mayer brown

RESIDENTIAL DEVELOPMENT
UPPER HALLIFORD ROAD, SHEPPERTON

AIR QUALITY ASSESSMENT

NOVEMBER 2022

the journey is the reward

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Project Code:	**25569 – APBugle (A)2.9**
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Issue Date:	November 2022
Status:	Rev 2

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Residential Development
Upper Halliford Road, Shepperton
Air Quality Assessment

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1 Introduction

1.1 Mayer Brown Limited has been instructed by Angle Property (RLP Shepperton) LLP to undertake an Air Quality Assessment (AQA) in support of an outline planning application with all matters reserved other than 'access' for the demolition of existing buildings and structures and the redevelopment of the site for a residential development comprising up to 80 dwellings plus associated works for landscaping, parking areas, pedestrian, cycle and vehicular routes, on the site known as Bugle Nurseries, Upper Halliford Road, Shepperton.

1.2 The following Air Quality Assessment (AQA) has been undertaken in order to assess any likely air quality impacts associated with the proposed development upon the surrounding area and to establish whether the site's location is considered suitable for the proposed use.

1.3 In the event that potential impacts are identified, specific mitigation measures have been recommended in order to minimise significant pollution impacts and help safeguard the health and wellbeing of any existing and proposed sensitive receptors within the local area.

1.4 The AQA is divided into the following sections:

- **Section 2** - Site Description and Proposals;
- **Section 3** - Legislation and Policy Content;
- **Section 4** - Assessment Methodology and Significance Criteria;
- **Section 5** - Baseline Conditions;
- **Section 6** - Evaluation of Potential Effects;
- **Section 7** - Road Traffic Emissions;
- **Section 8** - Mitigation Measures; and
- **Section 9** - Conclusions

2 Site Description and Proposals

2.1 The site is located on Upper Halliford Road, Shepperton under the jurisdiction of Spelthorne Borough Council (SBC).

2.2 The site location in relation to the local highway network can be seen in **Figure 2.1** below.

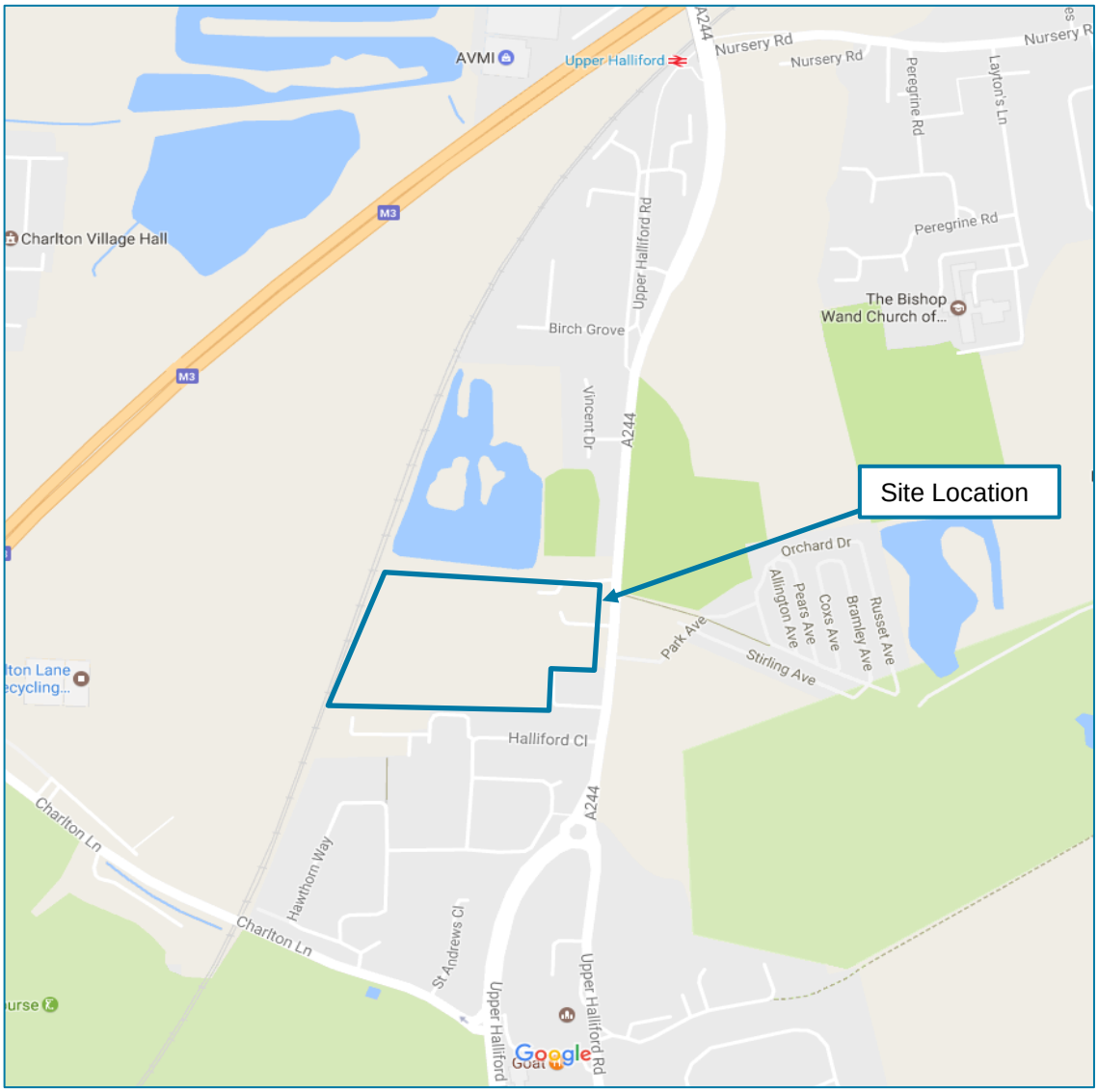

Figure 2.1: Site in Relation to the Local Highway Network

2.3 The surrounding area is predominantly residential. Shepperton Community Recycling Centre and Sunbury Golf Course are to the southwest of the site and to the north is Upper Halliford Station.

2.4 The 4.84-hectare site was formally partially utilised as a nursery and currently comprises of poor-quality commercial buildings on its eastern side, and one residential dwelling.

2.5 A previous planning application for the site, proposing a 72-bed care home, 51 residential units and supporting infrastructure, was submitted to SBC in in November 2018.

2.6 Additionally, the site currently benefits from an outline planning consent granted at appeal in July 2021 for a 31-unit residential development along with the provision of public open space and other associated works for landscaping, parking areas, pedestrian, cycle and vehicular routes.

2.7 The existing site layout and red line boundary are provided in **Figure 2.2** below.

Figure 2.2: Proposed Development Red Line Boundary

2.8 The current proposal includes the demolition of existing buildings and structures and the redevelopment of 2.05 ha of the site for a residential development comprising:

- Residential Development – 80 units
- Supporting access roads, parking bays and gardens
- Public grassland

2.9 The indicative proposed site plan is provided in **Figure A1** within **Appendix A**.

3 Legislation and Policy Content

The Air Quality Strategy[1]

3.1 The Air Quality Strategy (AQS) has been prepared following obligations imposed upon the UK Government to produce standards, objectives and measures for improving ambient air quality, following The Environment Act 1995 as amended by the Environment Act 2021.

3.2 The AQS sets out a framework for Local Authorities to reduce adverse health effects from ambient air pollution and ensures that international and national commitments are met, using the Local Air Quality Management (LAQM) system.

3.3 The strategy was reviewed in 2000 and the amended AQS for England, Scotland, Wales and Northern Ireland (2000) was published. This was followed by an Addendum in February 2003 and in July 2007 an updated AQS was published[2].

3.4 The AQS sets standards and objectives for pollutants to protect human health, vegetation and ecosystems. The pollutant objectives are the future dates by which each standard is to be achieved, taking into account economic considerations, practical and technical feasibility.

3.5 The main air quality pollutants of concern with regards to new developments such as the one is the traffic related pollutants of Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10} and $PM_{2.5}$).

3.6 The relevant air quality objectives, as they currently apply in the United Kingdom are presented in **Table 2.1** below.

Pollutant	Air Quality Objectives		Date to be Achieved by
	Concentration	Measured As	
Nitrogen Dioxide (NO_2)	200 µg/m^3	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	40 µg/m^3	Annual mean	31/12/2005
Particles (PM_{10})	50 µg/m^3	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	40 µg/m^3	Annual mean	31/12/2004
Particles ($PM_{2.5}$) (UK – Except Scotland)	20 µg/m^3	Annual mean	2020

[1] Department of Environment, Food and Rural Affairs in Partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, (2011), 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland', The Stationery Office (TSO). Norwich.
[2] Department of the Environment, Transport and the Regions, (2007), 'The Air Quality Strategy for England, Scotland, Wales and Northern Island (Volume 2)', HMSO, London.

Pollutant	Air Quality Objectives		Date to be Achieved by
	Concentration	Measured As	
Particles ($PM_{2.5}$) (UK – Urban Areas)	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020

Table 2.1: Air Quality Objectives in the UK

Air Quality Standards Regulations, 2010[3]

3.7 The air quality limit values set out in EU Directive (2008/50/EC, 2008) are transposed in English law by the Air Quality Standards Regulations (2010). This imposes duties on the Secretary of State relating to achieving the limit values.

3.8 With regards to dust, it is recognised that major construction works may give rise to dust emissions within the PM_{10} and $PM_{2.5}$ size fraction and it is noted within section 79 of the Environmental Protection Act 1990 that a statutory nuisance is defined as:

'Any dust or effluvia arising from an industrial, trade or business premises and being prejudicial to health or a nuisance'

National Planning Policy Framework (NPPF) 2021[4]

3.9 The NPPF was updated in July 2021 and supersedes all the previous versions. The purpose of the document is to set out the Government's policies in relation to planning for England and how these should be applied.

3.10 Section 9 of the NPPF refers to promoting sustainable transport. In relation to air quality, paragraph 104 states that:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:….

c) opportunities to promote walking, cycling and public transport use are identified and pursued;

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains…"

3.11 Additionally, it states:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be

3 UK Parliament (2010). The Air Quality Standards Regulations 2010, SI 2010/1001. HMSO, London.
[4] Ministry of Housing, Communities and Local Government (2021), National Planning Policy Framework, London

made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health…"

3.12 Section 15 of the document also refers to air quality within planning. Paragraph 185 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development…"

3.13 Paragraph 186 adds that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement…"

3.14 In relation to the planning conditions and obligations, paragraphs, 55 and 56 state the following:

"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.

Planning conditions should be kept to a minimum and only imposed where they are necessary, relevant to planning and to the development to be permitted, enforceable, precise and reasonable in all other respects. Agreeing conditions early is beneficial to all parties involved in the process and can speed up decision making. Conditions that are required to be discharged before development commences should be avoided, unless there is a clear justification."

Planning Practice Guidance – Air Quality[5]

3.15 The Planning Practice Guidance (PPG) is used to support the National Planning Policy Framework and is published online. The guidance on air quality was originally published

[5] Ministry of Housing, Communities and Local Government, November 2019, Planning Practice Guidance-Air Quality, Ministry of Housing, Communities and Local Government, London. Available on: https://www.gov.uk/guidance/air-quality--3#history

in 2014 and updated in November 2019. The PPG provides various principles on how planning can take account of the impact of new development on air quality.

