2016 Air Quality Annual Status Report (ASR)

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

January 2018

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Executive Summary: Air Quality in Our Area

The summary is designed to provide an overview for people who reside and work within the area of Runnymede Borough Council as to the air quality that was present within the Borough during 2016. It is worthy of note that the report deals with 2016 and takes no specific account of the Air Quality Plan for nitrogen dioxide in the UK 2017. The report also provides detail of how the issue of air quality is being addressed within the Borough and the intentions of the Council in determining any future action.

The main conclusions of the report are the following;-

1. Consideration is being given to air quality modelling of the Borough with a view to determine what action can be taken in relation to the current existing air quality management areas.
2. Air quality within the Borough has generally seen a slow decline in nitrogen dioxide levels across the Borough over the time period that the Council has been monitoring the levels of nitrogen dioxide.
3. When directly comparing the air quality of 2016 to 2015 then the air quality situation within the Borough has remained fairly static since some monitoring points have shown a slight decrease in levels and other monitoring points have shown a slight increase.
4. The levels of nitrogen dioxide are in the main generated by vehicular transport and problems can occur due to stationary traffic and congestion. It was interesting to note that when obvious and significant signage was placed out at a level crossing requesting drivers to turn their engines off while waiting for the barriers to lift then this seems to have produced a positive result in that there was a decrease of 1.9 $\mu g/m^3$.
5. A “watching brief” to be maintained in relation to an area adjacent to a road junction controlled by traffic lights in Chertsey due to the measured levels of nitrogen dioxide being close to the air quality objective at residential properties.

Air Quality in Runnymede Borough Council

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[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

Previous Review and Assessments have concluded that concentrations of carbon monoxide, benzene, 1,3-butadiene, lead, sulphur dioxide and PM_{10} are compliant with the relevant objectives.

Air Quality Management Areas (AQMAs) have however been declared at two locations for exceedances of the annual mean nitrogen dioxide objective, namely adjacent to the M25 and at a traffic light controlled junction in Addlestone town centre.

Monitoring carried out in 2014 confirmed that nitrogen dioxide concentrations adjacent to the M25 AQMAs in Egham at the Pooley Green railway level crossing were above the air quality objective at relevant locations and as a result the M25 AQMA was extended to include the area near to the level crossing. Hence in 2015 the department's available resource for air quality at that time was dedicated to declaring an extension of the AQMA.

At the AQMA in Addlestone town centre, the general trend tends to indicated a slight decrease in nitrogen dioxide concentrations at locations that are located within the AQMA. However, it is interesting to note that at the traffic light controlled junction at the centre of the AQMA where there is a monitor located on the façade of a residential premise, which continues to indicate a level above the air quality objectives. The monitoring in 2016 has shown that just outside of the defined

[1] Environmental equity, air quality, socioeconomic status and respiratory health; a linkage analysis of routine data from the Health Survey for England , 2005
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

Addlestone AQMA at a junction with a mini-roundabout then the monitor located on the pavement shows nitrogen dioxide levels slightly in excess of the objectives. However, once consideration of the exposure at residential properties then the levels are below the objective. Hence it is suggested that monitoring of the area in and around the Addlestone AQMA is still playing an important function in order to obtain a complete picture of nitrogen dioxide levels in and around the Addlestone AQMA.
At a busy roadside junction, controlled by traffic lights, in Chertsey it has been shown that there were exceedances in the air quality objective at the kerbside, however once distance correction factors were applied then the closest residential accommodation was within the objective limits. The Council is keeping a "watching brief" at this site and should the situation worsen then an AQMA would be declared.
This Annual Status Report has not identified any significant new emissions sources within the Borough.

Actions to Improve Air Quality

Consideration of how to improve air quality have been included in the Council's approved Air Quality Action Plan and has included such measures as consideration for planning applications within or near the Borough's Air Quality Management Areas. For example a planning application (RU.15/1538) approved in January 2016 contained conditions in relation to air quality requirements due to the fact that the development was within the defined Addlestone AQMA. The proposal was for the conversion of commercial premises into flats. Windows fronting the road were sealed and a mechanical ventilation system drawing air from the rear of the property was used to provide whole house ventilation. Electrically powered heating, hot water and cooking was provided to the flats.
Runnymede Borough Council monitors local air quality through an extensive diffusion tube monitoring network within the Borough.
Runnymede Borough Council, together with the other ten Surrey Local Authorities and representatives from Surrey County Council and Public Health England, have established the Surrey Air Alliance which aims to coordinate certain actions to reduce air pollution within Surrey and the is commissioning a modelling exercise of air pollution with emphasis on nitrogen dioxide and particulate matter. Surrey Air Alliance has recommended action on the introduction of emission standards for taxis countywide.

Since 2014 the Council has enlarged an existing AQMA in the Egham area. In March 2016 large banner signs were located on lampposts on the approaches to the railway level crossing requesting drivers to switch off their engines whilst waiting at the railway level crossing.

Figure 1 – Picture of signage erected at level crossing - Egham

A comparison of the nitrogen dioxide results measured during the year period prior to the signs installation was made with the results of the corresponding period when the signs were erected. The results indicate that there was a reduction of 1.9 µg/m^3 when the signs were in place when compared to the results of the previous year(see section 2.2 for more details of the results and findings).

Runnymede Borough Council supported Surrey County Council bid to DEFRA for air quality funding in order to facilitate a consistent approach across the county in relation to consideration of an electric charging network. Unfortunately the bid for grant aid from DEFRA, was not successful.

Conclusions and Priorities

An aim is to carry out modelling to generate a current picture of air quality not only within the Borough but also across the county. Some modelling is to be commissioned through the Surrey Air Alliance Group. Runnymede Borough Council is seeking to commission specific modelling of air quality which will consider the effects of the emerging Local Plan.

Monitoring for nitrogen dioxide is carried out using diffusion tubes at 32 locations within the Borough. This monitoring strategy is periodically reviewed to determine if this approach is still appropriate. Also a view is taken about complaints received relating to air quality and if residents have concerns about a specific area then there is the capacity to either move a diffusion tube or introduce a new site for consideration.

The vast majority of air pollution in the Borough comes from vehicle related emissions. The Borough has two major motorways within its area namely the M25 and the M3. The numbers of road vehicles entering into the Borough and the management of traffic is something which the Borough Council has no direct control of and hence partnership working with the various authorities that have responsibilities for the highways is therefore considered essential.

Local Engagement and How to get Involved

The following information is available on Runnymede Borough Councils website, https://www.runnymede.gov.uk/article/5755/Air-quality

In relation to air quality issues within the Borough;-

- AQMAs within the Borough; areas where there are exceedances of the health bases air quality standards.
- Air Quality Action Plan(AQAP); An action plan in relation to the AQMA and the measures to be adopted in order to reduce effect a reduction in levels of air pollution.
- Copies of previous air quality reports.
- Regularly updated diffusion tube results.

Other areas relating to air quality include

Cycling around Runnymede see https://www.runnymede.gov.uk/article/5172/Cycling-around-Runnymede

Energy in transport and travel see https://www.runnymede.gov.uk/article/5950/Energy-in-transport-and-travel

As the majority of air pollution is associated with traffic, consider alternatives to using a vehicle such as public transport, walking or cycling will help reduce emissions. Further ideas on minimising individuals impact on air quality impact can be found on Surrey County Council's
'Travel Smart' website www.travelsmartsurrey.info/.
When purchasing a new vehicle, consider vehicles with lower exhaust emissions, such as hybrid or electric vehicles, hydrogen fuel cell vehicles, or petrol cars instead of diesel to lower NO_x emissions.
Information on electric cars grants is available at www.gov.uk/plug-in-car-van-grants.
Air pollution impacts on people's health, especially those with heart or respiratory conditions such as asthma and COPD (chronic obstructive pulmonary disease). If residents feel that they wish advice on air quality then they can contact the Environmental Health department. If residents are of the opinion that an area within the Borough is an area where air quality is considered poor and the Council has not already considered/monitored that particular area then consideration can be given to including that area for air quality monitoring especially at locations where there is traffic control in place and large volumes of traffic flows..

Further consideration is being given to Runnymede Borough Council joining the airAlert consortium within Surrey.

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1 Local Air Quality Management

This report provides an overview of air quality in Runnymede Borough Council during 2016. 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 Runnymede 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 compliance with the objectives.

