



2014 Air Quality Progress Report for Waverley Borough Council

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

April 2014

Local Authority Officer	Ann-Marie Wade
	Environmental Services
Address	The Burys, Godalming GU7 1HR
Telephone	01483 523117
e-mail	Ann-marie.wade@waverley.gov.uk
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Executive Summary

This report presents the findings of Waverley Borough Council's Annual Progress Report of Air Quality within the Borough. The Progress Report evaluates new and changed sources to identify those that may require consideration in further reports.

Previous air quality assessments have concluded that concentrations of carbon monoxide, benzene, 1-3-butadiene, lead, sulphur dioxide (SO₂) and particulates (PM₁₀) are compliant with UK air quality objectives. However, concentrations of nitrogen dioxide (NO₂) have been found to exceed the annual mean objective at various locations within the Borough. A Detailed Assessment was carried out in 2004 and three Air Quality Management Areas (AQMAs) for annual mean nitrogen dioxide objectives were declared. This declaration committed Waverley to taking action towards achieving air quality objectives in AQMAs. In line with statutory requirements Waverley Borough Council put in place its Air Quality Action Plan in 2008. The Action Plan is an evolving document and since its publication in July 2008 changes have occurred. This includes the Air Quality behaviour-changing campaign that was carried out throughout 2010 and other improving actions associated with inter-agency Air Quality Workshops and Steering Groups. Further to this work, the Farnham project was undertaken. The main objective of this study was to assess the effectiveness of existing and proposed traffic management options included in the AQAP, to determine which would deliver satisfactory reductions in emissions to produce lower concentrations of nitrogen dioxide and attain the NO₂ Limits Value by 2015. The Farnham project assessed various low emissions schemes to consider the potential reduction in emissions affecting the Farnham AQMA. This resulted in the publication of the Farnham Traffic Management and Low Emission Feasibility Study.

A further Detailed Assessment was carried out in 2010 which led to the installation of two new nitrogen dioxide diffusion tubes, taking the total site network to 43 diffusion tubes across the Borough. The new monitoring sites were installed at streets approaching Farnham Level Crossing, where the assessment has determined that the concentrations of nitrogen dioxide are close to, but not exceeding, the annual

mean objectives at locations of relevant exposure in the vicinity of Farnham Level Crossing. Therefore and Air Quality Management Area is not required in this location. However, it should be noted that if measured concentrations increase in the future, the results of the Detailed Assessment should be reconsidered.

The 2013 air monitoring results show that PM₁₀ concentrations in the Borough meet the relevant objectives and have remained fairly constant in the last few years. However, nitrogen dioxide concentrations exceeded the annual mean objective in some but not all locations. Eight exceedences were recorded within existing AQMA's and five locations outside. These locations will require further consideration and monitoring, although two of the locations have previously been reviewed through a Detailed Assessment.

The annual report for 2015 will be a more detailed 'Updating and Screening Assessment' which is required every third year. This is required by Defra in order to maintain a more detailed assessment of the current air quality within Waverley Borough.

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1 Introduction

1.1 Description of Local Authority Area

Waverley Borough is situated in the south-western corner of Surrey. The Borough is largely rural with four main population centres: Farnham, Godalming, Haselmere and Cranleigh. Road traffic has been recognised as the major source of pollution in the Borough.

Two main trunk routes cross Waverley: the A31 London to Winchester and the A3 London to Portsmouth dual carriageways. The latter includes the site of the new Hindhead tunnel which opened in August 2011 in order to relieve a serious bottleneck on the A3 route in the village of Hindhead.

Three Air Quality Management Areas (AQMA) have been declared in the Borough of Waverley where exceedences of the annual mean Air Quality Strategy (AQS) objective for nitrogen dioxide (NO₂) were identified, mainly due to traffic congestion.

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) 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.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment (USA) reports, the last USA Report was published in 2012. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as USA Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and 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 microgrammes per cubic metre $\mu\text{g}/\text{m}^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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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 µg/m ³	Running annual mean	31.12.2003
	5.00 µg/m ³	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m ³	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m ³	Annual mean	31.12.2004
	0.25 µg/m ³	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/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
Particulate Matter (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

Waverley Borough Council (WBC) has completed Progress Reports annually and USA reports every third year. In addition to these standard reports WBC has to date completed a Detailed Assessment (DA) (2004) and an associated Further Assessment (2007). An additional Detailed Assessment was carried out in 2010 at Station Hill, in close proximity to Farnham level crossing.

The first round of review and assessment concluded that no exceedences of statutory air quality objectives were occurring in the Borough and in consequence, no Air Quality Management Areas (AQMAs) were required. However, the 2003 USA report determined that exceedences of the objectives were possible for nitrogen dioxide (NO₂) and therefore a Detailed Assessment of nitrogen dioxide levels were required for three locations: the centres of Farnham and Godalming and in Hindhead at the junction of the A3 and the A287.

The subsequent DA based on computer dispersion modelling and local monitoring, confirmed that exceedences were likely at these locations so the Council declared three AQMAs in 2005, (Figures 1.1 to 1.3 below). These are located in central Farnham, central Godalming, and in Hindhead.

A Further Assessment was undertaken in 2007, which confirmed the findings of the DA and recommended: that the Farnham AQMA be extended and that the other two AQMAs be left unaltered. An Air Quality Action Plan was subsequently developed in relation to the three AQMAs, to meet the requirements under Part IV of the Environment Act 1995, to work towards air quality objectives. However, the opening of the Hindhead Relief Road (Hindhead Tunnel) in August 2011 was expected to improve the air quality problem in that AQMA.

The Council published a detailed USA report of local air quality in 2009, as a result of changes in TG (09) guidance, regarding the identification of narrow congested streets. The USA identified one potential new source and a DA was undertaken. The DA was

carried out on the streets approaching and surrounding Farnham railway level crossing. Results determined that the concentrations of nitrogen dioxide are close to, but not exceeding, the annual mean objective at locations of relevant exposure in the vicinity. Therefore an AQMA is not required in this location. However, if concentrations measured at this location increase in the future, the result of the DA must be reconsidered.

A further Updating and Screening Assessment was carried out in 2012. This identified a number of monitoring sites outside of existing AQMAs that measured exceedences of the annual mean nitrogen dioxide objective. Further assessments were undertaken in the identified areas and these sites recorded lower measured nitrogen dioxide concentrations but only provided six months of relevant data. Further data was required in order to show accurate measured nitrogen dioxide concentration levels.

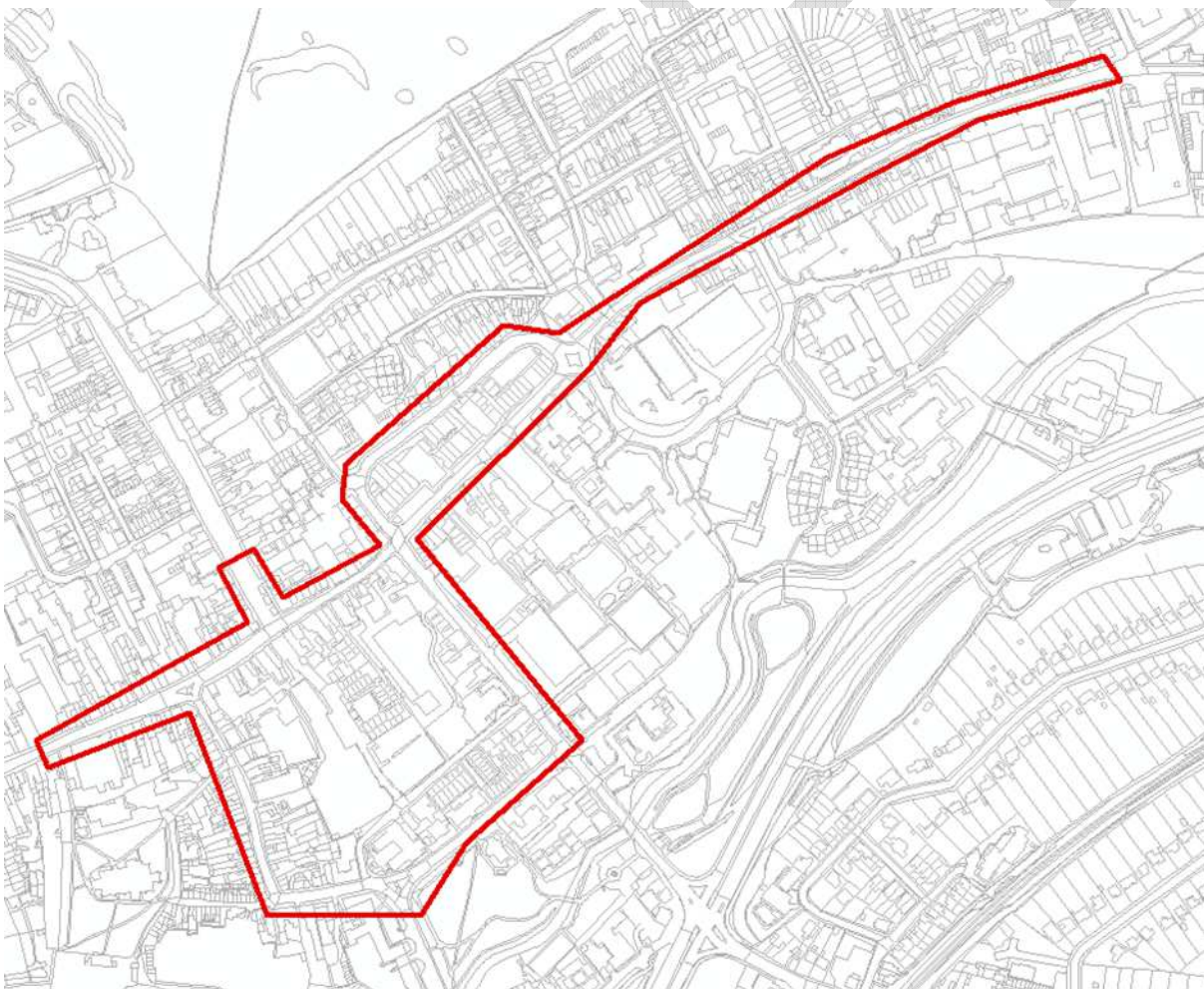


Figure 1.1 Map of Farnham AQMA Boundary © Crown Copyright and database right 2012. Ordnance Survey LA100025451.