3.16 The guidance refers to the specific issues that may need to be considered when assessing air quality impacts. It states:

"Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield…*
- *Introduce new point sources of air pollution…*
- *Expose people to harmful concentrations of air pollutants…*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity…"*

3.17 Guidance on how detailed an air quality assessment need to be is provided and states:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions", and because of this are likely to be locationally specific…"

3.18 Reference to how air quality can be mitigated states that:

"Mitigation option will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with the applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented…"

Regional Planning Policy

Surrey Transport Plan (2011-2026) – Low Emissions Transport Strategy 2018[6]

3.19 The Low Emission Transport Strategy was adopted in February 2019. Air quality has been considered in section 2: Defining the Problems – Air Quality which outlines baseline conditions such as number of AQMAs, key pollutants and impacts on public health and the climate.

3.20 Section 4: Aim and preferred approach states that;

[6] Surrey County Council (2018), Surrey Transport Plan (2011-2026) – Low Emission Transport Strategy

"Low emissions transport strategy aim: To reduce polluting emissions from road transport across the county which are harmful to health and the environment, and work with partners to achieve legal compliance for air quality locally.

4.1 The county council will reduce emissions of greenhouse gases, nitrous oxides and particulate matter and reduce exposure to poor air quality, through four key opportunity areas:

i. Transport networks and infrastructure for sustainable travel such as highway improvements for walking, cycling and passenger transport and supporting the growth of Surrey's public EV charge point network.

ii. Travel behaviour change such as initiatives and campaigns in schools and workplaces, road safety initiatives, expanding car clubs, encouraging lift sharing, raising awareness and public understanding of air quality and climate change.

iii. Partnership working such as working with district and borough councils on air quality matters, advising on transport impacts of new development, strategic planning input to Local Plans and partnerships with transport providers for modal shift and lower emissions vehicles, including bus companies and train operators.

iv. Reducing emissions from the council's own estate and operations such as influencing staff business travel, procuring electric vehicles / ultra-low emissions fleet vehicles where viable and where value for money is shown and opportunities in highways operations and maintenance supply chain."

3.21 Section 5: Delivery and Funding has highlighted the following actions to deliver the Low Emission Transport Strategy aim;

- *"…HGV re-routing away from AQMAs, whilst taking account of local business needs and where this does not cause negative air quality impacts elsewhere…"*
- *"…Take account of air quality issues in reviews of parking and loading restrictions via the Controlled Parking Zone rolling programme…"*
- *"…Raise public awareness and understanding of air quality via Healthy Surrey website and self-help for vulnerable people in the most severe periods of air pollution via the Air Alert service…"*
- *"…Work collaboratively with boroughs and districts to improve air quality in AQMAs and county-wide background air pollution and carbon emissions reduction, in particular working with district and borough councils to support them to monitor and assess air pollution levels and develop and delivering joint Air Quality action plans in AQMAs…"*
- *"…Review evidence and national policy to take account of impact on air quality when setting local speed limits, in future review of county speed limit policy…"*

- *"…Review Surrey Transport Plan Freight strategy to give additional weight to air quality problems and consider ways to tackle emissions Heavy Goods Vehicles e.g. supporting infrastructure for low emissions HGV fuels learning from the Low Emissions Freight and Logistics Trail and re-routing. Also to address the growth in mileage and emissions of Light Goods Vehicles (vans) e.g. through and low emissions local delivery partnerships/technology solutions…"*

Surrey Local Transport Plan 4 LTP4[7]

3.22 The Local Transport Plan LTP4 went into public consultation between July - October 2021 with the aim to be adopted in 2022 and will provide policies between 2022-2032. LTP4 plans to reduce the 46% of carbon emissions currently generated by transport in Surrey and will supersede the LTP3. The new plan will look at alternative modes of transport and changes in behaviours, such as reducing the need to travel by car, to help tackle the climate emergency and become carbon free by 2050.

Local Planning Policy

3.23 Spelthorne's current Local Plan is made up of various documents and contains a number of policies ensuring that the borough develops in a sustainable manner. The most important of these is the Core Strategy and Policies Development Plan Document, which sets out a vision for the borough up to 2026 and identifies objectives which need to be met in order to achieve this vision. The Allocations DPD relates to specific policies in the Core Strategy and Policies DPD and assists in implementing those policies.

Core Strategy and Policies Development Plan Document 2009[8]

3.24 This document is part of the Local Development Framework (LDF) and sets out the Council's core strategy and detailed policies.

3.25 Part of the 'vision' statement refers to air quality and states the following:

"*By 2026…. Uses with the potential to generate large amounts of traffic will have been located in town and other centres and locations accessible by noncar based travel. Use of non-car based travel will have increased and contributed to reducing congestion and resulted in improved air quality – which in Spelthorne is primarily traffic related."*

3.26 The objectives set out how the vision will be achieved. Objectives 3 and 15 refer to air quality and state:

"…*3. To secure an improvement in the Borough's air quality.*

[7] Surrey County Council (2021), Surrey Local Transport Plan 4 (LTP4) Public Consultation

[8] Spelthorne Borough Council (2009), Local Plan – Core Strategy & Policies DPD

Parts of Spelthorne suffer from poor air quality. This DPD can make a contribution to its improvement along with other plans and strategies...

…15. To ensure development contributes to sustainable transport choices and reduces the need to travel…

"Reducing reliance on the car offers congestion and air quality benefits. Locating and designing developments so that they are less car-dependent can assist in this process and contribute to a more sustainable pattern of development."

3.27 The spatial strategy has been developed from the spatial description of the Borough and the vision and objectives. It will meet future development requirements from within the existing urban area which lies broadly across the middle of the Borough and largely constitutes a continuous built-up area.

3.28 Chapter 4 Core Strategies and Policies – Spatial Strategy, point 4.10, relates to air quality and states:

"*The environment is of particular importance to local people and will be maintained and improved by ensuring new development is well designed and attractive and makes a positive contribution to the locality in which is situated. Both the historic environment and areas of landscape value and nature conservation value will be protected and enhanced. A range of actions is necessary to redress the impact of climate change and poor air quality and the contribution of traffic in Spelthorne to adverse its affects."*

3.29 Chapter 10 contains Strategic Policy SP6: Maintaining and Improving the Environment which states the following:

"*The Council will seek to maintain and improve the quality of the environment of the Borough. It will:*

a) ensure the design and layout of new development incorporates principles of sustainable development, and creates an environment that is inclusive, safe and secure, is attractive with its own distinct identity and respects the environment of the area in which it is situated,

b) contribute to improving air quality in the Borough,

c) protect and enhance areas of existing environmental character including sites of nature conservation value, areas of landscape value, the Borough's historic and cultural heritage (including historic buildings and Conservation Areas) and open space of amenity and recreation value,

d) promote the improvement of poor quality environments both within the urban area and in the Green Belt."

3.30 Policy EN3: Air Quality sets out how the aim of Policy SP6, of contributing to improving air quality in the Borough will be achieved. It states that:

"The Council will seek to improve the air quality of the Borough and minimise harm from poor air quality by:

a) Supporting measures to encourage non-car based means of travel,

b) Supporting appropriate measures to reduce traffic congestion where it is a contributor to existing areas of poor air quality,

c) Requiring an air quality assessment where development:

i. Is in an Air Quality Management Area, and

ii. Generates significant levels of pollution, or

iii. Increases traffic volumes or congestion, or

iv. Is for non-residential uses of 1000 m^2 or greater, or

v. Is for 10 or more dwellings, or

vi. Involves development sensitive to poor air quality.

d) Refusing development where the adverse effects on air quality are of a significant scale, either individually or in combination with other proposals, and which are not outweighed by other important considerations or effects and cannot be appropriately and effectively mitigated,

e) Refusing development where the adverse effects of existing air quality on future occupiers are of significant scale which cannot be appropriately or effectively mitigated and which are not outweighed by other material considerations."

3.31 Chapter 11 refers the strategy for Climate Change and Transport. In relation to transport the strategy covers two related aspects:

a) "The location of development. It aims to ensure development is located where it reduces the need to travel and in particular reduces the need to travel by car...

b) Promoting initiatives to encourage users of developments to be less dependent on the car…."

3.32 Strategic Policy SP7: Climate Change and Transport states that:

"*The Council will seek to minimise the impact of climate change. It will reduce the impact of development in contributing to climate change by:*

a) promoting the inclusion of provision for renewable energy, energy conservation and waste management facilities in both new and existing developments,

b) ensuring development is located in a way that reduces the need to travel and encourages alternatives to car use, and its design and layout takes account of climate change,

c) supporting initiatives, including travel plans, to encourage non- car-based travel…"

3.33 Reducing the need to travel and reducing reliance on the car will also enable the impact of new development on traffic congestion in the Borough to be minimised.

3.34 The transport related element of the strategy and detailed policies will also make a contribution to improving air quality and implementation of Strategic Policy SP6 and Policy EN3.

3.35 The following air quality assessment has taken into consideration all the above policies and guidelines.

Emerging Local Plan 2020-2035[9]

3.36 The Council are currently working on an updated Local Plan which will go into consultation from February to March 2022. When adopted this plan will replace the previous Core Strategy and Policies Development Plan Document (2009). The emerging Local Plan will set out how the local area will develop over the next 15 years in relation to housing, economy, community facilities and infrastructure.

[9] Spelthorne District Council (2022), Emerging Local Plan 2020-2035

4 Assessment Methodology and Significance Criteria

4.1 This section outlines the assessment methodology and the criteria that have been used to assess the magnitude and significance of risk associated with the proposed development.

4.2 **Table 4.1** below summarises the key information sources used in this assessment

Source	Details
Department for Environment, Food and Rural Affairs (Defra)	**COVID-19 Supplementary Guidance - Local Air Quality Reporting in 2021**[10] Prepared in order to inform local authorities in England of the key changes and points of reference with respect to LAQM duties, as described in Part IV of the Environment Act 1995, for the 2021 reporting year.
	Local Air Quality Management (LAQM) - Technical Guidance (TG22)[11] The LAQM (TG22) supersedes all previous versions, the most recent being the April 2021 release of LAQM (TG16). It is designed to support local authorities in carrying out their duties under the Environment Act 1995 as amended by the Environment Act 2021, the Environment (Northern Ireland) Order 2002, and subsequent regulations.
	The Local Air Quality Management (LAQM)Tools.[12] Contain information pertaining to monitoring networks across the UK and provides tools, which aid in the data processing and the estimation of pollutant concentrations with reference to the specific year of study.
	LAQM Background Maps (2018 Reference Year)[13] These provide mapped estimates of background concentrations for specific pollutants (NO_x, NO_2, PM_{10} and $PM_{2.5}$) using a 1x1 km grid. The maps also provide information on how pollutant concentrations change over time or across a wide area, while allowing for the assessment of new pollutant sources that are introduced into an area and the impact they may have upon local air quality.
	The Emissions Factors Toolkit (EFT) – version11.0[14] The EFT allows users to calculate road vehicle pollutant emission rates for NOx, PM_{10}, $PM_{2.5}$ and CO_2 for a specified year, road type, vehicle speed and vehicle fleet composition.

