2022 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995

Local Air Quality Management

Date: June 2022

Stantec

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Executive Summary: Air Quality in Our Area

The following Annual Status Report (ASR) was prepared and written by Stantec UK Ltd (Stantec), on behalf of Elmbridge Borough Council ('the Council') in accordance with Local Air Quality Management (LAQM) Technical Guidance (TG) 2016[1], published by Department for Environment , Food and Rural Affairs (DEFRA) on behalf of the devolved administrations. The 2022 ASR provides the latest information regarding air quality in Elmbridge for the reporting year of 2021. It also provides updates on actions to improve air quality that have occurred since the previous 2021 ASR was published.

Air Quality in Elmbridge

This report is designed to provide a summary for those living and working within the Borough of Elmbridge about the state of air quality in the area. It also provides progress on the actions that the Council and others, including the public, are taking, or could take, to improve air quality. Air quality and a healthy environment is important to the Council and measures to improve air quality also feature in our Council Plan[2].

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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas[3,4].

[1] DEFRA. Local Air Quality Management Technical Guidance (LAQM: TG.16). April 2021.

[2] Elmbridge Borough Council. Council Plan 2020/2021.2020.

[3] Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

[4] DEFRA. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages[5], with a total estimated healthcare cost to the NHS and social care of £157 million in 2017[6].

The main air pollutants of concern within Elmbridge are nitrogen dioxide (NO_2) and particulate matter ($PM_{2.5}$). The air quality objectives relevant to LAQM in England are outlined in Appendix E. Monitoring in the Borough shows that there were no breaches of the annual mean objective for NO_2 in 2021 at any of the monitoring locations. It should be noted that measured NO_2 concentrations in 2020 and 2021 were much lower than previous years due to the impact of COVID-19 restrictions on road traffic levels. A generally decreasing trend in measured concentrations is apparent at the majority of monitoring sites from 2017 to 2021. The Council has obtained funding for a $PM_{2.5}$ automatic monitoring station to be installed in the Borough by March 2023, this will establish a baseline for levels of particulate matter in the Borough, and to monitor progress in reducing particulate levels.

Whilst the air quality objectives do not include $PM_{2.5}$, the 2019 Clean Air Strategy[7] includes a commitment to set a "new, ambitious, long-term target to reduce people's exposure to $PM_{2.5}$" which the proposed Environment Bill 2019-2021[8] commits the Secretary of State to setting. Two $PM_{2.5}$ targets to be set under the Environment Bill are currently under consideration: an annual mean $PM_{2.5}$ concentration target; and an exposure reduction target. The Environment Bill introduces a duty on the government to set these targets by October 2022.

The World Health Organisation (WHO) sets out more stringent target levels for $PM_{2.5}$ than the legal air quality objectives in the UK, and the Council has ambitiously committed to achieving the WHO level by 2030. This can only be achieved through partnership working with the Surrey Authorities to drive down levels of $PM_{2.5}$ across the County. In September 2021 the WHO introduced even more stringent Guideline Values for particulates (5 $\mu g/m^3$), the AQAP target will remain at the former Guideline Value of 10 $\mu g/m^3$ for $PM_{2.5}$.

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[5] Defra. Air quality appraisal: damage cost guidance, July 2021

[6] Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

[7] DEFRA. Clean Air Strategy, 2019

[8] DEFRA. Policy Paper September 2021: Air Quality Factsheet (Part 4). Updated 1st April 2022

Surrey-wide modelling of pollutant concentrations, undertaken by Cambridge Environmental Research Consultants (CERC)[9], provides source apportionment predictions for nitrogen oxides (NOx: nitric oxide (NO) plus NO_2) in Elmbridge. The largest contributor to NOx emissions in Elmbridge is road transport sources (48%), with diesel cars (20%) being the largest contributor within the road transport source group. The largest contributor to $PM_{2.5}$ emissions is "other sources" at 20%[10] which is followed by road source contribution at 17%.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further. Furthermore, the Council is committed to targeting $PM_{2.5}$ pollution through a range of interventions with the aim of achieving concentrations of less than 10 µg/m^3 by 2030 across the Borough.

The 2019 Clean Air Strategy[11] sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero[12] sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMAs) are designated due to elevated concentrations heavily influenced by transport emissions.

The Council works to understand local air quality through an appropriate monitoring network within its administrative boundary. In March 2021, the Council's Environmental Services Team applied for Community Infrastructure Levy (CIL) funding for a new roadside automatic particulate monitor capable of monitoring both PM_{10} and $PM_{2.5}$ to be installed in

[9] CERC. Detailed Air Quality Modelling and Source Apportionment for Elmbridge Borough Council. Final Report. November 2019.

[10] Other sources include the following combustion in commercial, institution and agricultural sectors, combustion in industry, combustion in energy production and transfer, production processes, extraction and distribution of fossil fuels, solvent use, other transport and machinery, waste treatment and disposal, agricultural, forests and land use change, other sources and sinks.

[11] DEFRA. Clean Air Strategy, 2019

[12] DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Elmbridge. The automatic monitoring location was approved by the CIL Strategic Board on 7 June 2021 and endorsed by Cabinet on 7 July 2021. A review of suitable locations for the new particulate monitor was undertaken by Stantec on behalf of the Council (see Appendix F) in October 2021. Installation of the monitoring site is expected by March 2023.

Measures to improve air quality have been included in the Council's Development Management Plan and air quality is an important consideration for all planning applications, particularly within and adjacent to the Borough's six AQMAs. Air quality will also be embedded in the emerging Local Plan which is currently being prepared. The Council has committed to preparing several Supplementary Planning Documents (SPDs), that will provide detailed guidance on the implementation of policies set out in the Local Plan. This includes the Climate Change & Renewables SPD and the Elmbridge Design Code that will provide detailed guidance for addressing issues of air quality and will be aimed at those involved in the design, submission and determination of schemes and planning applications where air quality needs to be addressed.

The Council continues to fund and promote the airAlert pollution warning service to people living and working in the Borough. As of May 2022, 283 residents in Elmbridge had subscribed to receive airAlerts. The Council also utilises its website to display public information regarding air quality, including an animation of wood burning stoves which was added to the website in 2020 (see image below). This supported a joint campaign with the Surrey Air Alliance (SAA) for Clean Air Day that was delayed from June to October 2020 due to the COVID-19 pandemic.

Clean Air Day on 17 June 2021 focused on promoting five practical steps the public can take to improve air quality in Elmbridge supported by a short animation. EBC also hosted a joint initiative with the Energy Saving Trust on “help your staff go electric this Clean Air Day” whereby council staff and colleagues across SCC and Surrey District and Boroughs attended a virtual meeting that gave impartial advice on making the switch to an electric vehicle.

In July 2019, the Council declared a 'Climate Emergency' and have pledged to take action locally to contribute to national carbon neutral targets through the development of policies and practices, together with the aim of making the Council a carbon neutral organisation by 2030. In the Council's Service Delivery Plan for 2022/2023, a Council key priority is to respond to the climate change emergency and carbon neutral aim. The Council has adopted its Carbon Management and Reduction Plan[13] in 2021 to assist in the delivery of this commitment. There are number of carbon reduction measures proposed which will also benefit air quality, including the installation of electric car charging points in the key Council car parks, refreshing the air quality action plan for cleaner air and encouraging the use of sustainable transport modes.

Air Quality Action Plan 2021 – 2026

Throughout 2021, the Council has continued to progress the Air Quality Action Plan (AQAP) 2021 – 2026, despite resourcing challenges resulting from COVID-19. Steering Group meetings were held in August 2020 with stakeholders to develop suitable action

[13] Elmbridge Borough Council (2021). Carbon Management and Reduction Plan. Available at: https://www.elmbridge.gov.uk/pollution/climate-change-and-sustainability/

plan measures and the AQAP went out for public consultation between 10th March – 5th May 2021. The Council's AQAP has been approved by DEFRA and Council members and was adopted in December 2021. Progress on measures to improve air quality within the AQAP have been reported in this ASR.

Surrey Air Alliance

The Surrey Air Quality Study Group, formed in May 2016, has developed into the Surrey Air Alliance (SAA) made up of officer representatives from all eleven District and Borough Councils, and Surrey County Council's (SCC) Highways and Public Health services.

The Council continues to be an active member of the Surrey Air Alliance (SAA) and assist in the delivery of the SAA workplan. A key workplan task on which the Council has taken the lead on is the Surrey-wide air quality modelling project. The air quality modelling project, undertaken by CERC, was completed in 2019 and establishes a clear baseline for key pollutants (NO_2, PM_{10} and $PM_{2.5}$) across Surrey. The Council will work with the SAA to deliver an update to the Surrey-wide modelling in 2024. The interactive contour maps of modelled pollutant concentrations have continued to be hosted on the SCC website throughout 2021: https://surreycc.maps.arcgis.com/apps/webappviewer/index.html?id=43910ffb100248ed972115b7a9b49d20

The second workplan project Elmbridge is involved in is directed at raising awareness of air quality within schools close to AQMAs. The SAA applied to DEFRA for a further £264,819 of funding to support schools across Surrey close to AQMAs to develop School Travel Plans, develop and pilot a new cycle training course for secondary school children

and an overarching media campaign. In March 2020, DEFRA confirmed that the project scored well, and was put before the final panel, but was unsuccessful on this occasion.

Since the end of the DEFRA air quality work, the SAA jointly with The Safer Travel Team received grant funding from Surrey County Councils Rethinking Transport budget to support schools in encouraging parents and children to travel to school more sustainably. An additional 16 schools have benefitted from the one off grant payment to improve facilities such as cycle storage or scooter pods. By the end of the academic year 22/23 the 16 schools will have completed a school travel plan on Modeshift STARS to a bronze accreditation level, in addition some of these schools have also accepted the challenge to become Green Flag schools through the internationally recognised Eco Schools Framework, focusing their efforts on topics including Transport and energy.

Encouraging uptake of Sustainable Travel Modes

During 2020, a Local Cycling and Walking Infrastructure Plan (LCWIP) for Elmbridge began the early stages of its development and feasibility work progressed throughout 2021. An interactive map on the Council's website has been setup to allow members of the public to suggest where walking and cycling improvements are most needed in order

to feed into the feasibility work. The LCWIP is being developed in accordance with Department for Transport (DfT) guidance[14] and will include the following:

- identification of where good walking and cycling facilities would be most beneficial;
- identify what improvements are required at these locations; and
- plan how these improvements can be delivered, and which to prioritise first.

The LCWIP for Elmbridge has been developed and will move to implementation phase. Prioritisation of the routes has been completed; the feasibility expected to commence in August 2022. The LCWIP will have benefits in relation to encouraging walking and cycling in Elmbridge.

Encouraging Uptake of Electric Vehicles

The Council's Environmental Enforcement Officers continue to use an electric pool car for work travel. The Council's Parking Enforcement Contractor has also implemented a move towards an electric and hybrid vehicle fleet with the purchase of four electric motorbikes, two electric cars and a low emissions van. The Council also utilise the planning regime to increase the provision of electric vehicle charging points within the Borough.

As part of an upgrade to Holly Hedge car park in Cobham, the Office for Low Emission Vehicles (OLEV) funded rapid charger was replaced in 2021 with four fast charging points and infrastructure for a further two - a significant increase in charging provision. The new chargers are now fully operational. Similar upgrades of 4 fast charging points in Churchfield Car Park, Weybridge and the Civic Centre Car Park, Esher and Drewitts Court Car Park Walton on Thames are planned to be completed by the end of 2022. Six fast charging points will also be fitted in the Xcel Leisure Car Park Waterside Drive, Walton on Thames by the end of 2022.

In 2020, the SAA applied for a DEFRA 2020/21 Air Quality Grant to fund a project to encourage a greater uptake of Electric Vehicles as Taxi's across 7 eligible Boroughs and Districts in Surrey. Taxis were selected as the target vehicles given the high mileage and multiple trips the vehicles make within Surreys AQMA's and also the nature of the journeys which take the vehicles into areas frequented by the members of our communities who are most sensitive to air pollution such as to hospitals and care facilities and schools. In March 2021, the project was awarded £256.686 from the DEFRA Air Quality Grant Fund.

[14] DfT. Local Cycling and Walking Infrastructure Plans. Technical Guidance for Local Authorities. April 2017.

Following attempts to find a supplier and to begin procurement in 2021 it became clear that the prolonged impact of the pandemic on the taxi trade made the project unviable as it had been originally configured, and no vehicle supplier could be found. The project was reconfigured to accommodate longer vehicle trials based on feedback from the taxi trade and potential vehicle suppliers. DEFRA have asked for a legal opinion on State Aid regarding the reconfigured project and for a formal summary of the changes, the documents are currently under legal review before being submitted to Defra for approval for the project to continue.

The project is linked to Low Carbon Across the South East funding from the European Regional Development Fund through Surrey County Council, to provide grants to assist taxi drivers in switching to an electric vehicle through a subsidy. The Council is participating in this project and the Council's Licensing and Pollution Teams are supporting the project which is planned to be implemented later this year subject to approval of the revised scheme

In July 2020 the Council adopted a new Taxi and private hire licencing policy 2020 – 2025 that came into force on 1 September 2020. The new policy recognises the need to ensure the health and wellbeing of residents and aims to improve local air quality by encouraging the use of low and ultra-low emissions taxi and private hire vehicles such as electric, hybrid or liquified petroleum gas (LPG). From 1 September 2020 the Council will not issue new licences for diesel vehicles and all new petrol vehicles must meet the latest Euro emission standards. By 1 January 2026 the Council will phase out the use of all diesel vehicles, and petrol vehicles that do not meet the latest Euro emission standards.

Conclusions and Priorities

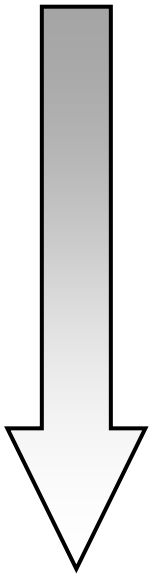
Air quality monitoring has shown a general decrease in NO_2 concentrations across the Borough since 2017. Monitoring in the Borough shows that there were no breaches of the annual mean objective for NO_2 in 2021 at any of the monitoring sites. However, it should be noted that measured NO_2 concentrations in 2020 and 2021 were much lower than previous years due to the impact of COVID-19 on road traffic levels. Further action is still required as there is uncertainty surrounding future trends in air quality following the return of traffic flows to pre-pandemic levels. Furthermore, the Council is committed to targeting $PM_{2.5}$ pollution through a range of interventions with the aim of achieving a concentration of less than 10 µg/m^3 by 2030 across the Borough. Achieving this target will require a move towards the use of more active travel modes across the Borough.

Concentrations have remained below the annual mean NO_2 objective at monitoring sites in the Hinchley Wood, Walton-on-Thames High Street and Walton Road, Molesey AQMAs since 2017. Furthermore, measured annual mean NO_2 concentrations in these AQMAs were more than 10% below the annual mean NO_2 objective in 2017, 2018, 2020 and 2021. However, due to elevated concentrations in 2019, the Hinchley Wood, Walton-on-Thames High Street and Walton Road, Molesey AQMAs have not been considered for revocation at this time as a minimum of three consecutive years of concentrations more than 10% below the annual mean NO_2 objective is required. Monitoring will continue in the AQMAs until there is robust monitoring evidence to support the revocation of the AQMAs.

Measured annual mean NO_2 concentrations within the former Cobham High Street AQMA (Cobham 1 and Cobham 7) have been more than 10% below the annual mean NO_2 objective for several years. The revocation of the Cobham High Street AQMA was approved by DEFRA in 2020.

Following the review of CERC modelling data and suitability of existing monitoring locations carried out by Stantec, an additional eight diffusion tube monitoring sites were deployed in January 2020, the monitoring results from which have been reported in this ASR. Stantec was also commissioned by the Council to undertake a review of existing diffusion tubes in April 2020 to advise on any sites that should be relocated to a more suitable location. Five diffusion tube monitoring sites were relocated in May 2020 as a result of the review, the results from which have also been reported in this ASR. In 2020, Cobham 11, recorded an exceedance of the annual mean NO_2 objective, however no exceedance occurred at the nearest location of relevant exposure. In 2021, this monitoring location did not exceed the annual mean NO_2 objective, however, this monitoring location will continue to be closely monitored in future years.

The areas prioritised for action in 2021/2022 are:



- **Priority 1 – reducing NO_2 levels within the Borough's AQMAs to below the objective in the shortest time practicable.**
- **Priority 2 - targeting $PM_{2.5}$ through a range of interventions with the aim of reaching the World Health Organisations recommended level of 10µg/m^3 by 2030 within the Borough.**
- **Priority 3 – modal shift to more sustainable transport.**
- **Priority 4 – ensuring air quality is a priority within the Council's policies and those of SCC and assist in delivering the projects and actions.**
- **Priority 5 – partnership working as part of the SAA to improve Surrey's air quality.**

Local Engagement and How to get Involved

As part of the approach of local engagement we will use messages such as the following:

- As the majority of air pollution is associated with traffic, consider alternatives to using your car; public transport, walking or cycling will help reduce emissions.
- When purchasing a new car, consider vehicles with lower exhaust emissions, such as hybrid or electric vehicles. Information on electric car grants is available at www.gov.uk/plug-in-car-van-grants.
- If you are carrying out building works, consider future-proofing your home by installing an electric vehicle charge point. A fast (7kW) charger is recommended and there are grants available which can bring the cost down to under £300. More information can be found at: https://www.gov.uk/government/collections/plug-in-vehicle-chargepoint-grants.
- If installing or replacing an existing wood burning stove, consider purchasing one that has been approved for use in smoke control areas by DEFRA or an Eco-design ready stove to help reduce emissions. More information can be found at: https://www.elmbridge.gov.uk/pollution/local-air-quality/
- Air pollution can cause short term (acute) and long term (chronic) health problems. The most sensitive groups are adults and young children with respiratory conditions and adults with heart conditions. If you feel that you are in one of the higher risk

groups or have particular concerns regarding air quality, you can sign up to our airAlert information service. For more information visit the airAlert website at: http://www.airalert.info/Surrey/Default.aspx.

Local Responsibilities and Commitment

This ASR was prepared by Planning and Environmental Health Team at Elmbridge Council with the support and agreement of the following officers and departments:

Elmbridge Borough Council – Planning and Environmental Health, Assets Management and Property Services.

Members of the Surrey Air Alliance (SAA made up from the 11 Surrey Districts and Boroughs, Surrey County Council Public Health and Highways Teams)

This ASR has been approved by:

- Kim Tagliarini, Head Planning and Environmental Heath Elmbridge Borough Council
- Ruth Hutchinson, Director of Public Health Surrey County Council
- Cllr Karen Randolph, Portfolio Holder for Planning and Environmental Health and Licensing approved the ASR at Individual Cabinet Member Decision Making (ICMDM) on 20 June 2022

If you have any comments on this ASR, please send them to Paul Leadbeater at:

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1 Local Air Quality Management

This report provides an overview of air quality in Elmbridge during 2021. 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 Elmbridge Borough Council ('the Council') to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1, 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 should prepare an Air Quality Action Plan (AQAP) within 12 months setting out measures it intends to put in place in pursuit of compliance with the objectives.

