2020 Air Quality Annual Status Report (ASR)

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

July 2020

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Executive Summary: Air Quality in Our Area

Air Quality in Epsom and Ewell

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].

In common with much of the region, the principle pollutant of concern in Epsom and Ewell is nitrogen dioxide arising from road transport. The other potentially relevant pollutants contained within the national air quality strategy have long been screened out. In response to a local hotspot in Ewell High Street, the Council declared an Air Quality Management Area (AQMA) in 2007 and modified the boundary in 2011. Details on the Ewell High Street AQMA can be found here https://uk-air.defra.gov.uk/aqma/details?aqma_ref=508. An action plan to begin to take measures to improve air quality and reduce exposure was subsequently developed, consulted on and delivered to the extent that was possible. It is recognised that work to improve air quality depends on close cooperation with other Epsom & Ewell Borough Council (EEBC), departments such as planning and partner agencies. In particular the two tier working arrangements in this area require the local highways authority, Surrey County Council to be involved with air quality matters. This is now achieved through the Surrey Air Alliance – a collaborative group of all councils in Surrey.

Within the Borough, a gradual improvement in air quality has been noted for over a decade which has been aided by no new major transport or industrial related sources of emissions, nor has there been any new AQMA declarations in the past year. However the significant improvement in nitrogen dioxide levels in 2018 was not

[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
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

carried into 2019 confirming the view that 2018 was an unusually favourable year for air quality. These observations are consistent with nearby Local Authority areas who observed a similar pattern.

Alterations to the traffic flow in Epsom town centre as part of 'Plan E' were undertaken in 2019 with the final phase expected to take place in 2020. Monitoring along South Street (site EE49), is located in the area subject to the most traffic flow change and is being used to quantify the effect on air quality longer term. At this location the NO_2 concentrations in 2019 matched those of 2018 and were below the national objective.

Actions to Improve Air Quality

The Council's previous ASR reported on the air quality modelling work which had just been delivered in draft. In 2019 this work was fully evaluated and actions brought forward to enhance the monitoring in one particular location. Regretfully a Surrey wide bid to DEFRA to develop School Travel Plans, a new cycle training course for secondary school children and an overarching air quality media campaign was not successful.

Conclusions and Priorities

Just one exceedance of the national objective was observed in 2019 within the existing AQMA although the margin of exceedance was less than in previous years. The priority for Epsom & Ewell Borough Council is to ensure conditions remain to allow the trend for air quality improvements to continue and in support of this, and the wider climate change agenda, the Council has adopted a climate change action plan located at www.epsom-ewell.gov.uk/residents/climate-change. This plan includes wide ranging measures aimed at increasing sustainability including improving air quality through policy and operational measures.

Clearly the COVID-19 pandemic currently active at the date of this report, will have an effect on the delivery of existing plans both negatively and positively. For example it is uncertain that the target dates in the climate change plan will be achieved but it is already apparent from preliminary NO_2 measurements during the lockdown period that a substantial fall in emissions has occurred. Whether or not this trend persists into later months will be closely monitored. Epsom & Ewell Borough

Council supports all initiatives to promote a sustainable recovery including the use of cycling, walking and public transport where it is safe to do so.

A priority will also be given to following up on the results of the air quality modelling exercise referred to elsewhere in this report. This was a substantial piece of work which has produced high resolution data on a borough wide basis for the first time since the early 2000s

Local Engagement and How to get Involved

The Council encourages individuals to change their behaviour so as to reduce emissions from transport, their home and their work. The Epsom and Ewell borough is compact with public transport links through to areas of south and south west London as well as routes to Sussex and the south coast. The Council has recently acquired its first electric vehicle and is actively considering the best way to provide electrical vehicle charging points in its carparks whilst working together with the County Council in considering opportunities for on street charging. On behalf of residents, the Council pays an annual fee for membership of the air alert system whereby anyone can sign up for free text messages and/or use an App to receive information about predicted periods of poor air quality. For vulnerable people or those with respiratory conditions, this helps to provide a warning to allow them to plan their activities. There are 70 residents who currently benefit from the text service with many more able to benefit from the app.

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1 Local Air Quality Management

This report provides an overview of air quality in Epsom and Ewell during 2019. 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 Epsom & Ewell 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 G.1 in Appendix G.

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 Epsom & Ewell Borough Council can be found in Table 1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=100 Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMA, which provides for a map of air quality monitoring locations in relation to the AQMA.

Table 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		
						At Declaration		Now		Name	Date of Publication	Link
Ewell High Street AQMA	09/07/2007	NO2 Annual Mean	Ewell	An area encompassing the section of High Street, Ewell from the junction with Spring Street to the junction with Cheam Road and continues a further 30 metres south on High Street Ewell	NO	63	µg/m3	44.1	µg/m3	Ewell High Street Air Quality Action Plan	2010	Here

☒ **Epsom & Ewell 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 Epsom and Ewell

Defra's appraisal of last year's ASR concluded that "air quality is improving in Epsom and Ewell and the Council should continue their hard work." There was commentary that this year's report should contain the worked calculations for both annualisation and distance corrections and that a full report on the modelling exercise should be included. Both these comments have been addressed in this report. There was also a suggestion that the 2010 AQMA air quality action plan is out of date and that the Council should bring forward a revised action plan. Whilst NO_2 remains above the national objective at this location it is showing a downward trend and should that continue it would be anticipated the objective would be met in the next 3-4 years. It is considered there are few viable measures which could be applied to this short section of canyon-like street and the Council's efforts should instead focus on wider measures to the benefit of the area as a whole including the AQMA.

Epsom & Ewell Borough Council has previously taken forward a number of direct measures in pursuit of improving local air quality.

More detail on these measures can be found in the existing action plan. Key completed measures are:

- The conversion of the mini roundabout in Ewell High Street into a conventional junction ensuring queuing traffic takes place outside the AQMA.
- The removal of on road parking during peak times promoting laminar traffic flow within the AQMA.
- The associated parking enforcement to ensure the junction is kept clear during peak times within the AQMA.

Details of all measures completed, in progress or planned are set out in Table 2.

The principal challenges and barriers to implementation that Epsom & Ewell Borough Council experiences in relation to the Ewell High Street AQMA is simply that it is narrow, with poor dispersal and at times congested and there are a lack of viable measures to ease these structural issues.

Table 2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Date Measure Introduced	Organisations involved	Funding Source	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Remove the formally marked parking bays from 53 to 67 High Street	Transport Planning and Infrastructure	Other	Jun-14	Surrey County Council	Complete	None	High	Complete	-	An evolution of this proposal was brought forward and delivered
2	Widen the road at 76 – 62 High Street	Transport Planning and Infrastructure	Other	Jun-14	Surrey County Council	Complete	None	High	Complete	-	Carried out in conjunction with above measure
3	Remove on-street car parking on Church Street junction.	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	None	Medium	Not started	-	Opinion sought that proposal would be difficult to achieve and not offer exceptional air quality gains.
4	Alter the junction of Cheam Road/High Street*	Transport Planning and Infrastructure	Other	2015	Surrey County Council	Complete	None	High	Complete	-	A conventional give way junction has replaced the mini roundabout. Queuing traffic now occurs away from AQMA.
5	Re-apply for traffic regulation order in relation to 7.5 tonne weight restriction	Traffic Management	Emission based parking or permit charges	-	Surrey County Council	-	-	Low	Not started	-	Not a priority for local transport service
6	Place restrictions on delivery times and stopping on High Street between Cheam Road and Spring Street junctions	Traffic Management	Parking Enforcement on highway	2015	Epsom & Ewell Borough Council	Complete	None	Medium	Complete	Complete	Stopping/Delivery restrictions in place in the most pollution sensitive area
7	Paint ‘keep clear’ lines at entrance to junctions of High Street with Church Street and	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	-	Medium	Not started	-	No longer favoured by local transport service

	West Street.										
8	Pedestrianise Ewell High Street in conjunction with Kiln Lane Link	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	None	High	Not started – non viable	-	Kiln Lane link presently unfunded
9	Pedestrianise Ewell High Street without Kiln Lane Link	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	None	High	Not started – non viable	-	Feedback indicates not a priority
10	Implement a one-way system	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	None	High	Not started – non viable	-	Dependent on Kiln Lane Link
11	Remove the traffic lights at the junction between Spring Street and High Street	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	None	High	Not started – non viable	-	Judgement that the worsening of pedestrian safety was unacceptable
12	Replace the pelican crossing outside market parade with zebra crossing	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	None	Medium	Not started - unnecessary	-	Clarification was received that these lights were linked with traffic control signals and had no effect on traffic flow
13	Implement a one-way system on Church Street/West Street	Transport Planning and Infrastructure	Other	-	Surrey County Council	-	None	Medium	Not started	-	Non viable at present

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.

The dispersion modelling results outlined elsewhere in this report can be used for comparison against the information behind the Public Health Outcomes Framework and in particular the Surrey local indicator[4] which estimates that the attributable fraction of 4.6% of deaths in Surrey were due to chronic $PM_{2.5}$ exposure in 2015 compared with Epsom & Ewell where it is likely to be slightly higher as found by both the 2010 PHE study and the 2018 CERC study.

Study	Mean anthropogenic $PM_{2.5}$ ($\mu g/m^3$)	Attributable fraction %†	Associated life years lost ‡
Public Health England[5]	10.4	5.9	348
CERC (on behalf of Epsom & Ewell BC)*	11.5	1.8 - 5.6	131-398

Table 3 - $PM_{2.5}$ comparison of modelled outcomes

† - The proportion of deaths associated as due to long term exposure of anthropogenic particle air pollution

‡ - The years of life lost to a population due to the increased mortality risk attributable to long term exposure to particulate air pollution

* - The CERC study used 5 different co-efficients for burden calculations resulting in the ranges seen

This is consistent with the Epsom and Ewell Borough being geographically more closely associated with the Greater London area than some of the Boroughs in the south of the County. The results confirm however that the Borough meets the EU target value of 25 $\mu g/m^3$ for nation states throughout. The majority of $PM_{2.5}$ is background in nature with only a limited fraction associated with local road transport

[4] https://www.surreyi.gov.uk/jsna/air-quality/
[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/332854/PHE_CRCE_010.pdf

and “other” sources. This modelling confirms the difficulties with any one single Council operating on its own in controlling $PM_{2.5}$. Nevertheless the Council will not completely disregard $PM_{2.5}$. It is concluded that actions to reduce other pollutants and particulates generally are appropriate to reduce $PM_{2.5}$ when combined with regional and national efforts through, for example, the Surrey Air Alliance.

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

Epsom & Ewell Borough Council does not operate any automatic monitoring sites.

3.1.2 Non-Automatic Monitoring Sites

Epsom & Ewell Borough Council undertook non- automatic (passive), monitoring of NO_2 at 25 sites plus a control blank during 2019. 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) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias[6], “annualisation” (where the data capture falls below 75%), and distance correction[7]. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

As indicated elsewhere in the report, measured NO_2 concentrations were greater than the previous year and more closely followed the trend established in the past decade of a gradual decline rather than the significant fall seen in 2018. This resulted in one measurement (site EE10 within the existing Ewell High Street AQMA), which whilst correcting for distance and bias still recorded an annual mean of 44.1µg/m^3, in excess of the national objective of 40µg/m^3, although not dramatically so. This compares with a concentration of 49.9µg/m^3 at the AQMA declaration in 2007 and a peak concentration of 66.8 µg/m^3 in 2009.

[6] https://laqm.defra.gov.uk/bias-adjustment-factors/bias-adjustment.html
[7] Fall-off with distance correction criteria is provided in paragraph 7.77, LAQM.TG(16)

The trend within the AQMA can be illustrated by the graph in Figure A1 which shows 17 years of data from tube EE10 – at the centre of the AQMA.

Table A.3 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. Note that the concentration data presented in Table A.3 represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2019 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant. Trend data from a selection of sites has been presented in appendix A in the form of graphs corresponding to location.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year and it is confirmed there were no exceedances of this objective.

3.2.2 Particulate Matter (PM10)

The Council does not undertake any monitoring of PM10.

3.2.3 Particulate Matter ($PM_{2.5}$)

The Council does not undertake any monitoring of $PM_{2.5}$.

3.2.4 Sulphur Dioxide (SO_2)

The Council does not undertake any monitoring of Sulphur Dioxide.

4 Surrey wide detailed air quality modelling and source apportionment

As part of the Surrey Air Alliance consortium, the Council commissioned Cambridge Environmental Consultants (CERC), to produce computer models for NO_2, PM_{10} and $PM_{2.5}$ on a borough and county wide basis. The air quality modelling was carried out with ADMS-Urban (version 4.2) dispersion modelling software, using meteorological data from Heathrow and Gatwick Airports and local NO_2 monitoring data from the calendar year 2017. Also included is source apportionment estimates at a range of locations to determine the fraction of pollutants arising from different sources and an estimate of the mortality burden resulting from exposure to poor air quality. The full report is available on request from the Council and the main points are as follows.

