering 85 square miles, and has a population of over 140,000. Littlehampton and Bognor Regis are the main urban centres and the principal administrative and commercial centres within the district.

Arun District is served by transport links to London, Gatwick Airport, the M25, the coast and Europe. A network of subsidiary routes connects the villages and small centres of population.

A large proportion of the district is composed of countryside with a varied landscape of woodland, downland, river valleys and meadows being represented. Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest, and Sites of Nature Conservation Importance overlap the area. Agriculture remains a major user of land within the District.

Figure 1. Shows the Arun District boundaries, parishes and main roads.

**Figure 1: Arun District**



### Industrial Sources

Industrial sources are currently controlled under The Environmental Permitting (England and Wales) Regulations 2007, 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, quarries, 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. The review and assessment technical guidance (LAQM.TG03) and LAQM.TG(03) – Update: January 2006, requires details of boilers with a thermal rating of greater than 5 MW that burn coal or fuel oil (e.g. in universities, hospitals, etc).

Lists of Part A, Part B/A2 and other processes of potential concern from within Arun District or from neighbouring areas are given in Appendix III. Any significant or new changes to these sources of emissions are referred to in the relevant pollutant section.

**Transport/ Road traffic**

No recent traffic counts have been carried out. It is anticipated that traffic counts will be undertaken before the next Updating and Screening Assessment in 2009.

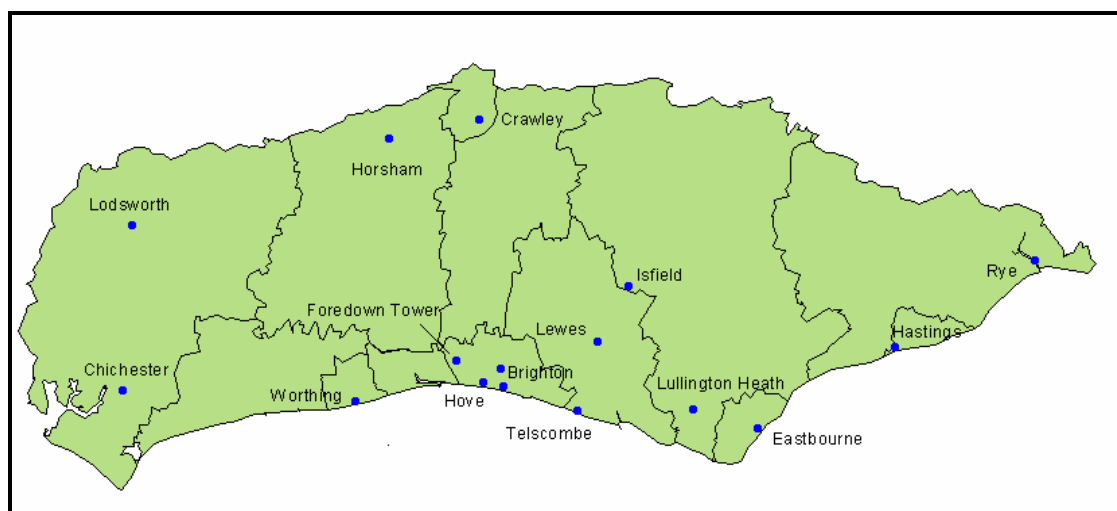


## 4. New Monitoring Results

### Monitoring of air quality across Sussex.

Arun District Council are members of the Sussex Air Quality Partnership (Sussex Air) which benefits from the co-ordinated monitoring of air pollutants across the region. The partnership has access to monitoring station data and is able to make comparative and comprehensive assessments for the different pollutants required under LAQM. The Sussex Air Quality Monitoring 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:

**Table 3: Sussex air quality monitoring stations.**

	LA	POLLUTANTS	LOCATION
1	Adur	NOx	Shoreham High St
2	Brighton & Hove/AURN	CO, NOX, O3 , PM10	Brighton Pavilion
3	Brighton & Hove/AURN	CO, NOX, O3 , PAH	Hove Roadside
4	Brighton & Hove CC	O3	Foredown Tower
5	Chichester D.C.	PM10(grav), NOx,O3	A27 Ring Road
6	Chichester D.C.	O3	Lodsworth( ARMO)
7	Crawley B.C.	NOx	East Gatwick
8	Eastbourne B.C.	PM10, NOx, O3	Devonshire Park
9	Hastings B.C.	PM10, NOx, O3	Hastings/Bexhill (A259)
10	Horsham D.C.	PM10, NOx,	Horsham centre
11	Lewes D.C.	PM10, NOx, O3,	Telscombe Cliffs
12	Lewes D.C.	PM10, NOx	Lewes Town Centre
13	Rother D.C.	O3	Rye Harbour
14	Rother D.C.	NOx, PM10	Bexhill (A259)
15	Worthing B.C.	NOx	High St, Worthing
16	Wealden D.C.	O3	Isfield (ARMO)
17	Sussex County Lab.	PM10, NOx,O3, CO	Mobile unit
18	DEFRA - AURN	NOx, O3	Preston Park, Brighton

	<b>LA</b>	<b>POLLUTANTS</b>	<b>LOCATION</b>
19	DEFRA - AURN	NOx, O3, SO2	Lullington Heath, Wealden

Key:

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

## 4.1 Updated data for carbon monoxide (CO)

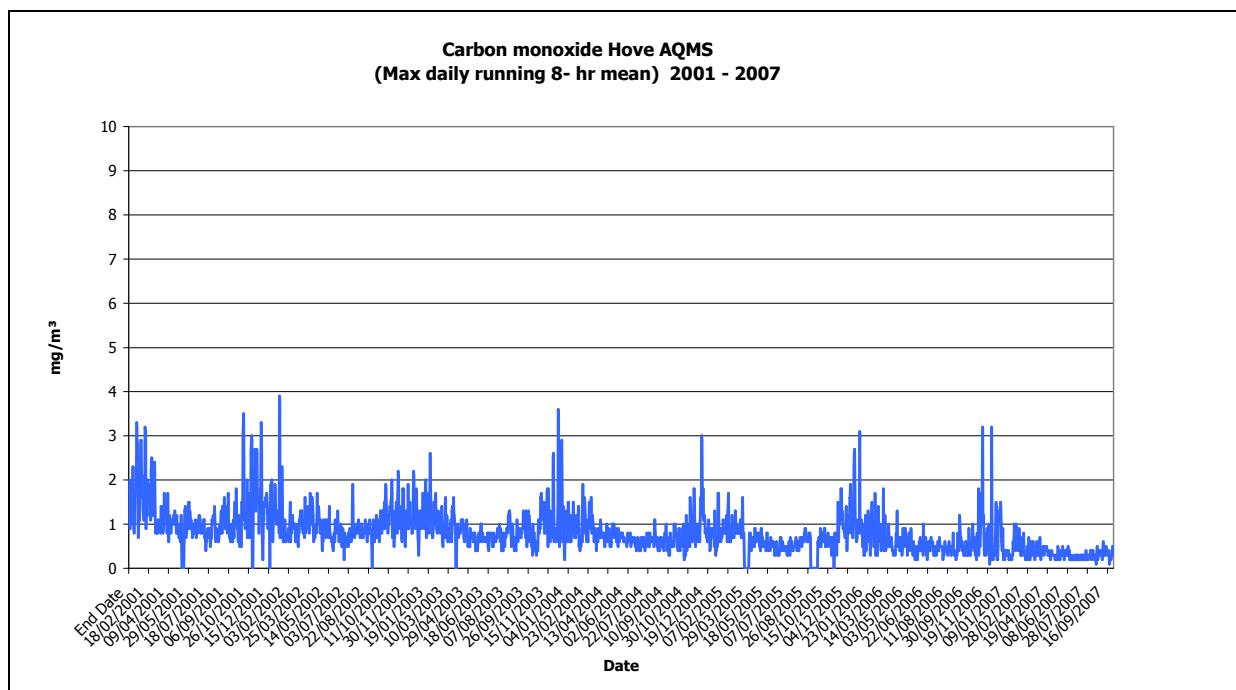
Carbon monoxide is an asphyxiating pollutant that reduces the ability of blood to carry oxygen to the different organs. The main source of carbon monoxide in the UK is road transport, which accounted for 67% of total releases in 2000 (the most recent year for which estimates are available). Annual emissions 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).