A summary of AQMAs declared by the Council can be found in Table 2.1. The table presents a description of the six AQMAs that are currently designated within Elmbridge. Appendix D: Maps of Monitoring Locations and AQMAs provides maps of AQMAs and also the air quality monitoring locations in relation to the AQMAs. The AQMAs have all been declared due to exceedances of the annual mean NO_2 objective.

In 2020, the revocation of the Cobham High Street AQMA was approved by the Department of Environment, Food and Rural Affairs (DEFRA) as it has been demonstrated by robust monitoring evidence that there are no longer any breaches of the air quality objectives in the AQMA. Furthermore, future vehicle emissions in the AQMA are estimated to decline, which is anticipated to result in a continued improvement in air quality within the former AQMA.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Walton-on-Thames High Street	01/11/2013	NO_2 Annual Mean	An area encompassing part of the High Street, Walton-on-Thames, between its junction with Hepworth Way/Church Street and Ashley Road/Herhsam Road	YES	42.3	28	Air Quality Action Plan for Elmbridge Borough 2021 - 2026	https://www.elmbridge.gov.uk/pollution/local-air-quality/
Weybridge High Street	17/11/2008	NO_2 Annual Mean	An area encompassing Balfour Road, Church Street, High Street and Monument Hill, Weybridge.	YES	62	33.6	Air Quality Action Plan for Elmbridge Borough 2021 - 2027	https://www.elmbridge.gov.uk/pollution/local-air-quality/
Hampton Court	17/11/2008	NO_2 Annual Mean	An area encompassing parts of Hampton Court Way and Riverbank.	NO	50.7	27	Air Quality Action Plan for Elmbridge Borough 2021 - 2028	https://www.elmbridge.gov.uk/pollution/local-air-quality/
Hinchley Wood	17/11/2008	NO_2 Annual Mean	An area encompassing part of the A309 Kingston Bypass between Littleworth Road and Manor Road North.	YES	57.7	29.6	Air Quality Action Plan for Elmbridge Borough 2021 - 2029	https://www.elmbridge.gov.uk/pollution/local-air-quality/

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	One Line Description	Is air quality in the AQMA influenced by roads controlled by National Highways?	Level of Exceedance: Declaration	Level of Exceedance: Current Year	Name and Date of AQAP Publication	Web Link to AQAP
Esher High Street	17/06/2005	NO_2 Annual Mean	An area extending along the High Street, Church Street and including parts of Esher Green and Lammas Lane.	YES	62.1	30.2	Air Quality Action Plan for Elmbridge Borough 2021 - 2030	https://www.elmbridge.gov.uk/pollution/local-air-quality/
Walton Road, Molesey	18/06/2005	NO_2 Annual Mean	An area extending 50m either side of the centre line of Walton Road, Molesey between its junction with Tonbridge Road and Esher Road/Bridge Road.	NO	55.8	27.1	Air Quality Action Plan for Elmbridge Borough 2021 - 2031	https://www.elmbridge.gov.uk/pollution/local-air-quality/

☒ **Elmbridge Borough Council confirm the information on UK-Air regarding their AQMAs is up to date.**

☒ **Elmbridge Borough Council confirm that all current AQAPs have been submitted to Defra.**

2.2 Progress and Impact of Measures to address Air Quality in Elmbridge

DEFRA's appraisal of last year's ASR concluded the report is well structured, detailed and provides information specified in the Guidance. DEFRA go on to say that the Council provided a thorough report which contains the required content and goes beyond in a number of cases to explain its decision making thoroughly. Furthermore, the following comments were provided by DEFRA to help inform future reports:

- The AQAP has been subject to an understandable delay, but submission of the draft commended during a challenging year. It is hoped that the AQAP will be adopted in 2021.
- A thorough review of the monitoring strategy has been undertaken and changes implemented including the planned commissioning of particulate monitor.
- The AQMAs have been reviewed including a clear discussion of when revocation would be considered and the close monitoring of Cobham 11 to identify if an AQMA is required in the area.
- Monitoring was presented in the correct format and QA/QC was detailed in the report.
- In the discussion of the use of local bias adjustment factors over the national factor, it may be useful to be specific what the national factor is, for comparison. If necessary, a sensitivity test can be performed to highlight any cases whereby the use of the national factor would cause any monitors to tip the exceedance.
- Charts and maps were presented clearly and were helpful in understanding the data presented.

The 2022 ASR has addressed these comments in the following areas:

- The AQAP has been adopted and published in 2021.
- The Council has secured funding for an automatic particulate monitoring station, however due to contractual barriers this is hoped to be installed in by March 2023.
- Cobham 11 is being closely monitored to identify if a new AQMA is required. Measured concentrations at this monitoring location were below the annual mean NO_2 objective in 2021.
- A description of the national bias adjustment factor is included in this ASR in Appendix C.

- A comparison between the national bias adjustment and the local bias adjustment was undertaken including a sensitivity test highlighting where the use of the national bias adjustment factor would cause an exceedance (see Appendix C).

The Council has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Thirty-two measures are included within Table 2.2, with the type of measure and the progress the Council have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

Key completed measures are:

- The adoption of AQAP 2021 – 2026.
- Progress on development of a LCWIP for Elmbridge.
- Installation of electric vehicle charging points at Holly Hedge Car Park Cobham
- Production of a ‘wood burning stoves animation’ for the Council website.
- Continued funding and promotion of the airAlert pollution warning service.
- Continued support of the successful engagement and behaviour change programme in Surrey schools.
- Responding to the ‘Climate Emergency’, included as a priority in the Council Plan 2020/2021 and 2022/2023, and implementation of the Council Carbon Management and Reduction Plan.

The Council’s expects the following measures to be completed over the next reporting year:

- Increasing the number of electric vehicles charging points in an additional four Council car parks.
- Investigate and adopt Air Quality Positive principles in the Climate Change & Renewables SPD and / or Elmbridge Design Code.
- Installation of an automatic roadside particulate monitor within the Borough.
- Supporting Transport for South East including the publication of the Strategic Investment Plan.
- Air Quality appropriately considered within the Local Transport Plan 4 (LTP4).
- Progress on development of LCWIP for Elmbridge.

The Councils priorities for the coming year remain:

- Priority 1 – reducing NO_2 levels within the Borough's AQMAs to below the objective in the shortest time practicable.
- Priority 2 - targeting $PM_{2.5}$ through a range of interventions with the aim of reaching the World Health Organisations recommended level of 10µg/m^3 by 2030 within the Borough.
- Priority 3 – modal shift to more sustainable transport.
- Priority 4 – ensuring air quality is a priority within the Council's policies and those of SCC and assist in delivering the projects and actions.
- Priority 5 – partnership working as part of the SAA to improve Surrey's air quality.

The Council has worked to implement these measures in partnership with the following stakeholders during 2021:

- SAA; Includes all Surrey Districts and Boroughs, SCC Public Health and Highways Teams
- SCC Trading Standards Team
- SCC Safer Travel Team

The principal challenges and barriers to implementation that the Council anticipates facing in the next reporting year are:

- Action EBC 13 - Progress on the installation of the particulate monitor has been delayed due to site approval and the contractual changes. This will therefore be a barrier to the implementation of this measure over the coming year with a new anticipated installation date of March 2023.
- Action EBC5 - Investigating options for a cargo bike scheme has been delayed until 2023/4 due to resources and Covid recovery of high street businesses.

The Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in all the Council's six AQMAs.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
EBC-1	Use of, and exploration of possibilities for increasing use of, Council electric vehicles for journeys within the Borough and supporting electric vehicle use by Council contractors	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	2020	2025	EBC	EBC	NO	Partially Funded	£10k - 50k	Implementation	Reduced vehicle emissions	Environmental Enforcement officer's new electric vehicle	Environmental Enforcement officers use an electric pool car for visit visits within the borough Parking enforcement contractor moved to green fleet.	The Carbon Management and Reduction Plan includes actions that will assist in the implementation of this measure including: • Review of the Council's internal purchases, working towards the ambition of an ultra-low carbon fleet. • Replace and review existing electric vehicle fleet and increase number of electric pool cars. The full Carbon Management and Reduction Plan can be viewed at: Elmbridge Borough Council - Our apporoach
EBC-2	Increasing the number of electric vehicles charging points in Council car parks	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV recharging, gas fuel recharging	2020	2022	EBC	EBC	NO	Partially Funded	£10k - 50k	Implementation	Reduced vehicle emissions	No. of charging points installed	Rapid Charger in Holly Hedge Car Park Cobham replaced with four fast charging points . Fast charging points to Esher Civic Centre, Churchfield Weybridge and Drewitts Court Walton car parks to be completed by end 2022.In addition to six charging points to the Xcel Leisure Centre Walton.	A requirement for all developments to implement electric vehicle charging points in accordance with the standards set out in the Parking Supplementary Planning Document (SPD) has been included in the emerging Local Plan. The Council adopted the Parking SPD in July 2020. The document includes standards that new developments are expected to meet in relation to electric vehicle charging infrastructure. The Parking SPD is available at: Elmbridge Borough Council - Supplementary planning documents The Parking SPD will be reviewed following the adoption of the new Local Plan.

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
EBC-3	Use of a tiered fee structure for taxi licensing to benefit operators with lower emission vehicles	Promoting Low Emission Transport	Taxi Licensing conditions	2020	2026	EBC	N/A	NO	Funded		Implementation	Reduced vehicle emissions	Percentage/ type diesel vehicles remaining	New EBC Taxi and Private Hire Licensing Policy adopted in September 2020.	The EBC Taxi and Private Hire Licensing Policy 2020 – 2025 includes a commitment to phase out use of all diesel-fuelled vehicles and petrol-fuelled vehicles that do not meet the latest Euro standard. From September 2020, new licences will not be issued for diesel-fuelled vehicles or petrol-fuelled vehicles that do not meet the latest Euro standard. Furthermore, if a licence holder wishes to replace their vehicle, the replacement vehicle must meet a higher Euro emission standard that the existing vehicle. The Taxi and Private Hire Licensing Policy is available at: Elmbridge Borough Council - Policies and information for passengers Also see SCC-3, SAA DEFRA grant from Taxi project
EBC-4	Reducing Council staff and fleet transport emissions as part of the Council's Carbon Reduction Strategy	Promoting Travel Alternatives	Workplace Travel Planning	2020	2030	EBC	EBC	NO	Partially Funded	£10k - 50k	Implementation	Reduced vehicle emissions	Latest carbon reduction action plan updates.	Initial assessment of emissions completed	The Carbon Management and Reduction Plan (CRMP) includes actions that will assist in the implementation of this measure including: • Review of the Council's internal purchases, working towards the ambition of an ultra-low carbon fleet. • Replace and review existing electric vehicle fleet and increase number of electric pool cars. The full Carbon Management and Reduction Plan can be viewed at: Elmbridge Borough Council - Our apporoach

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EBC-5	Investigate options for a pilot cargo bike scheme for local businesses	Promoting Travel Alternatives	Promotion of cycling	2021	2023	EBC			Not Funded		Implementation	-	-		High streets are where the Boroughs AQMAs are located. Exploring alternate delivery options for high street businesses could help reduce emissions within AQMAs. SCC to implement measure through the Local Transport Plan 4 (LTP4). Investigating options for a cargo bike scheme has been delayed until 2023/4 due to resources and Covid recovery of high street businesses.
EBC-6	Work towards fulfilling the Council's pledge to be carbon neutral by 2030	Promoting Travel Alternatives	Other	2020	2030	EBC	EBC	NO	Partially Funded	£10k - 50k	Implementation	-	-	Key priority in the Council's Service and Delivery Plan for 2020/2021. Carbon Management and Reduction Plan adopted.	The Carbon Management and Reduction Plan contains actions aimed at fulfilling the Council's Carbon neutral pledge. Such actions that will also be beneficial to air quality include: • Seeking strategic direction on enabling remote working for Council staff. • Replacement of gas-fired boilers with electric or other state-of-the- art technologies at the Civic Centre. • Planning for future replacement of gas-fired boilers at community centres. The full Carbon Management and Reduction Plan can be viewed at: Elmbridge Borough Council - Our apporoach The emerging Local Plan will also seek to encourage more sustainable development through the implementation of policies regarding energy usage etc. One of the key principles of the plan is Tackling Climate Change

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EBC-7	Embed air quality in the Local Plan	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2021	2023	EBC	EBC	NO	Funded	< £10k	Implementation	Reduced vehicle and building emissions	Adoption of the Local Plan and the Climate Change & Renewables SPD and Elmbridge Design Code	Ongoing	The emerging Local Plan will seek to encourage more sustainable development through the implementation of policies regarding matters such as energy efficiency, renewable and low carbon energy; minimising waste and promoting a circular economy; promoting high standards of sustainable design; encouraging sustainable transport modes and, the delivery of electric vehicle charging, etc. Specific guidance relating to air quality in terms of standards and design is to be covered in the Climate Change & Renewables SPD and Elmbridge Design Code. The latest information regarding the emerging Local Plan can be found at: Elmbridge Borough Council - Local Plan: current and emerging policy and guidance
EBC-8	Indoor air quality to be considered as part of the planning process for new development in the AQMAs	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2020	2026	EBC	N/A	NO			Planning	N/A	Number of planning applications in AQMA with indoor air quality considered	Ongoing	Housing within existing high streets is on the increase. The six AQMA's are all high street locations. While indoor air quality is not the primary focus of an AQAP it is included as an action on the grounds of public health. Consideration will be given to inclusion within an SPD on air quality.

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EBC-9	Investigate including Air Quality Positive principles in a Design and Renewables SPD	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	2021	2023	EBC	EBC	NO	Partially Funded	< £10k	Implementation	Reduced vehicle and building emissions	Number of planning applications considered to be air quality positive	Ongoing	Details on how this can be achieved to be provided within SPD's covering design and renewables. Also, a separate SPD on air quality if required. The Publication London Plan (December 2020), published in 2021, requires large-scale developments to consider how air quality can be improved across the area through an Air Quality Positive approach. The Air Quality Positive approach requires new development proposals to consider ways in which the development could maximise benefits to local air quality, as well as what measures and design features that will be put in place to reduce exposure to air pollution.
EBC-10	Encouraging residents to refrain from garden bonfires	Public Information	Via the Internet		2026	EBC	EBC	NO	Funded	< £10k	Implementation	Reduced stationary source emissions	Reduction in the number of "bonfire" complaints received	Ongoing	Use of the Council's website and social media to promote changes in behaviour to move away from burning.
EBC-11	Promoting approved wood- burning stoves and burning of approved products and encouraging recycling of waste	Promoting Low Emission Plant	Shift to installations using low emission fuels for stationary and mobile sources	2020	2022	EBC	EBC	NO	Funded	< £10k	Implementation	-	-	Animation video on wood burning stoves produced with the SAA.	Wood burning stove animation video. SAA plan on update to animation following new guidance. SAA has met with colleagues in Trading Standards to review options for updating the advice. Considering a future Defra Air Quality Grant application regarding particulates and burning.

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EBC-12	Ensure appropriate and effective monitoring is undertaken across Elmbridge to meet statutory review and assessment duties	Other	Other	2021	2026	EBC	EBC	NO	Funded	< £10k	Implementation	2021 ASR was submitted in June 2021	Production of Air Quality Annual Status Report	Annual reports produced.	The Council seeks to maintain and run and efficient monitoring network. That includes monitoring for nitrogen dioxide via passive diffusion tubes and two monitoring stations. Full monitoring continued throughout 2021
EBC-13	Installation of a $PM_{2.5}$ monitor in Elmbridge	Other	Other	2020	2023	EBC	Community Infrastructure Levy (CIL)	NO	Not Funded	£10k - 50k	Planning	-	Installation of a $PM_{2.5}$ monitoring site	Review of locations completed delays in site approvals and contractual changes	Stantec reviewed locations for $PM_{2.5}$ monitor which was completed in November 2021 (Appendix F) delays in site approvals and securing an electricity supply. Planned new target to be completed by March 2023 due to site approval delays and the contractual changes.
EBC-14	CERC Surrey-wide air quality modelling update	Other	Other	2022	2024	EBC in partnership with SAA	SAA	NO	Not Funded	£10k - 50k	Planning	-	Air quality modelling undertaken		To undertake updated borough modelling in 2024.
EBC-15	Review of diffusion tube locations across the Borough following CERC modelling update	Other	Other	2019	2025	EBC	EBC	NO	Not Funded	< £10k	Planning	N/A	Report on diffusion tube location review produced	Review of diffusion tube locations in accordance with CERC modelling undertake in 2019 and new locations added as a result. Result have been reported in 2021ASR.	Once updated borough modelling has been undertaken, a further review of diffusion tube locations will be carried out.
EBC-16	Monitor impact of London Low Emission Zones in Elmbridge AQMAs	Other	Other	2020	2026	EBC in partnership with SAA	EBC	NO	Funded	< £10k	Implementation	N/A	Results of traffic surveys and reported in air quality annual status reports	SAA to monitor the situation	Potential for negative impacts in Esher and Hampton Court with traffic rerouting around LEZ and ULEZ. Identification of any issues will allow further actions to be targeted in these areas. May 2022, Transport for London (TfL) launch consultation on expanding the Ultra Low Emissions Zone (ULEZ) London-wide. https://haveyoursay.tfl.gov.uk/cleanair?cid=clean-air

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EBC-17	Continuation of the Schools Air Quality Programme	Public Information	Via other mechanisms		2026	EBC in partnership with SAA	DEFRA, SAA	YES	Partially Funded	< £10k	Implementation	Reduced vehicle and building emissions	No. children/schools reached by promotional / engagement activities	Ongoing	The SAA jointly work with the Safer Travel Team at SCC to deliver Modshift STARS in schools. By the end of the academic year 22/23 16 schools will have completed a school travel plan on Modshift STARS to bronze accreditation.
EBC-18	Use of the EBC website to promote public awareness of the Elmbridge AQMAs and air quality in general	Public Information	Via the Internet			EBC	EBC	NO	Funded	< £10k	Implementation	2021 ASR is on website	Latest ASR available on website	Ongoing	The Council's website publishes the ASRs back to 2017, provides a link to the CERC modelling map, plus links to both real time monitors along with a range of advice Elmbridge Borough Council - Local Plan: current and emerging policy and guidance
EBC-19	Continue to promote the AirAlert service	Public Information	Via other mechanisms			EBC	EBC	NO	Funded	< £10k	Implementation	N/A	Number of residents subscribed in Elmbridge	283 subscriptions May 2022	Elmbridge continues to have the highest number of subscriptions within Surrey as of October 2021. AirAlert to be promoted via social media and website.
EBC-20	Clean Air Day Activities	Public Information	Via other mechanisms	2020	2026	EBC	EBC	NO	Partially Funded	< £10k	Implementation	-	-	-	Support the annual Clean Air Day (CAD). The next CAD is on 17 June 2022.
EBC-21	Raise awareness of indoor air pollution through the EBC website and social media	Public Information	Via the Internet	2021		EBC	EBC	NO	Partially Funded	< £10k	Implementation	N/A	Information available on website	Ongoing	Consideration is also given to planning applications for residential development with AQMA's and the likely impacts on indoor air quality
EBC-22	Remain an active member of the Surrey Air Alliance and contributors to Work Plan	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2016		EBC	EBC	NO	Funded	< £10k	Implementation	Reduced vehicle and building emissions	Adoption of Work Plan	Constitution adopted and workplan produced. Regular meetings held.	The SAA facilitates Surrey Authorities, and SCC working together to improve air quality in Surrey. Examples of large projects include CERC County wide modelling project, DEFRA grant for school's project and the recent DEFRA grant for Electric Taxi fleet trial see measure SCC 3.