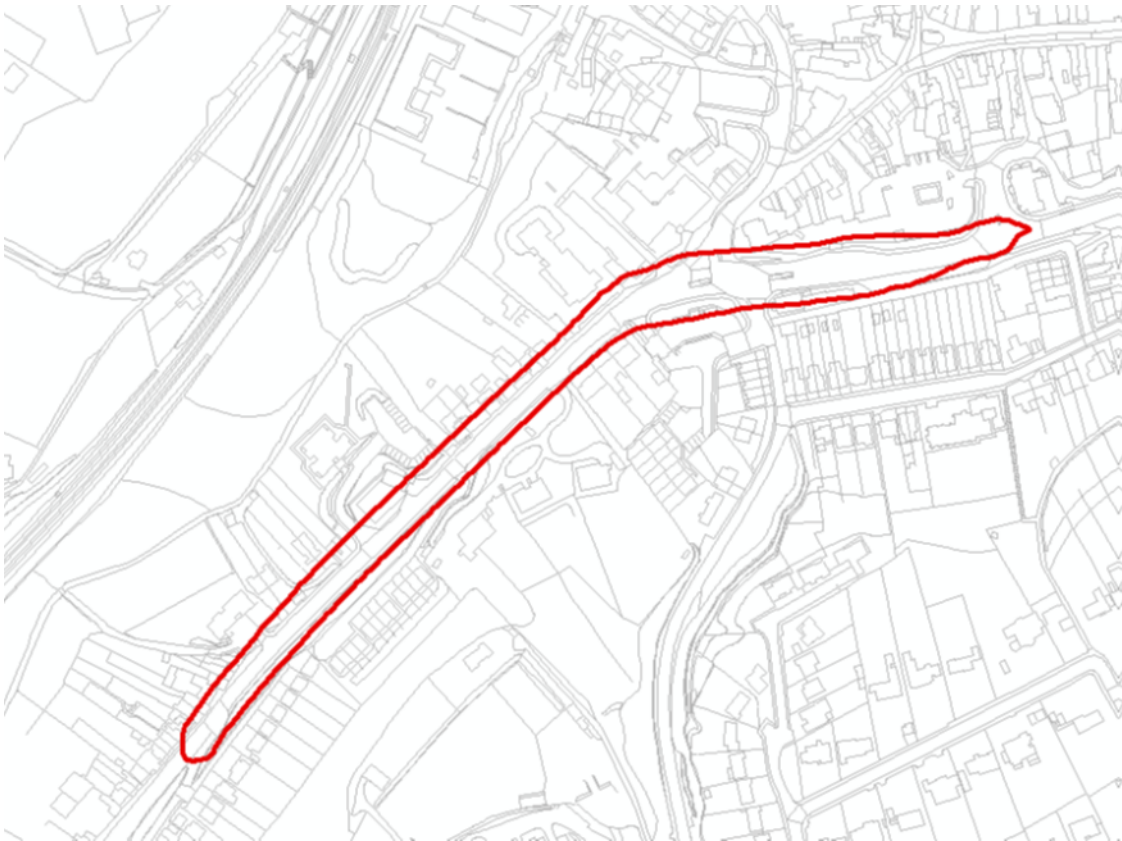


Figure 1.2 Godalming AQMA Boundary © Crown Copyright and database right 2012.
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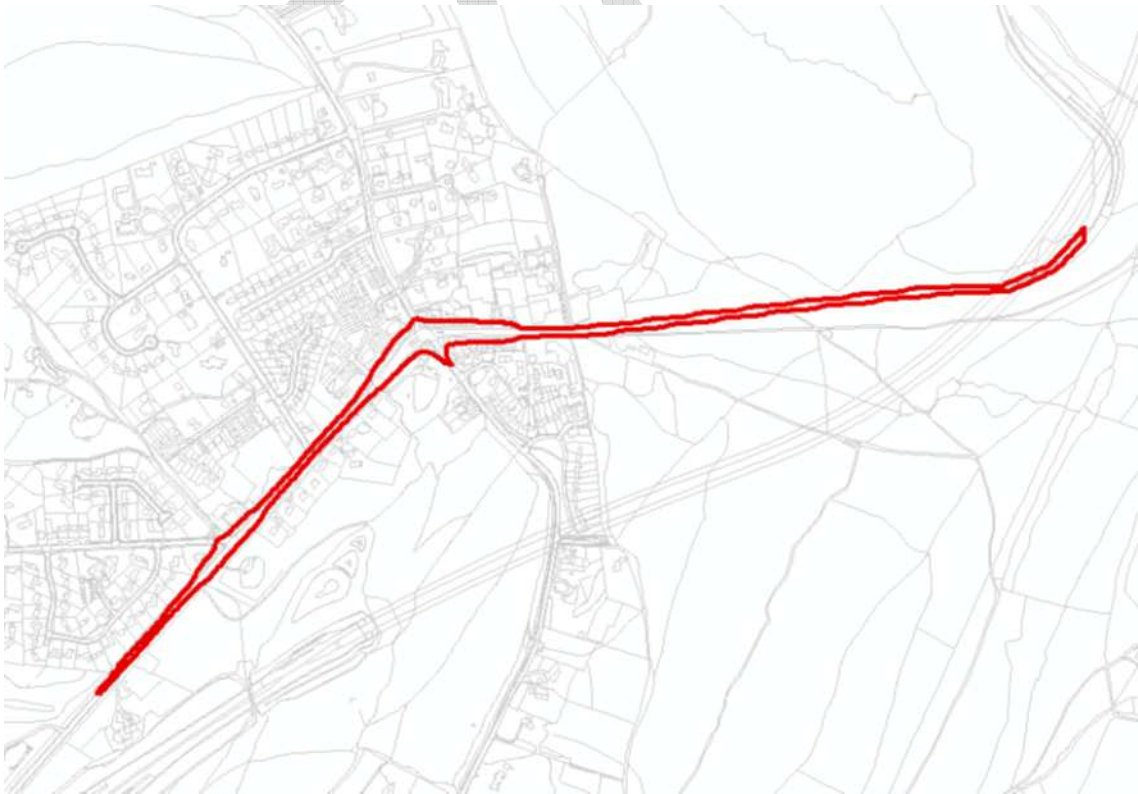


Figure 1.3 Hindhead AQMA Boundary © Crown Copyright and database right 2012.
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2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

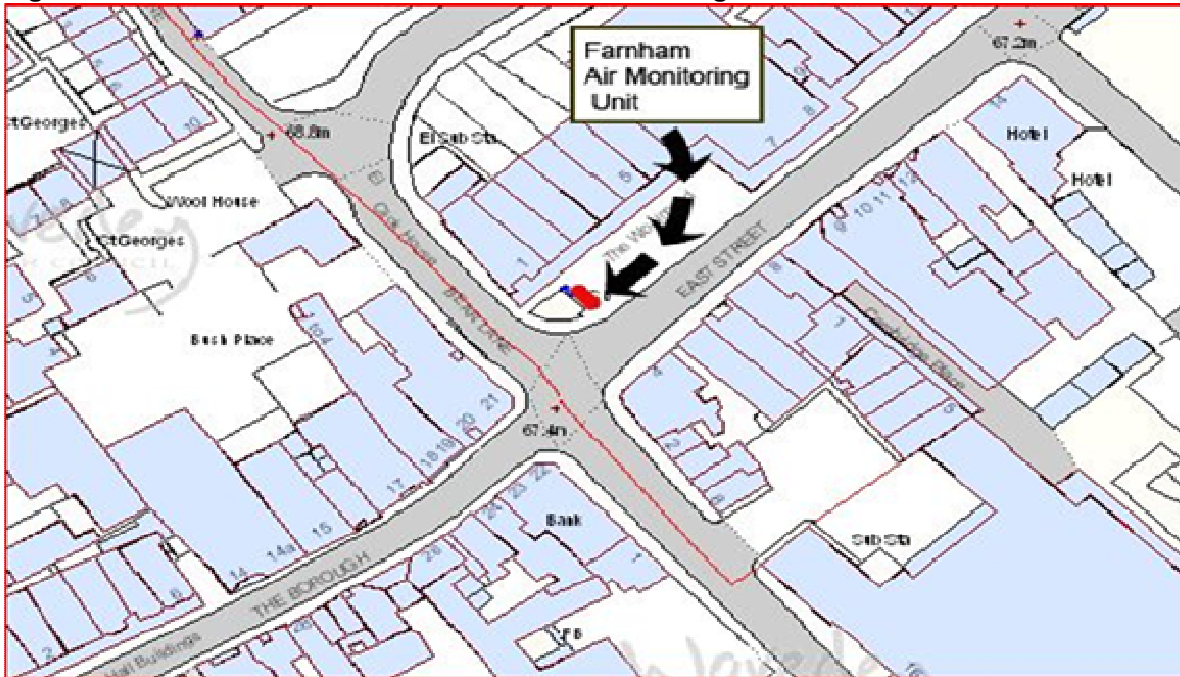
During 2013, monitoring was undertaken at 45 locations across the borough utilising 51 diffusion tubes. Three sites were co-location studies where monitoring was carried out using automatic analysers with triplicate co-located diffusion tubes for the calculation of local bias adjustment factors. At each of these monitoring locations, nitrogen dioxide concentrations are measured, and at Farnham PM₁₀ is also monitored.

2.1.1 Automatic Monitoring Sites

The three automatic monitors are located at roadside locations within, or adjacent to, each of the three AQMA's. All sites measure nitrogen dioxide, whilst the Farnham site also monitors PM₁₀. The location of each analyser is shown in Figures 2.1 to 2.3. No additional automatic monitoring stations have been established since the last USA report which was undertaken in 2012. The equipment is serviced and calibrated on a monthly basis by Enviro Technology. Data from the three sites is then ratified by Air Quality Consultants. Further details of the QA/QC for the automatic monitors is presented in Appendix A.

The Farnham automatic monitoring site is located within the AQMA, at the junction of East Street (A325) and Bear Lane. Nitrogen dioxide concentrations are monitored using an API M200E chemiluminescence NOx analyser, whilst PM10 concentrations are monitored using a Met One Beta-Attenuated (BAM) dust monitor.

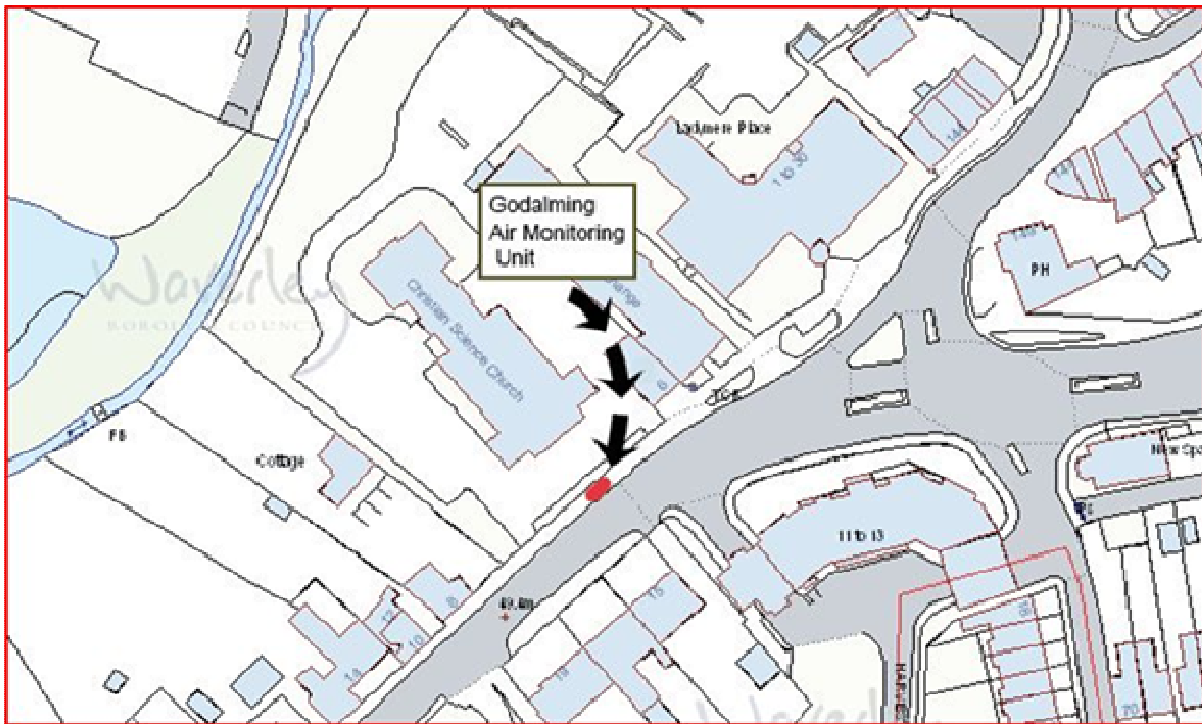
Figure 2.1 Location of the Farnham automatic monitoring station.



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The Godalming automatic monitoring site is located within the AQMA, adjacent to Ockford Road in Godalming town centre. It continuously monitors nitrogen dioxide concentrations using an API M200E chemiluminescence NO_x analyser.

