2012 Air Quality Updating and Screening Assessment for Mid Sussex District Council

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

Date (July, 2012)

Department	Environmental Health
Address	Mid Sussex District Council Oaklands Oaklands Road Haywards Heath West Sussex
Report Reference number	MSAQUSA12
Date	July 2012

Executive Summary

Diffusion tube monitoring data for January to December 2011 has been used to assess compliance with the national air quality objectives.

Mid Sussex do not have any automatic monitoring sites.

Nitrogen dioxide (NO_2)
The 2011 annual means were below the nitrogen dioxide (NO_2) objective at 13 monitoring sites.
The objective was exceeded at 3 locations, each with relevant exposure i.e. residential premises within 15m of a monitoring site.
Two of these sites are within the Air Quality Management Area (AQMA) declared in March 2012.
An Action Plan detailing how the detected NO_2 levels may be reduced is in progress.

Particulate matter (PM10)
No further action required.

Sulphur dioxide
No further action required.

Benzene
No further action required.

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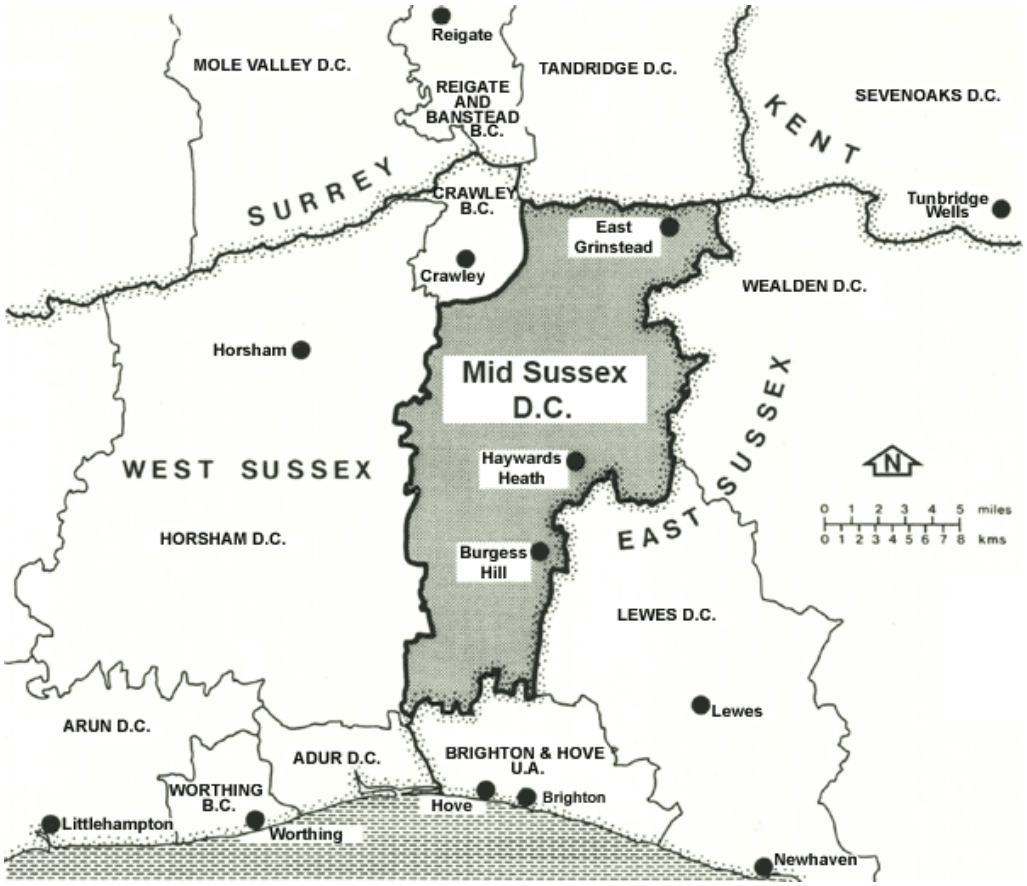
1 Introduction

1.1 Description of Local Authority Area

Mid Sussex District Council is located within the County of West Sussex. More than half the area is designated as an Area of Outstanding Natural Beauty. It lies on the eastern edge of the county and shares boundaries with East Sussex to the east, Surrey to the north and Brighton and Hove to the south.

Mid Sussex covers an area of some 33,400 hectares (approximately 128 square miles) and includes the three main towns of East Grinstead, Burgess Hill and Haywards Heath in a predominantly rural area, in which there are some 25 villages and many small hamlets.

The District has a population of approximately 128,000. Sixty percent of the population live in the three main towns with the remaining forty percent living in the smaller villages and rural areas. It is well served by transport links to London, Gatwick Airport, the M25, the coast and Europe.



1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to a risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$ (milligrammes per cubic metre, mg/m^3, for carbon monoxide) with the number of exceedences in each year that are permitted.

