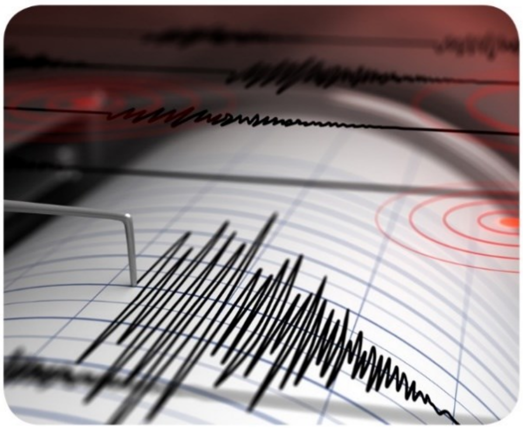
Air & Acoustic Consultants

Bridge Industrial

Weybridge Business Park, Weybridge

Air Quality Assessment

April 2022



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OFFICE ADDRESS:	PROJECT NO:	DATE:
Lombard House 145 Great Charles Street Birmingham B3 3LP	100492	April 2022

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Weybridge Business Park, Weybridge

Air Quality Assessment

Executive Summary

This Air Quality Assessment (AQA) has been produced in support of an outline planning application for a Proposed Development for three employment units within Classes E(g)ii, E(g)iii, B2 and B8. The AQA has considered the potential air quality impacts resulting from the operation of the Proposed Development upon existing sensitive receptors, as well as the impact of the Proposed Development on the Air Quality Management Areas (AQMAs) close to the site.

The Application Site is not located within or adjacent to an AQMA; however, operational traffic will pass through the Addlestone and Weybridge AQMAs. Local Authority monitoring in the surrounding area show a mixture of compliance and non-compliance of the NO_2 annual mean objective, with automatic monitors showing compliance of the NO_2 1-hour mean objective. The DEFRA background concentrations suggests that the NO_2, PM_{10} and $PM_{2.5}$ at the Application Site are expected to comply with the relevant annual mean objectives for the Proposed Development year of 2027.

The AQA shows that the construction dust impacts associated with the construction phase of the Proposed Development, with implementation of the suggested mitigation measures, although adverse, will be temporary and '**not significant**' at sensitive receptors.

The AQA shows that the air quality impacts associated with the Proposed Development, for both traffic scenarios, are **negligible (adverse)** on the modelled human receptors, with NO_2, PM_{10} and $PM_{2.5}$ concentration remaining within the relevant annual mean concentrations. The impacts are therefore considered to be '**not significant**' on these receptors. Furthermore, the impacts on the Addlestone and Weybridge AQMAs are predicted to be **negligible (adverse)**, with NO_2, PM_{10} and $PM_{2.5}$ concentration remaining within the relevant annual mean concentrations The impacts are therefore also considered to be '**not significant**' on these AQMAs

The Proposed Development is therefore expected to comply with all relevant national and local air quality policy.

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1 Introduction

1.1 Brief

1.1.1 Air & Acoustic Consultants Limited have been commissioned by Bridge Industrial to undertake an air quality assessment (AQA) in support of a planning application for a proposed industrial development at Weybridge Business Park.

1.2 Application Site

1.2.1 The Applicate Site is located on a vacant site at Weybridge Business Park, which currently has a number of office buildings, the Site is split into two areas by Addlestone Road.

1.2.2 The northern Site has residential properties located to the north and southeast, commercial premises to the southwest and the A317 borders the northern boundary.

1.2.3 The southern Site has residential properties located to the northeast, east and west and commercial premises to the south and west. The River Wey borders the eastern part of the site which has a number of nearby short-term 48-hour moorings. Addlestone Road and Hamm Moor Lane are adjacent to the northern and western Site boundaries.

1.2.4 The National Grid Reference for the centre of the Application Site is TQ 06321 64681 (British National Grid Coordinates E: 506321, N: 164681). The Application Site location and surrounding area are shown in Figure 1.1.

Figure 1.1: Site Location

1.3 Development Proposals

1.3.1 The development proposals seek to deliver the demolition of existing buildings and the development of three employment units within Classes E(g)ii, E(g)iii, B2 and B8, with ancillary office accommodation, new vehicular access, associated external yard areas, HGV and car parking, servicing, external lighting, hard and soft landscaping, infrastructure and all associated works.

1.3.2 The three employment units within Classes E(g)(ii), E(g)(iii), B2 and B8 land uses are totalling a floor area of 17,820m^2 Gross Internal Area (GIA). The breakdown of the three units GIA are as follows:

- Unit 100 – 14,752m^2;
- Unit 210 – 1,407m^2; and
- Unit 220 – 1,660m^2.

1.3.3 The proposed layout is shown in Figure 1.2.

Figure 1.2: Proposed Site Layout

1.4 Assessment Approach

1.4.1 This AQA has been undertaken to assess if the Proposed Development is likely to give rise to any significant air quality impacts, and to establish the magnitude and the significance of any impacts caused as a result of the proposals in respect to the prevailing air quality.

1.4.2 The report is structured as follows:

- Section 2 sets out an overview of the national and local air quality policy context, in relation to the Proposed Development;
- Section 3 details the methodology for estimating the air quality impacts;
- Section 4 describes the baseline conditions;
- Section 5 considers the construction phase dust impacts;
- Section 6 considers the operational impacts as a result of the Proposed Development;
- Section 7 describes potential mitigation measures for the construction and operational phase(s) (where required); and
- Section 8 summaries and concludes the AQA.

2 Legislation and Policy Context

2.1 European Legislation

2.1.1 Air pollutants at high concentrations can give rise to adverse effects upon the health of both humans and ecosystems. The European Union (EU) legislation on air quality forms the basis for the national UK legislation and policy.

2.1.2 The EU Framework Directive 2008/50/EC came into force in May 2008 and sets out legally binding limits for concentrations of the major air pollutants that can impact on public health. This Directive came into force in England in June 2010[1]. Amendments to this Directive was made following amendments to the 2008/50/EC and 1004/107/EC on air quality made by Directive 2015/1480/EC. The updated Directive, The Air Quality Standards (Amendment) Regulations 2016, came into force on 31st December 2016[2].

2.1.3 Following the UK's departure from the EU and the Brexit transition period the previous EU Legislation has been retained in the United Kingdom. The following text is taken from the legislation.gov.uk[3] website, setting out details of the retention:

> *"The UK is no longer a member of the European Union. EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies, and is published on legislation.gov.uk.*
>
> *[…]*
>
> *EU legislation which applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. This is set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 (c. 16)."*

2.2 National Legislation, Policy and Strategy

2.2.1 Part IV of the Environment Act 1995[4] requires local authorities to review and assess the air quality within their boundaries. As a result, the Air Quality Strategy was adopted in 1997[5], with national health-based standards and objectives set out for the, then, eight key air pollutants including benzene, 1-3 butadiene, carbon monoxide, lead, nitrogen dioxide (NO_2), ozone, particulate matter (PM) and sulphur dioxide.

2.2.2 Part IV of the Environment Act 2021[6] amends both the Environment Act 1995 and the Clean Air Act 1993[7]. It builds on the foundations provided by Part IV of the Environment Act 1995 and strengthens the Local Air Quality Management (LAQM) framework. The act allows the Secretary of State to make provisions for, about or connect with the recall of relevant products that do not meet relevant environmental standards.

2.2.3 The government have resisted calls for the adoption of the recently updated World Health Organisation (WHO) air quality guidelines, specifically targeting particulate matter pollution. The act does introduce a duty on the government to bring forward at least two air quality targets by October 2022 for consultation

[1] Statutory Instrument, 2010. *The Air Quality Standards Regulations,' No. 1001. Queen's Printer of Acts of Parliament.*
[2] Statutory Instrument, 2016. *The Air Quality Standards Regulations,' No. 1184. Queen's Printer of Acts of Parliament.*
[3] EU legislation and UK law. Accessible at: https://www.legislation.gov.uk/eu-legislation-and-uk-law
[4] Parliament of the United Kingdom, 1990. *Environmental Protection Act*, Chapter 43. Queen's Printer of Acts of Parliament.
[5] Department for Environment Food and Rural Affairs, 1997. *The United Kingdom National Air Quality Strategy*, Cm 3587.
[6] UK Public General Acts, 2021. *Environmental Act 2021, Chapter 30. Queen's Printer of Acts of Parliament.*
[7] UK Public General Acts, 1993. Clean Air Act 1993, Chapter 11. Queen's Printer of Acts of Parliament.

that will be set in secondary legislation. The first will aim to reduce the annual average level of fine particulate matter ($PM_{2.5}$) in ambient air. The second will be a long-term target (set a minimum of 15 years in the future), which the government says, *“will encourage long-term investment and provide certainty for businesses and other stakeholders.”*

2.2.4 The purpose of the Air Quality Strategy was to identify areas where air quality was unlikely to meet the objectives prescribed in the regulations. The strategy was reviewed in 2000 and the amended Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2000)[8] was published. This was followed by an Addendum in February 2003 and in July 2007, when an updated Air Quality Strategy was published[9].

2.2.5 The pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence regarding how each pollutant affects human health. Pollutant objectives are the future dates by which each standard is to be achieved, considering economic considerations, practical and technical feasibility.

2.2.6 The air quality objectives are managed through the LAQM regime, which is defined within the Air Quality (England) Regulations 2000 (SI 928) and The Air Quality (England) (Amendment) Regulations 2002 (SI 3043). Table 2.1 lists the National Air Quality Objectives that are relevant to this AQA, as set out in the Air Quality Standards (Amendment) Regulations 2016.

Table 2.1: Air Quality Objectives (England)

Pollutant	Air Quality Objective	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3	1-hour mean not to be exceeded more than 18 times per year
NO_2	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3*	24-hour mean not to be exceeded more than 35 times per year
PM_{10}	40 µg/m^3*	Annual mean
Particulate Matter ($PM_{2.5}$)	25 µg/m^3*	Annual mean – Stage 1 limit value pre 2020.
$PM_{2.5}$	20 µg/m^3*	Annual mean – Indicative Stage 2 limit value post 2020. 15% reduction in background to be achieved between 2010 & 2020 at Urban Background sites
Notes: *Except Scotland		

[8] Department of the Environment, Transport and the Regions, 2000. The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland
[9] Department for Environment Food and Rural Affairs, 2007. *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, Cm 7169, Department for Environment Food and Rural Affairs.