[10] Greater London Authority (GLA). (2021). 'Local Air Quality Management Reporting in 2021 COVID-19 Supplementary Guidance'. GLA, London
[11] Department of Environment, Food and Rural Affairs (DEFRA). (2022). 'Local Air Quality Management Technical Guidance (TG22)'. DEFRA, London
[12] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/list-of-available-tools/
[13] Department of Environment, Food and Rural Affairs (DEFRA). (2018), 'Background Mapping data for local authorities – 2018', DEFRA, London. https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018
[14] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/

Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM)	**Land-Use Planning & Development Control: Planning for Air Quality (2017)[15]** This document provides advice and guidance to ensure that air quality is adequately considered in the land-use planning and development control processes. This is particularly applicable to assessing the effect of changes in exposure of members of the public resulting from residential and mixed-use developments, especially those within urban areas where air quality is poorer.
	Guidance on the assessment of Dust from Demolition and Construction (2014 v.1.1)[16] The document provides guidance on how to undertake a construction impact assessment (including demolition and earthworks). The emphasis in the document is on providing the means for classifying the risk of dust impacts from a construction site, which then allows appropriate mitigation measures to be identified.
The National Atmospheric Emissions Inventory (NAEI)	**The UK NAEI[17]** estimates annual pollutant emissions from 1970 to the most current publication year for the majority of pollutants. The NAEI is compiled on an annual cycle, each year the latest set of data are added to the inventory and the full time series is updated to take account of improved data and any advances in the methodology used to estimate the emissions.
London Councils	**Air Quality and Planning Guidance[18]** This guidance is aimed at local authorities, developers and their consultants, and provides technical advice on how to deal with planning applications that could have an impact on air quality.
Local Authorities	**Spelthorne Borough Council ASR**[19] This Annual Status Report (ASR) highlights the status of the air quality within the Borough, discussing AQMAs, the monitoring strategy and concentrations of pollutants in the air.

Table 4.1: Key Information Sources

Scope of Air Quality Assessment

4.3 The following document assesses the suitability of the site for the proposed use and whether any significant air quality impacts are expected as a result of the construction and operation of the proposed development.

4.4 A staged assessment approach has been adopted. This ensures that the approach taken for the assessment of risk is proportional to the risk of an unacceptable impact being

[15] Environmental Protection UK & Institute of Air Quality Management (EPUK & IAQM) (2017) Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, London
[16] IAQM, (2014). 'Guidance on the assessment of dust from demolition and construction', IAQM, London.
[17] National Atmospheric Emissions Inventory (NAEI). Available from: https://naei.beis.gov.uk/
[18] London Councils. (2007), Air Quality and Planning Guidance, The London Air Pollution Planning and the Local Environment (APPLE) working group, London
[19] Spelthorne Borough Council (SBC), (2022). 'Spelthorne Borough Council 2022 Air Quality Annual Status Report'. (SBC)

caused. Where a simple review of the likely impacts associated with the proposed development shows that the risk of a health/annoyance impact is negligible, this will be sufficient to conclude that no further assessment is necessary.

4.5 In cases where the risk involved cannot be regarded as insignificant, a more detailed and quantitative assessment has been undertaken.

4.6 The specific methodology used in this assessment is presented below.

Dust Assessment

4.7 In February 2014, The Institute of Air Quality Management (IAQM) published a guidance on how to access and mitigate the impacts the dust emissions from demolition and construction sites. The guidance was updated in June 2016 (Version 1.1) and supersedes the 2012 IAQM guidance on the assessment of the impacts of construction on air quality and the determination of their significance.

4.8 Potential dust impacts associated with construction activities have been assessed in accordance with LAQM guidance. IAQM guidance provides a five-step assessment procedure to assess the potential impacts of construction dust pre-mitigation, provide mitigation measures specific to the risk and assess the post-mitigation impacts.

4.9 The assessment procedure follows the following framework:

- Screen the requirement for a more detailed assessment;
- Assess the risk of dust impacts of the four phases of construction (demolition, earthworks, construction and trackout), taking into account:
    - the scale and nature of the works, which determines the potential Dust Emission Magnitude; and
    - the sensitivity of the area.
- Determine the site-specific mitigation for the potential activities;
- Examine the residual effects and determine whether or not these are significant; and
- Prepare the Construction Dust Assessment.

4.10 In the process of screening the need for a detailed assessment, the following criteria has been used:

"An assessment will normally be required where there is:

- a 'human receptor' within:
    - 350m of the boundary of the site; or
    - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor' within:

- 50m of the boundary of the site; or
- 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s)."

4.11 When defining the sensitivity of an area/receptor, the following factors have been used.

Area Sensitivity	Human Receptors	Ecological Receptors
High	Very densely populated area, 10-100 dwellings within 20m of site. Annual mean concentrations of PM_{10} close to/in exceedance of the national objective (40 µg/m^3). Very sensitive receptors (e.g. residential properties, hospitals, schools, care homes).	Internationally or nationally designated site, the designated features may be affected by dust soiling. A location where there is dust sensitive species present.
Medium	Densely populated area, 1-10 dwellings within 20m of site. Annual mean concentrations of PM_{10} below the national objective (>28µg/m^3). Medium sensitivity receptors (e.g. office and shop workers).	Nationally designated site where the features may be affected by dust deposition. A location with a particularly important plant species where its dust sensitivity is unknown.
Low	Sparsely populated area, 1 dwelling within 20m of site. Annual mean concentrations well below the national objectives (< 28µg/m^3). Low sensitivity receptors (e.g. public footpaths, playing fields, shopping streets).	Locally designated site where the features may be affected by dust deposition.

Table 4.2: IAQM Factors for Defining the Sensitivity of an Area.

Building Emissions

4.12 At this stage the proposed energy strategy has not been confirmed yet. Any emissions associated with the proposed energy strategy should be reviewed and assessed, if required, at the appropriate stage, when all the required detailed plant technical information is confirmed.

4.13 Compliance with relevant regulations and standards, at this stage, should be secured through planning conditions, where necessary.

Traffic Exhaust Emissions

4.14 The EPUK & IAQM Guidance – 'Planning For Air Quality' has been used to assess potential traffic impacts associated with the development.

4.15 **Table 4.3** below provides the criteria used for screening the need for an Air Quality Assessment.

The Development Will:	Indicative Criteria to proceed to an Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on roads with relevant receptors.	A change of LDV flows of: • more than 100 vehicles per day (vpd) within or adjacent to an AQMA or within 100m of an internationally or nationally designated habitat; and • more than 500 vpd elsewhere. Coupled with relevant receptors within: • 10m of roads with AADT flows 5,000 to 10,000 vpd; • 20m of roads with AADT flows 10,000 to 30,000 vpd; and • 30m of roads with AADT flows > 30,000 vpd.

2. Cause a significant change in Heavy Duty Vehicles (HDV) flows on local roads with relevant receptors.	A change of HDV flows of: • more than 25 vpd within or adjacent to an AQMA or within 100m of an internationally or nationally designated habitat; and • more than 100 vpd elsewhere. Coupled with relevant receptors within: • 10m of roads with AADT flows 5,000 to 10,000 vpd; • 20m of roads with AADT flows 10,000 to 30,000 vpd; and • 30m of roads with AADT flows > 30,000 vpd.
3. Cause a significant change in road alignment bringing roads closer to relevant receptors.	Where relevant receptors will be within: • 10m of roads with AADT flows 5,000 to 10,000 vpd; • 20m of roads with AADT flows 10,000 to 30,000 vpd; and • 30m of roads with AADT flows > 30,000 vpd.
4. Introduce a new junction near to relevant receptors.	The junction will cause vehicles to slow down and accelerate, e.g. traffic lights. Coupled with relevant receptors within 50m of the junction.
5. Introduce or change a bus station.	Where bus flows will be: • more than 25 vpd within or adjacent to an AQMA; and • more than 100 vpd elsewhere. Coupled with relevant receptors within: • 50m of the buses within the bus station.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes.	Where the combustion unit is: • any centralised plant using biomass fuel; • a CHP unit > 15kWe; • any other combustion plant with thermal input > 400kWth; and • a standby emergency generator associated with a centralised energy centre.
Note – Where distances from the road are presented, they are from the edge of the nearest carriageway to the nearest relevant receptor, taking account of vertical and horizontal dimensions. Where traffic flows are presented they are Annual Average Daily Traffic (AADT) in vehicles per day (vpd). Where HDV flows are specified, they include lorries and buses. Where LDV's are specified they include cars and vans (with a gross vehicle weight ≤ 3.5 tonnes).	

Table 4.3: EPUK & IAQM Indicative Criteria for Proceeding to an Air Quality Assessment

4.16 If any of the above criteria in **Table 4.3** are met, then the significance of air pollution impacts must be assessed. This may be either a Simple or a Detailed Assessment. In accordance with the EPUK and IAQM guidance, a Simple Assessment is one relying on already published information and without quantification of impacts, in contrast to a Detailed Assessment that must be completed with the aid of a dispersion model.

Impact Criteria

4.17 In the event that the initial screening of proposed traffic flows indicates that there is a potential risk of impact, guidance is provided by the IAQM and EPUK on how to determine the magnitude and significance of any likely changes in air pollutant concentrations and/or exposure as a result of a proposed development.

4.18 This process takes the following into account:

- the magnitude of the change (% change of annual mean concentration);
- the concentration relative to the AQS objective (above or below the objective); and
- the direction of change (adverse or beneficial).

4.19 The magnitude of an impact should be described by using the EPUK criteria set out in **Table 4.4** below. The criteria are based upon the change in concentration resulting from the proposed development as a percentage of the Air Quality Action Level (AQAL) which in this case is NO_2 and PM_{10} annual mean objective levels of 40 µg/m^3.

Change Magnitude	NO_2/PM_{10} Annual Mean	No Days PM_{10}> µg/m^3
Large	Increase/decrease >10% (>4 µg/m^3)	Increase/decrease >4 days
Medium	Increase/decrease 6-10% (2.4-4 µg/m^3)	Increase/decrease 2-4 days
Small	Increase/decrease 2-5% (0.8-2 µg/m^3)	Increase/decrease 1-2 days
Imperceptible	Increase/decrease <1% (<0.4 µg/m^3)	Increase/decrease <1 day

Table 4.4: Impact Magnitude for Changes in NO_2 and PM_{10} Concentrations

4.20 The significance of the impact will be dependent upon the magnitude of change in relation to the relevant Air Quality Action Level (AQAL). The AQAL are the air quality objectives discussed within **Section 3**. This is set out in **Table 4.5** below, which is based on the EPUK and IAQM guidance.

Long term average Concentration at receptor in assessment year.	% Change in concentration relative to Air Quality Action Level (AQAL)			
	1	2-5	6-10	>10
Increase With Scheme				
75% of less of AQAL (<30 µg/m^3)	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL (30-38 µg/m^3)	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL (38-41 µg/m^3)	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL (41 - 44 µg/m^3)	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL (>44 µg/m^3)	Moderate	Substantial	Substantial	Substantial

Table 4.5: Impact Descriptors for Individual Receptors

4.21 Therefore, once the magnitude and the significance of the change has been established, the impact at each relevant receptor can be described. The impact magnitude at each receptor location can be described using the changes stated above as of Large, Medium, Small or Imperceptible magnitude and of Negligible, Slight, Moderate or Substantial significance and also as being either Temporary or Permanent.

4.22 The overall significance should be described separately for both the impact of emissions related to the proposed development on existing receptors, and for the impacts of

emissions from existing source(s) on new receptors being introduced from the proposed development. This is discussed below.

Exposure Criteria

4.23 When determining both the significance of exposure to air pollution and the levels of mitigation required, consideration should be given to the following Air Pollution Exposure Criteria (APEC) specified within the London Councils Air Quality and Planning Guidance[20].