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

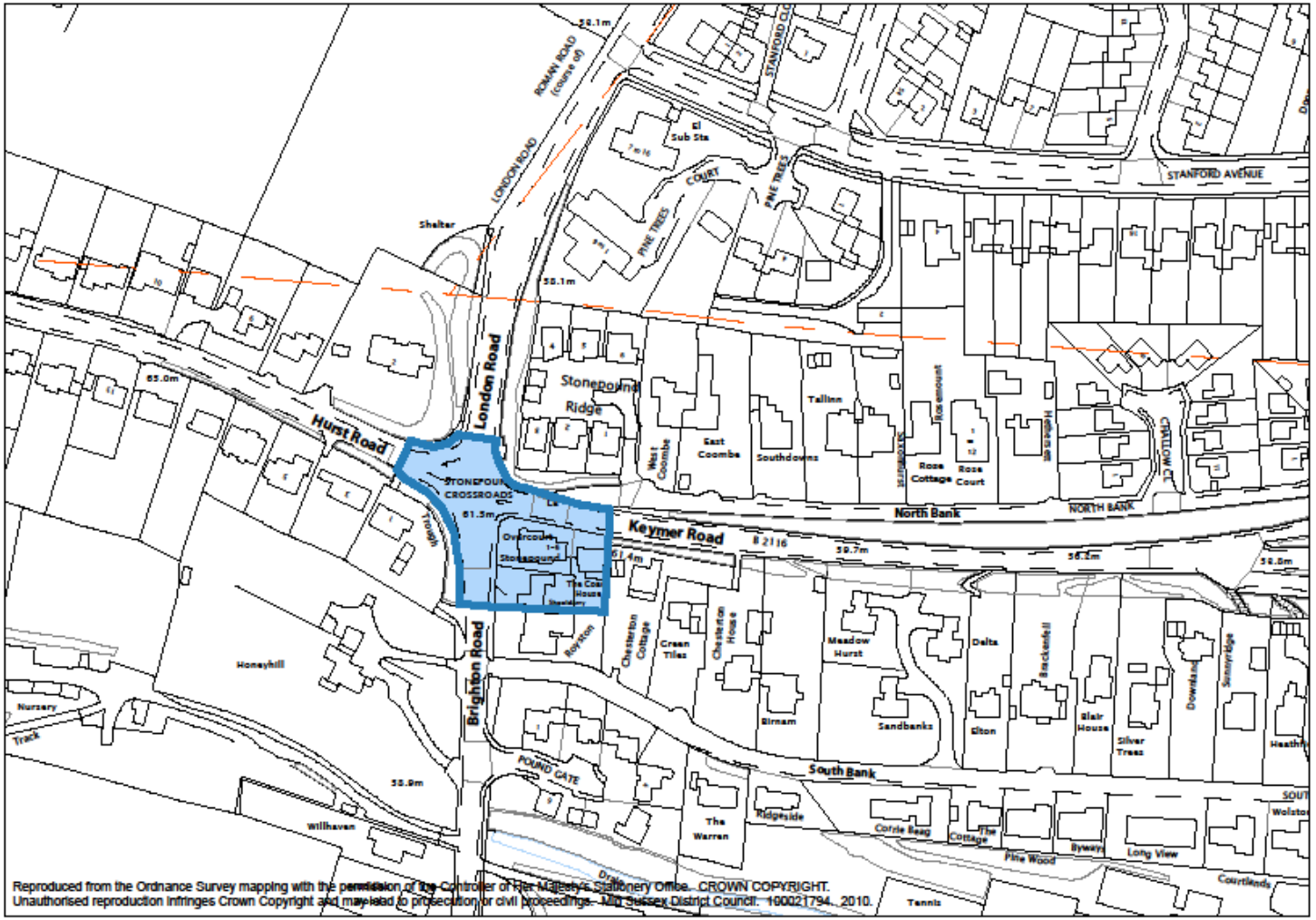
Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005

	40 μg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 μg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 μg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 μg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 μg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 μg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Previous Review /Assessment	Date	Exceedences	AQMA's Declared	Outcome
Stage 1 Review & Assessment Report	Dec 1998	None	None	
Stage 2 Review & Assessment Report	June 2000	None	None	
Updating & Screening Assessment 2003	April 2003	None	None	
Air Quality Progress Report 2004	April 2004	None	None	
Air Quality Progress Report 2005	April 2005	None	None	
Updating & Screening Assessment 2006	April 2006	None	None	
Air Quality Progress Report 2007	April 2007	None	None	
Air Quality Progress Report 2008	April 2008	NO_2 at 2 sites	None	Extra diffusion tubes to be installed. Detailed Assessment required for NO_2
Updating & Screening Assessment 2009	May 2009	NO_2 at 5 sites	None	Detailed Assessment required for NO_2
Air Quality Progress Report 2010	May 2010	NO_2 at 6 sites	AQMA to be declared	Detailed Assessment completed for NO_2
Detailed Assessment 2011	May 2011	NO_2 at 6 sites	AQMA Declared	Action Plan and Further Assessment to be completed

Figure 1.1 Map of Air Quality Management Area at Stonepound Hassocks



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Mid Sussex do not have any automatic monitoring sites

2.1.2 Non-Automatic Monitoring Sites

Across the District there are 20 locations where nitrogen dioxide (NO_2) diffusion tubes are located.
See Figure 2.1 and Table 2.1 for locations and details of the monitoring sites.

The Air Quality Progress Report 2008 indicated that the Stonepound crossroads area, located in Hassocks, was at risk of exceeding the annual mean air quality objective for nitrogen dioxide and consequently 8 additional monitoring sites were added to the network in July 2008.
The results for 2009 and 2010 confirmed further exeedences and consequently early in 2012 an Air Quality Management Area (AQMA) was declared.
Results at Stonepound for 2011 indicate there are 3 sites which exceed the annual mean air quality objective for nitrogen dioxide, all of which have relevant exposure.
Results from locations across the rest of the district confirmed there were no other exceedences.