Statutory Nuisance

2.2.7 Under Part III of the Environmental Protection Act (1990)[10], it is the duty of the local authorities to take steps as reasonably practical to investigate issues that could be a 'statutory nuisance'. Potential causes of statutory nuisance include:

- Any premises in such a state as to be prejudicial to health or a nuisance;
- Smoke emitted from premises so as to be prejudicial to health or a nuisance;
- Fumes or gases emitted from premises so as to be prejudicial to health or a nuisance;
- Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance; or
- Any accumulation or deposit which is prejudicial to health or a nuisance.

2.2.8 The local authority may serve an abatement notice on the person, premises owner or occupier if it is satisfied of the existence or likely existence of a statutory nuisance(s). Should the abatement notice not be complied with, penalties such as a fine or prosecution could occur. However, it is considered as a defence if the best practicable means to stop or reduce a nuisance are employed.

2.2.9 The most likely cause of a statutory nuisance associated with this AQA is dust. Dust is the generic term used in the British Standard document BS 6069 (Part Two)[11], to describe particulate matter in the size range 1–75µm (micrometres) in diameter. This document has been withdrawn and has been replaced with the BS ISO 4225:2020[12] document. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition.

National Planning Policy

2.2.10 The National Planning Policy Framework (NPPF)[13] (2021) sets out the planning policy for England, to help achieve sustainable development within the planning sector.

2.2.11 Paragraph 105 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 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. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."*

2.2.12 Paragraph 174 states:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*

[10] UK Public General Acts, 1990. *Environmental Protection Act 1990, Chapter 43. Queen's Printer of Acts of Parliament.*
[11] The British Standards Institution, 1994. *BS6069-2:1994 - Characterization of air quality.*
[12] The British Standards Institution, 2020. *BS ISO 4225:2020 - Air quality.*
[13] Ministry of Housing, Communities & Local Government, 2021. *National Planning Policy Framework.*

[...]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

[...]"

2.2.13 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."

2.2.14 Paragraph 186 states:

"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. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

2.2.15 Paragraph 188 states:

"The focus of planning policies and decisions should be on whether Proposed Development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

2.2.16 The NPPF also sets out the national planning policy on biodiversity and conservation. This emphasises that the planning system should seek to minimise effects on and provide net gains in biodiversity, wherever possible, as part of the Government's commitment to halting decline and establishing coherent and resilient ecological networks.

2.2.17 The NPPF is supported by Planning Practice Guidance (NPPG)[14] (DCLG, 2021), which sets out the principles on how planning can take account of the impacts of new developments on air quality.

[14] National Planning Practice Guidance web-based resource. Accessible at: http://planningguidance.planningportal.gov.uk/

2.2.18 Paragraph 001 Reference ID: 32-001-20191101 states:

> *"The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2).*
>
> *The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:*
>
> - *fine particulate matter ($PM_{2.5}$)*
> - *ammonia (NH_3)*
> - *nitrogen oxides (NO_x)*
> - *sulphur dioxide (SO_2)*
> - *non-methane volatile organic compounds (NMVOCs)*
>
> *As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."*

2.2.19 Paragraph: 005 Reference ID: 32-005-20191101 states:

> *"Whether air quality is relevant to a planning decision will depend on the Proposed Development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the Proposed Development would be particularly sensitive to poor air quality in its vicinity.*
>
> *Where air quality is a relevant consideration the local planning authority may need to establish:*
>
> - *The 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
> - *whether the Proposed Development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
> - *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality."*

National Clean Air Strategy

2.2.20 The Clean Air Strategy (CAS)[15] was published in January 2019 and sets out how the government will improve air quality nationally. The document aims to tackle the issue of air quality across all parts of government and society to protect public health and the environment, and identifies what needs to be done to achieve this. The document complements the Industrial Strategy (archived), the Clean Growth

[15] Department for Environment, Food and Rural Affairs, 2019. *Clean Air Strategy 2019.*

Strategy[16] and the 25 Year Environment Plan[17] and is a key part of delivering the government's 25 Year Environmental Plan.

2.2.21 The document has adopted international targets to reduce emissions of fine particulate matter, ammonia, nitrogen oxides, sulphur dioxide and non-methane volatile organic compounds by 2020 and 2030. The document proposes tougher goals to cut public exposure to particulate matter pollution, as recommended by the WHO.

2.2.22 The strategy not only targets the reduction of emissions, but also a reduction in exposure.

Reducing Emissions from Road Transport: Road to Zero Strategy

2.2.23 The *Reducing emissions from road transport: Road to Zero Strategy*[18] (2018) document produced by the Office for Low Emission Vehicles (OLEV), Office for Zero Emission Vehicles (OZEV) and the Department for Transport (DfT) sets out how the government aims to end the sale of new conventional petrol and diesel cars and vans by 2040, with almost every car and van having zero emissions by 2050. Furthermore, the aim of the government is to see at least 50%, and as many as 70%, of new car sales being ultra-low emission by 2030 (and up to 40% of new van sales).

2.2.24 A number of measures have been set out in the document which outline how the government will support this gradual transition, some of which are consumer incentives, research and development and innovation support based.

2.2.25 Since this document was released, the Prime Minister has announced that, as part of the *Ten Point Plan for a Green Industrial Revolution* (2020)[19], the government will end the sale of new petrol and diesel cars and vans from 2030, 10 years earlier than set out in the document above.

2.2.26 This ambitious plan will see road traffic-related oxides of nitrogen (NO_x) emissions to reduce significantly over the coming decades, and likely beyond the scale of reductions forecast in the air quality tools used to assess air quality impacts.

2.3 Local Legislation, Planning Policy and Strategy

Runnymede Borough Council 2030 Local Plan

2.3.1 The Runnymede 2030 Local Plan[20] was adopted in July 2020, and aims to guide growth to meet the needs of the communities within the borough, while taking opportunities to best preserve the heritage and environment of the borough, as well as preserve and enhance the green spaces. This plan will run through until 2030; the following policy has been included in this AQA as it relates to air quality:

2.3.2 Policy EE2 – *Environmental Protection,* states:

> *"[…]*
>
> *Air Quality*
>
> *Development proposals which may give rise to adverse impacts on air quality including sources of odour or fumes or which may place sensitive receptors in areas exceeding adopted air quality standards, or in close proximity to existing sources of odour will be expected to be*

[16] Department for Business, Energy and Industrial Strategy, 2017. *The Clean Growth Strategy.*
[17] Department for Environment, Food and Rural Affairs, 2018. *A Green Future: Our 25 Year Plan to Improve the Environment.*
[18] Department for Transport, Office for Low Emission vehicles and Office for Zero Emission Vehicles, 2018. *Reducing emissions from road transport: Road to Zero Strategy*
[19] Department for Transport and Office for Zero Emission Vehicles, 2020. *The Ten Point Plan for a Green Industrial Revolution*
[20] Runnymede Borough Council, 2020. *Runnymede 2030 Local Plan.*

> *accompanied by an air quality assessment or odour impact study. Where the air quality assessment or odour impact study shows that Proposed Development, either individually or cumulatively, will have an adverse impact on air quality, sensitive receptors, the natural environment or amenity, planning permission will only be granted where abatement or mitigation measures to reduce impacts to acceptable levels can be secured and implemented.*
>
> *[…]"*

2.4 Air Quality Action Plans

National Air Quality Action Plan

2.4.1 The Department for Environment, Food & Rural Affairs (DEFRA) has produced an Air Quality Action Plan (AQAP)[21] to tackle roadside NO_2, throughout the United Kingdom. Along with a package of infrastructure, initiatives and grants, the plan requires local authorities to produce local action plans by March 2018, with the aim of reducing the air quality concentrations below the objective as soon as practically possible, should they be predicting exceedances of the air quality objectives beyond 2020.

Local Air Quality Action Plan

2.4.2 The Runnymede Borough Council (RBC) AQAP[22] was produced as part of the statutory duties required by LAQM Framework and outlines what measures will be carried out to improve air quality, including within Air Quality Management Areas (AQMAs). A number of measures have been listed in the plan, some of which include (but not limited to):

- Requirement for certain types of developments to undertake Air Quality Assessment;
- Inclusion of air quality and climate change policies in development plan documents; and
- Refusal of planning permission on air quality grounds.

[21] Department for Environment Food & Rural Affairs & Department for Transport, 2017. *UK plan for tackling roadside nitrogen dioxide concentrations.*
[22] Runnymede Borough Council, 2014. *Runnymede Borough Council Air Quality Action Plan.*

3 Assessment Approach

3.1 Construction Phase

3.1.1 There is currently no formal assessment criterion for dust, therefore, the approach developed and published by the Institute of Air Quality Management (IAQM), in the *Guidance on the Assessment of Dust from Demolition and Construction'* (2016)[23] document has been utilised as part of this assessment. The approach consists of a five step processes to assess the potential level of risks, (Large, Medium, Small or Negligible), regarding the four main phases of development, (demolition, earthworks, construction, and trackout). The assessment includes consideration of pre-mitigation, and post-mitigation impacts, based upon the scale and nature of the Proposed Development.

3.1.2 The main air quality impacts that may arise during demolition and construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM_{10} and $PM_{2.5}$ concentrations, as a result of dust generating demolition and construction activities; and
- An increase in concentrations of NO_2 due to exhaust emissions from vehicles and equipment.

3.1.3 In relation to the most likely impacts, the guidance states the following:

> *"The most common impacts are dust soiling and increased ambient PM_{10} concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of particulate matter in all size fractions.*
>
> *[...]*
>
> *Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed."*

3.1.4 The approach states that an assessment will normally be required where there are either:

- Human receptors within 350 m of the site boundary, and/or within 50 m of the routes used by construction vehicles on the local highway network and up to 500 m from site entrances; and/or
- Ecological receptors within 50 m of the site boundary, or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

3.1.5 An ecological receptor refers to any sensitive habitat that is susceptible to dust soiling. For locations with a statutory designation, such as Ramsar Conservation Sites, Sites of Specific Scientific Interest (SSSI), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), consideration should be given as to whether the specific site is sensitive to dust. Some non-statutory sites, such as Local Nature Reserves (LNR), may also have to be considered if appropriate.

3.1.6 The degree of risk is then derived from the level of the risk, and the sensitivity of the receptor being considered. To note, not all the criteria for a particular risk class needs to be met for magnitude or

[23] Institute of Air Quality Management, 2016. *Guidance on the Assessment of Dust from Demolition and Construction.'*

significance. It is suggested in IAQM (2016) guidance that other criteria, (such as professional judgement) can be used to justify the assessment.

3.1.7 The full Construction Dust Impact Assessment methodology is set out in Appendix A, and the assessment is set out in Section 5.

