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Updating & Screening Assessment of Air Quality within the Borough of Reigate and Banstead.

May 2006

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Updating and Screening Assessment of Air Quality in The Borough of Reigate and Banstead 2006

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May 2006

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DOCUMENT CONTROL

Client

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Job Number	J261

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Document Status and Review Schedule

Issue No.	Date	Status	Description	Reviewed by:
1	21/04/06	Draft Report	Sent by email to client	Prof. Duncan Laxen
2	10/05/06	Final Report	Sent by post and email to client	Leon Hibbs
3				

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Executive Summary

An Updating and Screening Assessment of air quality has been carried out for the Borough of Reigate and Banstead. This is a requirement of Part IV of the Environment Act 1995, which obliges local authorities to periodically review and assess the current, and likely future, air quality in their area. The role of this process is to identify areas where it is unlikely that the air quality objectives will be achieved. These locations must then be designated as Air Quality Management Areas (AQMAs). The first round of review and assessment for the Borough of Reigate and Banstead was completed in 2003. The second round began in 2003 and is still being completed. This report is the initial stage of the third round of review and assessment. It focuses on changes that have occurred since the previous round.

The conclusions of this report are that a potential exceedence of the annual mean nitrogen dioxide air quality objective has been identified in Merstham. Therefore a Detailed Assessment is proposed for nitrogen dioxide at this location, which will be completed by April 2007. No further action is required for sources of carbon monoxide, benzene, 1,3-butadiene, lead, PM_{10} or sulphur dioxide. A Progress Report will be published in 2008, which will include results of any monitoring and significant changes to sources of these pollutants.

Summary of the Conclusions of the Updating and Screening Assessment

Pollutant	Conclusion
Carbon monoxide	No further action required
Benzene	No further action required
1,3 butadiene	No further action required
Lead	No further action required
Nitrogen dioxide	Detailed Assessment in Merstham
Sulphur dioxide	No further action required
PM_{10}	No further action required

1 Introduction

Introduction to the Third Round of Review and Assessment

1.1 The Government's Air Quality Strategy for England, Scotland, Wales and Northern Ireland (DETR, 2000) and the addendum to it, published in February 2003 (Defra, 2003a), set out a framework for air quality improvements, which includes a series of air quality objectives. National and international measures are likely to achieve these objectives in most locations, but where areas of poor air quality remain, local air quality management will be necessary. Part IV of the Environment Act 1995 requires local authorities to periodically review and assess the current, and likely future, air quality in their area. The role of this process is to identify areas where it is unlikely that the air quality objectives will be achieved. These locations must be designated as Air Quality Management Areas (AQMAs) and subject to active management.

1.2 Air quality will change in response to changes in emitting activities. Air quality objectives and Review and Assessment guidance change with advances in knowledge; much of which is learnt from the Review and Assessment process itself. As a result, Review and Assessment is a long-term, rolling process, structured as a series of 'rounds'. Most local authorities in England, Scotland and Wales have now completed the first and second round of Review and Assessment and the third round is currently underway.

1.3 The Local Air Quality Management Technical Guidance (LAQM.TG(03)) (Defra, 2003b) sets out a phased approach to Review and Assessment. This prescribes an initial Updating and Screening Assessment (USA), which all authorities must undertake. It is based on a checklist (updated in 2006 (Defra, 2006a)) to identify any matters that have changed since the previous round and may now require further assessment. The Updating and Screening Assessment should cover each of the following:

- Any new monitoring data.
- Any new pollutant sources, or significant changes to existing sources, either locally or in neighbouring authorities.
- Any other local changes that might affect air quality.

1.4 If the USA identifies any potential areas where there is a risk that the objectives may be exceeded, which were not identified in the in previous rounds, then the Local Authority should progress to a Detailed Assessment (DA) to identify whether there is a need to declare an AQMA.

1.5 This report describes the USA for the Borough of Reigate and Banstead. It aims to identify any potential exceedences of the air quality objectives. Such exceedences might result from changes in pollutant emissions, or they might be caused by pollutant sources not previously assessed.

The Air Quality Objectives

1.6 The Government's Air Quality Strategy (DETR, 2000) defines both standards and objectives for each of a range of air pollutants. The 'standards' are set as concentrations below which health effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of a particular pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of the costs, benefits, feasibility and practicality of achieving the standards. The objectives are prescribed within The Air Quality (England) Regulations 2000 (Staionery Office, 2000) and The Air Quality (England) (Amendment) Regulations 2002 (Stationery Office, 2002). This latter publication set revised, more stringent objectives for benzene and carbon monoxide which are relevant to this second round, but which were absent in the first. The addendum to the air quality strategy (Defra, 2003a) contains provisional objectives for PM_{10} to be achieved in 2010. As these are not in the regulations, they do not strictly need to be covered in the Review and Assessment process. However, for completeness they are discussed in this report. Table 1 summarises the objectives which are relevant to this report. Appendix 1 sets out the individual health effects of each of these "strategy pollutants".

1.7 These air quality objectives are only applicable where members of the public are likely to be regularly present and are likely to be exposed over the averaging time of the objective (Defra, 2003b). For annual mean and 24-hour objectives relevant exposure is limited to residential properties, schools and hospitals. The 1-hour and 15-minute objectives apply at these locations and at any outdoor location where a member of the public might reasonably be expected to stay for the averaging period of the objective, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

Table 1: Air Quality Objectives Relevant to this Report.

Pollutant	Time Period	Objective	To be achieved by[a]
Benzene	Running annual mean	16.25 μg/m^3	2003
	Annual mean	5 μg/m^3	2010
1,3-Butadiene	Running annual mean	2.25 μg/m^3	2003
Carbon Monoxide	Maximum daily running 8-hour mean	10 mg/m^3	2003
Lead	Annual mean	0.5 μg/m^3	2004
	Annual mean	0.25 μg/m^3	2008
Nitrogen Dioxide	1-hour mean	200 μg/m^3 not to be exceeded more than 18 times a year	2005
	Annual mean	40 μg/m^3	2005
Sulphur Dioxide	1-hour mean	350 μg/m^3 not to be exceeded more than 24 times a year	2004
	24-hour mean	125 μg/m^3 not to be exceeded more than 3 times a year	2004
	15-minutes mean	266 μg/m^3 not to be exceeded more than 35 times a year	2005
Fine particles (PM10)[b]	24-hour mean	50 μg/m^3 not to be exceeded more than 35 times a year	2004
	Annual mean	40 μg/m^3	2004
	24-hour mean[c]	50 μg/m^3 not to be exceeded more than 7 times a year	2010
	Annual mean[c]	20 μg/m^3	2010

[a] The achievement dates are all by the end of the specified year.
[b] Measured by the gravimetric method.
[c] Provisional objectives not included in the Regulations.

Summary of the Previous Rounds of Review and Assessment

1.8 Reports from the first round of review and assessment are summarised in Appendix 2. In the first round of review and assessment, potential exceedences of the annual mean nitrogen dioxide air quality objective were identified and a number of AQMAs were declared close to busy roads and to Gatwick Airport. Several of these AQMAs were subsequently revoked, leaving

three AQMAs: one beside the M25, one beside the M23, and one in Horley, close to Gatwick Airport.

1.9 The Updating and Screening Assessment carried out at the start of the second round of Review and Assessment for Reigate and Banstead in 2003 indicated a further risk of exceeding the annual mean nitrogen dioxide and PM_{10} objectives at residential properties at the junction of Rushworth Road and the A217, and recommended a Detailed Assessment for this area.

1.10 The Detailed Assessment concluded that an AQMA was required at this location for nitrogen dixoide, but not for PM_{10}. It also investigated air quality within current AQMAs and at a number of locations where AQMAs had previously been in place, but which had been subsequently revoked. The most significant conclusions for these locations were that a previously revoked AQMA at the junction of the A23 and Dean Lane should be redeclared, and that the three remaining AQMAs should be retained.

1.11 The 2005 Progress Report presented monitoring data for 2004. Nitrogen dioxide concentrations predicted for 2005 from concentrations measured during 2004 within the newly declared Rushworth Road and redeclared Dean Lane AQMAs showed that the annual mean nitrogen dioxide objective would be met. However, the results were close to the objective and a Further Assessment of air quality at these locations was undertaken.

1.12 Routine monitoring of nitrogen dioxide concentrations elsewhere within the Borough identified a further three sites where the concentrations were likely to breach the 2005 annual mean objective. These include residential properties at the junction of the A240 Reigate Road and the A2022 Fir Tree Lane (Drift Bridge), along Reigate High Street and Church Street (between the High Street and Bancroft Road) and a property on the A217 near Blackhorse Lane and the M25 junction 8 interchange.

1.13 The decision was made to progress to a Detailed Assessment for nitrogen dioxide at Drift Bridge, but to proceed straight to declaration of AQMAs (and thus to a Further Assessment) at Reigate High Street and the A217 Blackhorse Lane.

2 Methodology

2.1 Air pollutant concentrations in the vicinity of an emission source will be related to both the source strength and the background concentration. Interpolated background concentrations of the strategy pollutants have been produced from the national map of background concentrations available from the Air Quality Archive on the internet (Defra, 2006b). These maps of the Borough of Reigate and Banstead are presented in Appendix 3.

2.2 The locations of air quality monitoring locations across the Borough are shown in Appendix 4.

2.3 Traffic flow data have been obtained from the Surrey Traffic Model (SCC, 2005). Where future year traffic flows have been required, the modelled traffic data have been projected using National Road Traffic Forecast factors, available from the Department for Transport (www.dft.co.uk).

2.4 Where potential exceedences of the objectives have been identified, detailed DMRB calculations have been carried out for these specific locations using the Design Manual for Roads and Bridges (DMRB) screening method V1.02 (Highways Agency, 2003). Spreadsheets containing the input data used in these calculations can be made available.

2.5 Lists of industrial processes obtained from the Environment Agency and held by the Reigate and Banstead Borough Council, have been used to identify point source emissions within the Borough. The Environment Agency regulates large industrial processes, known as Part A1. Smaller industrial sources, which are known as Part A2 and Part B processes, are regulated by Reigate and Banstead Borough Council. Industrial sources in neighbouring Local Authority areas have also been identified through correspondence with neighbouring Councils. New or changed processes have been checked against the list of potentially significant processes that are set out in the Technical Guidance (Defra, 2003b). The Borough Council also holds a list of large petrol stations and these were screened using the criteria, prescribed in the Technical Guidance (Defra, 2003b). Appendix 5 describes each part A and B process within and in the vicinity of Reigate and Banstead. Processes are discussed in relevant pollutant sections where they are deemed to be significant.

2.6 The occurrence of other potential sources of air pollutants in the area, such as railway sidings, bus stations, large boilers and fugitive sources of PM_{10} has been identified using local knowledge and screened using the criteria set out in the Technical Guidance (Defra, 2003b).

3 Updating and Screening of Carbon Monoxide

Updating and Screening Summary for Carbon Monoxide.

Source, location or data which need to be assessed	Action
New monitoring data	No further action required
Very busy roads or junctions in built up areas	No further action required

New monitoring data

3.1 Previous rounds of review and assessment have not identified any risk of the carbon monoxide objective being exceeded. Therefore no monitoring of carbon monoxide has been carried out within the Borough.

Very busy roads or junctions in built-up areas

3.2 Monitoring data from across the country indicate that the carbon monoxide objective is only likely to be exceeded near to 'very busy' roads and junctions[1], where the current year background concentration is greater than 1 mg/m^3. The highest estimated background concentration within the Borough during 2006 is 0.3 mg/m^3. This confirms that the objective will be achieved at all locations within the Borough.

Conclusion

3.3 No further action required for carbon monoxide.

[1] 'Very busy' junctions are defined as single carriageways with greater than 80,000 vehicles per day, dual carriageways with greater than 120,000 vehicles per day or motorways with more than 140,000 vehicles per day

4 Updating and Screening of Benzene

Updating and Screening Summary for Benzene.

Source, location or data which need to be assessed	Action
New monitoring data	No further action required
Very busy roads or junctions in built-up areas	No further action required
Industrial sources	No further action required
Petrol stations	No further action required
Major petroleum storage depots	No further action required

New monitoring data

4.1 Monitoring of Benzene concentrations takes place using BTEX tubes exposed monthly at three locations within the Borough. These tubes are located at Roadside locations in Reigate High Street and London Road, Merstham, and at a location close to Gatwick Airport in Horley. Annual mean concentrations for 2005 are presented in Table 2. The measured annual mean benzene concentrations are well below the air quality objective in 2005 at all monitored locations.

Table 2: Annual mean benzene concentration (µg/m^3) measured during 2005

Location	Benzene concentration (µg/m^3)
High Street, Reigate	2.5
Riverside, Horley	1.8
London Road, Merstham	1.8
Annual mean objective for 2010	**5.0**

Very busy roads or junctions in built-up areas

4.2 Monitoring data from across the country indicate that the benzene objective for 2010 is only likely to be exceeded near to 'very busy' roads and junctions[2], where the 2010 background concentration is greater than 2 µg/m^3. The highest estimated background concentration in 2010 is 0.7 µg/m^3. This confirms that the objective will be achieved at all locations within the Borough.

[2] 'Very busy' junctions are defined as single carriageways with greater than 80,000 vehicles per day, dual carriageways with greater than 120,000 vehicles per day or motorways with more than 140,000 vehicles per day

Industrial sources

4.3 No industrial processes were found to emit significant quantities of benzene in the previous rounds of Review and Assessment and there has been no new relevant exposure introduced adjacent to existing sources. There have been no new processes introduced and no significant changes to existing industrial processes either in the Borough. One new regulated process in a neighbouring authority emits benzene, however this emits less than 1 tonne per annum (Appendix 5) and is over 7 km away from the boundary with Reigate and Banstead. Therefore there continues to be no significant contribution from Industrial sources and exceedences of the benzene objective are unlikely.

Petrol stations

4.4 Petrol stations are only likely to lead to an exceedence of the 2010 objective for benzene if they have a large throughput of petrol (greater than 2 million litres per annum) and are near to a busy road, with more than 30,000 vehicles per day. There must also be relevant exposure, i.e. a residential property, within 10 m of the petrol pumps. There are no petrol stations within the Borough that fulfil these criteria, and therefore it is not likely that petrol stations will lead to an exceedence of the benzene objectives for 2003 or 2010.

Major fuel storage depots (petroleum only)

4.5 There are no major fuel storage depots in the Borough or nearby in neighbouring authorities.

Conclusion

4.6 No further action required for benzene.

5 Updating and Screening of 1,3-butadiene

Updating and Screening Summary for 1,3-butadiene.

Source, location or data which need to be assessed	Action
New monitoring data	No further action required
New industrial sources	No further action required
Existing industrial sources with significantly increased emissions	No further action required

New monitoring data

5.1 Previous rounds of review and assessment have not identified any risk of the 1,3-butadiene objective being exceeded. Therefore no monitoring of 1,3-butadiene has been carried out within the Borough.

New industrial sources

5.2 One new process which emits 1,3-butadiene has been introduced within a neighbouring authority. This process emits less than 1 tonne per annum and is over 7 km away from the boundary with Reigate and Banstead, and will therefore have an insignificant impact on concentrations within the Borough of Reigate and Banstead.

Existing industrial sources with significantly increased emissions

5.3 No industrial processes in or near to the Borough were found to emit significant quantities of 1,3-butadiene in the previous rounds of Review and Assessment. There are no sources with significantly increased emissions and there has been no new relevant exposure introduced adjacent to existing sources. There thus are no significant sources within the Borough. Similarly, there are no, or near to the boundary in neighbouring authorities.