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EBC-23	Work with the Surrey Authorities to achieve the former WHO Guideline Values for PM_{10} and $PM_{2.5}$ in the Elmbridge Borough by 2030 and any further UK Government targets introduced	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2020	2030	EBC in partnership with Surrey Authorities	N/A				Implementation	Reduction in $PM_{2.5}$ concentrations	Achievement of WHO Guideline Values across Elmbridge	AQAP completed and published on website.	Various measures within the AQAP will assist in quantifying particulate levels within the Borough and seek to reduce PM levels within a local authority sphere of control.
SCC-1	Supporting Transport for South East	Policy Guidance and Development Control	Other policy	2021	2023	GLA, SCC and EBC	Developers & highway infrastructure funding	NO	Partially Funded	> £10 million	Planning	Reduced vehicle emissions	-	Transport Strategy adopted in Summer 2020	Elmbridge is located within two of the five study areas (the inner orbital and southwest radial). The outcome of these studies will form the basis of the Transport for South East Strategic Investment Plan for new transport schemes, initiatives, and policies. Public consultation is expected in summer 2022 and the Strategic Investment Plan is expected to be published in 2022. Further information on Transport for South East can be found at: Home - Transport for the South East

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SCC-2	Implementation of the Low Emission Transport Strategy for Surrey	Policy Guidance and Development Control	Low Emissions Strategy	2018	2026	SCC and EBC	Developers & highway infrastructure funding	NO	Partially Funded	> £10 million	Implementation	Reduced vehicle emissions	Suite of indicators associated with quantum and distribution of air pollution, travel behaviour and delivery of infrastructure for low emission transport options	Strategy in use	The Low Emissions Transport Strategy will be superseded by implementation of the LTP4. Covered within the LTP4 are the following relevant policy areas which, as the Low Emissions Strategy did, will contribute to lower emissions and therefore improved air quality: Planning for Place (through shorter journeys), digital connectivity (through reduced journeys), active travel/personal mobility (through shifting local car trips to walking and cycling), public/shared transport (through shifting local car trips to public/shared transport), demand management for cars (through de-incentivising car trips, and encouraging a shift to other, cleaner modes), demand management for goods vehicles (through incentivising more efficient and cleaner freight movements locally), efficient network management (through reducing congestion and idling), promoting zero emission vehicles (through increasing the uptake of EVs and hydrogen and electric buses, although this particular policy area will target NOx emissions, it will not drastically reduce PM emissions from brake and tyre wear which will still exist) and promoting behaviour change (through encouraging a shift from private petrol/diesel vehicles to more sustainable modes).LTP4 anticipated adoption July 2022.

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SCC-3	Support an electric vehicle strategy for Surrey	Policy Guidance and Development Control	Other policy	2018	2026	SCC and EBC	Developers & highway infrastructure funding	NO	Partially Funded	£100k - £500k	Implementation	-	-	Electric Vehicle Strategy produced and adopted by Elmbridge Borough Council	SCC electric vehicle charging infrastructure pilot underway. The pilot is trialling fast chargers in urban and residential streets in Guildford, Woking, Spelthorne and Waverley. The findings of the pilot will be used to develop EV charging design and policy guidelines. A report on lessons learned will be prepared to inform the delivery of a county-wide roll-out of EV charging infrastructure. As part of the LTP4, a new electric vehicle strategy is being developed and will be published alongside/as part of the LTP4. This will likely be in July 2022, when it is anticipated that the LTP4 will be adopted. The SAA has also submitted a grant application to DEFRA for an electric taxi fleet trial including telemetric devices in vehicles. In March 2021 the project was awarded £256,868 from the DEFRA Air Quality Grant Fund. May 2022 the project is reconfigured to accommodate longer vehicle trials awaiting Defra/ legal approval before continuing.
SCC-4	Implementation of the Climate Change Strategy for Surrey	Policy Guidance and Development Control	Low Emissions Strategy	2020	2025	SCC and EBC	Central Government, developers, highways and infrastructure funding.	YES	Partially Funded	£1 million - £10 million	Implementation	Reduced vehicle and building emissions	Implementation of Strategy	Strategy in use	The Strategy has been considered by 11 Districts and Boroughs. The Strategy includes measures that will be beneficial for air quality. Air quality-related actions are provided in the section 'Transport and Air Quality' of the Strategy which can be viewed at: https://www.surreycc.gov.uk/people-and-community/climate-change/what-are-we-doing/climate-change-strategy/surreys-climate-change-strategy-2020

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SCC-5	Development and implementation of a Local Cycling and Walking Infrastructure Plan (LCWIP) for Elmbridge Borough	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	2020	2025	SCC and EBC	Central Government, developers, highways and infrastructure funding.	NO	Partially Funded	£50k - £100k	Implementation	Reduced vehicle emissions	Completion and adoption of the LCWIP	The LCWIP, for Elmbridge has been developed and will move to implementation. Prioritisation of the routes complete, with feasibility expected to commence in August 2022	The LCWIP is a ten-year programme and would include the following: • Identification of where good walking and cycling facilities would be most beneficial. • Identify what improvements are required at these locations. Plan how these improvements can be delivered, and which prioritise first. The County LCWIP programme can be viewed at: https://www.surreycc.gov.uk/roads-and-transport/cycling-and-walking/plans
SCC-6	Alteration of existing signalised pedestrian crossings on the High Street, Weybridge to reduce congestion	Traffic Management	Other	2020		SCC and EBC	Developers & highway infrastructure funding	NO	Partially Funded	£10k - 50k	Planning	-	-	Study on going to determine feasibility	Still at feasibility stage. Work brief was issued to SCC's Professional Services Highway Partner in August 2021, awaiting work programme.
SCC-7	Improvements to the Hampton Court Roundabout / junction to reduce congestion	Traffic Management	Other	2020		SCC and EBC	Developers & highway infrastructure funding	NO	Partially Funded	£10k - 50k	Aborted			The Planning application was refused.	An agreed scheme as part of a development proposal. Could be implemented either as part of development or a standalone scheme. The planning application was refused (July 2021). Applicant has appealed, and the public enquiry starts 14 June 2022
SCC-8	Installation of additional pedestrian facilities on Esher High Street	Promoting Travel Alternatives	Promotion of walking	2020		SCC and EBC	Developers & highway infrastructure funding	NO	Partially Funded	£10k - 50k	Implementation	-	-	Feasibility study in progress	Feasibility study remains in progress. Following a recent LCWIP workshop, feedback received noted this location is a core walking area and needs a broader consideration of the local aspirations and the competing place vs. movement functions of the road. Significant improvements to achieve the 'place' objective and improve pedestrian facilities would likely require a reduction in capacity

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SCC-9	Working with SCC to ensure that Air Quality is appropriately considered within the Local Transport Plan 4 (LTP4)	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	2020	2022	SCC and EBC	N/A				Planning	-	-		See action SCC 2. LTP4 on target to be adopted by July 2022.

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 Public Health Outcomes Framework data tool compiled by Public Health England quantifies the mortality burden of $PM_{2.5}$ within England, as well as on county and local authority scales. The tool is available online at:

https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/data#page/0/gid/1000049/pat/6/par/E12000008/ati/102/are/E10000030.

The latest available data for 2019 shows that the percentage of mortality attributable to $PM_{2.5}$ pollution (indicator D01) across England is 5.1%. The percentage within Surrey is 5.4% and within Elmbridge is 5.7%. Elmbridge has a higher percentage of mortality attributable to $PM_{2.5}$ pollution when compared to England and Surrey as a whole.

The modelling exercise undertaken by CERC also quantifies the mortality burden of $PM_{2.5}$, in terms of fraction of deaths attributable to $PM_{2.5}$ pollution, associated total life years lost and economic cost within Elmbridge, and the wider-Surrey area. The estimated total number of deaths attributable to $PM_{2.5}$ pollution in Surrey in 2017 was between 173 – 468, which equated to an estimated economic cost between £87,235,665 – £235,790,2568[15]. In Elmbridge, the estimated total number of deaths attributable to $PM_{2.5}$ pollution in 2017 was between 19 - 51, which equated to an estimated economic cost between £9,828,813 – £29,869,995.

The CERC modelling contour maps of predicted pollutant concentrations across Surrey and Elmbridge are available in an interactive format at the following website:

https://surreycc.maps.arcgis.com/apps/webappviewer/index.html?id=43910ffb100248ed972115b7a9b49d20

[15] CERC. Detailed Air Quality Modelling and Source Apportionment. Final Report. August 2019.

However, given the implementation of the Technical Guidance LAQM.TG16[1] and Policy Guidance LAQM.PG16, the Council is working towards defining a strategy to reduce emissions or concentrations of $PM_{2.5}$. Existing actions to gain a better understanding of the current situation and measures to improve air quality already in place which can help reduce levels of $PM_{2.5}$ include:

- Planned installation of an automatic monitoring station measuring $PM_{2.5}$ in the Borough;
- $PM_{2.5}$ dispersion modelling, funded by the Council, has been carried out and is expected to be updated in 2024;
- Discouraging wood-burning and promoting the use of only approved wood-burning stoves and burning of approved products if wood-burning is necessary;
- Encouraging residents to refrain from garden bonfires through awareness through the Council's website;
- Promoting travel alternatives through the development and implementation of the LCWIP, installation of additional pedestrian facilities, reducing the Council staff and fleet transport through the Carbon Reduction Strategy;
- Implementing the SAA Taxi project;
- Implementing the new taxi and private hire licensing policy that came into force 1st September 2020;
- Promoting low emission transport through increasing the number of electric vehicles charging points in Council car parks, increasing the Council's electric vehicles for journeys in the Borough and supporting electric vehicle use by Council contractors;
- Implementing Surrey's Climate Change Strategy (April 2020)[16] which includes measures targeted at reducing vehicle emissions; and
- Implementing Surrey County Council's Low Emissions Transport Strategy (2018)[17]proposals now through LTP4.

[16] Surrey County Council. Surrey's Climate Change Strategy. 2020.

[17] Surrey County Council. Surrey Low Emission Transport Strategy. 2018.

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

This section sets out the monitoring undertaken within 2021 by Elmbridge Borough Council and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed.

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

The Council undertook automatic (continuous) monitoring at two sites during 2021, Hampton Court Parade and Weybridge High Street 2. Table A.1 in Appendix A shows the details of the automatic monitoring sites.

The Weybridge High Street 2 site was deployed in September 2019 and replaces the Weybridge High Street 1 site which was decommissioned in January 2020. The Weybridge High Street 2 site is a completely new monitoring station installed following a move as part of a High Street redevelopment.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on how the monitors are calibrated and how the data has been adjusted are included in Appendix C.

3.1.2 Non-Automatic Monitoring Sites

The Council undertook non-automatic (i.e. passive) monitoring of NO_2 at 45 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic 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, annualisation (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 and Table A.4 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past five years with the air quality objective of 40µg/m^3. Note that the concentration data presented 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 2021 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.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past five years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Automatic monitoring

During 2021, the Council undertook automatic monitoring of NO_2 concentrations at Hampton Court Parade and Weybridge High Street 2, within the Hampton Court and Weybridge High Street AQMAs. Annual mean NO_2 concentrations at both automatic monitoring sites were well below the objective, with annual mean NO_2 concentration of 27 µg/m^3 measured at Hampton Court Parade and 25 µg/m^3 measured at Weybridge High Street 2. NO_2 concentrations at the two automatic monitoring sites increased by 1 µg/m^3 in 2021 from 2020. In comparison, the NO_2 levels reduced significantly in 2020 from previous years, with a 15 µg/m^3 reduction recorded at Hampton Court Parade and a 7 µg/m^3 reduction recorded at Weybridge High Street 2 between 2019 and 2020, which was largely attributed to COVID-19 impacts on road traffic levels. Data capture during 2021 was good (>95%) at both automatic monitoring sites.

There were no measured exceedances of the hourly mean NO_2 objective of 200 µg/m^3 at the Hampton Court Parade or Weybridge High Street 2 monitoring sites.

Non-Automatic Monitoring

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Table B.1, in Appendix B. The diffusion tube data have been processed using the DEFRA Diffusion Tube Processing Tool (v2.0).

In 2021, all monitoring sites within Elmbridge Borough were below the annual mean NO_2 objective. Furthermore, during 2021, there were no measured annual mean NO_2 concentrations greater than 60 µg/m^3, and therefore it is considered unlikely that the hourly mean NO_2 objective is exceeded at monitoring locations within the Borough.

Distance correction has been carried out in order to estimate concentrations at the nearest location of relevant exposure in the vicinity of Cobham 11 (due to the measured concentration at this monitoring site being within 10% of the objective, i.e >36 µg/m^3). Once distance corrected, the annual mean NO_2 concentration in 2021 was 31.1 µg/m^3 at the nearest location of relevant exposure to Cobham 11. As no exceedance is predicted at the nearest location of relevant exposure, it is considered that further action (i.e. declaration of an AQMA) is not required at this time. However, concentrations at Cobham 11 will continue to be closely monitored and further action taken in the future, if required.

The highest measured annual mean NO_2 concentrations in 2021 occurred at Cobham 11 (39.2 µg/m^3). This was followed by, Weybridge 7 (33.6 µg/m^3), Esher 7 (30.2 µg/m^3), Esher 8 (29.6 µg/m^3) and Hinchley Wood 3 (29.6 µg/m^3). During 2021, NO_2 concentrations increased at 18 sites in Elmbridge when compared with 2020 concentrations. The largest NO_2 increase from 2020 to 2021 was 3.3 µg/m^3 at Cobham 1. NO_2 concentrations have decreased at 21 monitoring locations in the Borough between 2020 and 2021. Data trends for all current sites for the past five years are provided in Appendix A, Figures A.1 – A.7. Overall, between 2017 and 2021, concentrations have fluctuated, however a general decrease in concentrations is evident across the majority of sites since 2017.

Concentrations have remained below the objective at monitoring sites in the Hinchley Wood, Walton-on-Thames High Street and Walton Road, Molesey AQMAs since 2017. Furthermore, measured annual mean NO_2 concentrations in these AQMAs were more than 10% below the annual mean NO_2 objective in 2017, 2018, 2020 and 2021. However, due to elevated concentrations in 2019, the Hinchley Wood, Walton-on-Thames High Street and Walton Road, Molesey AQMAs have not been considered for revocation at this time as a minimum of three consecutive years of concentrations more that 10% below the annual mean NO_2 objective is required. Monitoring will continue in the AQMAs until it can

be demonstrated that concentrations have been more than 10% below the annual mean NO_2 objective for a minimum of three consecutive years.

3.2.2 Particulate Matter (PM_{10})

PM_{10} monitoring is not required and therefore is not currently carried out by Elmbridge Borough Council. However, the Council has funding for a PM_{10} automatic monitoring station to be installed in the Borough, by March 2023.

PM_{10} has been included within the modelling exercise undertaken by CERC. Interactive contour maps of predicted pollutant concentrations produced from the CERC modelling exercise can be accessed via the following link:

https://surreycc.maps.arcgis.com/apps/webappviewer/index.html?id=43910ffb100248ed972115b7a9b49d20

The contour map for the predicted annual mean PM_{10} concentrations in 2017 shows no exceedances of the annual mean PM_{10} objective (40 µg/m^3) in Elmbridge. The contour map for the 90.41st percentile of 24-hour mean PM_{10} concentrations shows exceedances of the 24-hour mean concentration (50 µg/m^3) along the A3 Portsmouth Road and the M25. However, these exceedances occur within the road and are therefore not representative of relevant exposure.

3.2.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ monitoring is not required and therefore is not currently carried out by Elmbridge Borough Council. However, the draft AQAP sets out a commitment for Elmbridge to work towards reducing annual mean $PM_{2.5}$ concentrations in the Borough to below the WHO Guideline Value of 10 µg/m^3. In September 2021 WHO introduced more stringent Guidelines for $PM_{2.5}$ of 5 µg/m^3, however as the $PM_{2.5}$ background concentrations within Elmbridge are over 10 µg/m^3 the target will remain to reduce emissions below the former WHO Guidance Value of 10 µg/m^3. The proposed Environmental Bill 2019 – 2021 will introduce a duty on the government to set new long-term targets for $PM_{2.5}$ by October 2022. The Council has obtained funding for a $PM_{2.5}$ automatic monitoring station to be installed in the Borough by March 2023, this will establish a baseline for levels of particulate matter in the Borough, and to monitor progress in reducing particulate levels.

PM_{10} has been included within the modelling exercise undertaken by CERC. Interactive contour maps of predicted pollutant concentrations produced from the CERC modelling exercise can be accessed via the following link:

https://surreycc.maps.arcgis.com/apps/webappviewer/index.html?id=43910ffb100248ed972115b7a9b49d20

The contour map for the predicted annual mean $PM_{2.5}$ concentrations in 2017 shows no exceedances of the annual mean $PM_{2.5}$ objective (25 µg/m^3) in Elmbridge.

3.2.4 Sulphur Dioxide (SO_2)

Monitoring of SO_2 is not required and is therefore not currently carried out by Elmbridge Borough Council.