3.2 Operational Phase

Environmental Projection UK & Institute of Air Quality Management Guidance

3.2.1 Another key guidance document which has been used to determine the potential for impacts upon air quality is the Environmental Protection UK (EPUK) & IAQM (2017)[24] *Land-Use Planning and Development Control: Planning for Air Quality* document.

3.2.2 This guidance document provides indicative screening criteria for when an Air Quality Impact Assessment is required. The following screening criterion have been considered for this AQA:

Local Highway Network

Step 1:

- If any of the following apply to the development:
  - Contains 10 or more residential units or a site area of more than 0.5ha; or
  - Contains more than 1,000 m^2 of floor space for all other uses or a site area greater than 1ha.
- Coupled with any of the following:
  - The development has more than 10 parking spaces; or
  - The development will have a centralised energy facility or other centralised combustion process.

Step 2:

- A change of cars / LDVs (light duty vehicles) flow of:
  - More than 100 AADT within or adjacent to an AQMA; or
  - More than 500 AADT elsewhere.
- A change of HDVs (heavy duty vehicles) flow of:
  - More than 25 AADT within or adjacent to an AQMA; or
  - More than 100 AADT elsewhere

3.2.3 Should these criteria not be met, then the guidance document considers air quality impacts associated with a scheme to be 'insignificant' and no further assessment is required.

3.2.4 As the Application Site contains a site area more than 0.5 ha, and car parking is expected to exceed 10 spaces, the Step 1 criteria is exceeded.

3.2.5 A review of the traffic data provided by the transport consultant indicates that Option A for the Proposed Development will generate 1,066 two-way average daily vehicle movements, of which 57 are classified

[24] Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM), 2017. *Land-use Planning & Development Control: Planning for Air Quality.*

as HDVs. As the Application Site is not situated within an AQMA, the less stringent criteria should be applied, which results in the Proposed Development exceeding the LDV criteria listed above.

3.2.6 Option B for the Proposed Development will generate 419 two-way average daily vehicle movements, of which 142 are classified as HDVs. As the Application Site is not situated within an AQMA, the less stringent criteria should be applied, which results in the Proposed Development exceeding the HDV criteria listed above.

3.2.7 Based on this, a full air quality impact assessment for both options are required for the Proposed Development. The impact assessment is set out in Section 6 and the parameters of this assessment are set out below.

3.2.8 The traffic generated as a result of the Proposed Development will pass through both the Addlestone and Weybridge AQMAs, with the number of traffic movements exceeding the criteria in Step 2 within an AQMA. Therefore, an assessment on the impacts of the Proposed Development on concentrations within these AQMAs has be carried out, and is set out in Appendix B.

3.3 Modelling Parameters

Sensitive Locations

3.3.1 The concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been considered as part of this AQA. While selecting the receptor locations, careful consideration was made to receptors located near key road junctions, where congestion may occur, or where a number of highway links merge.

3.3.2 The sensitive locations at which the standards and objectives apply are places where the population is expected to be exposed to the various pollutants over the particular averaging period. Thus, for those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to measure concentrations against the set standards are areas of residential housing, since it is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time.

3.3.3 Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time, such as on public footways or residential amenity areas.

3.3.4 DEFRA (2021) LAQM Technical Guidance (TG16)[25] states:

> *"Dispersion models cannot predict short-term concentrations as reliably as annual mean concentrations*
>
> *[…]*
>
> *Previous research carried out on behalf of Defra and the Devolved Administrations identified that exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60 $\mu g/m^3$ This assumption is still considered valid; therefore local authorities should refer to it."*

3.3.5 The modelled receptor locations are set out in Table 3.1 and illustrated in Figure 3.1.

[25] Department for Environment, Food & Rural Affairs, 2021. *Local Air Quality Management. Technical Guidance (TG16).*

Figure 3.1: Receptor Locations

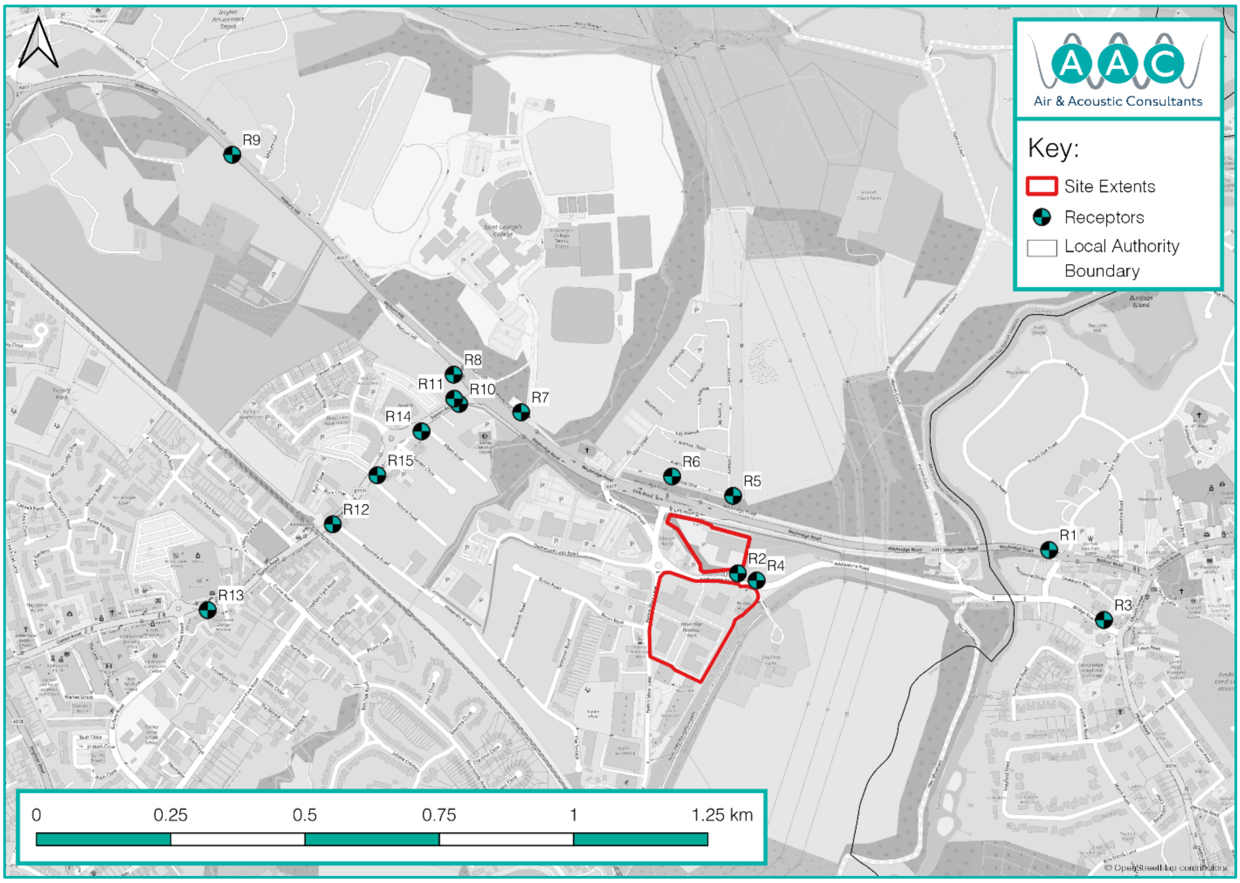


Table 3.1: Receptor Locations

ID	Description	Coordinates (m)		
		X	Y	Z
Human Receptors				
R1	Existing Residential Receptor	506973	164815	1.5
R2	Existing Residential Receptor	506393	164771	1.5
R3	Existing Residential Receptor	507075	164684	1.5
R4	Existing Residential Receptor	506428	164758	1.5
R5	Existing Residential Receptor	506385	164915	1.5
R6	Existing Residential Receptor	506271	164952	1.5
R7	Existing Residential Receptor	505990	165071	1.5
R8	Existing Residential Receptor	505865	165141	1.5
R9	Existing Residential Receptor	505452	165550	1.5

ID	Description	Coordinates (m)		
		X	Y	Z
Human Receptors				
R10	Existing Residential Receptor	505875	165087	1.5
R11	Existing Residential Receptor	505866	165096	1.5
R12	Existing Residential Receptor	505640	164863	1.5
R13	Existing Residential Receptor	505407	164703	4
R14	Existing Residential Receptor	505805	165036	1.5
R15	Existing Residential Receptor	505722	164954	1.5
Addlestone AQMA Monitoring				
RY14	Diffusion Tube	504992	164605	2.3
RY60	Diffusion Tube	504966	164836	2.4
Weybridge AQMA Monitoring				
Weybridge 7	Diffusion Tube	507199	164804	2.4
Weybridge 5	Diffusion Tube	507609	164966	2.2
Weybridge 6	Diffusion Tube	507511	164936	2
Weybridge 10	Diffusion Tube	507478	164924	1.7
Weybridge 11	Diffusion Tube	507478	164924	1.7
Weybridge 12	Diffusion Tube	507478	164924	1.7
Weybridge 13	Diffusion Tube	507459	164909	1.8
Weybridge 14	Diffusion Tube	507459	164909	1.8
Weybridge 15	Diffusion Tube	507459	164909	1.8
Weybridge 1	Diffusion Tube	507448	164900	2.3
Weybridge High Street 1	Automatic Monitor	507478	164924	1.7
Weybridge High Street 2	Automatic Monitor	507459	164909	1.8

Assessment Scenarios

3.3.6 The following scenarios have been considered for this AQA:

- 2019 Verification Baseline (verification);

- 2027 Baseline; and
- 2027 Baseline + Proposed Development.

3.3.7 The traffic data utilised within this AQA has been provided by the transport consultant, mode transport planning, and is set out in Appendix C for the 2027 assessment year scenarios. Department for Transport[26] data has been used for the verification process.

Modelling Methodology

3.3.8 The modelling of the release of vehicular emissions, (dispersion), into the air has been carried out using the latest version of the air dispersion model: ADMS-Roads model (v5.0.1.3). The model calculates pollution concentrations and deposition over a specified area and / or at a specified location, based upon the following input information:

- Source parameters: e.g. highway width, average speed of vehicles, the number of vehicles per hour and the diurnal traffic profile;
- Meteorological parameters: e.g. wind speed, direction, precipitation, temperature and atmospheric stability; and
- Topographical factors: e.g. ground levels, gradients, buildings and surface roughness.

