



# **2016 Air Quality Annual Status Report (ASR)**

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

**February 2017**

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## Executive Summary: Air Quality in Our Area

This Annual Status Report presents the findings of Waverley Borough Council's monitoring of air quality within the Borough during 2015. The report evaluates the results from the monitoring programme in relation to the national objective limits in fulfilment of Part IV of the Environment Act 1995, Local Air Quality Management.

Previous air quality assessments have concluded that concentrations of carbon monoxide, benzene, 1-3 butadiene, lead, sulphur dioxide (SO<sub>2</sub>) and particulates (PM<sub>10</sub>) are compliant with UK air quality objectives. However, concentrations of nitrogen dioxide (NO<sub>2</sub>) have been found to exceed the annual mean objective at various locations within the Borough.

Monitoring data for 2015 has shown that nitrogen dioxide concentrations have decreased across the Borough as a whole, and although three monitoring locations are slightly exceeding the 40µg objective limit, two are already located within the Air Quality Management Area (AQMA) of Farnham. The third location is showing exceedance at the monitoring site close to the road but falls below the limit at the nearest residential property. Future monitoring will indicate whether there is a long term trend towards the reduction of pollution concentrations or whether these are annual fluctuations.

### Air Quality in Waverley

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas<sup>1,2</sup>.

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1 Environmental equity, air quality, socioeconomic status and respiratory health, 2010

2 Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion<sup>3</sup>.

Waverley Borough is situated in the south-western corner of Surrey, the Borough is largely rural with four main populations centres; Farnham, Godalming, Haslemere and Cranleigh. Air quality within the Borough is generally very good but there are hotspots of pollution caused by high levels of Nitrogen Dioxide. Road traffic has been recognised as the major pollution source with the greatest effects in the largest towns within the Borough.

Two main trunk roads cross Waverley; the A31 London to Winchester and the A3 London to Portsmouth dual carriageways. The latter includes the site of the Hindhead Tunnel which opened in August 2011 in order to relieve serious congestion on the A3 route in the village of Hindhead.

Waverley Borough Council (WBC) declared three Air Quality Management Areas (AQMA's) in 2004, and these were directly attributed to exceedances of the annual mean Air Quality Strategy (AQS) objectives for nitrogen dioxide (NO<sub>2</sub>) due to traffic congestion. The AQMA in Hindhead was subsequently revoked in 2015 as a direct result of the Hindhead Tunnel project that was completed in 2011. This work incorporated the closure of a section of the road through Hindhead Common and the Devil's Punch Bowl. A majority of this traffic, in excess of 50%, now utilises the A3 rather than the more residential route along the A287

The remaining AQMA's at Farnham and Godalming continue to operate automatic monitors due to the persistent high levels of pollutants, specifically oxides of Nitrogen (NO<sub>x</sub>). These problems relate to congestion on heavily trafficked primary routes and poor dispersion of pollutants where roads narrow with tall buildings on either side. Air quality monitoring indicates that overall levels are slightly lower than previous years, with the air quality objective only being breached at three monitoring sites, two sites within the existing AQMA at Farnham, and a further breach at a location outside of the AQMA.

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<sup>3</sup> Defra. Abatement cost guidance for valuing changes in air quality, May 2013

A Borough wide Air Quality Action Plan (AQAP) was first developed in Waverley in 2008 and has recently been updated. The AQAP contains measures for consideration or implementation, targeted at reducing local air quality emissions and improving air quality across the whole Borough, but with specific regard for the AQMAs. Many of these actions require the co-operation of partner agencies including, but not limited to, Surrey County Council (SCC), Environment Agency (EA), Public Health England (PHE) and other neighbouring authorities.

## Actions to Improve Air Quality

WBC has undertaken extensive modelling work to establish the feasibility of options to address issues surrounding traffic flow and congestion. This work was carried out by Riccardo AEA on behalf of Waverley utilising Defra grant funding. An air quality steering group was established by WBC to engage with SCC and other partner agencies to review the proposed options and to assess the effectiveness of existing and proposed traffic management options included in Waverley's AQAP. The viable options proposed will require specific transport measures to be put into place and would therefore create challenges for SCC as well as WBC, in terms of implementing the proposals and the availability of appropriate funding.

WBC continue to take steps towards implementing small measures at every available opportunity and therefore we have developed joint working with other teams both externally through the steering and Surrey air quality groups, and internally within WBC. This joint working process has allowed us to develop new strategies incorporating specific transport measures and interventions to help deliver the key elements of the WBC air quality action plan. Some of these provisions include the provision of infrastructure to support the use of electric vehicle charging points (EVPs) through the planning process, developing Urban Traffic Control and traffic signal strategies, and enhanced enforcement of parking and loading restrictions.

## Local Priorities and Challenges

We know from modelling work undertaken that small measures such as reducing congestion on the worst roads will have some benefit on NO<sub>x</sub> concentrations, and it is also considered that the complex issues surrounding poor air quality, and its effective resolution, cannot be achieved simply through local initiatives but requires robust strategies nationally as well as locally.

Surrey County has the highest car usage in the UK, and in some of the more rural areas within Waverley the infrastructure for public transport is limited, encouraging vehicular usage further. It is with this knowledge that WBC's air quality officer and planning teams are implementing the requirement for EVP's at all new major developments across the Borough and not just within the AQMA boundaries. The transport plans within Waverley and Surrey County are dedicated to more walking and cycling provisions, and regularly review options for cleaner vehicles through the bus and taxi services that are available across Surrey.

The biggest challenge facing Waverley are the financial implications of long term options that are considered to aid the reduction in traffic based air pollution. The modelling work estimated conservative costs to be in the region of £3 million, and securing this level of funding is equally difficult for SCC as the transport authority for all eleven Surrey authorities.

WBC will continue to monitor at locations across the Borough and review any trends and improvements from existing initiatives. We will also continue to work with our partner agencies and we fully support all measures taken by SCC to address air quality across the entire County, including the recent bid for Defra funding to address the feasibility of a shared electric vehicle strategy for Surrey.