Figure 2.1 Map of NO_2 non-automatic monitoring sites in Mid Sussex

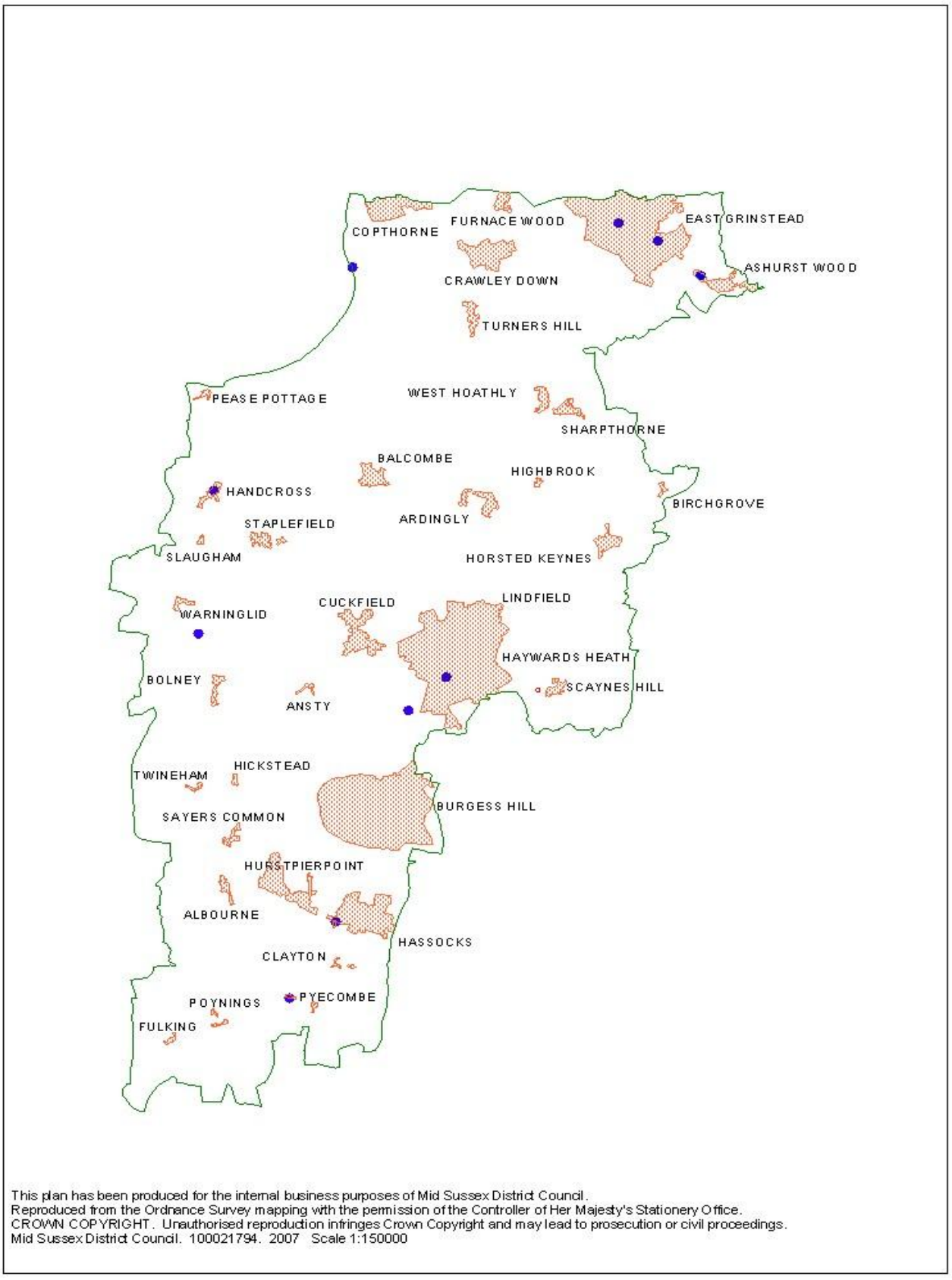


Table 2.1 Details of non-automatic monitoring sites

Site Name	Site Reference	Site Type	OS Grid Ref	Pollutants Monitored	In AQMA	Relevant Exposure	Distance to kerb of nearest road
South Road Haywards Heath	MSAQ1	Roadside	X 533342 Y 123588	NO_2	No	Yes (0m)	2.5m
Partly constructed Haywards Heath Relief Road	MSAQ2	Roadside	X 532184 Y 122459	NO_2	No	No	n/a
London Road East Grinstead	MSAQ3	Kerbside	X 538690 Y 138757	NO_2	No	No	0.5m
Court Close East Grinstead	MSAQ4	Suburban	X 539919 Y 138162	NO_2	No	Yes (14m)	0.5m
Lewes Road East Grinstead	MSAQ5	Suburban	X 541243 Y 136998	NO_2	No	No	1.5m
Smugglers End Handcross	MSAQ6	Roadside	X 526137 Y 129830	NO_2	No	Yes (0m)	n/a
Crabbet Park Worth	MSAQ7	Suburban	X 530440 Y 137280	NO_2	No	Yes (0m)	n/a
Pyecombe Street Pyecombe	MSAQ8	Roadside	X 528477 Y 112870	NO_2	No	Yes (7.5m)	1m
Water Tower Colwood Lane Warninglid	MSAQ9	Rural	X 525674 Y 125037	NO_2	No	No	n/a
Stonepound 1 Keymer Road Hassocks	MSAQ10	Roadside	X 529913 Y 115489	NO_2	Yes	Yes (6.7m)	1.5m
Stonepound 2 Keymer Road Hassocks	MSAQ11	Roadside	X 529928 Y 115482	NO_2	Yes	Yes (0m)	5.5m
Bus Stop Keymer Road Hassocks	MSAQ12	Kerbside	X 529984 Y 115487	NO_2	No	N	1.1m
Lamp Post Keymer Road Hassocks	MSAQ13	Kerbside	X 529995 Y 115475	NO_2	N	Yes (8.15m)	0.85m
Bus Stop London Road Hassocks	MSAQ14	Kerbside	X 529911 Y 115598	NO_2	N	No	1.6m

Traffic Light Sign London Road Hassocks	MSAQ15	Kerbside	X 529930 Y 115600	NO_2	N	Yes (6.5m)	1.6m
Façade of residential premises Brighton Road Hassocks	MSAQ16	Roadside	X 529918 Y 115443	NO_2	N	Yes (0m)	11.5m
Lamp Post Brighton Road Hassocks	MSAQ17	Kerbside	X 529894 Y 115340	NO_2	N	Yes (10m)	1.25m
Bus Stop Brighton Road Hassocks	MSAQ18	Kerbside	X 529909 Y 115442	NO_2	N	Yes (9m)	1.98m
Lamp Post Hurst Road Hassocks	MSAQ19	Roadside	X 529779 Y 115557	NO_2	N	Yes (13.2m)	1.3m
New Way Lane Hassocks	MSAQ20	Rural	X 529100 Y 114273	NO_2	N	n/a	n/a

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Mid Sussex District Council operate a number of diffusion tube sampling sites.

The bias corrected results for January to December 2011 are in Table 2.2.
All data have been ratified, see Appendix A, and where necessary extrapolated to cover a calendar year as stipulated in the technical guidance, TG(09), see Appendix C.

The 2011 annual means were below the NO_2 objective at 17 of the monitoring sites.

However, the objective was exceeded at the following locations:

- Stonepound 1, Keymer Road, Hassocks
- Stonepound 2, Keymer Road, Hassocks
- Lamp post, Keymer Road, Hassocks

All are sites with relevant exposure (i.e. residential premises within 15m of a monitoring site). Stonepound 1 & 2 are within the Air Quality Management Area (AQMA) declared in March 2012.