3.3.9 Junctions have been modelled in line with LAQM Technical Guidance (TG(16))[27], which states:

> *"For junctions, common sense, driving experience and local knowledge are helpful to estimate speeds. For example, for a section of road leading up to traffic lights, the aim should be to estimate average speeds over a 50 m section of road:*
>
> - *Traffic pulling away from the lights, e.g. 40-50 kph;*
> - *Traffic approaching the lights when green, e.g. 20-50 kph; and*
> - *Traffic on the carriageway approaching the lights when red, e.g. 5-20 kph, depending on the time of day and how congested the junction is.*
>
> *It is considered that the combined effect of these three conditions is likely in most instances to be a two-way average speed for all vehicles of 20 to 40 kph. Speeds in similar ranges would also apply at roundabouts, although on sections of large roundabouts, speeds may well average between 40-50 kph."*

3.3.10 The meteorological data required for the ADMS-Roads model, must be sourced from a representative location to the study site and include a full year of sequential readings. A review of the nearest available meteorological stations indicates Chertsey Abbey Meadow Meteorological Site is the most suitable site with the most complete/representative information. 2019 meteorological data has been utilised for this AQA in line with the verification year.

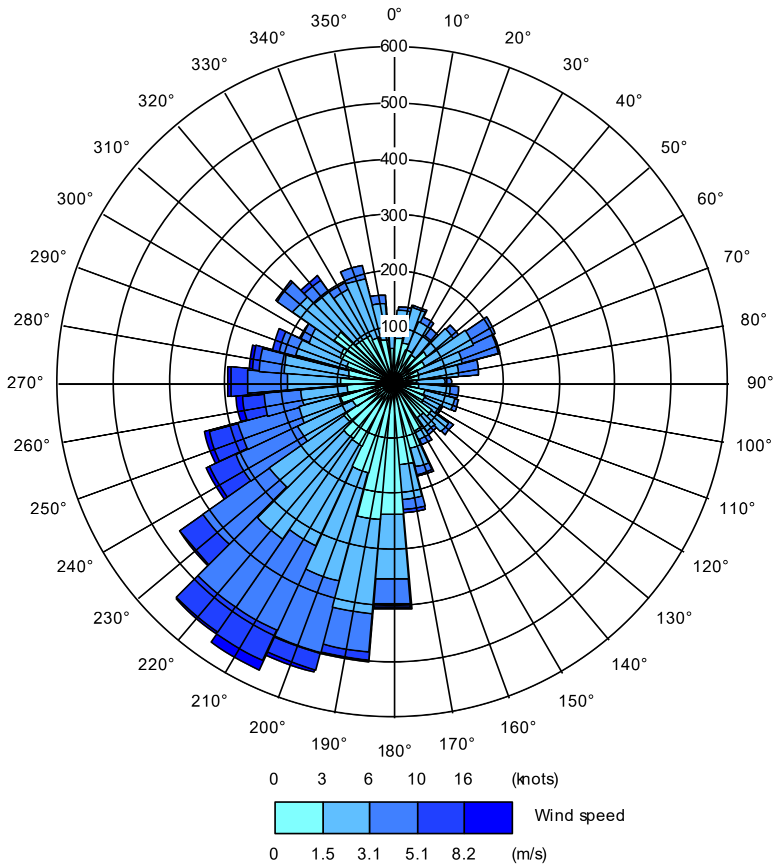
3.3.11 It is recognised that a minimum data capture of 90 % is recommended for representing hourly dispersion conditions within the dispersion model. Missing lines of meteorological data can be interpolated or filled by data for these specific hours from a neighbouring site. The data capture at Chertsey Abbey Meadow

[26] Department for Transport. Road Traffic Statistics. Accessible at: https://roadtraffic.dft.gov.uk/#6/55.254/-16.161/basemap-regions-countpoints

[27] Department for Environment, Food and Rural Affairs (2021). LAQM Technical Guidance LAQM.TG16, DEFRA, London.

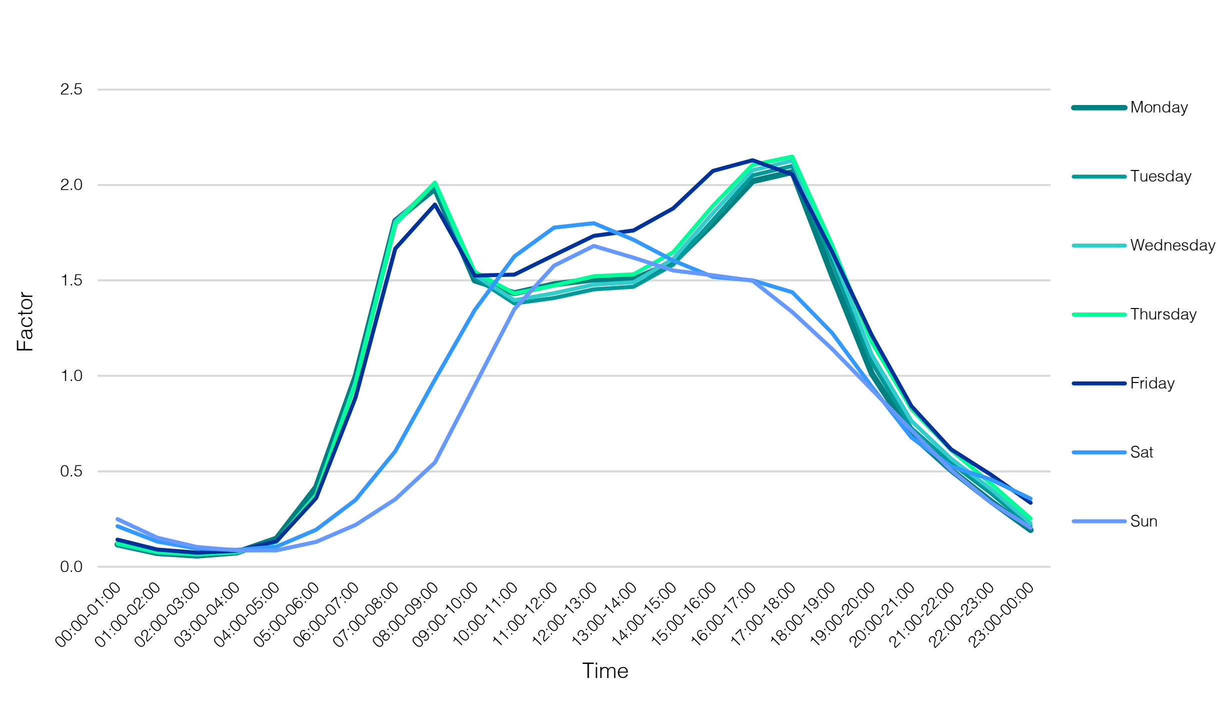
Meteorological Site for 2019 was within an acceptable margin error, for all parameters. The wind rose is illustrated in Figure 3.2.

Figure 3.2: Chertsey Abbey Meadow Meteorological Site (2019)



3.3.12 A standard diurnal profile from the Department of Transport website[28] has been utilised as part of the modelling process for an average 7-day week. The 2019 diurnal profile is illustrated in Figure 3.3.

Figure 3.3: Diurnal Profile (2019)



Emission Factors

3.3.13 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 AQA and due to the absence of other sources in the area, only road traffic emissions have been modelled.

3.3.14 The potential impacts have been modelled using the ADMS-Roads model atmospheric dispersion model, with Emission Factor Toolkit v11.0 which is built into the ADMS-Roads model.

3.3.15 It has been widely known for some time that NO_x/NO_2 levels historically have not reducing as quickly as anticipated, and this was identified by DEFRA in 2011. This was recently reiterated in an IAQM Interim Position Statement (v1.1)[29] released in July 2018 recognising that emissions from diesel vehicles have not declined as expected by DEFRA. This document has since been formally withdrawn, stating:

"There is a growing body of evidence to suggest that the latest COPERT vehicle emission factors, which feed into the EFT (v9 and onwards), reflect the real-world NO_x emissions more accurately.

It is judged that an exclusively vehicle emissions-based sensitivity test is no longer necessary.

On this basis, the EFT may be used for future year modelling with greater confidence when considering the per vehicle emission, provided that the assessment is verified against measurements made in the year 2016 or later."

[28] Department for Transport. Road Traffic Statistics (TRA). Accessible at: https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra

[29] Institute of Air Quality Management, 2018. *Dealing with Uncertainty in Vehicle NO_x Emissions within Air Quality Assessments.*

3.3.16 Therefore, the EFT v11.0 within the ADMS model is acceptable for an assessment year of 2027 and no sensitivity test has therefore been undertaken.

3.3.17 Vehicles emit NO_x with different proportions of NO_2. Following release into the atmosphere, chemical reactions take place between nitric oxide (NO), NO_2 and Ozone (O_3). In this AQA, the modelling of NO_x emissions has taken place and the resulting NO_2 concentration has been calculated post modelling using the DEFRA NO_x to NO_2 Calculator (v8.1)[30].

Verification Process

3.3.18 Whilst the ADMS-Roads model is widely accepted for its use in assessments of this nature, it is still important that a model verification process is undertaken to confirm that the model's performance is within an acceptable margin of error. Therefore, a comparison of modelled results with monitored results has been undertaken in line with LAQM.TG(16).

3.3.19 The model was found to be under-predicting compared to the monitored concentrations for all of the verification processes undertaken, which is not unusual. Therefore, adjustment factors have been derived and used to adjust concentrations at the receptor locations.

3.3.20 The model verification process is set out in Appendix D.

Modelling Uncertainty

3.3.21 There are many uncertainties when considering both measured and predicted pollution concentrations. The model is dependent upon the traffic data provided for the project, and should this be subject to change, so may the resulting pollution concentrations.

3.3.22 The background air quality concentrations have been taken from the DEFRA background mapping. The DEFRA website[31] includes estimated background air pollution data for NO_x, NO_2, PM_{10} and $PM_{2.5}$ for each 1km by 1km OS grid square. Background pollutant concentrations are modelled from the base year of 2018 and based on ambient monitoring and meteorological data from 2018. The 2018 mapping includes projections for future years, up to currently 2030. Furthermore, the concentrations are modelled at a standard 'living height,' which has been averaged across the grid square.

3.3.23 There is discrepancy between the concentrations mapped by DEFRA and those recorded at local background sites. Therefore, Air Quality Consultants Ltd (AQC)[32] have provided factors for NO_x and NO_2 (for both Inner London and the rest of the UK) based on data collected from Automatic Urban and Rural Network (AURN) monitors across the UK, which has been utilised for this AQA. To note, factors are not available for PM_{10} and $PM_{2.5}$.