A summary of AQMAs declared by Runnymede Borough Council can be found in Table 2.1. Further information related to declared AQMAs, including maps of AQMA boundaries are available within this report see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s). It should be noted that following the declaration of AQMAs then there is an air quality action plan put in place to ensure that there are measures in place which seeks to reduce levels to be consistently below the air quality objectives. It is suggested that once the Borough wide air quality modelling work is completed then this will provide invaluable data as to the areas adjacent to the M25 which may be considered to be consistently below the nitrogen dioxide objectives. Consideration can then be given to revoking such areas of the AQMA. The AQMA within Addlestone has over the last few years shown slight decreases in levels of nitrogen dioxide at the measuring locations and hence the area is making steady progress toward achieving levels below the objective. It is however interesting to note that in 2016 just outside the AQMA then there was a site on the pavement adjacent to a mini roundabout that was indicating levels above the objective levels. Once there is confidence that levels below the objective are being achieved then steps will be taken to revoke the AQMA.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan (inc. date of publication)
						At Declaration	Now	
AQMA M25	Declared 3/12/2001 Amended 20/10/2015	NO_2 annual mean	Runnymede	Entire length of M25 within the Borough and an extended area in December 2016 to include area in Egham near to railway crossing	Yes	unknown	Greater than 40 at some locations	Runnymede approved air quality action plan April 2014 https://www.runnymede.gov.uk/CHttpHandler.ashx?id=5497&p=0
AQMA Addlestone town	Declared 4/7/2008	NO_2 annual mean	Addlestone	Addlestone town centre traffic light 4 way junction- Brighton Road/Church Road/ Station Road/High Street	No	59 µg/m^3	47 µg/m^3	Runnymede approved air quality action plan April 2014 https://www.runnymede.gov.uk/CHttpHandler.ashx?id=5497&p=0

☒ **Runnymede Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date**

2.2 Progress and Impact of Measures to address Air Quality in Runnymede Borough Council

Defra's appraisal of the previous Annual Status Report concluded that because of ongoing improvements in air quality then Runnymede Borough Council may wish to consider reviewing the air quality monitoring programme in order to check there are no other locations outside the existing AQMA's with exceedances. It was also suggested that consideration could be given towards proceeding to revoke AQMA's when results are consistently below the objectives.

Runnymede Borough Council has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More precise details on these measures can be found within the Council's Air Quality Action Plan 2014;-see

https://www.runnymede.gov.uk/CHttpHandler.ashx?id=5497&p=0

Key completed measures are:

- Consider planning applications near to or within the designated AQMAs to ensure that suitable measures are adopted in relation to air quality(see page iii for example)

Progress on the following measures has been slower than expected due to:

- Highway infrastructure improvements – Liaison with agencies with responsibilities for transportation networks within area over trying to deal with improving the road layout and flow of traffic within AQMA such as the Surrey County Council to try and ensure that any temporary road works to roads adjacent or within the AQMA's then strict conditions are applied to any permit to minimise additional congestion within the AQMA.
- Maintain a close "watching brief" on the nitrogen dioxide levels at Bridge Road /Weir Road Chertsey.
- Continue to input comments in relation to planning applications adjacent to or within the designated AQMAs to ensure that suitable measures are adopted in relation to air quality.

- Consideration of a modelling exercise of target pollutant levels to be carried out in association with the Surrey Air Alliance (to include PM_{10}, $PM_{2.5}$ & NO_2).

- Consider unification of an emissions policy for taxi licencing within all of Surrey to ensure continuity of approach to this matter.

- Supporting SCC with plans and funding bids for the introduction of electric charging points across the County with at least three rapid electric vehicle chargers to be installed at suitable locations within the Borough.

- Three hydrogen refuelling stations located nearby; Cobham Motorway Services, Weybridge and Teddington, hence Runnymede Council is well placed to promote hydrogen fuel cell vehicles due to the availability of hydrogen within the area.

- Consideration of joining the AirAlert scheme.
- Maintain a strong presence within Surrey Air Alliance group.

Cut engine signage at Poole Green Level crossing

In March 2016 signage was installed on lampposts on the approaches to the Pooley Green, Egham, level crossing requesting that drivers switch off their engines while they were waiting for the level crossing barriers to lift due to air pollution concerns. A further sign requesting that drivers switch off their engines while waiting was placed on railway land at the crossing itself.

The period April 2016 to February 2017 was the period when full monthly nitrogen dioxide results were available during the period when the signage was displayed. The levels of pollution from April 2015 to February 2016, when there was no signage displayed, was compared to the period when the signage was displayed.. See table 2.1.A below

Table 2.1.A;- NO_2 results at level crossing with and without signage

Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	ave	bias	result
15/16	35.0	33.0	55	50	48	50	53	53	43	63	45	**48**	**0.97**	**46.6**
16/17	*51*	*46*	*30*	*36*	*47*	*37*	*36*	*51*	*51*	*65*	*68*	**47.1**	**0.95**	**44.7**

It is axiomatic from the results in the above table then the level of nitrogen dioxide has reduced by 1.9µg/m^3. It is suggested that in terms of air quality then overall the year 2016 was similar to the year 2015 since almost 50 percent of the site monitored showed an improvement in air quality whist just over 50% did the opposite. Hence overall then it has been suggested that, in general, there has been no significant improvement or deterioration of air quality year on year. Therefore, it could be suggested that the introduction of signage may have had a beneficial effect at reducing levels of nitrogen dioxide by around 2µg/m^3. Looking further at the results it seems that the summer and autumn months are the months when there was a reduction in the monthly levels when the signage was in place. It maybe that the signage is more prominent in periods when there is more daylight and hence drives may on seeing the signage pay more attention to what is being requested of them?

Also Network Rail were contacted and asked if there are further measures that they could take on their land such as a countdown clock which shows drivers how much longer the barriers are planned to be down but at this stage Network Rail would not be seeking to progress such measures.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Air Quality Action Plan produced and approved by committee	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Runnymede Borough Council		2014	AQAP published			2014	County with 2 tier authority
2	Established Surrey Air Alliance Group Coordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Policy Guidance and Development Control	Regional Groups	Surrey County Council and Surrey Local Authorities	2016	2016 Formation of group				Ongoing	
3	Permitted premises	Environmental Permits	Other measure through permit systems and economic instruments	Runnymede Borough Council			Ensuring that all permitted process operate within control limits			Ongoing	
4	Encourage adoption minimum emissions	Promoting Low Emission Transport	Taxi Licensing conditions/i	Runnymede Borough	2016	2017/18	Reduce tailpipe emissions	yes	Air Quality officers representing	2018	

	standards into taxi licensing procedures		ncentives	Council			in AQMA		the borough/district councils have asked taxi licencing authorities for County wide policy on emissions from taxis		
5	Use of Planning regime to incorporate measures to reduce air pollution	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Runnymede Borough Council	2015	2016		Air quality included in Development Planning			Ongoing
6	County and Borough modelling of key pollutants	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Surrey Air Alliance group	2016	2017	Modelling completed		Estimates obtained- tendering process to be followed	2017/18	
7	support of bid to DEFRA regarding electric vehicle strategy policy officer at SCC-	Promoting Low Emission Transport	Other	Surrey County Council and Surrey Local Authorities	2015	2016	More charging points throughout Surrey(3 per authority)			2017	
8	Extension to AQMA in Egham – erecting of large format signs on lampposts close to level crossing – switch off engines	Public information	Via other mechanisms	Runnymede BC	2015	2016	Signage erected	yes		ongoing	

2.3 $PM_{2.5}$ – 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 $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Given the recent implementation of the Technical Guidance LAQM.TG16 and Policy Guidance LAQM.PG16, Runnymede Borough Council is working towards defining a strategy to reduce emissions or concentration of $PM_{2.5}$. This work is being undertaken in close association with the Director of Public Health at Surrey County Council. It is further expected that the modelling exercises being promulgated will provide incisive and key information on $PM_{2.5}$ to assist with the production of a suitable strategy.

However, existing measures to improve air quality already in place can help reduce levels of $PM_{2.5}$, such as:

- Promoting driver awareness such as prevention of idling vehicles.
- Promoting low emission transport and provision of charging points and hydrogen refilling stations.
- Surrey County Council's Transport Plan (LTP3) and Air Quality Action Plan.

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

Runnymede Borough Council did not undertake any automatic (continuous) monitoring within the Borough during 2016 nor is it planning to introduce continuous monitoring.