## How to Get Involved

The air pollution in Waverley is traffic related and therefore every resident within the Borough should aim to do their bit to reduce emissions. This may include walking or cycling, taking public transport or car sharing, and if you need to use your car, plan your journey in advance and combine errands into one trip. Ensure your car is well

maintained and avoid idling as this also helps with fuel economy as well as reducing the impact of your vehicles emissions. When the option arises to change the vehicle, consideration should be given to low and ultra low emission vehicles, including electric options which lower overall costs for 'refuelling' and attract lower road tax fees. Additional information on local air quality can be found by following the link;

[www.waverley.gov.uk](http://www.waverley.gov.uk)

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## 1 Local Air Quality Management

This report provides an overview of air quality in Waverley during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) 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 an exceedance is considered likely the local authority must 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. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Waverley Borough Council to improve air quality and any progress that has been made. The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

## 2 Actions to Improve Air Quality

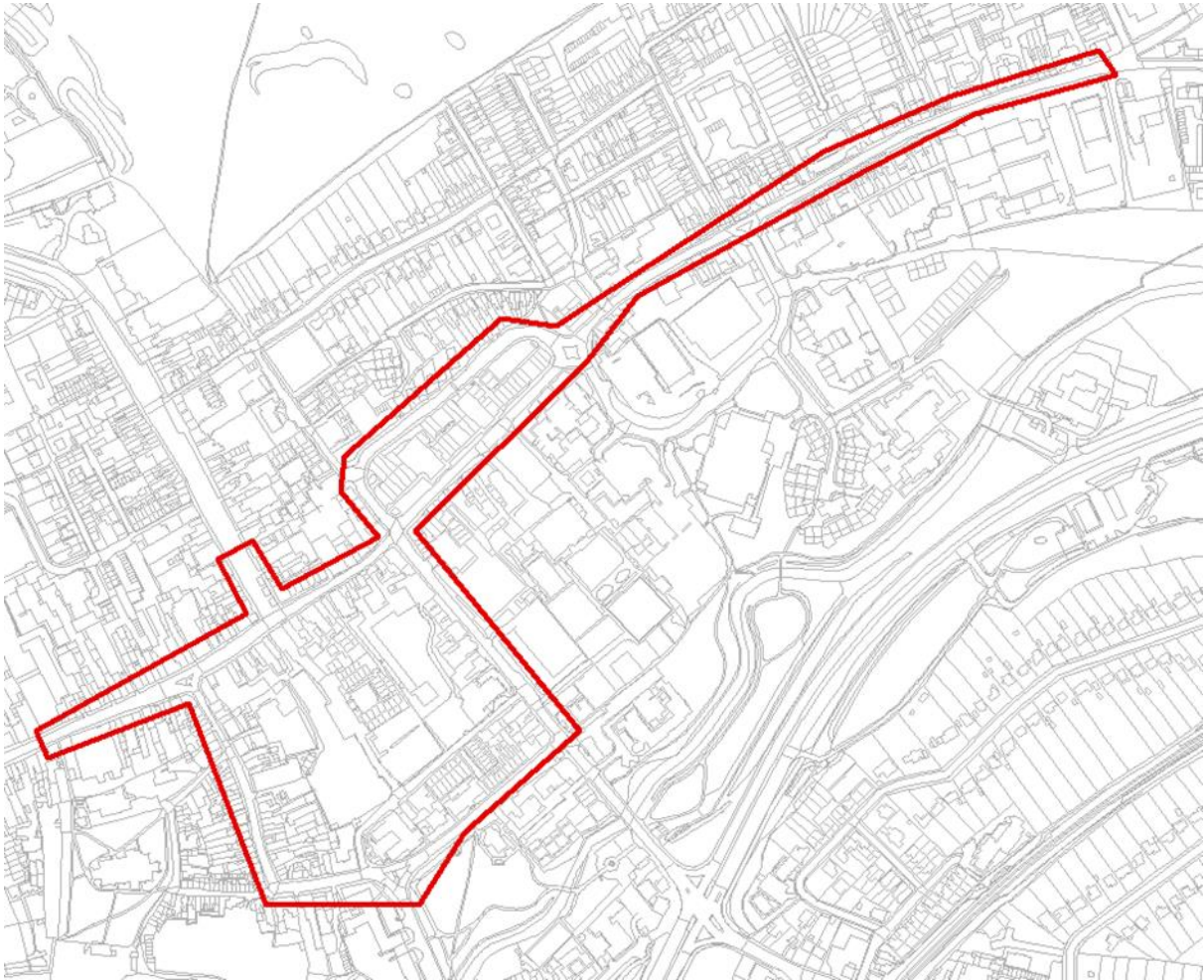
### 2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

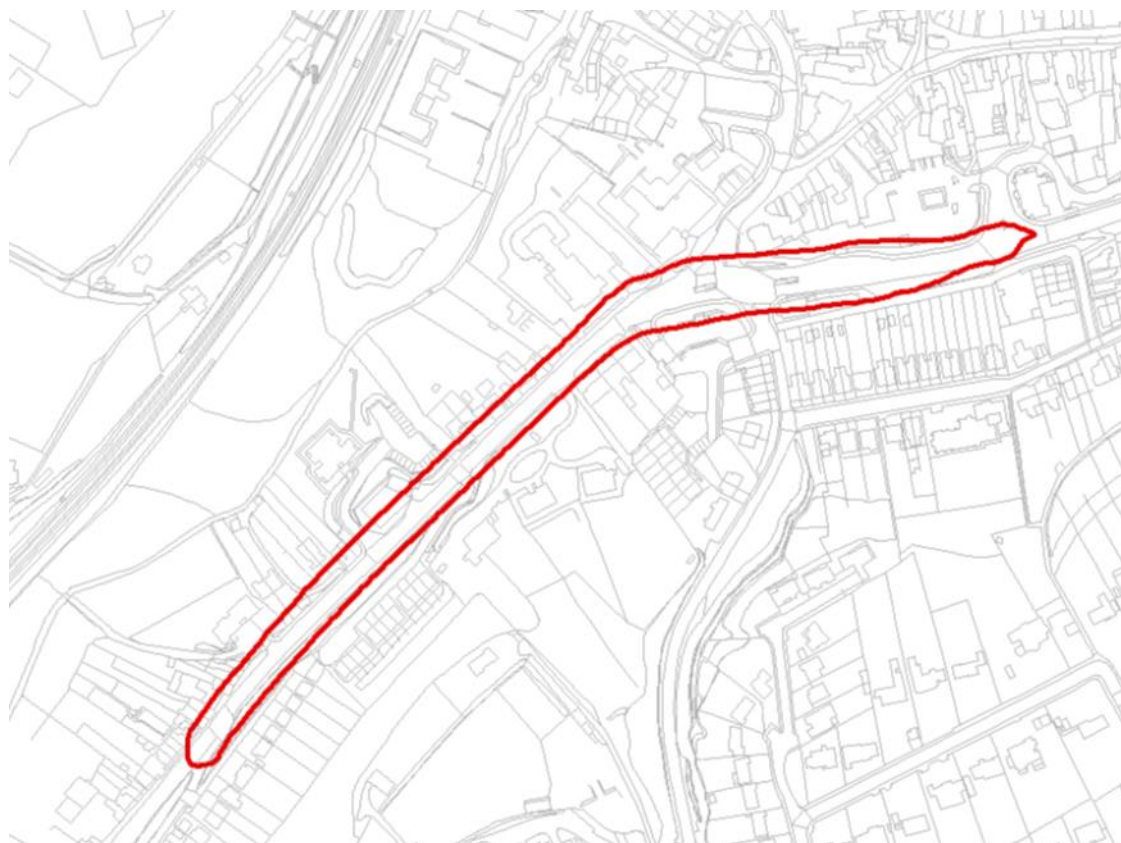
A summary of AQMAs declared by Waverley Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at <https://uk-air.defra.gov.uk>