Conclusion

5.4 No further action required for 1,3-butadiene.

6 Updating and Screening of Lead

Updating and Screening Summary for Lead.

Source, location or data which need to be assessed	Action
New monitoring data	No further action required
New industrial sources	No further action required
Existing industrial sources with significantly increased emissions	No further action required

New monitoring data

6.1 Previous rounds of review and assessment have not identified any risk of the lead objectives being exceeded. Therefore no monitoring of lead has been carried out within the Borough.

New industrial sources

6.2 No new processes, which handle lead, have been introduced in or near to the Borough since the previous round of review and assessment.

Existing industrial sources with significantly increased emissions

6.3 No industrial processes in or near to the Borough were found to emit significant quantities of lead in the previous rounds of Review and Assessment. There are no sources with significantly increased emissions and there has been no new relevant exposure introduced adjacent to existing sources. There thus are no significant sources within the Borough. Similarly, there are no significant sources near to the boundary in neighbouring authorities.

Conclusion

6.4 No further action required for Lead.

7 Updating and Screening of Nitrogen Dioxide

Updating and Screening Summary for Nitrogen Dioxide.

Source, location or data which need to be assessed	Action
New monitoring data outside an AQMA	Detailed Assessment required
New monitoring data within an AQMA	No further action required
Narrow congested streets with residential properties close to the kerb	No further action required
Junctions	No further action required
Busy streets where people may spend 1-hour or more close to traffic	No further action required
Roads with high flow of buses and/or HGVs	No further action required
New roads constructed or proposed since first round of Review and Assessment	No further action required
Roads close to the objective during the first round of Review and Assessment	No further action required
Roads with significantly changed traffic flows	No further action required
Bus Stations	No further action required
New industrial sources	No further action required
Industrial sources with substantially increased emissions	No further action required
Aircraft	No further action required

New monitoring data outside an AQMA

7.1 Reigate and Banstead Borough Council operate three automatic Air Quality Monitoring Stations (AQMS), one of which is a background site located outside of the AQMAs. The results for this AQMS are described in Table 3. All three automatic monitors are serviced by Casella ETi on a 6 monthly basis, whilst the data are collected and ratified by ERG Kings College. Nitrogen dioxide monitoring is also carried out at 31 locations outside of current AQMAs using diffusion tubes, and these results are also presented in Table 3. The average concentration measured over the three year period 2003-2005 is also presented, as this removes some of the year-on-year variation to give a more stable indication of air quality at each monitoring location.

7.2 Nitrogen dioxide concentrations at two monitoring locations currently outside of AQMAs show exceedences of the annual mean air quality objective. An exceedence has been measured at the monitoring location opposite Drift Bridge Hotel. This location is not representative of relevant exposure, however this area is currently the subject of detailed modelling as part of a Detailed Assessment to determine the level of nitrogen dioxide concentrations at residential properties close to the junction of the A240 and the A2022. A further exceedence has been measured at the corner of London Road, Merstham. This location is representative of relevant exposure and therefore it will be necessary to proceed to a Detailed Assessment for NO_2 at this location.

Table 3: Measured and Estimated Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) outside of AQMAs

Location	Site Ref.	Site Type[a]	2003[b]	2004[c]	2005[d]	Average[e]
Air Quality Monitoring Stations						
Poles Lane Pumping Station, Crawley AQMS	RG3			-	19	
Diffusion Tube Measurements						
The Horseshoe, Banstead	RB3/83	UB	30	25	30	28
St Mary's Road, Reigate	RB9	UB	28	27	27	27
Horley Police Station, Massetts Road, Horley	RB12	R	39	34	31	35
Car Park, Massetts Road, Horley	RB13	I	32	28	29	30
Sylvan Way, Redhill	RB17/84	UB	27	26	25	26
Brook Road, Merstham	RB18	UB	32	34	34	33
Village Hall, Station Road, Merstham	RB19	I	**47**	29	35	37
Corner of London Road, Merstham	RB20	R	**51**	38	**44**	**44**
Opp. Drift Bridge Hotel, Reigate Road, Banstead	RB21/85	R	**48**	**48**	**45**	**47**
Grey Alders, Banstead	RB22	I	36	27	26	30
Warren Mead School, Roundwood Way, Banstead	RB23	UB	27	23	30	27
Dilkusha, Shepherds Hill	RB40	O (M)	32	24	25	27
Upalond, Shepherds Hill	RB41	O (M)	22	26	26	25
Rhydlanfair, Shepherds Hill	RB42	R	**47**	**43**	35	**42**
Yew Cottage, Brighton Road (A217)	RB50	R	**41**	37	39	39
Flying Scud Public House, Brighton Road, Redhill	RB81/93	R	**40**	37	37	38
Crossways, Fir Tree Road, Banstead	RB106	R	-	-	30[f]	-

[a] Site Types are: R: Roadside; UB: Urban Background; I: Intermediate; B: Background; O (A): Other (Airport); O (M): Other (Motorway).
[b] A local bias adjustment factor of 1.29 has been applied, calculated from a collocation study at the Michael Crescent AQMS (RBBC, 2005a).
[c] A local bias adjustment factor of 1.32 has been applied, calculated from a collocation study at the Michael Crescent AQMS (RBBC, 2005a).
[d] A local bias adjustment factor of 1.349 has been applied. This was calculated from three collocation studies carried out at automatic monitoring stations within the Borough of Reigate and Banstead (see Appendix 6 for further details).
[e] Average of 2003, 2004 and 2005 annual means.
[f] Monitoring was only carried out for 5 months at these sites. The data presented are 2005 annual mean equivalent concentrations calculated using factors described in Appendix 7.

New monitoring data within an AQMA

7.3 Nitrogen dioxide monitoring is carried out at 57 locations within AQMAs. These results are presented in Table 4. Only six of the monitoring locations measured concentrations which exceeded the annual mean air quality objective for NO_2 during 2005. The average concentration measured over the three year period 2003-2005 is once again presented. Only seven locations have a three year average concentration which exceeds the annual mean nitrogen dioxide objective.

Table 4: Measured and estimated Annual Mean Nitrogen Dioxide Concentrations (µg/m^3) within AQMAs

Location	Site Ref.	AQMA	2003[a]	2004[b]	2005[c]	Average[d]
Air Quality Monitoring Stations						
Michael Crescent, Horley AQMS	RG1	Horley	31.4	30.5	29	
74 The Crescent, Horley AQMS	RG2	Horley	-	34.1	34	
Diffusion Tube Measurements						
Riverside, Horley	RB11	Horley	30	26	29	28
Horley AQMS	RB24/25 /26	Horley	31	28	29	29
17 Wolverton Gardens, Horley	RB51	Horley	38	30	31	33
20 Wolverton Gardens, Horley	RB52	Horley	35	31	28	31
66/68 Cheyne Walk, Horley	RB53	Horley	37	31	34	34
7/9 Crescent Way, Horley	RB54	Horley	35	33	29	32
40a Crescent Way, Horley	RB55	Horley	34	34	29	32
8/10 The Crescent, Horley	RB56	Horley	37	33	33	34
29/31 The Crescent, Horley	RB57	Horley	**42**	34	38	38
39/41 The Crescent, Horley	RB58	Horley	**40**	38	34	37
92/94 The Crescent, Horley	RB59	Horley	**40**	39	34	38
120/122 The Crescent, Horley	RB60	Horley	**43**	36	39	39
79/81 The Crescent, Horley	RB61	Horley	**43**	36	33	37
16/22 The Drive, Horley	RB64	Horley	33	34	30	32
4/6 The Drive, Horley	RB65	Horley	**41**	39	34	38
3a/3b Fairfield Avenue, Horley	RB66	Horley	32	32	30	31
30/32 Fairfield Avenue, Horley	RB67	Horley	28	34	33	32
57 Fairfield Avenue, Horley	RB68	Horley	33	27	31	30
61 Upfield, Horley	RB69	Horley	33	30	31	31
58/60 Upfield, Horley	RB70	Horley	33	35	31	33
25/27 Upfield, Horley	RB72	Horley	34	28	30	31
9/11 Upfield, Horley	RB73	Horley	24	29	28	27
30a/30b Meadowcroft Close, Horley	RB74	Horley	32	37	28	32
Roundabout, The Coronet, Horley	RB75	Horley	37	37	35	36
33 Limes Avenue, Horley	RB76	Horley	36	30	28	31
Layby at entrance to Staffords Place, Horley	RB77	Horley	32	31	32	32
74 The Crescent, Horley AQMS	RB78/79 /80	Horley	**41**	37	33	37
16/17 Woodroyd Gardens	RB98	Horley	-	-	33	-
Poles Lane Pumping Station, Crawley AQMS	RB99/ 100/101	Horley	-	-	24	-
1 Dean Lane, Hooley	RB82/94	Dean Lane	**46**	**40**	37	**41**
Tasboro House, Rushworth Road	RB95/96	Rushworth Road	**45**[e]	36	38	**40**
Trentham, Poles Lane	RB97	M23 (South)	**-**	**-**	**43**[f]	-
Field near Bridleway, Hathersham Farm, Horley	RB102	M23 (South)	-	-	22[g]	-
White Lodge, Sturts Lane, Walton on the Hill	RB27	M25	**43**	**42**	39	**41**
Badgers Cottage, Sturts Lane, Walton on the Hill	RB28	M25	**41**	33	35	36
April Cottage, Sturts Lane, Walton on the Hill	RB29	M25	38	35	35	36
Linden Lea, Chequers Lane, Walton on the Hill	RB30/86	M25	**41**	34	33	36
Margery Hall, Reigate Hill	RB31/87	M25	30	25	30	29
Rose Cottage, Margery Grove	RB33/88	M25	**41**	38	30	36
Stagholt, Merrywood Grove	RB34	M25	31	23	27	27
Applewood Cottage, Merrywood Grove	RB35	M25	33	28	31	31
Old Church House, Gatton Bottom	RB36/89	M25	35	31	28	31
14 Ashcombe Road, Merstham	RB37	M25	39	30	29	33
16 Ashcombe Road, Merstham	RB38	M25	38	32	36	35
17 Ashcombe Road, Merstham	RB39	M25	**40**	33	28	34
Glad House, Quality Street, Merstham	RB43/90	M25	**43**	35	31	36
High Street, Reigate	RB1	High Street	**52**	**47**	**41**	**47**

Location	Site Ref.	AQMA	2003[a]	2004[b]	2005[c]	Average[d]
Rear of Boots, Reigate	RB8	High Street	**42**	27	23	31
Gunshop, 45 Church Street, Reigate	RB44	High Street	**45**	34	39	39
Bus Stop, 14-18 Church Street, Reigate	RB45	High Street	**46**	**45**	**44**	**45**
Gerrards Menswear, 5 High Street, Reigate	RB46	High Street	**53**	**47**	**41**	**47**
Nationwide, 78 High Street, Reigate	RB47	High Street	**50**	**41**	**46**	**46**
ASK, High Street, Reigate	RB104	High Street	-	-	39[g]	-
Finishing Touch, High Street, Reigate	RB105	High Street	-	-	39[g]	-
Sussex Blinds, Church Street, Reigate	RB107	High Street	-	-	36[h]	-
Highlands, Brighton Road (A217)	RB49	Blackhorse	**59**	**59**	**59**	**59**
Highlands, Brighton Road (façade)	RB103	Blackhorse	-	-	37[g]	-

[a] A local bias adjustment factor of 1.29 has been applied, calculated from a collocation study at the Michael Crescent AQMS (RBBC, 2005a).
[b] A local bias adjustment factor of 1.32 has been applied, calculated from a collocation study at the Michael Crescent AQMS RBBC (RBBC, 2005a).
[c] A local bias adjustment factor of 1.349 has been applied. This was calculated from three collocation studies carried out at automatic monitoring stations within the Borough of Reigate and Banstead (see Appendix 6 for further details).
[d] Average of 2003, 2004 and 2005 annual means.
[e] Annual mean equivalent calculated for 2003 from 8 months monitoring data (RBBC, 2004).
[f] Monitoring was carried out for five months at the beginning of 2005. The data presented are 2005 annual mean equivalent concentrations calculated using factors described in Appendix 7.
[g] Monitoring was only carried out for 5 months at these sites. The data presented are 2005 annual mean equivalent concentrations calculated using factors described in Appendix 7.
[h] Monitoring was only carried out for 4 months at this site. The data presented is a 2005 annual mean equivalent concentration, calculated using factors described in Appendix 7.

Narrow congested streets with residential properties close to the kerb

7.4 There are no residential properties close to narrow or congested streets that were not considered in previous rounds of Review and Assessment.

Junctions

7.5 There are no busy junctions within the Borough that were not were considered in previous rounds of Review and Assessment.

Busy streets where people may spend 1-hour or more close to traffic

7.6 There are no busy streets where people may spend 1-hour or more close to traffic.

Roads with high flow of buses and/or HGVs

7.7 Roads with a high flow of buses and/or HGVs were considered fully in the previous USA.

New roads constructed or proposed since first round of Review and Assessment

7.8 A new road will be constructed to serve a proposed housing development in Horley (outside of the Horley AQMA). An air quality assessment of the development has been carried out and no objective exceedences were predicted.

Roads with significantly changed traffic flows

7.9 No roads have been identified where there has been a greater than 25% increase in traffic or new relevant exposure. All existing roads with new relevant exposure were adequately assessed in the previous USA.

Effect of Revised Background Concentrations

7.10 Changes have been made to the estimated background nitrogen dioxide maps since the previous round of Review and Assessment. Across the entire Borough, all of the estimated background nitrogen dioxide and oxides of nitrogen concentrations for 2005 are now smaller than they were previously thought to be. This means that the concentrations calculated during the previous round will tend to be conservative and will not have been under-predicted.

Bus Stations

7.11 No bus stations with greater than 1,000 bus movements per day were identified in the Borough in the previous USA. This continues to be the case.

New industrial sources

7.12 There have been no new processes within the Borough or neighbouring local authorities, which emit significant quantities of nitrogen dioxide, introduced since the previous USA.

Industrial sources with substantially increased emissions

7.13 No industrial processes in or near to the Borough were found to emit significant quantities of nitrogen dioxide in the previous rounds of Review and Assessment. There are no existing sources with substantially increased emissions and no new relevant exposure has been introduced adjacent to existing sources. There are no significant sources within neighbouring authorities.

Aircraft

7.14 Gatwick Airport lies adjacent to the Borough. Emissions from the airport have been the subject of considerable assessment during previous rounds of Review and Assessment. Exceedences of the annual mean nitrogen dioxide objective have been predicted in Horley and an AQMA has

been declared. It is useful to briefly revisit the findings of previous assessments in light of new information that is now available.

7.15 Figures 1, 2 and 3 present the annual mean nitrogen dioxide concentrations measured at monitoring locations within the Horley AQMA for the years 2003, 2004 and 2005, respectively. The figures show that the concentrations have decreased over the three year period, and also show that since 2004, there have been no concentrations measured in excess of the 2005 annual mean objective of 40 µg/m^3.

7.16 Figures 4 and 5 present concentrations that have been modelled by netcen on behalf of BAAG (Underwood *et al.,* 2003; 2004) for the same locations as those presented in Figures 1,2 and 3. A direct comparison can be made between measured (Figure 3) and modelled (Figure 4) concentrations for 2005. In general, modelled concentrations have over-predicted measured concentrations, however this is likely to be due to an over-estimation in the modelled 2005 scenario which assumed 34 million passengers per annum using the airport compared to 32.7 million passengers per annum who actually used the airport in 2005.