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? Which AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
Hampton Court Parade	Hampton Court Parade	Roadside	515338	168292	NO_2	YES	Chemiluminescence	10	1.9	1.6
Weybridge High Street 2	Weybridge High Street 2	Kerbside	507459	164909	NO_2	YES	Chemiluminescence	6.5	0.7	1.8

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
ESHER1	Church Street, Esher outside Cuvee	Roadside	513840	164693	NO_2	Yes - Esher	0.4	1.5	No	2.6
ESHER7	Outside Blink, 35-37 High Street, Esher	Roadside	513982	164750	NO_2	Yes - Esher	2.3	0.6	No	2.3
ESHER8	Outside 9 Church St	Roadside	513832	164684	NO_2	Yes - Esher	0.1	3.2	No	2.4
ESHER9	Lamp post next to Churchyard, Church St	Kerbside	513821	164712	NO_2	Yes - Esher	12.5	0.6	No	2.6
ESHER11	The Bear, 71 High St, Esher	Roadside	518395	164599	NO_2	Yes - Esher	1.6	5.1	No	2.6

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
ESHER13	Lamp post outside Panahar Tandoori, 124-126 High Street	Kerbside	513736	164489	NO_2	Yes - Esher	2.7	0.9	No	2.4
ESHER 14	Lamp post in Car Park, Sunrise Living off A3 Roundabout Esher	Roadside	514034	162282	NO_2	No	6.2	1.0	No	1.6
ESHER 15	Lamp post o/s Helix House, Esher Green/High St, Esher KT10 8AB	Roadside	513901	164779	NO_2	Yes - Esher	1.1	3.8	No	1.9
HAMPTON COURT 1	Lamp post outside Yew Tree Croft, Hampton Ct Way, North of Summer Road, (Bus Layby)	Kerbside	515379	167946	NO_2	Yes - Hampton Court	20.9	0.9	No	2.2
HINCHLEY WOOD 1	2 Portsmouth Road, Kingston Bypass opp. Fire Station	Roadside	515248	165535	NO_2	Yes - Hinchley Wood	20.8	4.5	No	2.4
HINCHLEY WOOD 3	Lamp post corner Kingston By Pass/Manor Rd Nth, Esher KT10 0AT	Roadside	515728	165191	NO_2	No	17.3	2.6	No	1.9
MOLESEY1	Outside 113 Walton Rd.	Kerbside	514450	168134	NO_2	Yes - Walton Road, Molesey	3.5	1.1	No	2.5
HAMPTON COURT5	Traffic Sign, 1 Creek Road	Roadside	515329	168390	NO_2	Yes - Hampton Court	13.7	0.4	No	2.4
MOLESEY8	44-46 Walton Rd	Roadside	514716	167960	NO_2	Yes - Walton Road, Molesey	0.1	2.6	No	2.4
MOLESEY9	Outside Tesco,114-118 Walton Road	Roadside	514507	168086	NO_2	Yes - Walton Road, Molesey	4.2	2.6	No	2.4
MOLESEY10	Molesey Mart 264 Walton Road	Roadside	514169	168152	NO_2	Yes - Walton Road, Molesey	0.1	4.9	No	2.4

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
HAMPTON COURT 2, HAMPTON COURT 3, HAMPTON COURT 4	Air Quality Station, opposite Hampton Court Station, Hampton Court Way	Roadside	515338	168292	NO_2	Yes - Hampton Court	10.0	1.9	Yes	1.7
OX 1	Parking Sign outside Birdshill Farmhouse, Warren lane Oxshott	Roadside	514558	160621	NO_2	No	20.0	1.8	No	2.0
OX 2	Lamp Post o/s Flats1/2, Braeside House, High Street, Oxshott	Roadside	514574	160493	NO_2	No	5.0	3.0	No	2.2
WALTON8	Leaders, 46 High St	Roadside	510154	166281	NO_2	Yes - Walton-on-Thames High Street	2.0	2.9	No	2.6
WALTON9	Traffic Sign, Café Nero, 18 High St	Roadside	510082	166379	NO_2	Yes - Walton-on-Thames High Street	2.2	2.6	No	2.5
WALTON10	Outside 34 Church Street, Walton	Roadside	510140	166522	NO_2	Yes - Walton-on-Thames High Street	2.0	3.3	No	2.6
WALTON11	Lamp post opposite Flour Cafe, The Heart, Hepworth Way	Roadside	510000	166401	NO_2	Yes - Walton-on-Thames High Street	21.0	2.3	No	2.4
WALTON 12	Lamp post o/s 60 High Street, Walton on Thames, KT12 1FL	Roadside	510185	166225	NO_2	Yes - Walton-on-Thames High Street	5.7	3.2	No	2.0
WEYBRIDGE4	Right of 6 Monument Hill	Roadside	507705	164907	NO_2	Yes - Weybridge High Street	5.0	2.0	No	2.4

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
WEYBRIDGE5	Pizza Express, 1 Monument Hill	Roadside	507609	164966	NO_2	Yes - Weybridge High Street	0.4	1.6	No	2.3
WEYBRIDGE 6A	Lamp post o/s 47 High St, Weybridge	Kerbside	507536	164952	NO_2	Yes - Weybridge High Street	3.0	0.7	No	3.3
WEYBRIDGE7	Prezzo, 44 Church St	Roadside	507199	164804	NO_2	Yes - Weybridge High Street	0.1	1.5	No	2.4
WEYBRIDGE8	Lloyd Roberts Opticians, 60A Church St	Roadside	507150	164761	NO_2	Yes - Weybridge High Street	0.1	4.6	No	2.4
WEYBRIDGE 13, WEYBRIDGE 14, WEYBRIDGE1 5	Air Quality Station, outside 40a High Street, Weybridge	Kerbside	507459	164909	NO_2	Yes - Weybridge High Street	6.5	0.7	Yes	1.8
WEYBRIDGE1 6	Lamp post Junction Parvis Road /Brookland Road, Byfleet	Roadside	507190	161340	NO_2	No	10.4	1.6	No	1.9
WEYBRIDGE 17	CCTV Column o/s Lloyds Bank	Kerbside	507365	164831	NO_2	Yes - Weybridge High Street	2.6	0.6	No	3.2
COBHAM1	o/s The Lemon Tree	Roadside	510813	160048	NO_2	No	3.5	0.6	No	2.4
COBHAM6	Harlequin Dry Cleaners, 2 Anyards Road	Roadside	510814	160099	NO_2	No	2.2	6.0	No	2.4
COBHAM7	Exclusively Surrey, 38A High Street	Roadside	510861	159906	NO_2	No	4.2	3.1	No	2.4
COBHAM8	'No Loading Sign' outside Fieldgate Court,	Kerbside	510300	160375	NO_2	No	1.3	1.0	No	1.9

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube Co-located with a Continuous Analyser?	Tube Height (m)
	Between Streets, Cobham									
COBHAM9	Sign outside 71 Portsmouth Road, Cobham	Kerbside	510348	160417	NO_2	No	2.3	1.0	No	2.0
COBHA10	Lamp post o/s 41 Portsmouth Road	Kerbside	510262	160454	NO_2	No	6.4	1.0	No	2.1
COBHAM 11	Lamp post outside West Lodge, Portsmouth Road, Cobham	Roadside	509623	160616	NO_2	No	7.1	1.5	No	2.2
COBHAM 12	'No Entry Sign', A3 East Bound off slip road, Portsmouth Road, Cobham	Roadside	509532	106068	NO_2	No	14.3	1.5	No	2.0
COBHAM 13	Railings on Footpath, adjacent to A3 East Bound Slip Rd Cobham	Roadside	509465	160640	NO_2	No	5.5	2.0	No	1.1

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: Automatic Monitoring (µg/m^3)

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
Hampton Court Parade	515338	168292	Roadside	96	96	**41**	38	**41**	26	27
Weybridge High Street 2	507459	164909	Kerbside	98	98	-	-	31	24	25

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

Notes:

The annual mean concentrations are presented as µg/m^3.

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

All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

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

(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%).

Table A.4 – Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
ESHER1	513840	164693	Roadside	100	82.7	37.1	**43.2**	39.7	25.8	28.2
ESHER7	513982	164750	Roadside	100	80.8	39.2	**41.9**	**46.0**	31.1	30.2
ESHER8	513832	164684	Roadside	100	100.0	38.6	**41.9**	**42.4**	30.1	29.6
ESHER9	513821	164712	Kerbside	100	92.3	28.7	33.4	31.9	20.2	21.3
ESHER11	518395	164599	Roadside	100	100.0	32.7	33.7	35.0	23.1	24.9
ESHER13	513736	164489	Kerbside	100	100.0	31.5	31.5	35.7	24.8	23.1
ESHER 14	514034	162282	Roadside	100	92.3	-	-	-	16.8	18.1
ESHER 15	513901	164779	Roadside	100	84.6	-	-	-	25.5	24.7
HAMPTON COURT 1	515379	167946	Kerbside	100	90.4	35.4	32.1	34.4	23.7	22.7
HINCHLEY WOOD 1	515248	165535	Roadside	100	100.0	35.4	34.4	37.4	27.6	27.2
HINCHLEY WOOD 3	515728	165191	Roadside	100	100.0	-	-	-	34.7	29.6
MOLESEY1	514450	168134	Kerbside	100	100.0	28.2	32.9	34.7	22.8	23.8
HAMPTON COURT5	515329	168390	Roadside	100	100.0	25.3	28.9	27.7	20.9	22.1

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2021 (%) [2]	2017	2018	2019	2020	2021
MOLESEY8	514716	167960	Roadside	100	100.0	31.2	35.7	39.2	27.6	27.1
MOLESEY9	514507	168086	Roadside	100	100.0	32.3	32.5	34.3	24.0	22.6
MOLESEY10	514169	168152	Roadside	100	100.0	27.5	28.5	28.1	19.8	20.4
HAMPTON COURT 2, HAMPTON COURT 3, HAMPTON COURT 4	515338	168292	Roadside	100	100.0	34.8	36.9	38.9	26.2	26.4
OX 1	514558	160621	Roadside	100	100.0	-	-	-	19.7	19.6
OX 2	514574	160493	Roadside	100	82.7	-	-	-	20.4	24.8
WALTON8	510154	166281	Roadside	100	100.0	30.5	33.2	36.2	25.4	23.2
WALTON9	510082	166379	Roadside	100	100.0	30.2	32.4	33.6	23.1	23.0
WALTON10	510140	166522	Roadside	100	100.0	33.2	34.9	37.0	28.3	28.0
WALTON11	510000	166401	Roadside	100	76.9	30.5	35.9	39.4	24.2	24.4
WALTON 12	510185	166225	Roadside	100	100.0	-	-	-	24.5	22.5
WEYBRIDGE4	507705	164907	Roadside	100	92.3	30.2	32.1	35.5	29.9	27.7
WEYBRIDGE5	507609	164966	Roadside	100	100.0	34.0	34.0	36.2	28.4	26.3

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
WEYBRIDGE 6A	507536	164952	Kerbside	100	100.0	-	-	-	23.5	22.1
WEYBRIDGE7	507199	164804	Roadside	100	100.0	**40.6**	39.6	**45.6**	33.1	33.6
WEYBRIDGE8	507150	164761	Roadside	100	82.7	35.5	31.9	35.2	23.8	25.6
WEYBRIDGE 13, WEYBRIDGE 14, WEYBRIDGE15	507459	164909	Kerbside	100	100.0	-	-	31.5	24.3	25.4
WEYBRIDGE16	507190	161340	Roadside	100	100.0	-	-	-	23.1	22.8
WEYBRIDGE 17	507365	164831	Kerbside	100	100.0	-	-	-	25.4	23.3
COBHAM1	510813	160048	Roadside	100	100.0	30.1	33.3	32.2	18.3	21.6
COBHAM6	510814	160099	Roadside	100	100.0	24.6	27.0	28.1	18.9	19.6
COBHAM7	510861	159906	Roadside	100	90.4	32.2	31.6	33.6	22.7	22.8
COBHAM8	510300	160375	Kerbside	100	90.4	-	-	-	22.4	23.9
COBHAM9	510348	160417	Kerbside	100	92.3	-	-	-	21.3	22.1
COBHA10	510262	160454	Kerbside	100	100.0	-	-	-	23.5	26.2
COBHAM 11	509623	160616	Roadside	100	100.0	-	-	-	**40.9**	39.2
COBHAM 12	509532	106068	Roadside	100	100.0	-	-	-	26.2	26.1

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
COBHAM 13	509465	160640	Roadside	100	100.0	-	-	-	24.0	25.2

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Diffusion tube data has been bias adjusted.**

☒ **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 correction.**

Notes:

The annual mean concentrations are presented as µg/m^3.

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**.

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

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

(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%).