- There was one road junction where there is an indication of possible exposure close to or in excess of the national objective that the Council was previously not aware of. This is discussed later in this section.
- There was no modelled exceedance of the hourly objective for either NO_2 or the 24 hourly mean average for particulates and consequently the maps from these have not been included in this status report.
- Road transport is identified as the largest contributor to nitrogen dioxide concentrations.
- Of the road transport fleet, diesel vehicles followed by light goods vehicles are the highest contributors to nitrogen dioxide exposure in the Borough.
- Most of the particulate exposure originates from sources external to the Borough and which have migrated in.
- Of those particulates generated from road transport, the dominant source is tyre and break wear, not exhaust emissions.
- The statistically derived estimated borough mortality burden from poor outdoor air quality is estimated at between 464 and 909 total life years lost (2017).

4.1 London Road / Kingston Road Junction

The modelling exercise outlined above highlighted one area which had not been considered in previous assessments. The junction which joins the Kingston Road/Ewell By Pass to London Road A24 has residential properties on both sides

beginning 80 metres from the junction itself but is still under the prevailing influence of emissions from road traffic negotiating this busy junction. The model estimates exposure of some of these properties to be at or near the national objective of NO_2. Consequently, commencing in 2019, the Council enhanced the monitoring in this area by installing an additional two monitoring sites EE52 and EE53. The results of this new monitoring will be reported in the 2021 ASR. Site EE43 in the map below is an existing site not representative of the conditions further to the north-east.

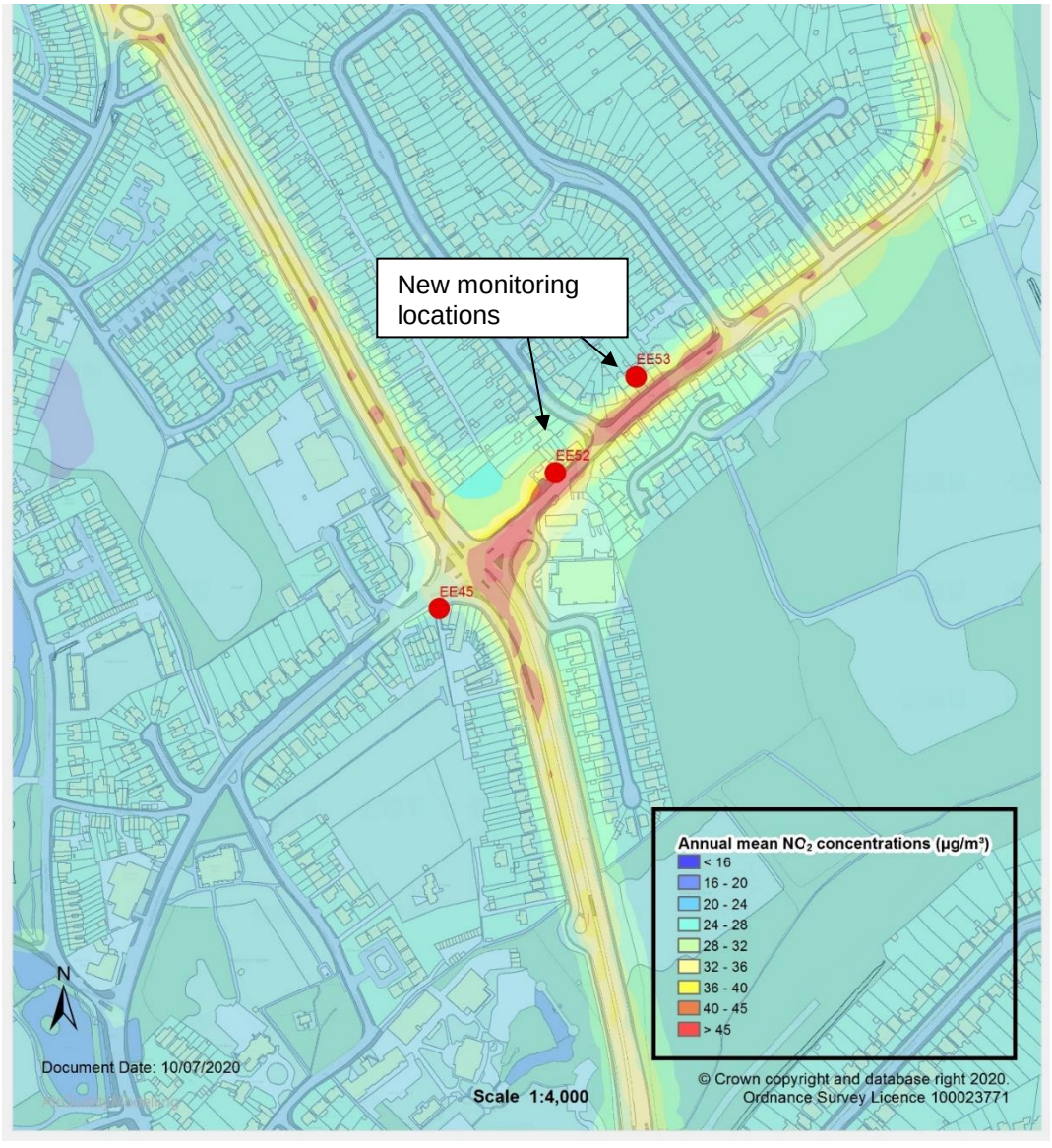


Figure 1 - Area of possible new exceedance

Appendix A: Monitoring Results

Table A.1 - Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
Not monitored										

Notes:

(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 (Easting)	Y OS Grid Ref (Northing)	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)
EE1	The Clock Tower	Roadside	520732	160762	NO_2	NO	13	2.5	NO	2.1
EE3	The Crescent	Urban Background	519293	160026	NO_2	NO	9	2	NO	2
EE6	Jct Kingston Rd/ Worcester Park Rd	Roadside	520525	165040	NO_2	NO	8.2	6.8	NO	2.1
EE7	Jct Ruxley Lane/Kingston Rd	Roadside	520916	164636	NO_2	NO	4.2	6.8	NO	2.3
EE9	Chessington Road, Ewell	Kerbside	519830	163740	NO_2	NO	2.4	3.2	NO	2.4
EE10	High Street, Ewell	Kerbside	521998	162633	NO_2	YES	0.5	1.3	NO	2.1
EE14	Hook Road Epsom-	Kerbside	520885	161308	NO_2	NO	3.4	1.6	NO	2
EE16	Church Street/High Street Ewell	Kerbside	522026	162624	NO_2	NO	0..1	1.1	NO	1.7
EE17	High Street Ewell	Kerbside	522025	162563	NO_2	YES	0.1	2	NO	2.2
EE22	High Street, Epsom	Kerbside	520965	160871	NO_2	NO	3	0.5	NO	2.3
EE36	Capitol Square, Church Street	Roadside	521069	160817	NO_2	NO	0.2	9.2	NO	2.1

EE37	British Heart Foundation, High Street	Roadside	520726	160857	NO_2	NO	0.6	4.5	NO	2.4
EE38	Station Approach South	Roadside	520726	160857	NO_2	NO	0.1	2.8	NO	1.8
EE39	The Parade	Roadside	520844	160729	NO_2	NO	0.2	3.3	NO	2.1
EE42	High Street/East Street	Roadside	521004	160901	NO_2	NO	0	7.7	NO	2.1
EE43	Kiln Lane	Roadside	521478	161447	NO_2	NO	0.3	5.5	NO	2.3
EE45	Castle Parade	Roadside	522211	163103	NO_2	NO	0.4	8.3	NO	2.1
EE46	Waterloo Road	Roadside	520724	161027	NO_2	NO	4.6	0.6	NO	2.1
EE47	Chessington Road	Roadside	520713	162968	NO_2	NO	0.2	4.7	NO	1.9
EE48	Ewell High Street South	Roadside	522022	162502	NO_2	YES	0.4	1.7	NO	2.1
EE49	37 South Street	Roadside	520580	160586	NO_2	NO	0.2	3.5	NO	2.2
EE50	Major Plaice Ewell High Street	Kerbside	521975	162677	NO_2	YES	7.5	0.9	NO	2.1
EE51	Station Approach North	Roadside	520702	160872	NO_2	NO	3	3.3	NO	1.8
EE52	77 London Road Ewell	Roadside	522303	163213	NO_2	NO	0.5	4.6	NO	1.8
EE53	115 London Road Ewell	Roadside	522369	163289	NO_2	NO	0	14.5	NO	1.8
EE33	Blank	-	-	-	NO_2	-	-	-	-	-

Notes:

(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.3 – Annual Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 Annual Mean Concentration (µg/m³) (3) (4)				
							2015	2016	2017	2018	2019
EE1	520732	160762	Roadside	Diffusion Tube	100	67	39.8	39.1	33.8	29.6	26.5
EE3	519293	160026	Urban Background	Diffusion Tube	100	92	19.8	20.2	16.9	14.8	15
EE6	520525	165040	Roadside	Diffusion Tube	100	83	**41.1**	37.5	31.3	30.4	33
EE7	520916	164636	Roadside	Diffusion Tube	100	100	39.4	**41.8**	35.5	33.5	34.2
EE9	519830	163740	Roadside	Diffusion Tube	100	100	27.5	29.8	23.2	23.5	24.4
EE10	521998	162633	Roadside	Diffusion Tube	100	58	**51.5**	**52.6**	**44.4**	34.8	**46.3**
EE14	520885	161308	Roadside	Diffusion Tube	100	100	29	29.0	25.4	25.2	25.3
EE16	522026	162624	Roadside	Diffusion Tube	100	100	34.6	33.6	30.7	25.5	27.8
EE17	522025	162563	Roadside	Diffusion Tube	100	92	36.7	36.0	30.2	28.9	31.4
EE22	520965	160871	Roadside	Diffusion Tube	100	92	**41.4**	**48.1**	39.3	35.1	35.4
EE36	521069	160817	Roadside	Diffusion Tube	100	75	29.6	29.1	26.3	23.5	23.3
EE37	520726	160857	Roadside	Diffusion Tube	100	92	**43.6**	38.6	33.4	26.9	32.7
EE38	520726	160857	Roadside	Diffusion Tube	100	83	29.2	29.0	25.1	23.3	24.2
EE39	520844	160729	Roadside	Diffusion Tube	100	92	33.6	35.6	27.6	29.9	24.6

EE42	521004	160901	Roadside	Diffusion Tube	100	100	34.5	32.9	28.8	23.1	24.5
EE43	521478	161447	Roadside	Diffusion Tube	100	92	35	34.4	28.5	26.0	25.5
EE45	522211	163103	Roadside	Diffusion Tube	100	100	28.8	28.3	22.5	23.9	21.3
EE46	520724	161027	Roadside	Diffusion Tube	100	100	25.5	23.0	24.6	27.1	27.9
EE47	520713	162968	Roadside	Diffusion Tube	100	83	28.4	33.0	24.5	23.5	25.1
EE48	522022	162502	Roadside	Diffusion Tube	100	83	31.6	32.2	29.0	27.8	28.4
EE49	520580	160586	Roadside	Diffusion Tube	100	100	n/a	n/a	28.6	34.1	34.2
EE50	521975	162677	Roadside	Diffusion Tube	100	92	n/a	n/a	36.4	36.2	35.7
EE51	520702	160872	Roadside	Diffusion Tube	100	92	n/a	n/a	n/a	30.1	25
EE52	522303	163213	Roadside	Diffusion Tube	17	50	n/a	n/a	n/a	n/a	n/a
EE53	522369	163289	Roadside	Diffusion Tube	8	100	n/a	n/a	n/a	n/a	n/a

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

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

☒ **Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance adjustment**

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.