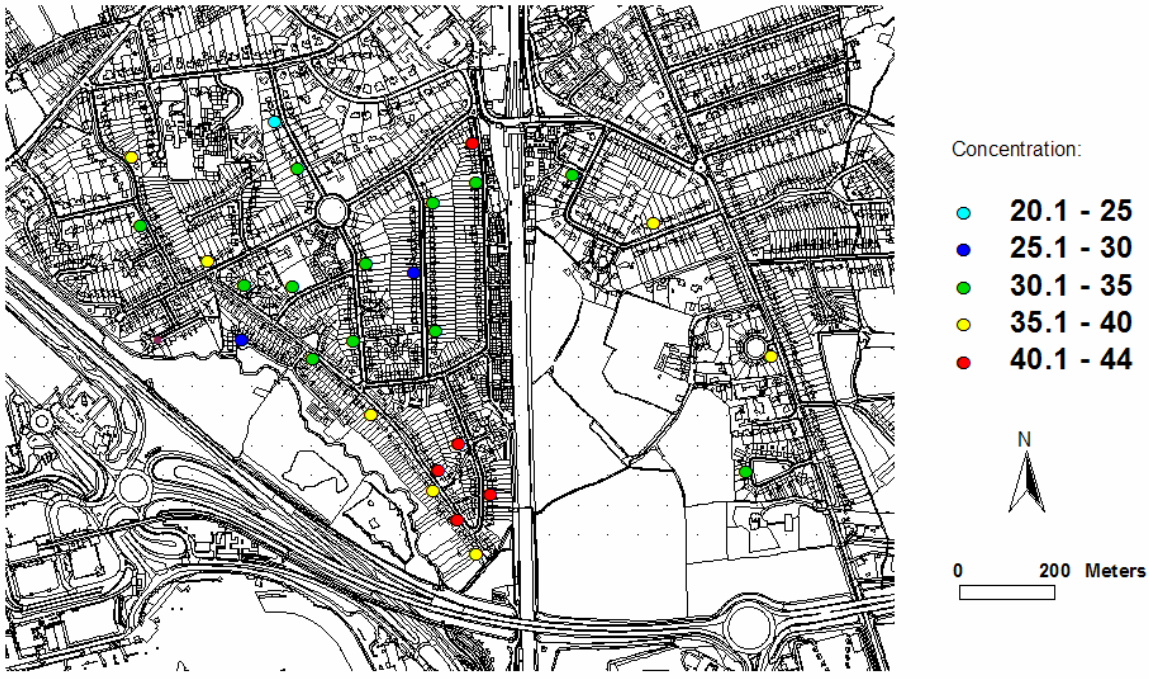


Figure 1: Measured 2003 Annual Mean NO_2 Concentrations (µg/m^3) in Horley, near to Gatwick Airport. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

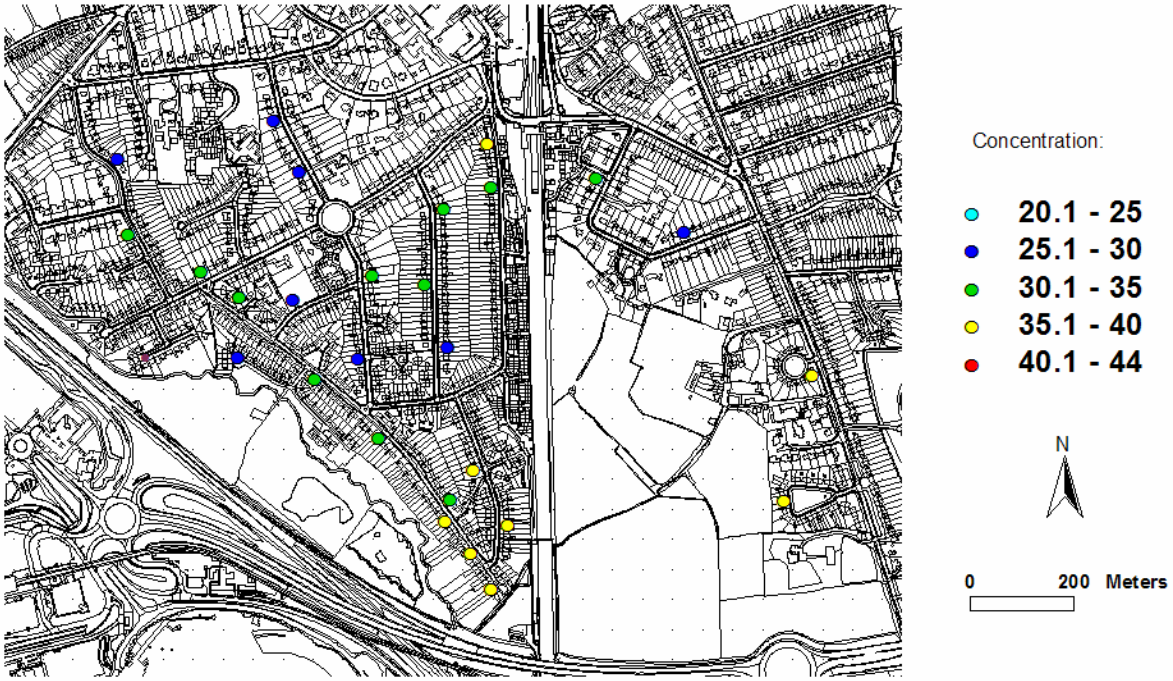


Figure 2: Measured 2004 Annual Mean NO_2 Concentrations (µg/m^3) in Horley, near to Gatwick Airport. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

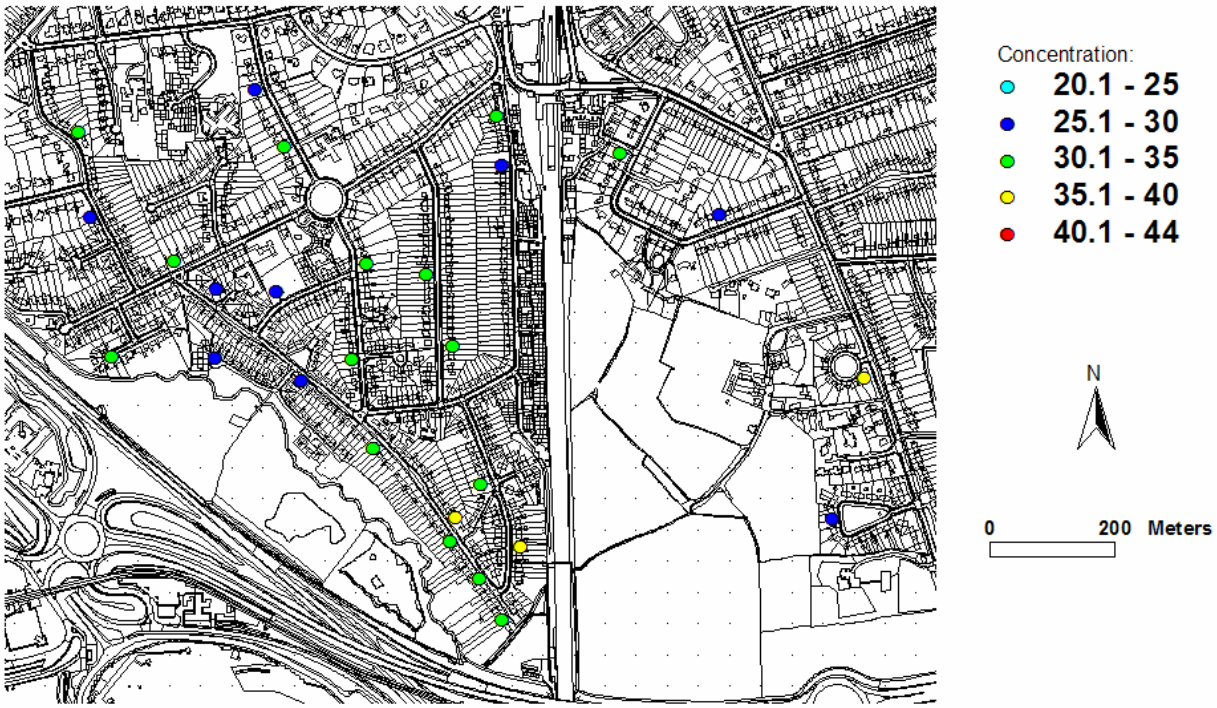


Figure 3: Measured 2005 Annual Mean NO_2 Concentrations (µg/m^3) in Horley, near to Gatwick Airport. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

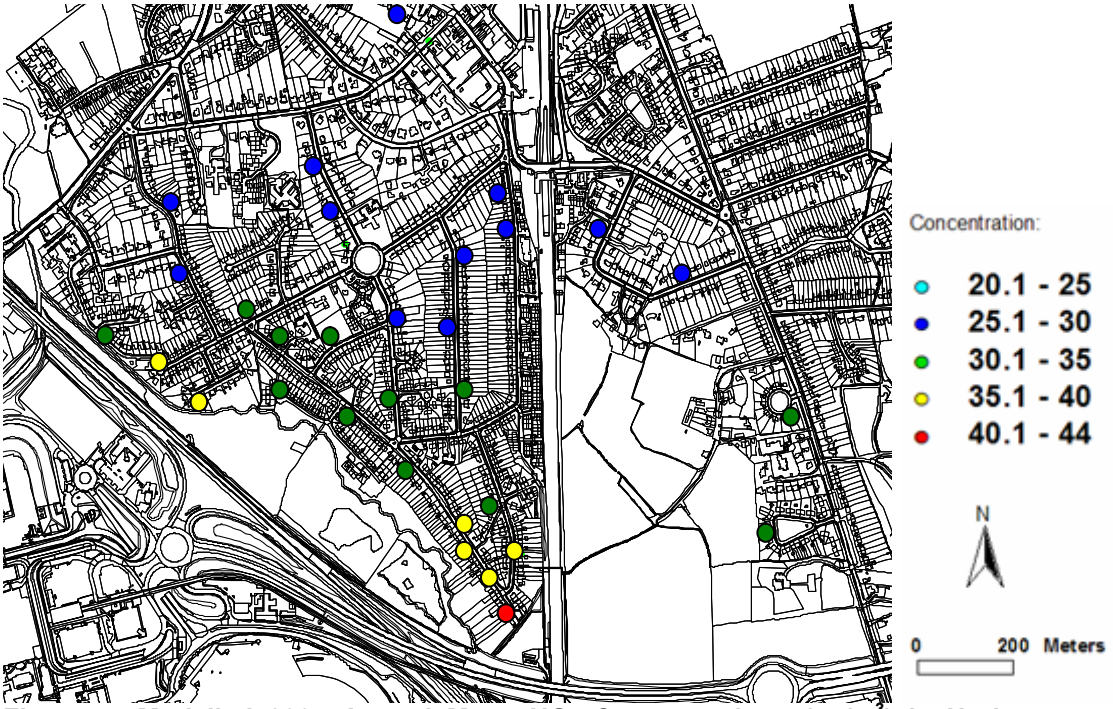


Figure 4: Modelled 2005 Annual Mean NO_2 Concentrations (µg/m^3) in Horley, near to Gatwick Airport. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

Figure 5: Modelled 2010 Annual Mean NO_2 Concentrations (µg/m^3) in Horley, near to Gatwick Airport. Values based on scaled 2002/3 dispersion modelling and 2010 Emissions Inventory. For full methodology see Underwood *et al*., 2003; 2004. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

7.17 Modelled concentrations for 2010 indicate that the annual mean objective will not be exceeded. These data differ from those presented in the Further Assessment of the Horley AQMA 2010 Addendum (RBBC, 2005b) due to an error by BAAG. The corrected data have resulted in a reduction in the predicted concentrations in 2010 at the worst case receptor from 42 µg/m^3 to 39 µg/m^3. However, the uncertainty in the modelled results for 2010 means that a breach of the 2010 EU Limit value is possible. It is also important to note that concentrations at these receptors are not expected to fall in line with the national projections, because they are strongly influenced by emissions from the airport, which are expected to increase in the future. It is thus prudent to continue monitoring concentrations and for the AQMA to remain in place.

Conclusion

7.18 A Detailed Assessment is required for nitrogen dioxide in Merstham.

8 Updating and Screening of Sulphur Dioxide

Updating and Screening Summary for Sulphur Dioxide.

Source, location or data which need to be assessed	Action
New monitoring data outside an AQMA	No further action required
New monitoring data within an AQMA	N/A
New industrial sources	No further action required
Industrial sources with substantially increased emissions	No further action required
Areas of domestic coal burning	No further action required
Small boilers (>5MW(thermal)) burning coal or oil	No further action required
Shipping	No further action required
Railway Locomotives	No further action required

New monitoring data outside an AQMA

8.1 Monitoring of sulphur dioxide concentrations has been carried out using diffusion tubes exposed monthly at four locations within the Borough. The results have not been presented as the monthly mean and annual mean concentrations, which can be calculated from these measurements, are not useful for Review and Assessment purposes. (The highest annual mean concentration measured is 16.0 µg/m^3).

Monitoring data within an AQMA

8.2 No AQMAs have been declared for sulphur dioxide and therefore this section is not applicable.

New industrial sources

8.3 There have been no new processes within the Borough that emit significant quantities of sulphur dioxide, introduced since the previous USA. One new process in a neighbouring borough is permitted to release <100t of sulphur dioxide, however this is more than 7 km from the boundary with Reigate and Banstead and is therefore unlikely to impact upon air quality within the Borough.

Industrial sources with substantially increased emissions

8.4 No industrial processes in or near to the Borough were found to emit significant quantities of sulphur dioxide in the previous rounds of Review and Assessment. There are no sources with significantly increased emissions and there has been no new relevant exposure introduced

adjacent to existing sources. There are thus no significant sources within the Borough. Similarly, there are no significant sources within neighbouring authorities.

Areas of domestic coal burning

8.5 There are no areas within the Borough with a high density of domestic coal burning.

Small boilers (>5MW(thermal)) burning coal or oil

8.6 Small coal and oil burners >5MW were considered in the previous USA. There continue to be no such sources, within or near to the Borough.

Shipping

8.7 There is no shipping activity in the Borough.

Railway Locomotives

8.8 There are no locations in the Borough where diesel or steam locomotives are stationary for 15 minutes or more, within 15m of relevant exposure.

Conclusion

8.9 A Detailed Assessment is not required for sulphur dioxide.

9 Updating and Screening of Particles (PM_{10})

Updating and Screening Summary for PM_{10}

Source, location or data which need to be assessed	Action
New monitoring data outside an AQMA	No further action required
New monitoring data within an AQMA	N/A
Junctions	No further action required
Roads with high flow of buses and/or HGVs	No further action required
New roads constructed or proposed since first round of Review and Assessment	No further action required
Roads close to the objective during the first round of Review and Assessment	No further action required
Roads with significantly changed traffic flows	No further action required
New industrial sources	No further action required
Industrial sources with substantially increased emissions	No further action required
Areas with domestic solid fuel burning	No further action required
Quarries, landfill sites, opencast coal, handling of dusty cargoes at ports etc	No further action required
Aircraft	No further action required

New monitoring data outside an AQMA

9.1 Monitoring of PM_{10} concentrations is carried out at the suburban automatic monitoring site in Michael Crescent, Horley. The results are described in Table 5, and can be compared with the statutory PM_{10} objectives. Annual mean concentrations of PM_{10} in 2005 remained below the objective at this monitoring site and only four exceedences of the daily mean objective were recorded.

9.2 PM_{10} concentrations in 2010 have been forecast from the 2005 monitoring data for direct comparison with the 2010 provisional objectives. The predicted annual mean concentration for 2010 exceeds the provisional objective, however this objective is not set in the regulations and it is not necessary for Local Authorities to assess against it. The projected 2010 PM_{10} concentrations do not, however, take into account any increases in PM_{10} concentration which may be brought about through predicted increases in aircraft movements at nearby Gatwick Airport, although the contribution that the airport makes is relatively small (1 to 2 $\mu g/m^3$). The annual mean concentrations are nevertheless currently well below the level of the statutory objective. Monitoring will continue at this site.