3.3.24 Due to the ongoing uncertainty regarding 2020 air quality monitoring data as a result of the COVID-19 global pandemic, and to ensure a conservative assessment of future exposure and impacts is made, the verification process has used 2019 monitoring data. This is supported by DEFRA and Greater London Authority (GLA), which published the LAQM Covid-19: Supplementary Guidance[33], which states:

> *"An option would be to exclude the use of 2020 as a verification year, certainly until such time as it becomes clearer what the longer-term impacts of COVID-19 are / have been. The use of*

[30] Department for Environment, Food & Rural Affairs. NO_x to NO_2 Calculator. Accessible at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

[31] Department for Environmental Food and Rural Affairs. Accessible at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

[32] Air Quality Consultants, 2020. *Calibrating Defra's 2018- based Background NO_x and NO_2 Maps against 2019 Measurements.*

[33] Department for Environment, Food & Rural Affairs, 2021. LAQM Covid-19: Supplementary Guidance.

2019 as a verification year would be recommended under such a direction, as the most recent year available without the effects of the pandemic. However, there are uncertainties as to whether changes to trends in both road traffic emissions and background concentrations have taken place and whether any changes would be likely to lead to longer-term shifts. This in turn could also lead to challenges and cost implications on LAQM projects (e.g. detailed modelling assessments, AQAPs) whose outcomes would be based on this more conservative approach in contravention, it could be argued, of real-world observations."

3.3.25 The emissions factors within the latest DEFRA Emission Factor Toolkit (EFT) are based on assumptions which were current before the occurrence of the COVID-19 pandemic. As such, this data will not reflect any changes that have occurred or may occur in the future as a result of behavioural change caused by the pandemic and / or as a result of measures implemented by governing authorities (e.g. lockdowns, travel restrictions etc.).

3.3.26 This is highlighted by a recent statement published by DEFRA, which states:

"Users of the updated LAQM tools should be aware that the projections in the 2018 reference year background maps and associated tools are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these tools do not reflect short or longer term impacts on emissions in 2020 and beyond resulting from behavioural change during the national or local lockdowns."

3.4 Significance Impact Criteria

Construction Impacts

3.4.1 The IAQM (2016) guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, (as set out in Section 7 and Appendix E) the IAQM (2016) guidance is clear that the residual effect will normally be 'not significant.'

Operational Impacts

3.4.2 Currently there is no formal guidance on the absolute magnitude and significance criteria for the assessment of air quality impacts. However, the EPUK & IAQM (2017) guidance recommendations for describing the impact at individual receptor locations as set out in Table 3.2, which has been utilised to determine the description of any impact.

Table 3.2: Operational Impact Descriptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in concentration relative to Air Quality Action Level (AQAL)				
	<0.5	1	2 – 5	6 – 10	>10
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

Notes:
- Vales are rounded to the nearest whole number.
- When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
- -AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL).'

3.4.3 The EPUK & IAQM (2017) advice provides guidance on the severity of an impact as a descriptor. However, although the impacts might be considered 'Slight,' 'Moderate' or 'Substantial' at one or more receptor location, the overall effects of a Proposed Development may not always be judged as being 'significant.'

3.4.4 The guidance believes that the assessment of significance should be based on professional judgement, with the overall air quality impact of the Proposed Development described as either 'significant' or 'not significant.' In drawing this conclusion, the following factors should be taken into account:

- Receptor Sensitivity;
- The existing and future air quality in the absence of the Proposed Development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

3.4.5 The judgement of the significance should be made by a competent professional who is suitably qualified.

4 Baseline Conditions

4.1 Air Quality Review and Assessment

4.1.1 Under the Air Quality Strategy, there is a duty on all local authorities to consider the air quality within their boundaries and to report annually to DEFRA.

4.1.2 LAQM has been assessed by RBC through the national Review and Assessment process and in fulfilment of Part IV of the Environmental Act 1995.

4.1.3 At the time of writing RBC has declared three AQMAs within the borough; the Addlestone AQMA, declared by RBC for exceedances of the NO_2 annual mean objective, is located approximately 950 south west of the Application Site. The Application Site is located close to Elmbridge Borough Council (EBC), which at the time of writing has declared seven AQMAs. The Weybridge AQMA is located approximately 550 m north east of the Application Site, and has been declared by EBC for exceedances of the NO_2 annual mean objective. Both AQMAs are illustrated in Figure 4.1.

4.2 Local Air Quality Monitoring

4.2.1 EBC carried out automatic monitoring at three locations in 2019, measuring annual mean and 1-hour mean concentrations of NO_2. Two of these monitors, located along Weybridge High Street, are located close to the Application Site within the Weybridge AQMA.

4.2.2 EBC and RBC have a network of non-automatic (diffusion tubes) monitoring stations located in close proximity to the Application Site, details of which are listed in the RBC[34] and EBC[35] Air Quality Annual Status Reports (ASRs). This monitoring is primarily concentrated within the AQMAs identified above.

Runnymede Air Quality Monitoring

4.2.3 The closest monitoring stations within Runnymede are illustrated in Figure 4.1.Table 4.1 sets out the annual mean NO_2 monitoring data collected at these monitoring stations for the past 5 years.

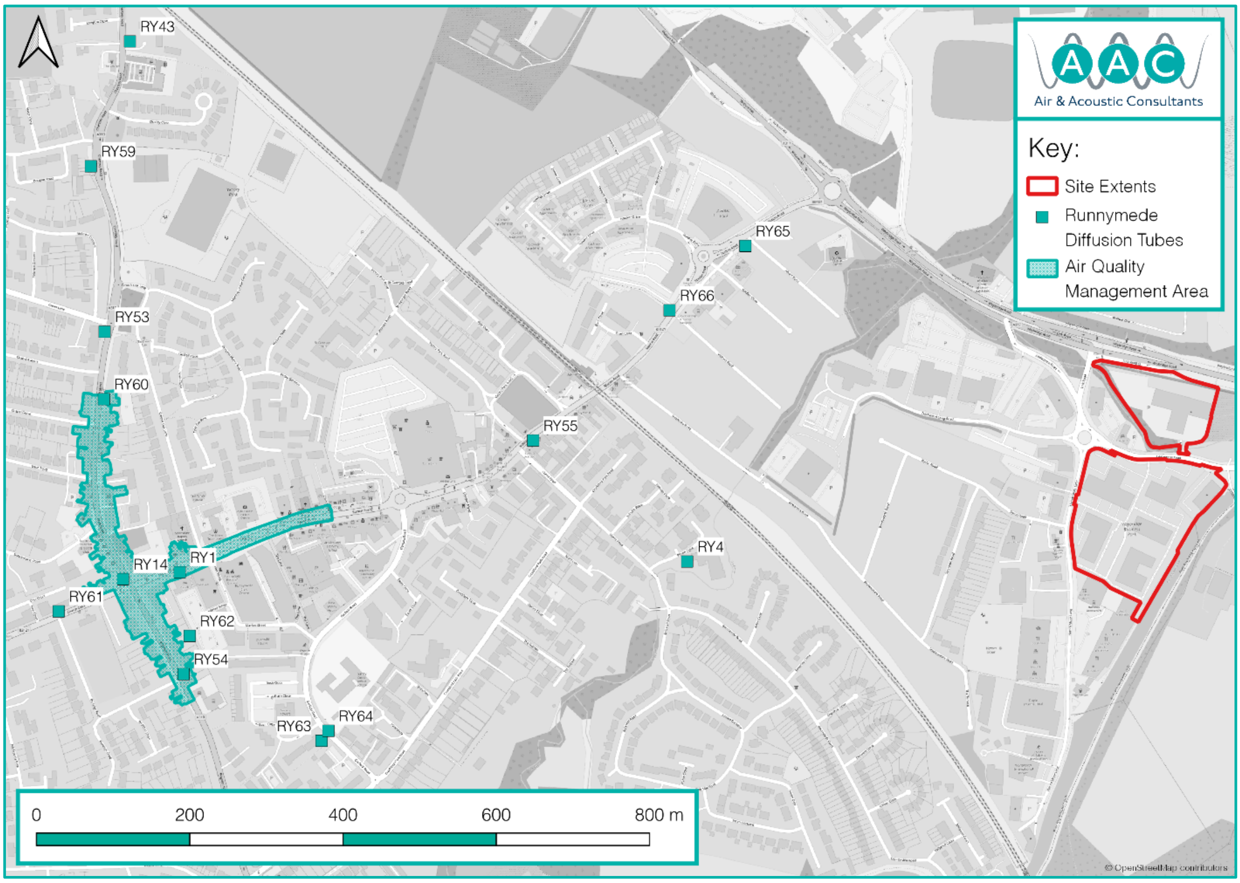
[34] Elmbridge Borough Council, 2020. *2020 Air Quality Annual Status Report (ASR).*
[35] Runnymede Borough Council, 2022. *Air Quality Annual Status Report (ASR) 2020.*

Table 4.1: Summary of NO_2 Annual Mean Air Quality Monitoring

ID	Type	Annual Mean (µg/m³)				
		2015	2016	2017	2018	2019
Diffusion Tubes						
RY1	Roadside	39	39.5	29.8	29.1	30.8
RY4	Urban Background	19.6	22.7	17.8	20.2	19.4
RY14	Roadside	**48.6**	**45.6**	**48.7**	**45.5**	**48.3**
RY43	Roadside	34.5	35.2	26.7	36.9	38.4
RY53	Roadside	39.2	**41.5**	32.2	35.8	**40.8**
RY54	Roadside	36.4	33.4	28.1	29.6	32.4
RY55	Roadside	35.9	34.1	28.7	32.7	34.4
RY59	Roadside	34	34	30.3	34.7	33.8
RY60	Roadside	38.8	36.3	28.9	33.3	32.9
RY61	Roadside	-	32	30.1	30.1	29.1
RY62	Roadside	-	32.7	31.3	32.8	32.1
RY63	Roadside	-	22.5	30.8	21.6	25.5
RY64	Roadside	-	25.5	22.4	24.1	26.5
RY65	Roadside	-	26.1	22.4	26.7	32.2
RY66	Roadside	-	28.7	22.1	26.2	-
Objective		40				

Notes:
Bold indicates exceedances of the NO_2 annual mean objective. **Bold and underlined** indicates exceedances of 60 µg/m³ (which is an indication the hourly mean objective could be being breached).

Figure 4.1: Runnymede Monitoring Locations



4.2.4 The air quality monitoring carried out closest to the Application Site shows a mixture of compliance and non-compliance with the NO_2 annual mean objective, for the past 5 years of available data. For reference, the monitoring station consistently exceeding the NO_2 annual mean objective (RY14) is located within the Addlestone AQMA.

Elmbridge Air Quality Monitoring

4.2.5 The closest monitoring stations within Elmbridge are illustrated in Figure 4.2 for automatic sites and Figure 4.3 for diffusion tubes. Table 4.2 sets out the annual mean NO_2 monitoring data collected at these monitoring stations for the past 5 years, with Table 4.3 setting out the number of NO_2 1-hour mean objective exceedances at automatic monitoring sites throughout the year.