Figure A.1 – Trends in Annual Mean NO_2 Concentrations in Esher

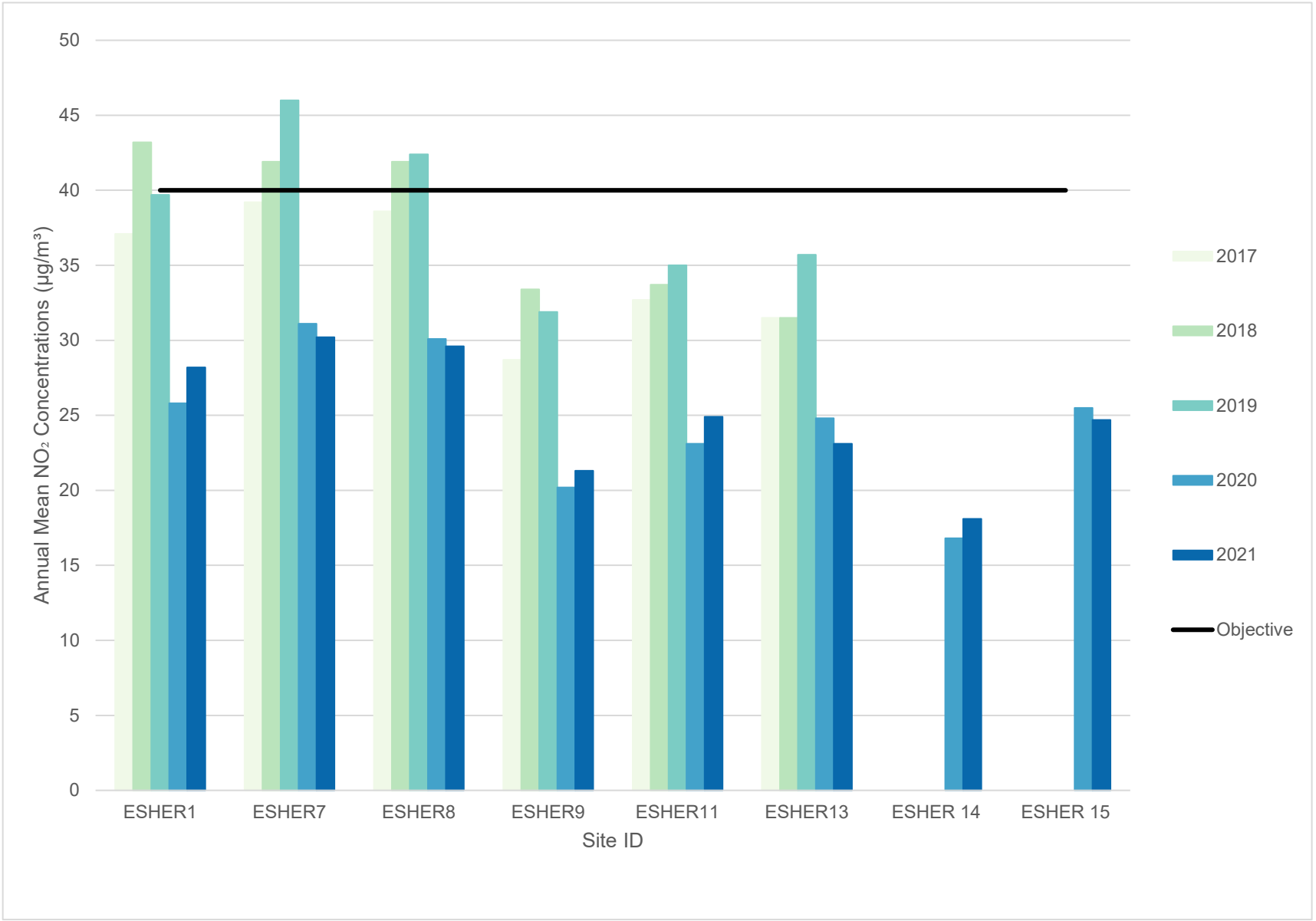


Figure A.2 – Trends in Annual Mean NO_2 Concentrations in Hinchley Wood

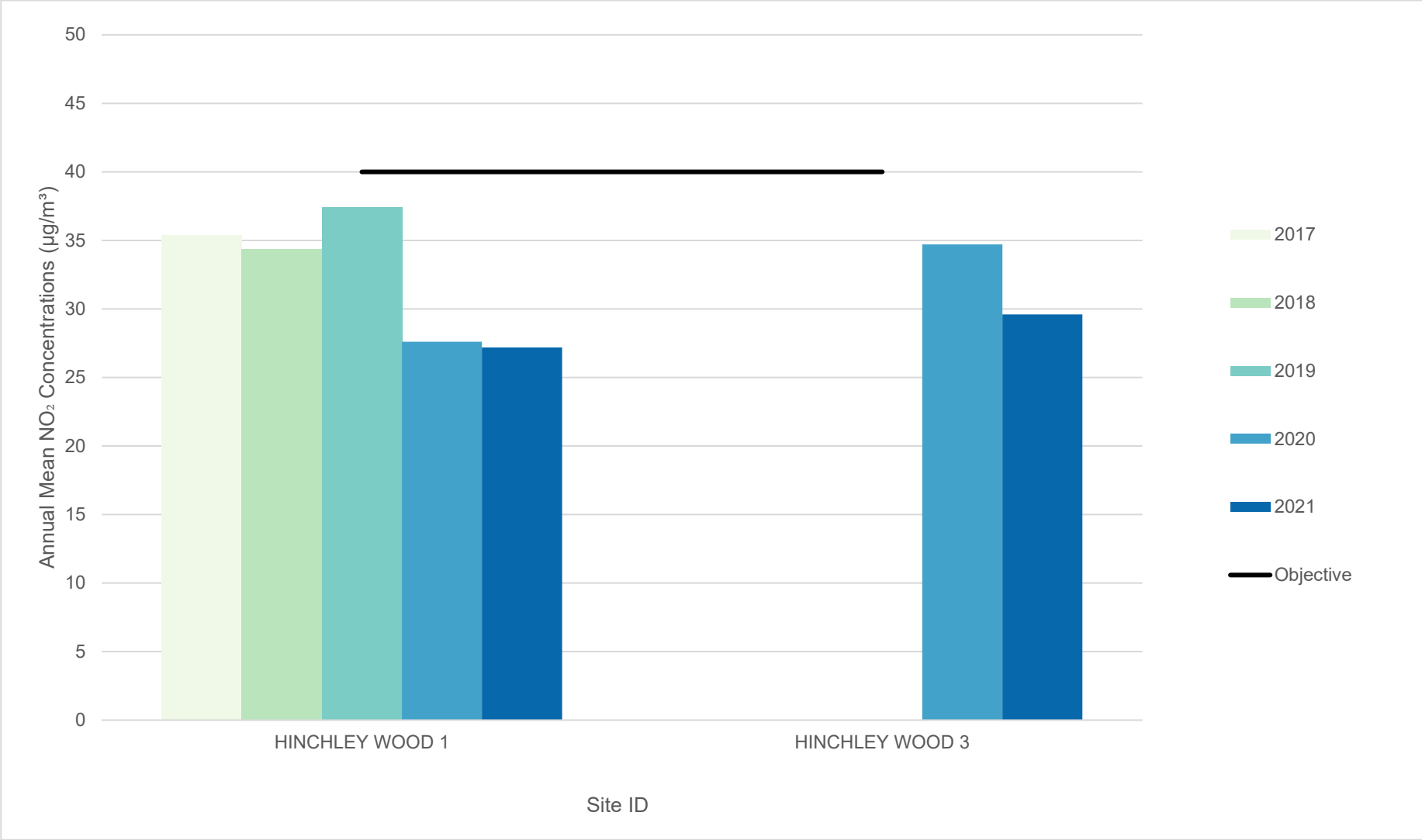


Figure A.3 – Trends in Annual Mean NO_2 Concentrations in Hampton Court

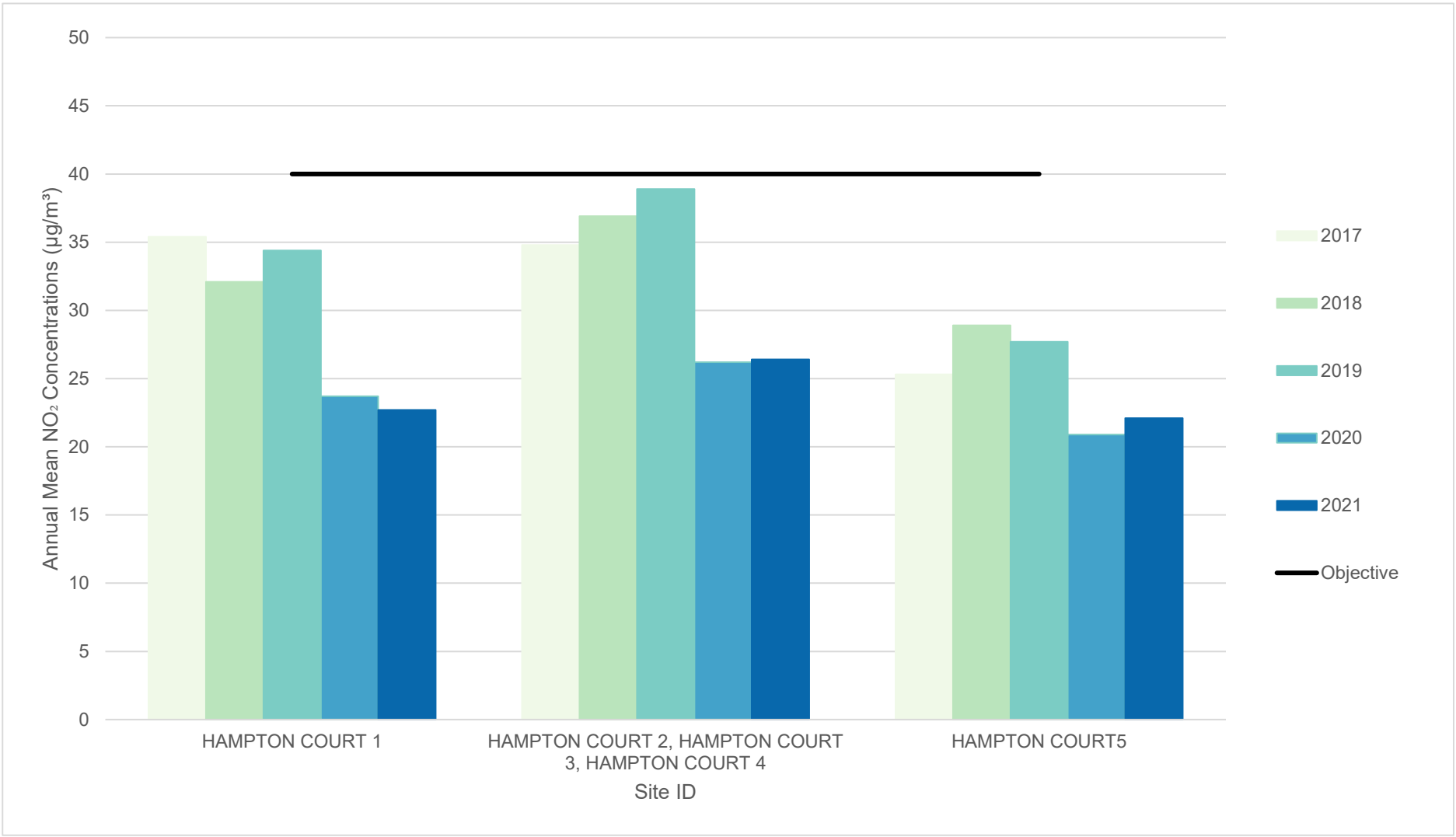


Figure A.4 – Trends in Annual Mean NO_2 Concentrations in Molesey

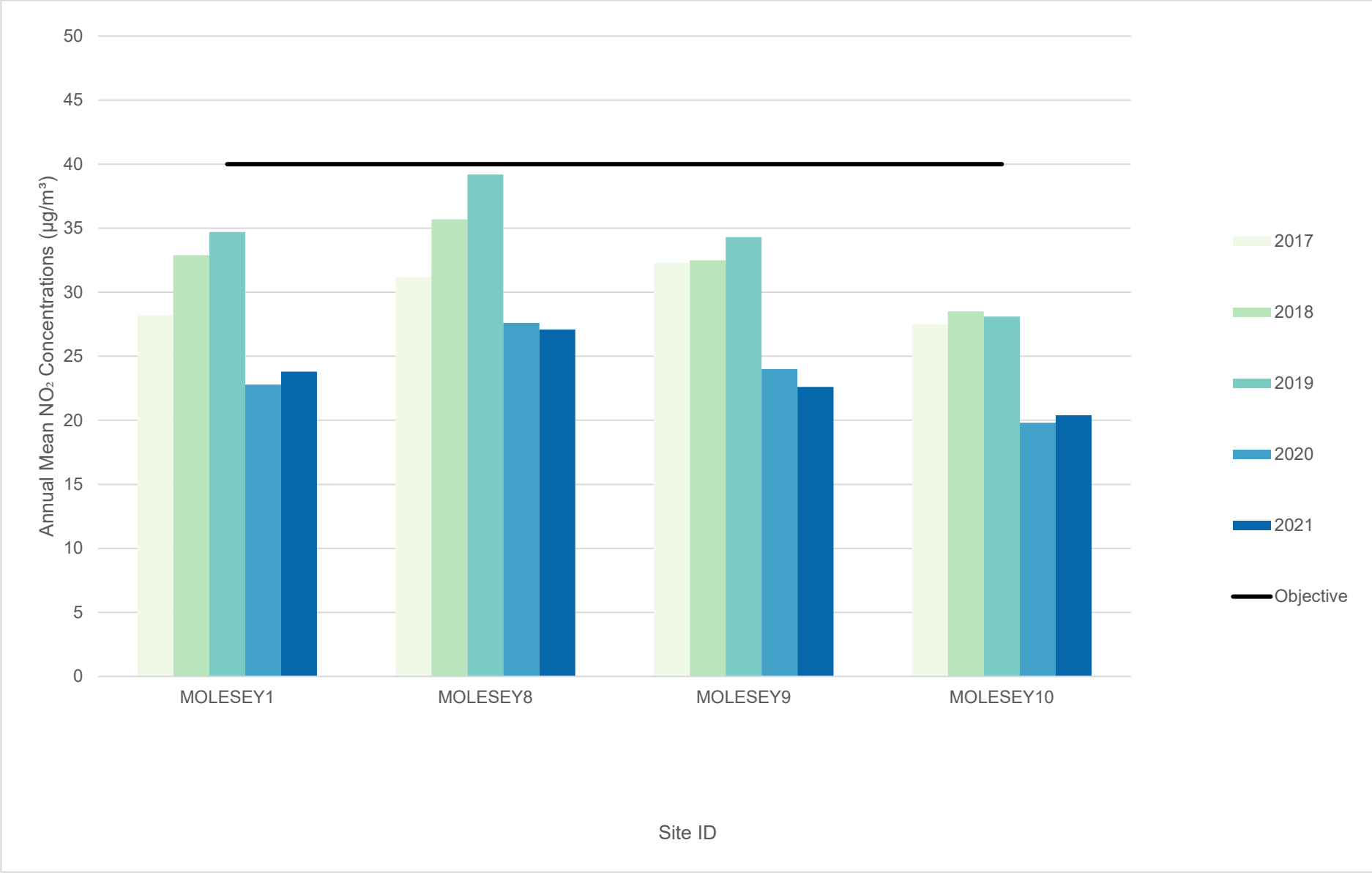


Figure A.5 – Trends in Annual Mean NO_2 Concentrations in Walton-on-Thames

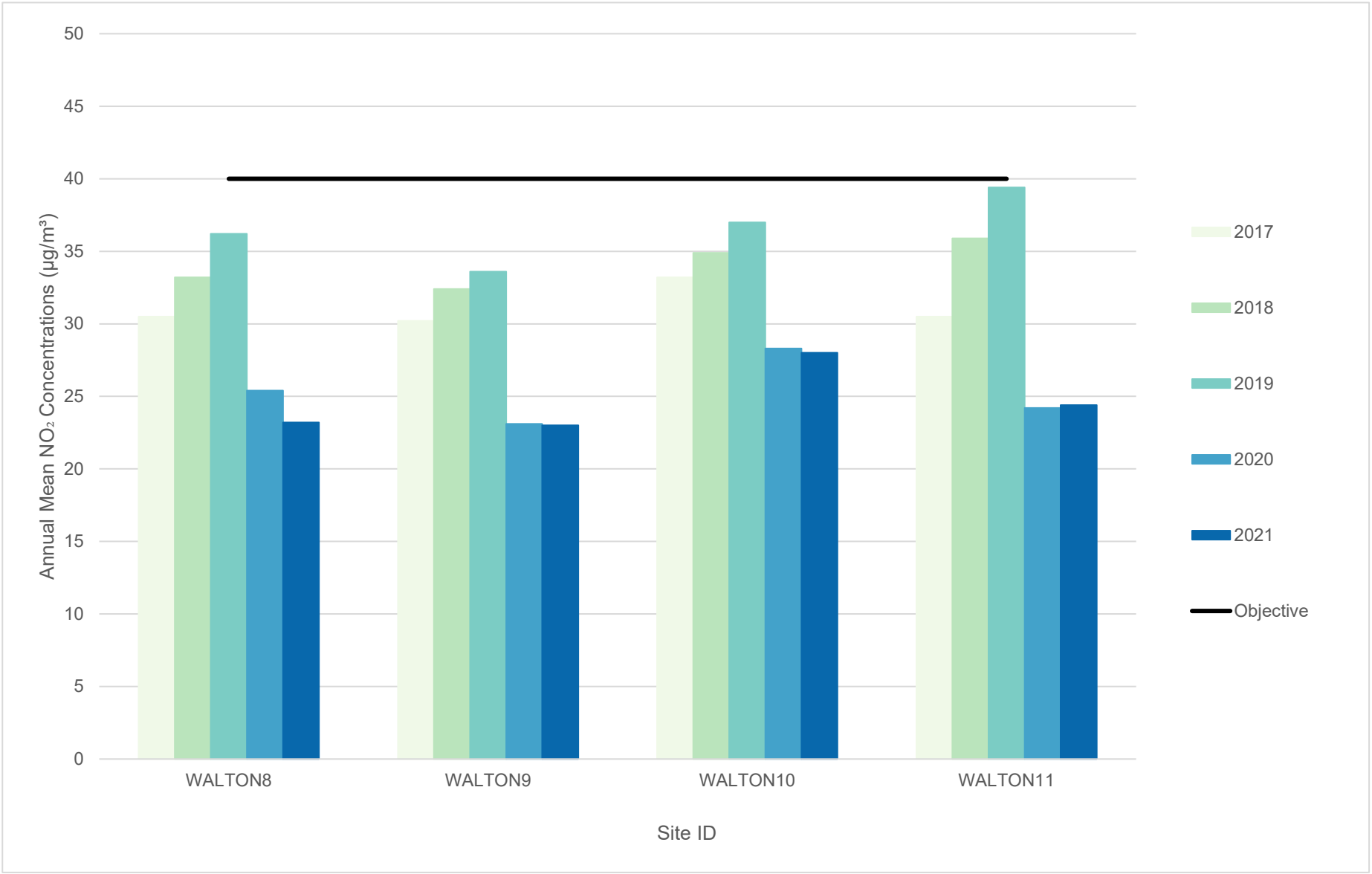


Figure A.6 – Trends in Annual Mean NO_2 Concentrations in Weybridge

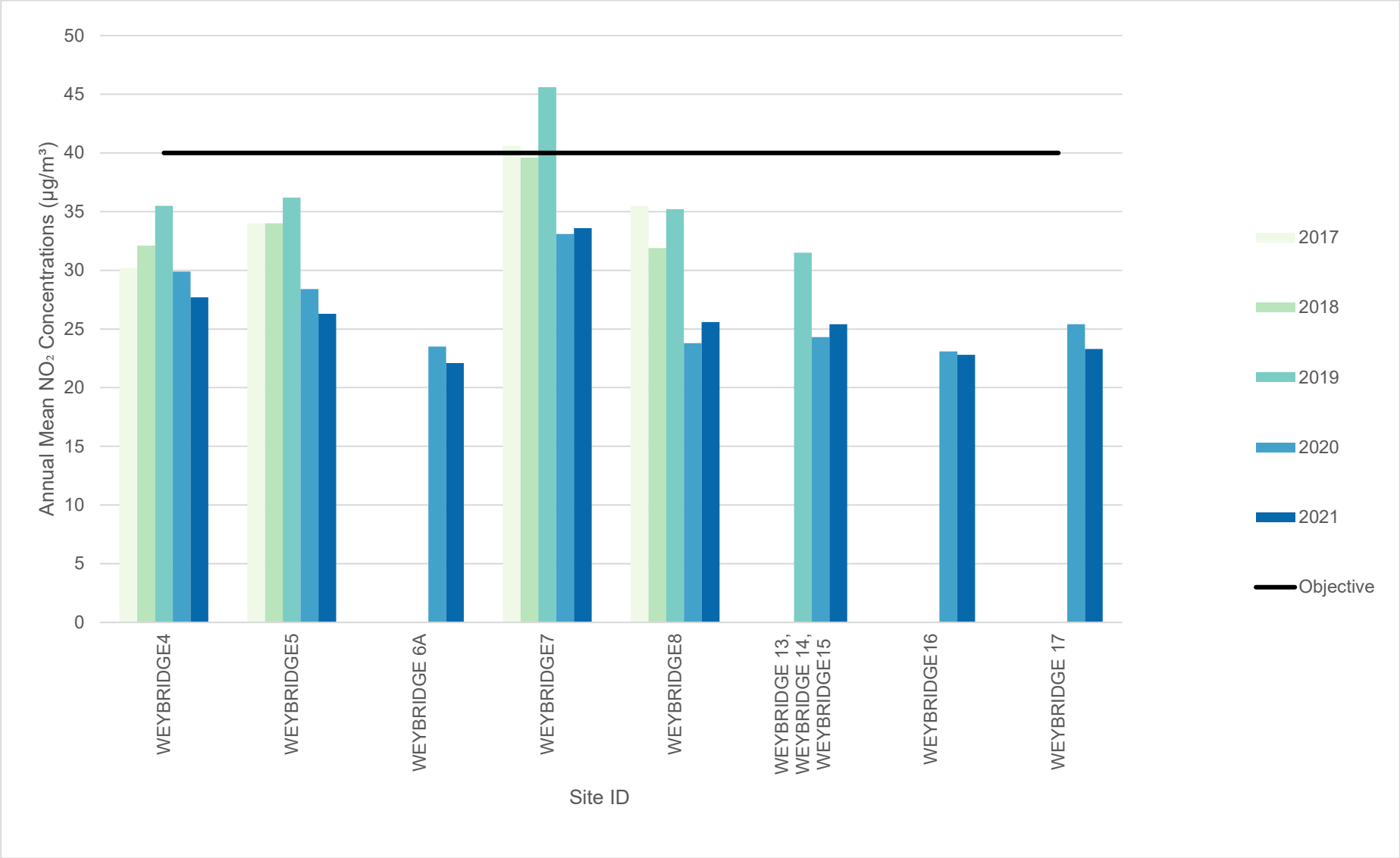


Figure A.7 – Trends in Annual Mean NO_2 Concentrations in Cobham and Oxshott

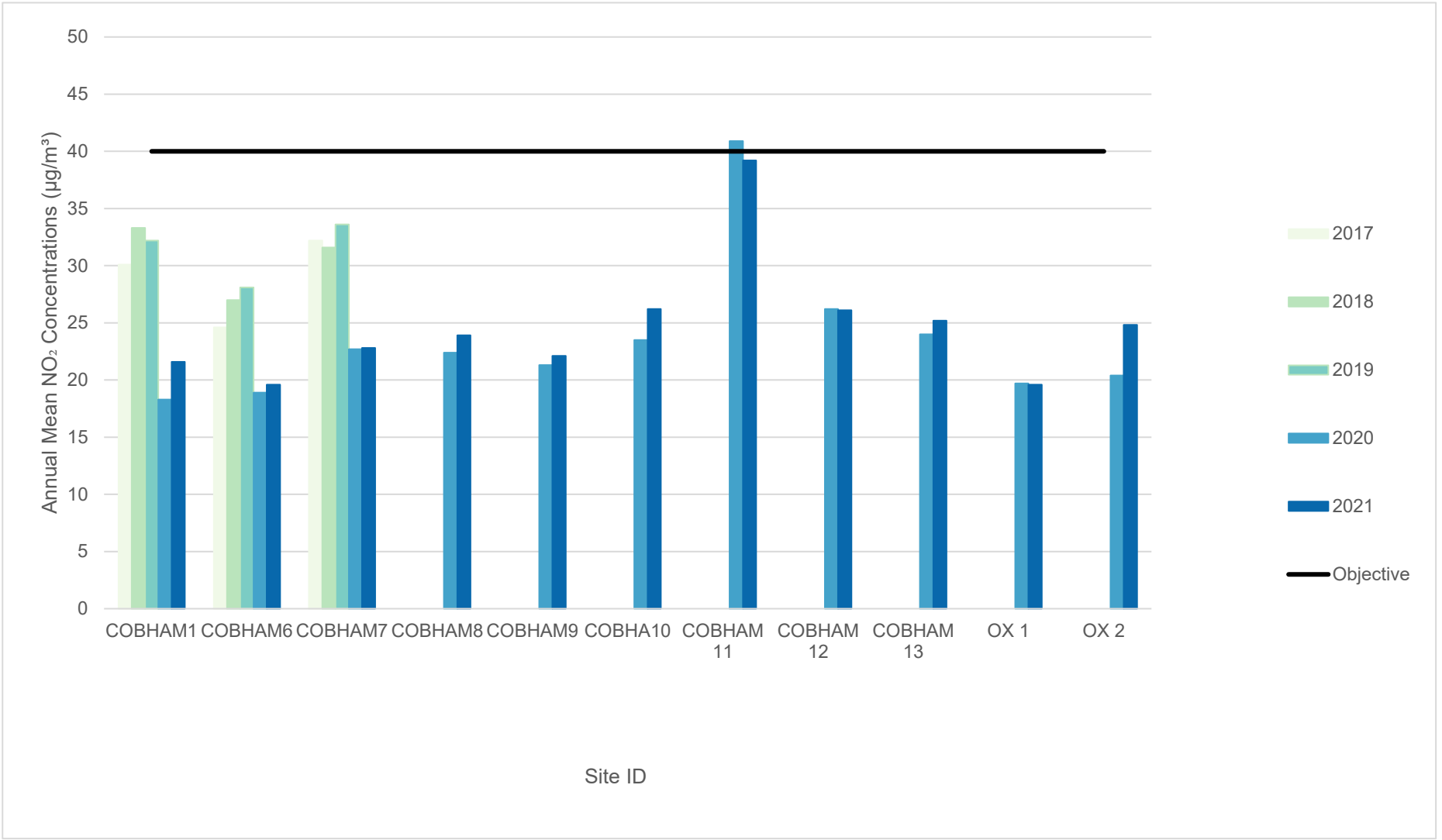


Table A.5 – 1-Hour Mean NO_2 Monitoring Results, Number of 1-Hour Means > 200µg/m^3

Site ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2021 (%) (2)	2017	2018	2019	2020	2021
Hampton Court Parade	515338	168292	Roadside	96	96	0	0	0	0	0
Weybridge High Street 2	507459	164909	Kerbside	98	98	-	-	0	0	0

Notes:

Results are presented as the number of 1-hour periods where concentrations greater than 200µg/m^3 have been recorded.