**Table 2.1 – Declared Air Quality Management Areas**

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Farnham AQMA	<ul style="list-style-type: none"> <li>• NO<sub>2</sub> annual mean</li> <li>• PM<sub>10</sub> 24-hour mean</li> </ul>	Farnham	Central town location encompassing the main one-way traffic system	Updated 2015
Godalming AQMA	NO <sub>2</sub> annual mean	Godalming	An area encompassing 500m stretch of road from Ockford Road to Flambard Way and incorporating the junction with Station Road and Holloway Hill	Updated 2015



**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.  
Ordnance Survey LA100025451.

## 2.2 Progress and Impact of Measures to Address Air Quality in Waverley Borough Council

Waverley Borough Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the detailed Air Quality Action Plan. Key completed measures are:

- On-going air quality monitoring
- Further traffic modelling work undertaken by Surrey County Council in relation to traffic changes within the AQMA at Farnham
- Increase in use of staff pool cars as part of WBC corporate travel plan
- Incorporate the Air Quality Action Plan into the Council's Local Plan and Infrastructure Delivery Plan

The Council's priorities for the coming year are;

- Continue all existing monitoring and review of monitoring locations around local infrastructure, residential and commercial developments.
- Incorporate strategies agreed by the Surrey partnership group meetings to aid the reduction of emissions across the County
- Liaise with WBC planning team and SCC transport team to maintain current actions that help to improve air quality and review new strategies and implementation of associated new measures.
- Incorporation of the Local Plan which identified 50 potential cycle routes to encourage sustainable travel.

**Table 2.2 – Progress on Measures to Improve Air Quality**

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date
1	Farnham Review Study (option 2b)	Policy Guidance and Development Control	Low Emissions Strategy	SCC/WBC	2015	2017 - 2021	Restrain or reduce traffic volumes in AQMA	Y	A Defra project to assess the effectiveness of traffic management options in Farnham developed this strategy. Further modelling work by SCC to assess the impact on surrounding areas is now completed.	2017 - 2021
2	Infrastructure to support the use of electric and hybrid vehicles	Traffic Management	Other	SCC/WBC	n/a	2013	Uptake of LEVs	Y	Promotion through the planning process in WBC for all new developments within AQMAs and large developments outside of AQMAs	Ongoing
3	WBC corporate travel plan	Promoting Travel Alternatives	Workplace Travel Planning	WBC	n/a	2009 - ongoing	Restrain or reduce traffic volumes in AQMA	Y	Staff pool cars are available and usage has increased. Potential to change to electric vehicles for future upgrades	Ongoing
4	Travel plans for major employers	Promoting travel alternatives	Workplace Travel Planning	WBC	n/a	ongoing	Restrain or reduce traffic volumes in AQMA	Y	Promotion through the planning process for all large commercial developments	Ongoing
5	Air quality and Planning Policies	Policy Guidance and Development Control	Air Quality and Policy Guidance	WBC	n/a	ongoing	Incorporation of guidance in WBC Local Plan	Y	Engagement with planning policy	Ongoing
6	Improvements in public transport	Promoting Low Emission Transport	Taxi Licensing Conditions	WBC	n/a	Ongoing	Uptake in LEVs	Y	Update of licensing conditions at next review date	2018
7	Urban Traffic Control Systems (UTC)	Traffic Management	UTC, Congestion Management, Traffic reduction	SCC	n/a	2017 - 2032	Improvements to traffic flow	Y	UTC changes assessed by SCC and S106 funding available. Awaiting changes to be implemented	2017 - 2021

Waverley Borough Council

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date
8	Air Quality Awareness Raising	Public Information	Other	WBC and partner agencies	n/a	Ongoing	Restrain or reduce traffic volumes in AQMA	Y	WBC website hosts current information on ongoing AQ work. Additional work being discussed with Town and Parish Councils	Ongoing
9	Surrey Air Alert scheme	Public Information	Via other mechanisms	WBC in conjunction with other Surrey Authorities	n/a	Ongoing	Public health improvements	Y	Implemented in a number of Surrey Authorities but additional equipment and funding required to allow coverage in Waverley	Ongoing
10	Surrey Pollution and Air Quality Study Group	Policy Guidance and Development Control	Regional Group co-ordinating programmes to develop area-wide strategies to reduce emissions and improve air quality	Borough and District Councils within Surrey	n/a	Ongoing	Implementation of Surrey Wide Strategies	n/a	Group meetings are ongoing and involve SCC and PHE attendance. SCC submitted a bid for DEFRA funding on behalf of all Surrey Authorities	Ongoing

Transport and Air Quality projects to be delivered through WBC Local Plan

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date
11	Farnham Town Centre Transport Package	Traffic Management	UTC, traffic management, traffic reduction	SCC	n/a	2017-2021	Restrain or reduce traffic volumes in AQMA	Y	Ongoing.	2021
12	A31 improvements Hickley's Corner	Traffic Management	UTC, traffic management, traffic reduction	SCC	n/a	by 2021	Restrain or reduce traffic volumes in AQMA	Y	Ongoing.	by 2021



Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date
13	A31 improvements Shepherd and Flock Roundabout	Traffic Management	UTC, traffic management, traffic reduction	SCC	n/a	by 2032	Restrain or reduce traffic volumes in AQMA	Y	Ongoing.	by 2032
14	A325 Road layout changes	Transport Planning and Infrastructure	Other	SCC	n/a	by 2032	Improved environment for pedestrians and cyclists	Y	Ongoing.	by 2032
15	A31 improvements Coxbridge Roundabout	Traffic Management	UTC, traffic management, traffic reduction	SCC	n/a	by 2032	Restrain or reduce traffic volumes in AQMA	Y	Ongoing.	by 2032
16	A325 Wrecclesham Road Signalisation	Traffic Management	UTC, traffic management, traffic reduction	SCC	n/a	by 2032	Restrain or reduce traffic volumes in AQMA	Y	Ongoing.	by 2032
17	Farnham Railway Station Improvements	Transport Planning and Infrastructure	Other	SCC	n/a	2016-2020	Improved environment for pedestrians and cyclists	Y	Ongoing.	by 2020
18	Improvements to strategic cycling network	Promoting Travel Alternatives	Promotion of cycling	SCC	n/a	2016-2020	Increase in cycling	Y	Ongoing	by 2020
19	A287 Firgrove Hill pedestrian crossing	Promoting Travel Alternatives	Promotion of walking	SCC	n/a	2016-2020	Increase in walking	Y	Ongoing.	by 2020
20	Long Bridge, Farnham pedestrian crossing	Promoting Travel Alternatives	Promotion of walking	SCC	n/a	2016-2020	Increase in walking	Y	Ongoing	by 2020
21	Road Safety improvements (A287)	Traffic Management	UTC, traffic management, traffic reduction	SCC	n/a	2016-2020	Restrain or reduce traffic volumes in AQMA	Y	Ongoing	by 2020

## 2.3 PM<sub>2.5</sub> – Local Authority Approach to Reducing Emissions and or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of PM<sub>2.5</sub> (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM<sub>2.5</sub> has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Waverley Borough Council is reviewing all available measures and interventions to deliver key elements of the air quality action plan. Implementation of these detailed measures will address all aspects of air pollution within the Borough with the potential outcomes of reducing all emissions, including PM<sub>2.5</sub>.

During 2015, monitoring was undertaken across the Borough using 52 passive diffusion tubes. Two sites were also co-located where monitoring was carried out using automatic analysers for the calculation of local bias adjustment factors. At each of these monitoring stations, nitrogen dioxide concentrations are measured, and at Farnham, PM10 is also monitored.

WBC does not exceed PM10 levels within the Borough and these concentrations have remained fairly constant in the previous years of assessment. WBC has not previously measured for PM2.5 levels and the analysers currently in place do not have the correct functions to allow the measurements to be taken, therefore we do not currently have any base levels to assess any future measurements against. WBC continues to develop strategies on the reduction of emissions, including PM2.5, and this will be actioned through the Surrey Authorities partnership working group. This group comprising of the Surrey authorities pollution group (Borough and District officers), Public Health and SCC Highways, will work in partnership to establish County wide modelling in order to map PM2.5 concentrations across Surrey as a whole.

Mapping will be undertaken during 2017 following agreement from each Borough and District to fund the costs of the modelling work. The results and conclusions of this

mapping will allow each Surrey Authority to incorporate further strategies to ensure the best means of measuring the effectiveness of actions to reduce PM2.5 emissions alongside other pollutants of concern.

## **3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance**

### **3.1 Summary of Monitoring Undertaken**

#### **3.1.1 Automatic Monitoring Sites**

This section sets out what monitoring has taken place and how it compares with objectives.

Waverley Borough Council undertook automatic (continuous) monitoring at two sites, located within the AQMAs in Godalming and Farnham, during 2015. Table A.1 in Appendix A shows the details of the sites. The Godalming site averaged below the 40µg objective limit prior to the bias adjustment factor being applied. However, the Farnham analyser recorded slight exceedances of the objective limits which subsequently dropped below this limit following the local bias adjustment factor. Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

#### **3.1.2 Non-Automatic Monitoring Sites**

Waverley Borough Council undertook non- automatic (passive) monitoring of NO<sub>2</sub> at 52 sites during 2015. Table A.2 in Appendix A shows the details of the sites. Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

## 3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Further details on adjustments are provided in Appendix C.

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

Table A.3 in Appendix A compares the ratified and adjusted monitored NO<sub>2</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>. For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO<sub>2</sub> hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m<sup>3</sup>, not to be exceeded more than 18 times per year.

One site, Farn 12, recorded an exceedance of the annual mean objective of 40µg/m<sup>3</sup> which reported an annual mean of 40.3µg/m<sup>3</sup>. The tube is a roadside location and once the distance correction factor was applied, the tube recorded a lower concentration at the façade of the nearest residential property. Monitoring will continue at this location in order for robust data to be gathered, and actions reviewed if the location continues to meet or exceed the annual objective limits.

There were no exceedances of the hourly objective recorded at the continuous monitoring sites in 2015, or in previous years. Research has shown that the hourly objective is unlikely to be exceeded where annual mean concentrations record a level below 60µg/m<sup>3</sup>. As none of the monitoring sites have recorded annual means of 60µg/m<sup>3</sup> or more, it can be assumed that the hourly nitrogen dioxide limit is not exceeded at any sensitive location within the Borough.

### 3.2.2 Particulate Matter (PM<sub>10</sub>)

Table A.5 in Appendix A compares the ratified and adjusted monitored PM<sub>10</sub> annual mean concentrations for the past 5 years with the air quality objective of 40µg/m<sup>3</sup>.

Table A.6 in Appendix A compares the ratified continuous monitored PM<sub>10</sub> daily mean concentrations for the past 5 years with the air quality objective of 50µg/m<sup>3</sup>, not to be exceeded more than 35 times per year.

### 3.2.3 Particulate Matter (PM<sub>2.5</sub>)

Modelling work will be undertaken during 2017 to establish PM<sub>2.5</sub> concentrations in order to assess for future requirements for action. The results of this modelling will be discussed in the 2016 report.