Figure 4.2: Elmbridge Automatic Monitoring Locations

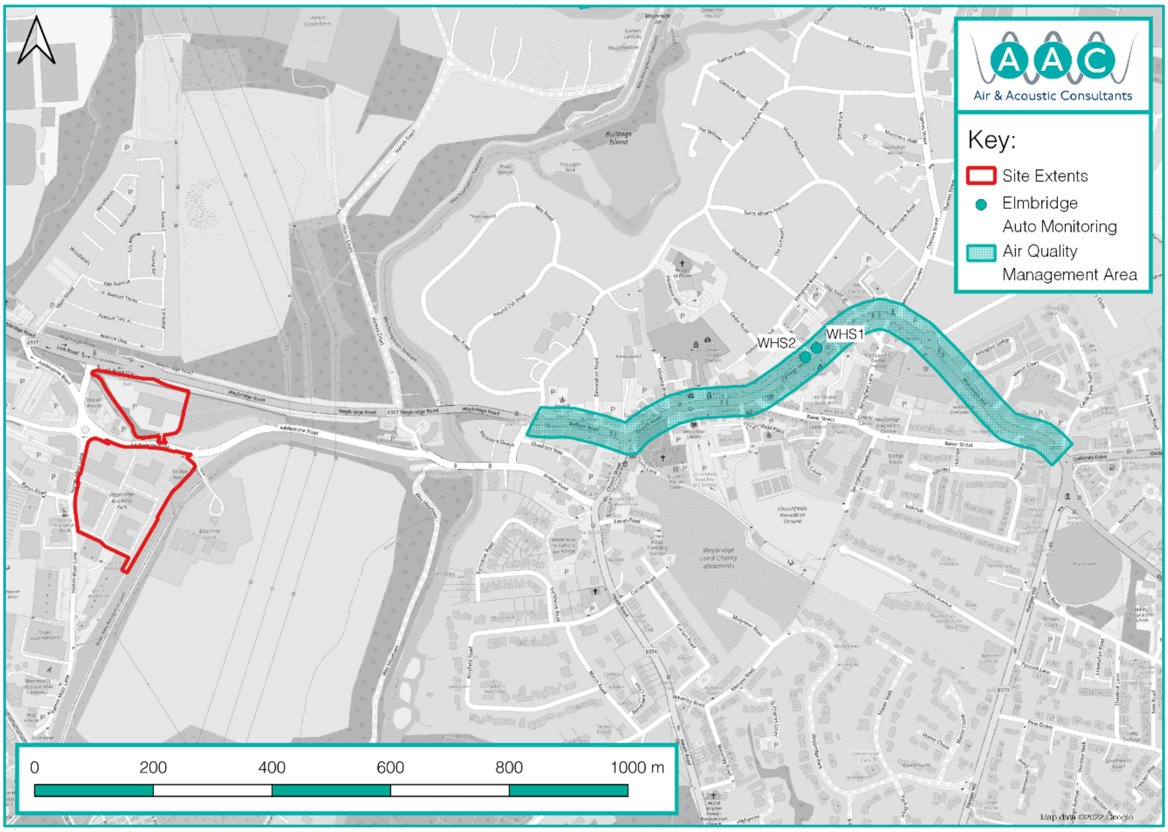


Figure 4.3: Elmbridge Diffusion Tube Monitoring Locations

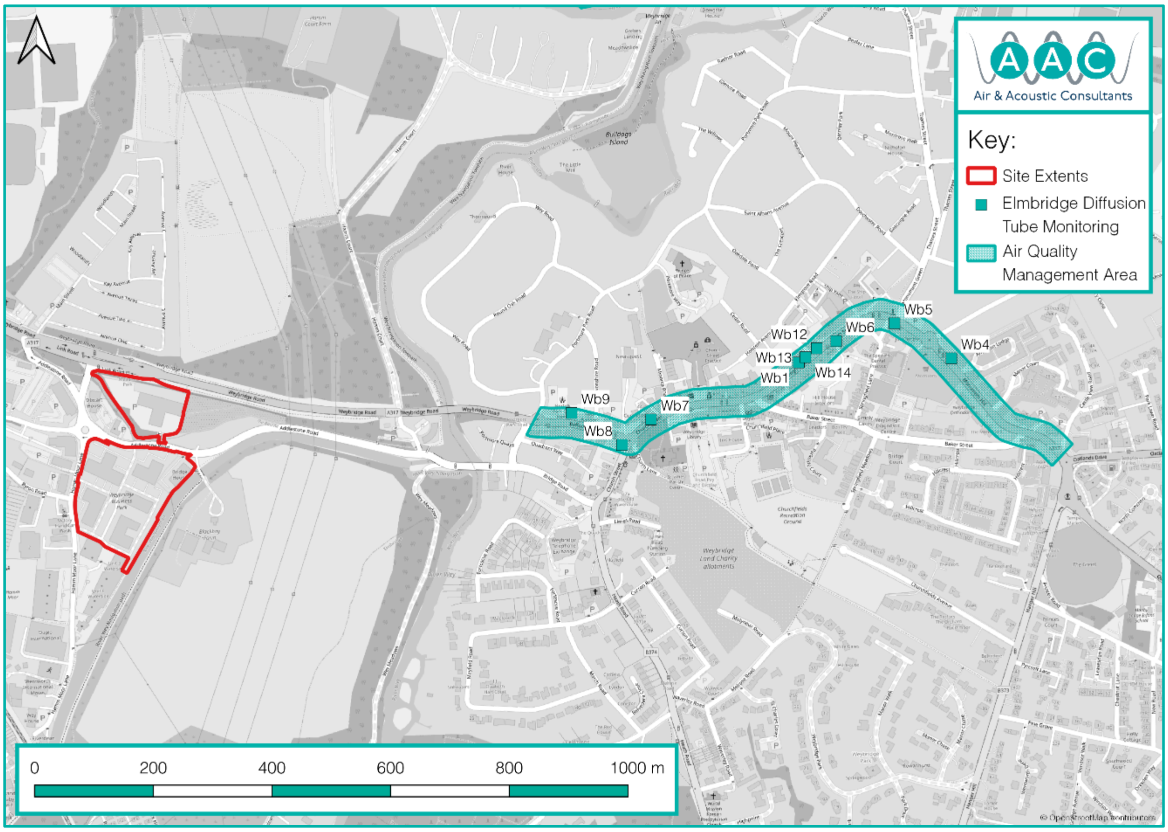


Table 4.2: Summary of Elmbridge NO_2 Annual Mean Air Quality Monitoring

ID	Type	Annual Mean (μg/m³)				
		2015	2016	2017	2018	2019
Automatic Monitors						
WHS1	Kerbside	38	38	33	32	31
WHS2	Kerbside	-	-	-	-	31
Diffusion Tubes						
Wb1	Kerbside	36.1	31.9	30.1	28.4	36.3
Wb4	Roadside	36.6	32.4	30.2	32.1	35.5
Wb5	Roadside	**42.8**	36.4	34.0	34.0	36.2
Wb6	Kerbside	30.1	30.9	28.1	27.7	32.9
Wb7	Roadside	**50.8**	**45.0**	**40.6**	39.6	**45.6**
Wb8	Roadside	37.2	37.4	35.5	31.9	35.2
Wb9	Roadside	25.1	25.8	22.7	25.4	24.6
Wb10	Kerbside	35.8	34.	31.3	32.5	33.5
Wb11	Kerbside	36.6	34.	30.9	32.0	32.8
Wb12	Kerbside	35.8	34.2	32.0	31.7	32.1
Wb13	Kerbside		-	-	-	32.5
Wb14	Kerbside	-	-	-	-	30.9
Objective				**40**		

Notes:
Bold indicates exceedances of the NO_2 annual mean objective. **Bold and underlined** indicates exceedances of 60 μg/m³ (which is an indication the hourly mean objective could be being breached).

Table 4.3: Summary of Elmbridge NO_2 1-Hour Mean Air Quality Monitoring

ID	Type	Number of NO_2 1-Hour Mean Objective Exceedances				
		2015	2016	2017	2018	2019
Automatic Monitors						
WHS1	Kerbside	0	0	0	2	0

WHS2	Kerbside	-	-	-	-	0 (103)
	Objective		18 times per year			

Notes:
Bold indicates exceedances of the NO_2 1-hour mean objective (200 µg/m^3 not to be exceeded more than 18 times per year).
If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

4.2.6 The air quality monitoring carried out closest to the Application Site shows a mixture of compliance and non-compliance with the NO_2 annual mean objective, for the past 5 years of available data. For reference, only one monitoring stations exceeded the NO_2 annual mean objective (Weybridge 7) in 2019.

4.2.7 The automatic monitoring carried out by EBC has not recorded any exceedances of the NO_2 1-hour mean objective.

4.3 Mapped Background Concentrations

DEFRA Background Concentrations

4.3.1 The DEFRA website includes estimated background air pollution data for NO_x, NO_2, PM_{10} and $PM_{2.5}$ for each 1km-by-1km OS grid square. Background pollutant concentrations are modelled from the base year of 2018 and based on ambient monitoring, meteorological data from 2018 and then projected for future years. Projected pollutant concentrations for the verification and baseline year (2019 and 2027), covering the closest OS grid square to the chosen receptor locations, are provided in Table 4.4 and have been utilised within this AQA.

4.3.2 As per a recent statement from DEFRA, as set out in paragraph 3.3.26, the DEFRA background concentrations do not consider short term variations as a result on the COVID-19 outbreak in the UK:

Table 4.4: Estimated Annual Mean Background Pollutant Concentrations (µg/m^3)

Pollutant	2019	2022	2027
NO_2	17.1 – 22.2	15.1 – 19.2	12.9 – 15.5
PM_{10}	15.1 – 17.6	14.5 – 17.0	14.0 – 16.4
$PM_{2.5}$	10.6 – 12.1	10.1 – 11.6	9.7 – 11.2

Notes: Data presented are derived from the ordinance survey grid references for receptors identified in Table 3.1.

4.3.3 Annual mean concentrations are within the relevant objective limits for NO_2, PM_{10} and $PM_{2.5}$.

4.3.4 It should be noted that NO_2 concentrations have been calibrated against Automatic Urban and Rural Network (AURN) sites with more than 75% data capture. The methodology for this is set out in the Air Quality Consultants document.