Available monitoring data (obtained with automatic infrared analysers from Sussex Monitoring stations in Hove) suggest that the carbon monoxide objective is unlikely to be exceeded at any location in Sussex. Data from Hove AURN station has not breached the 10mg/m<sup>3</sup> in recent years, with the 2007 maximum daily 8 hour mean = 1 mg/m<sup>3</sup>.

**Table 4 – Data from Hove AURN station**

Pollutant	Air Quality Objective		2007 Measurements (Local or Sussex AQMS)	
	Conc.	Measured as		Exceedance
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 >10mg/m <sup>3</sup> =	None	NO

**Figure 3: Graph Hove AURN 2002-2007 carbon monoxide (CO) results.**



### Conclusion

It is unlikely that the air quality objective for carbon monoxide will be exceeded in 2008 and future years.

## 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).

Arun District Council does not carry out any benzene monitoring, however it is unlikely to be have been breached in the District. Data from the pumped diffusion tube survey at Hove, undertaken as part of the national PAH monitoring network shows that the air quality objective is unlikely to be breached in 2007 (see Table 4 below)

**Table 5: Hove AURN 2002-2007 Benzene results**

Ref: UK national air quality archive:

([http://www.airquality.co.uk/archive/data\\_and\\_statistics.php](http://www.airquality.co.uk/archive/data_and_statistics.php) )

Site:	Hove	Hove	Hove	Hove	Hove	Hove
Year:	2002	2003	2004	2005	2006	2007
Units:	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Annual Average Benzene: (Annual limit value = 5 µg/m <sup>3</sup> )	1.62	1.93	1.91	1.86	1.13	1.01

### Conclusion

It is unlikely that the air quality objective for benzene will be exceeded in 2008 and future years.

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

Concentrations of 1,3-butadiene are measured at a limited number of UK national network sites. No monitoring of 1,3-butadiene is currently being carried out in any of the local authorities in Sussex.

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 exceedances of the running annual mean objective. New sources introduced into Arun District 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 Arun District.

#### Conclusion

It is unlikely that the air quality objective for 1,3-butadiene will be exceeded in 2008 and future years.

### 4.4 Updated data for lead (Pb)

There is currently no monitoring of lead in any of the local authorities in Sussex.

No industrial sources were identified during the first round of review and assessment as likely to give rise to exceedances of the annual mean objective for lead. No new sources have been introduced into Arun District and existing sources with substantially increased emissions have not been identified.

#### Conclusion

It is unlikely that the air quality objective for Lead will be exceeded in 2008.

### 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. There are a number of sampling sites throughout Sussex:

**Table 6 Sampling sites throughout Sussex**

Location	1-hour mean: 200 µg/m <sup>3</sup> (not to be exceeded more than 18 times a year)	Annual mean: 40 µg/m <sup>3</sup>
Brighton Pavilion	0	39
Hove Roadside	0	32
A27 Ring Road, Chichester	0	32
East Gatwick, Crawley	Insufficient data	Insufficient data
Devonshire Park, Eastbourne	0	17
Hastings/Bexhill (A259)	0	26
Horsham centre	0	30
Telscombe Cliffs	0	23
Lewes Town Centre	0	29
Bexhill (A259)	0	27

Arun District Council operates thirteen diffusive sampling sites (8 roadside, 5 urban background). The distribution of diffusion tubes are detailed in Appendix II. Four of the thirteen sites are also included in the national NO<sub>2</sub> diffusion survey.

#### 4.5.1 Bias Correction

The NO<sub>2</sub> diffusion tubes are supplied and analysed by South Yorkshire (including former Rotherham Metropolitan Borough Council) Laboratory. The NO<sub>2</sub> tube preparation method used is 50% triethanolamine (TEA) in Acetone, and the tubes are exposed over a monthly period. Details of the QA/QC and analysis methods for the NO<sub>2</sub> diffusion tube data are given in Appendix I.

In accordance with section 6.25 and Box 6.2 (A) of technical guidance document LAQM.TG (03), diffusion tube monitoring data must be appropriately corrected to account for any laboratory bias. Information published by Air Quality Consultants Ltd (on behalf of DEFRA) at <http://www.uwe.ac.uk/agm/review/diffusiantube310308.xls> provides bias correction factors for collocation studies involving specific laboratories. The following overall bias adjustment factors have been provided for Rotherham MBC (Rotherham MBC/South Yorkshire in 2003) laboratory:

**Table 7 Bias Adjustment Factors**

Year	Bias Adjustment Factor
2003	0.90
2004	0.90
2005	0.91
2006	0.92
2007	0.84

Arun District Council does not undertake any collocation studies and therefore the annual average monitoring data for each NO<sub>2</sub> tube has been corrected using the laboratory bias adjustment factors provided.

The results with bias correction are presented in Tables 8 and 9.

#### 4.5.2 Monitoring Data

**Table 8 - Annual mean NO<sub>2</sub> concentrations at background sites (using bias corrected data µg/m<sup>3</sup>)**

Year of Data	Background Sites				
	Thatchway Close	Westlands	King St	Priory Rd	Mornington Crescent
2003	19	21	22	19	18
2004	16	18	18	16	18
2005	18	19	21	13	19
2006	16	19	21	17	19
2007	15	18	18	14	17