## Appendix A: Monitoring Results

**Table A.1 – Details of Automatic Monitoring Sites**

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Inlet Height (m)
Farn 8	Farnham AQMA	Roadside	484087	146972	NO <sub>2</sub> ; PM <sub>10</sub>	Y	Chemiluminescent	6	5	2.0
God 8	Godalming AQMA	Roadside	496693	143695	NO <sub>2</sub>	Y	Chemiluminescent	24	3	2.0

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
Farn 1	The Borough	Roadside	484000	146899	NO <sub>2</sub>	Y	1	3	N
Farn 1B	The Borough	Kerbside	484016	146895	NO <sub>2</sub>	Y	15	2	N
Farn 2	Jct at Downing Street	Roadside	483907	146831	NO <sub>2</sub>	Y	32	4	N
Farn 3	Bishopsmead	Urban Background	483654	146600	NO <sub>2</sub>	N	10	N/A	N
Farn 5	East Street	Roadside	484417	147241	NO <sub>2</sub>	Y	11	3	N
Farn 6	A3016 Upper Hale	Kerbside	483915	149039	NO <sub>2</sub>	N	3	1	N
Farn 7	South Street	Roadside	484233	146782	NO <sub>2</sub>	Y	N	5	N



Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
Farn 8A/B/C	The Woolmead	Roadside	484087	146972	NO <sub>2</sub> PM <sub>10</sub>	Y	18	9	Y
Farn 9	Jct at Alma Lane	Roadside	484761	149431	NO <sub>2</sub>	N	5	2	N
Farn 10	Folly Hill	Roadside	483152	148703	NO <sub>2</sub>	N	10	1.5	N
Farn 11	Jct at The Street	Roadside	482699	145150	NO <sub>2</sub>	N	8	2	N
Farn 12	Wrecclesham Road	Roadside	482757	145588	NO <sub>2</sub>	N	10	1.5	N
Farn 13	Station Hill	Roadside	484371	146625	NO <sub>2</sub>	N	2	1.5	N
Farn 14	Station Hill	Roadside	484407	146602	NO <sub>2</sub>	N	10	1	N
Farn 16	Waverley Lane	Roadside	484737	146540	NO <sub>2</sub>	N	1	2	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
Farn 18	Station Hill	Roadside	484384	146615	NO <sub>2</sub>	N	1.5	2	N
Farn 19	Waverley Lane	Kerbside	484499	146566	NO <sub>2</sub>	N	30	6	N
God 1	Ockford Road	Roadside	496512	143519	NO <sub>2</sub>	Y	10	4	N
God 2	Bridge Street	Roadside	497285	143971	NO <sub>2</sub>	N	N	2	N
God 3	Bridge Road	Roadside	497408	144232	NO <sub>2</sub>	N	10	2	N
God 4	Flambard Way	Roadside	497300	143844	NO <sub>2</sub>	Y	10	2	N
God 5	Jct at High Street	Roadside	496741	143712	NO <sub>2</sub>	Y	30	1.5	N
God 6	Brighton Road	Roadside	497390	143436	NO <sub>2</sub>	N	6	2	N
God 7	Holloway Hill	Kerbside	496714	413523	NO <sub>2</sub>	N	N	3	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
God 8A/B/C	Ockford Road	Roadside	496693	143695	NO <sub>2</sub>	Y	37	3.5	Y
God 9	Croft Road	Kerbside	496780	143646	NO <sub>2</sub>	N	0	0	N
God 10	Jct at Wharf Street	Roadside	497279	143848	NO <sub>2</sub>	N	1.5	2	N
God 11	Catteshall Lane	Roadside	498025	144655	NO <sub>2</sub>	N	1	2	N
Cran 1	High Street	Roadside	505808	139078	NO <sub>2</sub>	N	N	1.3	N
Cran 2	Avenue Road	Urban Background	506883	138514	NO <sub>2</sub>	N	16	3	N
Cran 4	Rowly Drive	Roadside	504760	140683	NO <sub>2</sub>	N	5	2	N
Hind 1	London Road (crossroad)	Kerbside	488775	135690	NO <sub>2</sub>	N	N	1	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
Hind 2	High Pitfold	Urban Background	488095	134369	NO <sub>2</sub>	N	N	N/A	N
Hasl 1	High Street	Roadside	490486	132819	NO <sub>2</sub>	N	N	2	N
Hasl 2	Weydown Road	Urban Background	483528	133005	NO <sub>2</sub>	N	N	N/A	N
Hasl 3	High Street	Roadside	490626	133145	NO <sub>2</sub>	N	10	1.5	N
Hasl 4	Wey Hill	Roadside	489090	132842	NO <sub>2</sub>	N	1.5	1.5	N
Hasl 5	High Street	Kerbside	490599	133106	NO <sub>2</sub>	N	10	1.5	N
Bram 2	Birtley Road	Roadside	501498	144049	NO <sub>2</sub>	N	13	3.5	N
Bram 3	High Street	Roadside	500908	144780	NO <sub>2</sub>	N	5	3.5	N
Pet 1	Petworth Road	Roadside	494483	141316	NO <sub>2</sub>	N	N	3.5	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) <sup>(1)</sup>	Distance to kerb of nearest road (m) <sup>(2)</sup>	Tube collocated with a Continuous Analyser?
AU 1/2/3	Heather Way	Roadside	488819	135639	NO <sub>2</sub>	N	20	3	N
Dun 1	Alfold Crossways	Roadside	504064	135319	NO <sub>2</sub>	N	N	5	N
Dun 2	Stovolds Hill	Urban Background	502782	137268	NO <sub>2</sub>	N	30	N/A	N

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.3 – Annual Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
					2011	2012	2013	2014	2015
Farnham AQMA	Roadside	Automatic		77.1	35.1	36.1	36.6	39.4	37.2
Godalming AQMA	Roadside	Automatic		89.8	26.1	27.8	28.6	24.2	32.7

Notes: Exceedances of the NO<sub>2</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

NO<sub>2</sub> annual means exceeding 60µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> 1-hour mean objective are shown in **bold and underlined**.

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO<sub>2</sub> Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	NO <sub>2</sub> 1-Hour Means > 200µg/m <sup>3</sup> <sup>(3)</sup>				
					2011	2012	2013	2014	2015
Farnham AQMA	Roadside	Automatic		77.1	0(115)	0	0	0	0
Godalming AQMA	Roadside	Automatic		89.8	2(104)	0	0	0	0

Notes: Exceedances of the NO<sub>2</sub> 1-hour mean objective (200µg/m<sup>3</sup> not to be exceeded more than 18 times/year) are shown in **bold**.