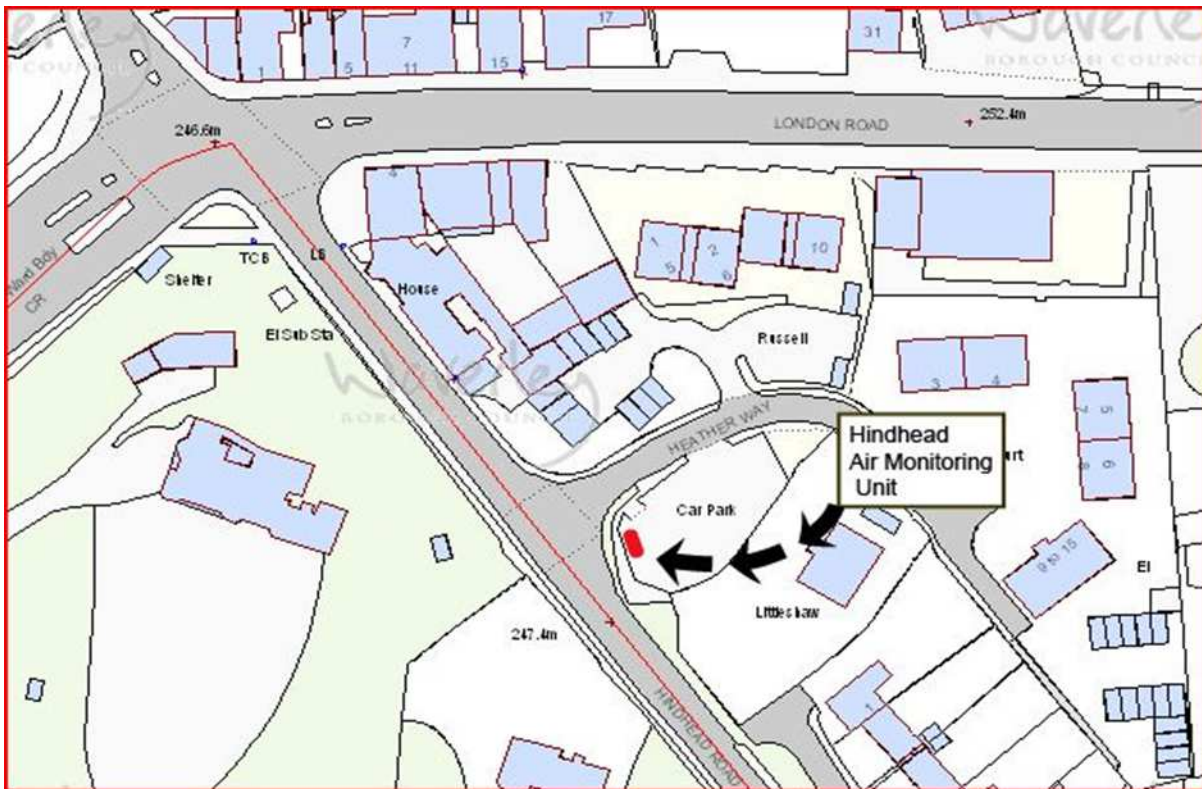
Figure 2.2 Location of the Godalming automatic monitoring station.



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The Hindhead automatic monitoring site is located at the edge of the Hindhead AQMA, close to the junction of the A3 Portsmouth Road and the A287 Hindhead Road. Nitrogen dioxide concentrations are monitored continuously using an API M200E chemiluminescence NOx analyser.

Figure 2.3 Location of the Hindhead automatic monitoring station.



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Table 2.1 Details of Automatic Monitoring Sites

Site	Hindhead	Farnham	Godalming
Site type	Roadside	Roadside	Roadside
OS Grid Ref	X488819 Y135639	X484087 Y146972	X496693 Y143695
Pollutants monitored	NO ₂	NO ₂ PM ₁₀	NO ₂
Monitoring technique	Chemiluminescence	Chemiluminescence Beta attenuation	Chemiluminescence
Within AQMA?	N	Y	Y
Relevant Exposure? <small>(distance to relevant exposure)</small>	Y (20m)	Y (20m)	Y (25m)
Distance to nearest road kerb	7m	5m	3m
Represents worst-case exposure?	N	Y	Y

2.1.2 Non-Automatic Monitoring Sites

Nitrogen dioxide is monitored at 45 sites across the Waverley Borough Council area; 18 sites in Farnham; 3 sites in Hindhead; 11 sites in Godalming; 5 sites in Haslemere; and a further 8 sites in locations across Cranleigh, Bramley, Milford and Dunsfold (see Figure 2.4). Triplicate diffusion tubes are co-located with each of the automatic analysers.

The diffusion tubes are prepared and analysed by Lambeth Scientific Services using the 50% TEA in acetone method. Tubes are changed on a monthly basis.

No new diffusion tubes have been placed since the last additions in 2011, following on from recommendations of the Farnham level crossing Detailed Assessment.

Figure 2.4 Map(s) of Non-Automatic Monitoring Sites (if applicable)

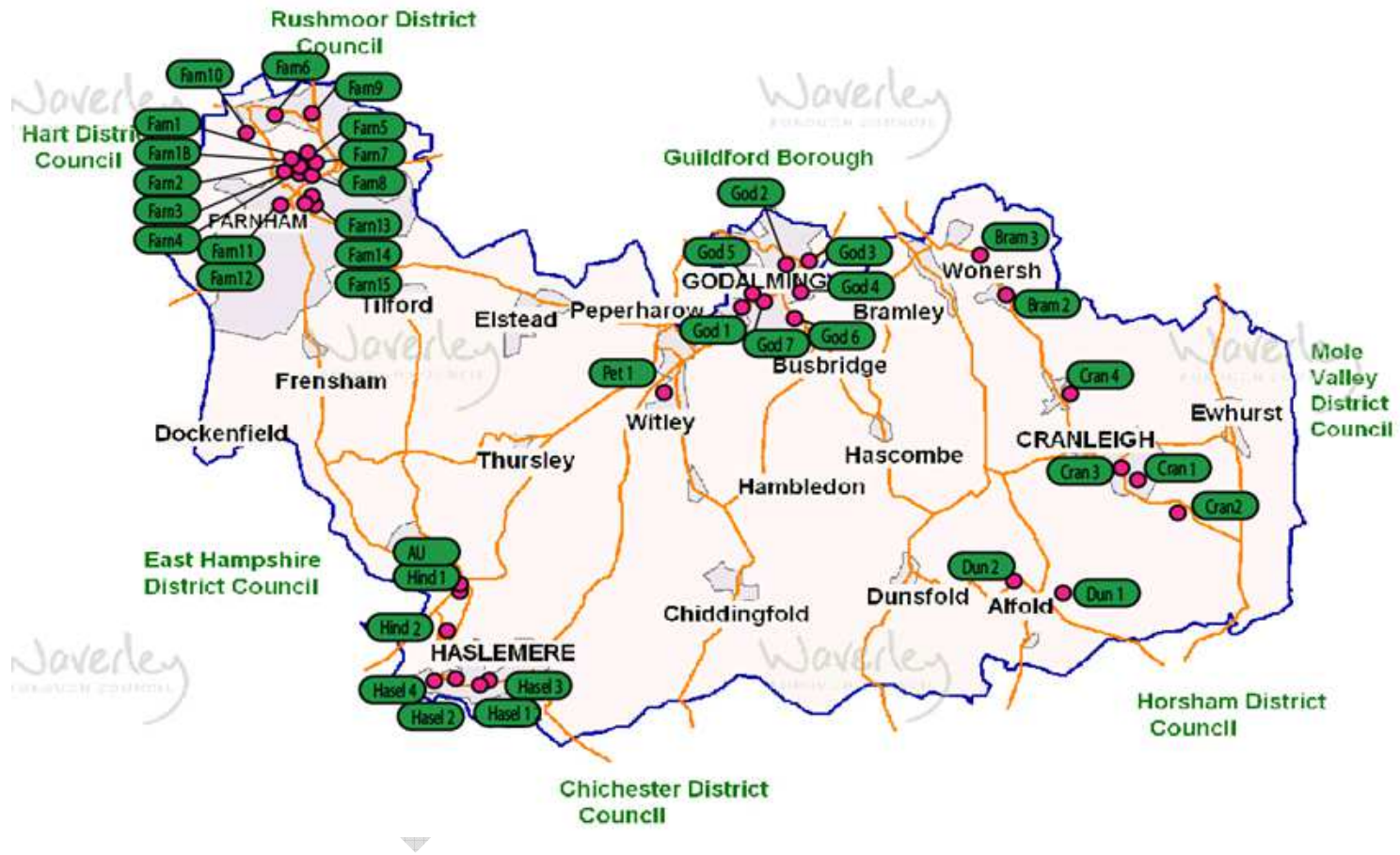


Table 2.2 Details of Non- Automatic Monitoring Sites

Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location?
Farn 1	Roadside	X484020	Y146910	NO ₂	Y	Next to café with pavement seating	1.8m	Y
Farn 1B	Kerbside	X484064	Y146928	NO ₂	Y	N	0.9m	Y
Farn 2	Roadside	X483907	Y146831	NO ₂	Y	Y (15m)	1.5m	Y
Farn 3	Urban Background	X483654	Y146600	NO ₂	N	Y (10m)	N/A	N
Farn 4	Urban Background	X483407	Y146794	NO ₂	N	N	N/A	N
Farn 5	Roadside	X484423	Y147233	NO ₂	Y	Y (10m)	2.1m	Y
Farn 6	Kerbside	X483915	Y149039	NO ₂	N	Y (3m)	1.0m	Y
Farn 7	Roadside	X484233	Y146782	NO ₂	Y	N	5.0m	Y
Farn 8a/b/c *	Roadside	X484087	Y146972	NO ₂	Y	15m from pavement café	3.0m	Y
Farn 9	Roadside	X484761	Y149431	NO ₂	N	Y (5m)	2.0m	Y
Farn 10	Roadside	X483152	Y148703	NO ₂	N	Y (20m)	1.7m	Y
Farn 11	Roadside	X482717	Y145183	NO ₂	N	Y (8m)	2.0m	Y
Farn 12	Roadside	X482766	Y145632	NO ₂	N	Y (2m)	2.0m	Y
Farn 13	Roadside	X484416	Y146619	NO ₂	Y	Y (2m)	1.7m	Y
Farn 14	Roadside	X484446	Y146609	NO ₂	N	Y (10m)	1.0m	Y
Farn 16	Roadside	X484616	Y146230	NO ₂	Y	Y (1.1m)	1.9m	Y
Farn 18	Roadside	X484645	Y146570	NO ₂	N	Y (1.5m)	2.0m	Y
Farn 19	Roadside	X484620	Y146493	NO ₂	N	Y(0M)	0.5M	Y
God 1	Roadside	X496497	Y143508	NO ₂	Y	Y (0m)	7.0m	Y
God 2	Roadside	X497294	Y143981	NO ₂	N	N	2.0m	Y
God 3	Roadside	X497376	Y144153	NO ₂	N	Y (10m)	2.0m	Y
God 4	Roadside	X497320	Y143864	NO ₂	Y	Y (10m)	1.9m	Y

God 5	Roadside	X496740	Y143721	NO ₂	Y	Y (30m)	1.5m	Y
God 6	Roadside	X497387	Y143437	NO ₂	N	Y (6m)	2.0m	Y
God 7	Kerbside	X496778	Y143656	NO ₂	N	Y (0M)	2M	Y
God 8a/b/c*	Roadside	X496693	Y143695	NO ₂	Y	Y(0M)	3M	Y
God 9	Kerbside	X496780	Y143695	NO ₂	N	Y (5M)	0M	Y
God 10	Roadside	X497275	Y143844	NO ₂	Y	Y(1.5M)	2.2M	Y
God 11	Roadside	X498025	Y144653	NO ₂	N	Y(1M)	2.2M	Y
Pet 1	Roadside	X494483	Y141316	NO ₂	N	N	3.5m	Y
Hind 1	Kerbside	X488774	Y135705	NO ₂	Y	N	0.8m	Y
Hind 2	Urban Background	X488095	Y134369	NO ₂	N	N	N/A	N
Hasl 1	Roadside	X490486	Y132819	NO ₂	N	N	2.2m	Y
Hasl 2	Urban Background	X485928	Y133005	NO ₂	N	N	N/A	N
Hasl 3	Roadside	X490636	Y133160	NO ₂	N	Y (10m)	1.5m	Y
Hasl 4	Roadside	X489090	Y132842	NO ₂	N	Y (1.6m)	1.5m	Y
Hasl 5	Kerbside	X490599	Y133106	NO ₂	N	Y(10M)	1.5M	Y
AU a/b/c *	Roadside	X488819	Y135639	NO ₂	N	Y (20m)	3.2m	Y
Cran 1	Roadside	X505808	Y139078	NO ₂	N	N	1.3m	N
Cran 2	Urban Background	X506883	Y138514	NO ₂	N	Y	N/A	N
Cran 4	Roadside	X504760	Y140683	NO ₂	N	Y (5m)	1.7m	Y
Bram 2	Roadside	X501498	Y144049	NO ₂	N	Y (13m)	3.7m	N
Bram 3	Roadside	X500908	Y144780	NO ₂	N	Y(5m)	3.6m	Y
Dun 1	Roadside	X504051	Y135373	NO ₂	N	N	5.0m	N
Dun 2	Urban Background	X502765	Y13731*9	NO ₂	N	Y (30m)	N/A	N
* Co-located with automatic monitor								

2.2 Comparison of Monitoring Results with Air Quality Objectives

This section summarises air quality monitoring data measured within the Waverley area

2.2.1 Nitrogen Dioxide (NO₂)

Automatic Monitoring Data

A summary of the air quality monitoring data from Waverley automatic monitoring sites are shown in Tables 2.3a & 2.3b.