(4) Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

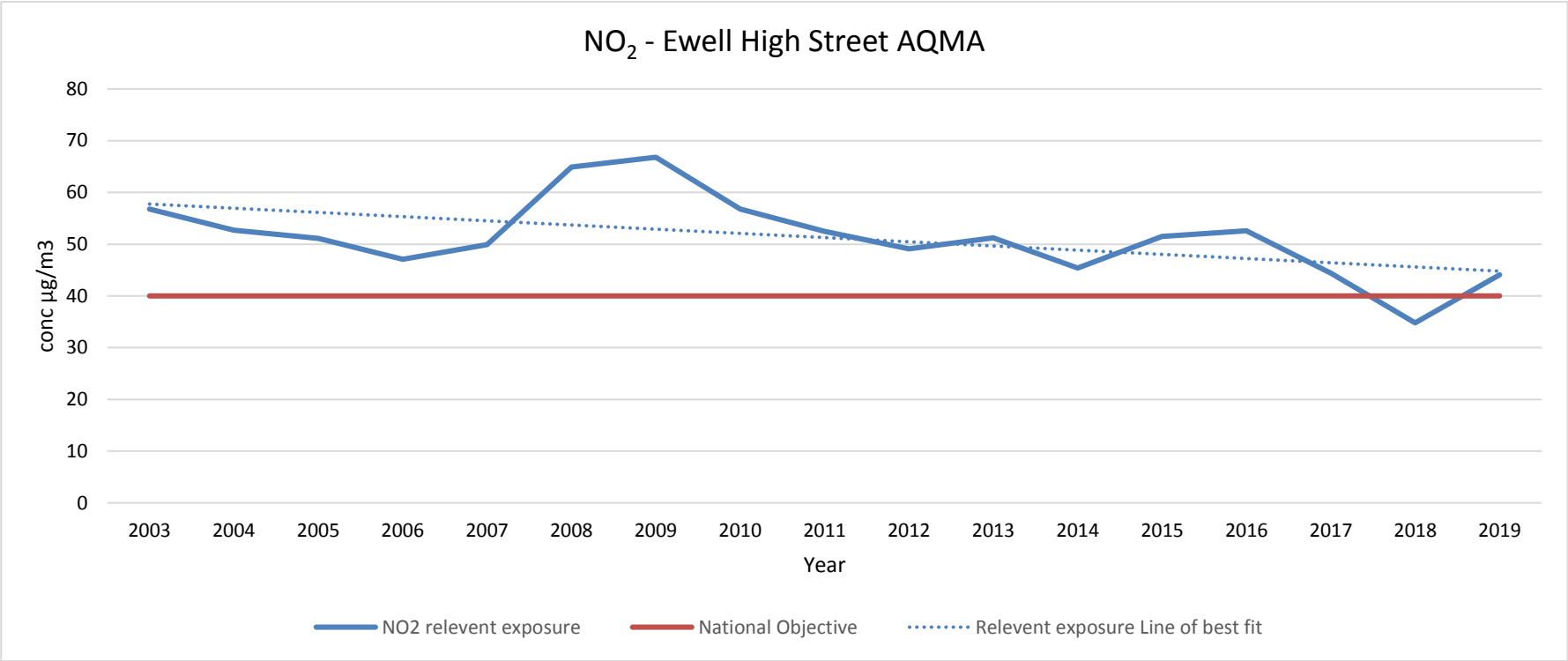


Figure A 1 - Trends in Annual Mean NO_2 Concentrations – Ewell High Street AQMA (site EE10)

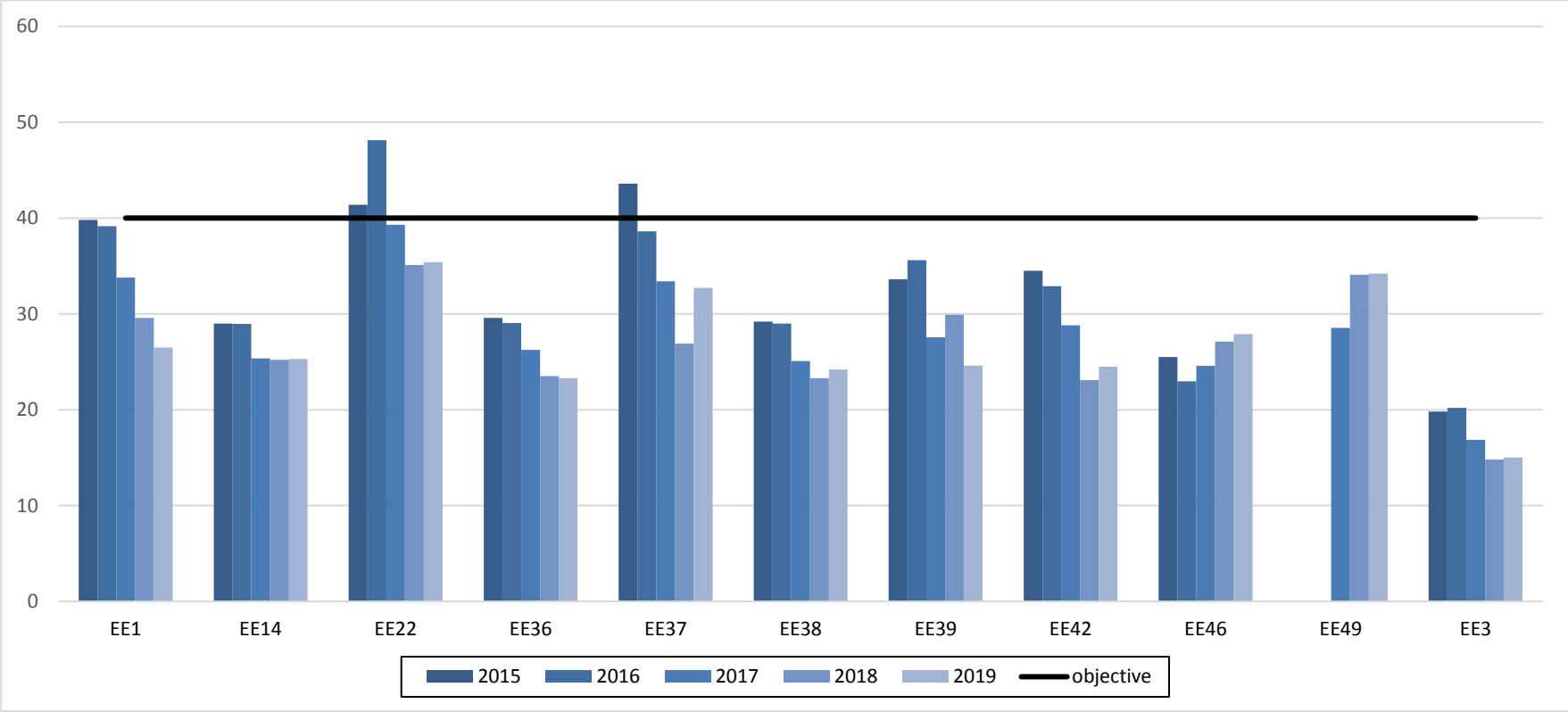


Figure A 2 Trends in Annual Mean NO_2 Concentrations – Epsom (selected sites)

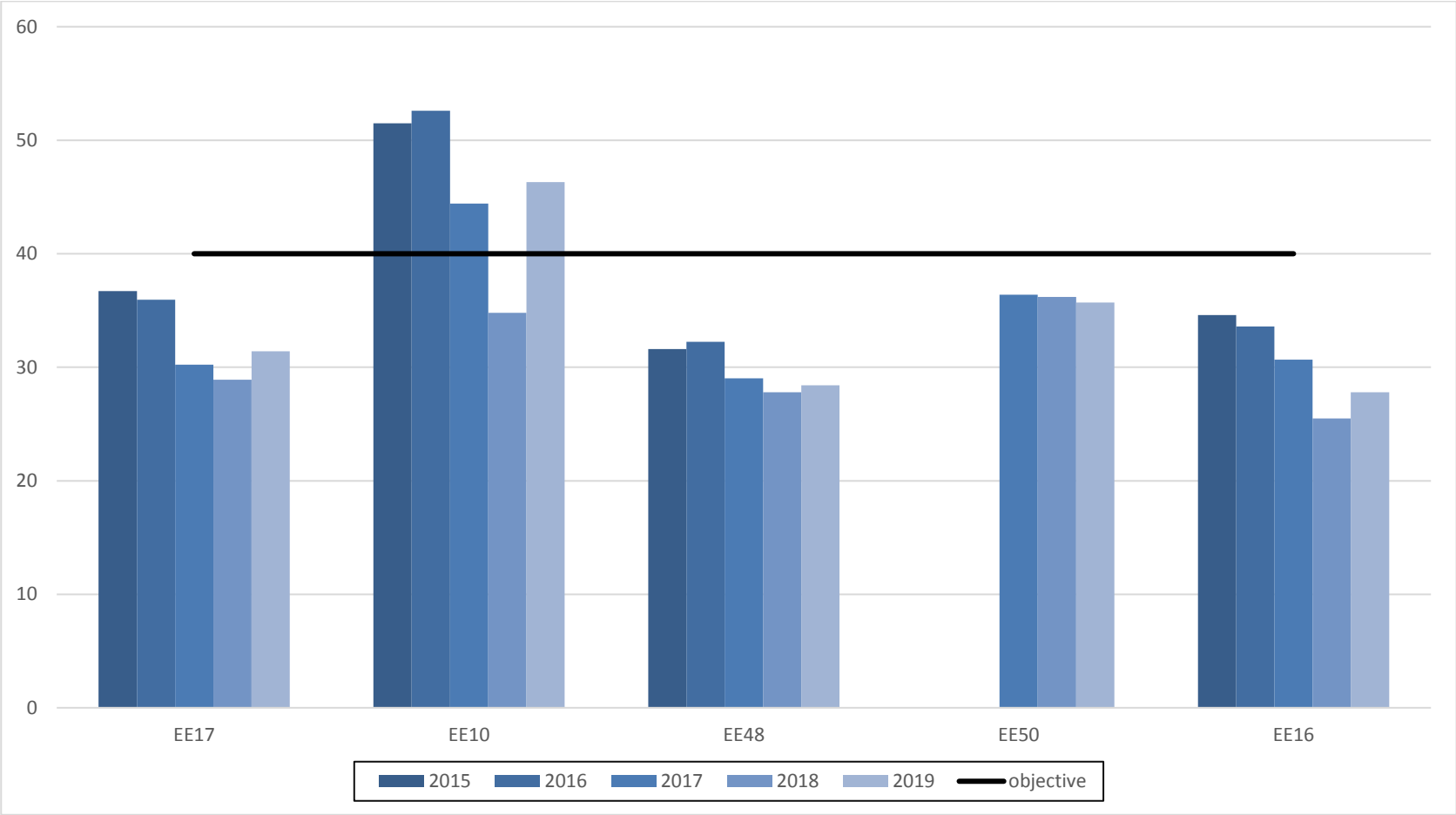


Figure A 3 Trends in Annual Mean NO_2 Concentrations – Ewell Village (selected sites)

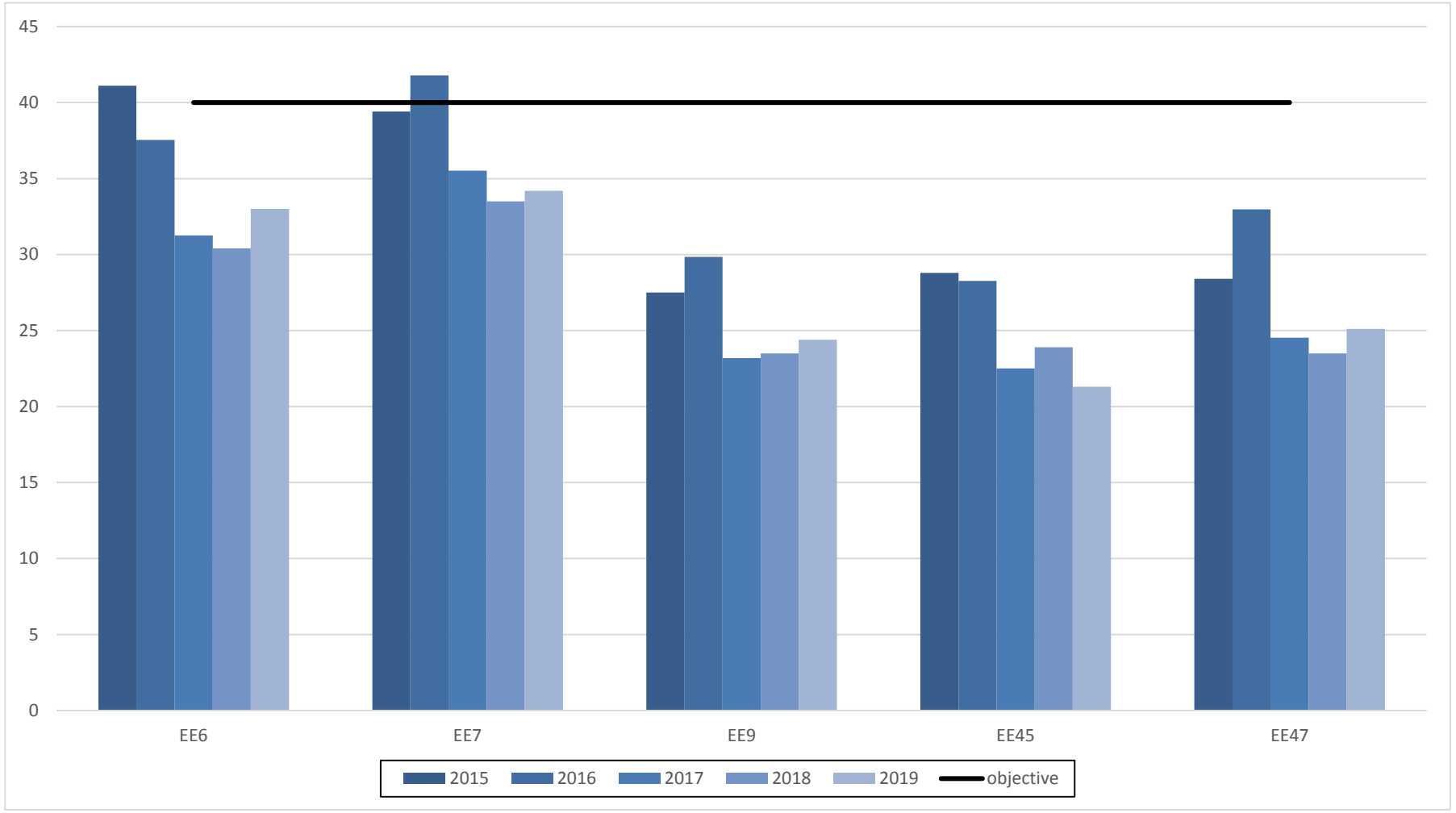


Figure A 4 Trends in Annual Mean NO_2 Concentrations – West Ewell, Stoneleigh and surrounding areas (selected sites)

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
							2015	2016	2017	2018	2019
Not monitored											

Notes:

Exceedances of the NO_2 1-hour mean objective (200µg/m^3 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 99.8th percentile of 1-hour means is provided in brackets.