3.1.2 Non-Automatic Monitoring Sites

Runnymede Borough Council undertook non- automatic (passive) monitoring of NO_2 at 32 sites during 2016 using diffusion tubes as supplied by Lambeth Scientific Services. Table A..1 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites within the AQMAs and elsewhere in the Borough are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment considerations for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

It should be noted that the air quality monitoring results presented in this section are, where relevant, adjusted for bias and distance correction. “Annualisation” of the areas where sampling collection data was below 75% was not undertaken because of the differential between the objective standard and the level established. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.2 in Appendix A shows the suitably adjusted monitored NO_2 annual mean concentrations for the past 5 years. The air quality objective for annual mean concentration is 40µg/m^3.

For diffusion tubes, the full dataset of monthly mean values is provided in Appendix B.

Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

Since Runnymede Borough Council do not have a continuous monitor then it is difficult to consider in detail the nitrogen dioxide hourly mean concentrations . The air quality objective is 200µg/m^3, not being exceeded more than 18 times per year. However, a comparison between the hourly objective and the annual mean objective can be made. It is understood that an annual mean of greater than than 60µg/m^3, provides an indication that an exceedence of the 1-hour mean objective could be likely at these sites.

Consideration of relevant exceedances

In 2016, following bias correction of the raw data and the application of distance correction then only one location in the Borough was in exceedance of the annual mean objective. See table 3.1 below. Site RY14 is located within the Addlestone AQMA.

Table 3.1 – Annual exceedances

Site number	Reading - bias corrected	Distance correction
RY14	45.6	**45.6**
RY23	42.5	30.5
RY26	44	36.2
RY53	41.5	38
RY56	49.4	37.1

It is noted that for the hourly objective to be exceeded then the annual mean would have to exceed 60µg/m^3. No site within the Borough had an annual mean greater than 60µg/m^3. **Hence there are no sites which exceed the hourly objective limit**. However, it is considered prudent to look at monthly results which exceed 60µg/m^3 . See table 3.2. There were six measured concentrations greater than the equivalent bias corrected levels of 60µg/m^3 in 2016.Since the figure of 0.95 has been used as a bias correction then this equates to an unbiased correct figure of greater than 63µg/m^3 (63.1 x0.95 = 60). It should be noted that all these monthly exceedances greater than 60 µg/m^3 occurred during the winter periods when weather conditions are such that tend to cause an increase in nitrogen dioxide levels. Also most occurred within an already defined AQMA. The other sites outside an AQMA namely

RY23 and RY56 relates to an area in Bridge Street/Weir Road and is an area which is currently under a “watching brief” in that should the air quality deteriorate then an AQMA would be declared.

Table 3.2 – Monthly exceedances >60 µg/m^3

Site number	Month	Level (µg/m^3) -Raw data	With bias (0.95) correction
RY1	December	65	**61.8**
RY14	January	65	**61.8**
RY14	December	64	**60.8**
RY23	December	69	**65.6**
RY25	December	64	**60.8**
RY26	January	63	59.8
RY26	March	63	59.8
RY56	January	68	**64.6**
RY56	March	61	58

When generally comparing 2016 bias corrected levels to 2015 bias corrected levels then it shows that there has been a decrease in levels of nitrogen dioxide at 14 locations, one location remained the same but increases in nitrogen dioxide levels at the other 16 locations. Hence it is suggested that in comparing the last two years then the air quality situation has remained roughly similar. From the graphs produced in appendix A, then these depict that over the past 6 years, between 2011 and 2016, concentrations tend to show a slight overall decreasing trend. Nevertheless it is interesting to consider a site located in the AQMA in Addlestone that has been monitored over the last 16 years indicates that the levels of nitrogen dioxide at that location have remained fairly stable at around 40µg/m^3 throughout the measurement period, which is contrary to the reported national average picture.

Further it was interesting to report that complaints were received from commuters using the New Haw and Byfleet railway station that they were of the view that air quality within the area was poor because it was reported that there was the smell of diesel fumes due to queuing vehicles waiting at the traffic lights to go through the tunnel below the railway line. Monitoring was commenced in May 2016 (see site reference RYMV) and hence after 8 months of data the then it has been ascertained

that the level at the monitoring location was 34.6 µg/m^3 (biased corrected). It should be noted that the level in December was 53 µg/m^3 hence it is foreseeable why commuters would suggest that the air quality needed to be considered further. A full picture of the levels of nitrogen dioxide at this location will be obtained once a full year's worth of data is obtained for the site including which will include the winter levels and reported on in the next Annual Status Report.

3.2.2 Particulate Matter (PM_{10})

PM_{10} is not currently monitored within the Runnymede Borough Council area. However, modelling work for levels of particulate matter within the Borough is being commissioned in order to ascertain, amongst other things, as to whether or not the previous assertions that particulate matter levels do not exceed air quality objectives were correct and to determine if there are potential areas where PM_{10} could actually be in breach of the relevant limits.

3.2.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ is not currently monitored within the Runnymede Borough Council area. However, modelling work for levels of particulate matter within the Borough is being commissioned in order to ascertain ,amongst other things, as to whether or not the previous assertions that particulate matter levels do not exceed air quality objectives were correct and to determine if there are potential areas where $PM_{2.5}$ could actually be in breach of the relevant limits.

3.2.4 Sulphur Dioxide (SO_2)

Sulphur dioxide is not currently monitored within the Runnymede Borough Council area.

Appendix A: Monitoring Results

Table A.1 – 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) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
RY1	Civic Centre, Station Road, Addlestone	Roadside	X 505065	Y 164613	NO2	Y	4	3	N	2.3
RY4	Riverside Sheltered Housing, Pitson Close, Addlestone	Urban B/G	X 505727	Y 164624	NO2	N	7	6	N	2.0
RY8	Ongar Place First School, Milton Road, Addlestone	Suburban (near to M25)	X 504325	Y 163940	NO2	Y	15	21	N	1.9
RY14	1 Church Road, Addlestone	Roadside	X 504991	Y 164601	NO2	N	0	2	N	2.3
RY19	78 Woodham Lane, New Haw	Roadside	X 505227	Y162701	NO2	Y	8	2	N	2
RY21	London Street/Heriot Road junction, Chertsey	Roadside	X 504261	Y 166945	NO2	N	2	1	N	2
RY23	37 Bridge Road, Chertsey	Roadside	X 504888	Y 166786	NO2	N	14	1	N	2.2

RY25	1 Pooley Green Road, Egham	Roadside	X 501748	Y 171316	NO2	Y	7	13	N	2.3
RY26	Railway crossing, Vicarage Road, Egham	Roadside	X 501716	Y 171383	NO2	Y	6	2	N	2.2
RY33	46 The Avenue, Egham	intermediate	X 501679	Y 171676	NO2	Y	5	15	N	2.1
RY34	St Judes Rd Englefield Green	roadside	X501	Y17	NO2	N	1	1	N	2.3
RY39	Chobham Lane, Longcross, near Kitsmead Lane roundabout	Roadside	X 498827	Y 166217	NO2	N	New houses building in 2017	10	N	1.8
RY40	Homewood Park, Stonehill Road	Urban B/G	X 502052	Y 165313	NO2	N	N/A	68	N	2.5
RY43	114 Chertsey Cl (opp Langton Cl) Addlestone	Roadside	X 505000	Y 165339	NO2	N	10	2	N	2.3
RY44	87 Church Rd Addlestone	Roadside	X 504621	Y 164434	NO2	N	4	2	N	2.4
RY45	27/29 Weir Rd Chertsey	Roadside	X 504842	Y 166648	NO2	N	5	2	N	2.3
RY52	12 Thorpe Road, Egham	Roadside	X 503011	Y 171333	NO2	N	3	2	N	2.3
RY53	1-22 Wyvern Place, High St,	Roadside	X 504959	Y 164778	NO2	Y	2	2	N	2.4

	Addlestone									
RY54	23 Brighton Road, Addlestone	Roadside	X 505036	Y 164554	NO2	Y	5	2	N	2.3
RY55	158 Station Road, Addlestone	Roadside	X 505589	Y 164844	NO2	N	2	0.2	N	2.3
RY56	34/36 Bridge Road Chertsey	Roadside	X 504911	Y 166766	NO2	N	8	1	N	2.3
RY57	Opposite Knightsmead, on Bridge Road, Cherstey	Roadside	X 504826	Y 166819	NO2	N	8	2	N	2.3
RY58	39 Weir Road. Chertsey	Roadside	X 504859	Y 166701	NO2	N	6	2	N	2.3
RY59	12 Thorpe Road Egham	Roadside	X 503011	Y 171333	NO2	N	3	1	N	2.3
RY60	Renaissance flats, High Street Addlestone	Roadside	X 504970	Y 164800	NO2	Y	2	2	N	2.4
RY61	Pine Court, Addlestone	Roadside	X 504907	Y 164556	NO2	N	2	2	N	2.4
RY62	26/28 Brighton Road Addlestone	Roadside	X 505082	Y 164431	NO2	N	3	2	N	2.3
RY63	Garfield Road, Middlesex Court Addlestone	Roadside	X 505248	Y 164518	NO2	N	4	2	N	2.5
RY64	Garfield Road, opposite	Roadside	X 505252	Y 164399	NO2	N	6	1	N	