Table 5: Measured and Estimated Annual Mean PM_{10} Concentrations (µg/m^3) and Statistics

Location	Annual mean concentration		No. days >50 µg/m^3	
	2005	2010[a]	2005	2010[b]
Air Quality Monitoring Station				
Michael Crescent, Horley AQMS	22.4	20.4	4	4
Statutory objective for 2004	**40**		**35**	
Provisional Objective for 2010		**20**		**7**

[a] Estimated using future year adjustment factors provided by Defra (2006b).
[b] Estimated from the relationship with the annual mean concentration described in Defra (2003b).

Figure 6: Daily PM_{10} Concentrations (µg/m^3; gravimetric equivalent) measured during 2005 at Michael Crescent, Horley.

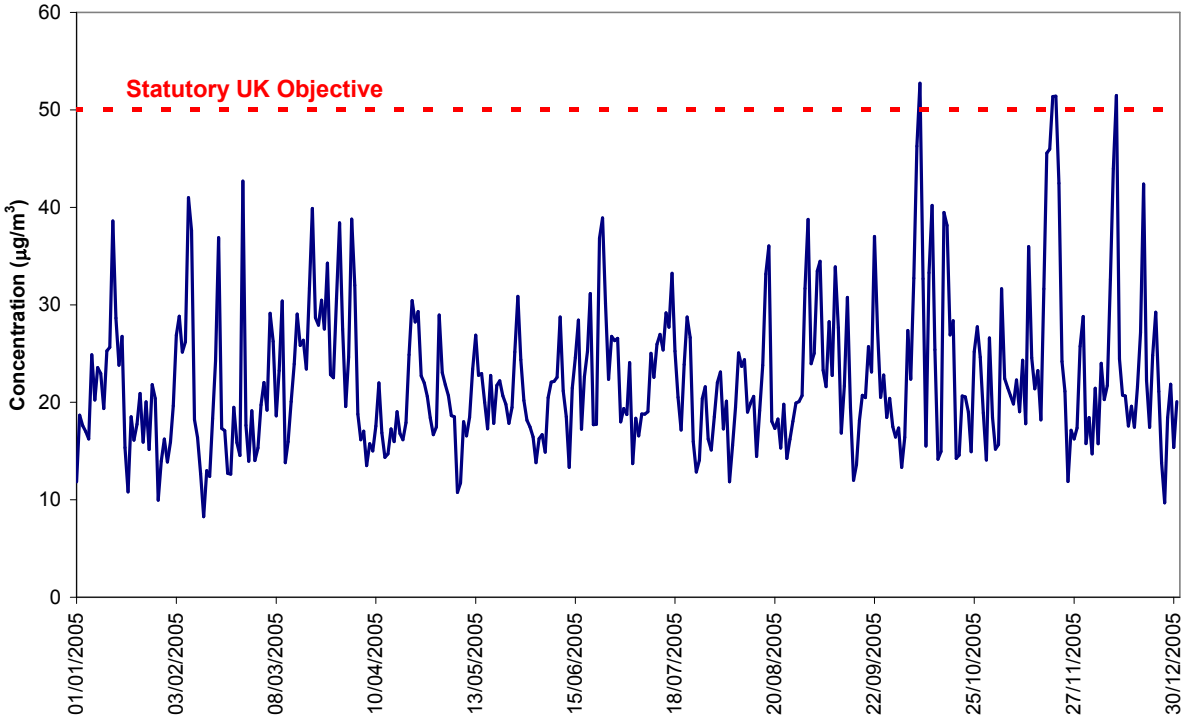


Table 6: Historical PM_{10} Concentrations (µg/m^3; gravimetric equivalent) at Michael Crescent, Horley.

Year	Annual Mean	Days >50 µg/m^3	Max Daily Mean	Min Daily Mean	Median Daily Mean	SD of Daily Means	N (days)	Data Capture (%)
2001	22.8	6	73.0	8.5	20.4	9.4	364	99.7
2002	23.2	6	63.9	6.8	21.3	8.3	365	100.0
2003	25.7	16	75.8	6.4	21.9	11.4	363	99.5
2004	22.3	0	48.9	7.3	20.3	7.3	366	100.0
2005	22.4	4	52.7	8.3	20.6	7.6	365	100.0
Objective for 2004	**40**	**35**	-	-	-	-	-	**90.0**

New monitoring data within an AQMA

9.3 No AQMAs have been declared for PM_{10} and therefore this section is not applicable.

Junctions

9.4 There are no busy junctions within the Borough that were not considered in previous rounds of Review and Assessment.

Roads with high flow of buses and/or HGVs

9.5 Roads with a high flow of buses and/or HGVs were considered fully in the previous rounds of Review and Assessment.

New roads constructed or proposed since first round of Review and Assessment

9.6 A new road will be constructed to serve a proposed housing development in Horley. An air quality assessment of the development has been carried out and no objective exceedences were predicted.

Roads with significantly changed traffic flows

9.7 No roads have been identified where there has been a greater than 25% increase in traffic or new relevant exposure. All existing roads with new relevant exposure were adequately assessed in the previous USA.

Roads close to the objective during the first round of Review and Assessment

9.8 Changes have been made to the estimated background PM_{10} maps at some locations since the previous USA and it is thus important to ensure that the previous work did not under-predict concentrations at the worst-case locations. The previous USA identified three worst-case locations for PM_{10} concentration: A217 / Rushworth Road; M25 (Ashcombe Road); and A217 / A240. Concentrations at these three locations have been predicted again in light of the revised background concentrations. The results are set out in Table 7. It should be noted that these predictions have been calculated using a revised version of the DMRB model (v1.02), which was not available for the previous USA. The results in Table 7 indicate that both the annual mean and 24-hour objectives were achieved in 2005 and are predicted to be achieved by a greater margin during 2006.

9.9 The provisional (2010) objectives for PM_{10} are much more stringent than the statutory objectives and their levels are predicted to be exceeded in 2010 at all three of the modelled locations. These provisional objectives are not set in the regulations and Local Authorities are not required to assess air quality against them. Furthermore, background levels of PM_{10} are predicted to be greater than the objective level at all three locations (and for a large proportion of the Borough) during 2010 (Appendix 3).

Table 7: Summary of DMRB Calculations For PM_{10}.

Receptor Location	2005 ($\mu g/m^3$)	Days >50 $\mu g/m^3$	2006 ($\mu g/m^3$)	Days >50 $\mu g/m^3$	2010 ($\mu g/m^3$)	Days >50 $\mu g/m^3$
A217/Rushworth Road	30.3	29	29.3	25	25.4	13
M25 (Ashcombe Road)	29.6	26	28.8	23	25.1	13
A217/A240	28.3	22	27.5	19	23.8	10
Statutory Objective for 2004	**40**	**35**	**40**	**35**		
Provisional Objective for 2010					**20**	**7**

New industrial sources

9.10 There have been no new processes within the Borough or neighbouring local authorities, which emit significant quantities of PM_{10}, introduced since the previous USA.

Industrial sources with substantially increased emissions

9.11 No industrial processes in or near to the Borough were found to emit significant quantities of PM_{10} in the previous rounds of Review and Assessment. There are no existing sources with substantially increased emissions and no new relevant exposure has been introduced adjacent to existing sources. There are no significant sources within neighbouring authorities.

Areas with domestic solid fuel burning

9.12 There are no areas with a high density of domestic coal burning.

Quarries, landfill sites, opencast coal, handling of dusty cargoes at ports etc

9.13 There are no quarries, landfill sites or other dusty operations in the Borough that have the potential to significantly affect PM_{10} concentrations at residential properties.

Aircraft

9.14 Emissions from Gatwick Airport have been assessed in previous rounds of Review and Assessment and no objective exceedences have been predicted. The PM_{10} monitoring data presented above are from a site immediately downwind of the airport. They confirm that PM_{10} exceedences due to aircraft emissions are still unlikely.

Conclusion

9.15 A Detailed Assessment is not required for PM_{10}.

Glossary

Standards	A nationally defined set of concentrations for eight pollutants below which health effects do not occur or are minimal.
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date, taking into account costs, benefits, feasibility and practicality. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides.
Exceedence	A period of time where the concentration of a pollutant is greater than the appropriate air quality objective.
AQMA	Air Quality Management Area
AQMS	Air Quality Monitoring Station
USA	Updating and Screening Assessment
DA	Detailed Assessment
Defra	Department for Environment Food and Rural Affairs
LAQM.TG(03)	Technical guidance document provided by Defra to assist local authorities in completion of Air Quality Review & Assessment reports.
DMRB	Design Manual for Roads and Bridges (Highways Agency, 2003)
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometers in aerodynamic diameter.
NO_2	Nitrogen dioxide.
m	Metres.
μm	Micrometres (one millionth of a metre)
$\mu g/m^3$	Microgrammes per cubic metre.

Appendix 1
Summary of Health Effects of Air Quality Strategy Pollutants

Pollutant	Main Health Effects
Carbon monoxide	Exposure to very high concentrations may promote the formation of carboxyhaemoglobin in the blood, which reduces the capacity to carry oxygen. Effects are most pronounced in those suffering from an existing disease which affects the delivery of oxygen to the heart or brain.
Benzene	A genotoxic human carcinogen, related to excess risk of leukaemia.
1,3-butadiene	A genotoxic human carcinogen, linked to cancers of the lymphoid system and blood forming tissues, lymphomas and leukaemia.
Lead	Exposure to very high levels may result in toxic biochemical effects, causing problems in the synthesis of haemoglobin and the possible inhibition of intellectual development in infants as well as effects on the kidneys, gastrointestinal tract, joints and reproductive system, and acute or chronic damage to the nervous system.
Nitrogen dioxide	Short-term exposure to high concentrations may cause inflammation of respiratory airways. Long-term exposure may affect lung function and enhance responses to allergens in sensitised individuals. Asthmatics will be particularly at risk.
Sulphur dioxide	Very high concentrations may constrict respiratory airways by stimulating nerves in the lining of the nose, throat and lung. Asthmatics and those with chronic lung disease will be particularly at risk.
Airborne particles	Long-term exposure to particulate matter is associated with a marked reduction in life expectancy, primarily due to increased heart and lung disease and lung cancer mortality. Impaired lung function in both children and adults has also been identified. Short-term exposure is associated with increased mortality in particularly susceptible individuals.

Defra, 2003. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum.

Appendix 2
Summary of Previous Review and Assessment Reports

Round One

The first stage Review and Assessment report was produced by Reigate and Banstead Borough Council in June 1999. It concluded that no further action was required for benzene, 1,3-butadiene, lead or sulphur dioxide. Further investigation was however required for carbon monoxide, nitrogen dioxide (NO_2) and PM_{10}, and the Council proceeded to the second stage.

The second stage of Review and Assessment for Reigate and Banstead (November 1999) indicated a risk of exceeding the annual mean NO_2 objective at a number of major roads in the area, as well as a risk of exceeding the 24-hour PM_{10} objective along certain stretches of road.

The third stage of Review and Assessment (July 2001) involved detailed modelling work focusing on the potential exceedence areas highlighted in the Stage 2 report. Results indicated a likely exceedence of the annual average NO_2 objective in 2005 at a number of residential properties that were within 30 m of the M25, A217 or M23, and for an area of Horley alongside Gatwick Airport.

In April 2002, Reigate and Banstead Borough Council declared five Air Quality Management Areas (AQMAs). One of these areas has two sections and so there were effectively six separate AQMAs. These were all areas where the Review and Assessment reports had predicted concentrations of nitrogen dioxide are likely to exceed the Government's air quality objective in 2005. Four of these areas were located in the northern part of the Borough, close to busy roads. Two were in the southern part of the Borough and close to Gatwick Airport.

The first Stage 4 Further Assessment (May 2003) dealt with the four road-related AQMAs and identified that objective exceedences were unlikely in three of the four. It thus recommended that they could be revoked. The report concluded that remaining "M25" AQMA should be retained. The second Stage 4 Further Assessment (April 2004) dealt with the two airport-related AQMAs. It concluded that these AQMAs should be retained.

An addendum to the stage 4 Further Assessment of the Horley AQMA (February 2005) presented modelled NO_2 concentration data for 2010. It concluded that close to Gatwick Airport, expansion of the airport has a more significant effect on concentrations than improvements in road vehicle technology and therefore there are likely to be exceedences of the 2010 Limit value.

Thus, at the end of the first round of Review and Assessment, the Borough had three AQMAs: which were termed the M25 AQMA, the Horley AQMA, and the M23 AQMA.

Round Two

The Updating and Screening Assessment (May 2003) identified one new area on the south east corner of the junction of the A217 and Rushworth Road as in need of a Detailed Assessment for both NO_2 and PM_{10}. The USA also recommended that the Detailed Assessment should reassess conditions within the three remaining AQMAs, as well as at two of the AQMAs that had been revoked at the end of Round 1.

The Detailed Assessment (April 2004) concluded that:
i) the property on the SE corner of the junction of the A217 and Rushworth Road would not breach the 2004 objective for PM_{10}, however a breach of the 2005 annual mean NO_2 objective was predicted. Therefore an AQMA was declared for this property for NO_2.
ii) the AQMA declared on the property on the SE corner of the junction of the A23 and Dean Lane, and subsequently revoked following the stage 4 assessment, was predicted to breach the 2005 annual average NO_2 objective based on monitoring data from 2003. Therefore this site was re-declared as an AQMA for NO_2.
iii) the AQMA surrounding the M23 to the north of the M25, and the AQMA at the Flying Scud Public House on the A23, which were revoked following the stage 4 assessment, would still meet the 2005 annual average objective for NO_2 based on the 2003 data and thus remained revoked.
iv) the AQMA on the M23 to the south of the M25 should remain in its current form due to the uncertainty in the modelling results. Diffusion tube monitoring was established.
v) The AQMA on the M25 should remain in its original form.

vi) The Horley AQMA near to Gatwick airport should remain in its original form, due primarily to the uncertainty over the impact of the predicted growth at the airport beyond 2005. However, only properties closest to both the airport and the A23 were predicted to exceed the 2005 objective in 2005.

A Further Assessment (March 2006) of air quality within two existing AQMAs at Rushworth Road and Dean Lane concluded that, whilst monitoring data for 2005 showed no exceedences of the annual mean nitrogen dioxide at relevant receptor locations, the concentrations were close to the objective level. Coupled with appreciable year-on-year variation in measured data, it was recommended that both AQMAs were retained.

The Progress Report (July 2005) identified three areas outside of current AQMAs where the concentrations of nitrogen dioxide were likely to breach the 2005 annual mean objective:
i) properties backing onto the A240 Reigate Road near junction with A2022 (Drift Bridge);
ii) Reigate High Street and Church Street between the High Street and Bancroft Road;
iii) A property on the A217 near Blackhorse Lane and the M25 junction 8 interchange.

The council proceeded to a Detailed Assessment for nitrogen dioxide at Drift Bridge, and proceeded directly to declaration of AQMAs, (and stage 4 Further Assessment reports) of two locations, at Reigate High Street and the A217 Black Horse.