4.24 Whilst this guidance has been developed for London, it is consistently adopted for urban areas across the UK. The guidance takes into account the now superseded Planning Policy Statement 23: Planning and Pollution Control, with a view of reducing exposure to air pollution across the whole of London and is considered relevant for this Development Site. The APEC criteria is set out in **Table 4.6** below.

	Applicable Range Nitrogen Dioxide Annual Mean	Applicable Range PM_{10}	Recommendation
APEC – A	> 5% below national objective	**Annual Mean:** > 5% below national objective **24 hr:** > 1-day less than national objective	No air quality grounds for refusal; however mitigation of any emissions should be considered.
APEC – B	Between 5% below or above national objective	**Annual Mean:** Between 5% above or below national objective **24 hr:** Between 1-day above or below national objective.	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g., Maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
APEC – C	> 5% above national objective	**Annual Mean:** > 5% above national objective **24 hr:** > 1-day more than national objective.	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

Table 4.6: Air Pollution Exposure Criteria

4.25 It should be noted that air quality is not well suited to the rigid application of a generic significance matrix to determine the overall significance of a development and individual

[20] London Councils. (2007) Air Quality and Planning Guidance, The London Air Pollution Planning and the Local Environment (APPLE) working group, London

receptor sensitivity should also be taken into account. Therefore, professional judgement should be employed throughout, and the assessment should take into account site specific considerations.

4.26 Both the impact and exposure criteria will be applied to the findings of this assessment, where required.

5 Baseline Conditions

Local Air Quality Management

5.1 The proposed development site falls within the jurisdiction of Spelthorne Borough Council (SBC).

5.2 Under the Air Quality Strategy, there is a duty on all Local Authorities to consider the air quality within their boundaries and prepare an annual update report.

5.3 A review of the Air Quality Assessments undertaken by SBC has indicated that an Air Quality Management Area (AQMA) has been declared which encompasses the whole Borough including the majority of Staines, Shepperton, Ashford and Sunbury-on-Thames extending from west of the M25 in the northwest to the River Thames in the south east. The AQMA has been declared as a result of exceedances to the annual mean objective for Nitrogen Dioxide (NO_2).

5.4 In 2000, SBC completed its third stage review and in response to the findings of the first round of Review and Assessment, SBC declared the Borough an Air Quality Management Area (AQMA) in respect of predicted exceedances for both the annual average objective for nitrogen dioxide (NO_2) and the 1-hour mean.

5.5 The last stage of the first round of Review and Assessment required a Detailed Assessment of the AQMA. This concluded that the predicted exceedance of the NO_2 objective for the 1-hour mean was unlikely to result in members of the public being exposed to elevated levels of NO_2 at these locations over the averaging exposure time of 1-hour. Therefore, the designated AQMA in respect of the NO_2 1-hour mean was revoked in 2003.

5.6 An Air Quality Action Plan (AQAP) was published in 2005 which outlined proposals to reduce emissions on local roads by implementing improved traffic management, promoting public transport and providing an integrated transport system.

5.7 Due to this AQAP being older than 5 years, the Council are currently updating the action plan which will be published later in 2022/2023.

Background

5.8 DEFRA 2018 background mapping was used to find the background NO_x and PM_{10} concentrations in 2019 for the grid square the site is located in: X:509500, Y:168500.

Year	Location	Site Coordinates (X,Y)	DEFRA Grid (X,Y)	Annual Mean Background Concentration			
				NO_2	NO_X	PM_{10}	$PM_{2.5}$
2019	Bugle	509028, 168647	505500, 168500	16.7	23.3	15.4	10.8

Table 5.1: DEFRA Background Concentrations in 2019

Monitoring

5.9 SBC have undertaken and published their latest Annual Status Report in 2022 which contains monitoring data between 2017- 2021 within the Borough.

5.10 However, monitored results from 2020 and 2021 are likely to have been impacted by the COVID- 19 pandemic and are likely to be less representative of the 'true' baseline concentrations. Therefore, in line with the Covid-19 Supplementary Guidance produced by DEFRA and the GLA in 2021, the use of 2019 data, as a reference year, is encouraged.

Automatic Monitoring

Automatic monitoring was undertaken at three sites within the Borough of Spelthorne. Their location is illustrated in **Figure 5.1** below.

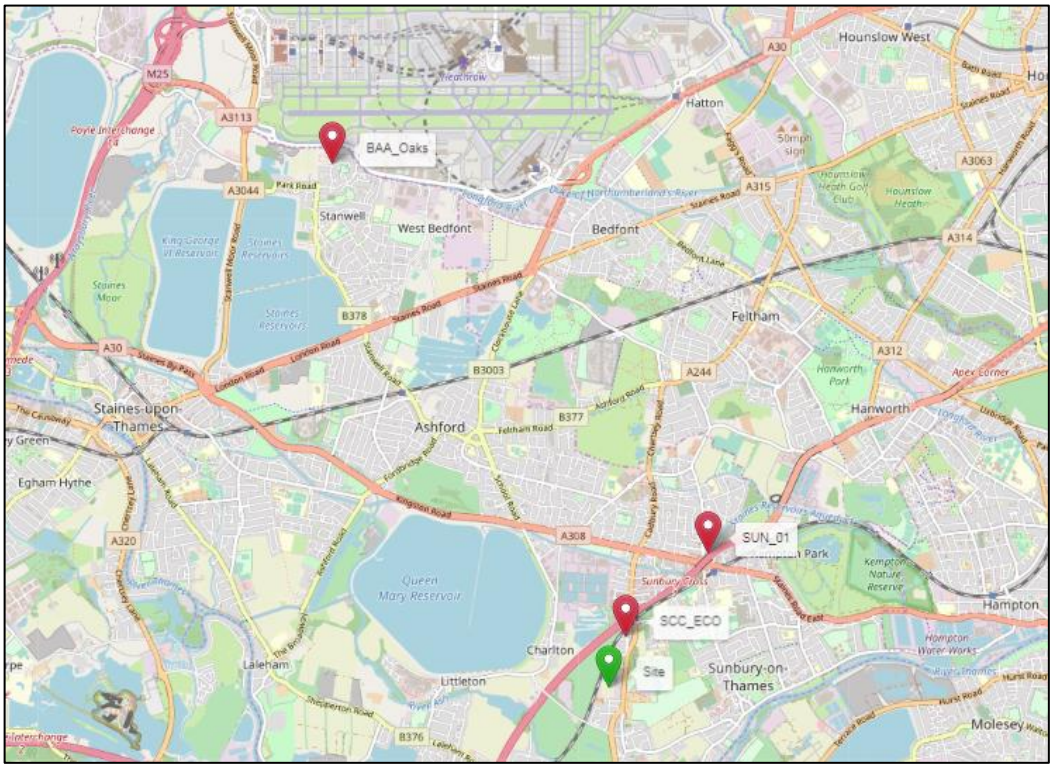

Figure 5.1: Site Location in Relation to Automatic Monitoring Locations

5.11 The most recent annual mean data for all three locations is set out in **Tables 5.2, 5.3 and 5.4** below.

Site	Location	Distance to kerb of nearest road (m)	Site Coordinates (X,Y)	Annual Mean Concentration $N0_2$ (µg/m^3)		
				2019	2020	2021
BAA_Oaks	Heathrow Oaks Road	1	505729 174496	26.3	16.8	18.1
SUN_01	Sunbury	19	510064 170199	33.1	23.0	22.9
SCC_ECO	Haslett Road	5.5	509155 169228	17.1	17.6	15.2

Table 5.2: NO_2 Automatic Annual Mean Concentrations

Site	Location	Distance to kerb of nearest road (m)	Site Coordinates (X,Y)	Annual Mean Concentration PM_{10} (µg/m^3)		
				2019	2020	2021
BAA_Oaks	Heathrow Oaks Road	1	505729 174496	14.9	12.7	12.3
SUN_01	Sunbury	19	510064 170199	15.7	14.2	13.2
SCC_ECO	Haslett Road	5.5	509155 169228	24.6	20.7	19.2

Table 5.3: PM_{10} Automatic Annual Mean Concentrations

Site	Location	Distance to kerb of nearest road (m)	Site Coordinates (X,Y)	Annual Mean Concentration $PM_{2.5}$ (µg/m^3)		
				2019	2020	2021
BAA_Oaks	Heathrow Oaks Road	1	505729 174496	9.5	7.2	7.5
SUN_01	Sunbury	19	510064 170199	9.9	8.3	8.1
SCC_ECO	Haslett Road	5.5	509155 169228	12.9	12.2	11.0

Table 5.4: $PM_{2.5}$ Automatic Annual Mean Concentrations

Non-Automatic Monitoring

5.12 SBC also undertakes non-automatic monitoring of NO_2 using diffusions tubes, at various locations across the Borough.

5.13 The proposed redevelopment site location in relation to the closest non-automatic monitoring locations is illustrated in **Figure 5.2** below.

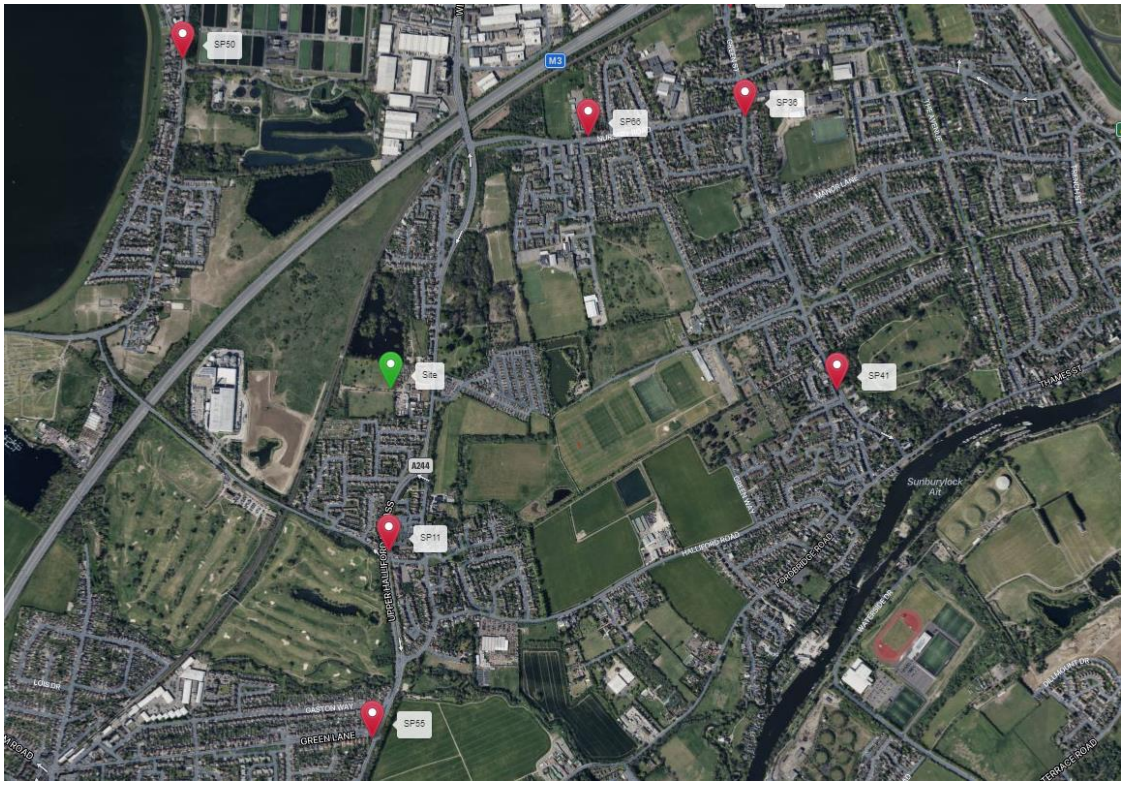

Figure 5.2: Site Location in Relation to Closest Non-Automatic Monitoring Locations

5.14 The most recent/published bias adjusted results for all the closest monitoring locations are set out in **Table 5.5** below.