Diffusion Tube Monitoring Data

Table 2.2 Results of nitrogen dioxide diffusion tube monitoring in 2011

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011	Data with less than 9 months has been annualised	Annual mean concentration (Bias Adjustment factor = 0.83) 2011 (µg/m3)	Notes
MSAQ1	South Road Haywards Heath	Roadside	No		12 months		24.2	Relevant exposure (façade)
MSAQ2	Partly constructed Haywards Heath Relief Road	Roadside	No		11 months		13.7	Not relevant exposure
MSAQ3	London Road East Grinstead	Kerbside	No		11 months		39.1	Not relevant exposure
MSAQ4	Court Close East Grinstead	Suburban	No		12 months		20.1	Relevant exposure Estimated Concentration at nearest receptor 17.5µg/m^3 (2)
MSAQ5	Lewes Road East Grinstead	Suburban	No		12 months		35.6	Not relevant exposure
MSAQ6	Smugglers End Handcross	Roadside	No		12 months		28.2	Relevant exposure (façade)
MSAQ7	Crabbet Park Worth	Suburban	No		11 months		29.1	Relevant exposure (façade)
MSAQ8	Pyecombe Street Pyecombe	Roadside	No		12 months		32.0	Relevant exposure Estimated Concentration at nearest receptor 25.5µg/m^3 (2)

MSAQ9	Water Tower Colwood Lane Warninglid	Rural background	No		12 months		10.2	Not relevant exposure
MSAQ10	Stonepound 1 Keymer Road Hassocks (2)	Roadside	Yes	Trilocated	12 months		**49.0**	Relevant exposure Estimated Concentration at nearest receptor 38.1μg/m^3 (2)
MSAQ11	Stonepound 2 Keymer Road Hassocks (2)	Facade	Yes	Trilocated	12 months		**47.0**	Relevant exposure (façade)
MSAQ12	Bus Stop Keymer Road Hassocks	Kerbside	No		6 months	Y	33.0 (3)	Not relevant exposure
MSAQ13	Lamp Post Keymer Road Hassocks	Kerbside	No		12 months		**45.9**	Relevant exposure Estimated Concentration at nearest receptor 30.8μg/m^3 (2)
MSAQ14	Bus Stop London Road Hassocks	Kerbside	No		12 months		39.7	Not relevant exposure
MSAQ15	Traffic Light Sign London Road Hassocks	Kerbside	No		12 months		38.5	Relevant exposure Estimated Concentration at nearest receptor 29.4μg/m^3 (2)
MSAQ16	Façade of residential premises Brighton Road Hassocks	Facade	No		12 months		23.7	Relevant exposure (façade)
MSAQ17	Lamp Post Brighton Road Hassocks	Kerbside	No		12 months		24.8	Relevant exposure Estimated Concentration at nearest receptor 19.4μg/m^3 (2

MSAQ18	Bus Stop Brighton Road Hassocks	Kerbside	No		12 months		35.7	Relevant exposure Estimated Concentration at nearest receptor 26.7μg/m^3 (2)
MSAQ19	Lamp Post Hurst Road Hassocks	Kerbside	No		12 months		20.9	Relevant exposure Estimated Concentration at nearest receptor 16.9μg/m^3 (2)
MSAQ20	New Way Lane Hurstpierpoint	Rural background	No		7 months	Y	13.5 (3)	Not relevant exposure

(1) Bias adjustment factor taken from the spreadsheet available at the defra website (v03.12) http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

(2) Concentration at nearest receptor calculated using the spreadsheet available at http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html and the background map data available at http://laqm.defra.gov.uk/maps/maps2010.html

(3) Mean "annualised" as in Box 3.2 of TG(09), as monitoring data was not available for the full year - see Appendix C

Table 2.3 Results of nitrogen dioxide monitoring using diffusion tubes 2007 to 2011