Appendix 3
Estimated Background Concentrations

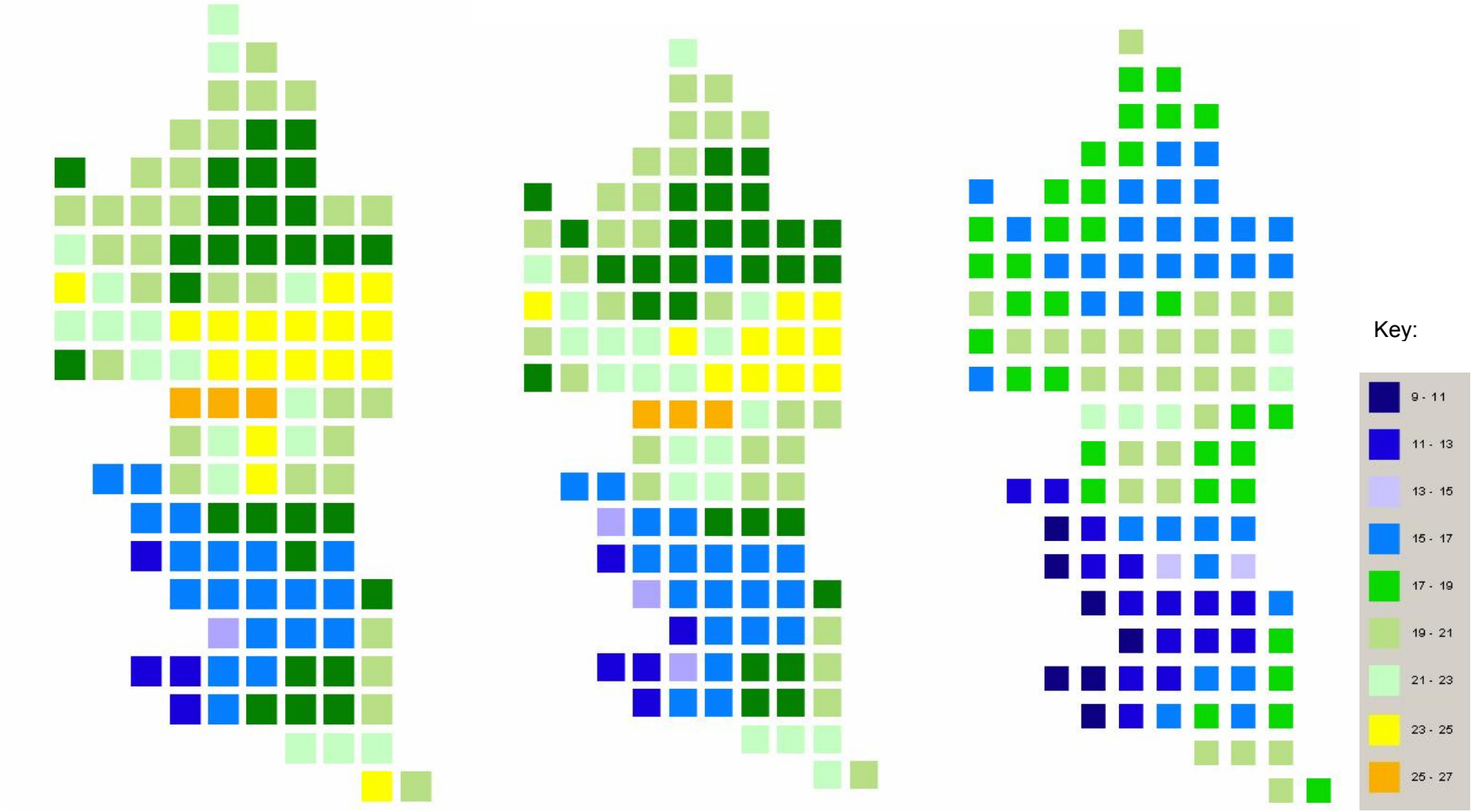


Figure A3.1: Estimated NO_2 background concentrations (µg/m^3) for 2005, 2006 and 2010 for the Borough of Reigate and Banstead (Defra, 2006b).

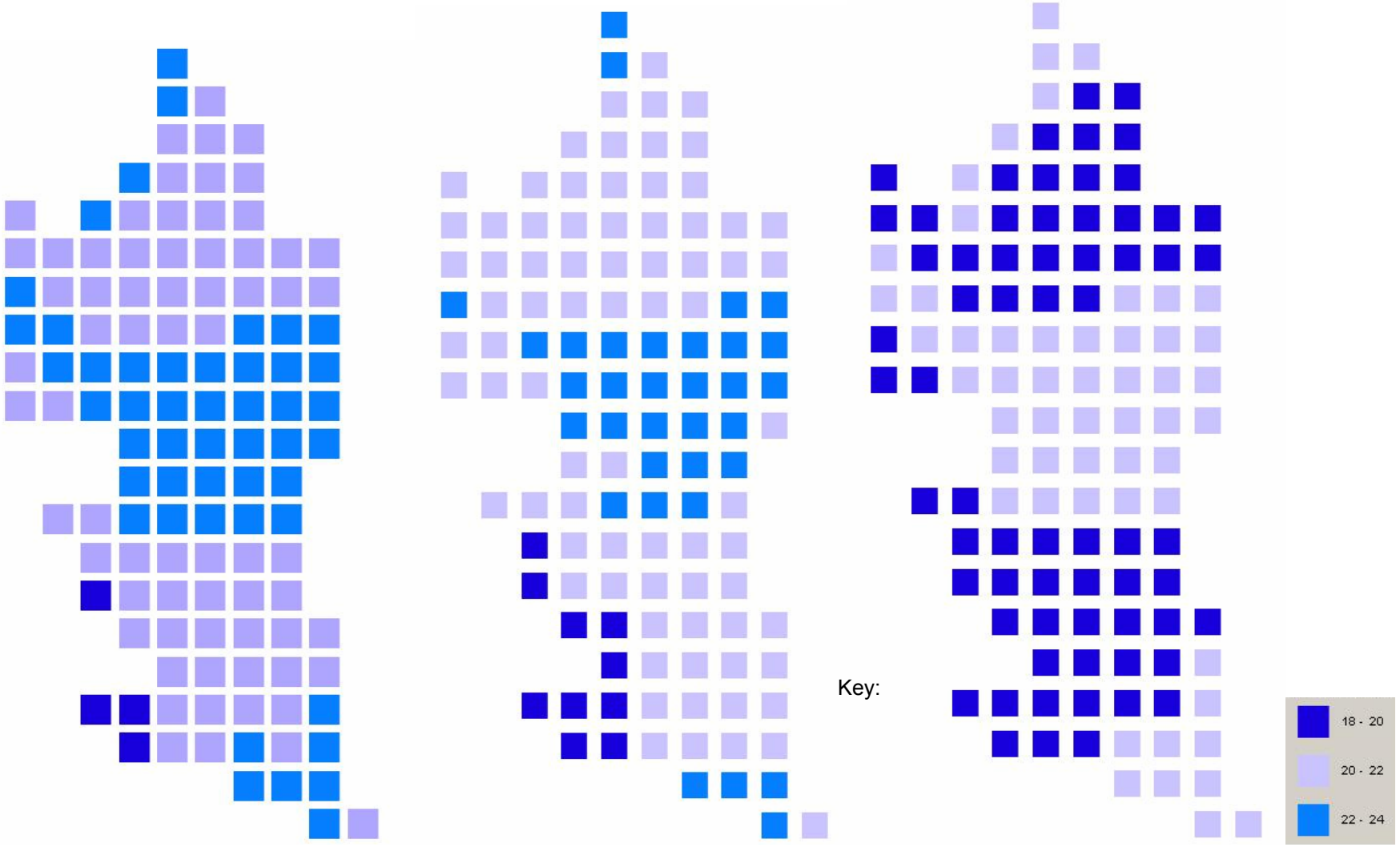


Figure A3.2: Estimated PM_{10} background concentrations ($\mu g/m^3$) for 2005, 2006 and 2010 for the Borough of Reigate and Banstead (Defra, 2006b).

Appendix 4
Monitoring Locations

Maps presented indicate diffusion tube monitoring locations and, where noted, automatic quality monitoring stations (AQMSs).

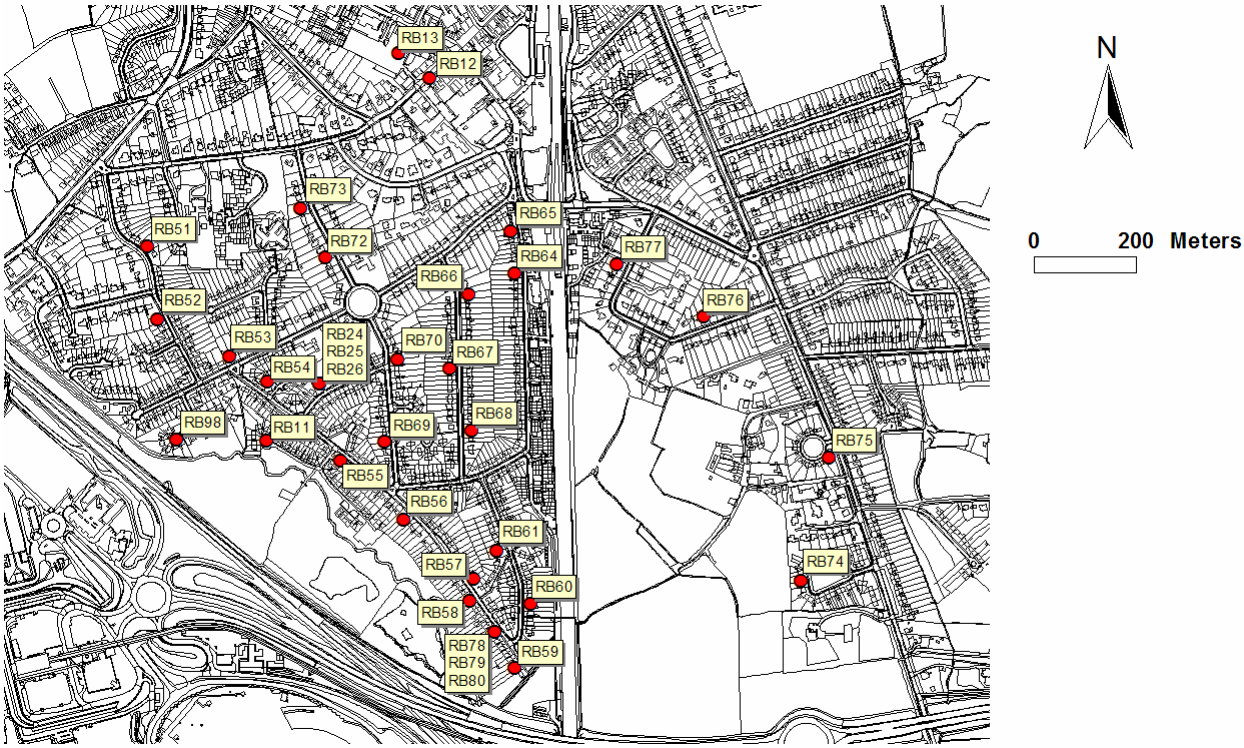


Figure A4.1: Monitoring locations within the Horley AQMA. RG1 AQMS located at RB24/25/26; RG2 AQMS located at RB78/79/80. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

Figure A4.2: Monitoring locations at the AQMS Poles Lane, Crawley. RG3 AQMS also located at this site. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

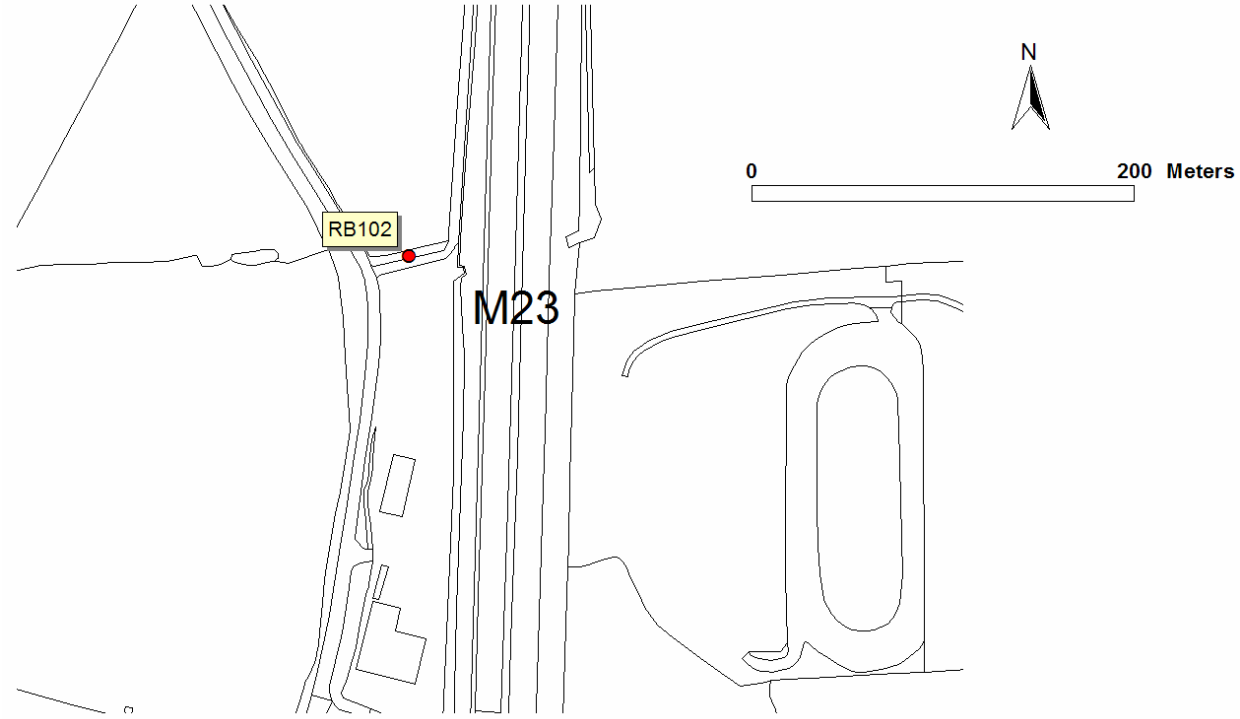


Figure A4.3: Monitoring location in the M23 (South) AQMA. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

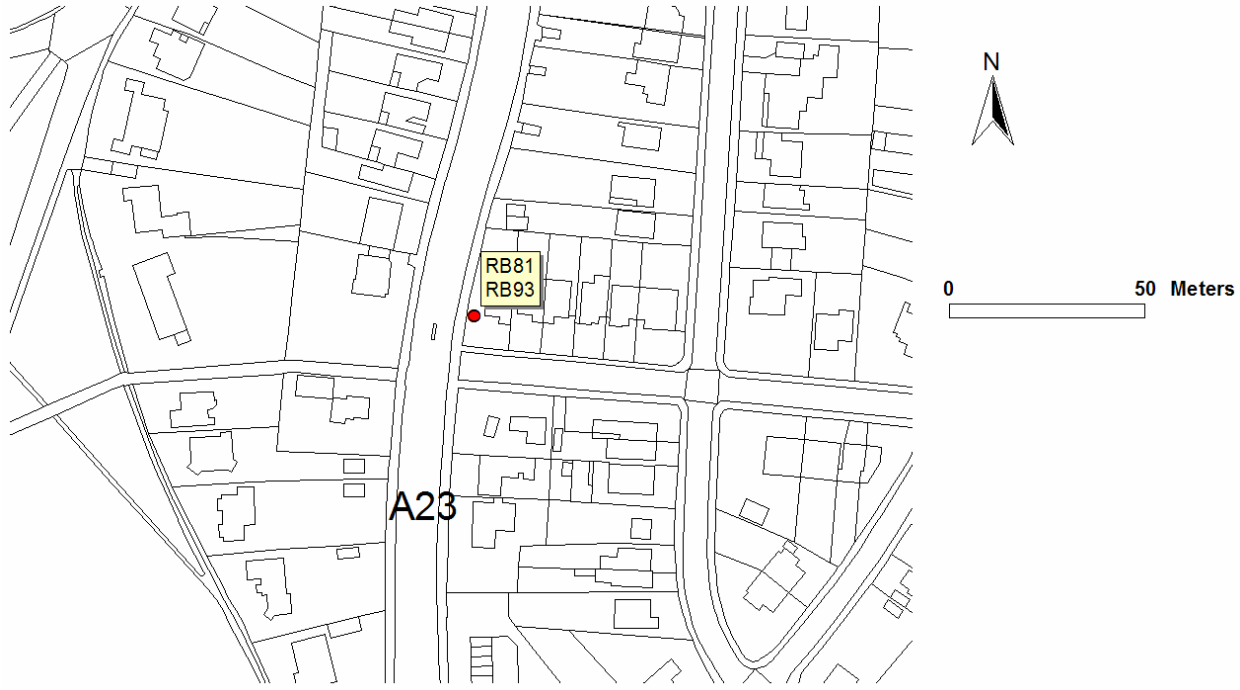


Figure A4.4: Monitoring locations within A23 AQMA, Flying Scud Pub. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