	Marnham Place Addlestone									2.3
RY65	268 Station Road Addlestone	Roadside	X 505803	Y 165037	NO2	N	4	2	N	2.3
RY66	223 Station Road, Addlestone	Roadside	X 505703	Y164953	NO2	N	7	2	N	2.3
RYMV	Westfield Byfleet Road (Byfleet train station)	Roadside	X505798	Y162303	NO2	N	6	2	N	2.3

Notes:

(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.2 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2016 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2012	2013	2014	2015	2016
RY1	Roadside	Diffusion Tube	100	92	**40.4**	39.5	35	39	39.5
RY4	Urban Background	Diffusion tube	100	100	19.5	26.1	19.6	19.6	22.7
RY8	Roadside	Diffusion Tube	100	83	20.7	28.9	25.5	35.1	24
RY14	Roadside	Diffusion Tube	100	100	**54.9**	**54**	**48.2**	**48.6**	**45.6**
RY19	Roadside	Diffusion Tube	100	92	36.7	**43.9**	37.3	34.3	33.7
RY21	Roadside	Diffusion Tube	100	92	36.1	36.8	31.5	32.1	35.9
RY23	Roadside	Diffusion Tube	100	83	**51.7**	**49.4**	36	**42.2**	**42.5**
RY25	Roadside	Diffusion Tube	100	**67**	36.4	33.6	31.6	28.2	30.6
RY26	Roadside	Diffusion Tube	100	100	**57.5**	**53.8**	**53.9**	**41**	**44**
RY33	Roadside	Diffusion Tube	100	92	36.8	37.7	36.6	32.4	30.6
RY34	Roadside	Diffusion Tube	100	75	31.2	30.8	31.1	25.1	24.9
RY39	Roadside	Diffusion Tube	100	83			26.9	25.1	25.7
RY40	Roadside	Diffusion Tube	100	92			17.7	17	16.9
RY43	Roadside	Diffusion Tube	100	92			27.4	34.5	35.2
RY44	Roadside	Diffusion	100	100			15.3	23.3	29.3

		Tube							
RY45	Roadside	Diffusion Tube	100	92			31.6	37.2	33.3
RY52	Roadside	Diffusion Tube	100	92			31.3	34.	30
RY53	Roadside	Diffusion Tube	100	100	**51.1**	**48.6**	38.4	39.2	**41.5**
RY54	Roadside	Diffusion Tube	100	100	37.7	37.9	32.7	36.4	33.4
RY55	Roadside	Diffusion Tube	100	100	34.5	38.8	36.2	35.9	34.1
RY56	Roadside	Diffusion Tube	100	75			**48.4**	**48.7**	**49.4**
RY57	Roadside	Diffusion Tube	100	82			31.5	36.7	30.8
RY58	Roadside	Diffusion Tube	100	92			35.2	33.4	31.7
RY59	Roadside	Diffusion Tube	100	100			31.2	34	34
RY60	Roadside	Diffusion Tube	100	100			32.6	38.8	36.3
RY61	Roadside	Diffusion Tube	100	92					32
RY62	Roadside	Diffusion Tube	100	92					32.7
RY63	Roadside	Diffusion Tube	100	**67**					22.5
RY64	Roadside	Diffusion Tube	100	100					25.5
RY65	Roadside	Diffusion Tube	100	100					26.1
RY66	Roadside	Diffusion Tube	100	100					28.7
RYMV	Roadside	Diffusion Tube	100	88					34.6

☒ **Diffusion tube data has been bias corrected**

☐ **Annualisation has been conducted where data capture is <75%**

☒ **If applicable, all data has been distance corrected for relevant exposure**

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 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.

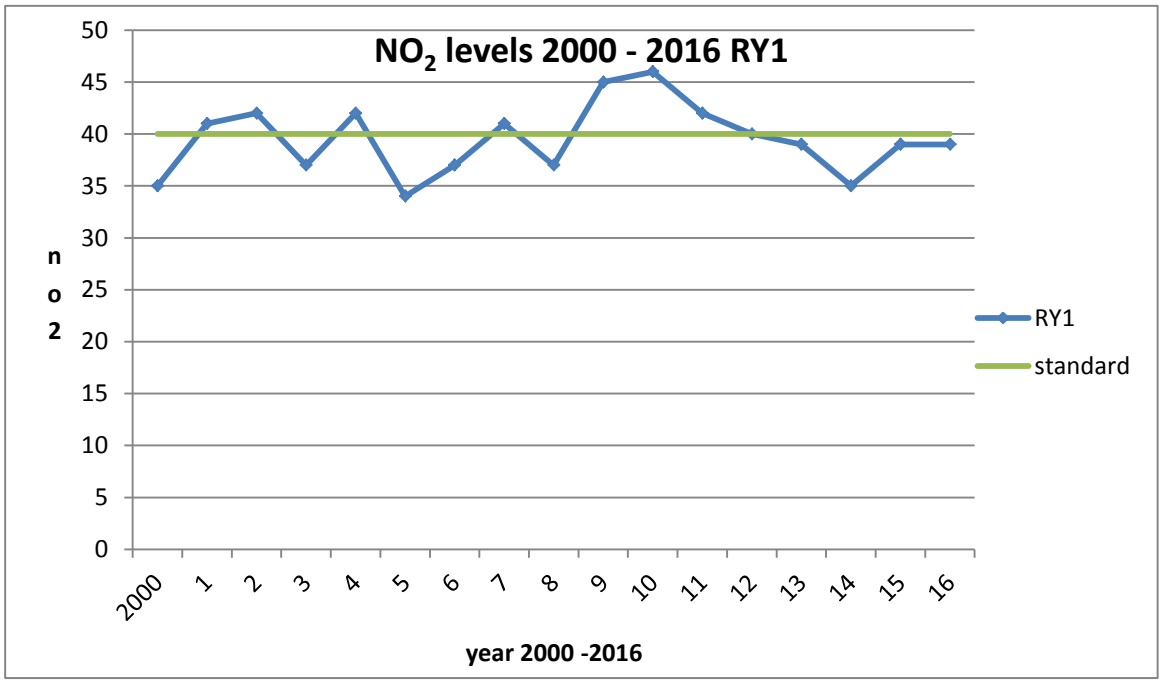
(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

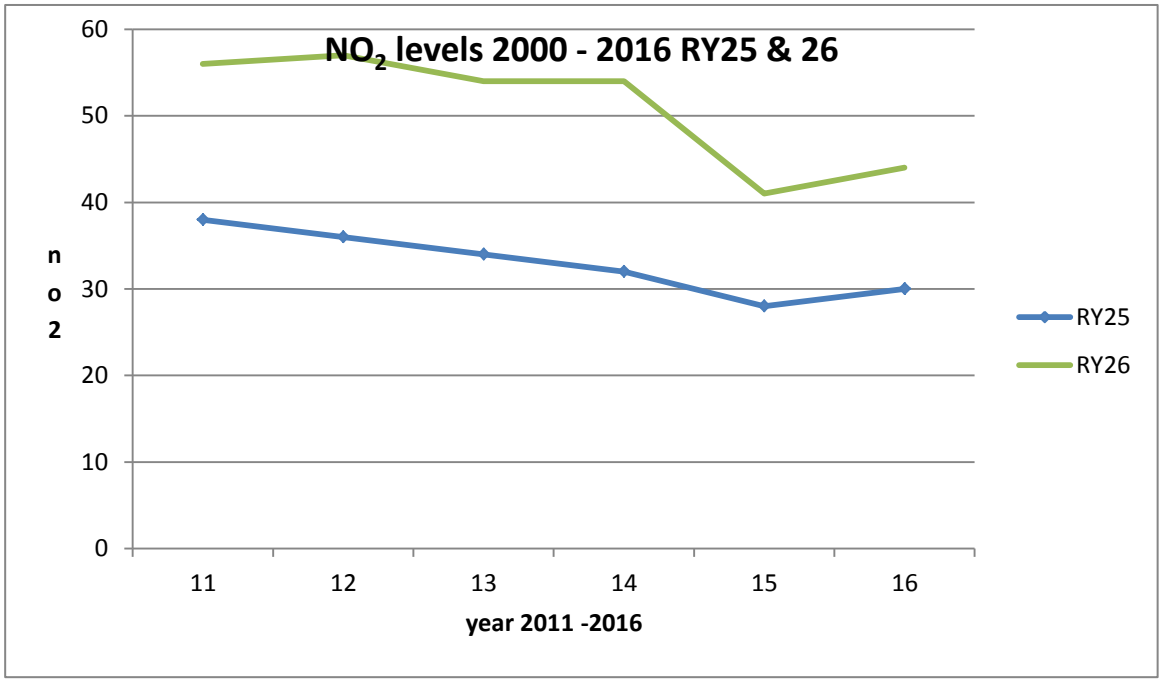
Figure A.1 – Graphical trends in Annual Mean NO_2 Concentrations