The continuous monitoring at Farnham and Godalming had good data capture at 99.5% and 99.2% respectively. Measured concentrations at these sites indicate a slight increase compared to 2012 (table 2.3a), but stayed below the corresponding hourly mean objective (table 2.3b). Both sites are located within the AQMA's for the respective areas.

At the Hindhead station data capture for nitrogen dioxide was only 50.3% owing to equipment failure. The measured concentration at this site shows a decrease compared to 2012, also staying below the corresponding hourly mean objective. This site is not located within the AQMA, as defined by the predicted area of exceedence of the annual mean objective, and is set some way back from the junction with A3.

Table 2.3a: Results of Automatic Monitoring for Nitrogen Dioxide – Comparison with Annual Mean Objective

Site ID	Location	Within AQMA ?	Data Capture for full calendar year 2013 %	Annual mean concentrations 40 (µg/m ³)		
				2011	2012	2013 Objective (annual mean): 40 µg/m ³
Godalming	Ockford Road	Y	99.2	26.1	27.8	28.6
Hindhead	Heather Way	N	50.3*	38.9	36.8a	34.5a
Farnham	Woolmead	Y	99.5	35.1	36.1	36.6

^a Where period of valid data is less than 90% of a full year, the site annualisation calculation has been carried out according to the methodology outlined in LAQM TG(09).

* Data capture in Hindhead covers 6 months (Jan-Jun) owing to equipment failure

Exceedences of the relevant air quality objective are indicated in **bold**

Table 2.3b: Results of Automatic Monitoring for Nitrogen Dioxide – Comparison with 1-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture for full calendar year 2013 %	Number of Exceedences of hourly mean ($200 \mu\text{g}/\text{m}^3$) ^a		
				2011	2012	2013
Godalming	Ockford Road	Y	99.2	2(103.5)	0	0
Hindhead	Heather Way	N	50.3	0(113.3)	0(112.2)	0(109.1)
Farnham	Woolmead	Y	99.5	0(115.2)	0	0

^a Where data capture was less than 90%, the 99.8th percentile of hourly means are presented in brackets.

Diffusion Tube Monitoring Data

In 2013, nitrogen dioxide diffusion monitoring was undertaken at 45 locations across the Borough. This included the three co-location sites with automatic monitors at Farnham, Godalming and Hindhead, where diffusion tubes are exposed in triplicate.

A local bias adjustment factor has been applied to correct the diffusion tube measurements as the national bias adjustment factor considers only one study. The local bias adjustment, which considers the worst case scenario, has led to a slight increase in measurements across the Borough with an overall of thirteen sites found to exceed the annual mean nitrogen dioxide objective. Eight exceedences were within existing AQMA's and five were located outside (table 2.4).

The highest annual mean concentration was recorded at Farnham, Farn1b ($55.6 \mu\text{g}/\text{m}^3$). Other sites where bias-adjusted concentrations exceeded the annual mean NO_2 objective during 2013 were; Farn1 ($51.3 \mu\text{g}/\text{m}^3$); Farn2 ($43.4 \mu\text{g}/\text{m}^3$); Farn5 ($42.7 \mu\text{g}/\text{m}^3$); Farn9 ($40.0 \mu\text{g}/\text{m}^3$); Farn12 ($42.5 \mu\text{g}/\text{m}^3$); Farn14 ($49.7 \mu\text{g}/\text{m}^3$); Farn18 ($46.7 \mu\text{g}/\text{m}^3$); God1 ($43.7 \mu\text{g}/\text{m}^3$); God4 ($43.7 \mu\text{g}/\text{m}^3$); God7 ($45.6 \mu\text{g}/\text{m}^3$); Hind1 ($44.3 \mu\text{g}/\text{m}^3$) and Has14 ($40.3 \mu\text{g}/\text{m}^3$).

Sites Farn 14 and 18 are located at streets approaching and surrounding Farnham level crossing which has previously been subject to a Detailed Assessment study. The study concluded that the indicated exceedences occur at ground level where there is no relevant exposure. Although there are residential flats at the 1st floor above the Waverley Arms Public House and at 1st and 2nd floor above the shops, predictions from the air dispersion modelling study indicated that nitrogen dioxide concentrations decline with increasing height, such that the annual mean concentration (although close to the objective) is not exceeding at 1st floor level and above and therefore the AQMA is not required for this area. Network rail have also completed works at Farnham level crossing to renew the barrier, which is the cause of queuing traffic at this location. The new system will run automatically replacing the old manual system and is considered to be more efficient and may reduce the time that cars are held queuing at this barrier. Monitoring will continue at this location and if the measured concentrations continue to increase in the future, then the results of the Detailed Assessment should be reconsidered.

Sites Farn 1, 1b, 2 and 5, and God 1 and 4 are located within existing AQMA's. Sites Farn 9 and Hasl 4 have both reduced in concentration during 2013 and are only just reaching the threshold for the annual mean objectives. Sites Farn 12, God 7, and Hind 1 will require further consideration and monitoring. The overall measured concentration for the Borough has increased throughout 2013 with a noticeable increase during the second half of the year. The concentrations increased significantly during November and December 2013, coinciding with severe weather patterns and high levels of construction works across the Borough.

The USA report 2012 recommended a Detailed Assessment should be carried out for High Street, Haslemere. Additional diffusion tubes were located on High Street at locations of relevant exposure in order to gain further information on the concentrations of nitrogen dioxide in this vicinity. The additional monitoring gathered six months worth of data and indicated that the concentrations of nitrogen dioxide were below the annual mean objectives. Throughout 2013 only Hasl 4 is on the exceedence threshold and therefore continued monitoring will be required to confirm that there is a likely exceedence at this location.

God 7 has lowered in concentration but still exceeds the annual mean concentration. A previous recommendation for a DA at this location was not considered appropriate at that time as the tube had been relocated during the second half of 2012 and the combined data reflected lower concentrations than were previously detected. Full data for 2013 reflects that there are exceedences at this location and a Detailed Assessment will need to be conducted.

Table 2.4: Results of Nitrogen Dioxide Diffusion Tubes

Site ID	Location	Within AQMA?	% Data Capture for full calendar year 2013	Annual mean concentrations ($\mu\text{g}/\text{m}^3$) Objective (annual mean): $40\mu\text{g}/\text{m}^3$		
				2011	2012	2013
Farnham Sites						
Farn 1	Café Rouge Farnham	Y	91	52.6	43.8	51.3
Farn 1B	Opposite FARN1	Y	100	52.3	50.9	55.6
Farn 2	Roundabout in West St and Downing St	Y	100	48.0	39.5	43.4
Farn 3	Bishopsmead off West St	N	91	16.3	16.5	18.2
Farn 5	East St , St James House	Y	83	38.6	41.4	42.7
Farn 6	no 120, A3016, Upper Hale	N	100	35.9	34.2	35.2
Farn 7	South St, Farnham	Y	100	34.6	30.9	31.6
Farn 8	Co-location study Woolmead	Y	100	35.5	33.6	34.5
Farn 9	Post near 95 Farnborough Road, close to junction with Alma Road	N	91	39.0	38.1	40.0
Farn 10	Old Park Close Jn, A287, Folly Hill	N	91	24.8	22.3	25.0
Farn11	The Street junction	N	91	32.6	26.3	32.6
Farn 12	Bottom of A325 Wrecclesham Road	N	83.3	40.9	17.1	42.5*
Farn 13	Tasty House , Station Hill no.1, Farnham,	N	91	41.6	34.5	37.1
Farn 14	Elmsleigh House Dental Clinic, Station Hill	N	91	54.6	47.4	49.7
Farn16	2A - 2B Waverley Lane, Farnham	N	91	31.0	29.4	25.7
Farn 18	Station Hill Store, Farnham	N	91	29.9	34.1	46.7
Farn 19	Waverley Arms PH, Farnham	N	100	30.4	24.8	24.3
Godalming Sites						
God 1	70 Flambards Way	Y	83	33.2	33.7	43.7*
God2	Bridge St, Godalming	N	91	26.0	22.6	21.6
God3	Bridge Road outside Children's nursery	N	91	35.4	29.2	37.3

God4	Police Stn, Flambards Way	Y	66	44.2	45.5	43.7*
God5	Flambard Way/High St/Ockford Road Jn	Y	83	41.4	34.7	38.3*
God6	Brighton Road nr Underhill Close	N	83	27.2	24.0	23.9*
God7	St Hilary's School Holloway Hill	N	83	49.2	45.1	45.6*
God 8	Co-location study, Ockford Road	Y	91	n/a	27.9	31.0
God 9	70 Croft Rd, Godalming	N	83	n/a	28.2**	33.8*
God 10	Felica Court, Flambards Way, Godalming	Y	75	n/a	34.6**	34.9*
God 11	Catteshall Lane, Godalming	N	83	n/a	27.3**	24.2*
Pet1	Petworth Rd	N	91	20.9	24.7	22.9
Hindhead Sites						
Hind1	London Rd/Hindhead Rd cross roads	Y	91	47.1	39.0	44.3
Hind 2	Grove School, High Pitfold, Hindhead	N	91	15.8	16.8	17.3
Hasl 1	Town Hall, High St	N	100	31.4	26.6	29.4
Hasl 2	Car Park, Weydown Rd,	N	83	18.8	14.2	14.9*
Hasl 3	High St, Haslemere	N	83	41.9	37.4	34.1*
Hasl 4	90 to 98 Wey Hill	N	91	36.7	37.4	40.3
Hasl 5	Heath Edge Cottage, High St, Haslemere	N	91	n/a	32.2**	33.9
AU 1/2/3*	Heather Way co-location study	N	100	36.9	30.3	30.0
Cranleigh Sites						
Cran 1	Barclays Bank, High Street, Cranleigh	N	100	22.2	20.4	20.7
Cran 2	Avenue Rd, Cranleigh	N	100	13.7	14.9	14.7
Cran4	Nutshell House (opp. shops) Rowly	N	100	23.3	22.3	24.2
Bramley Sites						
Bram 2	No 3, Hirst Hill Cottages, Bramley	N	100	25.1	25.3	24.4
Bram 3	No 12, Bramley High St	N	91	21.6	21.6	22.8
Dunsfold Sites						
Dun 1	Alfold traffic island	N	100	25.3	24.9	28.8
Dun 2	Stovolds Hill opposite "The Old Farmhouse"	N	100	18.0	18.0	17.8

*Site with less than 90% data capture during 2013 ** Site set up in second half of 2012

Exceedences of 40 µg/m³ annual mean NO₂ objective are highlighted in **bold**.

Bias adjustment factors: 2013 (0.90), 2012 (0.91), 2011 (1.08),

2.2.2 Particulate Matter (PM₁₀)

Measured PM₁₀ concentrations have been well below the annual mean and daily mean objectives consistently over the past few years. During 2013 there were only two daily mean concentrations which exceeded 50µg/m³, compared with 35 allowed. This is a further reduction from the 7 exceedences during 2012. Overall, concentrations have remained low and are not considered to be significant within Waverley.

Table 2.5a Results of PM₁₀ Automatic Monitoring: Comparison with Annual Mean Objective

Site ID	Location	Within AQMA?	Data Capture for full calendar year 2013 %	Annual mean concentrations (40 µg/m ³)			
				Objective (annual mean): 40µg/m ³			
				2010	2011	2012	2013
Farnham	Woolmead	Y	91.4	21.0	23.3	21.0	21.5

* Less than 90% data capture.

Table 2.5b Results of PM₁₀ Automatic Monitoring: Comparison with 24-hour Mean Objective

Site ID	Location	Within AQMA?	Data Capture 2013 %	Number of Exceedences of daily mean objective (50 µg/m ³)			
				Objective (24-hour mean): the 50 µg/m ³ limit can not be exceeded more than 35 times at year			
				2010	2011	2012	2013
Farnham	Woolmead	Y	91.4	2	7	7	2

*Where data capture <90%, 90.4th %ile of hourly mean in brackets.