4.4 Modelled Baseline Concentrations

4.4.1 The modelled baseline concentrations are set out in Table 4.5 for the 2027 'Future Baseline' scenario, for the receptor locations as set out in Table 3.1 and illustrated in Error! Reference source not found.. The modelled concentrations of diffusion tubes within the relevant AQMAs, as illustrated in Figure 4.1, Figure 4.2 and Figure 4.3 are also set out in the table.

Table 4.5: 2027 NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Specified Receptors (µg/m^3)

Receptor	Calculated Annual Mean (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
Human Receptors			
R1	30.1	20.1	13.1
R2	14.8	14.8	10.1
R3	15.9	15.1	10.4
R4	15.0	14.9	10.2
R5	16.9	15.8	10.7
R6	18.0	15.8	10.7
R7	22.2	17.8	11.7
R8	20.8	16.6	11.1
R9	22.4	18.3	12.0
R10	24.3	17.9	11.8
R11	22.0	17.2	11.4
R12	23.7	18.1	12.2
R13	16.2	15.6	10.8
R14	19.0	16.0	10.8
R15	20.1	17.4	11.8
Addlestone AQMA Monitoring			
RY14	26.1	20.0	13.2
RY60	25.3	20.7	13.6
Weybridge AQMA Monitoring			
WB7	26.1	18.5	12.4
WB5	22.4	17.2	11.6
WB6	23.7	18.7	12.4

WB10	25.7	19.6	13.0
WB11	25.7	19.6	13.0
WB12	25.7	19.6	13.0
WB13	24.2	18.9	12.6
WB14	24.2	18.9	12.6
WB15	24.2	18.9	12.6
WB1	22.8	18.3	12.2
WHS1	25.7	19.6	13.0
WHS2	24.2	18.9	12.6

Note: **Bold** indicates exceedance of the annual mean objectives. **Bold and underlined** indicates a possible exceedance of the NO_2 1-hour mean objective.

4.4.2 The modelled annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$ are all below the respective annual mean objective. The annual mean NO_2 concentrations are all below 60 µg/m^3, which is regarded to be an indicator that the hourly mean objective will also not be breached.

4.4.3 The annual mean PM_{10} concentrations are below 32 µg/m^3 and it is therefore unlikely that the 24-hour mean PM_{10} objective will be exceeded.

5 Construction Dust Impact Assessment

5.1 Introduction

5.1.1 The assessment of construction activities has focused on demolition, earthworks, construction and trackout activities at the Site. in line with the IAQM (2016) guidance methodology (as set out in Appendix A. A summary of the assessment is provided below.

5.2 Screening for a Full Assessment

5.2.1 Having reviewed the Site location, it is evident that the Site has a number of human receptors within 350 m of the Site boundary, therefore a detailed dust impact assessment is required.

5.2.2 A review of the DEFRA Magic website[36] indicates that no ecological site is present within the immediate surrounding area. The closest ecological sites is Chertsey Meads LNR, which sits approximately 890 m north of the Application Site. As per box 1 of the IAQM (2016) guidance, it is not within 50 m of the boundary of the Site or construction vehicular routes (up to 500 m from the Site), therefore, an assessment of the impact of the construction phase on this receptor has not been scoped out.

5.3 Potential Dust Emission Magnitude

Demolition

5.3.1 A review of the Site indicates that there are a number of buildings present on the Site that require demolition. Total building volume is unknown, but it is expected that it will be <50,000m^3. Furthermore, judging by the construction material being generally of non-dusty material and demolition activities not occurring >20m above ground-level, the potential dust emission magnitude for demolition activities is classified as **Medium**.

Earthworks

5.3.2 The South Unit of the Site has an area of ~25,900m^2 while the North unit has an area ~9,000m^2, therefore the total area where earthworks will occur is greater than 10,000 m^2. It is anticipated that the soil exiting in the ground has a 'loamy and clayey'[37] texture. Therefore, in line with Table A1 as set out in Appendix A, the magnitude of potential dust release from earthworks activities is classified as **Large**.

Construction

5.3.3 The total building volume to be constructed is unknown, however, it is known that the warehouses will occupy a total area of 17,820m^2. When considering the construction material will be of low dust potential and size of the Proposed Development and the square footage of the Proposed Development area, in line with Table A1 as set out in Appendix A and professional judgement, the magnitude of potential dust release from construction activities is classified as **Medium**.

Trackout

5.3.4 The number of daily HGV vehicles movements which may trackout dust and dirt for the construction phase of the Proposed Development is unknown, but it is considered that there would be between 10 – 50 HGV movements per day. Therefore, in line with Table A1 as set out in Appendix A, and considering

[36] Natural England. MAGIC. Accessible at: https://magic.defra.gov.uk/
[37] Cranfield Soil and Agrifood Institute. Soilscapes. Accessible at: http://www.landis.org.uk/soilscapes/

the potentially clayey content of the soil, the magnitude of potential dust release from trackout activities is classified as **Medium**.

Summary

5.3.5 Table 5.1 summarises the dust emission magnitude for the Proposed Development.

Table 5.1: Summary of Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Medium
Earthworks	Large
Construction	Medium
Trackout	Medium

5.4 Sensitivity of Area

5.4.1 Step 2B considers the number and the sensitivity of the receptors. A consideration is also made for the background PM_{10} concentrations when looking at human health impacts (which is based upon the DEFRA background concentrations in Table 4.4). Buffer zones are set out in Figure 5.1 and Figure 5.2 to illustrate the number of receptors in proximity to the Site that could be impacted by dust as a result of the demolition and construction activities.

Effects of Dust Soiling

5.4.2 The presence of between 1 - 10 'High' sensitivity human (residential) receptors within approximately 20 m of the Application Site boundary, indicates that the area around the construction site has a '**Medium**' sensitivity (Based upon Table A3 in Appendix A) for demolition and construction activities.

5.4.3 There may be numerous access roads to the Site. As a reasonable worst case scenario, routing of construction vehicles from the south unit is expected to be west out of the heading towards the A317 Weybridge Road (Westbound). Therefore, receptors have been considered along this road up to 200 m south of the Application Site access. For trackout, there are between 1 – 10 'High' sensitivity human (residential) receptors within 20 m of where trackout may occur (for a distance of up to 200m m from the site entrance). This would be considered a '**Medium**' sensitivity (Based upon Table A3 in Appendix A).

Effects on Human Health

5.4.4 The presence of 1 – 10 'High' sensitivity human (residential) receptors within approximately 20 m of the site boundary, and the background PM_{10} concentrations being under 24 µg/m^3 (as set out in Table 4.4), would indicate that the area has a '**Low**' sensitivity for demolition and construction activities (Based upon Table A4 in Appendix A).

5.4.5 There may be numerous access roads to the Site. As a reasonable worst case scenario, routing of construction vehicles from the south unit is expected to be west out of the heading towards the A317 Weybridge Road (Westbound). Therefore, receptors have been considered along this road up to 200 m south of the Application Site access. For trackout, there are between 1 – 10 'High' sensitivity human (residential) receptors within 20 m of where trackout may occur (for a distance of up to 200m m from the site entrance). Along with the background PM_{10} concentrations being below 24 µg/m^3 (as set out in Table 4.4), it would indicate the area will have a '**Low**' sensitivity (Based upon Table A4 in Appendix A).