Figure 4 Annual Mean Nitrogen Dioxide Concentrations at Background Sites

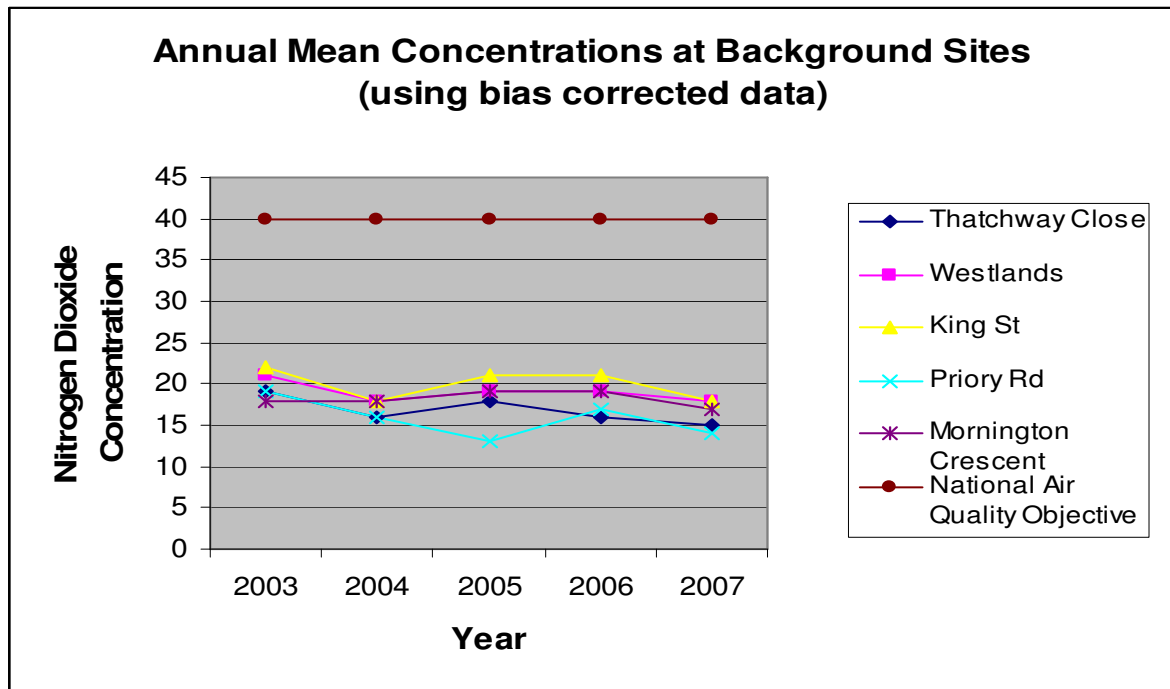
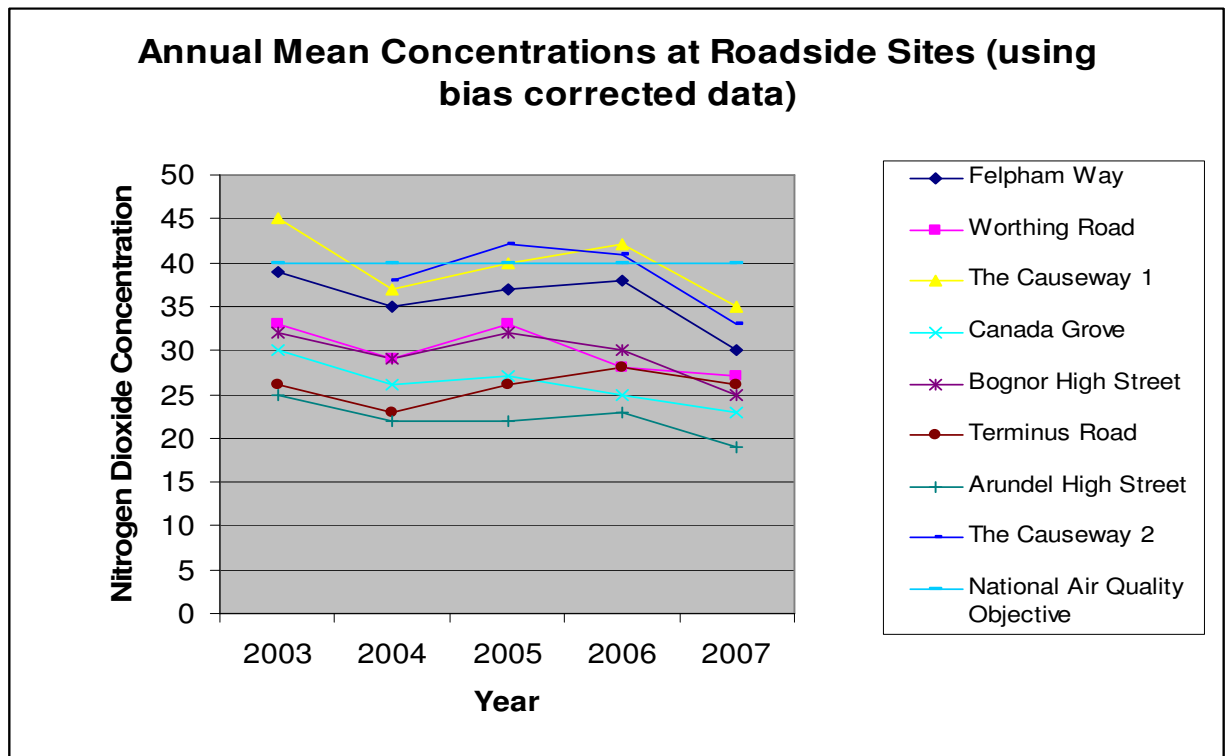


Table 9 - Annual mean NO<sub>2</sub> concentrations at roadside sites (using bias corrected data µg/m<sup>3</sup>) (\*NS= Not sampled)

Year of Data	Roadside Sites							
	Felpham Way	Worthing Road	The Causeway (1)	Canada Grove	Bognor High St	Terminus Road	Arundel High St	The Causeway (2)
2003	39	33	45	30	32	26	25	NS*
2004	35	29	37	26	29	23	22	38
2005	37	33	40	27	32	26	22	42
2006	38	28	42	25	30	28	23	41
2007	30	27	35	23	25	26	19	33

Figure 5 Annual Mean Concentrations of Nitrogen Dioxide at Roadside Sites



#### 4.5.3 Estimated Future NO<sub>2</sub> Concentrations

Following the procedure as set out in Boxes 6.2 and 6.7 of technical guidance document LAQM.TG(03), the bias corrected monitoring data has been adjusted to provide an estimate for the annual mean NO<sub>2</sub> concentration in 2008 and 2010.

**Table 10: Annual mean NO<sub>2</sub> concentrations at background sites, estimated for 2008 and 2010 (using bias corrected data µg/m<sup>3</sup>)**

Projected Year	Background Sites				
	Thatchway Close	Westlands	King St	Priory Rd	Mornington Crescent
2008	15	17	17	14	16
2009	14	17	17	13	16
2010	14	16	16	13	15

The results for background NO<sub>2</sub> concentrations in 2008 and 2010 are estimated to be well below the annual mean objective of 40 µg/m<sup>3</sup>.



**Table 11 Annual Mean NO<sub>2</sub> Concentrations at Roadside Sites, Estimated for 2008 and 2010 (using corrected data µg/m<sup>3</sup>)**

Projected Year	Roadside Sites							
	Felpham Way	Worthing Road	The Causeway (1)	Canada Grove	Bognor High St	Terminus Road	Arundel High St	The Causeway (2)
2008	29	26	34	22	24	25	18	32
2009	28	25	33	22	23	24	18	31
2010	27	24	32	21	23	24	17	30

The results for roadside NO<sub>2</sub> concentrations in 2008 and 2010 are estimated to be below the annual mean objective of 40 µg/m<sup>3</sup>

#### 4.5.4 Additional Diffusion Tube at The Causeway, Arundel

After submission of Arun’s Progress Report in 2004, the following comments were received from DEFRA: “It is suggested that the diffusion tube situated at the Causeway is moved to the façade of the closest building (if practicable) or an extra site included in order that the Council satisfies itself that there is no likely exceedence of the annual mean nitrogen dioxide objective at this location.”