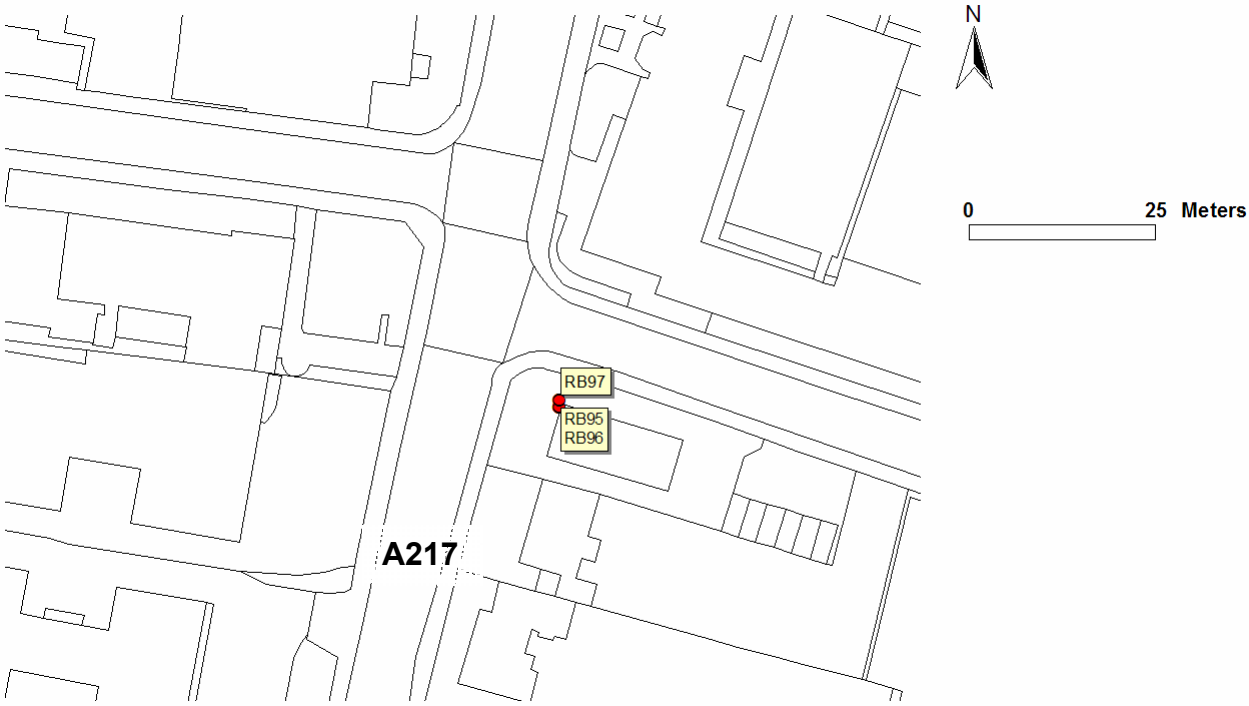


Figure A4.5: Monitoring locations within Rushworth Road AQMA. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

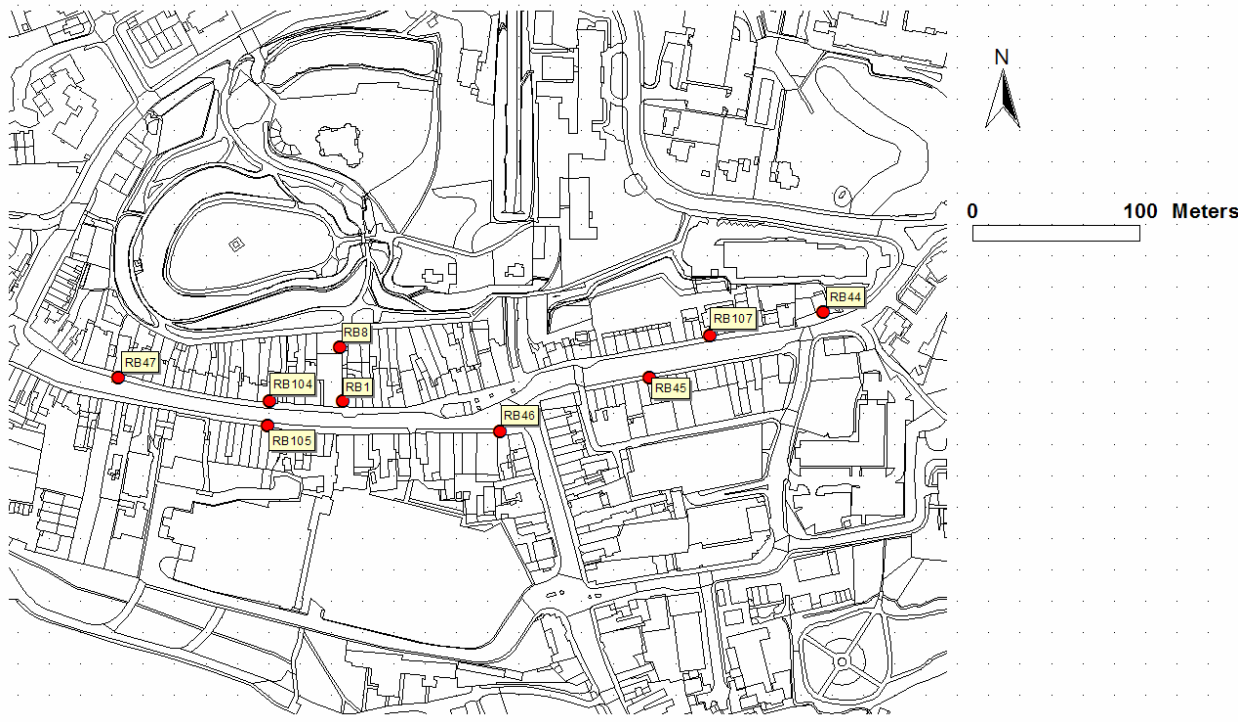


Figure A4.6: Monitoring locations within the High Street AQMA. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

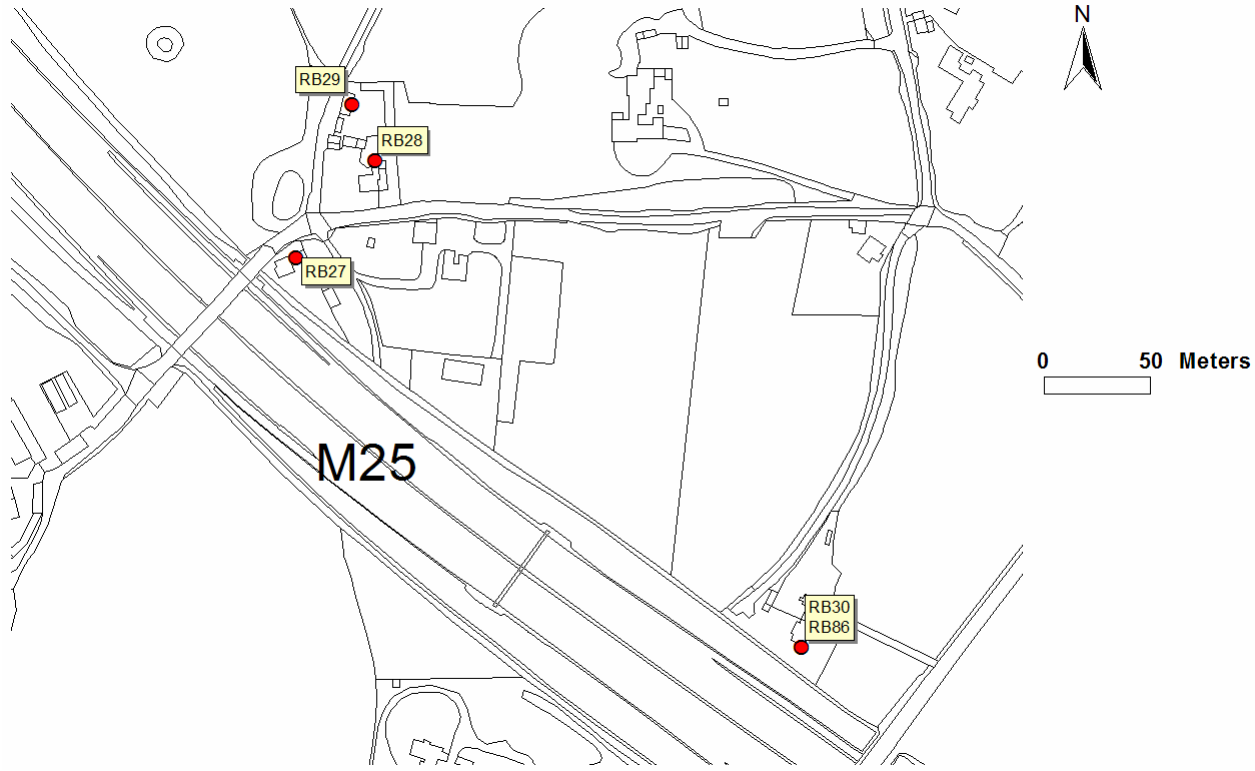


Figure A4.7: Monitoring locations near Sturt Lane, close to M25. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

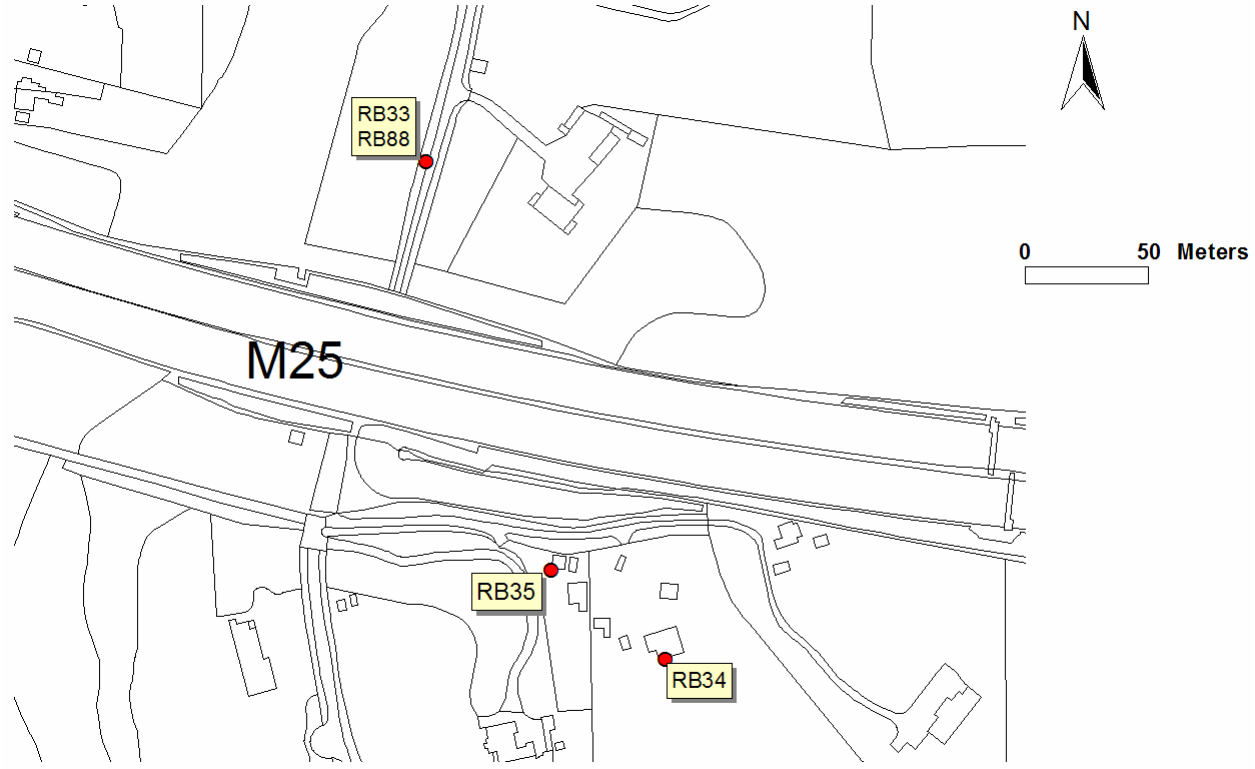


Figure A4.8: Monitoring locations near Merrywood Grove, close to M25. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

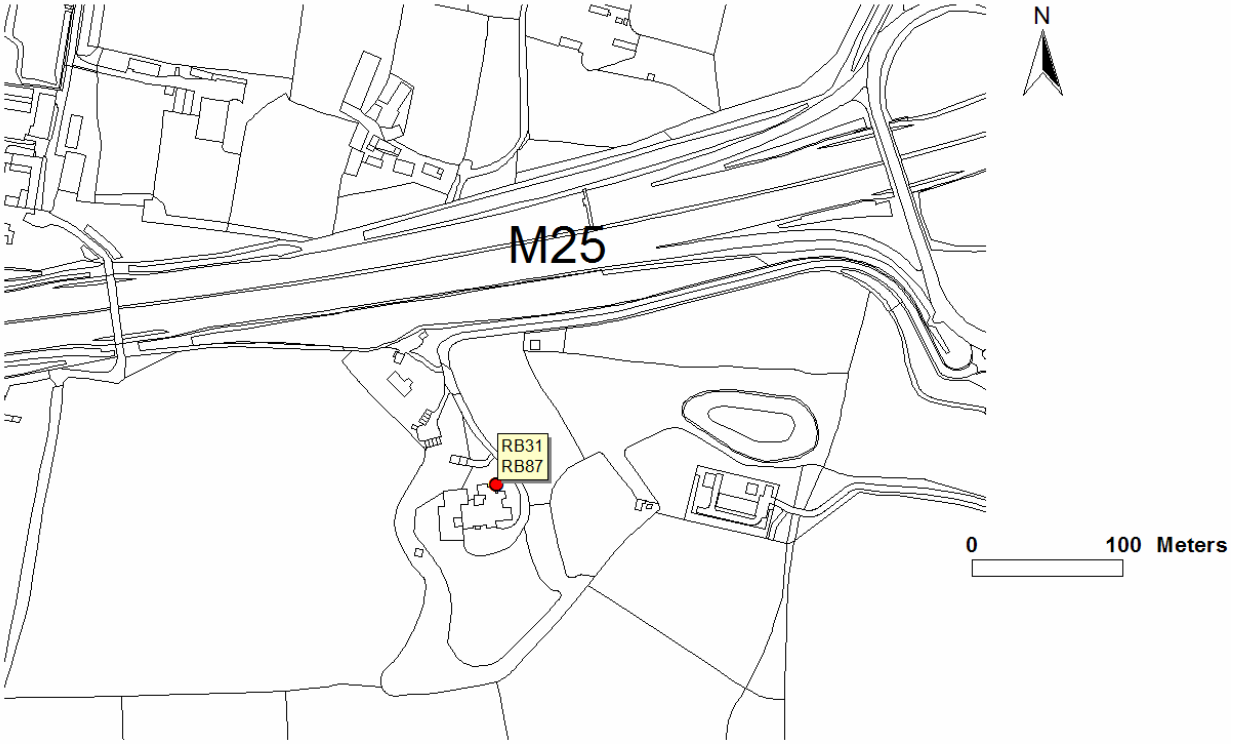


Figure 4.9: Monitoring locations at Margery Hall, close to M25. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