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
						2015	2016	2017	2018	2019
Not monitored										

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

Notes:

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 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 Boxes 7.9 and 7.10 in 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_{10} Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
						2015	2016	2017	2018	2019
Not monitored										

Notes:

Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 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 90.4th percentile of 24-hour means is provided in brackets.

Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2019 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) (3)				
						2015	2016	2017	2018	2019
Not monitored										

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

Notes:

(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 Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.8 – SO_2 Monitoring Results

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for monitoring Period (%) [1]	Valid Data Capture 2019 (%) [2]	Number of Exceedances 2019 (percentile in bracket) [3]		
						15-minute Objective (266 µg/m^3)	1-hour Objective (350 µg/m^3)	24-hour Objective (125 µg/m^3)
Not monitored								

Notes:

Exceedances of the SO_2 objectives are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed a year)

(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 relevant percentiles are provided in brackets.

Appendix B: Full Monthly Diffusion Tube Results for 2019

Table B.1 - NO_2 Monthly Diffusion Tube Results - 2019

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	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 (0.92) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
EE1	520732	160762	20.0	37.0				22.0	23.0		25.0		35.0	31.0	27.6	26.5	
EE3	519293	160026	12.0	20.0	13.0	20.0	14.0	14.0	12.0	16.0	15.0	18.0	25.0		16.3	15.0	
EE6	520525	165040	25	51	36	45	25		31	32	31		47	36	35.9	33.0	
EE7	520916	164636	26	47	47	42	35	40	31	41	28	42	34	33	37.2	34.2	
EE9	519830	163740	20	38	23	27	22	24	24	34	21	32	34	19	26.5	24.4	
EE10	521998	162633	31	64	55	50		42	42	47					47.3	**46.3**	**44.1**
EE14	520885	161308	19	36	30	35	21	21	20	18	24	29	42	35	27.5	25.3	
EE16	522026	162624	20	42	33	29	26	30	24	28	27	35	39	29	30.2	27.8	
EE17	522025	162563	24	40	39	41	28	31	27	34		36	40	36	34.2	31.4	
EE22	520965	160871	30	50	47	56	40	42	10	32	41	41		34	38.5	35.4	
EE36	521069	160817	19	33	32	26	23			19	21	25		26	24.9	23.3	
EE37	520726	160857	21	46	32	39	21		49	36	33	34	42	38	35.5	32.7	
EE38	520726	160857	19	34	25	29	18			19	38	25	32	24	26.3	24.2	
EE39	520844	160729	18	35	28		25	27	23	25	27	30	31	25	26.7	24.6	
EE42	521004	160901	17	34	26	38	22	23	24	26	25	28	29	27	26.6	24.5	

EE43	521478	161447	17	37	32	32	29		20	27	26	30	31	24	27.7	25.5	
EE45	522211	163103	16	25	21	36	20	24	20	24	23	21	30	18	23.2	21.3	
EE46	520724	161027		31	33	38	28	26	26	29	25	32	40	25	30.3	27.9	
EE47	520713	162968	19	33	28	34	23	29			26	26	33	22	27.3	25.1	
EE48	522022	162502	23	42	30	38	22	25	31	29	27	35	38	31	30.9	28.4	
EE49	520580	160586	24	48	38	41	26	43	43	34	34	36	42	37	37.2	34.2	
EE50	521975	162677	30	59	40	44	41	40	45	0		42	41	45	38.8	35.7	
EE51	520702	160872	20	35	37	33	23		23	23	27	28	23	27	27.2	25.0	
EE52	522303	163213											47	40	43.5	**40.0**	39.2
EE53	522369	163289												25	25.0	23.0	

☐ **Local bias adjustment factor used**

☒ **County bias adjustment factor used**

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

☒ **Where applicable, data has been distance corrected for relevant exposure in the final column**

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 public exposure.

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

In 2019 there were no new sources of local emissions which might have influenced local air quality.

The diffusion tubes are supplied and analysed by Lambeth Scientific Services. The method of preparation is 50% TEA in acetone. The lab follows the procedures set out in the Practical Guidance Documents.

The analysing laboratory participates in the AIR NO_2 Proficiency Testing Scheme for diffusion tubes which provides Quality Assurance / Quality Control (QA/QC).

Based on advice contained within LAQM.TG(16), two results were subject to a distance fall off calculation – EE10 and EE52 as the results were at or above the 36 µg/m^3 level considered to be within the range of error for diffusion tubes of the 40 µg/m^3 national objective. As no automatic analyser was present, the results from tube EE3 have been used as the background site data consistent with box 7.10 of LAQM.TG(16). To perform this, the calculation tool at laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html was used as follows:

BUREAU VERITAS

EE10

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	1.3	metres
Step 2	How far from the KERB is your receptor (in metres)?	1.8	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	15	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	46.3	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	**44.1**	µg/m^3

EE52

Enter data into the pink cells

Step 1	How far from the KERB was your measurement made (in metres)?	4.6	metres
Step 2	How far from the KERB is your receptor (in metres)?	5.1	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	15	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	40	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	*39.2*	µg/m^3

Selection of Bias Adjustment Factor

The bias adjustment factor was adopted using data from those members of the Surrey Air Alliance with automatic monitoring co-located with triplicate tubes. In the absence of a local bias adjustment factor option, it was considered this county-wide factor offered the next best solution. The calculation of this factor is as follows:

	Data Capture	Bias factor A	Bias B
Spelthorne Oaks Rd	83.8	0.92	9
Spelthorne Sunbury X	96.8	1.03	-3
Reigate & Banstead RG1	>90	0.77	29
Reigate & Banstead RG2	>90	0.92	9
Reigate & Banstead RG3	>90	0.94	7
Elmbridge Hampton Ct	97	1.05	5
Elmbridge Weybridge	100	0.94	7
		Av Bias B	9
		Factor	0.09
		Add 1	1.09
		Inverse	0.917431
		Surrey wide factor	0.92

Annualisation calculations

Owing to missing data caused by tampering, theft and occasional vandalism it was necessary to perform annualisation on tube numbers EE1, EE10 and EE36. The detail of these calculations is as follows:

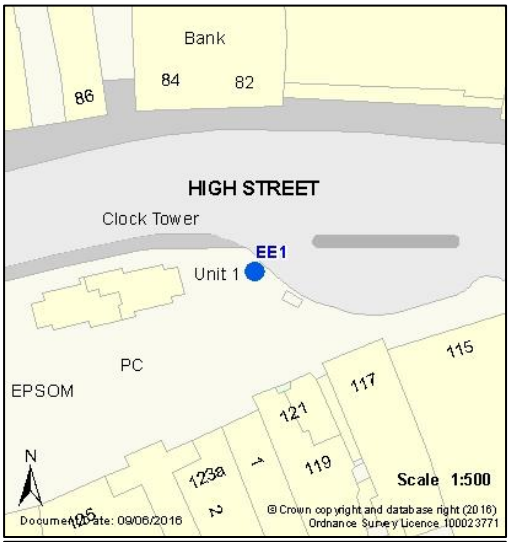
EE1		B1	D1	B1 when D1 is Available
	1	12	20	12
	2	20	37	
	3	13		
	4	20		
	5	14		
	6	14	22	14
	7	12	23	12
	8	16		
	9	15	25	15
	10	18		
	11	25	35	25
	12		31	
av		16.3		15.6
ratio		**1.04**		

EE10		B1	D1	B1 when D1 is Available
	1	12	31	12
	2	20	64	20
	3	13	55	13
	4	20	50	20
	5	14		
	6	14	42	14
	7	12	42	12
	8	16	47	16
	9	15		
	10	18		
	11	25		
	12			
av		16.3		15.3
ratio		**1.06**		

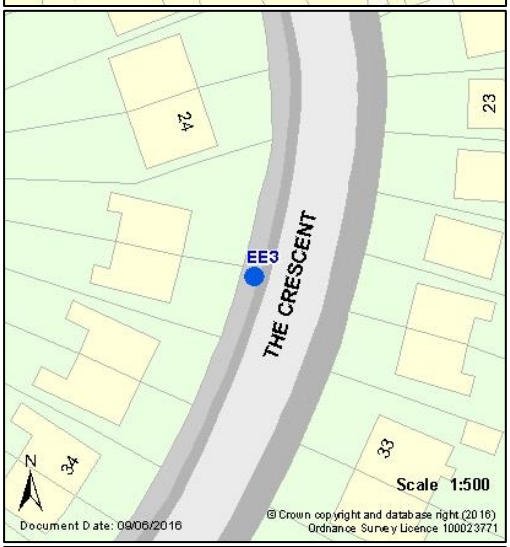
EE36		B1	D1	B1 when D1 is Available
	1	12	19	12
	2	20	33	20
	3	13	32	13
	4	20	26	20
	5	14	23	14
	6	14		
	7	12		

	8	16	19	16
	9	15	21	15
	10	18	25	18
	11	25		
	12		26	
	av	16.3		16.0
	ratio	**1.02**		

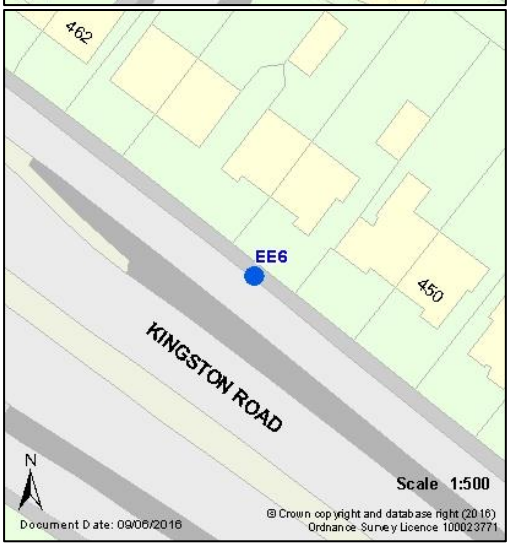
Appendix D: Map(s) of Monitoring Locations and AQMA