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) If the period of valid data is less than 85%, the 99.8<sup>th</sup> percentile of 1-hour means is provided in brackets.

**Table A.5 – Annual Mean PM<sub>10</sub> Monitoring Results**

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	PM <sub>10</sub> Annual Mean Concentration (µg/m <sup>3</sup> ) <sup>(3)</sup>				
				2011	2012	2013	2014	2015
Farnham AQMA	Roadside		69.3	23.3	21.0	21.5	22.7	19.2

Notes: Exceedances of the PM<sub>10</sub> annual mean objective of 40µg/m<sup>3</sup> are shown in **bold**.

- (1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
- (3) All means have been “annualised” as per Technical Guidance LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

**Table A.6 – 24-Hour Mean PM<sub>10</sub> Monitoring Results**

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) <sup>(1)</sup>	Valid Data Capture 2015 (%) <sup>(2)</sup>	PM <sub>10</sub> 24-Hour Means > 50µg/m <sup>3</sup> <sup>(3)</sup>				
				2011	2012	2013	2014	2015
Farnham AQMA	Roadside		69.3	7	7	2	5	5

Notes: Exceedances of the PM<sub>10</sub> 24-hour mean objective (50µg/m<sup>3</sup> not to be exceeded more than 35 times/year) are shown in **bold**.

- (1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.
- (2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).
- (3) If the period of valid data is less than 85%, the 90.4<sup>th</sup> percentile of 24-hour means is provided in brackets.



## Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO<sub>2</sub> Monthly Diffusion Tube Results - 2015

SITE	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Avg	local bias	National bias	Data capture
NO2	07/01/15 04/02/15	04/02/15 05/03/15	05/03/15 02/04/15	02/04/15- 30/05/15	30/05/15 27/05/15	27/05/15 02/07/15	02/07/15 30/07/15	30/07/15 26/08/15	26/08/15 30/09/15	30/09/15 28/10/15	28/10/15 02/12/15	02/12/15 07/01/16		0.84	0.81	%
Farn1	53.0	51.0	71.0	50.0	45.0	24.0		50.0	55.0	53.0		52.0	50.4	42.3	40.8	83.3
Farn1B	60.0	57.0	73.0	53.0	49.0	36.0	47.0		61.0	55.0	48.0	57.0	54.2	45.5	43.9	91.7
Farn2	48.0	45.0	50.0	49.0	44.0	21.0	41.0	44.0	48.0	50.0	42.0	49.0	44.3	37.2	35.8	100.0
Farn3	15.0	19.0	25.0	22.0	18.0	14.0	18.0	18.0	21.0	20.0	17.0	19.0	18.8	15.8	15.3	100.0
Farn5	42.0	40.0	52.0	40.0	43.0	32.0	47.0	39.0	53.0	51.0	42.0	26.0	42.3	35.5	34.2	100.0
Farn6	43.0	48.0	39.0	47.0	42.0	22.0	34.0	29.0	38.0		32.0		37.4	31.4	30.3	83.3
Farn7	44.0	36.0	39.0	42.0	41.0	24.0		22.0	35.0	36.0	39.0	38.0	36.0	30.2	29.2	91.7
Farn8A	41.0	39.0	53.0	40.0	38.0	34.0	36.0	38.0	43.0	48.0	44.0	50.0	42.0	35.3	34.0	100.0
Farn8B	42.0	36.0	45.0	40.0	38.0	33.0	38.0	37.0	42.0	47.0	45.0	47.0	40.8	34.3	33.1	100.0
Farn 8C	42.0	35.0	46.0	38.0	33.0	34.0	39.0	37.0	42.0	49.0	45.0	46.0	40.5	34.0	32.8	100.0
Farn9	49.0	50.0	29.0	41.0	41.0	26.0	33.0	40.0	42.0	46.0	43.0	49.0	40.8	34.2	33.0	100.0
Farn10	37.0	31.0	18.0	24.0	21.0	15.0	13.0	13.0	16.0	24.0	28.0	26.0	22.2	18.6	18.0	100.0
Farn11	37.0	27.0	34.0	37.0	25.0	21.0	25.0	32.0	41.0	34.0	35.0	36.0	32.0	26.9	25.9	100.0
Farn12	53.0	61.0	84.0	44.0	44.0	36.0		32.0	48.0	49.0	47.0		49.8	41.8	40.3	83.3
Farn13		40.0	53.0	46.0	42.0	33.0	37.0	42.0	46.0	41.0	37.0	39.0	41.5	34.8	33.6	91.7
Farn14	58.0	54.0	59.0	49.0	46.0	34.0	42.0	45.0	52.0	41.0	42.0	46.0	47.3	39.8	38.3	100.0
Farn 16	36.0	31.0	35.0	31.0	24.0	20.0	16.0	18.0	26.0	27.0	39.0	30.0	27.8	23.3	22.5	100.0
Farn 18	44.0	53.0	62.0	41.0	41.0	30.0	34.0		42.0	45.0	44.0	41.0	43.4	36.4	35.1	91.7
Farn 19	36.0	34.0		26.0	27.0	31.0	33.0	32.0	36.0	37.0	31.0	35.0	32.5	27.3	26.4	91.7