Graphs data sets; bias adjusted levels at the point of data collection

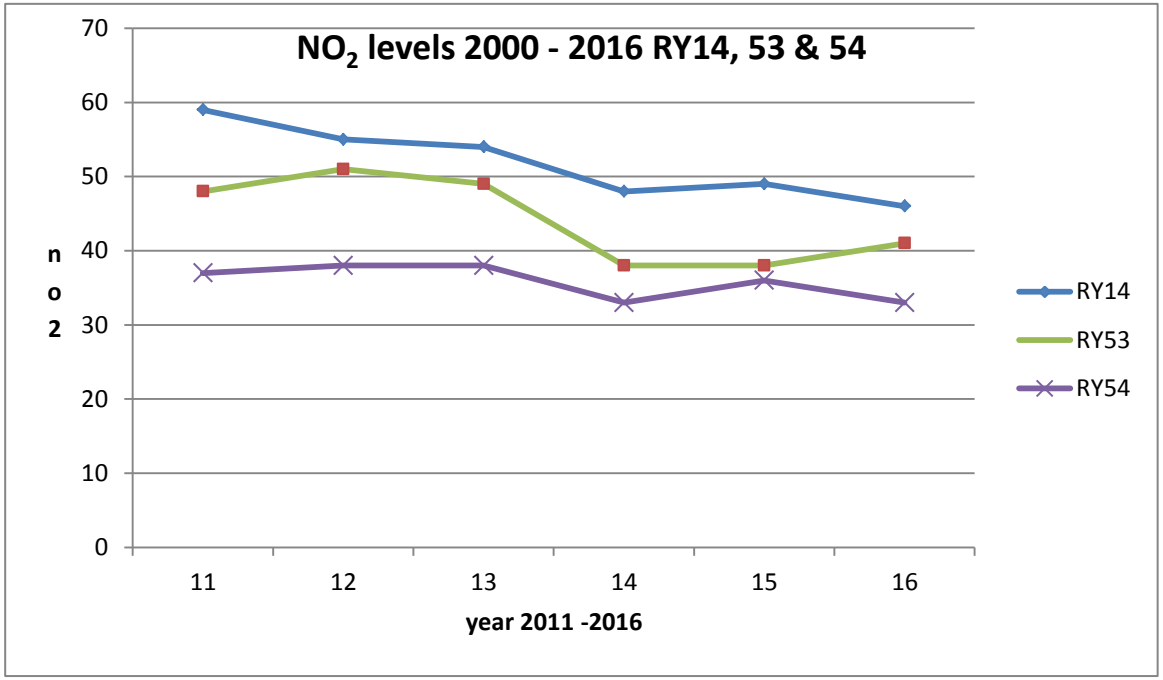
Graph of site RY1 – long term trend in Addlestone



Graph sites RY25 and RY26;- Pooley Green level crossing AQMA



Graph of RY14, RY,53 & RY54 – Addlestone AQMA



Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2016

Site ID	NO_2 Mean Concentrations (µg/m^3)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (factor) (1)	Distance Corrected to Nearest Exposure (2)
RY1	tm	34	53	28	**43**	**41**	38	32	36	40	48	**65**	41.6	39.5	35.2
RY4	27	24	27	19	17	20	20	14	19	31	33	36	23.9	22.7	22.6
RY8	tm	24	32	22	24	26	tm	16	11	35	23	40	25.3	24	22.9
RY14	**65**	**47**	**48**	**41**	38	**45**	**43**	36	37	**59**	**53**	**64**	**48**	**45.6**	**45.6**
RY19	**44**	36	34	31	30	28	30	27	tm	38	**41**	**52**	35.5	33.7	29.3
RY21	**45**	35	**48**	32	27	33	28	31	tm	**50**	**42**	**45**	37.8	35.9	33.7
RY23	**48**	39	**55**	tm	35	38	36	41	34	tm	**53**	**69**	44.8	**42.5**	30.5
RY25	tm	33	tm	tm	tm	19	17	29	20	35	**41**	**64**	32.2	30.6	28.7
RY26	**63**	**45**	**63**	**51**	**46**	30	36	**47**	37	36	**51**	**51**	46.3	**44**	36.2
RY33	**42**	29	37	32	31	32	28	19	22	tm	35	**47**	32.2	30.6	35.8
RY34	tm	tm	tm	26	28	16	16	19	23	34	30	**44**	26.2	24.9	23.8
RY39	39	30	tm	21	25	24	tm	22	24	22	25	39	27.1	25.7	24.2
RY40	22	13	39	14	15	14	12	12	9	tm	19	27	17.8	16.9	N/A
RY43	**45**	32	21	39	**43**	39	37	31	31	**43**	**47**	tm	37.1	35.2	28.8
RY44	**41**	**43**	**51**	22	16	15	17	25	16	31	**41**	**53**	30.9	29.3	26.9

RY45	**43**	24	36	**42**	31	tm	27	32	27	36	38	**50**	35.1	33.3	29.4
RY52	**42**	31	**45**	26	37	tm	17	19	18	35	30	**48**	31.6	30	27.9
RY53	**55**	**50**	**48**	40	**51**	**43**	39	24	25	**46**	**50**	**53**	43.7	**41.5**	38.0
RY54	**43**	37	**43**	39	35	23	21	30	26	36	36	**54**	35.2	33.4	29.5
RY55	**50**	**42**	**41**	34	27	29	25	28	28	40	**43**	**44**	35.9	34.1	29
RY56	**68**	**46**	**61**	**47**	**50**	**55**	tm	**53**	40	**48**	tm	tm	**52**	**49.4**	37.1
RY57	**46**	34	**42**	26	27	30	30	27	30	tm	tm	tm	32.4	30.8	27.3
RY58	**42**	40	35	37	30	30	26	29	21	37	**41**	tm	33.4	31.7	27.9
RY59	36	37	**44**	31	35	27	26	22	34	**43**	**46**	**49**	35.8	34	30.1
RY60	**47**	38	39	25	35	35	26	36	27	**47**	**44**	**59**	38.2	36.3	33.7
RY61	**44**	32	40	33	33	27	31	21	27	40	tm	**43**	33.7	32	30.1
RY62	**45**	**42**	**47**	31	tm	27	3	21	tm	40	39	**49**	34.4	32.7	30
RY63	33	26	37	23	21	1	tm	tm	15	tm	34	tm	23.7	22.5	21.9
RY64	37	30	28	24	23	22	22	18	16	32	29	**41**	26.8	25.5	23.3
RY65	**41**	32	36	25	17	14	17	21	16	36	33	**42**	27.5	26.1	24.
RY66	36	31	40	25	26	23	21	29	21	33	31	**47**	30.2	28.7	25.9
RYMV					39	25	tm	29	24	**45**	40	55	36.2	34.6	30.5

☒ National bias adjustment factor used – see below for further information on selection of bias correction factor

Notes:

Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant residential or public exposure.

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

Diffusion Tube Bias Adjustment Factors

Runnymede's diffusion tubes are supplied by Lambeth Scientific Services Limited. 50% triethanolamine (TEA) solution is the absorbent used to prepare the tubes.