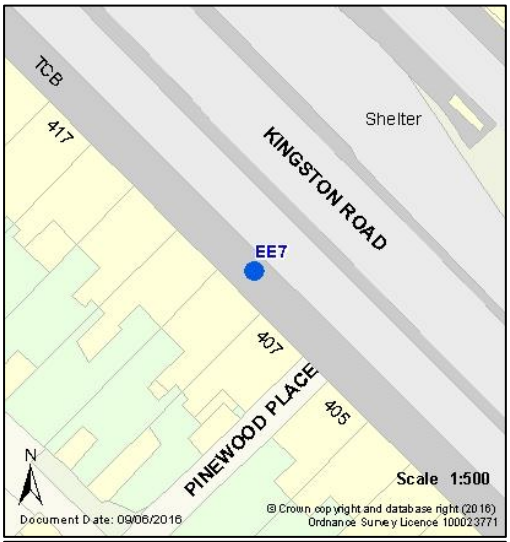
EE1 Clock Tower Epsom



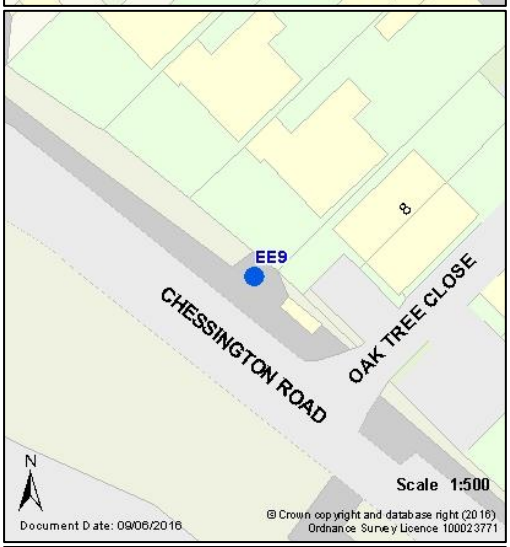
EE3 The Crescent Epsom



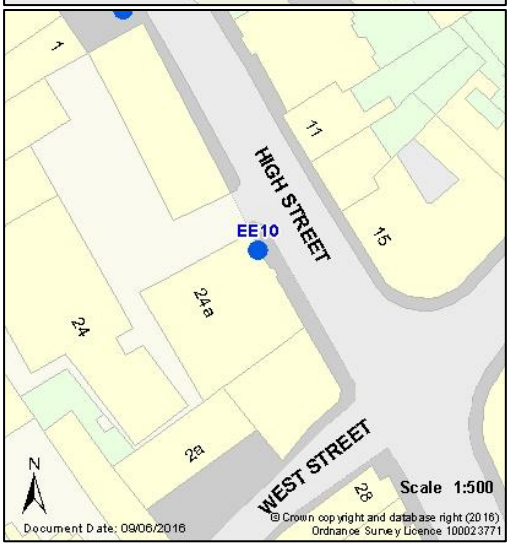
EE6 Kingston Road, Ewell



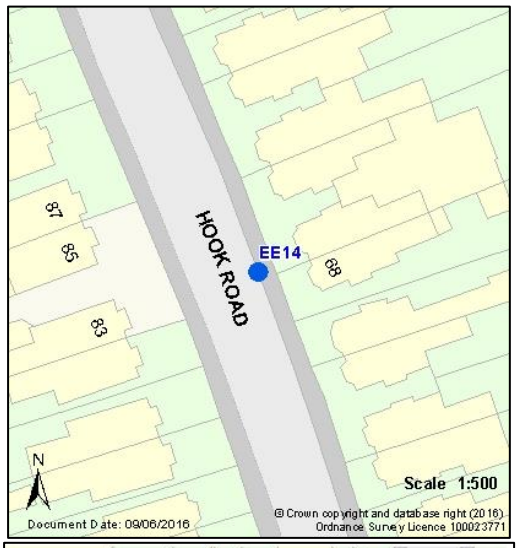
EE7 Kingston Road Ewell



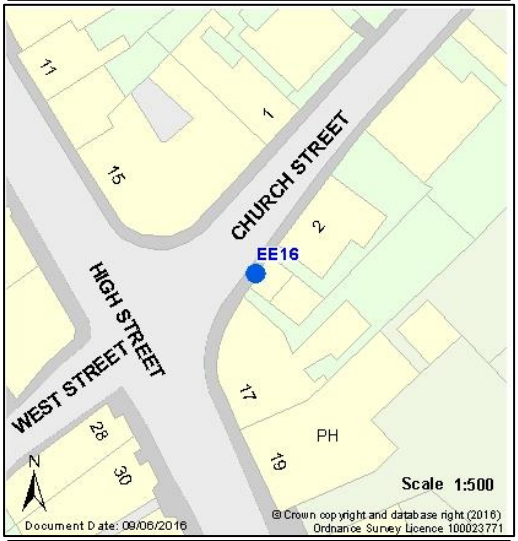
EE9 Chessington Road Ewell



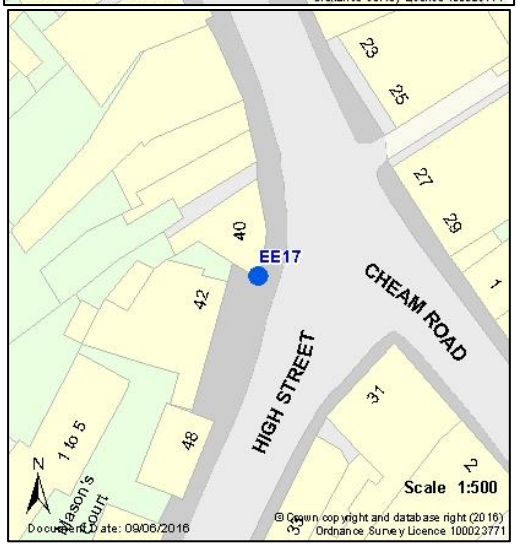
EE10 High Street Ewell



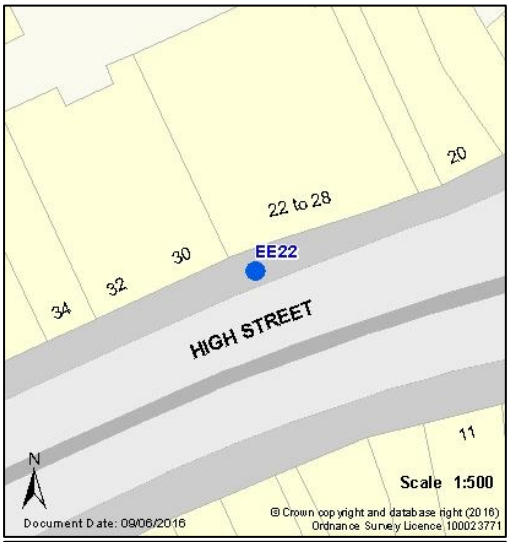
EE14 Hook Road Epsom



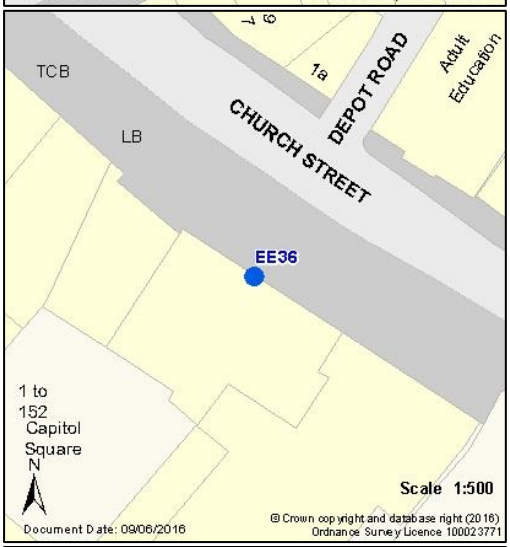
EE 16 Church Street Ewell



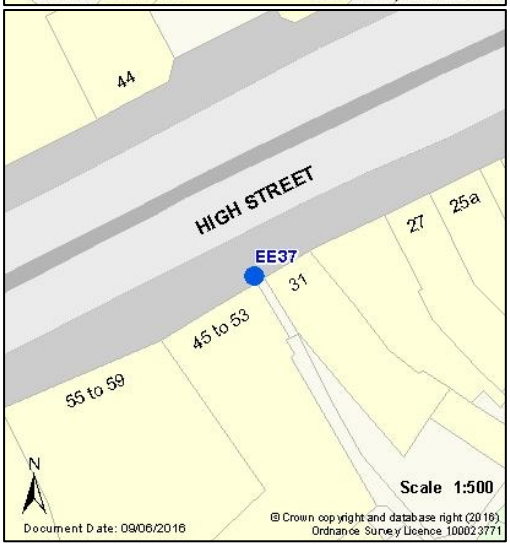
EE17 High Street Ewell



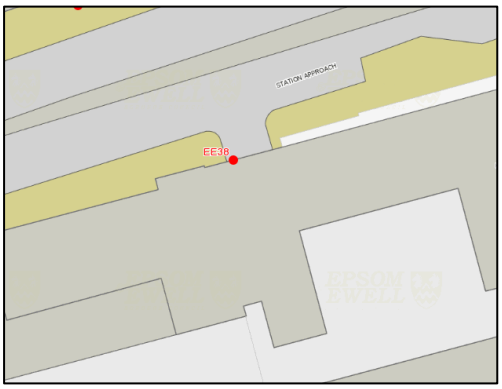
EE22 High Street Epsom



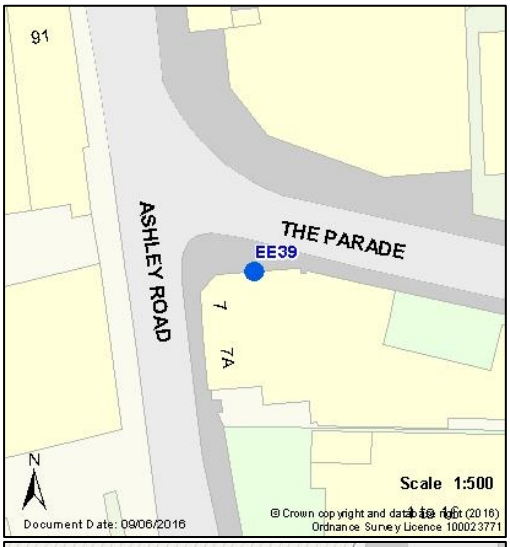
EE36 Church Street Epsom



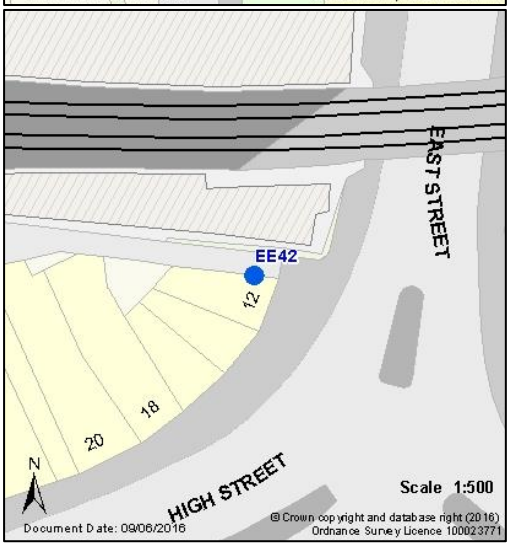