2.2.3 Sulphur Dioxide

Sulphur Dioxide is not monitored in Waverley Borough Council area.

2.2.4 Benzene

Benzene is not currently monitored within the Waverley Borough Council area. Monitoring ceased at the end of 2008; measured concentrations prior to cessation of monitoring were well below the national objectives.

2.2.5 Other pollutants Measured

No other pollutants are monitored within the Waverley Borough Council area.

2.2.6 Summary of Compliance with AQS Objectives

There has been an overall slight increase in measured concentrations throughout Waverley during 2013. Exceedences are recorded at thirteen sites, with five that lie outside of AQMA's. Two sites have previously been subject to a Detailed Assessment and were not considered to be exceeding the annual objectives at the locations of relevant exposure.

The overall increase across the Borough may not indicate a long term trend and will need to be monitored closely to determine whether there is a need to continue to Detailed Assessments for some locations which are currently exceeding the annual nitrogen dioxide objective. God 7, Holloway Hill, Godalming, is likely to be an exception as it has previously measured high concentrations.

Automatic continuous monitoring of PM10 at Farnham town centre indicates that the UK objectives for PM10 are being complied with in this area. Further, following the previous USA report in 2012, it is evident that exceedences of these objectives are unlikely at any location within the Waverley BC area.

Monitoring will continue across the Borough at the existing locations, however, owing to the continued exceedence of the measured concentration of nitrogen dioxide, and the improved data at God 7 it will now be necessary to proceed to a Detailed Assessment.

Waverley Borough Council has examined the results from monitoring in the Borough.

Concentrations within the AQMA still exceed the annual mean objectives for nitrogen dioxide (NO₂) at Farnham and Godalming and the AQMA should remain.

Concentrations within the AQMA at Hindhead are below the annual mean objectives for nitrogen dioxide (NO₂) and Waverley will consider revoking the AQMA.

Waverley Borough Council has measured concentrations of nitrogen dioxide (NO₂) above the annual mean objective at relevant locations outside of the AQMA at Godalming, and **will need to proceed to a Detailed Assessment**, for God 7, Holloway Hill, Godalming.

3 New Local Developments

3.1 Road Traffic Sources

Road traffic sources were considered in the previous Updating and Screening Assessment.

Waverley confirms that there are no new or newly identified

- narrow congested streets with residential properties close to the kerb
- busy streets where people may spend one hour or more close to traffic
- roads with a high flow of buses and/or HGVs
- junctions
- new roads constructed or proposed since the last Updating and Screening Assessment
- roads with significantly changed traffic flows
- bus or coach stations

which may have an impact on air quality within the Local Authority area.

3.2 Other Transport Sources

The nearest airport to Waverley Borough is Farnborough, which is located 1 km from the Borough and has annual throughput well below 10 million passengers per year.

Waverley confirms that there are no new or newly identified

- airports
- railways locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m
- locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m
- ports for shipping

which may have an impact on air quality within the Local Authority area.

3.3 Industrial Sources

Industrial sources were considered in the previous Updating and Screening Assessment.

Waverley confirms that there are no:

- new or proposed installations
- existing installations where emissions have increased substantially or new relevant exposure has been introduced
- new or significantly changed installations with no previous air quality assessment
- major fuel storage depots storing petrol
- new or newly identified petrol stations
- new newly identified poultry farms

which may have an impact on air quality within the Local Authority area.

3.4 Commercial and Domestic Sources

Commercial and Domestic Sources were considered in previous Updating and Screening Assessment with regards to Biomass plants. A Detailed Assessment was unnecessary.

Waverley confirms that there are no new or newly identified:

- Areas where the combined impact of several biomass combustion sources may be relevant
- Areas where domestic solid fuel burning may be relevant.

which may have an impact on air quality within the Local Authority area.

3.5 New Developments with Fugitive or Uncontrolled Sources

No complaints have been received regarding fugitive dust problems caused by any identified industrial processes within the Borough since the last USA report in 2012.

Waverley confirms that there are no new or newly identified:

- landfill sites
- quarries
- haulage roads on industrial sites
- waste transfer stations etc.
- other potential sources of fugitive particulate emissions

which may have an impact on air quality within the Local Authority area.

Waverley Borough Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

Waverley Borough Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

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4 Planning Applications

4.1 East Street Development, Farnham: WA/2008/0278 & WA/2010/1650

The following development has been granted approval in 2008 for a mixed-use development of 239 residential units, a new multi-screen cinema, shops, cafes and restaurants in Farnham Town Centre. The proposed site is adjacent to the current Farnham AQMA. An Air Quality Impact Assessment has been submitted with the application to assess the effect of development.

However due to modification with respect to the construction phase of the development the Environmental Health Service has been consulted on the air quality implications of provision of temporary construction at the A31, comprising bridge across the River Wey, pedestrian underpass, other supporting infrastructure and re-instatement works including re-siting of the proposed footbridge across the River Wey from that approved under WA/2008/0278. Environmental Health was concerned that initially assessed impacts on air quality did not consider all aspects of road traffic movements associated with construction of temporary access. The potential impacts of dust emissions generated during the construction and reinstallation phase also were questioned.

In March 2011 planning permission for this development was granted, however, to offset the potential impacts of the development on air quality, Environmental Health requested the implementation of strict traffic and dust emission mitigation measures which should be summarised in a Method of Construction Statement subject to a planning condition.

The development applicants are due to re-submit a new and updated EIA for the location to assess the impacts and options for mitigation.

This development has been highlighted in previous progress reports.

5 Air Quality Planning Policies

Waverley Borough Council is currently developing a core strategy and are looking to incorporate specific guidance and policies relating to human health and the environment. These include noise policies and air quality guidance.

Consideration is also being given to the adoption of a Surrey wide planning guidance for air quality and noise to ensure consistency and best practice. These plans will be reported upon in future years as they are adopted and actioned.

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6 Local Transport Plans and Strategies

The Surrey Transport Plan is the third Local Transport Plan (LTP) for the county. It is a statutory plan (required by the Local Transport Act 2008 and Transport Act 2000), which replaced the second LTP on 1 April 2011. The strategies look forward to 2026 and will be reviewed every three to five years as necessary.

Transport strategies reviewed and developed as part of the Surrey Transport Plan include;

- Air Quality Strategy
- Climate Change Strategy
- Congestion Strategy
- Freight Strategy
- Parking Strategy
- Passenger Transport Strategy
- Travel Planning Strategy

The Air Quality Strategy is one of the core strategies of the Surrey Transport Plan. The proposed aim of the Air Quality Strategy is to improve air quality in AQMAs on the county roads network. This is to enable Surrey's boroughs and districts to revoke these areas as soon as possible to help meet the national air quality objectives in declared AQMAs.

The Congestion Strategy was open for consultation under the Surrey Future programme in May 2013. Waverley responded to the consultation in order to ensure that air quality objectives are taken into consideration alongside congestion issues.

All three Waverley AQMAs were declared in relation to excessive nitrogen dioxide concentrations. The main source of this pollution is road traffic. While it is recognised that the AQMAs are the responsibility of the Districts, Surrey County Council has a clear role in working towards achieving air quality objectives in the majority of the AQMAs in Surrey. This has led to the implementation of a steering group, with representatives from Surrey County Council transport planners, Waverley environmental health and other key partners involved in air quality. These meetings facilitate specific transport measures and interventions used to deliver key elements

of the strategies and measures included in Waverley's Air Quality Action Plan, for example;

Developing Urban Traffic Control and traffic signal strategies.

Providing infrastructure to support use of hybrid/electric vehicles.

Advisory signage to inform drivers of air quality issues and solutions.

Enhanced enforcement of parking and loading restriction.

Roadside emissions testing.

Developing Freight Quality Partnerships

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7 Climate Change Strategies

This first Climate Change Strategy for Surrey has been developed by the Surrey Climate Change Partnership (SCCP) as a focal point for the County's future action on climate change. The strategy seeks to provide a framework to effectively address climate change across Surrey up to 2020. It will be delivered through the Partnership approach that has been successfully established between the Surrey Climate Change Partnership (SCCP) members.

The strategy shares the vision for Surrey and the principles of improving quality of life for people living and working there by addressing social, economic and environmental well-being. To achieve this, the Strategy establishes a comprehensive framework for consistently addressing climate change across Surrey, with central objectives of:

- Progressive and permanent reductions in carbon dioxide (CO₂) and other climate changing emissions;
- Effective adaptation to the impacts of climate change; and
- Raising awareness of climate change impacts and solutions.

Under each of these objectives the strategy identifies clear policy aims and necessary actions structured as a range of common work streams. These work streams will be developed under these aims that allow members to reflect their own priorities, whilst working collectively to maximum effect. For each of these work streams the strategy illustrates opportunities to develop good practice through examples of current activity in both Surrey and the UK.

In 2010 the SCCP commissioned Carbon Descent to conduct carbon scenario modelling to identify optimum routes, in terms of energy generation and efficiency measures, to achieve two scenarios; firstly to meet national carbon reduction targets and secondly going further to make Surrey one of the lowest carbon areas. The results of the study recommends that Surrey should make far greater use of its locally available biomass resource for power generation and at commercial scales, along with significant installation of household energy efficiency measures and micro-generation domestic renewable, including heat pumps.

Comments:

Although the potential role of biomass combustion in achieving national carbon reduction targets across Surrey has been recognised, there are concerns that a large increase in biomass combustion, particularly in Air Quality Management Areas and urban areas with great density, could have a detrimental effect of pollution concentration in particular PM and NO₂. These concerns should be considered by SCCP when working towards the Climate Change Strategy targets.

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8 Implementation of Action Plans

Waverley's Air Quality Action Plan (AQAP) published in 2008 was followed by the first AQAP Annual Progress Report in April 2009 and Air Quality Progress Report in 2010. The Air Quality Action Plan included the various projects identified as contributing to improvements in air quality. Table 7.1 summarises those projects and is updated to include changes since the previous Air Quality Progress Report.

The Hindhead tunnel and bypass were completed as expected in 2011. It had been assumed that the re-routing of the traffic flow would help to alleviate the nitrogen dioxide exceedences in the AQMA. Post operative monitoring is ongoing in the area to determine any reductions in the annual emission targets, with the aim of revoking the AQMA. In the years since the tunnel opened there has been a significant reduction in the annual mean nitrogen dioxide level in the Hindhead area. This has led to Hindhead dropping below the $40\mu\text{g}/\text{m}^3$ objective limit, and 2013 has seen the most significant drop to $30.0\mu\text{g}/\text{m}^3$, this is based on the local bias factor which reflects the worst case scenario. It is recognised that the data for the Hindhead AQMA only allows for six months of data collection due to equipment failure, but it is relevant and accurate as it has been ratified and annualised to correct any errors. This allows for higher confidence in the monitoring results and ensures that the measured concentrations remain lower than the annual mean objectives. Waverley are currently in discussion with Defra to review the revocation options for Hindhead.

Continuation of joint work between Surrey County Council and Waverley Borough Council has led to new strategies being implemented to tackle traffic related air quality issues. This initially led to the implementation of loading time restrictions in Farnham town centre to alleviate congestion. However, following the Detailed Assessment on air quality in the location of Farnham level crossing, SCC have since discussed the option of re-validating the Urban Traffic Control system (UTC). This would aim to reduce queue lengths and waiting times at the level crossing, therefore, reducing traffic emissions affecting air quality in the area.

The Farnham project which led to the Farnham Traffic Management and Low Emission Feasibility Study, was undertaken as part of the Defra projects programme

that Waverley actioned as part of the AQAP. Other projects undertaken through the projects programme that will be updated throughout 2014 include a Health Impact Assessment to assess the health impacts from calculated emissions reductions. A Godalming feasibility study will also be undertaken, this will follow a similar model to the Farnham project, and proposes to understand the impacts of the air quality in Godalming, particularly with relation to the AQMA.