SITE	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Avg	local bias	National bias	data capture
NO2	07/01/15 - 04/02/15	04/02/15 05/03/15	05/03/15 02/04/15	02/04/15 30/05/15	30/05/15 27/05/15	27/05/15 02/07/15	02/07/15 30/07/15	30/07/15 26/08/15	26/08/15 30/09/15	30/09/15 28/10/15	28/10/15 02/12/15	02/12/15 07/01/16		0.84	0.81	%
God1		41.0	32.0		42.0	35.0	39.0	42.0	47.0	44.0	57.0	43.0	42.2	35.4	34.2	83.3
God2	47.0	26.0	22.0	24.0	20.0	16.0	18.0	26.0	27.0	25.0	22.0	23.0	24.7	20.7	20.0	100.0
God 3	22.0	41.0	43.0				36.0			38.0	37.0	34.0	35.9	30.1	29.0	58.3
God4	40.0	47.0	39.0	44.0		36.0		32.0	48.0	49.0	59.0		43.8	36.8	35.5	75.0
God5	49.0	40.0	32.0	41.0	28.0	24.0	26.0	35.0	41.0	46.0	48.0	36.0	37.2	31.2	30.1	100.0
God 6	43.0	29.0	21.0	25.0	23.0	18.0	19.0	25.0	28.0	22.0	24.0	26.0	25.3	21.2	20.5	100.0
God 7	48.0	45.0	37.0	41.0	43.0	33.0	32.0	25.0	28.0	32.0	42.0	39.0	37.1	31.2	30.0	100.0
God 8a	40.0	38.0	31.0	37.0	25.0	21.0	25.0	32.0	39.0	41.0	44.0	35.0	34.0	28.6	27.5	100.0
God 8b	40.0	36.0	33.0	38.0	25.0	20.0	24.0	32.0	37.0	41.0	42.0	35.0	33.6	28.2	27.2	100.0
God 8c	41.0	37.0	30.0	37.0	26.0	18.0	24.0	32.0	36.0	43.0	44.0	36.0	33.7	28.3	27.3	100.0
God 9	40.0	30.0	24.0	29.0	24.0	19.0	22.0	33.0	34.0	39.0	41.0	33.0	30.7	25.8	24.8	100.0
God 10	48.0	45.0	47.0	34.0	37.0		28.0	27.0	23.0	35.0	42.0	49.0	37.7	31.7	30.6	91.7
God 11	49.0	28.0	23.0	24.0	12.0	15.0	14.0	14.0	22.0	26.0	32.0	27.0	23.8	20.0	19.3	100.0
Cran1	24.0	20.0	19.0	32.0	26.0	20.0	21.0	19.0	19.0	23.0	27.0	22.0	22.7	19.0	18.4	100.0
Cran2	26.0	17.0	12.0	19.0	17.0	18.0	16.0	19.0	21.0	22.0	20.0	22.0	19.1	16.0	15.5	100.0
Cran4	25.0	24.0	16.0	28.0	23.0	18.0	17.0	15.0	17.0	25.0	24.0	21.0	21.1	17.7	17.1	100.0
Hind1	34.0	42.0	46.0	45.0	34.0	31.0	34.0	32.0	43.0	50.0	45.0	41.0	39.8	33.4	32.2	100.0
Hind2	30.0	19.0	23.0	21.0	19.0	17.0	15.0	18.0	21.0	22.0	24.0	18.0	20.6	17.3	16.7	100.0
Has1	15.0	32.0	34.0	37.0	35.0	29.0	22.0	25.0	26.0	26.0	33.0	37.0	29.3	24.6	23.7	100.0
Has2	29.0	13.0	16.0	17.0	12.0	7.0	9.0	11.0	10.0	13.0	26.0	19.0	15.2	12.7	12.3	100.0
Has3	15.0	39.0	32.0	37.0	37.0	32.0	28.0	24.0	28.0	29.0	35.0	39.0	31.3	26.3	25.3	100.0

SITE	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Avg	local bias	National bias	data capture
NO2	07/01/15 - 04/02/15	04/02/15 - 05/03/15	05/03/15 - 02/04/15	02/04/15 - 30/05/15	30/05/15 - 27/05/15	27/05/15 - 02/07/15	02/07/15 - 30/07/15	30/07/15 - 26/08/15	26/08/15 - 30/09/15	30/09/15 - 28/10/15	28/10/15 - 02/12/15	02/12/15 - 07/01/16		0.84	0.81	%
Hasl4	39.0	52.0	46.0	44.0	32.0	35.0	37.0	31.0	33.0	42.0	40.0	37.0	39.0	32.8	31.6	100.0
Hasl5	42.0	36.0	46.0	42.0	41.0	38.0	35.0	31.0	37.0	37.0	41.0	46.0	39.3	33.0	31.9	100.0
Bram2	30.0	29.0	23.0	19.0	24.0	18.0	24.0	26.0	22.0	25.0	28.0	24.0	24.3	20.4	19.7	100.0
Bram3	30.0	28.0	24.0	17.0	22.0	19.0	21.0	22.0	18.0	20.0	24.0	21.0	22.2	18.6	18.0	100.0
Pet1		18.0	22.0	19.0	23.0	23.0	18.0	17.0	17.0	19.0	21.0	19.0	19.6	16.5	15.9	91.7
Au 1a	35.0	26.0	36.0	34.0	30.0	21.0	24.0	29.0	25.0	29.0	26.0	28.0	28.6	24.0	23.2	100.0
Au 1b	36.0	26.0	37.0	34.0	31.0	19.0	22.0	28.0	24.0	28.0	26.0	28.0	28.3	23.7	22.9	100.0
Au 1c	35.0	30.0	32.0	35.0	30.0	19.0	22.0	26.0	25.0	28.0	25.0	27.0	27.8	23.4	22.5	100.0
Dun1	37.0	35.0	25.0	34.0	24.0	18.0	30.0	36.0	33.0	34.0	32.0	33.0	30.9	26.0	25.0	100.0
Dun2	29.0	15.0	17.0	16.0	22.0	21.0	17.0	15.0	16.0	16.0	19.0	18.0	18.4	15.5	14.9	100.0
Blank	3.0	3.0	3.0		4.0	6.0	5.0		7.0	4.0	3.0	3.0	4.1	3.4	3.3	83.3

## Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

### QA/QC of Diffusion Tube Monitoring

During 2015 the diffusion tubes were prepared and analysed by Lambeth Scientific Services (LSS) using the 50% TEA in Acetone method. LSS participate in the AIR NO<sub>2</sub> PT scheme. This scheme forms an integral part of the UK NO<sub>2</sub> Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). In AIR NO<sub>2</sub> PT rounds AR001, 3, 4, 6, 7, 9 and 10, LSS did not achieve consistent scoring with two rounds achieving just 25% and 50%.