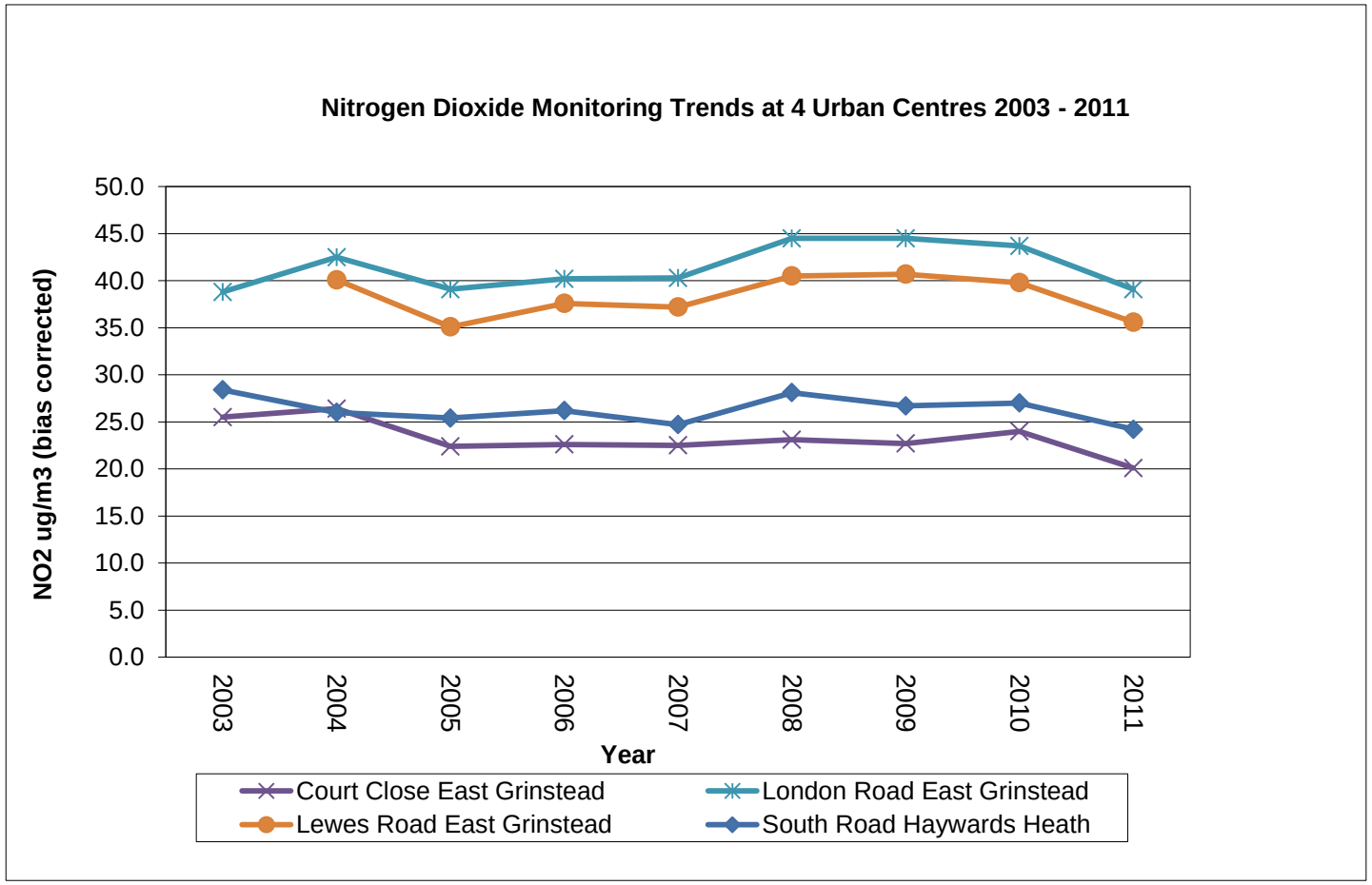
Site ID	Location	Site Type	Within AQMA	Annual mean concentrations (μg/m^3) Adjusted for bias				
				2007 (0.77 bias)	2008 (0.87 bias)	2009 (0.84 bias)	2010 (0.85 bias)	2011 (0.83 bias)
MSAQ1	South Road Haywards Heath	Roadside	No	24.7	28.1	26.7	27.0	24.2
MSAQ2	Partly constructed Haywards Heath Relief Road	Roadside	No	14.5	14.7	15.0	16.4	13.7
MSAQ3	London Road East Grinstead	Kerbside	No	40.3	44.5	44.5	43.7	39.1
MSAQ4	Court Close East Grinstead	Suburban	No	22.5	23.1	22.7	24.0	20.1
MSAQ5	Lewes Road East Grinstead	Suburban	No	37.2	40.5	40.7	39.8	35.6
MSAQ6	Smugglers End Handcross	Roadside	No	28.9	32.3	32.1	33.2	28.2
MSAQ7	Crabbet Park Worth	Suburban	No	29.2	32.5	30.1	31.6	29.1
MSAQ8	Pyecombe Street Pyecombe	Roadside	No	27.6	33.5	33.9	32.8	32.0
MSAQ9	Water Tower Colwood Lane Warninglid	Rural background	No	11.2	11.3	11.7	13.0	10.2
MSAQ10	Stonepound 1 Keymer Road Hassocks	Roadside	Yes	40.9	48.7	50.7	55.2	49.0
MSAQ11	Stonepound 2 Keymer Road Hassocks	Facade	Yes	44.1	48.1	50.4	50.1	47.0
MSAQ12	Bus Stop Keymer Road Hassocks	Kerbside	No	N/A	46.4(1)	45.5(1)	50.4	33.0(1)
MSAQ13	Lamp Post Keymer Road Hassocks	Kerbside	No	N/A	43.2(1)	44.5	45.4	45.9

MSAQ14	Bus Stop London Road Hassocks	Kerbside	No	N/A	42.4(1)	43.8	41.3	39.7
MSAQ15	Traffic Light Sign London Road Hassocks	Kerbside	No	N/A	39.3(1)	41.3	42.8	38.5
MSAQ16	Façade of residential premise Brighton Road Hassocks	Facade	No	N/A	26.5(1)	24.5	27.2	23.7
MSAQ17	Lamp Post Brighton Road Hassocks	Kerbside	No	N/A	25.0(1)	25.6	28.0	24.8
MSAQ18	Bus Stop Brighton Road Hassocks	Kerbside	No	N/A	32.1(1)	35.3	38.5	35.7
MSAQ19	Lamp Post Hurst Road Hassocks	Kerbside	No	N/A	22.3(1)	23.2	23.9	20.9
MSAQ20	New Way Lane Hurstpierpoint	Rural background	No	N/A	N/A	N/A	N/A	13.5(1)

(1) The estimated annual mean was obtained using the method in Box 3.2 of the Local Air Quality Management Technical Guidance TG(09) – see Appendix C