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Waverley Borough Council

Action Plan

Current and completed actions 2008 - 2014

Table 3 Action Plan Progress

Current Actions

Item No.	1
Measure	Farnham Review Study option 2b
Focus	An holistic set of traffic interventions for Farnham Town Centre e.g. road space reallocation, construction of new cycle routes and cycle facilities, part-time closure of The Borough (road with highest air quality exceedences)
Lead authority	Surrey County Council
Planning phase	East Street Development Working Group is trying to put together a project plan to work backwards from a start date so that triggers and actions can be more easily calculated.
Implementation phase	Actual dates for East Street development are not yet known.
Indicator	Adoption of package 2b as outlined in Farnham Review Study
Target annual emission reduction in the AQMA	To be quantified when it appears likely that the recommendations of the Farnham Review study get the go ahead. However package 2b has the potential to remove air quality exceedences from the Farnham AQMA.
Progress to date	The permission for a major development (the East Street development) has been granted with a section 106 agreement. A Defra project to assess the effectiveness of traffic management options in Farnham was carried out in 2012 and this work is ongoing.
Progress in last 12 months	In March 2011 planning permission was given for construction of temporary access to the East Street development site. The Farnham project led to the publication of the Farnham Traffic Management and Low Emission Feasibility Study
Estimated completion date	Not yet known.
Comments relating to emission reductions	When the funds become available the main areas of allocation are: - Park & Stride Study - £15k Park & Stride Implementation Measures – up to £250k Town Centre Traffic Reduction Measures Study - £25k Town Centre Traffic Reduction Measures – up to £75k - s278 improvements to junctions on East Street and restoring two way working on Woolmead. - S278 improvements to public transport waiting areas (e.g. new shelters or real time information).

Item No.	2
Measure	Waverley Corporate Travel Plan
Focus	A suite of actions aimed at reducing the impact of staff commuting to work and driving to work meetings
Lead authority	Waverley Borough Council
Planning phase	2008 – travel plan measures were tested during a Green Travel Week and subsequent travel survey
Implementation phase	March 2009 – launch and continued marketing of Waverley Car Share
Indicator	An annual travel survey will outline changes in travel behaviour including any increases in car sharing etc
Target annual emission reduction in the AQMA	Less than 1% - likely to impact Godalming AQMA as this route is used by a number of staff working in the Waverley office in Godalming
Progress to date	Two low emission staff pool cars now available & in use.
Progress in last 12 months	Two low emission staff pool cars now available & in use. 51 members of staff registered.
Estimated completion date	On going
Comments relating to emission reductions	

Item No.	3
Measure	Hindhead Tunnel and bypass
Focus	A 1.1 mile tunnel and bypass to relieve the bottleneck at Hindhead
Lead authority	Highways Agency
Planning phase	Work on the scheme began in 2007
Implementation phase	Ongoing.
Indicator	Completion and opening of bypass; closure of existing road.
Target annual emission reduction in the AQMA	This measure is expected to remove all AQ exceedences in the AQMA
Progress to date	The project was completed on time in 2011.
Progress in last 12 months	Post-operative monitoring has continued since the completion and as expected AQ exceedences have reduced.
Estimated completion date	Tunnel operational since summer 2011.
Comments relating to emission reductions	Defra are currently reviewing Waverley's proposals to revoke the AQMA in Hindhead.

Item No.	4
Measure	Work with schools
Focus	Community monitoring scheme. The launch of the community monitoring scheme is part of a pilot project involving a partner school in awareness rising of air quality issues.
Lead authority	Waverley Borough Council
Planning phase	December 2008
Implementation phase	Launch of community monitoring scheme in Farnham primary school
Indicator	Continued partnership – monitoring data obtained, publicity in local press
Target annual emission reduction in the AQMA	N/a
Progress to date	The partnership has been maintained throughout 2009 and 2010
Progress in last 12 months	Throughout 2012 the Air Quality Officer regularly delivered diffusion tubes to the school. The tube has been changed in accordance with national diffusion tube calendar.
Estimated completion date	On going
Comments relating to emission reductions	

Item No.	5
Measure	Cycling promotion
Focus	Implementation of cycle parking and cycle paths
Lead authority	Surrey County Council
Planning phase	Proposed cycle improvements for Farnham outlined in Farnham Review study
Implementation phase	Not currently being progressed
Indicator	N/a
Target annual emission reduction in the AQMA	N/A
Progress to date	In 2010 cycling was promoted during Air Quality Awareness
Progress in last 12 months	Secure cycle paths and storage facilities included as planning conditions on larger proposed development.
Estimated completion date	On going
Comments relating to emission reductions	

Item No.	6
Measure	Travel plans for major employers
Focus	Requirement and monitoring of travel plans as part of planning consents
Lead authority	Surrey County Council
Planning phase	Ongoing
Implementation phase	Ongoing
Indicator	The number of sites approved or submitted TP
Target annual emission reduction in the AQMA	N/a
Progress to date	Travel plans for several sites in Farnham and Godalming have been approved or submitted.
Progress in last 12 months	There were no new travel plans from major employers in Waverly implemented in 2012. There was however a travel plan implemented at the residential site adjacent to Farnham Hospital.
Estimated completion date	On going
Comments relating to emission reductions	

Item No.	7
Measure	Freight Quality Partnership (FQP)
Focus	
Lead authority	Surrey County Council
Planning phase	2010
Implementation phase	ongoing
Indicator	Not available
Target annual emission reduction in the AQMA	N/a
Progress to date	Loading restrictions have been implemented in Farnham
Progress in last 12 months	No further progress
Estimated completion date	On going
Comments relating to emission reductions	No significant reductions

Item No.	8
Measure	A Surrey Air Alert Scheme
Focus	A phone / text service to alert people with minor respiratory ailments of imminent air pollution episodes
Lead authority	All Surrey local authorities involved in air quality monitoring
Planning phase	Costing and project plan completed in 2008 by Reigate and Banstead
Implementation phase	Not currently being progressed due to lack of agreed funding.
Indicator	
Target annual emission reduction in the AQMA	
Progress to date	At present a viable air alert service can only be run in Mole Valley, Reigate and Banstead, and Tandridge, as these are the only areas with sufficient monitoring both north and south of &/or within their Boroughs.
Progress in last 12 months	DEFRA grant was obtained in mid 2010 to set up a pilot project in East Surrey. if successful project would be rolled out to the rest of Surrey. However further development depends on funds availability
Estimated completion date	Not available
Comments relating to emission reductions	

Item No.	9
Measure	Electric car charging point
Focus	This facility should encourage people to consider purchasing electric cars.
Lead authority	Waverley Borough Council
Planning phase	Feb 2010
Implementation phase	2013
Indicator	Popularity and use of electric charging point.
Target annual emission reduction in the AQMA	Not available yet
Progress to date	Waverley has now been accepted for the installation of Electric charging points to be placed in public car parks in Farnham.
Progress in last 12 months	Env Health will continue to encourage installation of Electric charging points across the borough through planning process.
Estimated completion date	2013/2014
Comments relating to emission reductions	

Item No.	10
Measure	Air Quality Information
Focus	New Waverley website launched January 2011.
Lead authority	Waverley Borough Council
Planning phase	New information to support the air quality awareness week added in January 2011
Implementation phase	Website content regularly reviewed
Indicator	Number of people visiting website. From Jan 2010 to December 2010 AQ website was visited 801 times.
Target annual emission reduction in the AQMA	N/a
Progress to date	Waverley's air quality website www.waverley.gov.uk/airquality contains information about Waverley's air quality work and information on how to get involved in tackling local air quality.
Progress in last 12 months	Advice about biomass boilers was added to the air quality and planning pages. AQ pages have been updated with information from AQ Awareness week.
Estimated completion date	On going
Comments relating to emission reductions	

Item No.	11
Measure	Air Quality and planning policies
Focus	Potential supplementary guidance to support air quality.
Lead authority	Waverley Borough Council
Planning phase	No date given
Implementation phase	Monitoring of other Local Authorities' Low Emissions Strategies taking place to determine if suitable alternative
Indicator	Production of supplementary planning guidance
Target annual emission reduction in the AQMA	N/A
Progress to date	EH AQ Officer examines planning list for developments that have potential to impact on AQ. Consultation on planning policies continues.
Progress in last 12 months	Low-emissions principles are considered in responses to planning and suitable advice given.
Estimated completion date	On going
Comments relating to emission reductions	Low-emission principles being encouraged through planning consultation process.

Item No.	12
Measure	Air Quality raising awareness campaign
Focus	The publication is important in dealing with air pollution problems. The aim of the air quality campaign is to generate public activism by heightened public awareness of air pollution, and its impact on human health.
Lead authority	Waverley Borough Council
Planning phase	May –July 2010
Implementation phase	Early 2011
Indicator	Number of information leaflets distributed to general public, schools etc
Target annual emission reduction in the AQMA	See also above individual measures: 5-8 and 13-18
Progress to date	During 2011, leaflets were distributed across local businesses, garages and libraries. Electronic copies of the leaflet were attached to the monthly newsletter forwarded to parents by 5 local secondary schools.
Progress in last 12 months	No further work has been carried out since 2011. It is unclear how effective this campaign was.
Estimated completion date	On hold
Comments relating to emission reductions	This campaign initiative is likely to become available during 2014 to aid potential new measures being considered by Waverley.

Item No.	13
Measure	Defra projects
Focus	Projects that have been undertaken to assess the effectiveness of measures proposed in the action plan.
Lead authority	Waverley
Planning phase	2011
Implementation phase	2012
Indicator	Modelling data and results produced
Target annual emission reduction in the AQMA	n/a
Progress to date	Farnham report published – raising awareness of diesel car emissions.
Progress in last 12 months	Farnham report as detailed in this Progress Report. Continuation of Health Impact Assessment and Godalming feasibility study.
Estimated completion date	2014
Comments relating to emission reductions	

Item No.	14
Measure	Review of urban traffic control systems (UTC) on Flambard Way, Godalming.
Focus	Review of traffic-light management through AQMA with aim of minimising idling traffic and congestion
Lead authority	Surrey County Council
Planning phase	
Implementation phase	To be completed between 2014 - 2015
Indicator	Calculated reduction of NO2 emissions based on calculations of reduced queue length and waiting times plus ambient monitoring.
Target annual emission reduction in the AQMA	To establish annual emission reduction target detailed information is required with regards to waiting times, and reductions in queue length. Information has been requested from Surrey County Council; data are not yet available.
Progress to date	Installation of a new communication system (between the UTC and the computer at Surrey's Network Management Information Centre in Leatherhead) has been completed.
Progress in last 12 months	System currently operating in minimised congestion mode. The system has not been re-validated due to limited resources. SCC agreed re-validation was appropriate but outcome has been on hold due to financing.
Estimated completion date	2015
Comments relating to emission reductions	Ricardo-AEAT are assisting Waverley with Defra projects and data ratification.

Completed Actions

Item No.	1
Measure	Joint agency exercises stopping and checking vehicles
Focus	These can be used to check air quality emissions
Lead authority	WBC, SCC, VOSA, SurPOL
Planning phase	Not yet specified
Implementation phase	Currently there is no planned joint agency exercise to include air quality emissions testing
Indicator	Not available
Target annual emission reduction in the AQMA	N/a
Progress to date	No significant progress
Progress in last 12 months	There were no roadside vehicles emission checks although other checks were carried out.
Estimated completion date	On hold until further notice
Comments relating to emission reductions	VOSA equipment no longer available for this.

Item No.	2
Measure	Review of urban traffic control systems (UTC) on Flambard Way, Godalming and Farnham level crossing
Focus	Review of traffic-light management through AQMA with aim of minimising idling traffic and congestion
Lead authority	Surrey County Council
Planning phase	
Implementation phase	To be completed between 2008 and 2011. Farnham review completed 2013
Indicator	Calculated reduction of NO2 emissions based on calculations of reduced queue length and waiting times plus ambient monitoring.
Target annual emission reduction in the AQMA	To establish annual emission reduction target detailed information need with regards to waiting times, and reductions in queue length. Information has been requested from Surrey County Council; data are not yet available.
Progress to date	Installation of a new communication system (between the UTC and the computer at Surrey's Network Management Information Centre in Leatherhead) has been completed.
Progress in last 12 months	System currently operating in minimised congestion mode. The system has not been re-validated due to limited resources. SCC are now planning to re-validate the system during 2013 to minimise idling traffic within the Farnham level crossing area.
Estimated completion date	2013
Comments relating to emission reductions	Ricardo-AEAT are assisting Waverley with Defra projects and data ratification.