It was not possible to move the original diffusion tube to the façade of the closest building. However, an extra tube was included at The Causeway from September 2004 onwards.

In order to get a more detailed picture of conditions at this site, a more accurate continuous NO<sub>2</sub> analyser was installed at The Causeway between July and October 2005, by West Sussex County Council giving hourly readings of nitrogen dioxide concentrations. Some technical problems were experienced and, as a result, less data was collected than initially expected. All data have been ratified, extrapolated to cover a full calendar year where necessary, and projected to the end of year (2005), as indicated in the technical guidance (Box 6.5 - adjustments for short term monitoring) of the technical guidance LAQM.TQ (03). The results from this monitoring are shown in the table below:

**Table 12: Monitoring from the continuous NO<sub>2</sub> analyser – Arundel Causeway**

Month in 2005	Number of days monitored	Level of nitrogen dioxide
July	6	10.9 µg/m <sup>3</sup>
August	14	20.2 µg/m <sup>3</sup>
September	30	19.1 µg/m <sup>3</sup>

The overall average for nitrogen dioxide from the above data is 23.16 µg/m<sup>3</sup>. This level is well below the objective level.

Using the results directly from the diffusion tubes, the annual mean concentration at “The Causeway” site for 2007 is the objective level of 40µgm<sup>3</sup>. However, section 1.20 LAQM.TG(03) states that: “it is considered appropriate to measure at the building façade to represent relevant exposure...(and) it is considered reasonable to select the façade of residential properties closest to the road as a representative location to assess exposure for pollutants with an annual mean objective”.

Furthermore, advice given in the Frequently Asked Questions section of the Air Quality Review and Assessment Website (UWE) suggests that concentrations will be slightly lower at the building façade.

Given that the distance from the façade of the nearest residential properties (1-8 Causeway Villas) to the tube located at “The Causeway(2)”, Arundel, is 8 metres it can be assumed that

concentrations at this position would be even further below the objective level. As the tubes are not located at the façade of the building, the results were adjusted as detailed in the FAQ on the following website: <http://www.uwe.ac.uk/aqm/review/mfaqroad.html>. Therefore the adjusted annual mean for The Causeway for 2007 at the building facade is:

$$34 \times 0.90 = 30.6 \mu\text{g}/\text{m}^3$$

#### 4.5.5 Conclusion

It is unlikely that the air quality objective for Nitrogen Dioxide will be exceeded in 2008 or 2010.

#### 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).

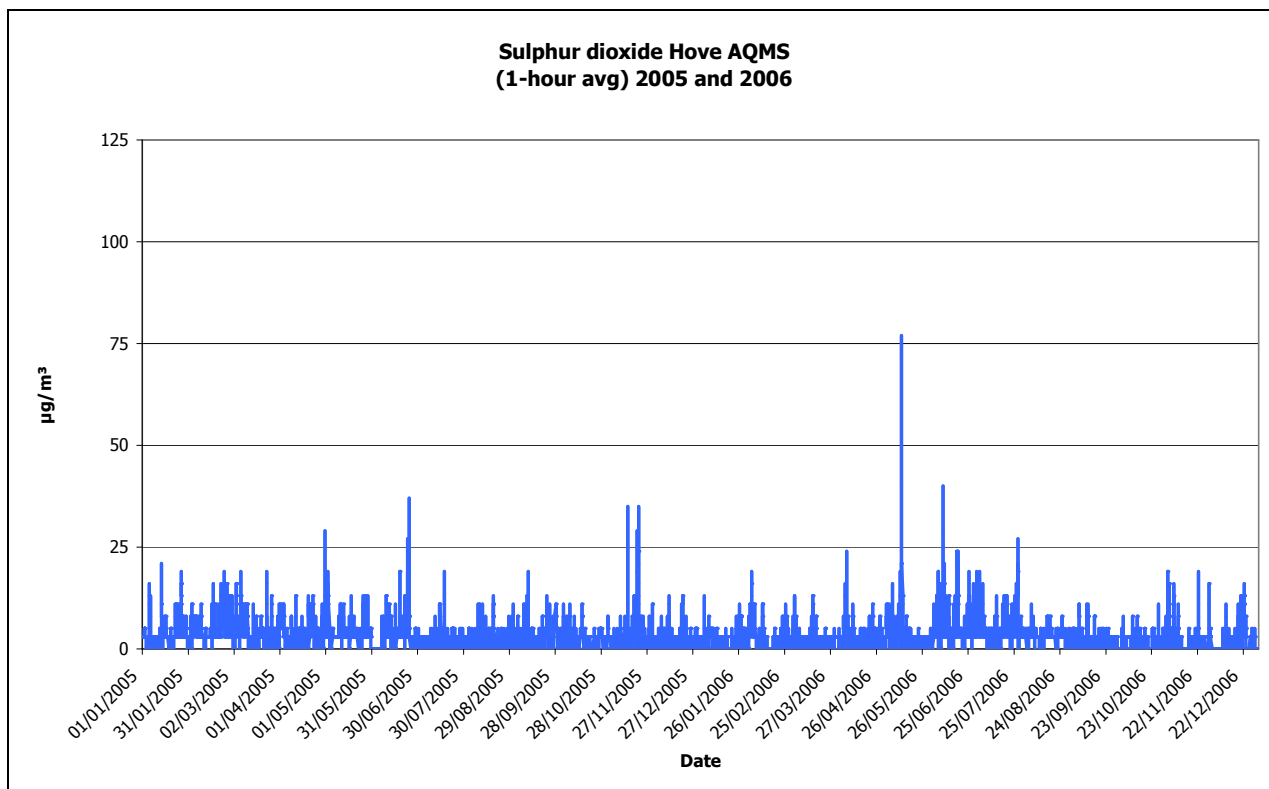
Automatic sulphur dioxide monitoring is undertaken at two permanent stations in Sussex located in Hove (roadside) and Lullington Heath (rural). The 2005 - 06 data from the Hove AURN air quality station does not indicate any exceedence of the national objectives.

\*Note: The Hove AURN station was closed on 30<sup>th</sup> October 2007, therefore data is not complete for 2007.

**Table 13: Sulphur dioxide monitoring summary (2007) Hove AURN**

Pollutant	Air Quality Objective		2007 Measurements (Local or Sussex AQMS)	
	Conc.	Measured as		Exceedance
Sulphur dioxide	350 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 24 times a year	- 1 hour mean	32 $\mu\text{g}/\text{m}^3$ (max) (Hove)	NO
	125 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 3 times a year	- 24 hour mean	9 $\mu\text{g}/\text{m}^3$ (max) (Hove)	NO
	266 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 35 times a year	- 15 minute mean	37 $\mu\text{g}/\text{m}^3$ (max) (Hove)	NO

Figure 6 Sulphur Dioxide 1-hour averages



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. No boilers have been identified.

There are no significant shipping or railway locomotive emissions in Arun District. It is thus concluded that the sulphur dioxide objective is unlikely to be exceeded at any location in the District.

### Conclusion

Due to the Hove AURN air quality station being well below the air quality objective for sulphur dioxide, it is unlikely that the air quality objective will have been exceeded in 2008 or in Arun District.