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**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(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%).

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO_2 2021 Diffusion Tube Results (µg/m^3)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.93)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
ESHER1	513840	164693	28.0	30.0	32.0	33.0	31.0	34.0	33.0	26.0			30.0	28.0	30.5	28.2	-	
ESHER7	513982	164750	33.0	39.0	29.0		30.0	31.0		21.0	37.0	36.0	34.0	36.0	32.6	30.2	-	
ESHER8	513832	164684	31.0	34.0	26.0	29.0	36.0	33.0	34.0	21.0	38.0	33.0	37.0	31.0	31.9	29.6	-	
ESHER9	513821	164712	23.0	27.0	20.0	24.0	25.0		23.0	17.0	27.0	23.0	24.0	20.0	23.0	21.3	-	
ESHER11	518395	164599	31.0	28.0	26.0	28.0	25.0	28.0	26.0	20.0	30.0	26.0	30.0	25.0	26.9	24.9	-	
ESHER13	513736	164489	26.0	27.0	25.0	24.0	26.0	25.0	23.0	18.0	25.0	25.0	29.0	26.0	24.9	23.1	-	
ESHER 14	514034	162282	20.0	21.0	22.0	23.0	19.0	18.0	16.0		21.0	17.0	20.0	18.0	19.5	18.1	-	
ESHER 15	513901	164779	38.0		21.0	30.0		26.0	23.0	20.0	34.0	23.0	27.0	25.0	26.7	24.7	-	
HAMPTON COURT 1	515379	167946	27.0	25.0	20.0	29.0	23.0	25.0	26.0	17.0	29.0	23.0	26.0		24.5	22.7	-	
HINCHLEY WOOD 1	515248	165535	31.0	26.0	24.0	27.0	28.0	31.0	30.0	24.0	35.0	35.0	34.0	28.0	29.4	27.2	-	
HINCHLEY WOOD 3	515728	165191	34.0	28.0	29.0	33.0	27.0	38.0	32.0	23.0	39.0	32.0	35.0	33.0	31.9	29.6	-	
MOLESEY1	514450	168134	27.0	29.0	25.0	27.0	23.0	26.0	22.0	15.0	29.0	24.0	33.0	28.0	25.7	23.8	-	
HAMPTON COURT5	515329	168390	25.0	25.0	21.0	22.0	30.0	23.0	20.0	19.0	24.0	20.0	35.0	23.0	23.9	22.1	-	
MOLESEY8	514716	167960	31.0	29.0	27.0	29.0	30.0	26.0	27.0	30.0	33.0	31.0	35.0	23.0	29.3	27.1	-	
MOLESEY9	514507	168086	31.0	23.0	24.0	26.0	23.0	23.0	21.0	14.0	30.0	23.0	31.0	24.0	24.4	22.6	-	
MOLESEY10	514169	168152	25.0	19.0	24.0	24.0	21.0	19.0	19.0	19.0	23.0	21.0	29.0	22.0	22.1	20.4	-	
HAMPTON COURT 2	515338	168292	27	31	23	26	26	27	25	39	33	28	30	28	-	-	-	Triplicate Site with HAMPTON COURT 2, HAMPTON COURT 3 and HAMPTON COURT 4 - Annual data provided for HAMPTON COURT 4 only
HAMPTON COURT 3	515338	168292	29	32	31	30	27	27	25	37	34	28	28	31	-	-	-	Triplicate Site with HAMPTON COURT 2, HAMPTON COURT 3 and HAMPTON COURT 4 - Annual data provided for HAMPTON COURT 4 only

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.93)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
HAMPTON COURT 4	515338	168292	25	29	27	29	26	25		43	33	28	28	31	28.5	26.4	-	Triplicate Site with HAMPTON COURT 2, HAMPTON COURT 3 and HAMPTON COURT 4 - Annual data provided for HAMPTON COURT 4 only
WALTON8	510154	166281	28.0	23.0	23.0	22.0	26.0	23.0	23.0	16.0	30.0	28.0	30.0	29.0	25.1	23.2	-	
WALTON8	510154	166281	28.0	23.0	23.0	22.0	26.0	23.0	23.0	16.0	30.0	28.0	30.0	29.0	25.1	23.2	-	
WALTON9	510082	166379	33.0	27.0	21.0	24.0	24.0	22.0	22.0	18.0	26.0	25.0	29.0	27.0	24.8	23.0	-	
WALTON10	510140	166522	31.0	37.0	30.0	34.0	31.0	27.0	29.0	22.0	33.0	28.0	29.0	32.0	30.3	28.0	-	
WALTON11	510000	166401		34.0	27.0	26.0		21.0	25.0	17.0		27.0	30.0	30.0	26.3	24.4	-	
WALTON 12	510185	166225	29.0	30.0	21.0	26.0	24.0	12.0	22.0	17.0	28.0	24.0	28.0	30.0	24.3	22.5	-	
WEYBRIDGE4	507705	164907	48.0	32.0	27.0	27.0	25.0	30.0	33.0	19.0	33.0	29.0		26.0	29.9	27.7	-	
WEYBRIDGE5	507609	164966	33.0	32.0	25.0	24.0	29.0	27.0	28.0	18.0	33.0	30.0	30.0	32.0	28.4	26.3	-	
WEYBRIDGE 6A	507536	164952	26.0	24.0	22.0	23.0	23.0	23.0	22.0	22.0	26.0	25.0	25.0	25.0	23.8	22.1	-	
WEYBRIDGE7	507199	164804	36.0	39.0	32.0	43.0	40.0	36.0	38.0	24.0	42.0	32.0	38.0	36.0	36.3	33.6	-	
WEYBRIDGE8	507150	164761	29.0	31.0	24.0	29.0	27.0	27.0	24.0		31.0	23.0	32.0		27.7	25.6	-	
WEYBRIDGE 13	507459	164909	30.0	23.0	24.0	34.0	24.0	27.0	23.0	28.0	32.0	25.0	32.0	28.0	-	-	-	Triplicate Site with WEYBRIDGE 13, WEYBRIDGE 14 and WEYBRIDGE15 - Annual data provided for WEYBRIDGE15 only
WEYBRIDGE 14	507459	164909	32.0	30.0	26.0	32.0	25.0	26.0	25.0	18.0	31.0	26.0	29.0	26.0	-	-	-	Triplicate Site with WEYBRIDGE 13, WEYBRIDGE 14 and WEYBRIDGE15 - Annual data provided for WEYBRIDGE15 only
WEYBRIDGE15	507459	164909	30.0	33.0	27.0	31.0	27.0	27.0	23.0	16.0	31.0	25.0	31.0	29.0	27.4	25.4	-	Triplicate Site with WEYBRIDGE 13, WEYBRIDGE 14 and WEYBRIDGE15 - Annual data provided for WEYBRIDGE15 only
WEYBRIDGE16	507190	161340	29.0	23.0	21.0	26.0	26.0	28.0	25.0	18.0	29.0	21.0	27.0	22.0	24.6	22.8	-	
WEYBRIDGE 17	507365	164831	30.0	26.0	22.0	27.0	22.0	25.0	25.0	18.0	28.0	24.0	27.0	28.0	25.2	23.3	-	
COBHAM1	510813	160048	26.0	23.0	23.0	20.0	21.0	22.0	22.0	17.0	26.0	28.0	24.0	28.0	23.3	21.6	-	
COBHAM6	510814	160099	23.0	22.0	21.0	25.0	20.0	20.0	18.0	18.0	22.0	19.0	24.0	22.0	21.2	19.6	-	

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Easting)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.93)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
COBHAM7	510861	159906	22.0	25.0	26.0	27.0	24.0	26.0	21.0	15.0	30.0	24.0	31.0		24.6	22.8	-	
COBHAM8	510300	160375	28.0	30.0	23.0		26.0	25.0	22.0	15.0	30.0	24.0	32.0	29.0	25.8	23.9	-	
COBHAM9	510348	160417	27.0	28.0		28.0	24.0	23.0	20.0	16.0	26.0	20.0	28.0	23.0	23.9	22.1	-	
COBHAM10	510262	160454	30.0	29.0	29.0	27.0	25.0	25.0	26.0	19.0	35.0	28.0	32.0	35.0	28.3	26.2	-	
COBHAM 11	509623	160616	42.0	41.0	40.0	43.0	64.0	44.0	41.0	35.0	50.0	47.0	36.0	25.0	42.3	39.2	31.1	
COBHAM 12	509532	106068	28.0	29.0	27.0	36.0	31.0	28.0	32.0	22.0	32.0	26.0	25.0	22.0	28.2	26.1	-	
COBHAM 13	509465	160640	31.0	28.0	26.0	32.0	30.0	22.0	27.0	19.0	32.0	26.0	26.0	27.0	27.2	25.2	-	

☒ **All erroneous data has been removed from the NO_2 diffusion tube dataset presented in Table B.1.**

☒ **Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.**

☒ **Local bias adjustment factor used.**

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

☒ **Elmbridge Borough Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.**

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**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Elmbridge During 2021

Elmbridge has not identified any new sources relating to air quality within the reporting year of 2021.

The London Ultra Low Emission (ULEZ) zone extension was extended in October 2021. Whilst the ULEZ is not considered to be a new source of air pollution, it has the potential to displace traffic onto roads within Elmbridge through existing AQMAs.

Transport for London (TfL) are currently consulting on a further extension of the ULEZ to expand London -wide planned for 2023.

https://haveyoursay.tfl.gov.uk/cleanair?cid=clean-air

Any increase in traffic flows and resulting NO_2 concentrations will be closely monitored in these areas.

Additional Air Quality Works Undertaken by Elmbridge Borough Council During 2021

Air Quality Action Plan 2021-2026

The AQAP was consulted upon between 10th March – 5th May 2021. Following review by Council Cabinet Members, the AQAP was revised to in August 2021. The final AQAP was approved by Cabinet Members, with DEFRA approval received in December 2021. A link to the AQAP is provided below:

https://www.elmbridge.gov.uk/pollution/local-air-quality/

Elmbridge PM Monitor Location Review

In October 2021, Elmbridge Borough Council commissioned Stantec to review potential locations to install a new automatic particular matter (PM) monitoring station within the borough.

The review identified worse-case $PM_{2.5}$ locations through the CERC contour maps, DEFRA background maps. The report then reviewed the suitability of the worst-case $PM_{2.5}$ locations which looked at a number of factors including the distance of relevant exposure and siting requirements.

The full PM monitor location review is provided in Appendix F.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes in 2021 were prepared and analysed by Lambeth Scientific Services using a preparation method of 50% TEA in acetone. In 2021, there was some divergence from the 2021 LAQM Diffusion Tube Monitoring Calendar, however this did not exceed more than 2 days for any month. Therefore, these divergences are with the ±2 days allowed either side of the calendar dates.

Lambeth Scientific Service take part in the analytical proficiency testing scheme (AIR-PT), formerly known as the WASP operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). During 2021, 100% of samples were determined to have been satisfactory in the 1st quarter (the only quarter for which results are currently available).

Diffusion Tube Annualisation

All diffusion tube monitoring locations within Elmbridge Borough Council recorded data capture of 75% therefore it was not required to annualise any monitoring data.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring[1]. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

The DEFRA Technical Guidance LAQM.TG16(16) recommends the use of a local bias adjustment factor where available and relevant to diffusion tube sites.

A local bias adjustment factor of 0.91 has been derived from Hampton Court Parade site. The measurements obtained from the automatic monitor and triplicate diffusion tubes at this site have good data capture and overall data precision.

A local bias adjustment factor of 0.93 has been derived from the Weybridge High Street 2 site. The measurements obtained from the automatic monitor and triplicate diffusion tubes at this site have good data capture and overall data precision.

Given the agreement between local bias adjustment factors, the good data capture and data precision for Hampton Court Parade and Weybridge High Street 2, the local bias adjustment of 0.93 has been applied to the 2021 monitoring data. A summary of bias adjustment factors used by Elmbridge Borough Council over the past five years is presented in Table C.1. Also, the local bias adjustment calculations are shown in Table C.2.

The national bias adjustment factor for Lambeth Scientific Services (50% TEA in Acetone) in 2021 was 0.97 (spreadsheet 03/22) which was derived from the national studies. As part of a sensitivity test, both bias adjustment factors (local and national) have been applied to the raw annual mean NO_2 data. When applying the national bias adjustment factor this resulted in an increase of between 0.9 µg/m^3 to 1.6 µg/m^3 across monitoring sites in comparison to the local bias adjustment factor. As shown in Table C.3, using the national bias adjustment factor also resulted in an exceedance of the annual mean NO_2 at site Cobham 11 (41.1 µg/m^3).

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	Local	-	0.93
2020	Local	-	1.01
2019	Local	-	0.995
2018	Local	-	1.11
2017	National	03/18	0.90

NO_2 Fall-off with Distance from the Road

Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO_2 concentration at the nearest location relevant for exposure has been estimated using the Diffusion Tube Data Processing Tool/NO_2 fall-off with

distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO_2 concentrations corrected for distance are presented in Table B.1.

NO_2 fall-off distance from road has been calculated for monitoring sites which exceeded 36 µg/m^3 in 2021. The only site which exceeded 36 µg/m^3 in 2021 was Cobham 11 and therefore NO_2 fall-off with distance has been calculated for this site. Table C.3 presents the inputs in the Diffusion Tube Processing Tool used to calculate NO_2 fall-off with distance for Cobham 11. The annual mean NO_2 background concentration at Cobham 11 has been obtained from the latest 2018-based DEFRA background maps.

The NO_2 fall-off distance using the national bias adjusted results for Cobham 11 have also been calculated in Table C.3. As shown in Table C.3, both the local bias adjusted results and national bias adjusted results are below the annual mean NO_2 objective when calculating the results back to the relevant exposure at Cobham 11.

QA/QC of Automatic Monitoring

Air Quality Data Management (AQDM) provide the data management services and carry out Local Site Operator duties for the Hampton Court and Weybridge High Street 2 automatic monitors. All data has been validated and ratified to the standards outlined in LAQM TG.16. The data presented in the ASR for 2021 is fully ratified.

Automatic Monitoring Annualisation

All automatic monitoring locations within Elmbridge recorded data capture of greater than 75% therefore it was not required to annualise any monitoring data.

NO_2 Fall-off with Distance from the Road

No automatic NO_2 monitoring locations within Elmbridge required distance correction during 2021.

Table C.2 – Local Bias Adjustment Calculation

	Local Bias Adjustment Input 1	Local Bias Adjustment Input 2
Periods used to calculate bias	11	11
Bias Factor A	0.91 (0.77 - 1.13)	0.93 (0.86 - 1.02)
Bias Factor B	9% (-12% - 30%)	7% (-2% - 17%)
Diffusion Tube Mean (µg/m^3)	29.1	28.0
Mean CV (Precision)	5.0%	5.5%
Automatic Mean (µg/m^3)	26.6	26.0
Data Capture	100%	98%
Adjusted Tube Mean (µg/m^3)	26 (22 - 33)	26 (24 - 29)

Notes:

A local bias adjustment factor of 0.93 has been used to bias adjust the 2021 diffusion tube results.