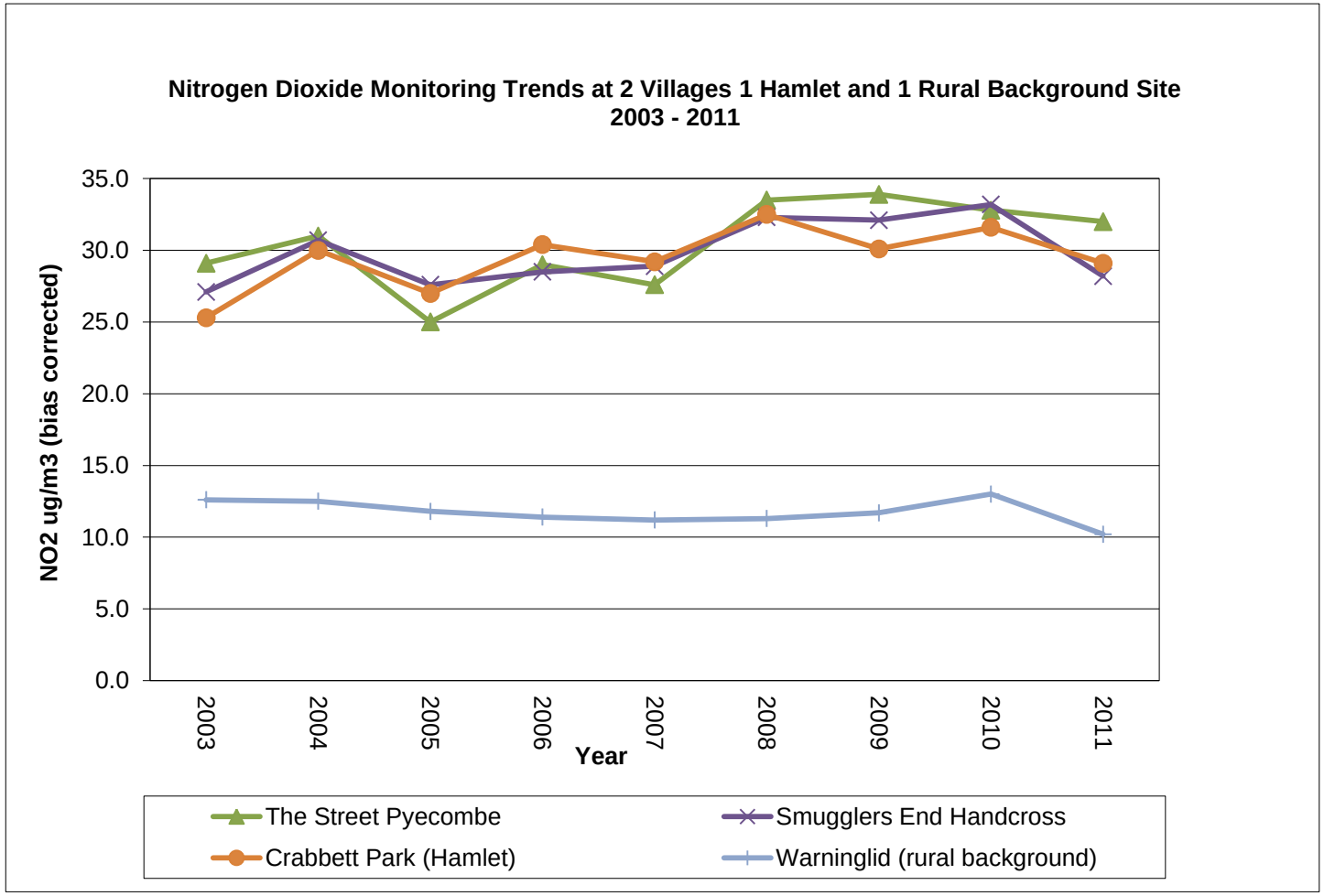
Trends in annual mean nitrogen dioxide concentrations measured at diffusion tube monitoring sites

Graph 2.2
Annual mean concentrations (bias corrected) 2003 to 2011 of nitrogen dioxide diffusion tube measurements at 4 urban centre sites



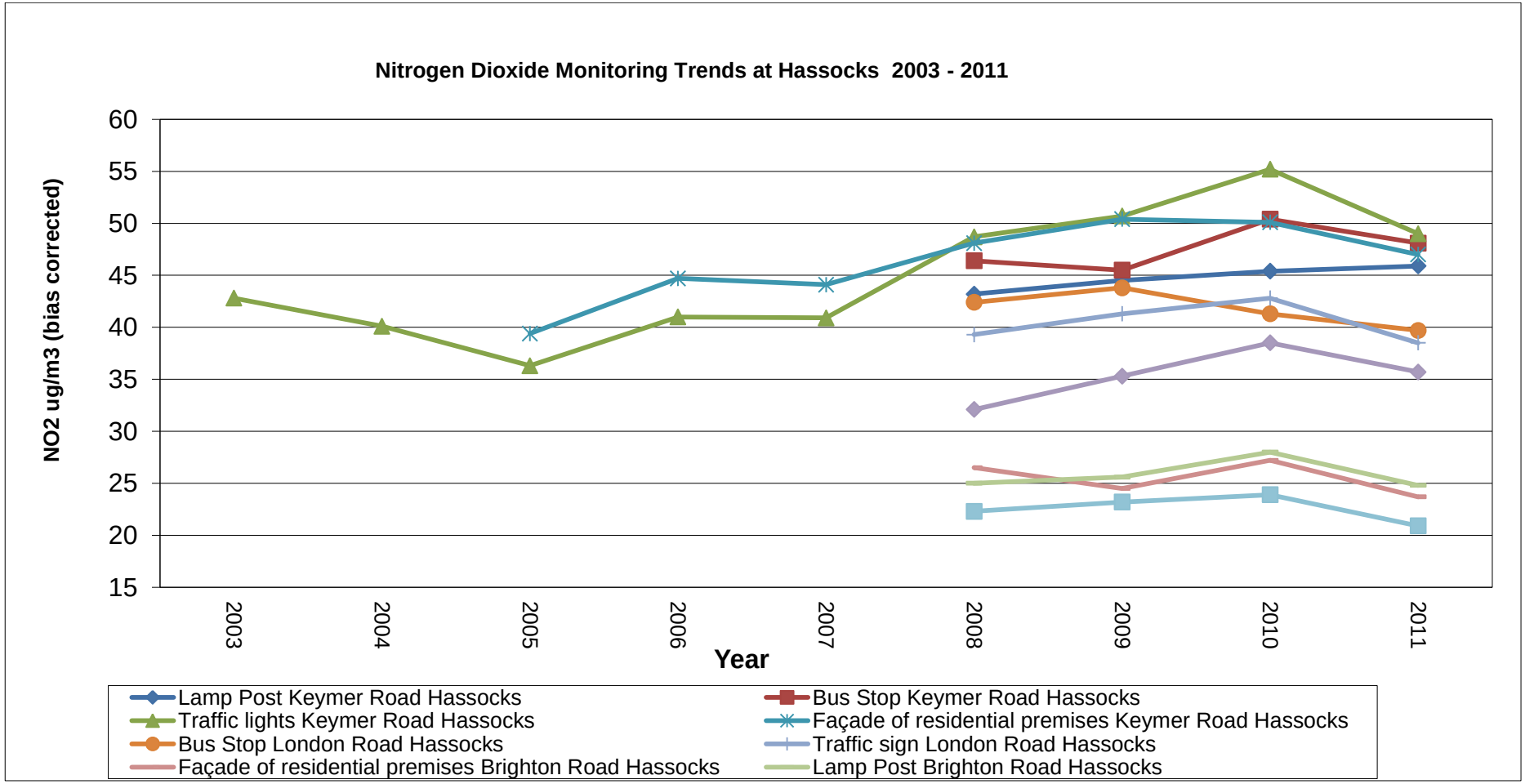
From 2005 to 2009 there has been a gradual increase in the monitored levels of nitrogen dioxide at 3 of the 4 urban centres. The 4th, Court Close East Grinstead, has remained at a relatively consistent level.
In 2010 the monitored levels declined slightly at 2 sites, London Road and Lewes Road East Grinstead and in 2011 the monitored levels at 3 of the sites were lower than in previous years.