### 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 (APEG, 1999): (I) *Primary particle* emissions are derived directly from combustion sources, including road traffic, power generation, industrial processes etc. (II) *Secondary particles* are formed by chemical reactions in the atmosphere, and comprise principally of sulphates and nitrates. (III) *Coarse particles* 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 Sussex network contains 7 permanent (2007/08) automatic (TEOM) monitors. Table 14 shows the averages for the PM<sub>10</sub> monitoring stations measured in gravimetric equivalent (TEOM x 1.3)

**Table 14 Sussex PM10 monitoring results (grav.) for 2007**

Monitoring location	PM10 (grav.)	
	24 hour mean (50 µg/m <sup>3</sup> not to be exceeded 35 times a year)	Annual mean (40 µg/m <sup>3</sup> )
<b>Chichester</b>	<b>22</b>	<b>31</b>
<b>Eastbourne</b>	<b>12</b>	<b>25</b>
<b>Hastings</b>	<b>20</b>	<b>31</b>
<b>Horsham</b>	<b>11</b>	<b>27</b>
<b>Telscombe Cliffs</b>	<b>18</b>	<b>29</b>
<b>Lewes Town</b>	<b>25</b>	<b>31</b>
<b>Rother D.C.</b>	<b>9</b>	<b>27</b>

The nearest monitor is permanently located at Chichester, giving hourly readings of PM<sub>10</sub> concentration. The annual average for the year 2007 was 31, which is below the national objective. The number of exceedances of the 24-hour PM<sub>10</sub> objective for the same year was 22, thus below the allowed number of exceedances.

### **Conclusion**

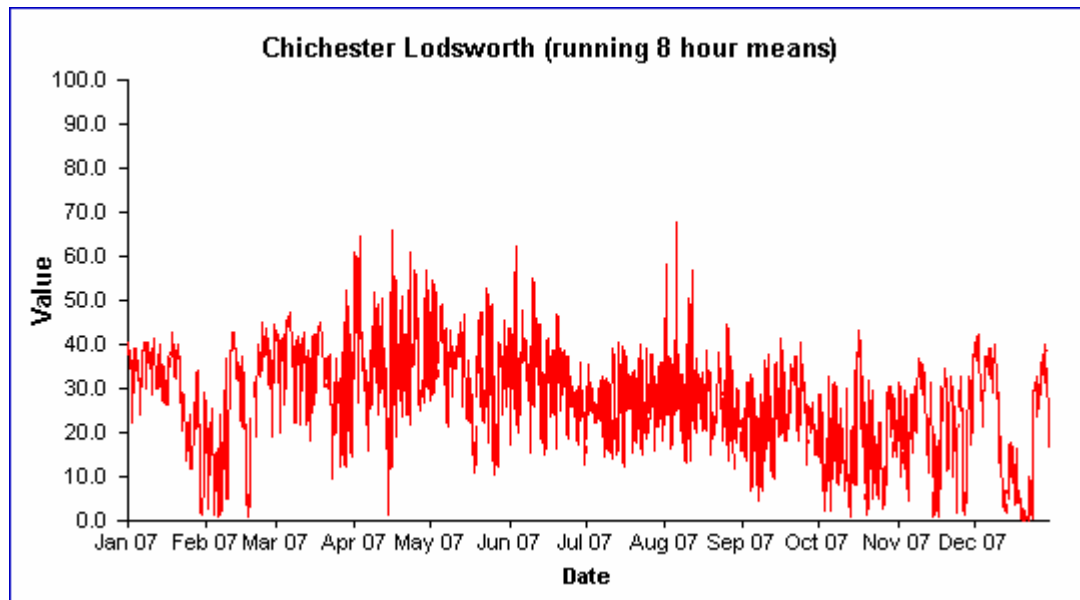
The air quality objective for PM<sub>10</sub> was not exceeded in 2007 and therefore it is unlikely that the will be exceeded in future years.

#### 4.8 Updated data for other pollutants.

Arun has been working with the Sussex Air Quality Partnership (SAQP) to monitor ozone levels in the region. Diffusion tubes (a similar technique to that used to measure Nitrogen Dioxide), were attached to lampposts at a site in Bognor Regis and another in Arundel. In addition to the diffusion tubes, an ozone monitor has been installed at West Beach. These were part of the Anglo-French ARMO project (<http://www.arm-ozone.org/en>)

Ozone monitoring results, available on [www.sussex-air.net](http://www.sussex-air.net), show that the ozone levels at both the Arundel and Bognor Regis sites are higher than the average shown in Sussex. In the revised 2007 Air Quality Strategy for the UK, objectives have also been included for ozone, although these are to be addressed at the national level rather than by individual local authorities. The objective for ozone is  $100 \mu\text{g}/\text{m}^3$  (50 ppb) not to be exceeded more than 10 times a year, measured as a daily maximum of running 8-hour mean. The following graph details the 8 hour running mean for ozone measured at the Lodsworth site in rural Chichester. These readings will be appropriate for rural areas of Arun.

**Figure 7 Ozone readings at Chichester Lodsworth for running 8 hour mean ( $\mu\text{g}/\text{m}^3$ )**



## **5 New Local Developments**

### **New Developments**

Arun District has had no new major developments that may have an impact on local air quality. However Bognor Regis has a number of major development schemes in the planning stage. These include 3 developments of new houses and flats (a total of 1350 new dwellings altogether), 2 areas of commercial redevelopment, a new relief road and two mixed use sites.

As the redevelopment of Bognor Regis is in the planning stages at the moment, full consideration of any impacts on Air Quality will be explored in the 2009 Update and Screening Assessment.

However, it should be noted that an Environmental Impact Assessment carried out as part of the planning application for the main housing development and relief road concluded that “no exceedances of the Air Quality Strategy objectives will occur at existing potentially sensitive receivers”.

### **Industrial Sources**

Industrial sources are currently controlled under The Environmental Permitting (England and Wales) Regulations 2007, 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, quarries, etc.) for guidance and control. Since the last Updating and Screening Assessment (USA) 2005, it has been a requirement that Dry Cleaners are permitted. There are a total of seven dry cleaners in Arun District.

## **6 Local Air Quality Strategy**

The Sussex Air Quality Strategy (Draft Sept. 2003) – Framework for Action, has been formulated as a framework document from which members of the Sussex Air Quality Steering Group (SAQSG) can integrate into their own Local Air Quality Strategy.

From the SAQSG Air Quality Strategy (Sept 2003):

“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.

By providing an air quality template, each authority can adopt it and modify it according to their authority circumstances and role. Much of the template will be common to many authorities in Sussex. However, vital to ensuring a consistent approach is maintained in the aim and purpose of every authority’s strategy, all agencies participating in Sussex Air Quality Steering Group has agreed to the Guiding Principle and Aims of improving air quality in Sussex.”

## **7 Planning and Policies**

The Arun District Local Plan 2003 forms a statement of Arun District Council's planning policies, which will be used as a basis for decision making on planning applications. The Plan covers the period from 1996 to 2011 and it's key aim is to apply the principles of sustainable development in assessing development proposals, striking the balance between the need for development and the protection of scarce resources. The Plan also serves to translate the

land use elements of the Council's Community Strategy, "Our Kind of Place", into policies and proposals. The Core Strategy of the Local Development Framework will be published for consultation late in 2007, and should be adopted in July/August 2009. Two Development Plan Documents, Sustainable Communication and the Gypsy and Traveller document should be adopted in 2010. There are a number of general policies within the current Local Plan that may affect local air quality.