Table C.3 – NO_2 Fall off with Distance Calculations (concentrations presented in µg/m^3)

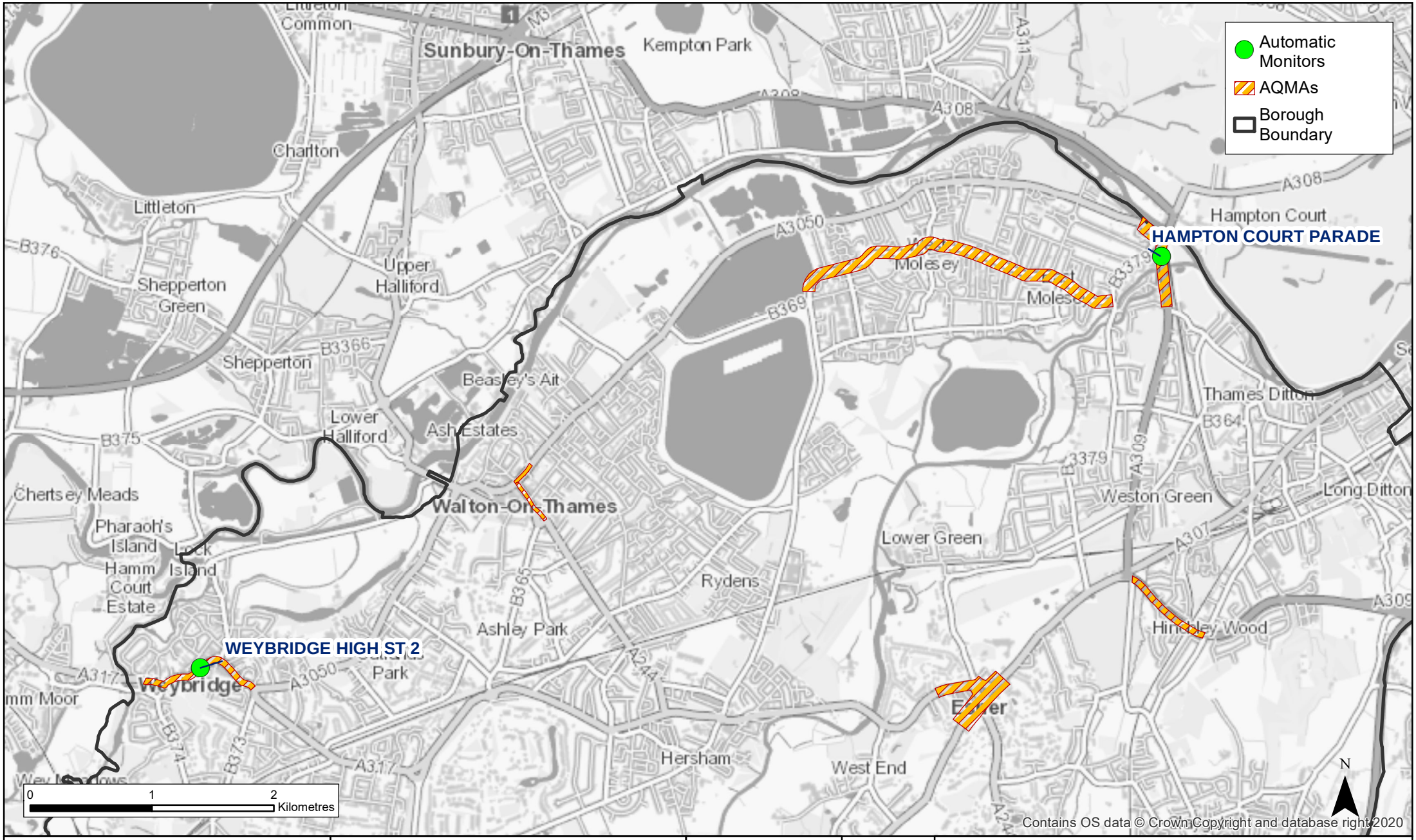
Site ID	Distance (m): Monitoring Site to Kerb	Distance (m): Receptor to Kerb	Monitored Concentration (Annualised and Bias Adjusted) [a]	Monitored Concentration (Annualised and Bias Adjusted) [b]	Background Concentration	Concentration Predicted at Receptor [a]	Concentration Predicted at Receptor [b]	Comments
COBHAM 11	1.5	8.6	39.2[a]	41.1[b]	18.2	31.1[a]	32.3[b]	-

[a] Local bias adjustment factor used (0.93)

[b] National bias adjustment factor used (0.97)

Appendix D: Maps of Monitoring Locations and AQMAs

Document Path: J:\47763 Elmbridge 2020 LAQM\Air Quality\Plans and Figures\ArcGIS\ASR 2022\Figure D.1(Automatic Monitoring).mxd



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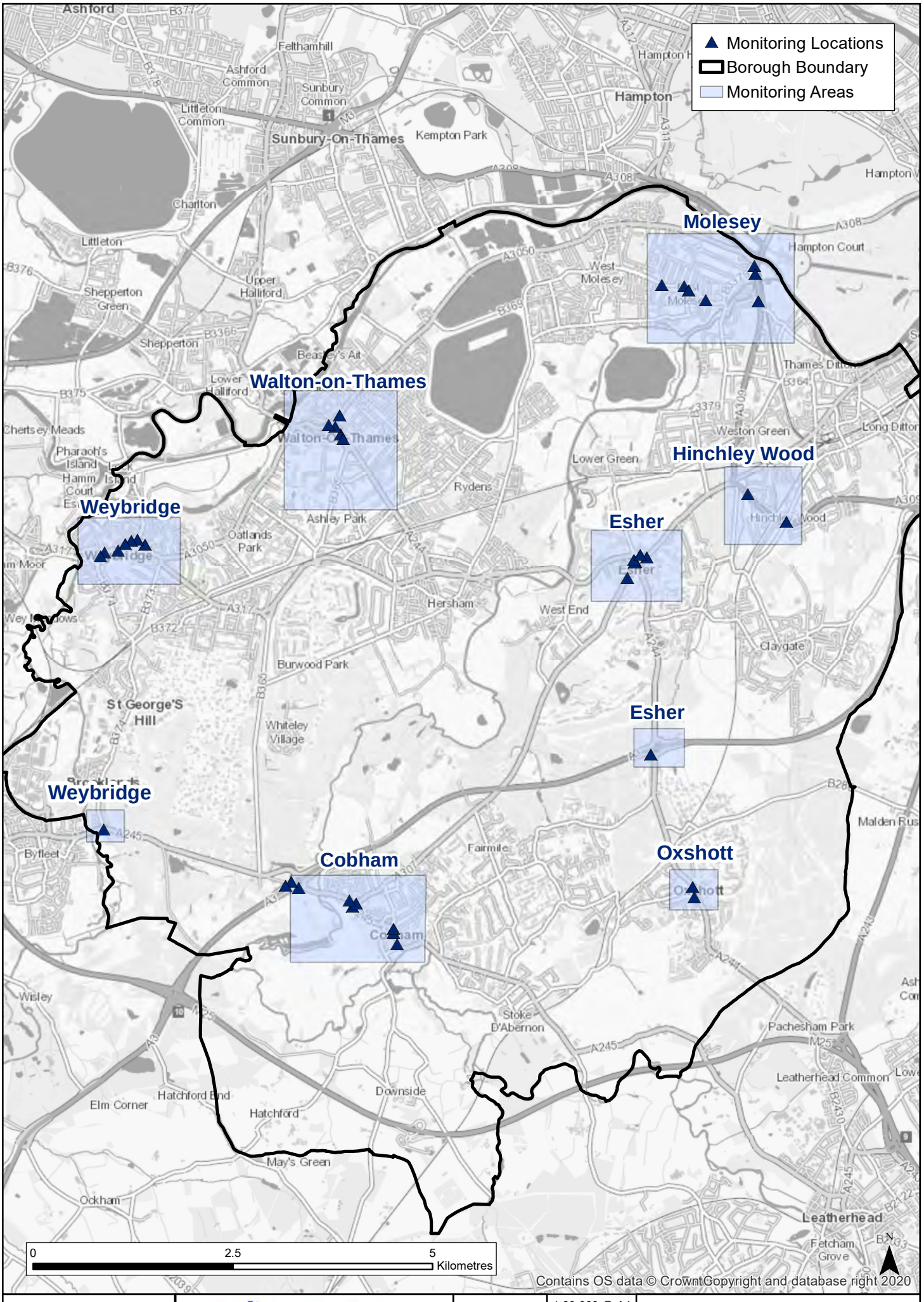
Automatic Monitoring Locations in Elmbridge

Figure D.1 | Rev A



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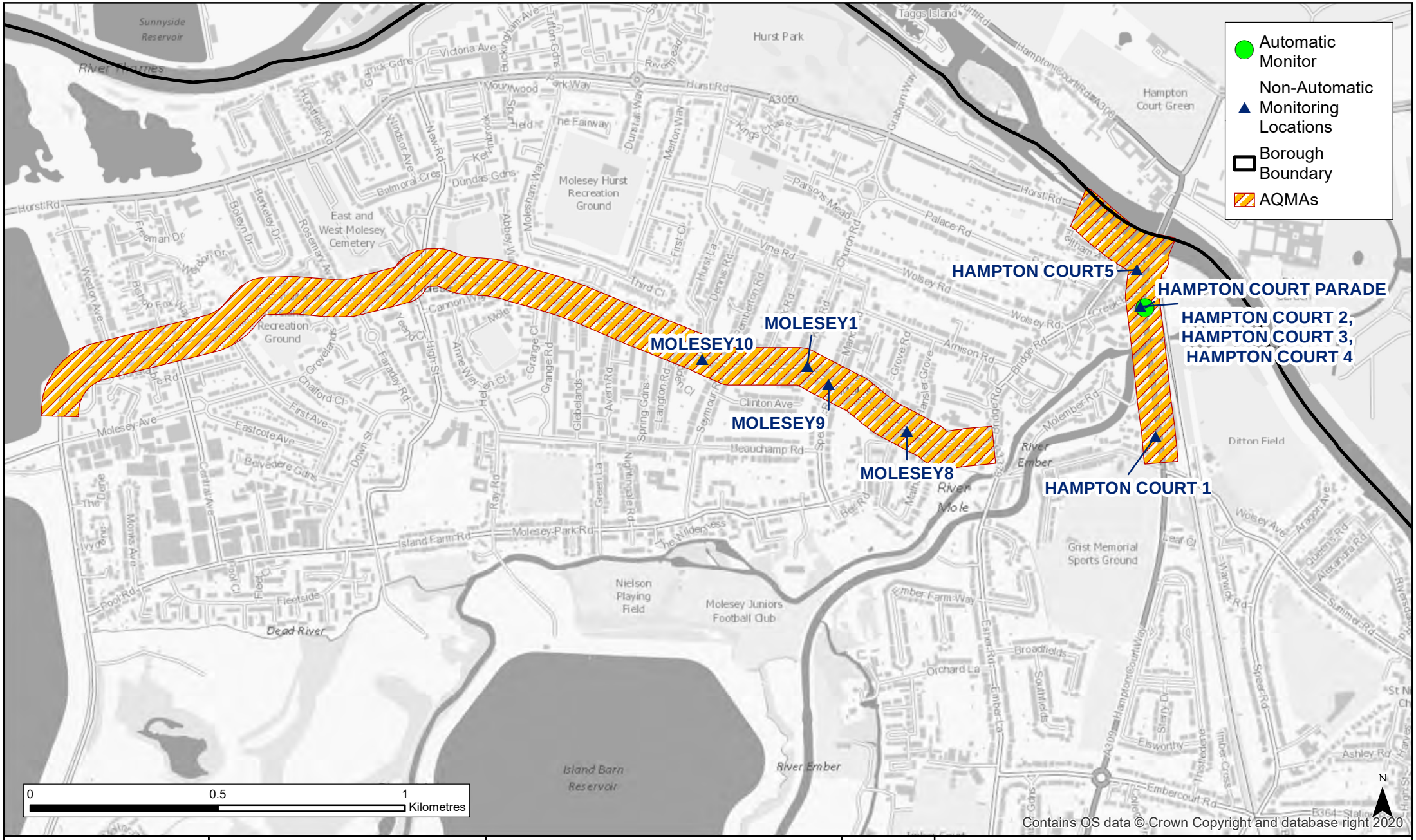
Monitoring Locations in Elmbridge

Figure D.2 | Rev A

Document Path: J:\47763 Elmbridge 2020 LAQM\Air Quality\Plans and Figures\ArcGIS\ASR 2022\Figure D.3(Molesey Monitoring).mxd



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Monitoring Locations in Molesey

Figure D.3 | Rev A

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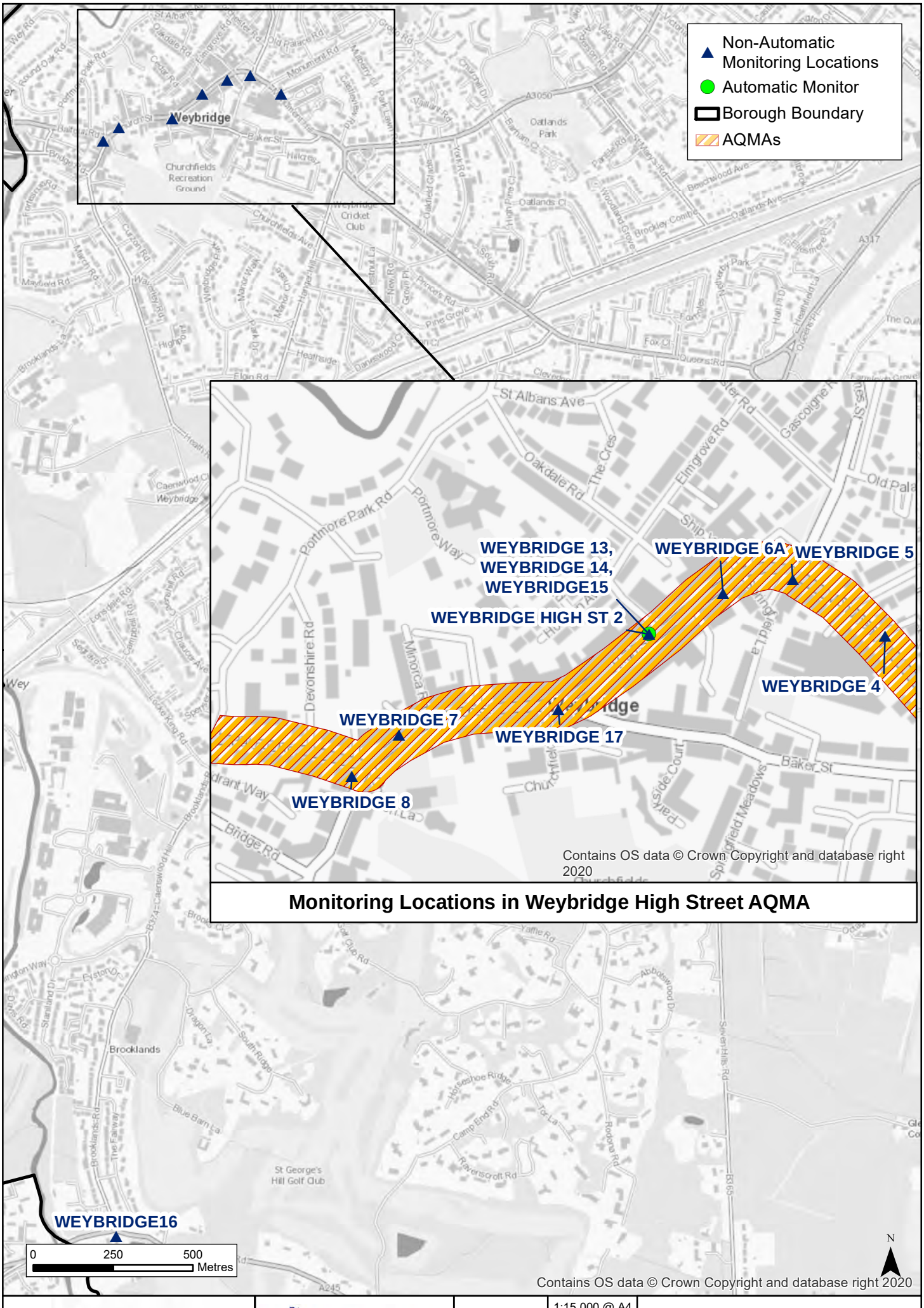
Monitoring Locations in Walton-on-Thames

Figure D.4 | Rev A



Monitoring Locations in Weybridge High Street AQMA

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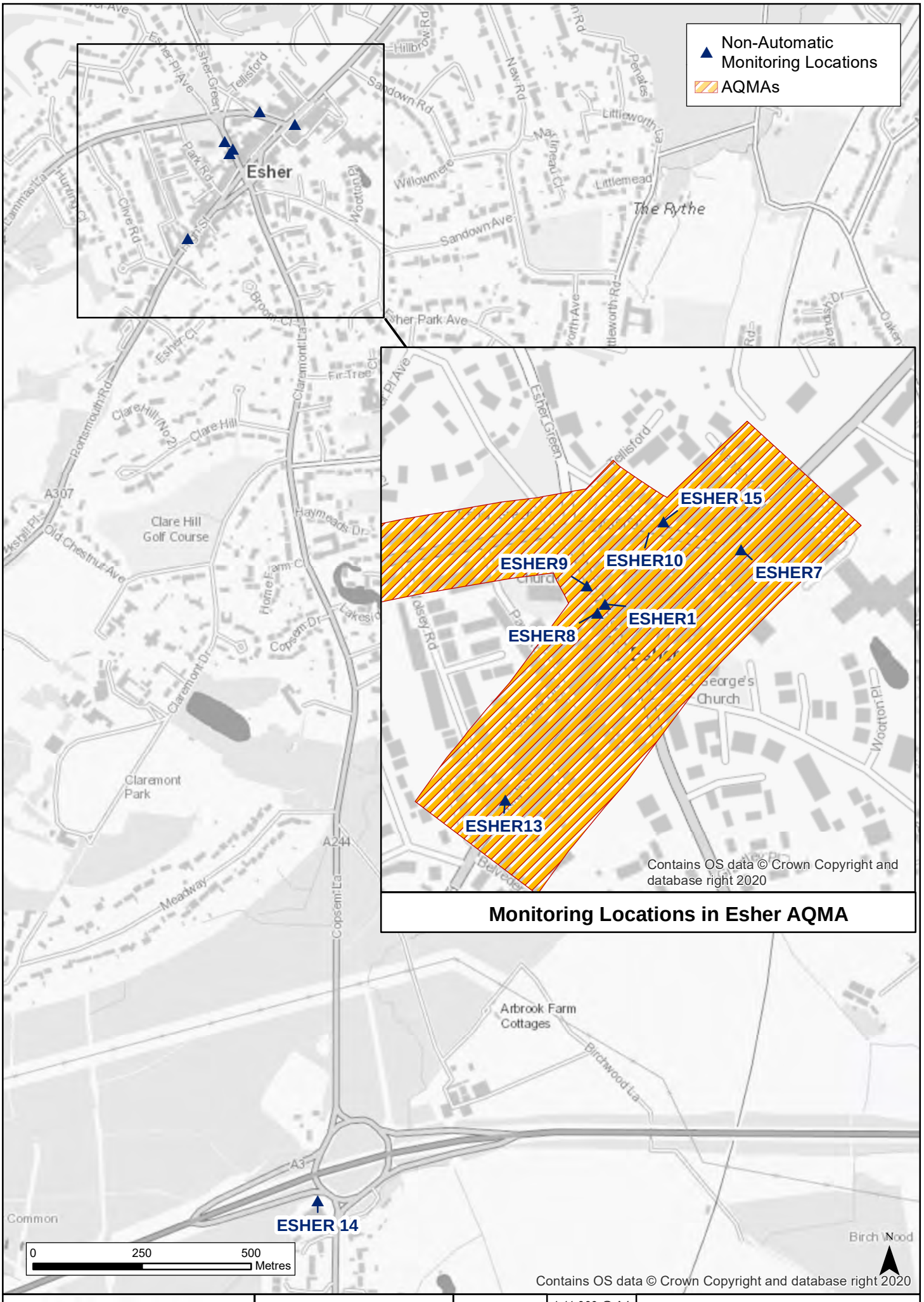
Monitoring Locations in Hinchley Wood

Figure D.6 | Rev A

Document Path: J:\47763 Elmbridge 2020 LAQM\Air Quality\Plans and Figures\ArcGIS\ASR 2022\Figure D.7\Esher Monitoring_1.mxd