Graph 2.3
Annual mean concentrations (bias corrected) 2003 to 2011 of nitrogen dioxide diffusion tube measurements at 2 villages, 1 hamlet and 1 rural background site



From 2005 to 2009 there has been a gradual increase in nitrogen dioxide at 3 of the sites.
The levels recorded in 2011 have reduced slightly form 2010.
The rural background has remained steady.

Graph 2.4
Annual mean concentrations (bias corrected) 2003 to 2011 of nitrogen dioxide diffusion tube measurements at Hassocks



From 2003 to 2010 the levels recorded at the traffic lights and at the façade in Keymer Road have increased year on year, reducing slightly in 2011. All sites showed an overall increase in levels from 2008 to 2010. 3 of the sites remain above the objective in 2011.

2.2.2 PM_{10}

Mid Sussex do not monitor for PM_{10}.
The Sussex Air Network has permanent automatic PM_{10} monitors across Sussex. The objective for PM_{10} has not been exceeded in 2011 at these sites, it is unlikely, therefore, that it will be exceeded in future years in Mid Sussex as no new industrial developments are currently planned.

2.2.3 Sulphur Dioxide

Mid Sussex do not monitor for sulphur dioxide.
The Sussex Air Network automatic SO_2 monitor located at Lullington Heath showed the air quality objective had not been exceeded during 2011, therefore, it is unlikely that it will be exceeded in future years in Mid Sussex as no new industrial developments are currently planned in the District.

2.2.4 Benzene

Mid Sussex do not monitor for Benzene.
Monitoring of benzene across the district was undertaken using diffusion tubes between 1997 and 2005.
The results considered in the Updating & Screening Assessment 2003 and the Progress Reports for 2004 and 2005 indicated the benzene objective would not be exceeded in the future.

Summary of Compliance with AQS Objectives

The results from monitoring for nitrogen dioxide across the Mid Sussex district show, except within the Air Quality Management Area at Hassocks, levels recorded are below the objective at all relevant locations.

3 Road Traffic Sources

Mid Sussex confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

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

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

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

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

Mid Sussex confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

Mid Sussex confirms that there are no new/newly identified busy junctions.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

Mid Sussex confirms that there are no new or proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Mid Sussex confirms that there are no new or newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

Mid Sussex confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Mid Sussex confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

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

4.2.2 Moving Trains

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

4.3 Ports (Shipping)

Mid Sussex confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

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

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

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

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

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

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

5.2 Major Fuel (Petrol) Storage Depots

There are no major fuel (petrol) storage depots within the Local Authority area.

5.3 Petrol Stations

Mid Sussex confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

Mid Sussex confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

Mid Sussex confirms that there are no biomass combustion plant in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

Mid Sussex confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

Mid Sussex confirms that there are no areas of significant domestic fuel use in the Local Authority area.

7 Fugitive or Uncontrolled Sources

Mid Sussex confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The 2011 annual means were below the nitrogen dioxide (NO_2) objective at 17 monitoring sites.
The objective was exceeded at 3 locations, each with relevant exposure i.e. residential premises within 15 metres of a monitoring site.
Two of these sites are within the Air Quality Management Area (AQMA) declared in March 2012.
An Action Plan detailing how the detected NO_2 levels may be reduced is in progress.

8.2 Proposed Actions

A Detailed Assessment for NO_2 has been undertaken for the Stonepound area of Hassocks and an Air Quality Management Area declared.
An Action Plan is in the process of being compiled and a Further Assessment is also being undertaken.

9 References

DEFRA (2002) The Air Quality (England) (Amendment) Regulations. HMSO.

DEFRA (2003) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum. HMSO.

DETR (2000) The Air Quality (England) Regulations. HMSO.

DETR (2000) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. HMSO.

DEFRA (2009) Local Air Quality Management Policy Guidance. LAQM.PG(09)

DEFRA (2009) Local Air Quality Management Technical Guidance. LAQM.TG(09)

The Environment Act (1995)

The Environmental Protection Act (1990)

Appendices

Appendix A: QA/QC Data

Diffusion Tube Bias Adjustment Factors

The laboratory supplying our diffusion tubes in 2011 was Bristol City Scientific Services.

The tubes are prepared using 20% triethanolamine (TEA) in water.

The bias adjustment factor of 0.83 was taken from the spreadsheet available at the defra website (v03.12) http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.

QA/QC of diffusion tube monitoring

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

Appendix B:

Nitrogen dioxide diffusion tube monitoring
Monthly results January to December 2011