#### POLICY GEN4 Location and Travel Demand

When considering proposals for new development, consideration will be given to the effect the proposals will have on demand for transport. Planning permission will be granted for new development, provided that:-

- (i) it is located so as to minimise the demand for travel;
- (ii) it does not materially add to existing road congestion and air pollution; and appropriate provision is made for safe and convenient access by public transport, cyclists and pedestrians.

Before granting planning permission, the Local Planning Authority will need to be satisfied that any identified potential travel problems arising from a proposal will be resolved.

#### POLICY GEN14 Public Transport

The Council will support the provision of comprehensive public transport services throughout the District, and encourage improvements to be made to services wherever possible. Where appropriate, new development will be required to make provision for public transport facilities. Where new development can only take place with improvements to public transport services, or such improvements would be likely to influence desirable travel patterns, the Local Planning Authority will seek contributions towards the cost of improvements.

#### POLICY GEN34 Air Pollution

Development that contributes to air pollution through dust, smell, fumes, smoke, heat, radiation, gases, steam or other forms of pollution will not be permitted unless the Council decides that the health, safety and amenity of users of the site or surrounding land is not put at risk and the quality of the environment would not be damaged or put at risk.

## **8 Local Transport Plans and Strategies**

West Sussex County Council (WSCC) is the Highways Authority for West Sussex and is responsible for all roads, other than trunk roads. WSCC published its first Local Transport Plan (LTP) in 2000 for the period from April 2001 to 2006. It's second LTP, a new ten year plan covering the period 2006 to 2016 was approved in March 2006 (LTP2).

LTP2 is the second cycle of the Local Transport Plans which transport authorities must submit to government on strategic transport planning issues related to their area. Guidance documents are provided by government and outline priorities, one of which is Air Quality, especially in relation to AQMA's.

The Plan's main objectives are to:

- Reduce congestion & pollution;
- Improve road & personal safety;
- Improve accessibility for our residents to key services;
- Improve overall quality of life in West Sussex

The LTP is designed to integrate transport planning with land use planning, health and social needs, which includes air quality. It also explains how air quality considerations are taken account of in the wider plan and in the assessment of individual transport schemes.

The strategy will impact in particular upon the transport plan objectives of reducing congestion and growth in unsustainable travel, improving air quality, reducing the impact of expected climate change and reducing the environmental impact of undertaking all aspects of transport provision and maintenance.

Key targets include:

- Continue to work closely with all councils, including those that are neighbours to West Sussex, and with the primary health care trusts, the Environment Agency, Highways Agency, Sussex and Brighton universities and the Sussex Air Quality Partnership;
- Assist district councils and surrounding counties in their air quality assessments;
- Promote the provision of alternative fuels on Garage forecourts across West Sussex, primarily LPG but also CNG, LNG, and biofuels. Look at provision of public electric recharging points if electric vehicle use is to be promoted;
- Continue with our air quality forecasting and warning system to inform the public and improve their awareness of air quality issues and less polluting means of travel;
- Consider use of Low Emission Zones (LEZs) as part of our developing policies on environmental access controls for town centres, which will be geared to local circumstances.



## 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 metre of air
µg/m <sup>3</sup>	Micrograms of the pollutant per cubic metre 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
WSCC	West Sussex County Council

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- The Environment Act (1995)
- The Environmental Protection Act (1990)

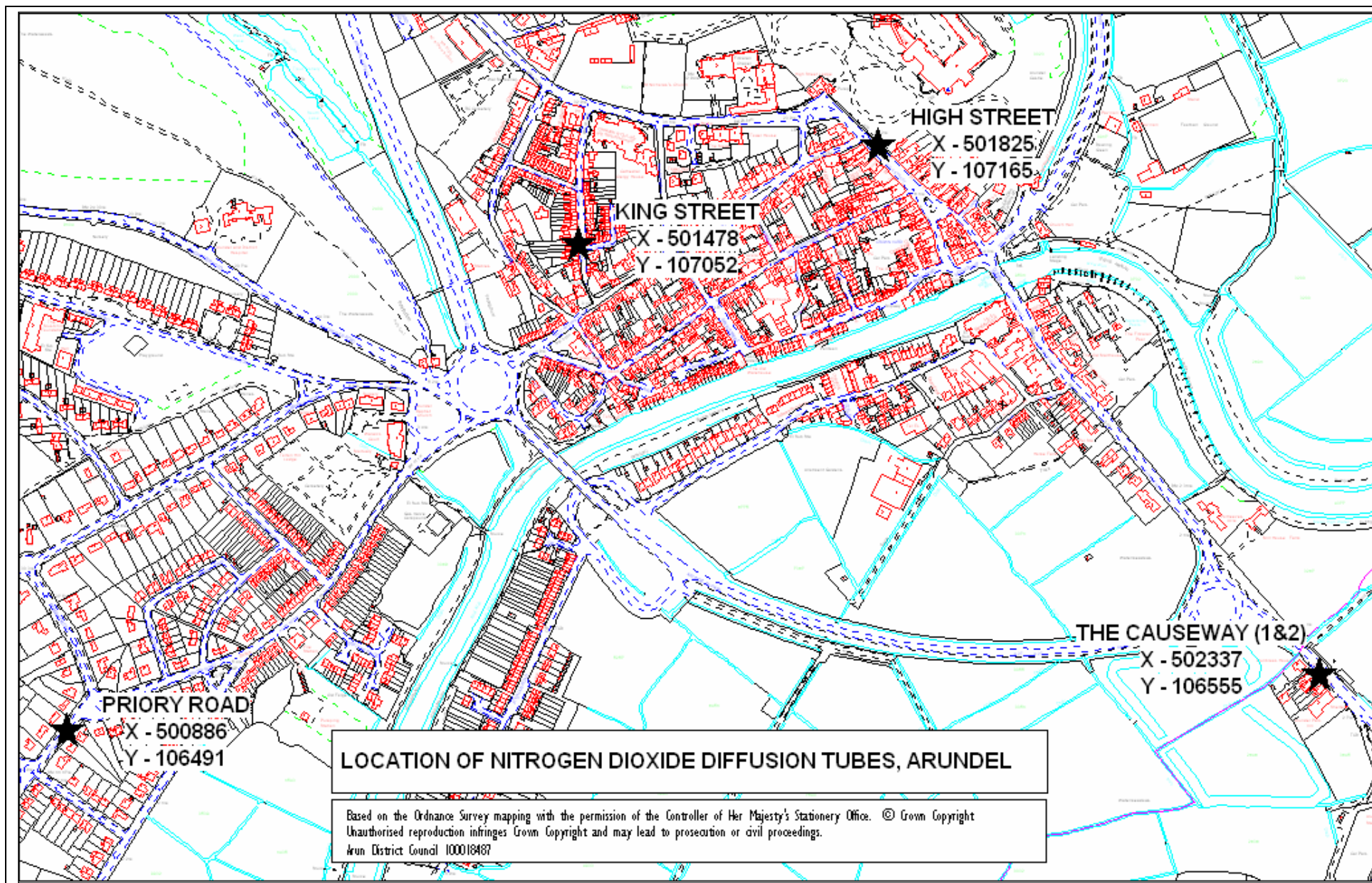
## **Appendix I: Monitoring Data – QA/QC and ratification**

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).