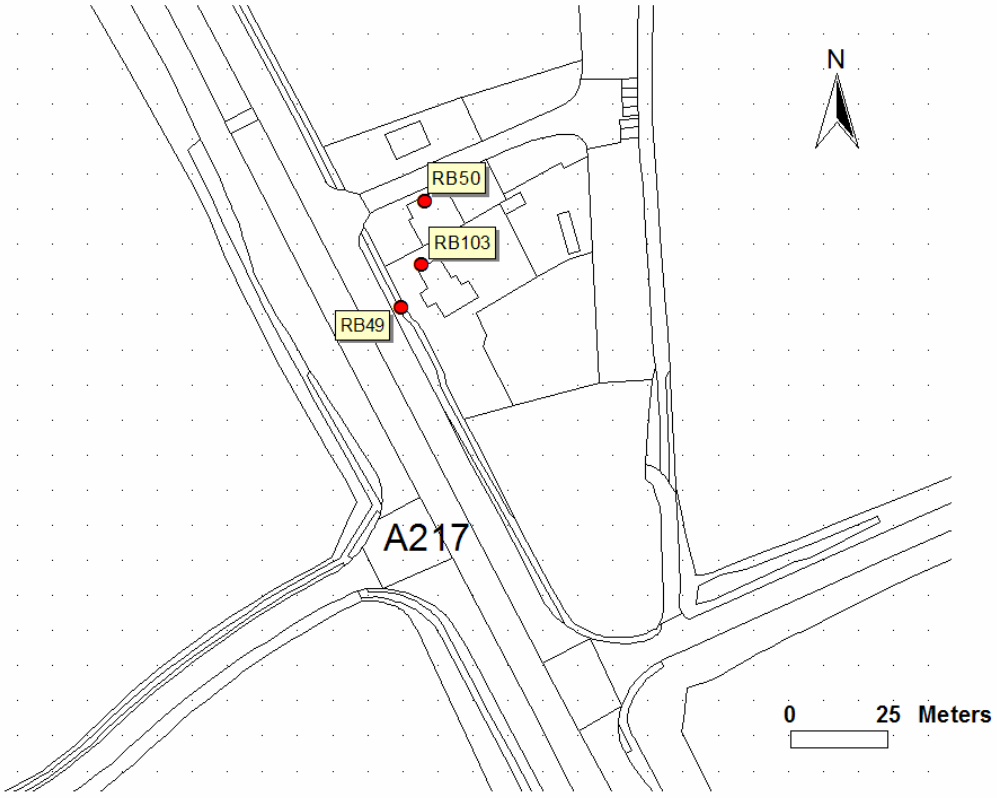


Figure A4.10: Monitoring locations at Highlands, Brighton Road (A217). © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

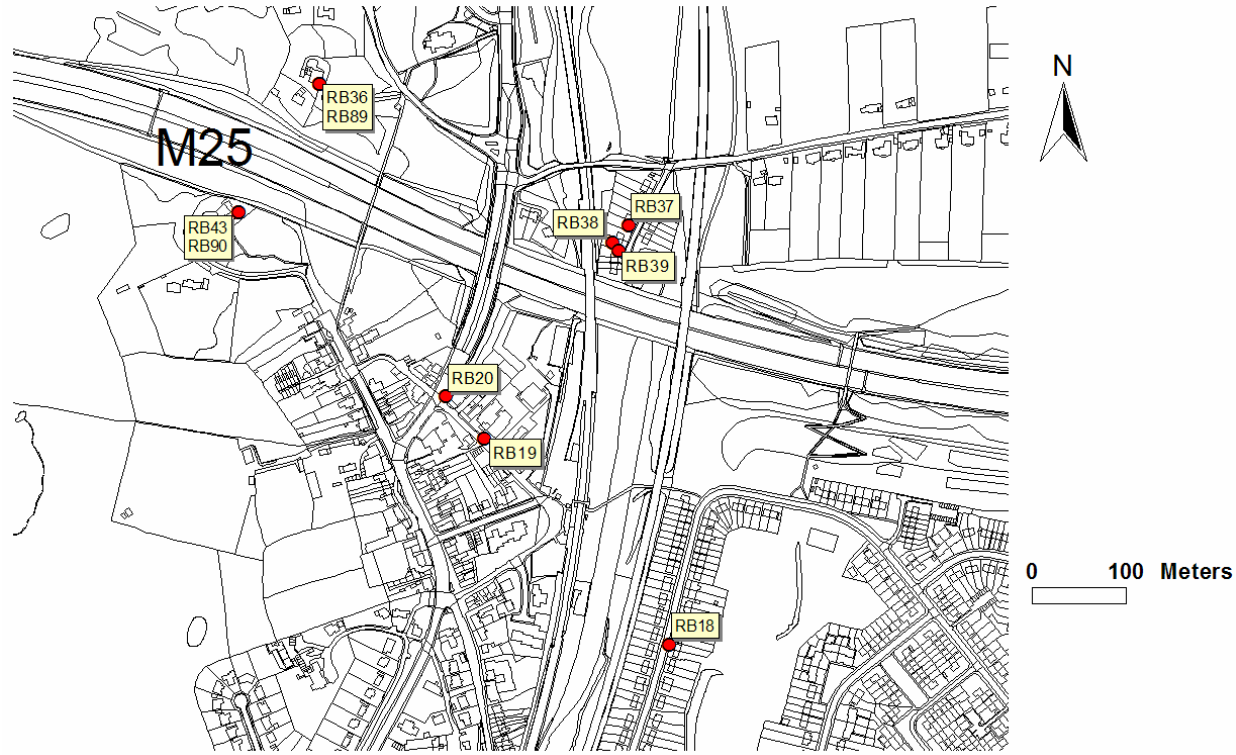


Figure A4.11: Monitoring locations near to M25 and in Merstham. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

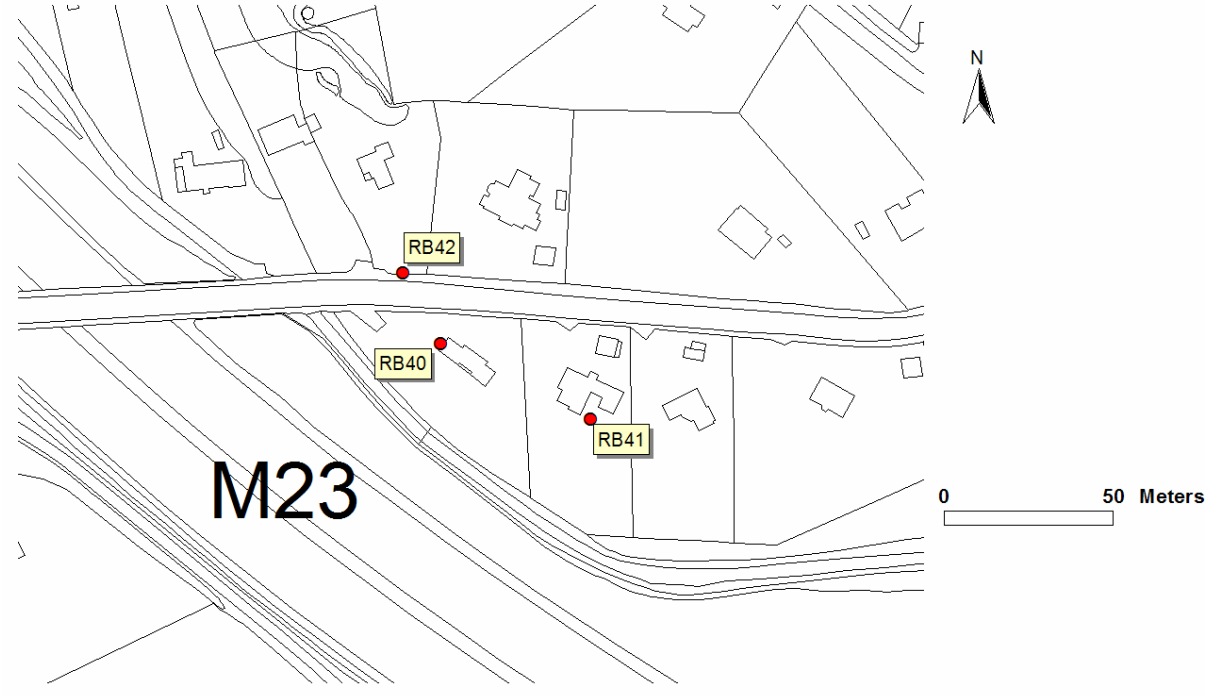


Figure A4.12: Monitoring at Shepherd's Hill, near M23. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

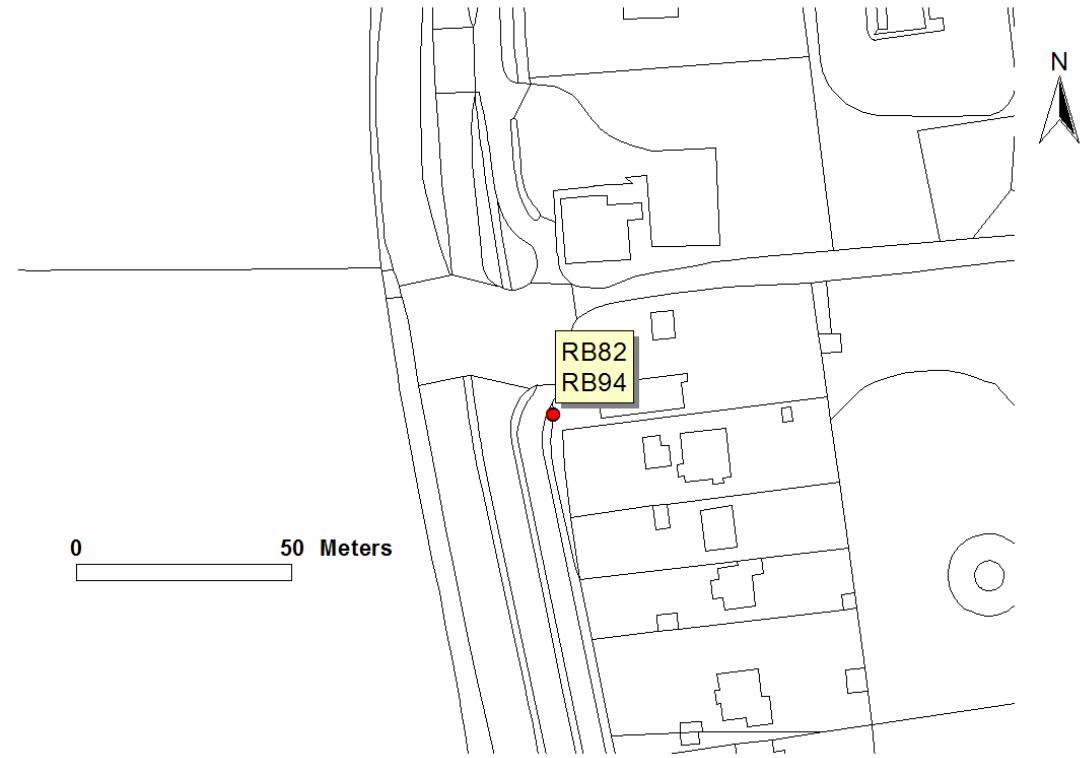


Figure A4.13: Monitoring locations at Dean Lane AQMA. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

Figure A4.14: Monitoring locations at Drift Bridge. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

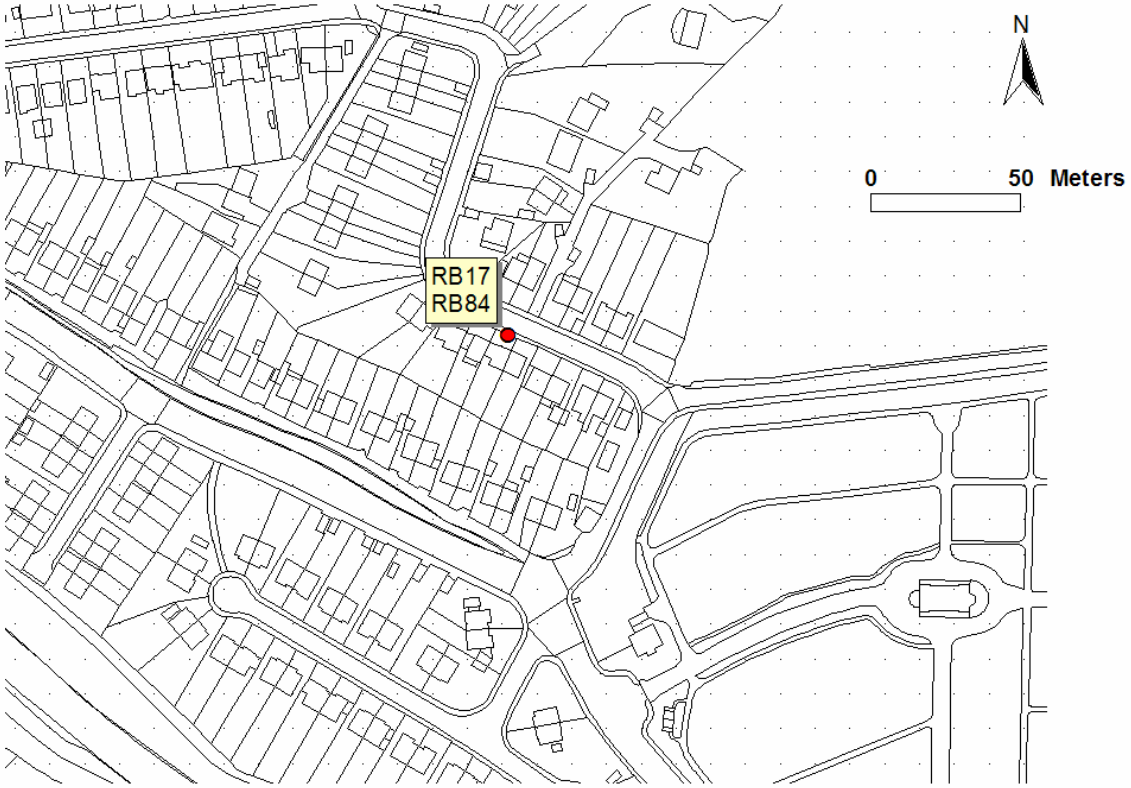


Figure A4.15: Monitoring locations at Sylvan Way, Redhill. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

Figure A4.16: Monitoring locations at St. Mary's Road, Reigate. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