Site ID	Location	Monthly Average levels of NO_2 ($\mu g/m^3$)											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
MSAQ1	South Road Haywards Heath	34.3	29.8	38.0	31.6	26.6	20.5	26.0	26.1	24.1	33.1	34.0	25.7
MSAQ2	Partly constructed Haywards Heath Relief Road	22.2	16.3	26.3	17.2	12.5	12.2	15.5	11.6	11.3	16.3	20.8	Lost
MSAQ3	London Road East Grinstead	44.5	50.0	48.2	47.6	Lost	41.0	44.6	46.0	43.6	52.0	51.6	49.3
MSAQ4	Court Close East Grinstead	28.6	27.2	29.3	25.2	23.0	19.0	20.4	20.7	22.6	26.3	27.5	21.0
MSAQ5	Lewes Road East Grinstead	43.9	39.2	47.5	46.4	41.2	40.4	40.5	43.8	42.3	47.7	42.5	38.8
MSAQ6	Smugglers End Handcross	28.8	31.9	32.6	29.4	40.8	27.9	39.6	38.3	38.2	33.7	33.1	33.5
MSAQ7	Crabbet Park Worth	41.2	34.9	39.6	28.9	35.8	33.0	29.4	Lost	35.3	30.4	35.3	41.3
MSAQ8	Pyecombe Street Pyecombe	39.8	37.2	45.8	38.3	41.0	32.3	Lost	33.1	35.3	40.1	36.2	44.4
MSAQ9	Water Tower Colwood Lane Warninglid	12.9	15.9	22.8	14.9	8.4	9.0	10.2	9.0	7.9	12.3	16.2	7.6
MSAQ10	Stonepound 1 Keymer Road Hassocks	61.9	60.6	63.7	75.4	63.5	55.4	66.0	49.9	47.4	56.7	63.0	44.7
MSAQ11	Stonepound 2 Keymer Road Hassocks	49.9	54.0	65.2	64.9	61.6	52.2	61.1	47.8	49.8	56.3	54.7	49.3
MSAQ12	Bus Stop Keymer Road Hassocks	55.5	56.5	68.1	60.2	Lost	Lost	60.4	47.0	Lost	Lost	Lost	Lost
MSAQ13	Lamp Post Keymer Road Hassocks	68.0	58.5	69.6	59.9	58.2	45.9	54.0	44.5	44.6	48.9	57.3	53.9
MSAQ14	Bus Stop London Road Hassocks	45.5	45.2	61.2	52.4	50.0	41.7	49.5	39.8	45.9	53.7	53.1	35.9
MSAQ15	Traffic Light Sign London Road Hassocks	40.8	48.6	49.7	51.5	Lost	45.6	55.5	45.8	47.7	43.6	41.6	40.0
MSAQ16	Façade of residential premises Brighton Road Hassocks	38.7	32.5	35.6	34.7	25.0	24.7	27.8	24.1	22.7	26.4	29.7	21.2
MSAQ17	Lamp Post Brighton Road Hassocks	37.1	34.4	46.2	29.8	25.7	21.6	29.3	24.0	23.2	31.9	35.2	20.3
MSAQ18	Bus Stop Brighton Road Hassocks	56.3	43.8	52.3	45.9	43.4	36.7	43.0	39.6	36.7	40.1	38.9	39.1
MSAQ19	Lamp Post Hurst Road Hassocks	31.3	32.5	39.2	27.3	20.9	18.4	19.7	16.5	18.8	28.5	28.3	20.8
MSAQ20	New Way Lane Hurstpierpoint	23.9	16.7	22.9	Lost	10.5	Lost	Lost	8.5	Lost	12.3	21.0	Lost

Appendix C:

Annualisation of NO_2 diffusion tube monitoring results

NO_2 monitoring information from 3 long term continuous monitors was obtained for 2011 from the defra web site :- http://uk-air.defra.gov.uk/data/data_selector.
The monitors lie within a 50 mile radius of the Stonepound, Hassocks area.

1. Bus Stop Keymer Road Hassocks 2011
Site reference: MSAQ12

Long Term Site	Measurement period	Annual mean (Am)	Period mean (Pm)	Ratio (Am/Pm)
Lullington Heath (Background)	January to April 2011	7.5	9.9	0.76
Horley (Urban Background)	January to April 2011	21.0	26.4	0.80
Portsmouth (Urban Background)	January to April 2011	19.0	24.2	0.79
			Average (Ra)=	**0.78**

Long Term Site	Measurement period	Annual mean (Am)	Period mean (Pm)	Ratio (Am/Pm)
Lullington Heath (Background)	July to August 2011	7.5	5.7	1.32
Horley (Urban Background)	July to August 2011	21.0	15.8	1.33
Portsmouth (Urban Background)	July to August 2011	19.0	14.2	1.34
			Average (Ra)=	**1.33**
			Overall Average (Ra1)=	**1.06**

Short Term Site	Measurement period	Period mean (A)	Bias Corrected (A)*0.83=(B)
Bus Stop Keymer Road Hassocks	January to April 2011	21.2	17.6
	July to August 2011	53.7	44.6

Estimated annual average= ((17.6 + 44.6) / 2) * 1.06 = **33.0μg/m^3**

2. New Way Lane Hurstpierpoint 2011
Site reference: MSAQ20

Long Term Site	Measurement period	Annual mean (Am)	Period mean (Pm)	Ratio (Am/Pm)
Lullington Heath (Background)	January to March 2011	7.5	10.3	0.73
Horley (Urban Background)	January to March 2011	21.0	28.4	0.74
Portsmouth (Urban Background)	January to March 2011	19.0	25.6	0.74
			Average (Ra)=	**0.74**

Long Term Site	**Measurement period**	**Annual mean (Am)**	**Period mean (Pm)**	**Ratio (Am/Pm)**
Lullington Heath (Background)	May 2011	7.5	4.5	1.67
Horley (Urban Background)	May 2011	21.0	13.4	1.57
Portsmouth (Urban Background)	May 2011	19.0	11.3	1.68
			Average (Ra)=	**1.64**

Long Term Site	**Measurement period**	**Annual mean (Am)**	**Period mean (Pm)**	**Ratio (Am/Pm)**
Lullington Heath (Background)	August 2011	7.5	5.6	1.34
Horley (Urban Background)	August 2011	21.0	16.2	1.30
Portsmouth (Urban Background)	August 2011	19.0	14.6	1.30
			Average (Ra)=	**1.31**

Long Term Site	**Measurement period**	**Annual mean (Am)**	**Period mean (Pm)**	**Ratio (Am/Pm)**
Lullington Heath (Background)	October to Nov 2011	7.5	8.5	0.88
Horley (Urban Background)	October to Nov 2011	21.0	23.4	0.90
Portsmouth (Urban Background)	October to Nov 2011	19.0	22.6	0.84
			Average (Ra)=	**0.87**
			Overall Average (Ra1)=	**1.14**

Short Term Site	**Measurement period**	**Period mean (A)**	**Bias Corrected (A)*0.83=(B)**
New Way Lane	January to March 2011	21.2	17.6
Hurstpierpoint	May 2011	10.5	8.7
	August 2011	8.5	7.1
	October to Nov 2011	16.7	13.9

Estimated annual average= ((17.6 + 8.7 + 7.1 + 13.9) / 4) * 1.14 = **13.5μg/m^3**