EE37 High Street Epsom



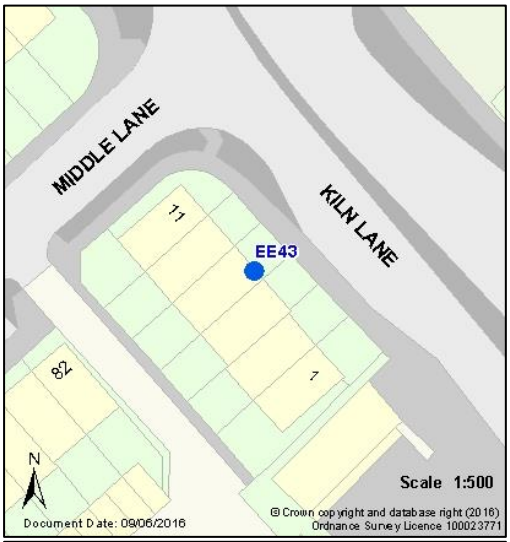
EE38 Station Approach South Epsom



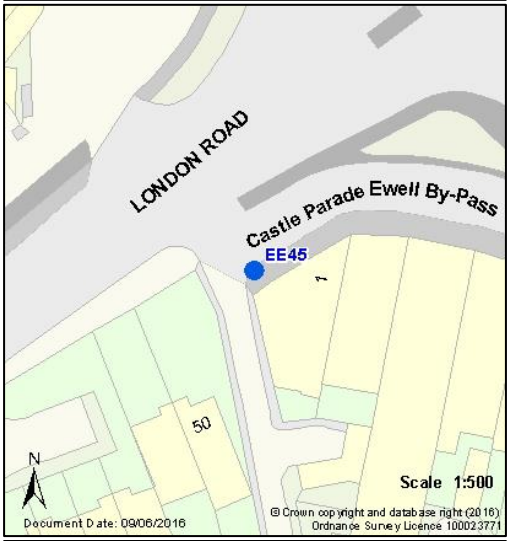
EE39 The Parade Epsom



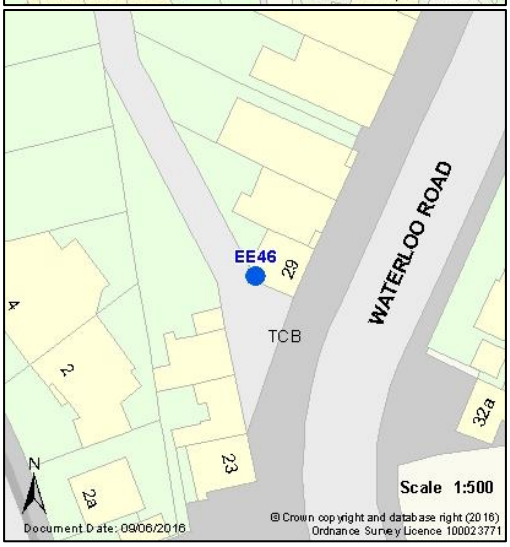
EE42 East Street Epsom



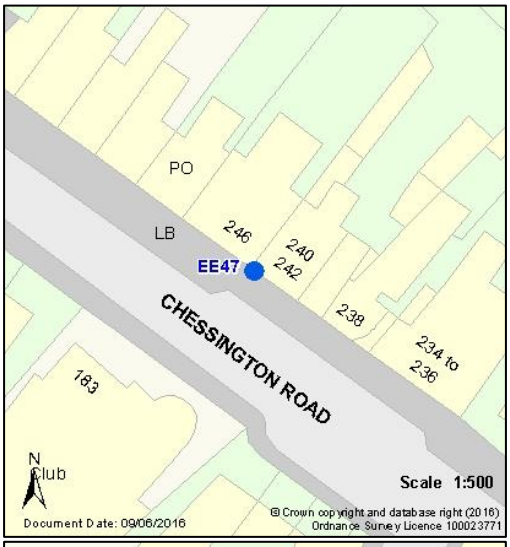
EE43 Kiln Lane Epsom



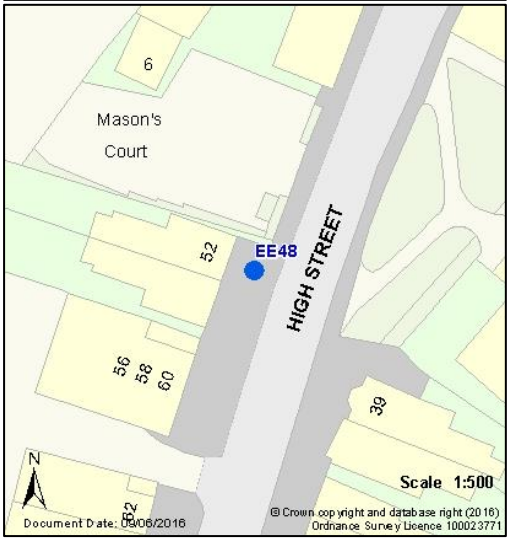
EE45 Castle Parade Ewell



EE46 Waterloo Road Epsom

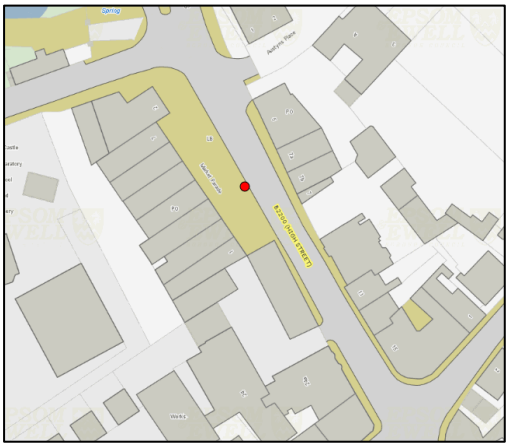


EE47 Chessington Road Ewell

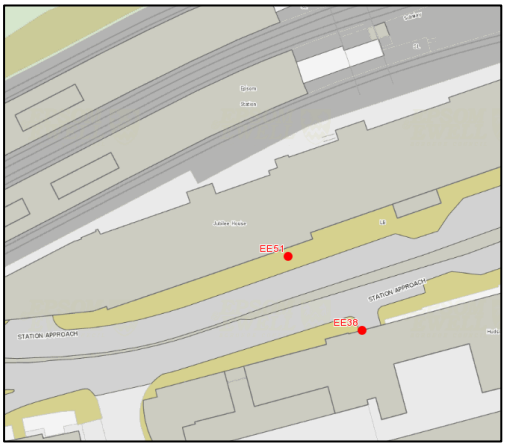


EE48 High Street Ewell

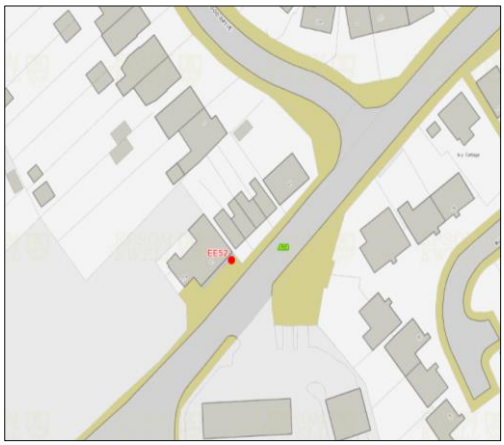
EE49 – South Street Epsom



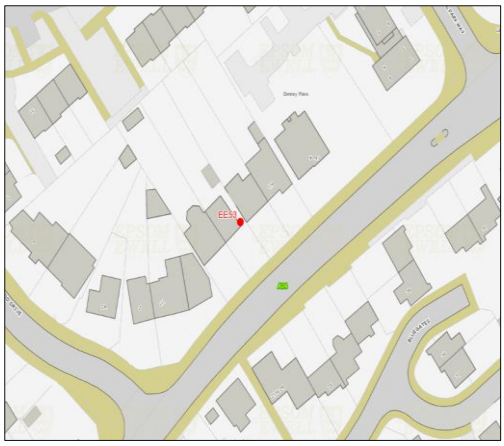
EE50 High Street Ewell



EE51 Station Approach North



EE52 – London Road Ewell (1)



EE53 – London Road Ewell (2)