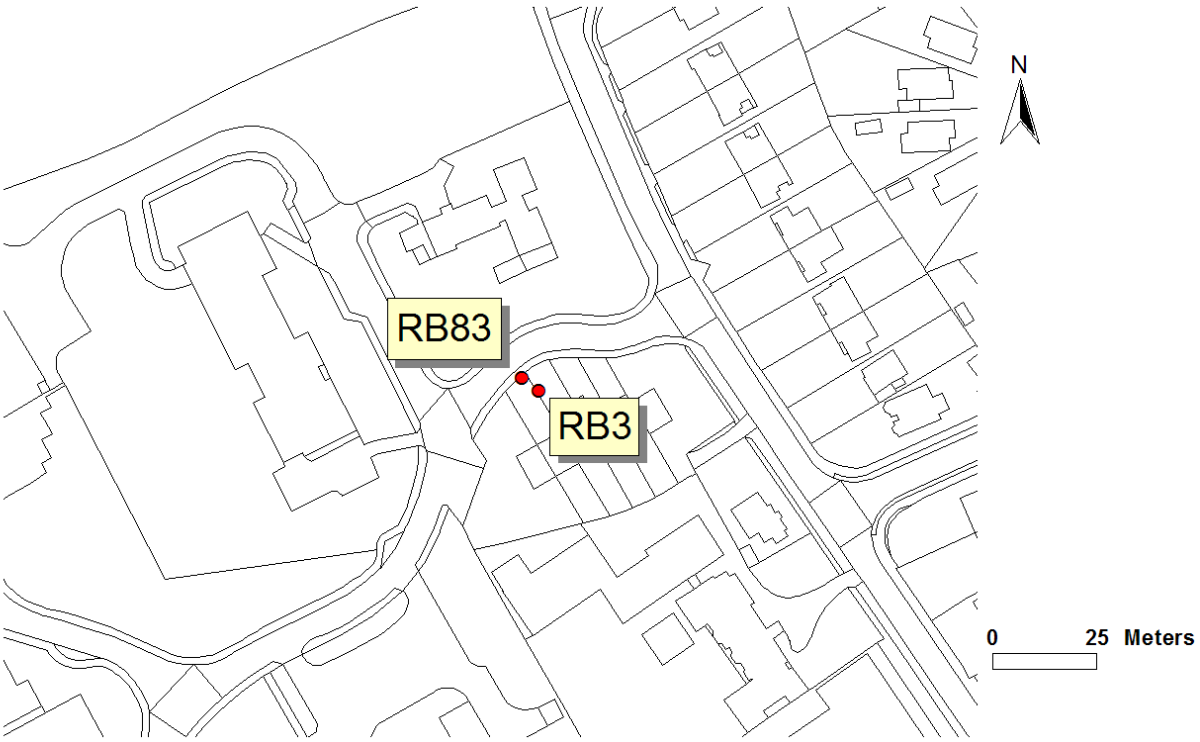


Figure A4.17: Monitoring locations at The Horseshoe, Banstead. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

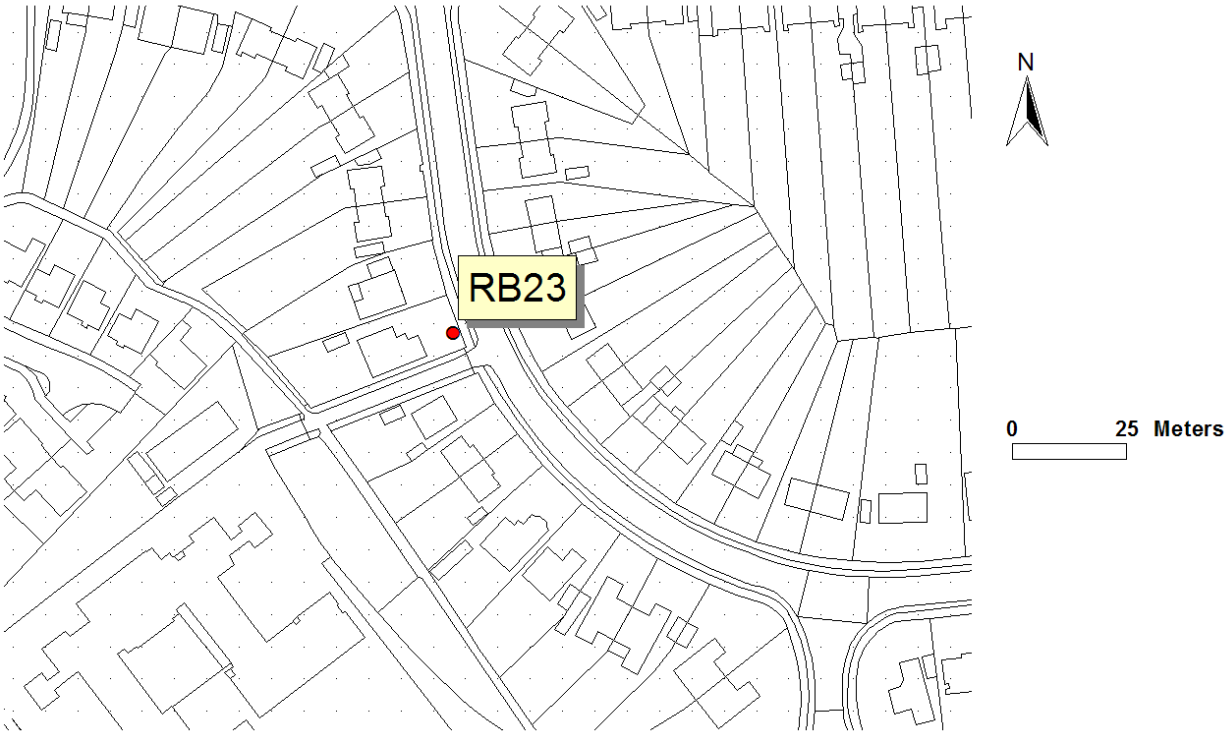
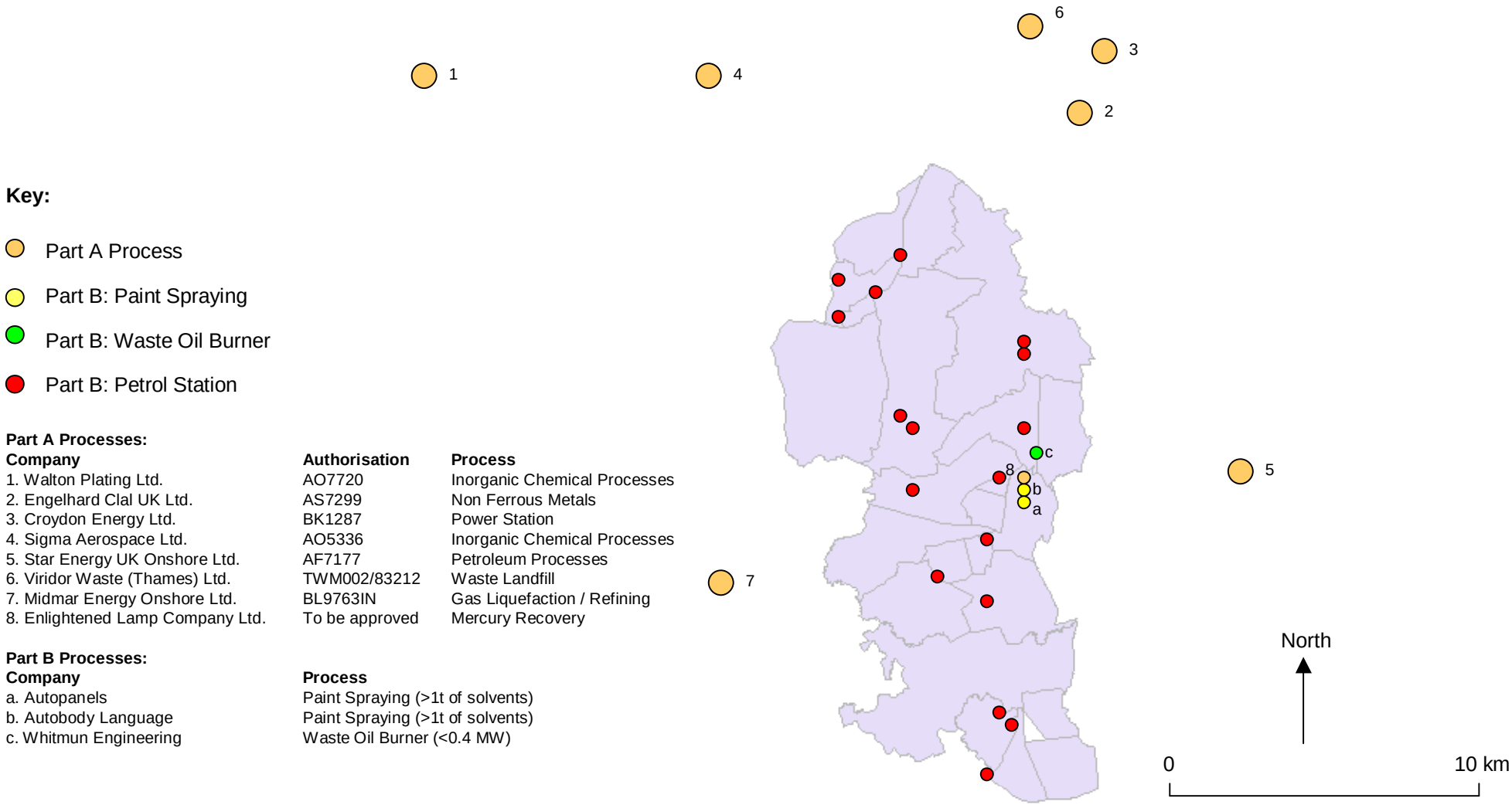


Figure A4.18: Monitoring location at Warren Mead School, Banstead. © Crown Copyright. Reigate & Banstead Borough Council. Licence no. 100019405.

Appendix 5
Part A and B Processes



Part A Processes:

Company	Authorisation	Process
1. Walton Plating Ltd.	AO7720	Inorganic Chemical Processes
2. Engelhard Clal UK Ltd.	AS7299	Non Ferrous Metals
3. Croydon Energy Ltd.	BK1287	Power Station
4. Sigma Aerospace Ltd.	AO5336	Inorganic Chemical Processes
5. Star Energy UK Onshore Ltd.	AF7177	Petroleum Processes
6. Viridor Waste (Thames) Ltd.	TWM002/83212	Waste Landfill
7. Midmar Energy Onshore Ltd.	BL9763IN	Gas Liquefaction / Refining
8. Enlightened Lamp Company Ltd.	To be approved	Mercury Recovery

Part B Processes:

Company	Process
a. Autopanels	Paint Spraying (>1t of solvents)
b. Autobody Language	Paint Spraying (>1t of solvents)
c. Whitmun Engineering	Waste Oil Burner (<0.4 MW)

Figure A5.1: Part A Processes within the vicinity of, and Part A and B Processes within Reigate and Banstead.

Company	CO	Benzene	1,3 Butadiene	NO_2	PM_{10}	SO_2	Pb	Comments
1. Walton Plating Ltd.	-	-	-	-	-	-	-	Emits mainly organics to air.
2. Engelhard Clal (UK) Ltd.	-	-		<100t(02)	<10t(02)	<100t(02)		Range of organics & metals.
3. Croydon Energy Ltd.	-	-	-	✓	✓	✓	-	No further details available.
4. Sigma Aerospace Ltd.	-	-	-	-	-	-	-	Emits some organics to air.
5. Star Energy (UK) Onshore Ltd.	<100t(04)	<1t(04)	-	<100t(04)	-	-	-	
6. Viridor Waste (Thames) Ltd.	<100t(04)	<1t(04)	<1t(04)	-	<10t(04)	<100t(04)*		Range of chemicals emitted.
7. Midmar Energy Onshore Ltd.	-	-	-	-	-	-	-	Only ammonia and CO_2 reported in 2004.
8. Enlightened Lamp Company Ltd.	-	-	-	-	-	-	-	Not yet operational. Possible Hg emissions.
a. Autopanels.	-	-	-	-	-	-	-	Opens November 2006.
b. Autobody Language.	-	-	-	-	-	-	-	Not a significant source.
c. Witmun Engineering.	-	-	-	-	-	-	-	Not a significant source.
Petrol Stations.	-	•	-	-	-	-	-	

Key:

t Metric Tonne.
(xx) Last available year for data.
- Does not emit pollutant or for Part A processes no data reported.
TSP Total suspended particulates i.e. all particles.
✓ Croydon Energy limited emission data to date. Thus represents possible releases.
* Emission relate to Sulphur oxides rather than just SO_2.
• For Part Bs: Possible source of pollutant but not necessarily significant.

Note: Walton Coachworks, The Repair Centre, and the Crash Repair Centre Ltd listed in the 2003 USA emit less than 1t of solvent per annum, and so no longer fall within the regulatory regime. WBB minerals closed in March 2005.

The Part A processes Alpha Fry Ltd., Walterisation (UK) Ltd., and AIK electronics (UK) Ltd., listed in the 2003 USA have since closed.

Table A5.1: Part A Emissions Inventory and Possible Part B Pollutant Sources in and around the Borough.

Appendix 6
Diffusion Tube Bias Adjustment

Diffusion tubes are known to exhibit bias when compared to results from automatic analysers. Therefore diffusion tube results need to be adjusted to account for this bias. One of the main factors influencing diffusion tube performance is thought to be the laboratory that supplies and analyses the tubes. Reigate and Banstead Borough Council use diffusion tubes that are supplied and analysed by Lambeth Scientific Services. These are prepared using 50% TEA in acetone.

In order to determine the bias exhibited by these tubes, studies are carried out using triplicate tubes collocated with each of the three automatic monitors within the Borough of Reigate and Banstead (data capture 75% or greater). All 2005 diffusion tube data presented in this report have been adjusted using the overall factor calculated using the data presented in Table A6.1, and orthogonal regression.

Table A6.1 Results of Diffusion Tube and Continuous Monitor Collocation Studies

Year	AQMS	Diffusion tube	Automatic	Adjustment Factor
2005	Michael Crescent, Horley	21.6	29.1	1.351
2005	74 The Crescent, Horley	24.3	34.3	1.411
2005	Poles Lane Pumping Station, Crawley	15.3	19.4	1.274
2005	**Overall factor** (after orthogonal regression)			**1.349**

Appendix 7
Adjustment of Short-Term Data to Annual Mean

A number of additional diffusion tube monitoring sites were established during 2005. This resulted in data from these sites not being available for a full calendar year. Therefore these data have been adjusted to an annual mean based on the ratio of concentrations during the short-term monitoring periods to those over a full calendar year at four sites where long-term data are available, in accordance with the guidance in LAQM.TG(03). The Teddington AURN, Wandsworth AURN, Michael Crescent, Horley and The Crescent, Horley sites have been used for this purpose because they have reliable long-term datasets and are urban background sites, as recommended in LAQM.TG(03).

The annual mean nitrogen dioxide concentrations and the relevant period means for each of the four monitoring sites from which adjustment factors are to be calculated are presented in Table A7.1, along with the Overall Factor for each short-term monitoring period.

Table A7.1 Data used for the adjustment of short-term monitoring data to 2005 annual mean

Period Mean Concentration (µg/m^3)	Teddington	Wandsworth	Michael Crescent, Horley	The Crescent, Horley	Overall Factor
2005	26.3	53.4	29.1	34.3	-
4/1/05-31/5/05	28.9	56.7	30.8	35.7	-
Adjustment factor	**0.91**	**0.94**	**0.95**	**0.96**	**0.94**
2/8/05-3/1/06	28.0	54.8	31.0	35.3	-
Adjustment factor	**0.94**	**0.97**	**0.94**	**0.97**	**0.96**
4/10/05-3/1/06	32.5	56.3	34.7	38.0	-
Adjustment factor	**0.81**	**0.95**	**0.84**	**0.90**	**0.87**

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