The bias adjustment factor applied is a combined bias adjustment factor derived from the national database of co-location studies, available from the LAQM Support Website.
The selection of bias correction factors play an important part in relation to air quality. Currently there is much local debate over the selection of such criterial factors. The bias correction factors that have been used since 2000 are produced below in table C.1

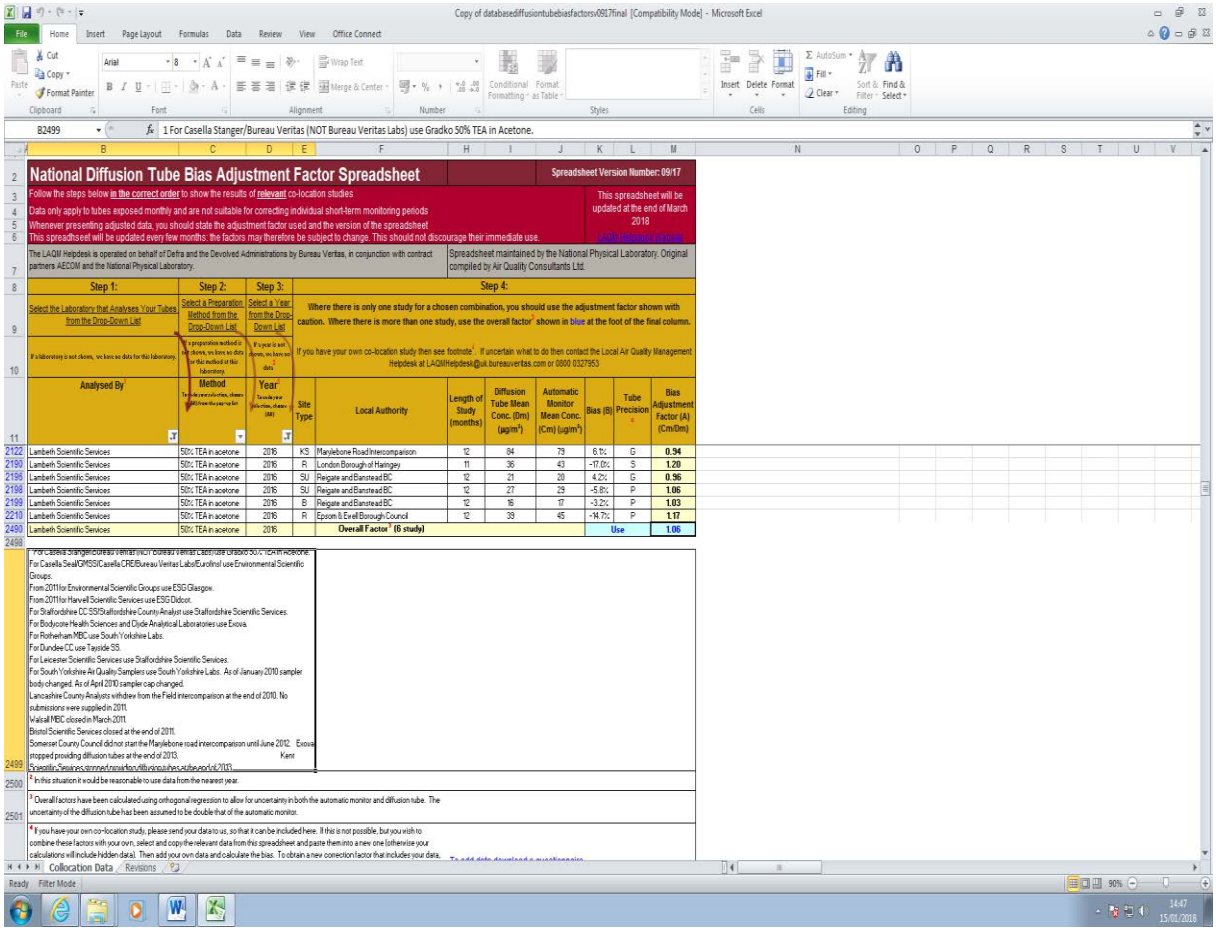
Table C.1 Diffusion Tube Bias Adjustment Factors, 2000-2016

Year	Bias Adjustment Factor
2000	0.97
2001	1.09
2002	1.15
2003	1.05
2004	1.19
2005	1.24
2006	1.28
2007	1.07
2008	0.98
2009	1.03
2010	1.06
2011	1.06
2012	0.87
2013	0.83
2014	0.89
2015	0.97
2016	0.95

Bias correction factor 2016 = 0.95

Considerations used for the selection of 2016 bias correction factor;-

Figure C.1 -Screenshot of national website bias correction factors



It should be noted that two results, one from Reigate and Banstead Borough Council, and another from the Government's inter-comparison at Marylebone Road site were selected from the national database in order to produce the best quality bias correction factor.

The result from The London Borough of Haringey was posted on the national website following the use of single diffusion tube co-located with their continuous analyser. However, since there were no other single tube results posted on the national website which could have resulted in a statistically averaging of single co-located tubes hence an individual result using a single tube may not be considered fully significant since it does not strictly comply with the required methodology of 3 diffusion tubes co-located. Two other results from Reigate and Banstead Borough Council indicated that the precision of the tube data were classified as "poor". A

further result posted by Epsom and Ewell Borough Council also classified as “poor” precision.

Precision versus accuracy is detailed within DEFRA web site and it states “*where results show poor precision then they should be treated with caution and may not be suitable for their intended purpose” . the aim should be to use results from tubes that are giving “good” precision as this will improve the overall reliability of the annual mean concentrations derived from the diffusion tubes*”.

Hence in selecting the bias correction factor for 2016 then the best quality data is sought and hence only the sites which could provide “good” precision and have followed the required methodology were used to work out a “robust” bias correction factor. ((NB good precision is where the coefficient of variance(CV) of multiple exposed tubes collated with a continuous monitor for eight or more period during the year is less than 20% and the average CV of all monitoring periods is less than 10%). Two data points were used in order to provide what could be arguable be the most robust a bias correction factor using the best quality information available. Thereafter orthogonal regression was performed on the data set using the approximating methodology for orthogonal regression as detailed by DEFRA.

Tube precision “good” for two posted results

Site	**average**	**bias**
1. Reigate and Banstead Borough Council	0.94	6.1%
2. Marylebone Road inter-comparison site	0.96	4.2%

Averaging the bias correction factors 6.1 + 4.2 = 10.3/2 = 5.15

5.15 expressed as a factor = 0.0515

Add 1 to averaged factor. 1+ 0.0515= 1.0515

Inversion of the resultant sum = 1/1.0515 = 0.95

Bias correction factor to be applied to 2016 data = **0.95**

Annualisation

No annualisation was undertaken on the diffusion tubes results (2 locations) which had less than 75% capture due to the fact that there was a significant differential between the objective standard and the results. Hence time and effort to obtain annualisation data was not considered appropriate in these circumstances

QA/QC of diffusion tube monitoring

Nitrogen dioxide

Laboratory Performance and WASP scheme

Lambeth Scientific Services Limited follows the procedures set out in the Harmonisation Practical Guidance and participates in the WASP scheme operated by the Health and Safety Laboratory.