Appendix E: Model outputs for NO_2, PM_{10} and $PM_{2.5}$

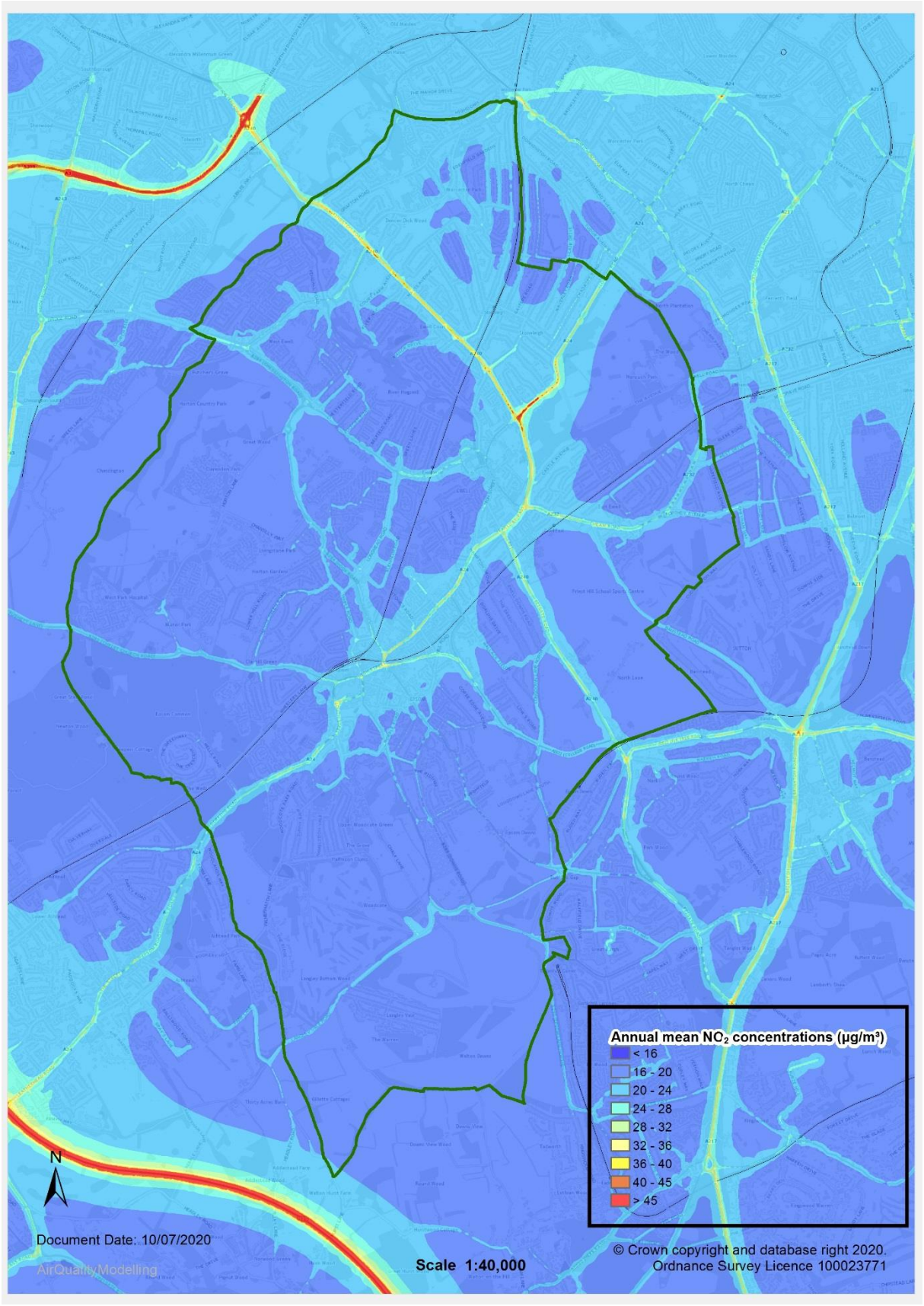


Figure E.1 Computed NO_2 annual mean averages

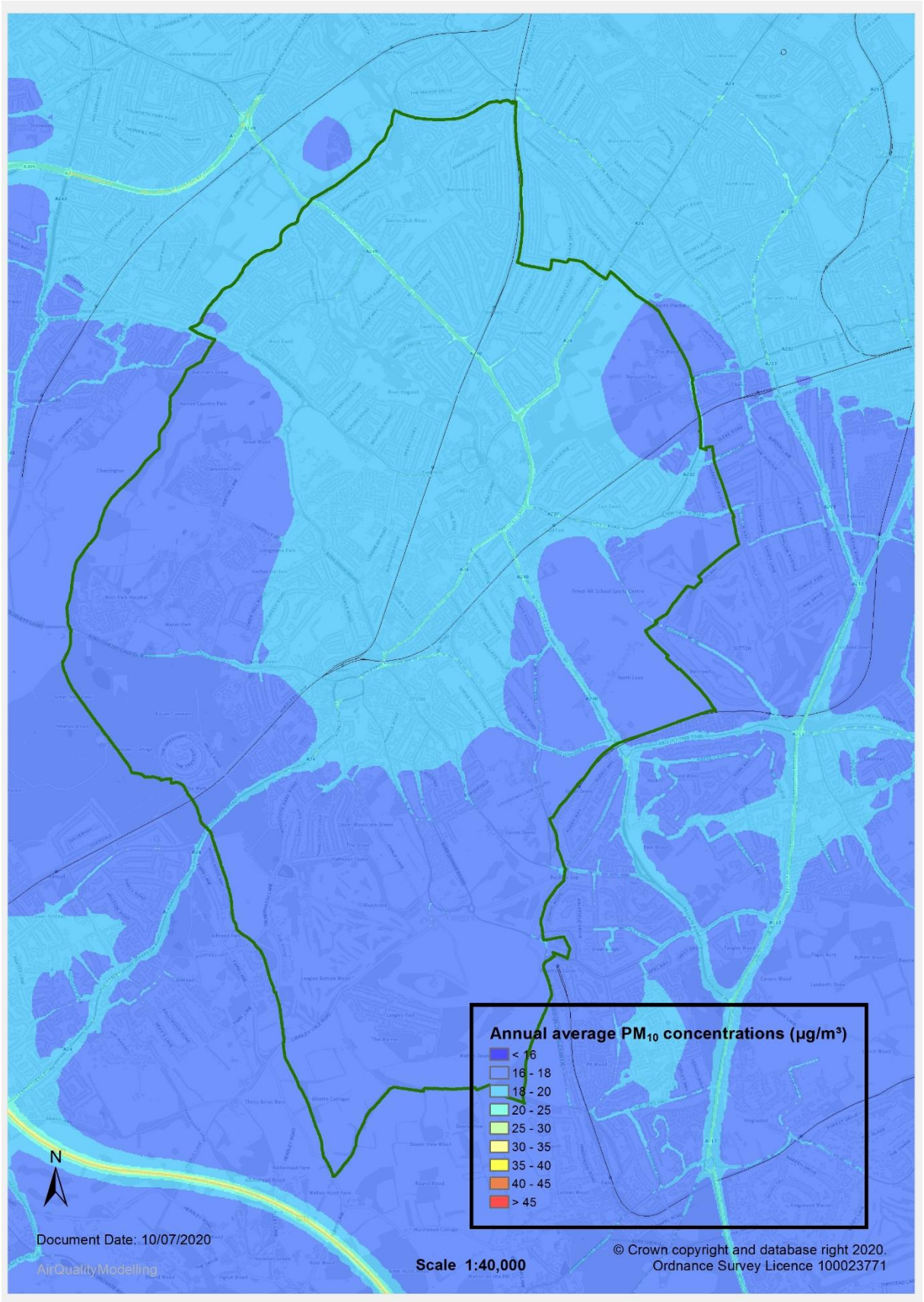


Figure E.2 Computed PM_{10} annual mean averages

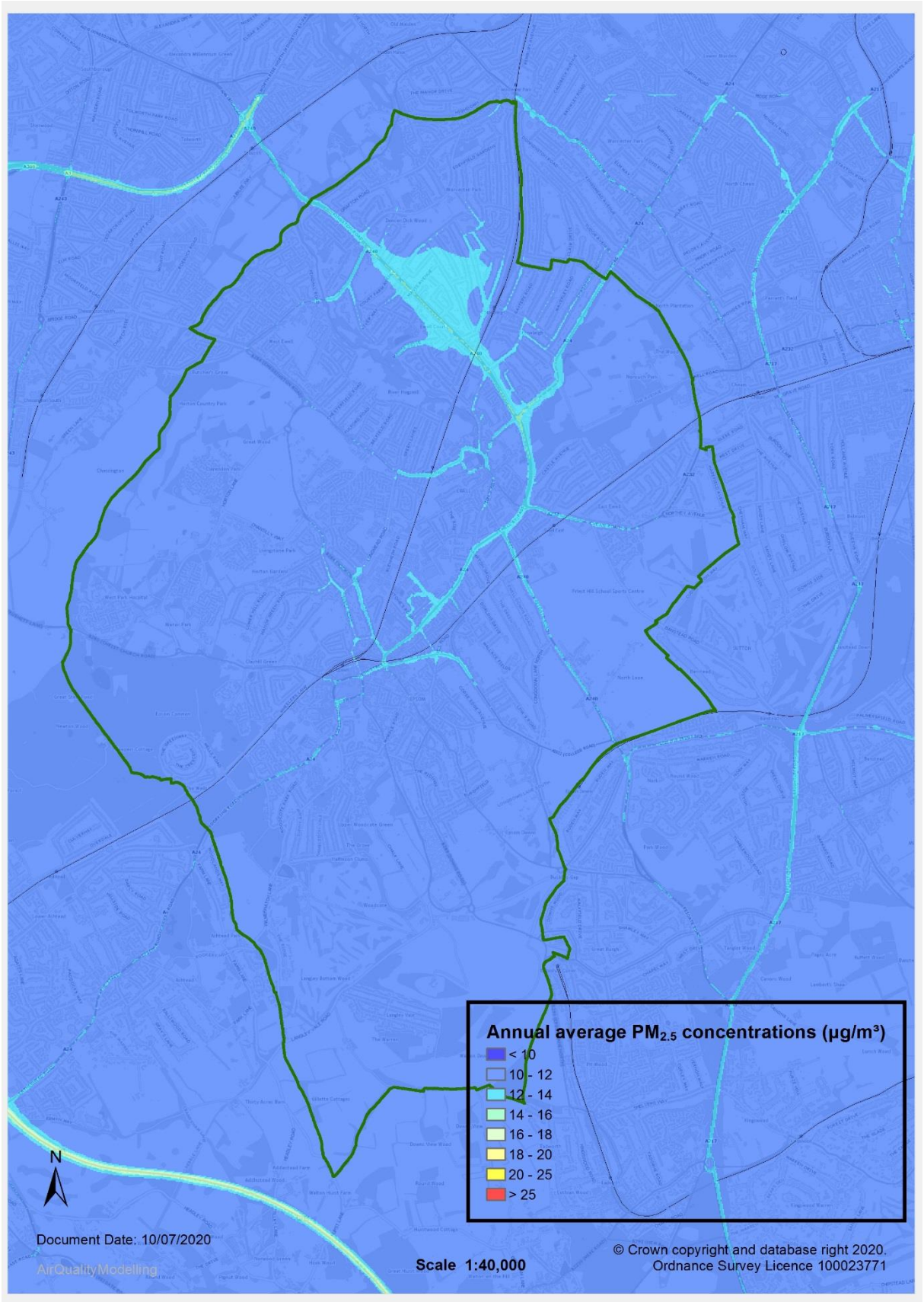


Figure E.3 Computed $PM_{2.5}$ annual mean averages

Appendix F – Source Apportionment

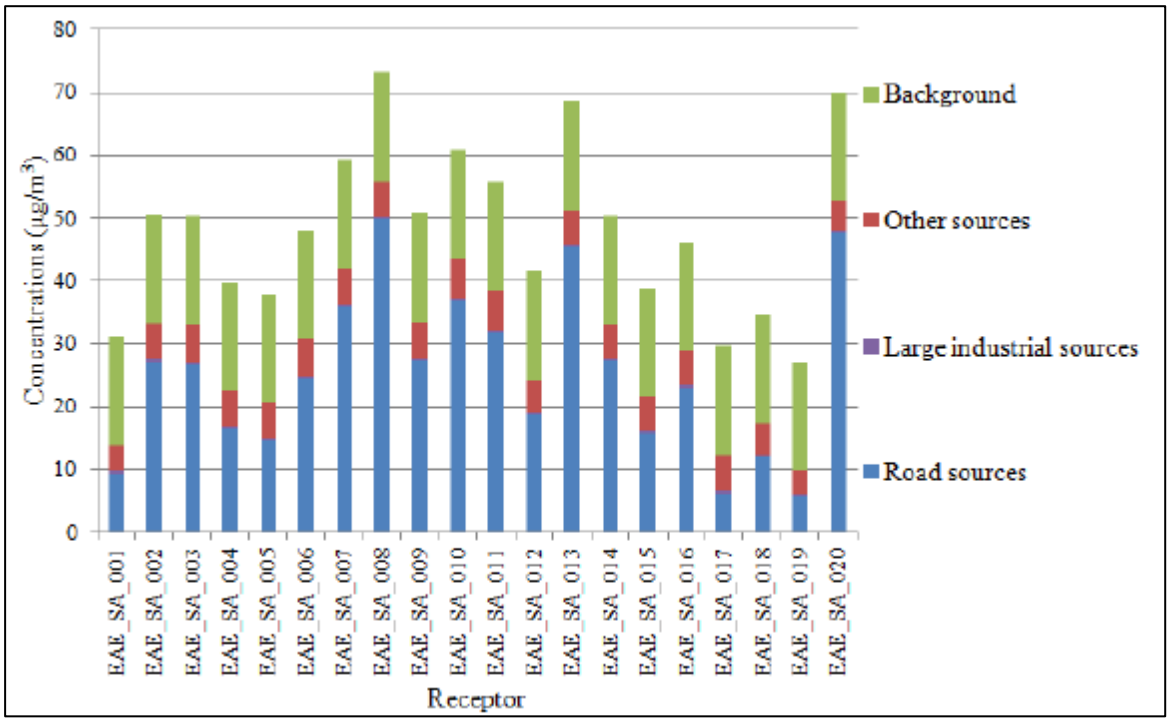


Figure F.1 – NOx concentrations by major source group

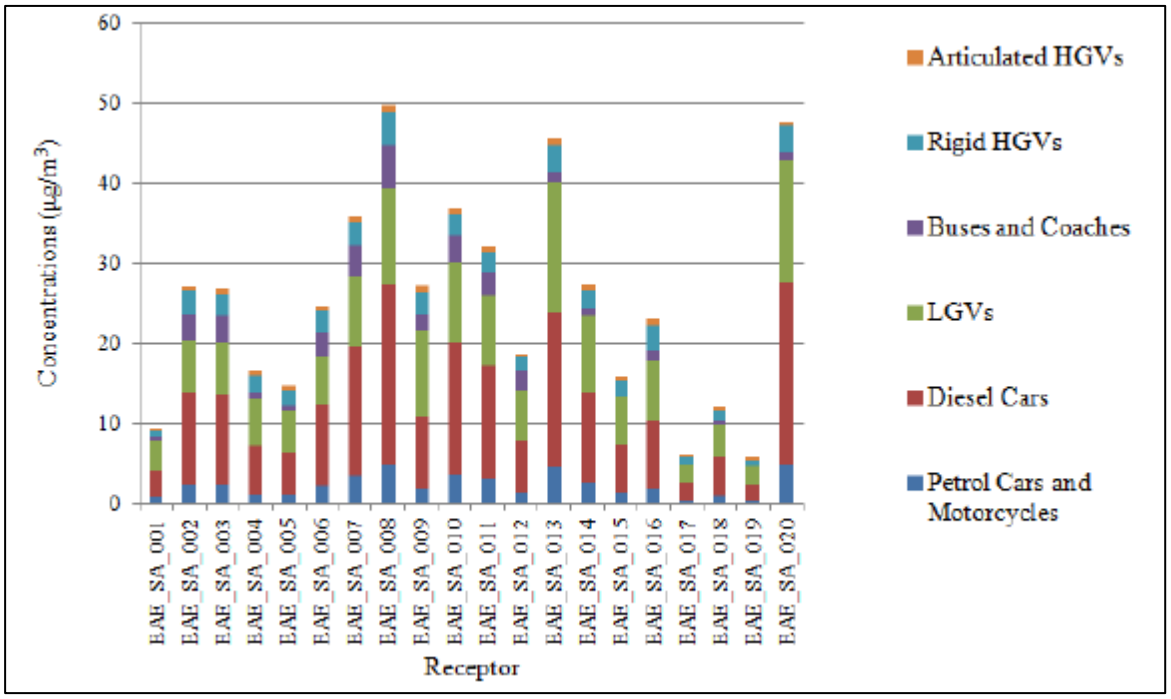


Figure F.2 – Road transport NOx concentrations by vehicle category

Other source include 1. Combustion in commercial, institution and agricultural sectors, 2. Combustion in industry, 3. Combustion in energy production and transfer, 4. Production processes, 5. Extraction and distribution of fossil fuels, 6. Solvent use, 7. Other transport and machinery, 8. Waste treatment and disposal, 9. Agricultural, forests and land use change, 10. Other sources and sinks