Monitoring Locations in Esher AQMA

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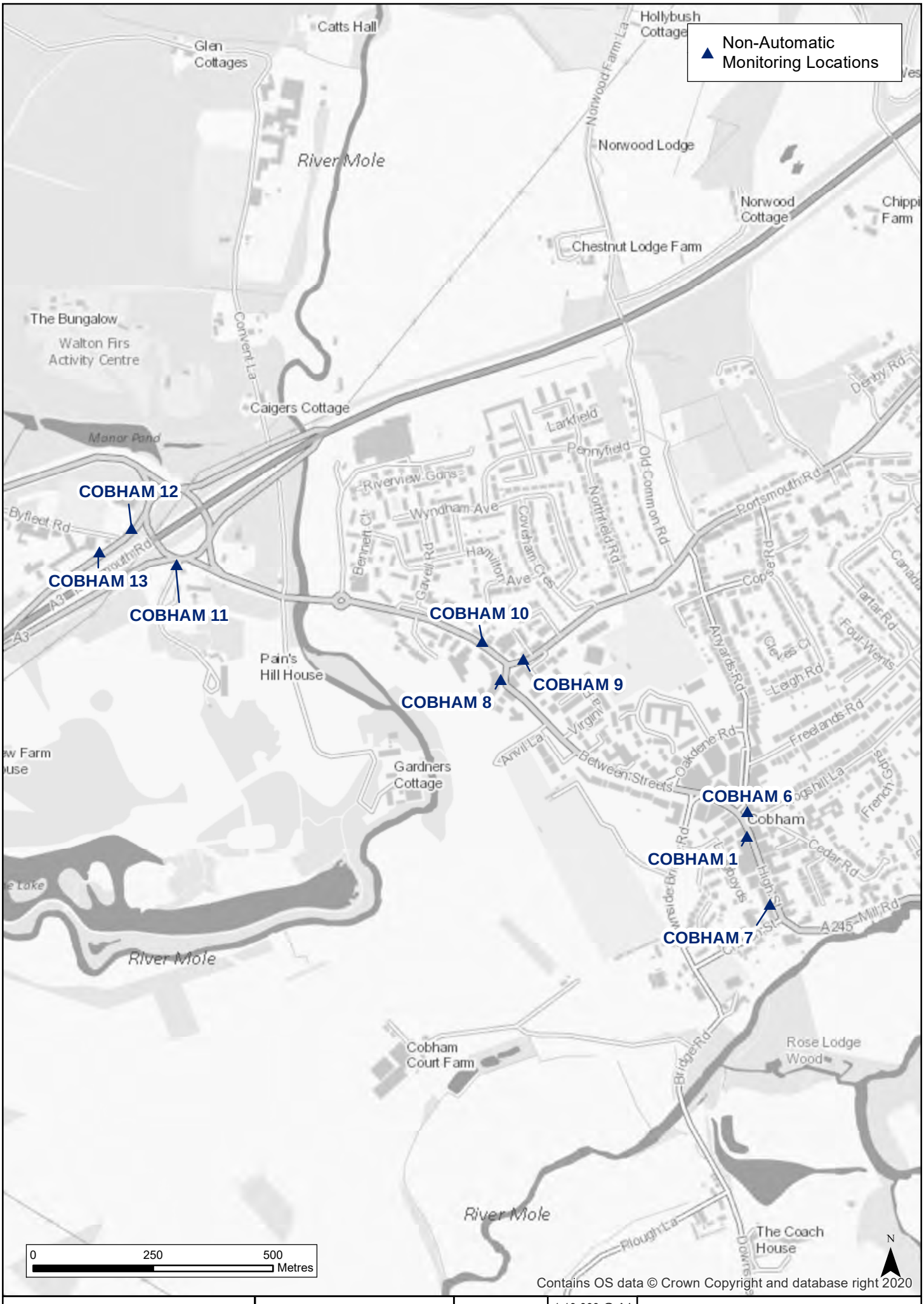
Monitoring Locations in Esher

Figure D.7 | Rev A



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Monitoring Locations in Cobham

Figure D.8 | Rev A

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Monitoring Locations in Oxshott

Figure D.9 | Rev A

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England[18]

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

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

Appendix F: PM Monitor Location Review

TECHNICAL NOTE

Job Name: Elmbridge 2020 LAQM

Job No: 332510134

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Subject: **Elmbridge Particulate Matter Monitor Location Review**

1. Introduction

1.1. Elmbridge Borough Council (EBC) has commissioned Stantec UK Ltd. (Stantec) to undertake a review of potential locations to install a new automatic particulate matter (PM) monitoring station in the borough.

1.2. The installation of a roadside PM monitoring station is a measure within EBC's draft Air Quality Action Plan (AQAP) 2021 – 2026 and funding has been granted. The PM monitoring station will measure concentrations of both PM_{10} and $PM_{2.5}$ in order to establish a baseline for these pollutants in the borough for comparison against national air quality objectives, EU limit values (in the case of $PM_{2.5}$) and World Health Organisation guideline values, as well as monitoring long-term trends and progress on measures to improve air quality.

1.3. This technical note outlines the approach to, and findings of the review of locations for the installation of the PM monitoring station.

2. Approach

2.1. EBC have requested that the PM monitoring station location is roadside and worst-case in terms of PM concentrations. Initial discussions with EBC have also determined that there are no significant energy or industrial sources of PM in the borough that would need to be considered in the review of monitoring locations.

2.2. There is some variation in worst-case locations between annual mean concentrations of PM_{10} and $PM_{2.5}$, due to differences in sources and dispersion of varying sized particles. Therefore, it has been considered most appropriate to base the siting of the monitoring station on the locations where the highest concentrations of $PM_{2.5}$ occur as the risk of adverse health effects associated with particles of this size are greater.

2.3. The following sources of information have been utilised to identify potential worst-case $PM_{2.5}$ locations:

- Contour maps of predicted $PM_{2.5}$ concentrations across Elmbridge[1] from air dispersion modelling undertaken by Cambridge Environmental Research Consultants (CERC) on behalf of the Surrey Authorities.

[1] Surrey County Council (2021). '*Air Quality – Surrey Deliverables'*. Available at: https://surreycc.maps.arcgis.com/apps/webappviewer/index.html?id=43910ffb100248ed972115b7a9b49d20

- A large proportion of $PM_{2.5}$ comes from background sources (approximately 70 – 85%[2]), therefore the DEFRA background maps[3] have been used to provide an indication of locations where annual mean background $PM_{2.5}$ concentrations are highest in the borough.
- EBC NO_2 monitoring data. Research has shown that there is a correlation between $PM_{2.5}$ and NO_2 at roadside locations.

2.4. Once worst-case locations in terms of $PM_{2.5}$ concentrations had been identified, the suitability of each location for monitoring has been considered. This took into account the proximity of the proposed monitoring location to relevant human exposure (i.e. where people are likely to be present for the averaging period of the $PM_{2.5}$ limit value). In addition, the following siting requirements from DEFRA's Local Air Quality Management Technical Guidance[4] (LAQM TG16) have been considered:

- Roadside sites should be located at least 25m from the edge of major junctions and no more than 10m from the kerbside.
- Sites should be in an open setting in relation to surrounding buildings.
- The inlet sampling point should be between 1.5m and 4m above ground. Due to security reasons, and inlet height between 2m and 4m may be most appropriate, however it should be recognised that lower sampling heights better reflect public exposure.
- The inlet sampling point should not be located within the immediate vicinity of sources in order to avoid direct intake of emissions unmixed with air.
- The site should not be close to local or point emission sources.
- Security and access.
- Availability of electrical power and telephone communications.

3. Identification of Worst-case $PM_{2.5}$ Locations

CERC Contour Maps

3.1. The highest $PM_{2.5}$ concentrations (approximately 22 µg/m^3) are predicted to occur within the vicinity of the M25 at the Portsmouth Road junction towards the southwestern edge of the borough. Concentrations of approximately 15 – 18 µg/m^3 occur around the A3 Esher Bypass/A245 junction and along the M25, however these concentrations are within the vicinity of the road. Concentrations of approximately 14 µg/m^3 occur on land surrounding the A3 Esher Bypass/A244 Copsem Lane junction, the A3 Esher Bypass/A245 junction, and the Kingston Bypass/A3 Esher Bypass junction, as well as in close proximity (up to approximately 20m) either side of the M25. Small hotspots of $PM_{2.5}$ concentrations of approximately 14 µg/m^3 were also identified in Esher at the A307 High Street/A244 junction, in Cobham at the A307/A245 roundabout and in Walton-on-Thames at the High Street/A244 New Zealand Avenue junction. Concentrations across the remainder of the borough are predicted to be less than 13 µg/m^3.

DEFRA Background Maps

3.2. **Figure 1** shows the estimated DEFRA background annual mean $PM_{2.5}$ concentrations across the borough in 2021 on a 1km x 1km basis.

3.3. It should be noted that the areas with the highest background concentrations may not necessarily be the worst-case locations in terms of total $PM_{2.5}$ concentrations, as the contribution from different sources will vary in each location. However, the background maps are useful in identifying areas

[2] CERC (2019). '*Detailed Air Quality Modelling and Source Apportionment for Elmbridge Borough Council*'.
[3] DEFRA (2020) '*Background Mapping Data for Local Authorities*'. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018
[4] DEFRA (2021). 'Local Air Quality Management Technical Guidance (TG16)'. Available at: https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf

where the combined effects of different sources may lead to the greatest total $PM_{2.5}$ concentrations (i.e. adjacent to busy roads in an area with high background concentrations).

3.4. The highest background concentrations of $PM_{2.5}$ (>11 µg/m^3) occur in Walton-on-Thames (around the High Street AQMA), and West Molesey (around the Walton Road AQMA). Background concentrations of $PM_{2.5}$ between 10.5 – 11 µg/m^3 tend to occur in the northern half of the borough, including East Molesey, Weston Green, Hinchley Wood and Weybridge.

3.5. Concentrations of between 10 – 10.5 µg/m^3 are predicted to occur around Esher High Street, Claygate, the A3/Copsem Lane junction in Esher, the A3/A245 junction, and around the A245 in Cobham, as well as along the M25.

Measured NO_2 Concentrations

3.6. Data from the monitoring sites which recorded the highest NO_2 concentrations in 2018 - 2020 are provided in **Table 1** and their locations are shown in **Figure 1**.

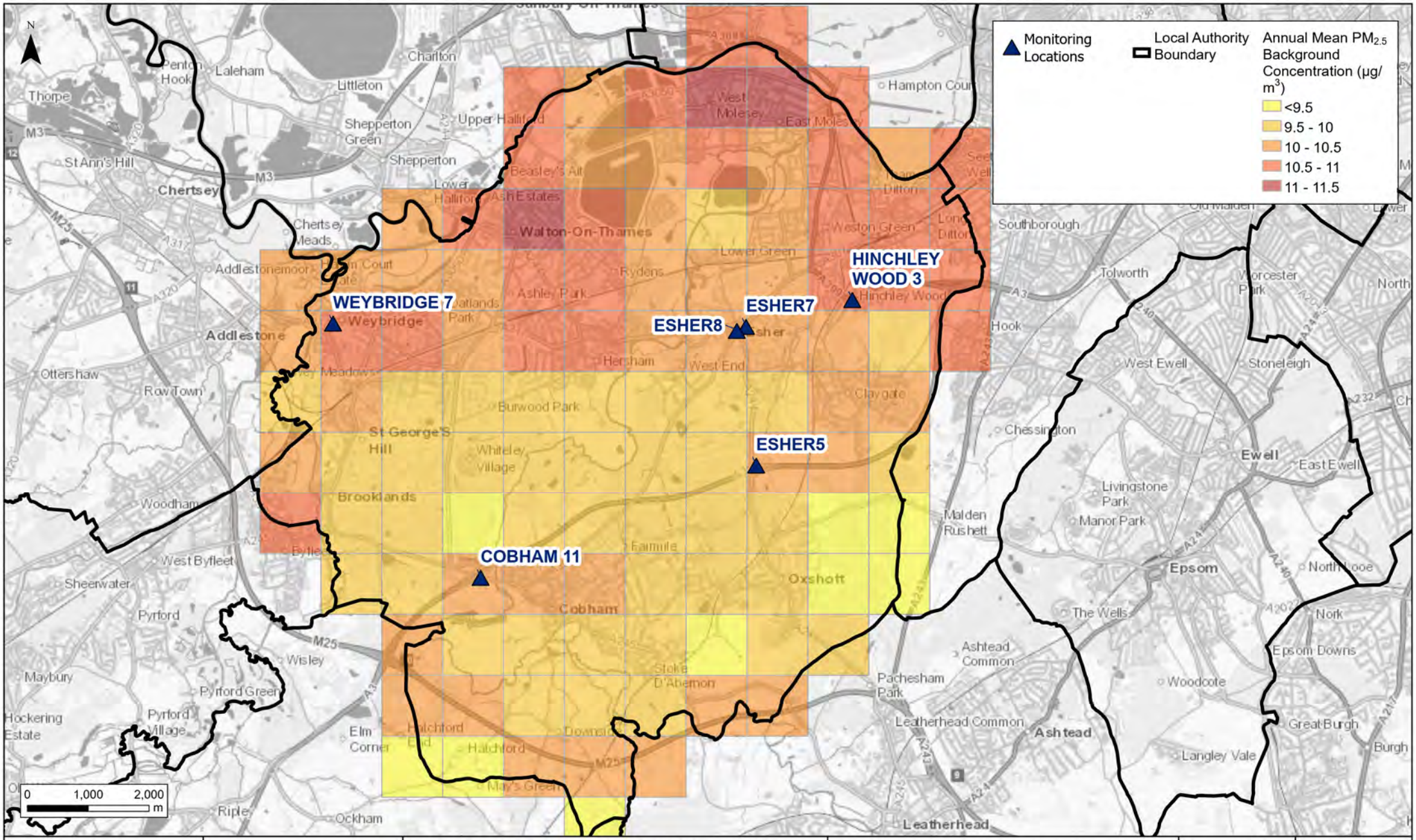
Table 1: Measured annual mean NO_2 concentrations at EBC monitoring sites with the highest recorded concentrations in 2018 – 2020.

Site ID	Location	Distance from Kerb of Road (m)	Annual Mean NO_2 Concentration (µg/m^3)		
			2018	2019	2020
Cobham 11	Lampost outside West Lodge, Portsmouth Road, Cobham	1.5	-	-	**40.9**
Hinchley Wood 3	Lampost corner Kingston Bypass/Manor Rd Nth, Esher	2.6	-	-	34.7
Weybridge 7	Prezzo, 44 Church St, Weybridge	1.5	39.6	**45.6**	33.1
Esher 7	Outside Blink, 35-37 High Street, Esher	0.6	**41.9**	**46.0**	31.1
Esher 5	Roundabout, Copsem Lane/A3, Esher	1.4	**46.1**	**48.1**	31.0
Esher 8	Outside 9 Church St	3.2	**41.9**	**42.4**	30.1
Objective			**40**		

Exceedances of the objective are highlighted in bold

3.7. In 2020, the highest measured NO_2 concentrations occurred at Cobham 11. This was followed by Hinchley Wood 3, Weybridge 7, Esher 5, Esher 7 and Esher 8. It should be noted that due to COVID-19 restrictions and a subsequent reduction in road traffic, measured concentrations in 2020 are not considered to be representative of usual conditions and are lower than previous years. However, Weybridge 7, Esher 5, Esher 7 and Esher 8 all also reported the highest concentrations in 2019 and 2018. Monitoring at Cobham 11 and Hinchley Wood 3 began in 2020 so cannot be compared with previous years. The high measured NO_2 concentrations in these areas indicate that concentrations of other pollutants may also be elevated.

Document Path: J:\47763 Elmbridge 2020 LAQM\Air Quality\Plans and Figures\ArcGIS\Elmbridge LAQM\Elmbridge LAQM.aprx



Stantec	Elmbridge Borough Council ... bridging the communities ...	**Elmbridge Particulate Monitor Location Review** DEFRA Estimated Annual Mean Background $PM_{2.5}$ Concentrations (µg/m^3)	OS_Open_Greyscale_2: Contains OS data © Crown Copyright and database right 2020	1:80,000 @ A4 / Date: 27/10/2021 Drawn: LS / Checked: KH Figure 01 / Rev A

Summary of Worst-case Locations

3.8. The following areas have been identified as potential worst-case locations for $PM_{2.5}$ concentrations from two or more sources of information and have therefore been considered further in terms of relevant exposure and siting requirements:

- M25 and land up to 20m either side, Downside;
- High Street/A244 New Zealand Avenue junction, Walton-on-Thames;
- A3 Esher Bypass/A244 Copsem Lane junction, Esher;
- A3 Esher Bypass/A245 junction, Cobham;
- Kingston Bypass/A3 Esher Bypass junction, Hinchley Wood; and
- A307 High Street/A244 junction, Esher.

4. Monitoring Location Suitability

Relevant Exposure

4.1. Monitoring stations should be representative of relevant public exposure where possible. The closest locations of relevant exposure to the M25 are more than 20m from the kerb of the M25 (with the closest being approximately 28m from the road). Similarly, there is no relevant exposure in proximity to the Kingston Bypass/A3 Esher Bypass junction, within EBC's administrative boundary. Therefore, these locations have not been considered further in this review.

4.2. There is relevant exposure in close proximity to the remaining worst-case $PM_{2.5}$ locations and therefore specific siting requirements have been reviewed in the following section.

Siting Requirements

4.3. The following locations have been identified as potential sites for the new monitor due to their proximity to relevant exposure, $PM_{2.5}$ concentrations, and because they are considered to meet the TG.16 siting requirements (see **paragraph 2.3**).

Figure 2: High Street/A244 New Zealand Avenue junction, Walton-on-Thames. Source: Google Maps, 2021

Figure 3: A3 Esher Bypass/A244 Copsem Lane junction, Esher. Source: Google Maps, 2021

Figure 4: Esher Bypass/A245 junction. Source: Google Maps, 2021

Figure 5: A307 High Street/A244 junction, Esher. Source: Google Maps, 2021

5. Conclusions

5.1. The most appropriate location for the new PM monitoring site is considered to be the A307 High Street/A244 junction, Esher for the following reasons:

- There are several locations of relevant exposure in close proximity to the proposed monitoring site location.
- CCTV cameras in the area provide security.
- Telephone communications and electrical power appear to be available.
- Annual mean NO_2 concentrations have exceeded the national air quality objective for a number of years at this location and there is local concern regarding air quality.
- The site would be easily accessible by personnel maintaining the monitoring equipment.

DOCUMENT ISSUE RECORD

Technical Note No	Rev	Date	Prepared	Checked	Reviewed (Discipline Lead)	Approved (Project Manager)
332510134TN003	-	October 2021	LS	KH	KH	KH

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	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
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
SAA	Surrey Air Quality Alliance
SCC	Surry County Council
SO_2	Sulphur Dioxide
The Council	Elmbridge Borough Council
TEA	Triethanolamine

References

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