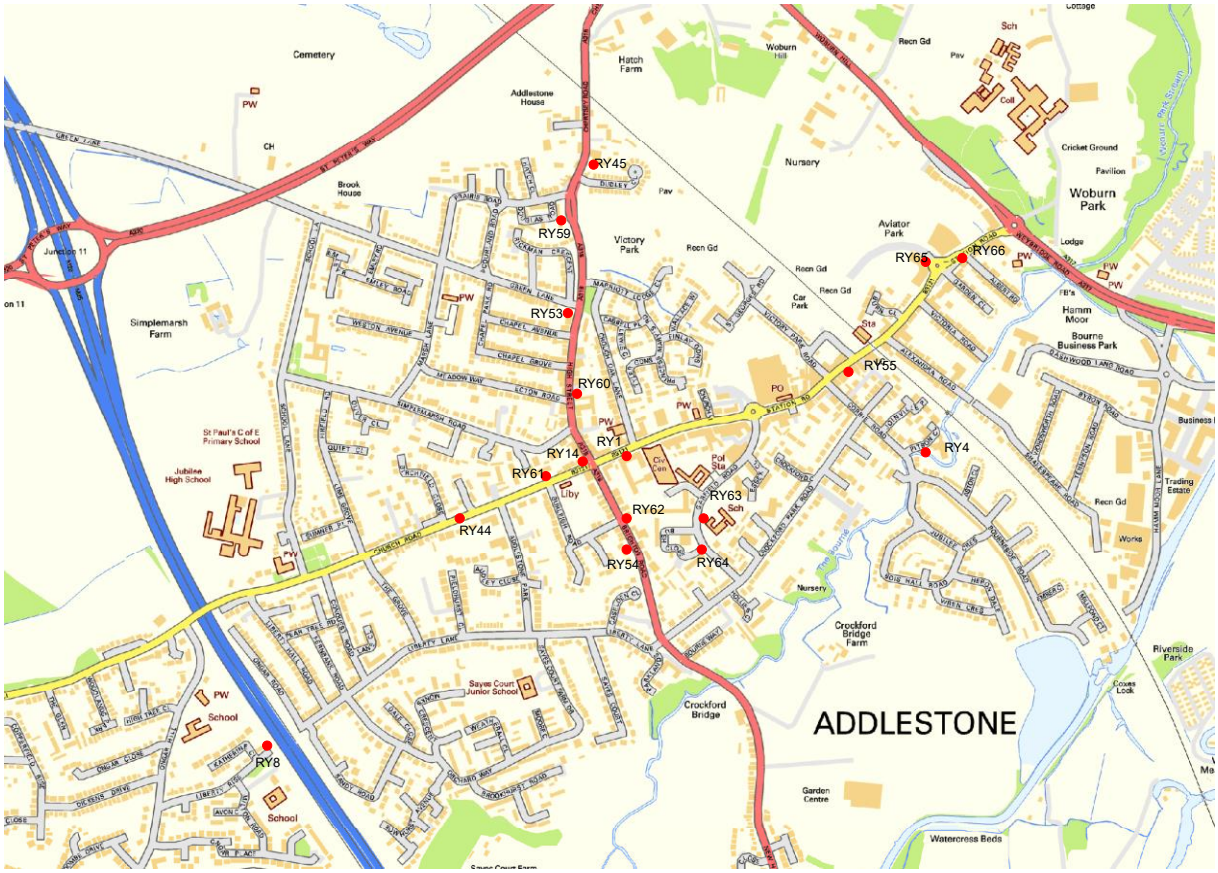
Nitrogen dioxide fall-off with distance

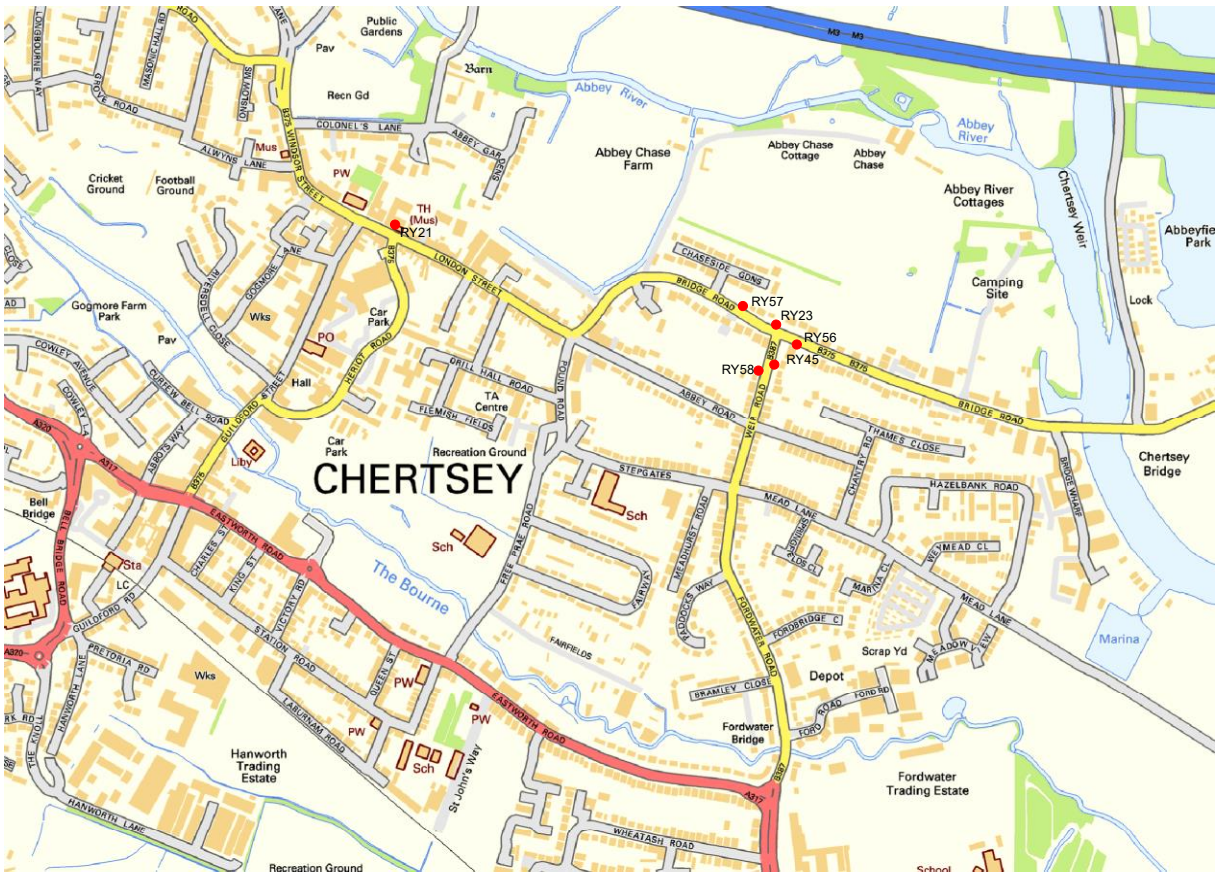
Site number RY56- Bridge Street Chertsey

Use of DEFRAs on-line nitrogen dioxide fall-off with distance calculator – version v4.1 released 2016.

Appendix D: Map(s) of Monitoring Locations and AQMAs

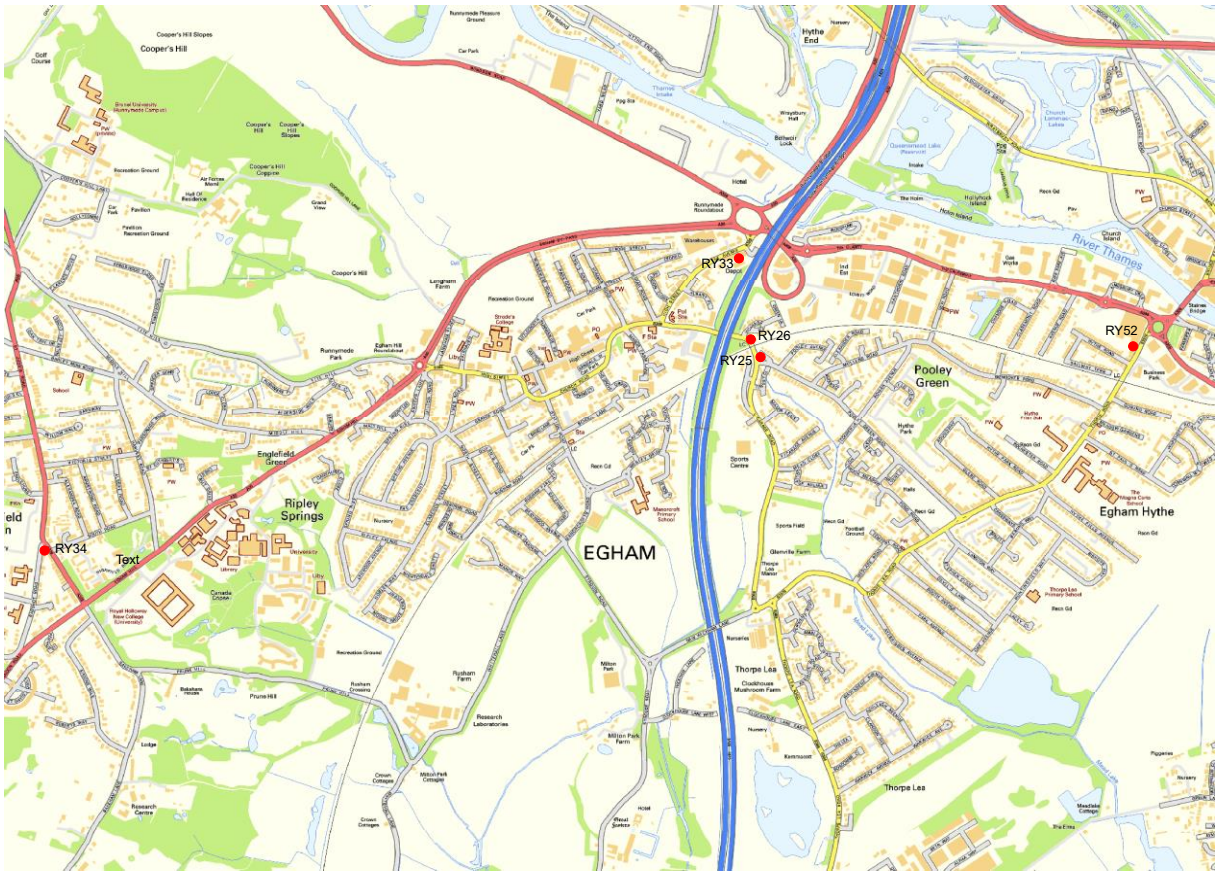
Map of monitoring points in and around Addlestone AQMA