Site	Location	Distance to kerb of nearest road (m)	Site Coordinates (X,Y)	Annual Mean Concentration NO_2 (µg/m³)		
				2019	2020	2021
SP11	Halliford Bypass	1.4	509033 168146	34.0	23.6	25.4
SP36	St Ignatius School, Sunbury	1.6	510104 169508	34.6	24.4	26.7
SP41	Green Street, Sunbury	0.5	510404 168675	29.6	20.7	21.4
SP50	Waterside Close, Shepperton	1.3	508364 169648	37.4	24.6	25.1
SP55	Green Lane, Shepperton	1.8	508994 167573	38.8	25.2	25.9

Table 5.5: Annual Mean Non-Automatic Concentrations for Closest Locations

5.15 **Table 5.2, 5.3, 5.4** and **5.5** demonstrate that all the closest automatic and non-automatic monitoring locations are >5% below the annual mean national objective levels for NO_2, PM_{10} and $PM_{2.5}$.

5.16 Therefore, in accordance with the exposure criteria set out in **Table 4.6** the Site is likely to fall within APEC-A which states the following:

"No air quality grounds for refusal; however, mitigation of any emissions should be considered"

5.17 The requirement for any mitigation measures has been considered within **Section 8** of this AQA.

6 Evaluation of Potential Effects

6.1 The following section sets out the potential sources of air quality impact that could be applied to the proposed development site. It also assesses site suitability with regards to residential exposure.

Construction

Construction Dust

6.2 During the demolition and construction phases, there is the potential for emissions of dust to cause annoyance, nuisance and health effects to sensitive receptors, both human and ecological located close to the site.

6.3 The construction activities associated with the proposed development can be separated into four stages:

- Demolition/site clearance
- Earthworks;
- Construction; and
- Trackout.

6.4 There are a number of human receptors within 350m of the site boundary therefore a dust assessment has been undertaken in order to evaluate and minimise potential dust effects during the aforementioned four stages.

6.5 The construction dust assessment is included in **Appendix B.**

Construction Traffic and Plant

6.6 It is anticipated that, throughout the construction period, there will be a number of delivery vehicles, stationary plant and vehicles used by the construction workforce. These may potentially present an additional source of air pollutants in the vicinity of the proposed development site. Any likely pollutant impacts will be addressed by implementing Best Available Techniques (BAT) mitigation measures. Likely BAT are provided in **Section 8**.

Completed Development

Development Traffic

6.7 The Transport Assessment undertaken for the same application by Mayer Brown Limited, has provided traffic data for baseline (2019) and the proposed completion year (2015) for Upper Halliford Road.

6.8 Traffic surveys were undertaken along Upper Halliford Road in 2017 which were then Converted into 2019 using a TemPro factor. Whereas traffic data for Russell Road and

Staines Road (2019) was collated from the Department for Transport (DfT) and used for the verification purposes only.

6.9 The existing and proposed daily vehicle movements are included in **Table 6.1** below.

Road Name/ ID	Baseline (2019) AADT		Proposed Completion Year (2025) 'Do Nothing' (DN) (Baseline + growth up to opening year + Committed + Consented) AADT		Proposed Completion Year (2025) 'Do Something' (DS) (Baseline + growth up to opening year + Committed + Development (minus consented)) AADT	
	Lights	Heavies	Lights	Heavies	Lights	Heavies
Upper Halliford Road	21995	574	22955	600	23206	600
Russell Road (DfT)	13464	127	-	-	-	-
Staines Road W (DfT)	31886	1039	-	-	-	-

Table 6.1: Proposed Development Net Traffic Impact

6.10 **Table 6.1** demonstrates an increase of 251 daily AADT between the Do Nothing (DN) and Do Something (DS). This level of traffic impact meets the EPUK & IAQM criteria, as set out in **Table 4.3**, for requiring further or detailed assessment. This is included in **Section 7**.

Building Emissions

6.11 As previously stated, an Energy Statement has not been submitted as part of this Application.

6.12 Any operational plant effects will need to be considered further, if required, at the appropriate stage, when all the required detailed plant technical information is confirmed. Compliance with relevant regulations and standards, at this stage, should be secured through the use of a suitable planning condition, where necessary.

7 Road Traffic Emissions

Vehicular Traffic Assessment Model

7.1 A quantitative assessment of traffic related air quality impacts has been undertaken. The modelling tool which has been used is the dispersion model ADMS-Roads (Extra) version 5.0.0.1, which has been developed by the Cambridge Environmental Research Consultants.

7.2 This model uses the following input data:

- Hourly Average Traffic Flows and Speeds;
- Defra average background concentrations for 2019 and 2025 from the 1km grid square the site is in (X:509500; Y:168500)
- Latest relevant Emission Factor Toolkit (v.10.1);
- NOx to NO_2 Calculator (v. 8.1)
- Geo-referenced mapping data; and
- 2019 Hourly Sequential ADMS format MET data for the most suitable site (Heathrow), as advised by Met Office

Emissions

7.3 There are numerous sources of NO_2, PM_{10} and $PM_{2.5}$ which include for example, industry and domestic origins. However, the main source is usually road transport. For the purpose of this assessment only road traffic emissions have been modelled.

Study Scenarios

7.4 Traffic related air quality impacts associated with the operation of the Proposed Development have been assessed for the following scenarios:

- **Baseline** - The predicted levels for NO_2, PM_{10} and $PM_{2.5}$ in the locality in 2019;
- **Proposed Opening Year 2025 (Do Nothing)** - This includes baseline traffic plus growth to 2025, plus consented and committed development traffic, but without the proposed development traffic ; and
- **Proposed Opening Year 2025 (Do Something)** - This includes baseline traffic plus growth to 2025, plus committed and proposed development traffic but excludes the consented development traffic.

Traffic Data

7.5 Traffic data for all the above scenarios has been provided by the Transport Consultants at Mayer Brown Ltd.

7.6 Development traffic air quality impacts have been quantitatively assessed by modelling the effect of the development traffic flows along the proposed routes for the three above mentioned scenarios. The resultant predicted changes in air quality have then been compared against the stated assessment criteria, in **Section 4,** in order to establish the significance of the impact.

7.7 The hourly traffic data used in this assessment is described in **Table 7.1** below.

ID/Road	Speed (kph)	Baseline 2019		Proposed Completion Year (2025) 'Do Nothing'		Proposed Completion Year (2025) 'Do Something'	
		Lights	Heavies	Lights	Heavies	Lights	Heavies
Upper Halliford Road	40	916	24	956	25	967	25
Russell Road (DfT)*	30	561	5	-	-	-	-
Staines Road W (DfT) **	40	1329	43	-	-	-	-
*Used for Verification against monitoring location SP54 **Used for Verification against monitoring location SP9							

Table 7.1: Hourly Traffic Flows Used in Modelling

7.8 Time variation hourly factors (2019) have been derived from the DfT Car Traffic Distribution on all roads by time of the day in Great Britain and applied to the roads in all the scenarios modelled. This is included in **Appendix C.**

Receptor Types and Locations

7.9 The receptors, which have been assessed, relate to potentially sensitive receptors in the vicinity of the site.

7.10 For the purpose of this air quality assessment, sensitive receptors have been identified where the public might regularly be present and likely to be exposed over the averaging period of the objective, such as residential properties, hospitals schools and care homes. This assessment focuses on modelling annual mean concentrations.

7.11 All the receptor locations have been modelled at 1.5m above ground level and are listed in **Table 7.2** and illustrated in **Figure 7.1** below.

No.	Coordinates (X, Y)		Address
R1	509132	168607	139 Upper Halliford Rd, Shepperton TW17 8SN
R2	509127	168528	1 Halliford Cl, Shepperton TW17 8SL
R3	509155	168753	175a Upper Halliford Rd, Shepperton TW17 8RJ
R4	509061	168046	1 Vincent Dr, Shepperton TW17 8SW
R5	509159	168895	Charlton Ln, Upper Halliford, Shepperton TW17 8QN
R6	509126	168500	119 Upper Halliford Rd, Shepperton TW17 8SJ

Table 7.2: Receptor Locations

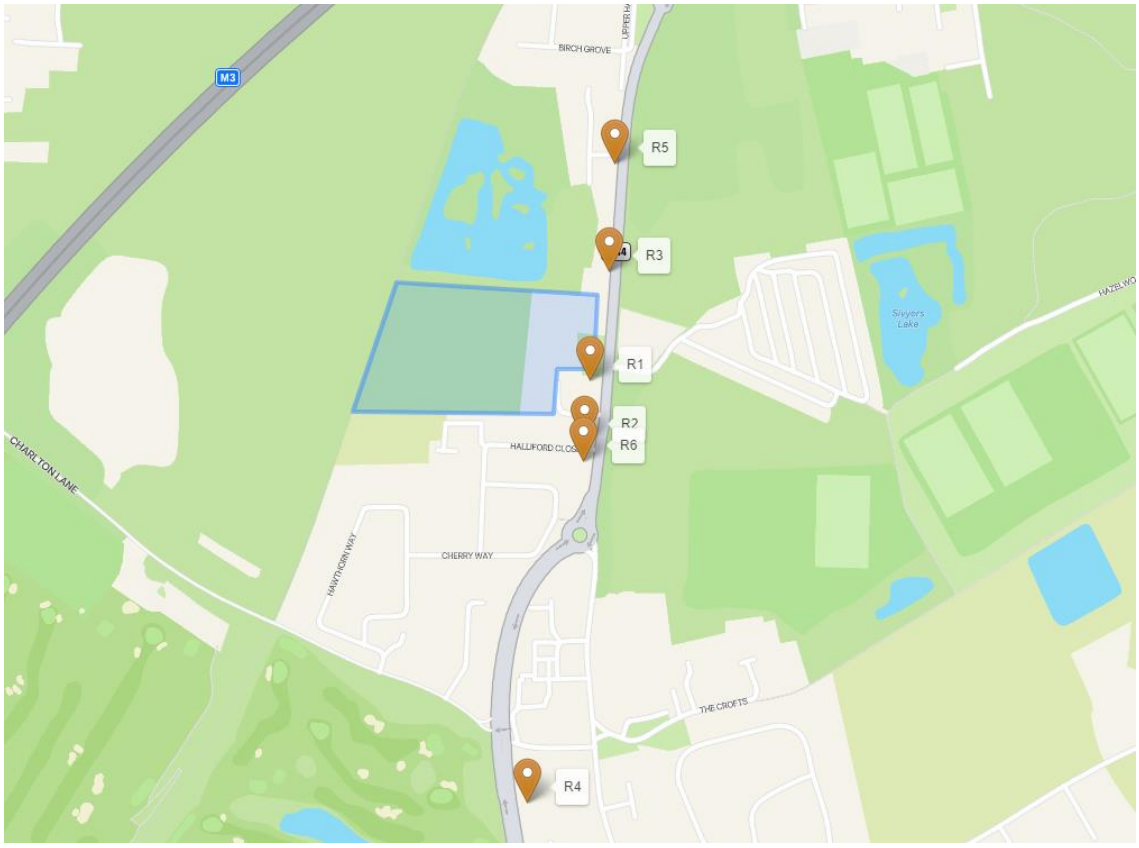

Figure 7.1: Receptor Locations

Meteorological Data

7.12 The meteorological data required for the ADMS model must be from a representative location to the site and include a full year of sequential readings.