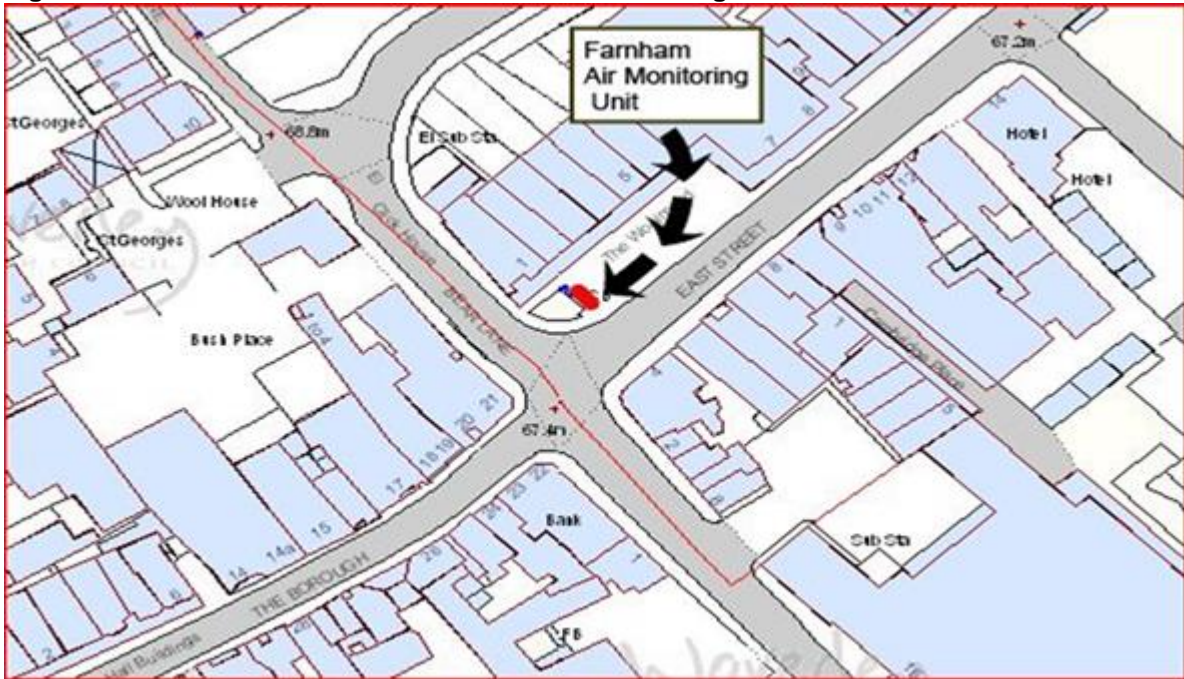
Waverley Borough Council's diffusion tube network consists of 52 tubes placed in relevant locations including roadside, kerbside and urban background. Additionally there are three tubes co-located at the analyser stations at both Godalming and Farnham, and this allows WBC to determine the local bias correction factor. The tubes are changed on a monthly basis and compared to the detailed data collected by the adjacent analyser station. The results are collated over a twelve month period to determine the annual mean concentration.

### Discussion of Choice of Factor to Use

The local co-location study produces a similar but slightly higher verification factor than the national factor (0.84 v 0.81), and is consistent with the factors that have been used in Waverley in the past and is more precautionary. However, in this case the factors are too similar to have changed the number of exceedances experienced within this twelve month period.

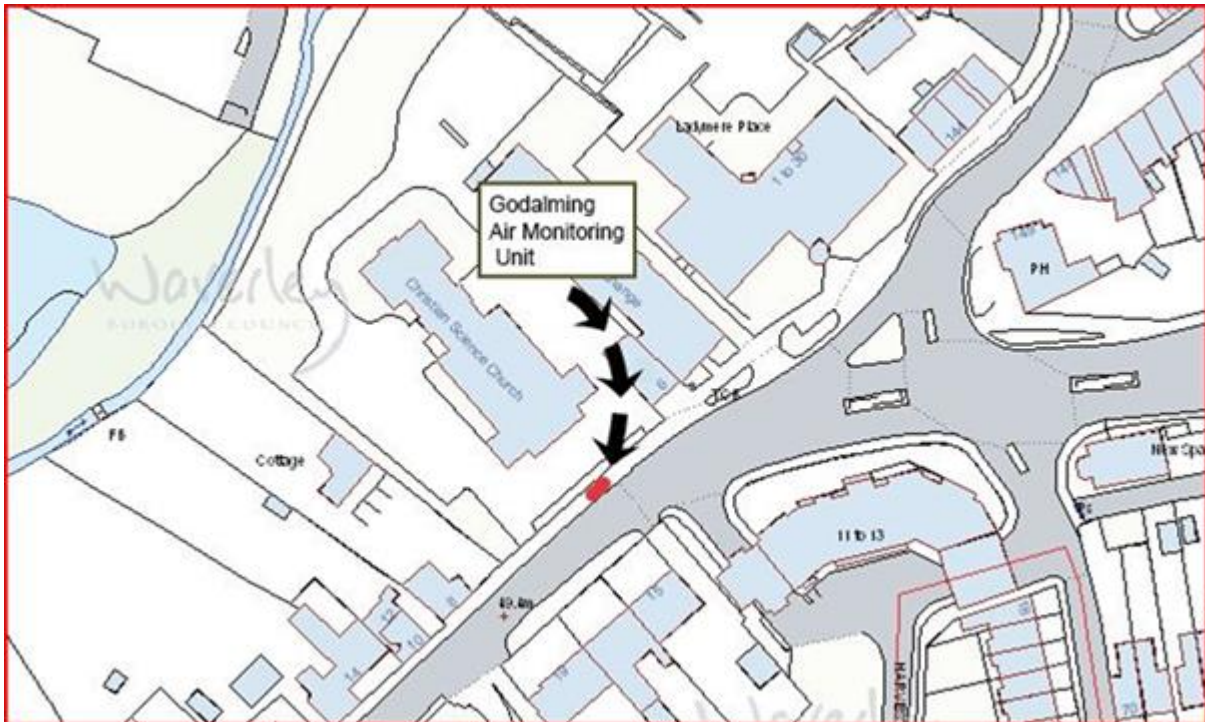
## Appendix D: Map(s) of Monitoring Locations

Figure 2.1 Location of the Farnham automatic monitoring station.



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Figure 2.2 Location of the Godalming automatic monitoring station.



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## Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective <sup>4</sup>	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m <sup>3</sup>	Annual mean
Sulphur Dioxide (SO <sub>2</sub> )	350 µg/m <sup>3</sup> , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m <sup>3</sup> , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	15-minute mean

<sup>4</sup> The units are in microgrammes of pollutant per cubic metre of air (µg/m<sup>3</sup>).

## Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
PM <sub>10</sub>	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM <sub>2.5</sub>	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO <sub>2</sub>	Sulphur Dioxide
...	...