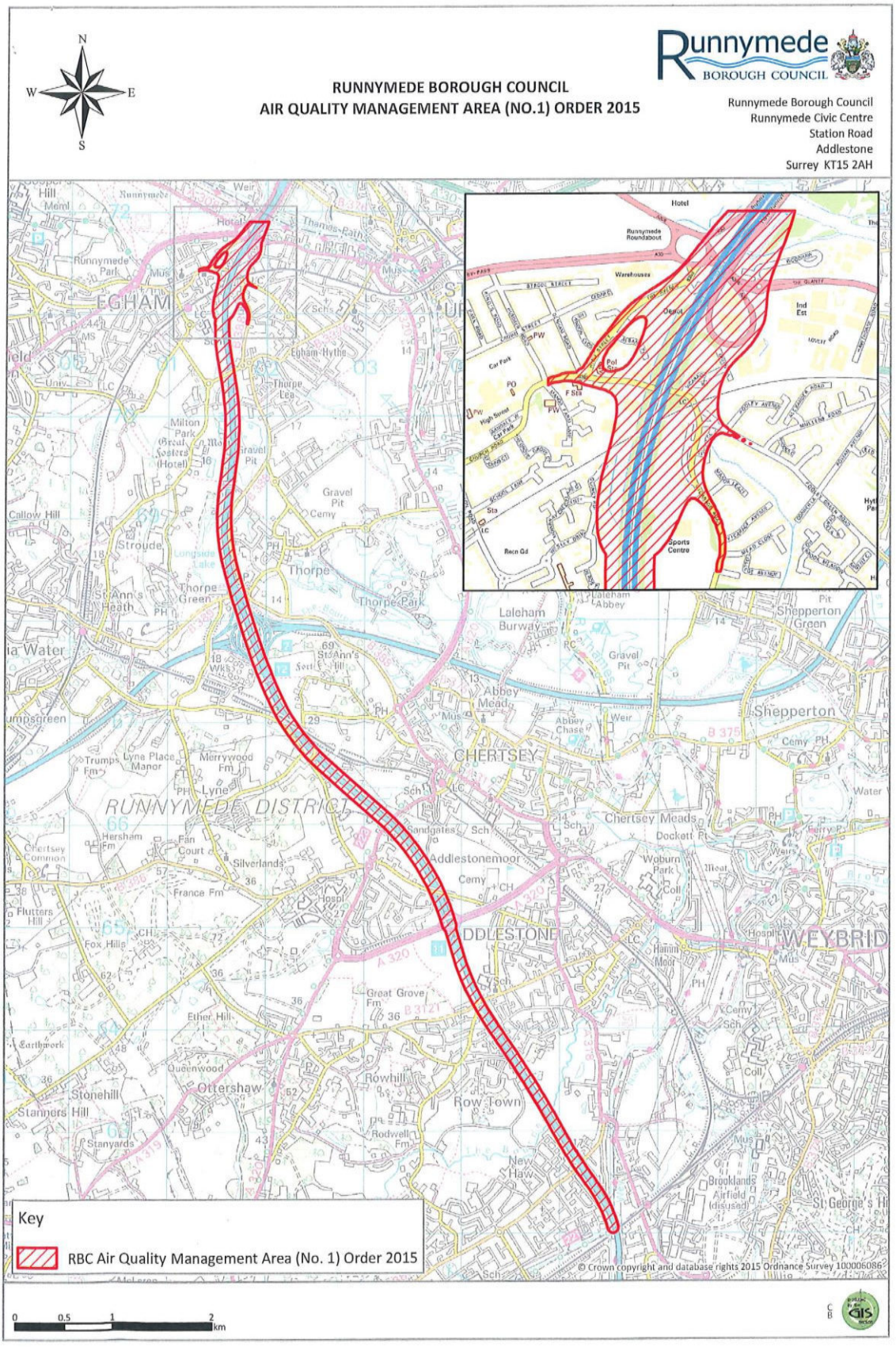




Map of monitoring locations at Weir Rd / Bridge Rd

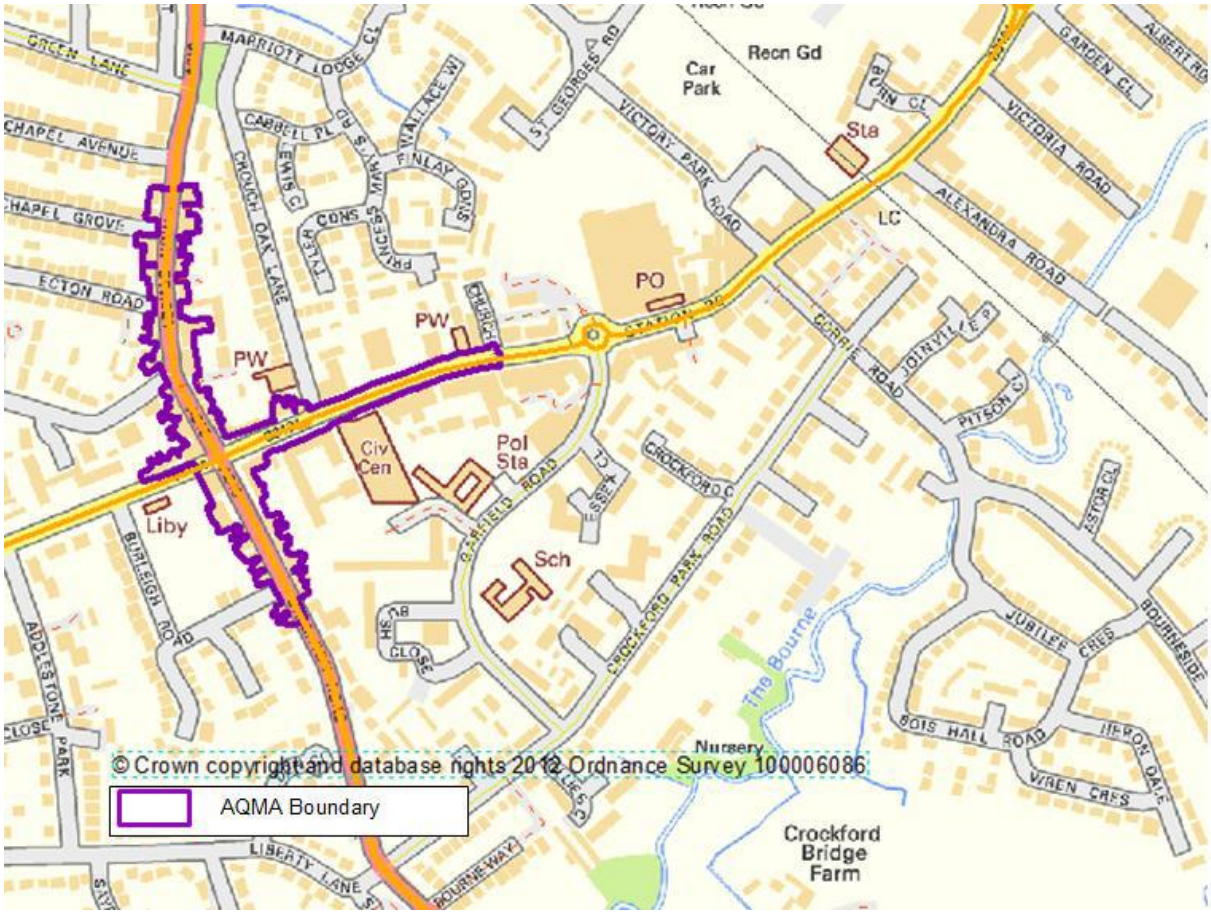
Map of monitoring locations in Egham





M25 + Egham extension - AQMA

Map of Addlestone AQMA



Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[4] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

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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_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
…	…

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