7.13 The MET office has advised that the most suitable site with the most complete/representative set of data is located at Heathrow Airport ~8km from the site. Subsequently, 2019 data for this location has been obtained and used.

7.14 The windrose for Heathrow Airport 2019 is illustrated in **Figure 7.2** below.

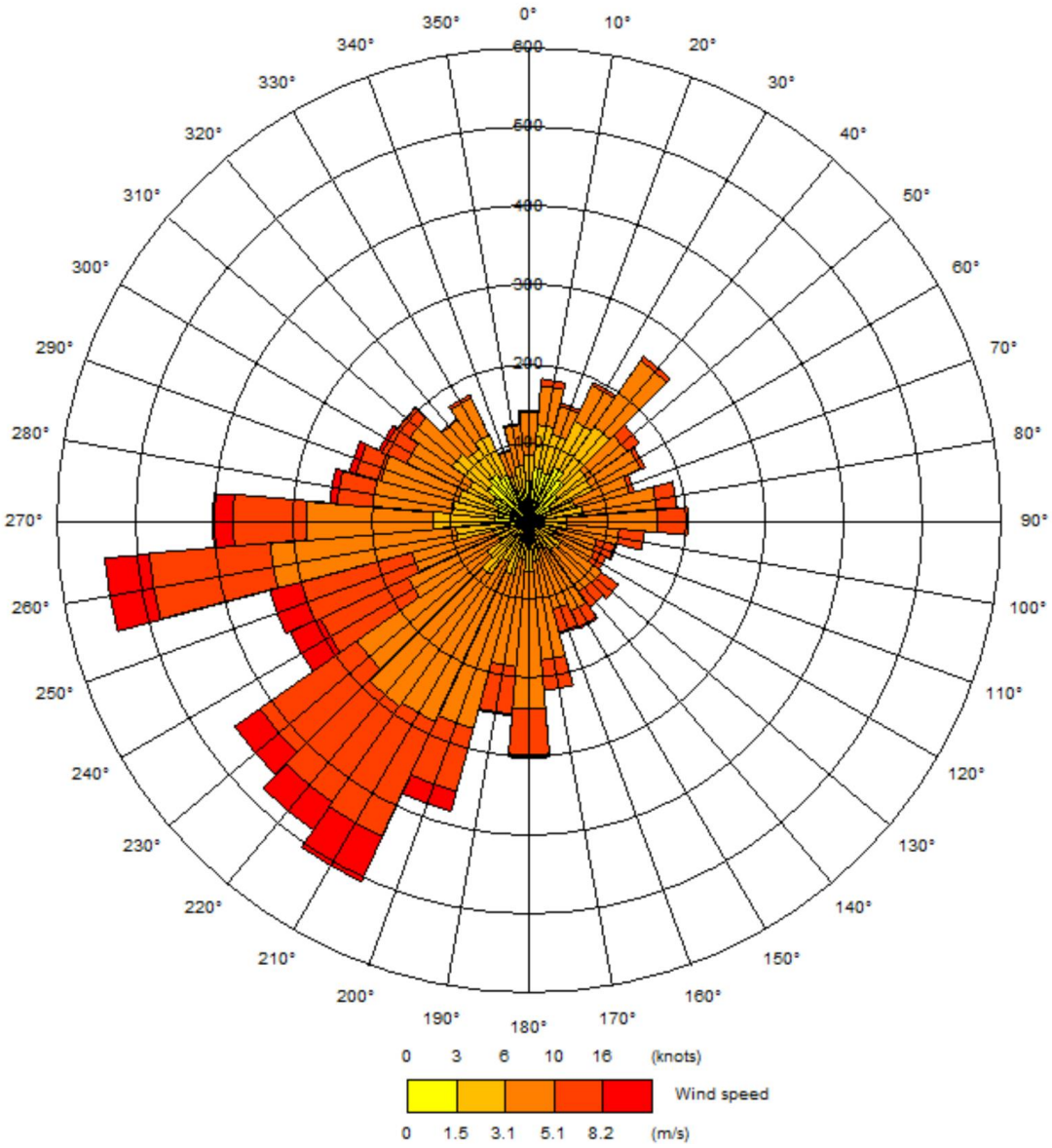

Figure 7.2: Windrose, Heathrow Airport 2019

Background

7.15 As previously discussed in **Section 5**, the DEFRA backgrounds for NO_2, NOx, PM_{10} and $PM_{2.5}$ in 2019 and 2025 has been used. Background levels are highlighted in **Table 7.3** for grid square X:509500, Y:168500.

Year	Location	Site Coordinates (X,Y)	DEFRA Grid (X,Y)	Annual Mean Background Concentration			
				NO_2	NO_X	PM_{10}	$PM_{2.5}$
2019	Bugle	509028, 168647	505500, 168500	16.7	23.3	15.4	10.8
2025	Bugle	509028, 168647	505500, 168500	13.3	18.1	14.2	9.8

Table 7.3: DEFRA Background Concentrations in 2019 and 2025

NO_x: NO_2 Chemistry

7.16 Vehicles emit NO_x with different proportions of NO_2. In the atmosphere, chemical reactions take place between NO, NO_2 and Ozone. In this assessment the screening of NOx emissions has taken place and the resulting NO_2 concentration has been calculated post modelling using the DEFRA NO_x to NO_2 Calculator.

Assumptions and Limitations

7.17 This assessment focuses on modelling annual mean concentrations. This is because it is inherently more difficult to make satisfactory predictions for short-term behaviour of pollutants than it is to model an annual mean value.

7.18 It should also be noted that the modelling process is dependant in the first instance upon projected traffic data. Where this data is subject to change, this may affect the results of the modelling process. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

7.19 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions.

7.20 The above limitations have been taken into consideration in the assessment.

Model Verification

7.21 Model verification is required to demonstrate that the model is performing within an acceptable margin of error. Therefore, it is necessary to undertake modelling at a location where air quality levels are known (and for where traffic data is available for), and to compare the result with ratified monitored data for that location.

7.22 Although not considered ideal due to risk of overestimation, kerbside monitoring sites may be used within the model verification process where there is relevant exposure, for example properties fronting directly onto the road.

7.23 The verification model used three roadside locations; SP9, SP11 and SP54.

7.24 The initial verification process demonstrated that that the modelling results for all three locations were >25% margin of error before adjustment.

7.25 In accordance with the LAQM TG22, an adjustment correction factor of 3.3 has been calculated and applied to the modelled road contribution NOx.

7.26 The verification process following adjustment, demonstrated that the modelling results for all three locations were <25% margin of error when compared the monitoring values at the same location.

7.27 Therefore, a correction factor of 3.3 has been applied to all modelled results for all pollutants assessed.

7.28 Further details, including graphs, relevant tables/calculations and methodology for the verification process, are included in **Appendix D.**

Potential Impacts

7.29 The likely significant impacts of traffic from the development on potentially sensitive receptors has been assessed. The Baseline and 2025 NO_2 modelling results for all receptors are represented in **Table 7.4** below.

ID	'Baseline' NO_2 ($\mu g/m^3$)	2025 'Do Nothing' NO_2 ($\mu g/m^3$)	2025 'Do Something' NO_2 ($\mu g/m^3$)	Impact between 'Do Nothing' and 'Do Something'	% Difference in Relative to Annual Mean Objective (40 $\mu g/m^3$)	Impact Significance
R1	22.9	20.4	20.4	0.04	0%	Negligible
R2	22.9	20.4	20.4	0.04	0%	Negligible
R3	30.2	24.9	24.9	0.09	0%	Negligible
R4	25.9	22.2	22.2	0.06	0%	Negligible
R5	27.9	23.4	23.5	0.07	0%	Negligible
R6	23.4	20.7	20.7	0.05	0%	Negligible

Table 7.4: Baseline and 2025 Modelled Annual Mean Concentrations for NO_2

7.30 **Table 7.4** demonstrates that 2025 NO_2 levels for 'Do Something' are likely to have a 0% increase relative to the annual mean objective, when compared to the 'Do Nothing'. Additionally, the modelled results show that NO_2 levels are significantly under the national annual mean objective level for all the receptors assessed. Therefore, in accordance with **Table 4.4** and **Table 4.5** in **Section 4**, NO_2 impacts are considered to be of imperceptible magnitude and negligible significance.

7.31 The Baseline and 2025 PM_{10} modelling results for all receptors are represented in **Table 7.5** below.

ID	'Baseline' NO_2 ($\mu g/m^3$)	2025 'Do Nothing' NO_2 ($\mu g/m^3$)	2025 'Do Something' NO_2 ($\mu g/m^3$)	Impact between 'Do Nothing' and 'Do Something'	% Difference in Relative to Annual Mean Objective (40 $\mu g/m^3$)	Impact Significance
R1	16.5	15.31	15.32	0.01	0%	Negligible
R2	16.5	15.31	15.32	0.01	0%	Negligible
R3	18.0	16.70	16.73	0.03	0%	Negligible
R4	17.1	15.86	15.88	0.02	0%	Negligible
R5	17.5	16.25	16.27	0.02	0%	Negligible
R6	16.6	15.40	15.41	0.01	0%	Negligible

Table 7.5: Baseline and 2025 Modelled Annual Mean Concentrations for PM_{10}

7.32 **Table 7.5** demonstrates that 2025 PM_{10} levels for 'Do Something' are likely to have a 0% increase relative to the annual mean objective, when compared to the 'Do Nothing'. Additionally, the modelled results show that PM_{10} levels are significantly under the national annual mean objective level for all the receptors assessed. Therefore, in accordance with **Table 4.4** and **Table 4.5** in **Section 4**, PM_{10} impacts are considered to be of imperceptible magnitude and negligible significance.

7.33 The Baseline and 2025 $PM_{2.5}$ modelling results for all receptors are represented in **Table 7.6** below.

ID	'Baseline' NO_2 ($\mu g/m^3$)	2025 'Do Nothing' NO_2 ($\mu g/m^3$)	2025 'Do Something' NO_2 ($\mu g/m^3$)	Impact between 'Do Nothing' and 'Do Something'	% Difference in Relative to Annual Mean Objective (25 $\mu g/m^3$)	Impact Significance
R1	11.47	10.42	10.43	0.01	0%	Negligible
R2	11.47	10.42	10.43	0.01	0%	Negligible
R3	12.30	11.20	11.21	0.01	0%	Negligible
R4	11.80	10.73	10.74	0.01	0%	Negligible
R5	12.03	10.94	10.96	0.01	0%	Negligible
R6	11.52	10.47	10.48	0.01	0%	Negligible

Table 7.6: Baseline and 2025 Modelled Annual Mean Concentrations for $PM_{2.5}$

7.34 **Table 7.6** demonstrates that 2025 $PM_{2.5}$ levels for 'Do Something' are likely to have a 0% increase relative to the annual mean objective, when compared to the 'Do Nothing. Additionally, the modelled results show that $PM_{2.5}$ levels are significantly under the national annual mean objective level for all the receptors assessed.. Therefore, in accordance with **Table 4.4** and **Table 4.5** in **Section 4**, $PM_{2.5}$ impacts are considered to be of imperceptible magnitude and negligible significance.