Item No.	3
Measure	Work with schools
Focus	Installation and use of air quality software in schools
Lead authority	WBC, SCC, Surrey University
Planning phase	Ongoing
Implementation phase	September 2009 to December 2009
Indicator	Number of schools where software is installed and used
Target annual emission reduction in the AQMA	N/a
Progress to date	TBC once more detail is available from Surrey University
Progress in last 12 months	No significant progress
Estimated completion date	Not available
Comments relating to emission reductions	No information from Surrey University about progress of this project.

Item No.	4
Measure	Work with schools
Focus	School Travel plans (STP)
Lead authority	Surrey County Council
Planning phase	2008-11
Implementation phase	Ongoing
Indicator	A number of Schools that completed STP
Target annual emission reduction in the AQMA	Not available
Progress to date	Surrey County Council is continuing its programme of developing school travel plans through 2008 -2011
Progress in last 12 months	No more schools expected to join.
Estimated completion date	Completed
Comments relating to emission reductions	

Item No.	5
Measure	Working with Schools
Focus	The aim of the air pollution campaign is to introduce pupils from local schools to air pollution problems and to teach them how small changes in day to day life can benefit the air quality.
Lead authority	Waverley Borough Council
Planning phase	May - July 2010
Implementation phase	Early 2011
Indicator	Number of schools take part in Air Quality awareness campaign
Target annual emission reduction in the AQMA	N/a
Progress to date	Research of local schools willing to participate in campaign completed. 15 local primary schools agreed to use tool kit for teachers developed by Waverly.
Progress in last 12 months	The tool kit for teachers completed.
Estimated completion date	
Comments relating to emission reductions	Completed 2011

Item No.	6
Measure	Variable vehicle messaging sign system (VMS) car park signs
Focus	
Lead authority	Waverley Borough Council
Planning phase	2010
Implementation phase	2011
Indicator	Try to remove circulation as cars wait for spaces in favoured car parks
Target annual emission reduction in the AQMA	n/a
Progress to date	WBC reported low emission parking incentives to Exec C'tte (Sept 2010). Initial assessment is that the scheme is cost prohibitive.
Progress in last 12 months	No available funding
Estimated completion date	On hold
Comments relating to emission reductions	

Item No.	7
Measure	Decriminalised parking enforcement
Focus	On-street parking is enforced by Guildford Borough Council (GBC) and car parks are enforced and managed by Waverley.
Lead authority	Waverley Borough Council,
Planning phase	Launched April 2007
Implementation phase	On-going
Indicator	Not available
Target annual emission reduction in the AQMA	N/a
Progress to date	SCC Parking Strategy in LTP3 has been reviewed and will be published in April 2011. The next review in WBC is in April/May if funded by Local Committee; for implementation in early 2012.
Progress in last 12 months	SCC identified locations where additional on street charges could be introduced across the County. There is now on-street charging in central Farnham.
Estimated completion date	2011-2012
Comments relating to emission reductions	The majority of locations identified are existing short term parking spaces near shopping areas and other busy locations.

Item No.	8
Measure	Real time sign at Farnham Level Crossing
Focus	To encourage drivers to switch off their engines by advising how long the barriers will remain down
Lead authority	Waverley Borough Council
Planning phase	2010
Implementation phase	2011
Indicator	Lower NO2 concentrations in relevant area
Target annual emission reduction in the AQMA	n/a
Progress to date	Signage placed on signposts along queue area advising to switch off engines while waiting.
Progress in last 12 months	Interactive display was refused by DfT. SCC are instead looking to optimise the traffic signals on Farnham level crossing, working around barrier down times, to lower the time cars are idling
Estimated completion date	2013
Comments relating to emission reductions	AEA are assisting Waverley with data modelling to ensure effective results are obtained.

9 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The results of diffusion tube monitoring within Waverley Borough indicate that the UK objective for annual mean nitrogen dioxide continues to be exceeded in the Godalming and Farnham AQMA's. It is therefore recommended that these be retained.

The results for the Hindhead AQMA show a significant reduction as expected since the opening of the Hindhead tunnel. It is therefore proposed to continue in discussions with Defra concerning the revocation of the AQMA in 2014.

Although exceedence of the UK objective for annual mean nitrogen dioxide was recorded by diffusion tubes at other sites outside of AQMA's, a number of these sites were not immediately situated at relevant receptors, and some had already been subject to Detailed Assessment.

The increase in annual mean concentrations across Waverley does not necessarily indicate an upward trend in concentrations and will continue to be monitored. During November and December 2013 the concentrations increased notably and are likely to be affected by the adverse weather patterns seen across Southern Britain during that time. If the increase in concentrations continue throughout 2014 they will be assessed through the next USA report due in 2015 and considerations will be given for Detailed Assessments on any that continually exceed the annual mean concentrations.

Ratified 2013 PM₁₀ data indicates generally standard annual and daily mean PM₁₀ concentrations and are well below air quality objectives.

8.2 Conclusions relating to New Local Developments

Waverley Borough Council has identified no relevant new developments requiring assessment, since the Updating and Screening Assessment 2013.

8.3 Other Conclusions

The Action Plan has identified the work that Waverley Borough Council and a range of partners are required to carry out to reduce air quality problems identified in AQMAs, and to meet the Government objective for nitrogen dioxide. However, many of the Action Plan measures are beyond the direct control of the Borough Council. Therefore, the success of the Action Plan will depend partly on the input of the local transportation authority – Surrey County Council. This is especially the case where Air Quality Management Areas are declared as a result of traffic related emissions. To assess the effectiveness of the Action Plan, some projects were developed. These are on going and include feasibility studies in Farnham and Godalming, due to the continued exceedence of nitrogen dioxide annual mean objectives. A Health Impact Assessment is also being undertaken to re-assess the health impacts as a direct result of poor air quality through emissions.

The completion of the Hindhead bypass was expected to resolve air quality problems at the Hindhead AQMA. Continuous monitoring has established more confidence in results for this area, and discussions will continue for the revocation of the existing AQMA.

8.4 Proposed Actions

Currently no changes are proposed for the boundaries of the AQMA in Farnham. There is ongoing monitoring around Farnham level crossing, to review any further exceedences since the Detailed Assessment was carried out.

The Godalming AQMA may be subject to an extension to the current area, if the monitoring at the sites located outside of the AQMA indicate exceedences of the nitrogen dioxide annual mean. Two of the monitoring sites indicated in the USA 2012 fall slightly outside of the Godalming AQMA and further diffusion tubes were located to establish more relative results. Limited data and relocation of some tubes to locations of more relevant exposure led to low confidence levels in the data which indicated exceedences at those locations. Further monitoring was advised to be completed to allow strong evidence of a trend in increased concentrations. Further data obtained during 2013 indicates an upward trend at God 7 and therefore a Detailed Assessment will now be carried out at this site, Holloway Hill in Godalming.

Waverley will continue to monitor air quality in line with the Environment Act 1995.

The officers from Waverley will continue to work closely with partners toward achieving the air quality standards. However, implementation of many of the measures will depend strongly on funding availability

9 References

Defra (2009) Review & Assessment: Technical Guidance LAQM.TG(09), available at: <http://archive.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/tech-guidance-laqm-tg-09.pdf>

Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007.

Stationery Office (2000) Air Quality Regulations, 2000, Statutory Instrument 928.

Stationery Office (2002) Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043

Waverley Borough Council (2009) Updating and Screening Assessment, May 2009, available at: www.waverley.gov.uk/site/scripts/download_info.php?downloadID=45

Waverley Borough Council (2010) Air Quality Progress Report, May 2010, available at: www.waverley.gov.uk/site/scripts/download_info.php?downloadID=45

Waverley Borough Council (2011) Air Quality Progress Report, April 2011, available at: www.waverley.gov.uk/site/scripts/download_info.php?downloadID=45

Waverley Borough Council (2011) Detailed Assessment of Air Quality at Station Hill, May 2011, available at: www.waverley.gov.uk/site/scripts/download_info.php?downloadID=45

Waverley Borough Council (2012) Updating and Screening Assessment, May 2012, available at: www.waverley.gov.uk/downloads/file/3206/updating_and_screening_assessment_2011-2012

Appendix A

Farnham Diffusion Tube Precision and Accuracy

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	03/01/2013	31/01/2013	45.0	41.0	43.0	43	2.0	5	5.0
2	31/01/2013	28/02/2013	36.0	46.0	37.0	40	5.5	14	13.7
3	28/02/2013	27/03/2013	46.0	50.0	50.0	49	2.3	5	5.7
4	27/03/2013	24/04/2013	40.0	40.0	36.0	39	2.3	6	5.7
5	24/04/2013	30/05/2013	22.0	20.0	19.0	20	1.5	8	3.8
6	30/05/2013	26/06/2013	34.0	36.0	36.0	35	1.2	3	2.9
7	26/06/2013	01/08/2013	36.0	38.0	35.0	36	1.5	4	3.8
8	01/08/2013	29/08/2013	34.0	35.0	36.0	35	1.0	3	2.5
9	28/08/2013	01/10/2013	42.0	38.0	41.0	40	2.1	5	5.2
10	01/10/2013	30/10/2013	32.0	36.0	34.0	34	2.0	6	5.0
11	30/10/2013	04/12/2013	50.0	48.0	47.0	48	1.5	3	3.8
12	04/12/2013	08/01/2013	47.0	51.0	49.0	49	2.0	4	5.0
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
39.07	99.19	Good	Good
40.51	100	Good	Good
45.77	99.87	Good	Good
33.62	100	Good	Good
33	99.6	Good	Good
27	96.39	Good	Good
33	100	Good	Good
33	99.9	Good	Good
35	99.9	Good	Good
31	99.9	Good	Good
42.18	100	Good	Good
43.91	100	Good	Good
Overall survey ->		Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

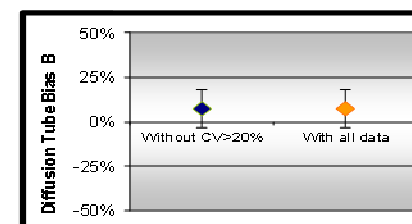
Site Name/ID: Farnham

Precision 12 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.93 (0.85 - 1.03)
Bias B	7% (-3% - 18%)
Diffusion Tubes Mean:	39 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	36 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	36 (33 - 40) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.93 (0.85 - 1.03)
Bias B	7% (-3% - 18%)
Diffusion Tubes Mean:	39 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	36 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	36 (33 - 40) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Godalming Diffusion Tube Precision and Accuracy

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	03/01/2013	31/01/2013	37.0	37.0	38.0	37	0.6	2	1.4
2	31/01/2013	28/02/2013	35.0	31.0	43.0	36	6.1	17	15.2
3	28/02/2013	27/03/2013	45.0	45.0	47.0	46	1.2	3	2.9
4	27/03/2013	24/04/2013	40.0	33.0	34.0	36	3.8	11	9.4
5	24/04/2013	30/05/2013	28.0	23.0	24.0	25	2.6	11	6.6
6	30/05/2013	26/06/2013	30.0	32.0	30.0	31	1.2	4	2.9
7	26/06/2013	01/08/2013	29.0	25.0	29.0	28	2.3	8	5.7
8	01/08/2013	29/08/2013	37.0	32.0	35.0	35	2.5	7	6.3
9	28/08/2013	01/10/2013							
10	01/10/2013	30/10/2013	26.0	37.0	30.0	31	5.6	18	13.8
11	30/10/2013	04/12/2013	30.0	41.0	43.0	38	7.0	18	17.4
12	04/12/2013	08/01/2013	40.0		39.0	40	0.7	2	6.4
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
36.61	99.87	Good	Good
36.90	100	Good	Good
40.84	99.87	Good	Good
26.12	99.86	Good	Good
21	99.19	Good	Good
19	96.53	Good	Good
24	100	Good	Good
21	100	Good	Good
28	100	Good	Good
23	99.87	Good	Good
33.18	100	Good	Good
30.68	95.26	Good	Good

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey →

Good precision	Good Overall DC
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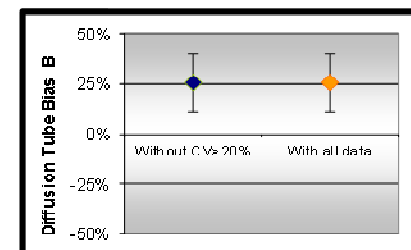
(Check average CV & DC from Accuracy calculations)