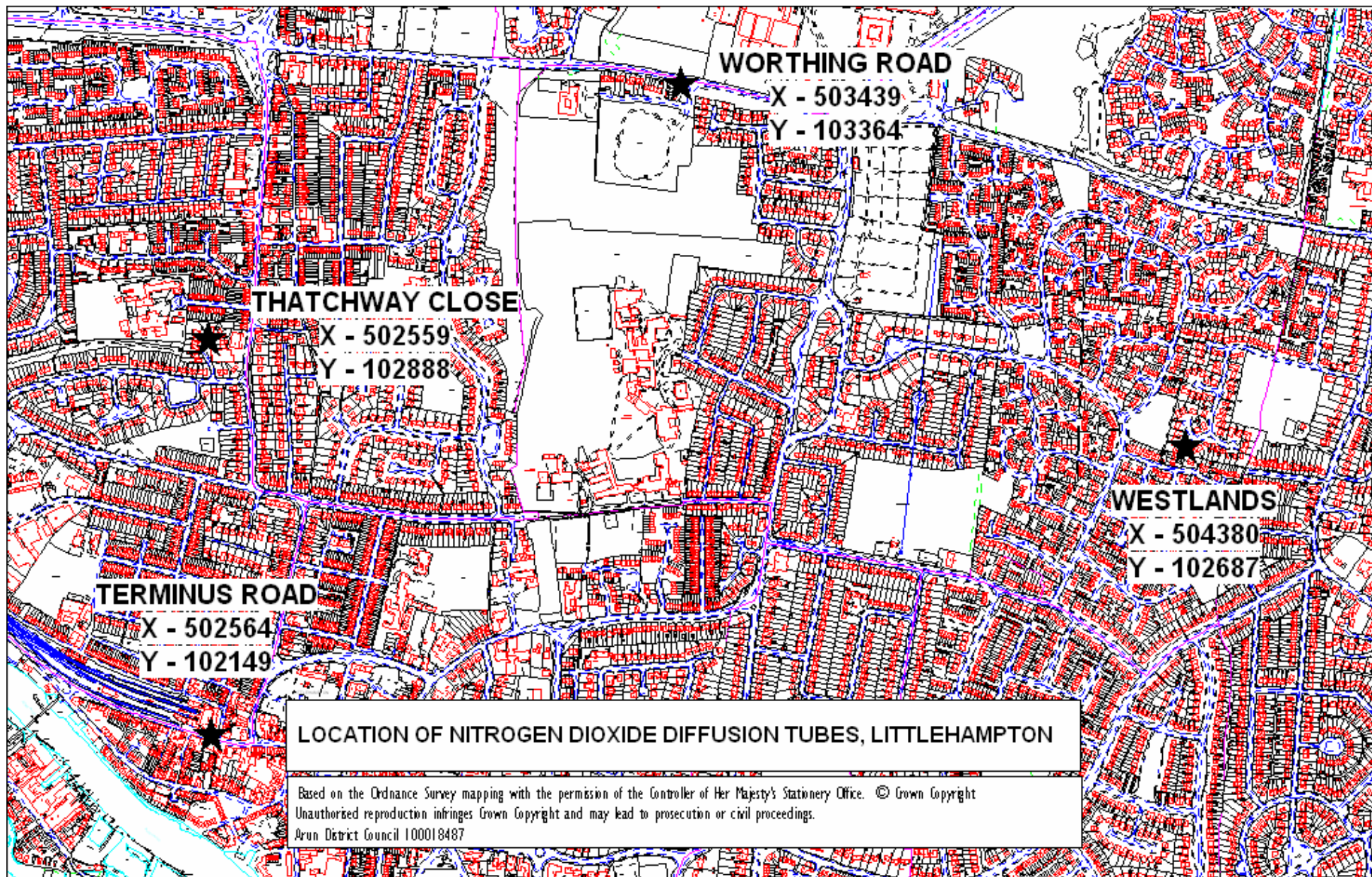
The NO<sub>2</sub> diffusion tube analysis was carried out at South Yorkshire Laboratory. The NO<sub>2</sub> tube preparation method used is 50% triethanolamine (TEA) in acetone. Data from the NO<sub>2</sub> diffusion tubes has been compared and bias corrected to the factors produced from the UK co-location data-base as produced by University of West of England (UWE) on behalf of DEFRA. (<http://www.uwe.ac.uk/aqm/review/no2dtbiasdatabase.xls> )

## **Appendix II: Distribution of Nitrogen Dioxide Diffusion Tubes**

NO<sub>x</sub> diffusion tube location details are shown on following pages:







**WORTHING ROAD**

X - 503439

Y - 103364

**THATCHWAY CLOSE**

X - 502559

Y - 102888

**WESTLANDS**

X - 504380

Y - 102687

**TERMINUS ROAD**

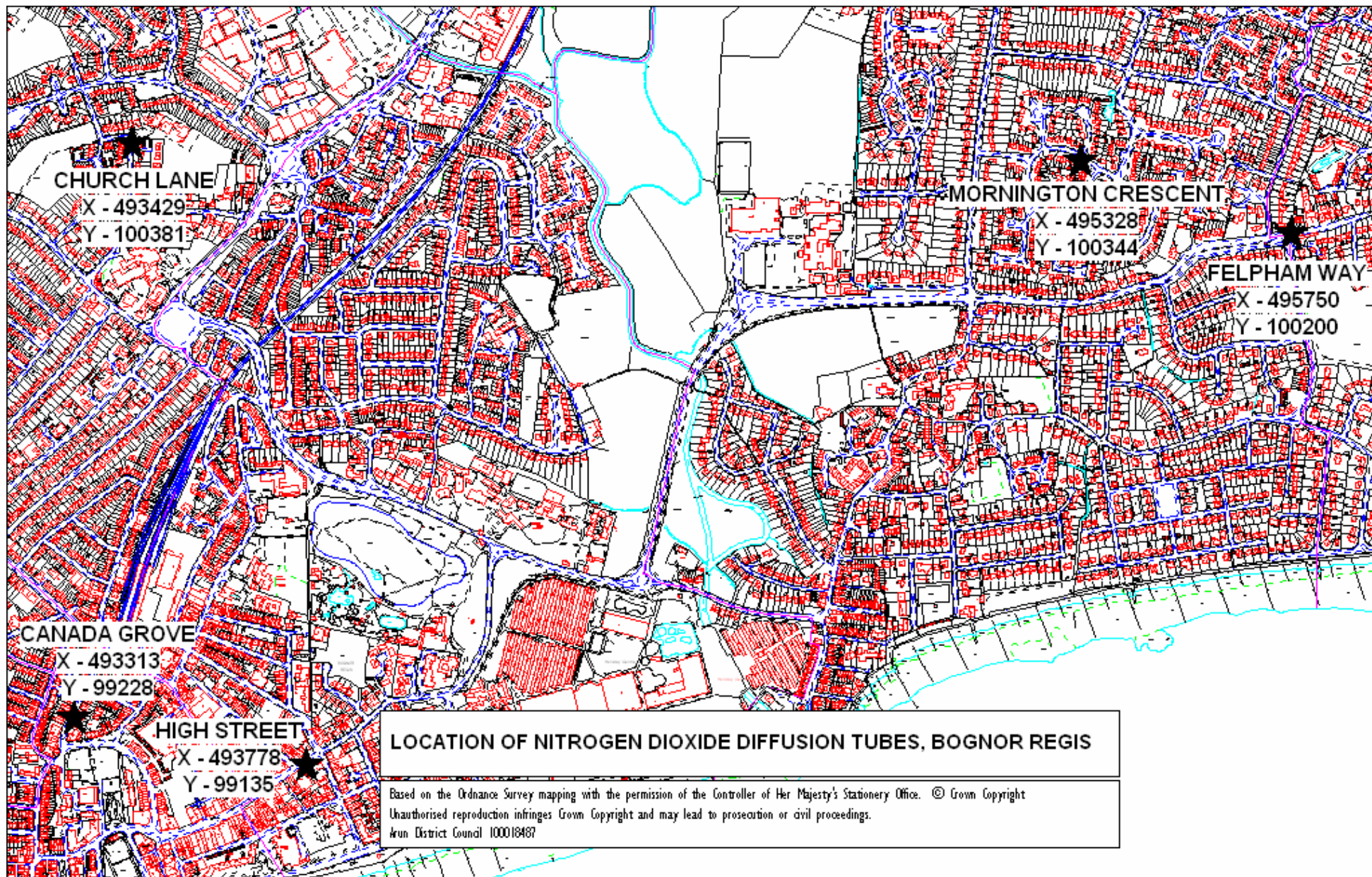
X - 502564

Y - 102149

**LOCATION OF NITROGEN DIOXIDE DIFFUSION TUBES, LITTLEHAMPTON**

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Arun District Council 100018487





### Appendix III: Industrial Processes

Part A, A2 or B Processes:

Tarmac Southern Ltd - Roadstone Coating Plant	Tarmac Southern Ltd., Quayside, Littlehampton, West Sussex, BN17 5DD
Tarmac Topblock Ltd - Production of Formed Concrete Blocks	Tarmac Topblock Ltd., Ford Aggregate Works, Ford Airfield Industrial Estate, Yapton, Nr Arundel, West Sussex, BN18 0HY
The Worthing Crematorium - Cremation of human remains	The Worthing Crematorium, Horsham Road, Findon, West Sussex
Eurotek Office Furniture Ltd - Waste wood combustion	Eurotek Office Furniture Ltd, Southern Cross Trading Estate, Bognor Regis, West Sussex, PO22 9SB - Brian Halson
Marine Pack Ltd - Breeding of Maggots	Marine Pack Ltd., T/A National Bait Company, Lidsey Farm, Lidsey, West Sussex
Dudman Equipment Ltd - Mobile Concrete Crusher	Mobile Plant operated at various locations including:- Valdoe Quarry, New Road, Goodwood, West Sussex, PO21 0PJ - Steve Grant
Finecast Foundry Limited - Aluminum Foundry Process	Finecast Foundry Ltd, Unit 1, Lineside Way, Lineside Industrial Estate, Littlehampton, West Sussex BN17 7EH
Poling Motor Company - Respraying of Road Vehicles	Poling Motor Company, Fordingbridge Industrial Estate, Barnham Road, Barnham, West Sussex, PO22 0HD
Bognor Garage/J & S Motors - Small Waste Oil Burner	Bognor Garage/J & S Motors, Shripney Road, Bognor Regis, West Sussex, PO22 9NJ
Chris Clarke Cars - Small Waste Oil Burner	Chris Clarke Cars, Spencer Street, Bognor Regis, West Sussex, PO22 1AN
Arundel Road Garage - Small Waste Oil Burner	Arundel Road Garage, Arundel Road, Angmering, West Sussex, BN16 4JZ
Yeomans Honda - Small Waste Oil Burner	Yeomans Honda, Chichester Road, Elbridge, Chichester, West Sussex, PO21 5EH
Yeomans Honda - Small Waste Oil Burner	Yeomans Honda, Chichester Road, Elbridge, Chichester, West Sussex, PO21 5EH
Littlehampton Marina - Small Waste Oil Burner	Marina Workshop, Littlehampton Marina, Ferry Road, Littlehampton, West Sussex, BN17 5DS
Petrol Express - Unloading of Petrol into Storage	Rose Green Service Station, Hewarts Lane, Bognor Regis, West Sussex, PO21 3DS
Pace Filling Station (Felpham) - Unloading Petrol into Storage	Pace Petrol Filling Station, 97 Felpham Way, Bognor Regis, West Sussex, PO22 8QB

Pace Filling Station (Westergate) - Unloading Petrol into Storage	Pace Petrol Filling Station, Nyton Road, Westergate, Chichester, West Sussex, PO20 8QB
Tesco Petrol (Littlehampton) - Unloading Petrol into Storage	Tesco Stores Limited, Broadpiece, Littlehampton, West Sussex, BN17 5RA
Tesco Petrol (Bognor Regis) - Unloading Petrol into Storage	Tesco Stores Limited, Shripney Road, Bognor Regis, West Sussex, PO22 9ND
Shell Petrol (Rustington) - Unloading Petrol into Storage	Shell Eastfield, Rustington Bypass, Rustington, Littlehampton, West Sussex, BN17 6LE
Shell Petrol (Fontwell) - Unloading Petrol into Storage	Shell Fontwell, Arundel Rd, Fontwell, BN18 OSB
BP Filling Station (Rustington) - Unloading Petrol into Storage	Rustington Filling Station, 102, Worthing Road, Rustington, Littlehampton, West Sussex, BN16 3LS
Snax 24 (Lyminster) - Unloading Petrol into Storage	Snax 24 Ltd, Lyminster Road, Lyminster, Littlehampton, West Sussex
Regis Service Station - Unloading Petrol into Storage	Regis Service Station, 449 Chichester Road, Bognor Regis, West Sussex, PO21 5DS
Cuff Miller - Unloading Petrol into Storage	Cuff Miller & Co (Littlehampton) Ltd, Horsham Road, Littlehampton, BN17 6BX
Sandra's Village Laundry & Dry Cleaners	Sandra's Village Laundry & Dry Cleaners, 146 Sea Road, East Preston, BN16 1NN
Colshaz Limited, T/A James Dry Cleaners	Colshaz Limited, T/A James Dry Cleaners, 39a Queensway, Bognor Regis, PO21 1QN
East Preston Laudrette	East Preston Laudrette, 132 Downs Way, East Preston, BN16 1AF
Johnson Cleaners UK Ltd	Johnson Cleaners UK Ltd, 166 The Street, Rustington, BN16 3DA
Johnson Cleaners UK Ltd	Johnson Cleaners UK Ltd, 2 Central Buildings, London Road, Bognor Regis, PO21 1PW
Kingfisher Cleaners	Kingfisher Cleaners, Shop 3 Station Parade, Station Road, East Preston BN16 3AE
Beach Road Dry Cleaners	Beach Road Dry Cleaners, 4 Beach Road, Littlehampton, BN17 5HT