7.35 **Table 7.4, Table 7.5 and Table 7.6** clearly demonstrate that NO_2, PM_{10} and $PM_{2.5}$ concentrations for all proposed receptors modelled are >5% below national objectives. Which, in accordance with the exposure criteria in **Table 4.6**, means the site would definitely fall within APEC – A for site suitability, once the development is completed and fully operational in 2025.

7.36 APEC A states the following:

"No air quality grounds for refusal; however mitigation of any emissions should be considered."

7.37 The requirement for any mitigation measures, will be considered in **Section 8** of this AQA.

8 Mitigation Measures

Construction

Construction Dust

8.1 A construction dust assessment has been completed for the proposed development in accordance with IAQM guidance and is presented in **Appendix B.** Within the assessment, site specific mitigation measures have been identified which ensure compliance with relevant standards.

8.2 The mitigation measures outlined in **Appendix B**, should make up part of a Construction Method Statement (CMS) that should be implemented to minimise the potential for adverse construction dust impacts throughout all the relevant construction stages.

Construction Traffic and Plant

8.3 As previously stated, there is potential for air pollutant impacts to arise from construction plant and vehicles associated with the scheme. Therefore, the following BAT should be implemented during the construction phase.

- All vehicles should switch off engines when stationary, no idling vehicles;
- Minimise the movement of construction traffic around the site;
- Maximising efficiency (this may include alternative modes of transport, maximising vehicle utilisation by ensuring full loading and efficient routing);
- Vehicles should be well maintained and kept in a high standard of working order;
- Avoid the use of diesel or petrol powered generators by using mains electricity or battery powered equipment where possible; and
- Locate plant away from boundaries close to residential areas.

Completed Development

Operational Traffic

8.4 The AQA has demonstrated that the predicted net traffic impact increase associated with the proposed development is unlikely to result in a detrimental pollution impact upon the local road network and the current pollution levels. Therefore, it is not anticipated that mitigation measures will be required.

Building Emissions

8.5 At this early stage, an Energy Statement has not been submitted as part of this Application.

8.6 Any operational plant effects should be assessed, if required, at the appropriate stage, when all the required detailed plant technical information is available.

8.7 Nonetheless, it is suggested that, at the appropriate stage, any boilers being used on site should be highly efficient low NOx boilers, and emissions should be ≤ 40 mgNOx/kWh and CHP plant that meets the following minimum emissions standards:

- Spark ignition engine: 250mgNOx/Nm^3,
- Compression ignition engine: 400NOx/Nm^3;
- Gas turbine: 50mg/NOx/Nm^3.

8.8 This will ensure that any additional NOx contributions associated with proposed heating strategy are kept as low as possible. Where possible, the above should be combined with Photovoltaic (PV) panels.

8.9 Compliance to relevant regulations and standards should be secured through planning conditions, where necessary.

9 Conclusions

9.1 Spelthorne Borough Council have declared one AQMA as a result of exceedances of the annual mean objective for NO_2. The declared AQMA encompasses the entire borough.

9.2 A review of the monitoring sites within the Borough has been undertaken. It was concluded that the nearest air quality monitoring sites, considered most representative of the conditions experienced at the proposed development site, identify monitored annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$ which are >5% below national their respective annual mean objective.

9.3 In accordance with the exposure criteria in **Table 4.6**, the site would fall within APEC – A which states the following:

"No air quality grounds for refusal; however mitigation of any emissions should be considered."

9.4 The minor net traffic increase associated with the proposed development is unlikely to result in a detrimental pollution impact upon the local road network and the current pollution levels.

9.5 A construction dust assessment has been undertaken for the four stages of construction activities associated with the proposed development. Mitigation measures have been proposed for construction traffic and stationary plant associated with the proposed development.

9.6 An Energy Statement has not been completed at this early stage. Any operational plant effects should be assessed, if required, at the appropriate stage, when all the required detailed plant technical information is available.

9.7 Compliance to relevant regulations and standards should be secured through planning conditions, where necessary.

Conclusion

9.8 The proposed development does not raise any significant or other residual adverse impacts on the health and/or quality of life for existing neighbours, as a result of any anticipated changes to air quality.

9.9 It is therefore concluded that the proposed development complies fully with air quality related national, regional and local planning policy and any mitigation can, if considered necessary, be enforced by means of appropriate planning conditions, consistent with paragraphs 54 and 55 of the National Planning Policy Framework.

Appendix A: Indicative Proposed Site Plan

Figure A.1 Indicative Proposed Site Plan

Appendix B: Construction Dust Assessment

CONSTRUCTION DUST ASSESSMENT

B.1 The construction dust assessment has been completed in accordance with 2014 IAQM guidance and follows the procedures as outlined in Section 3 of this report.

Screen the Need for a Detailed Assessment

B.2 The following screening criterion has been applied to the assessment: An assessment will normally be required where there is:

- a 'human receptor' within:
  - 350m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor' within:
  - 50m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

B.3 There are a number of human receptors within 350m of the site boundary. Therefore, a dust assessment is required due to the proposed development location meeting some of the above criteria.

Assess the Risk of Dust Impacts

B.4 The construction activities associated with the proposed development have been separated into four stages:

- Demolition/Site Clearance
- Earthworks;
- Construction; and
- Trackout.

B.5 The assessment of the risk of dust impacts has been completed in two stages:

- Determine the potential dust emission magnitude; and
- Determine the sensitivity of the area to dust impacts.

B.6 The potential dust emission magnitude for all four of the construction stages have been determined to be either Small, Medium or Large according to the criteria presented in **Table B.1** below.

Construction Activity	Dust Emission Magnitude Scale		
	Small	Medium	Large
Demolition/ Site Clearance	Total building volume <20,000m^3, construction material with low potential for dust release, demolition activities <10m above ground, works during wetter months.	Total building volume 20,000-50,000m^3, potentially dusty construction material, demolition activities 10-20m above ground level.	Total building volume >50,000m^3, potentially dusty material, on-site crushing and screening, activities >20m above ground level.
Earthworks	Total site area <2,500m^2, soil type with large grain size, <5 heavy earth moving vehicles active at one time, bunds <4m high, total material moved <20,000t, works during wetter months.	Total site area 2,500-10,000m^2, moderately dusty soil type, 5-10 heavy earth moving vehicles active at one time, bunds 4-8m high, total material moved 20,000-100,000t.	Total site area >10,000m^2, potentially dusty soil type, >10 heavy earth moving vehicles active at one time, bunds >8m high, total material moved >100,000t.
Construction	Total building volume <25,000m^3, construction material with low potential for dust release.	Total building volume 25,000-100,000m^3, potentially dusty construction material, on site concrete batching.	Total building volume >100,000m^3, on site concrete batching, sandblasting.
Trackout	<10 HDV* outwards movements in any one day, surface material with low potential for dust release, unpaved road length <50m.	10-50 HDV outward movements in any one day, moderately dusty surface material, unpaved road length 50-100m.	>50 HDV outward movements in any one day, potentially dusty surface material, unpaved road length >100m.
* HDV – Heavy Duty Vehicle (>3.5t), Note – In each case, not all the criteria need to be met, and that other criteria may be used if justified.			

Table B.1: Dust Emission Magnitude Criteria

B.7 The completed assessment of Dust Emission Magnitude is shown in **Table B.2** below.

Construction Activity	Dust Emission Magnitude	Justification
Demolition/ Site Clearance	small	Total building volume estimated to be <20,000m^3.
Earthworks	large	Total site area >10,000m^2.
Construction	medium	Total building volume estimated to be between 25,000-100,000m^3.
Trackout	small	Estimated <10 HDV outward movements in any one day

Table B.2: Dust Emission Magnitude Assessment

B.8 Due to the scale of the proposed development the magnitude of dust emissions has been assessed as **large**.

B.9 The sensitivity of the area has been assessed in relation to a number of factors such as; the specific sensitivities of receptors in the area, the proximity and number of those receptors and in the case of PM_{10}, the local background concentration and by following the significance criteria in **Table B.3, Table B.4** and **Table B.5** below.

Receptor Sensitivity	Number of Receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

Table B.3: Sensitivity of the Area to Dust Soiling Effects of People and Property

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table B.4: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table B.5: Sensitivity of the Area to Ecological Impacts

B.10 In addition to **Table B.3, Table B.4** and **Table B.5** any site specific factors have been taken into account when defining the sensitivity of the area:

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors; and
- the duration of the potential impact, as a receptor may become more sensitive over time.

B.11 The completed assessment of Sensitivity of the Area in **Table B.6** below.

Receptor Sensitivity	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Medium
Human Health	Low	Low	Low	Low
Ecological	Low	Low	Low	Low

Table B.6: Sensitivity of the Surrounding Area Assessment

B.12 The completed pre-mitigation impact risk assessment incorporating the sensitivity of the area and the dust emissions magnitude for the three construction activities is shown in **Table B.7** below.

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Medium	Medium	Negligible
Human Health	Negligible	Low	Low	Negligible
Ecological	Negligible	Low	Low	Negligible

Table B.7: Summary of Dust Risk (pre-mitigation)

B.13 The risk of dust soiling has been considered medium due to the risk of several receptors located in close proximity to the proposed site. The human health risk was considered low due to the low PM_{10} background concentrations in the local area for 2019 (15.4µgm^3), there are no ecological sites within 50m of the proposed site, therefore ecological sensitivity has been assessed as low. Therefore, overall risk pre-mitigation is considered **medium**.

B.14 Additionally, the dust emissions magnitude, pre-mitigation, based on the scale of the development, is considered to be **large**.

Site-specific Mitigation

B.15 From the identification of the risk of impacts with no mitigation applied in Table B6, it is possible to determine the specific mitigation measures that can be applied in relation to the level of risk associated with the construction activity. The mitigation measures described below are suggested as measures that should be included in a site-specific Construction Method Statement (CMS). Due to the site being considered Medium Risk, the following mitigation measures are either D=Desirable, H=Highly Recommended or N=Not Required.

Demolition:

Mitigation Measures	Low Risk	Medium Risk	High Risk
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	D	D	H
Ensure effective water suppression is used during demolition operations. Hand-held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	H	H	H
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	H	H	H
Bag and remove any biological debris or damp down such material before demolition.	H	H	H

Table B.8: Site Specific Mitigation Measures for Demolition Activities

Earthworks:

Mitigation Measures	Low Risk	Medium Risk	High Risk
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	N	D	H
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	N	D	H
Only remove the cover in small areas during work and not all at once	N	D	H

Table B.9: Site Specific Mitigation Measures for Earthwork Activities

Construction:

Mitigation Measures	Low Risk	Medium Risk	High Risk
Avoid scabbling (roughening of concrete surfaces) if possible	D	D	H
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	D	H	H
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	N	D	H
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	N	D	D

Table B.10: Site Specific Mitigation Measures for Construction Activities

Trackout:

Mitigation Measures	Low Risk	Medium Risk	High Risk
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	D	H	H
Avoid dry sweeping of large areas.	D	H	H
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D	H	H
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	N	H	H
Record all inspections of haul routes and any subsequent action in a site log book.	D	H	H
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	N	H	H
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D	H	H

Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	N	H	H
Access gates to be located at least 10 m from receptors where possible.	N	H	H

Table B.11: Site Specific Mitigation Measures for Trackout Activities

General Mitigation Measures:

Mitigation Measures	Low Risk	Medium Risk	High Risk
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	N	H	H
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary.	H	H	H
Display the head or regional office contact information	H	H	H
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, realtime PM_{10} continuous monitoring and/or visual inspections.	D	H	H
Site Management			
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H	H	H
Make the complaints log available to the local authority when asked.	H	H	H
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	H	H	H

Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	N	N	H
Monitoring			
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	D	D	H
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked	H	H	H
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H	H	H
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	N	H	H
Preparing and Maintaining the Site			
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H	H	H
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H	H	H
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	D	H	H
Avoid site runoff of water or mud.	H	H	H

Keep site fencing, barriers and scaffolding clean using wet methods.	D	H	H
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	D	H	H
Cover, seed or fence stockpiles to prevent wind whipping.	D	H	H
Operating Vehicle/Machinery and Sustainable Travel			
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable	H	H	H
Ensure all vehicles switch off engines when stationary - no idling vehicles.	H	H	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H	H	H
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	D	D	H
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	N	H	H
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)	N	D	H
Operations			
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	H	H	H
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H	H	H
Use enclosed chutes and conveyors and covered skips.	H	H	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H	H	H

Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	D	H	H
Waste Management			
Avoid bonfires and burning of waste materials.	H	H	H

Table B.12: Site Specific Mitigation Measures for General Activities

B.16 It is important that attention is paid to any construction activity that takes place in close proximity to the site boundary, potentially at the closest location to sensitive receptors.