Site Name/ID:	Godalming
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Precision	11 out of 11 periods have a CV smaller than 20%
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Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	0.82 (0.73 - 0.93)
Bias B	22% (7% - 36%)
Diffusion Tubes Mean:	35 μgm^{-3}
Mean CV (Precision):	9
Automatic Mean:	28 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	28 (25 - 32) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.82 (0.73 - 0.93)
Bias B	22% (7% - 36%)
Diffusion Tubes Mean:	35 μgm^{-3}
Mean CV (Precision):	9
Automatic Mean:	28 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	28 (25 - 32) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Hindhead Diffusion Tube Precision and Accuracy

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm ⁻³	Tube 2 µgm ⁻³	Tube 3 µgm ⁻³	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	03/01/2013	31/01/2013	40.0	38.0	36.0	38	2.0	5	5.0
2	31/01/2013	28/02/2013	32.0	33.0	31.0	32	1.0	3	2.5
3	28/02/2013	27/03/2013	32.0	31.0	31.0	31	0.6	2	1.4
4	27/03/2013	24/04/2013	33.0	30.0	34.0	32	2.1	6	5.2
5	24/04/2013	30/05/2013	22.0	19.0	28.0	23	4.6	20	11.4
6	30/05/2013	26/06/2013	31.0	29.0	29.0	30	1.2	4	2.9
7	26/06/2013	01/08/2013	35.0	38.0	36.0	36	1.5	4	3.8
8	01/08/2013	29/08/2013	39.0	41.0	35.0	38	3.1	8	7.6
9	28/08/2013	01/10/2013	35.0	37.0	36.0	36	1.0	3	2.5
10	01/10/2013	30/10/2013	32.0	39.0	35.0	35	3.5	10	8.7
11	30/10/2013	04/12/2013	39.0	38.0	41.0	39	1.5	4	3.8
12	04/12/2013	08/01/2013	38.0	36.0	38.0	37	1.2	3	2.9
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
32.07	95.97	Good	Good
33.27	94.94	Good	Good
28.87	95.03	Good	Good
33.41	93.06	Good	Good
37	95.83	Poor Precision	Good
30	89.31	Good	Good
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
		Good	
Overall survey →		Good precision	Good Overall DC

Site Name/ ID: Hindhead

Precision 11 out of 12 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
 without periods with CV larger than 20%

Bias calculated using 5 periods of data

Bias factor A 0.96 (0.87 - 1.09)

Bias B 4% (-8% - 15%)

Diffusion Tubes Mean: 33 µgm⁻³

Mean CV (Precision): 4

Automatic Mean: 32 µgm⁻³

Data Capture for periods used: 94%

Adjusted Tubes Mean: 31 (28 - 36) µgm⁻³

Accuracy (with 95% confidence interval)
 WITH ALL DATA

Bias calculated using 6 periods of data

Bias factor A 1.05 (0.86 - 1.32)

Bias B -4% (-24% - 16%)

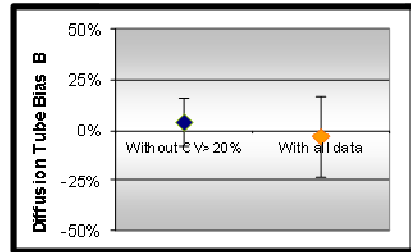
Diffusion Tubes Mean: 31 µgm⁻³

Mean CV (Precision): 7

Automatic Mean: 32 µgm⁻³

Data Capture for periods used: 94%

Adjusted Tubes Mean: 33 (27 - 41) µgm⁻³



Jaume Targa, for AEA
 Version 04 - February 2011

Appendix B

Unbiased NO2 data in micrograms per cubic metre, 2013

SITE	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Average	local bias	National bias	data capture
NO2	03/01/13 - 31/01/13	31/01 - 28/02	28/02 - 27/03	27/03- 24/04	24/04- 30/05	30/05- 26/06	26/06- 01/08	01/08- 29/08	28/08- 01/10	01/10- 30/10	30/10- 04/12	04/12- 08/01		0.90	0.83	%
Farn1	50.0	60.0	63.0	59.0	41.0	48.0	59.0		57.0	56.0	64.0	70.0	57.0	51.3	47.3	91.7
Farn1B	49.0	63.0	66.0	69.0	44.0	60.0	67.0	59.0	61.0	66.0	68.0	69.0	61.8	55.6	51.3	100.0
Farn2	60.0	41.0	60.0	50.0	25.0	44.0	48.0	43.0	50.0	48.0	53.0	56.0	48.2	43.4	40.0	100.0
Farn3	26.0	26.0	34.0		12.0	16.0	18.0	14.0	18.0	13.0	24.0	22.0	20.3	18.2	16.8	91.7
Farn5	58.0	46.0	64.0	41.0	35.0		35.0	42.0	45.0		59.0	49.0	47.4	42.7	39.3	83.3
Farn6	55.0	48.0	57.0	47.0	25.0	39.0	38.0	18.0	23.0	34.0	46.0	39.0	39.1	35.2	32.4	100.0
Farn7	44.0	36.0	41.0	32.0	27.0	28.0	34.0	35.0	38.0	22.0	44.0	40.0	35.1	31.6	29.1	100.0
Farn8	45.0	36.0	46.0	40.0	22.0	34.0	36.0	34.0	42.0	32.0	50.0	47.0	38.7	34.8	32.1	100.0
Farn8B	41.0	46.0	50.0	40.0	20.0	36.0	38.0	35.0	38.0	36.0	48.0	51.0	39.9	35.9	33.1	100.0
Farn 8C	43.0	37.0	50.0	36.0	19.0	36.0	35.0	36.0	41.0	34.0	47.0	49.0	38.6	34.7	32.0	100.0
Farn9	53.0	47.0	52.0	33.0	25.0	41.0	48.0	47.0		46.0	54.0	43.0	44.5	40.0	36.9	91.7
Farn10		29.0	46.0	32.0	18.0	28.0	19.0	24.0	28.0	21.0	38.0	23.0	27.8	25.0	23.1	91.7
Farn11	19.0	38.0	46.0	50.0	35.0	36.0	30.0		52.0	25.0	40.0	28.0	36.3	32.6	30.1	91.7
Farn12	49.0	52.0	50.0		22.0	50.0		30.0	27.0	52.0	72.0	68.0	47.2	42.5	39.2	83.3
Farn13	43.0		49.0	36.0	25.0	40.0	36.0	41.0	40.0	40.0	53.0	50.0	41.2	37.1	34.2	91.7
Farn14	61.0	63.0	68.0	59.0		42.0	56.0	46.0	52.0	45.0	59.0	56.0	55.2	49.7	45.8	91.7
Farn 16	37.0	32.0		31.0	23.0	22.0	22.0	33.0	29.0	24.0	37.0	24.0	28.5	25.7	23.7	91.7
Farn 18	51.0	64.0	73.0	46.0	43.0	52.0	57.0	40.0	46.0	41.0	58.0		51.9	46.7	43.1	91.7
Farn 19	17.0	30.0	43.0	27.0	18.0	25.0	21.0	23.0	29.0	25.0	40.0	26.0	27.0	24.3	22.4	100.0
God1		51.0	59.0	53.0	41.0	41.0	45.0	44.0	41.0	45.0		65.0	48.5	43.7	40.3	83.3
God2	27.0	24.0	32.0	28.0	7.0	23.0	15.0	31.0		20.0	30.0	27.0	24.0	21.6	19.9	91.7
God 3	46.0	43.0	57.0	51.0	20.0	38.0		35.0	37.0	36.0	46.0	47.0	41.5	37.3	34.4	91.7
God4	53.0	60.0	76.0	52.0	27.0	39.0	40.0	41.0					48.5	43.7	40.3	66.7
God5	55.0	53.0		38.0	29.0	39.0	35.0	32.0	41.0		48.0	56.0	42.6	38.3	35.4	83.3

God 6	35.0	33.0			19.0	22.0	20.0	20.0	27.0	22.0	35.0	32.0	26.5	23.9	22.0	83.3
God 7	72.0	52.0		31.0	45.0		58.0	51.0	52.0	44.0	54.0	48.0	50.7	45.6	42.1	83.3
God 8a	37.0	35.0	45.0	40.0	28.0	30.0	29.0	37.0		26.0	30.0	40.0	34.3	30.8	28.4	91.7
God 8b	37.0	31.0	45.0	33.0	23.0	32.0	25.0	32.0		27.0	41.0		32.6	29.3	27.1	83.3
God 8c	38.0	43.0	47.0	34.0	24.0	30.0	29.0	35.0		30.0	43.0	39.0	35.6	32.1	29.6	91.7
God 9	37.0	43.0	49.0		22.0	34.0	36.0	43.0		32.0	45.0	34.0	37.5	33.8	31.1	83.3
God 10	47.0	39.0	49.0		36.0	31.0		40.0		35.0	25.0	47.0	38.8	34.9	32.2	75.0
God 11	34.0	29.0	35.0	28.0	18.0	20.0	22.0	32.0		23.0		28.0	26.9	24.2	22.3	83.3
Cran1	31.0	24.0	29.0	24.0	12.0	19.0	19.0	19.0	22.0	21.0	29.0	27.0	23.0	20.7	19.1	100.0
Cran2	23.0	20.0	22.0	13.0	11.0	14.0	12.0	13.0	14.0	14.0	23.0	17.0	16.3	14.7	13.6	100.0
Cran4	34.0	31.0	35.0	28.0	18.0	22.0	19.0	27.0	23.0	23.0	36.0	27.0	26.9	24.2	22.3	100.0
Hind1	15.0	55.0	62.0	54.0		47.0	50.0	51.0	49.0	50.0	59.0	49.0	49.2	44.3	40.8	91.7
Hind2	25.0	24.0	24.0	21.0	14.0	18.0		17.0	18.0	17.0	29.0	4.0	19.2	17.3	15.9	91.7
Hasl1	40.0	35.0	40.0	31.0	22.0	25.0	30.0	27.0	35.0	31.0	41.0	35.0	32.7	29.4	27.1	100.0
Hasl2	20.0	23.0	21.0	15.0		12.0	16.0	13.0		13.0	18.0	15.0	16.6	14.9	13.8	83.3
Hasl3	44.0	34.0	46.0	42.0		37.0	42.0	21.0	34.0		42.0	37.0	37.9	34.1	31.5	83.3
Hasl4	48.0	56.0	58.0	45.0	26.0	37.0		38.0	41.0	39.0	56.0	49.0	44.8	40.3	37.2	91.7
Hasl5	46.0	38.0	39.0	30.0	27.0	35.0		23.0	37.0	33.0	49.0	57.0	37.6	33.9	31.2	91.7
Bram2	37.0	30.0	34.0	28.0	17.0	19.0	23.0	24.0	25.0	24.0	32.0	32.0	27.1	24.4	22.5	100.0
Bram3	30.0	28.0	32.0	23.0		23.0	21.0	21.0	23.0	20.0	30.0	28.0	25.4	22.8	21.1	91.7
Pet1	33.0		33.0	22.0	13.0	23.0	22.0	24.0	22.0	23.0	35.0	30.0	25.5	22.9	21.1	91.7
Au 1a	40.0	32.0	32.0	33.0	22.0	31.0	35.0	39.0	35.0	32.0	39.0	38.0	34.0	30.6	28.2	100.0
Au 1b	38.0	33.0	31.0	30.0	19.0	29.0	38.0	41.0	37.0	39.0	38.0	36.0	34.1	30.7	28.3	100.0
Au 1c	36.0	31.0	31.0	34.0	28.0	29.0	36.0	35.0	36.0	35.0	41.0	38.0	34.2	30.8	28.4	100.0
Dun1	39.0	39.0	42.0	30.0	23.0	27.0	26.0	30.0	28.0	25.0	42.0	33.0	32.0	28.8	26.6	100.0
Dun2	30.0	19.0	22.0	16.0	12.0	23.0	17.0	23.0	17.0	16.0	26.0	16.0	19.8	17.8	16.4	100.0
Blank	5.0		6.0	8.0						5.0	4.0	4.0	5.3	4.8	4.4	50.0