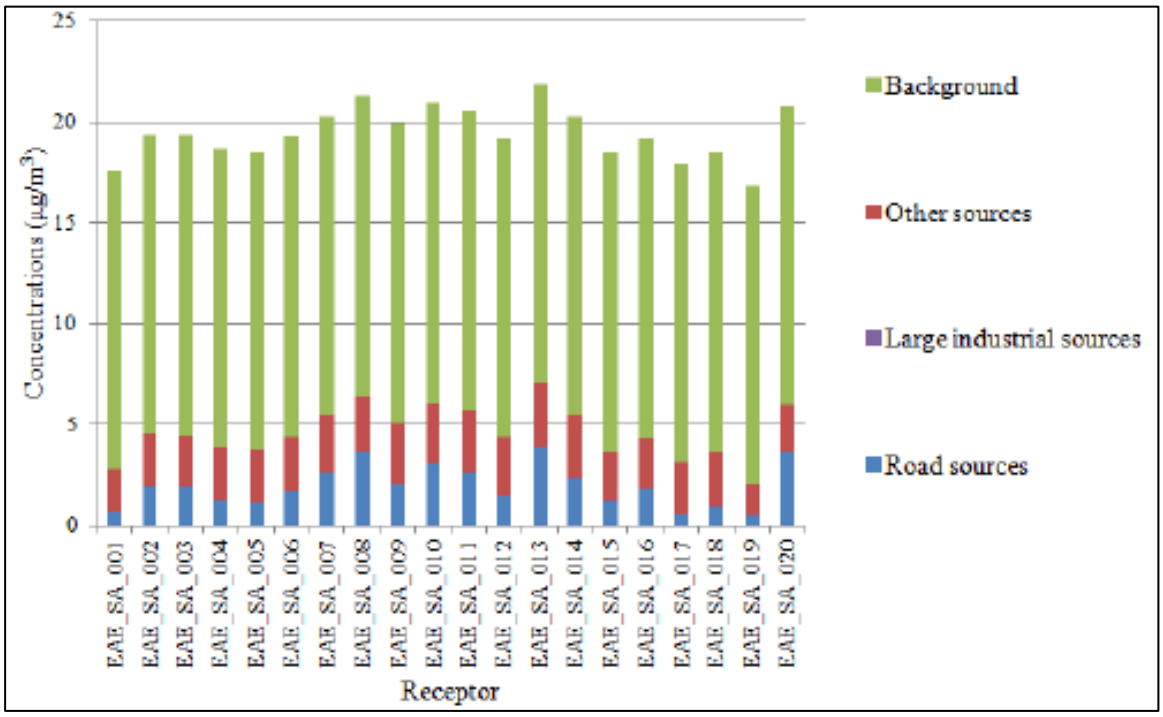


Figure F.3 – PM_{10} concentrations by major source group

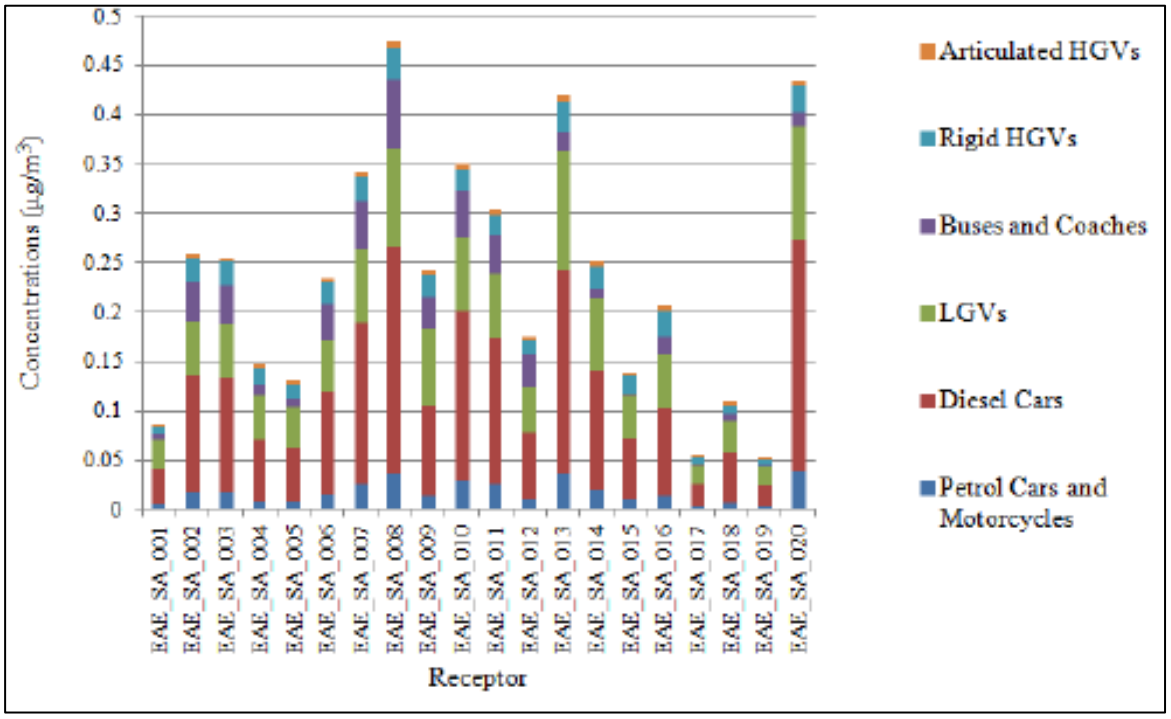


Figure F.4 – Road transport exhaust PM_{10} concentrations by vehicle category

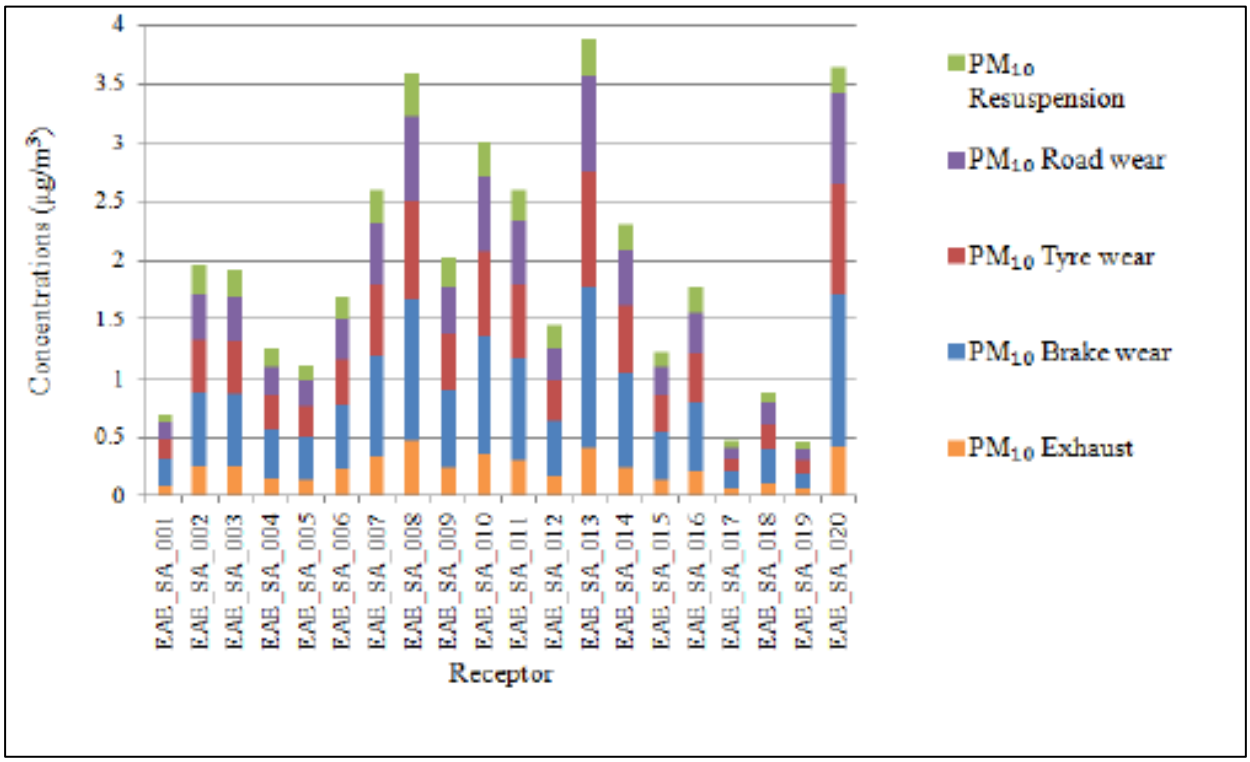


Figure F.5 – Road transport PM_{10} road transport concentrations by exhaust and non-exhaust components

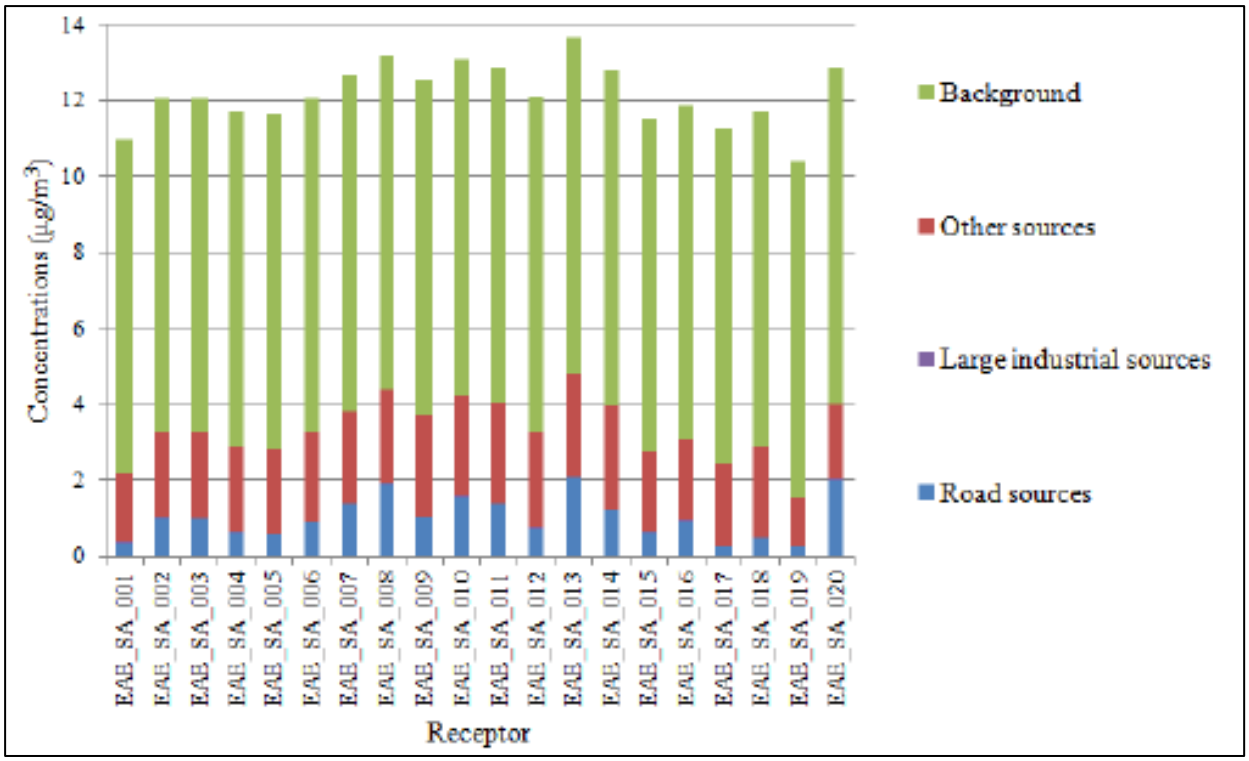


Figure F.6 – $PM_{2.5}$ concentrations by major source group

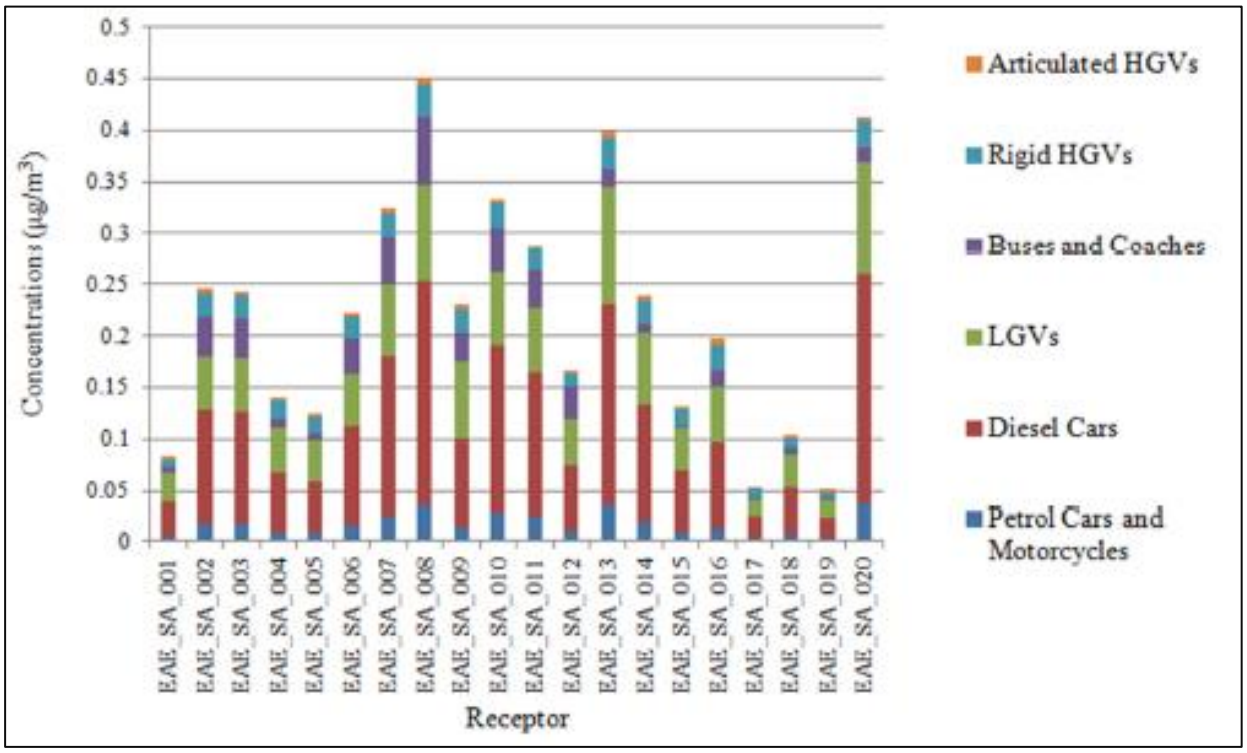


Figure F.7 – Road transport exhaust $PM_{2.5}$ concentrations by category

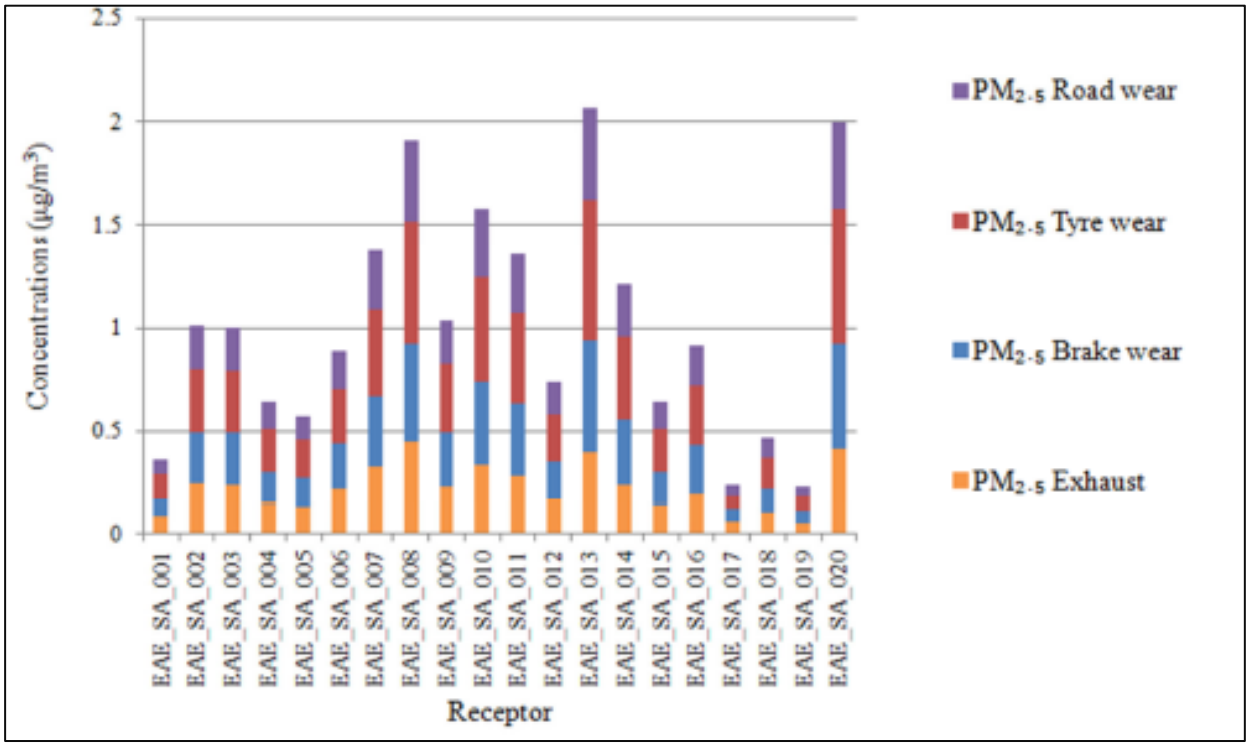


Figure F.8 – Road transport $PM_{2.5}$ concentrations by exhaust and non-exhaust components

Appendix G: Summary of Air Quality Objectives in England

Table G.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[8]	
	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

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

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
CERC	Cambridge Environmental Research Consultants
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EEBC	Epsom & Ewell Borough Council
EU	European Union
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PHE	Public Health England
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm 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