B.17 It is noted by the IAQM that through the use of effective mitigation, the effects of dust from construction activity will normally be considered 'not significant'.

Determine Significant Effects

B.18 Prior to the implementation of any mitigation measures the highest significance of adverse effects was medium risk for dust soiling and low risk for human health and ecological, with dust emissions magnitude considered to be medium.

B.19 The mitigation measures listed above have been chosen due to their suitability to the site and to reduce the risk of adverse effects from the four stages of construction.

B.20 Through the implementation of site specific mitigation measures (secured by planning condition), which are designed to mitigate potential dust impact, will ensure that potential significant adverse dust effects will not occur, and the residual effect will normally be 'not significant'.

Conclusions of Construction Dust Assessment

B.21 The completion of the construction dust assessment has shown that the residual effect of the proposed development in the context of construction dust emissions will be 'not significant'. This conclusion has been made based on the medium dust emissions magnitude related to the scale of development and the assumption that the suggested mitigation measures will be implemented (secured by planning condition) and is relevant for all sensitive receptors within 350m of the site.

B.22 It should be noted that it is not possible to guarantee that all mitigation measures will be effective at all times. If there is an interruption in the water supply used for dust suppression or adverse weather conditions are experienced that exacerbate dust emissions, the receptors may experience occasional, short term dust annoyance.

B.23 However, the likely scale of this would not normally be considered sufficient to change the conclusion of this assessment. It is therefore important to consider all mitigation measures and provide a frequent review and assessment procedure at each stage, to ensure that mitigation measures continue to provide the maximum attenuation level possible.

Appendix C: Time Variation Hourly Factors

Time Variation Hourly Factors

Hour	Weekday	Saturday	Sunday
00:00-01:00	0.12	0.24	0.32
01:00-02:00	0.07	0.15	0.19
02:00-03:00	0.06	0.11	0.13
03:00-04:00	0.07	0.10	0.11
04:00-05:00	0.13	0.12	0.11
05:00-06:00	0.36	0.22	0.17
06:00-07:00	0.90	0.39	0.28
07:00-08:00	1.67	0.68	0.45
08:00-09:00	1.86	1.11	0.70
09:00-10:00	1.43	1.52	1.21
10:00-11:00	1.35	1.84	1.72
11:00-12:00	1.39	2.00	2.01
12:00-13:00	1.44	2.03	2.14
13:00-14:00	1.46	1.93	2.06
14:00-15:00	1.56	1.81	1.98
15:00-16:00	1.77	1.71	1.94
16:00-17:00	1.95	1.69	1.91
17:00-18:00	1.97	1.62	1.70
18:00-19:00	1.52	1.38	1.45
19:00-20:00	1.05	1.06	1.18
20:00-21:00	0.72	0.76	0.91
21:00-22:00	0.53	0.59	0.64
22:00-23:00	0.39	0.52	0.43
23:00-00:00	0.23	0.40	0.26
Total	24.0	24.0	24.0

Table C.1: Time Variation Hourly Factors

Appendix D: Model Verification

Model Verification

D.1 Model verification is required to demonstrate that the model is performing within an acceptable margin of error. Therefore, it is necessary to undertake modelling at a location where air quality levels are known (and for where traffic data is available for), and to compare the result with ratified monitored data.

D.2 Although not considered ideal due to risk of overestimation, kerbside monitoring sites may be used within the model verification process where there is relevant exposure, for example properties fronting directly onto the road.

D.3 The verification model used the following roadside locations; SP9, SP11 and SP54.

D.4 Modelled results should be within 25% margin of error when compared to the monitored values at the same location, which is considered acceptable within TG22. However, 10% is considered ideal.

D.5 The initial verification process demonstrated that that the modelling results for all three locations were underestimating the monitored results by >25% margin of error before adjustment. This is not uncommon and is usually due to the fact that monitored results take account of all pollution sources, while modelled results only take into account road traffic.

D.6 The initial model verification results, before adjustment, are set out in **Table D1 and Figure D1** below.

Site	Coordinates	Total Monitored NO_2 ($\mu g/m^3$)	Total Modelled NO2 ($\mu g/m^3$)	% Difference**
SP9	509166; 170260	40.8	26.27	-43.3
SP11	509033; 168169	34	21.68	-44.3
SP54	508498; 166850	31	23.43	-27.8

Modelled results for road-NOx using ADMS-Roads (Extra).

**Percentage Difference = Absolute difference / Average x 100

Table D.1: Results of Verification Exercise (Before Adjustment)

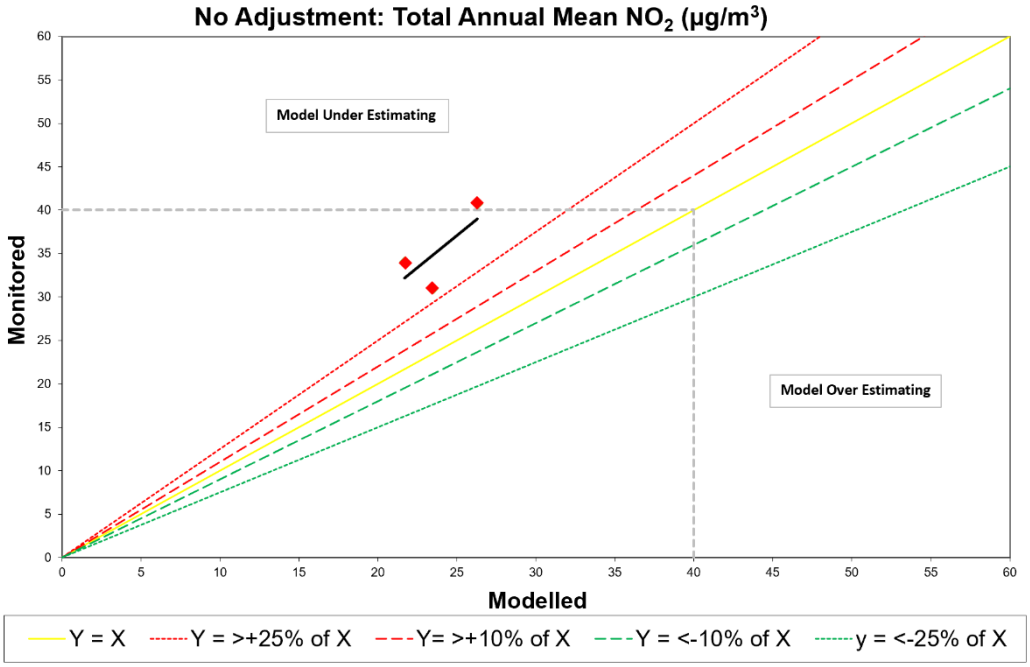

Figure D.1: Verification (Before Adjustment)

D.7 In accordance with the LAQM TG22, an adjustment correction factor of 3.3 has been calculated and applied to the modelled road contribution NOx.

D.8 The adjusted road contribution NOx has been converted into total NO_2 concentrations, using the NOx to NO_2 calculator and compared to the total NO_2 annual mean concentrations at each monitoring/verification location.

D.9 The verification process, following adjustment, demonstrated that the modelling results for all three locations were <25% margin of error when compared to the monitoring values at the same location. This is demonstrated in **Table D2**Error! Reference source not found. below.

Site	Coordinates	Total Monitored NO_2	Total Modelled NO_2 (Adjusted)*	% Difference**
Maid 113	578567, 155392	40.8	39.5	-3.2
Maid 131	579090, 152270	34.0	32.3	-5.3
Maid 133	578412, 152598	31.0	34.4	10.3

*calculated using modelled results for road-NO_x and NOx to NO_2 calculator.

** Percentage Difference = Absolute difference / Average x 100

Table D.2: Results of Verification Exercise (Following Adjustment)

D.10 Error! Reference source not found.**Figure D.2** below demonstrates the model performance following adjustment. All locations now lie within <25% margin of error.

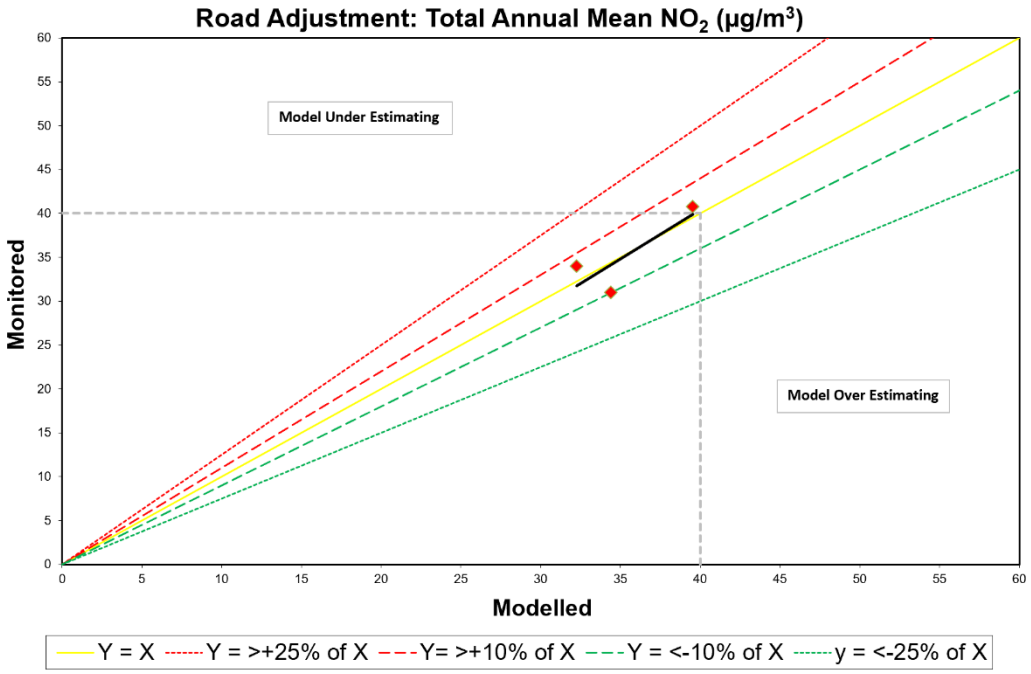

Figure D.2: Verification Model After Adjustment

D.11 Subsequently and in accordance with the LAQM TG22, a correction factor of 3.3 has been applied to all modelled results for all pollutants assessed (applied to NOx then converted to NO_2, PM_{10} and $PM_{2.5}$).