Figure 5.1: Construction Dust Risk Buffers

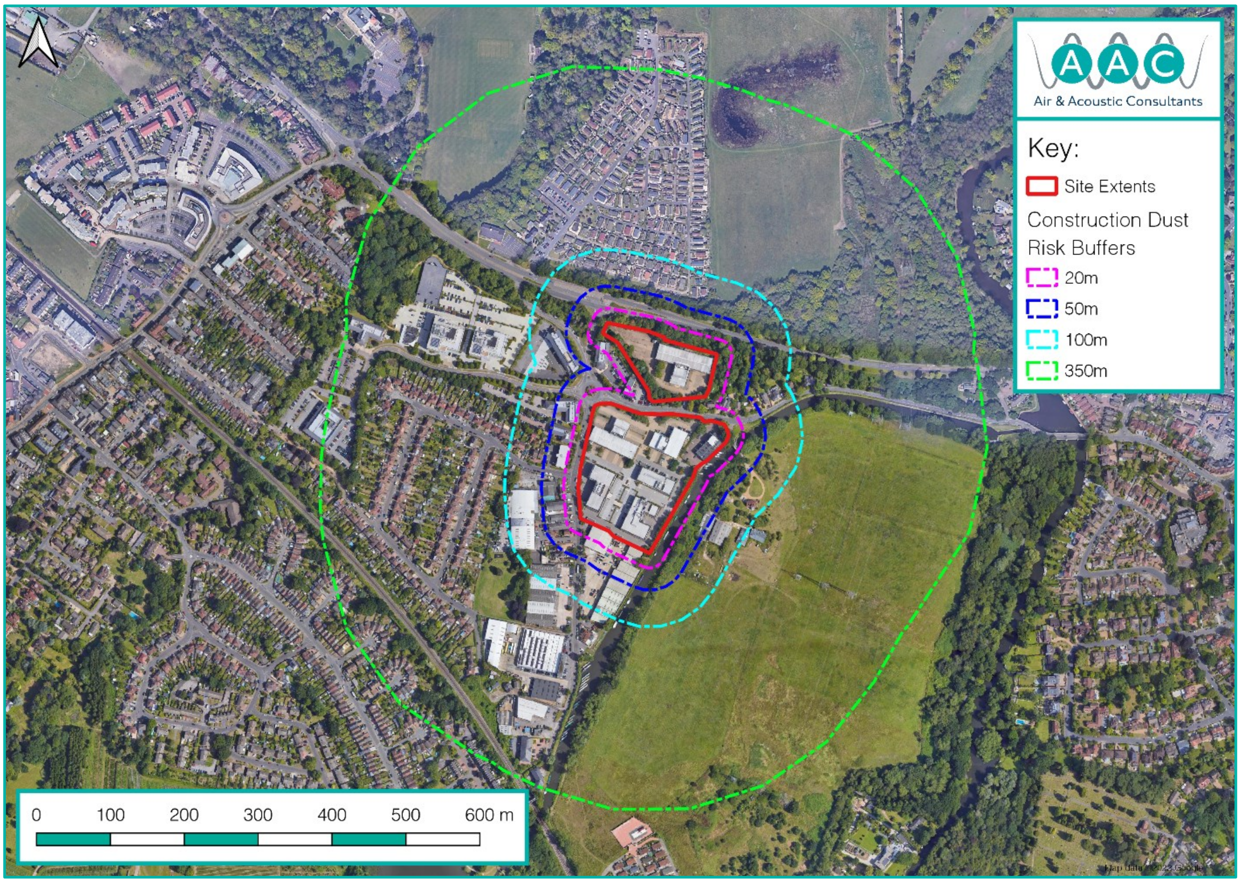
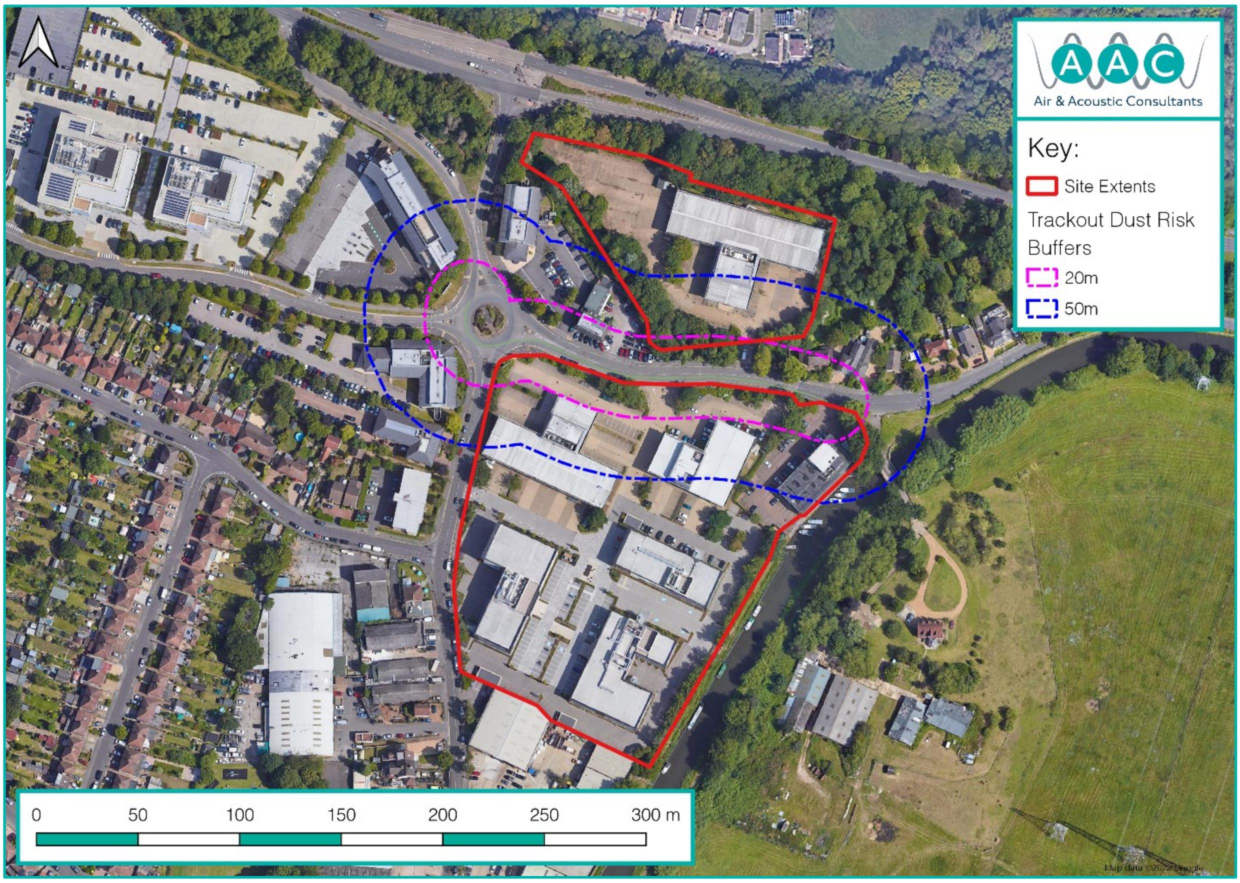


Figure 5.2: Trackout Dust Risk Buffers



Effects on Ecological Receptors

5.4.6 As discussed earlier in paragraph 5.2.2, the ecological sites element of the assessment has been scoped out based on the screening criteria in box 1 of the IAQM (2016) guidance.

5.5 Risk and Significance

5.5.1 The dust emission magnitude described in the sections above, is combined with the sensitivity of the area assessment set out in the assessment matrix, (Table A6 of Appendix A). The resulting risk categories for the demolition and construction activities, without mitigation, are set out in Table 5.2.

Table 5.2: Summary of Dust Risk to Define Site-Specific Mitigation

Activity	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Medium Risk	Low Risk
Human Health	Low Risk	Low Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

5.5.2 As previously advised, the IAQM (2016) guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, (as set out in Section 7 and Appendix E) the IAQM (2016) guidance is clear that the residual effect will normally be '**not significant**.'

6 Operational Impacts

6.1 Traffic Emissions – Option A

6.1.1 As set out in Section 3, the screening process highlighted that a full impact assessment was required for the Proposed Development for traffic flows related to Option A.

6.1.2 The '2027 Future Baseline' NO_2, PM_{10} and $PM_{2.5}$ concentrations at the previously specified human receptor locations, as set out in Table 3.1 and illustrated in Error! Reference source not found., have been compared to the '2027 Future Baseline + Proposed Development' concentrations and the results are set out in Table 6.1, Table 6.2 and Table 6.3. The tables also set out the impact descriptor at each receptor location in line with the assessment matrix set out in Table 3.2.

Table 6.1: Predicted NO_2 Impacts at Specified Receptors

Calculated NO_2 Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
R1	30.1	30.3	0%	Negligible
R2	14.8	15.0	0%	Negligible
R3	15.9	15.9	0%	Negligible
R4	15.0	15.0	0%	Negligible
R5	16.9	17.0	0%	Negligible
R6	18.0	18.2	0%	Negligible
R7	22.2	22.5	1%	Negligible
R8	20.8	21.0	0%	Negligible
R9	22.4	22.5	0%	Negligible
R10	24.3	24.7	1%	Negligible
R11	22.0	22.3	1%	Negligible
R12	23.7	24.1	1%	Slight
R13	16.2	16.3	0%	Negligible
R14	19.0	19.3	1%	Negligible
R15	20.1	20.4	1%	Negligible

Table 6.2: Predicted PM_{10} Impacts at Specified Receptors

Calculated PM_{10} Annual Mean (µg/m³)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
R1	20.1	20.2	0%	Negligible
R2	14.8	14.8	1%	Negligible
R3	15.1	15.1	0%	Negligible
R4	14.9	14.9	0%	Negligible
R5	15.8	15.8	0%	Negligible
R6	15.8	15.9	0%	Negligible
R7	17.8	17.9	0%	Negligible
R8	16.6	16.6	0%	Negligible
R9	18.3	18.4	0%	Negligible
R10	17.9	18.0	0%	Negligible
R11	17.2	17.3	0%	Negligible
R12	18.1	18.3	0%	Negligible
R13	15.6	15.6	0%	Negligible
R14	16.0	16.1	0%	Negligible
R15	17.4	17.5	0%	Negligible

Note: **Bold** indicates exceedance of the PM_{10} annual mean objective.

Table 6.3: Predicted $PM_{2.5}$ Impacts at Specified Receptors

Calculated $PM_{2.5}$ Annual Mean (µg/m³)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
R1	13.1	13.1	0%	Negligible

R2	10.1	10.1	0%	Negligible
R3	10.4	10.4	0%	Negligible
R4	10.2	10.2	0%	Negligible
R5	10.7	10.7	0%	Negligible
R6	10.7	10.7	0%	Negligible
R7	11.7	11.8	0%	Negligible
R8	11.1	11.1	0%	Negligible
R9	12.0	12.1	0%	Negligible
R10	11.8	11.9	0%	Negligible
R11	11.4	11.5	0%	Negligible
R12	12.2	12.2	0%	Negligible
R13	10.8	10.8	0%	Negligible
R14	10.8	10.8	0%	Negligible
R15	11.8	11.8	0%	Negligible

Note: **Bold** indicates exceedance of the $PM_{2.5}$ annual mean objective.

NO_2

6.1.3 The modelled NO_2 concentrations in Table 6.1 show that NO_2 concentration at all specified residential receptor locations, for both options, are below the annual mean objective (40 µg/m^3).

6.1.4 Using the matrix in Table 3.2, it can be seen that the impacts associated with the Proposed Development are anticipated to be **negligible (adverse)** at all receptors.

6.1.5 Based on the annual average mean concentration at all reports being below 60 µg/m^3, it is unlikely that any receptor identified would experience an exceedance of the 1-hour mean objective.

PM_{10}

6.1.6 The modelled PM_{10} concentrations in Table 6.2 do not predict any exceedances of the annual mean objective (40 µg/m^3) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

6.1.7 For PM_{10}, the following equation can be used to derive the number of days that the 24-hour mean objective (50 µg/m^3) is likely to be exceeded:

$$No.24\ hour\ exceedances = -18.5 + 0.00145 \times annual\ mean^3 + \left(\frac{206}{annual\ mean}\right)$$

6.1.8 There are limitations to this calculation, and this is set out in LAQM.TG(16), which states:

> *"The relationship does have limitations in so far that it should not be applied when the annual mean PM_{10} concentration is lower than 14.8 µg/m³".*

6.1.9 On the basis that all receptors are above 14.8 µg/m³, concentrations can be used to inform whether the 24-hour mean objective will be exceeded or not. The highest concentration is predicted to be 20.2 µg/m³ at Receptor R1. Based on the formula above, this predicts 3.6 exceedance days, which is below the 35-days annual limit. It is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of PM_{10}.

$PM_{2.5}$

6.1.10 The modelled $PM_{2.5}$ concentrations for both options in Table 6.3 do not predict any exceedances of the Stage 2 Post 2020 annual mean objective (20 µg/m³) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

Significance of Impacts

6.1.11 The impacts on the receptors associated with the Proposed Development are anticipated to be **negligible (adverse)** for NO_2, PM_{10} and $PM_{2.5}$ concentrations. The concentrations do not exceed the relevant national objectives as set out in Table 2.1. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the impacts can be considered '**not significant.**'

6.2 Traffic Emissions – Option B

6.2.1 As set out in Section 3, the screening process highlighted that a full impact assessment was required for the Proposed Development for traffic flows related to Option B.

6.2.2 The '2027 Future Baseline' NO_2, PM_{10} and $PM_{2.5}$ concentrations at the previously specified human receptor locations, as set out in Table 3.1 and illustrated in Error! Reference source not found., have been compared to the '2027 Future Baseline + Proposed Development' concentrations and the results are set out Table 6.4, Table 6.5 and Table 6.6. The tables also set out the impact descriptor at each receptor location in line with the assessment matrix set out in Table 3.2.

Table 6.4: Predicted NO_2 Impacts at Specified Receptors

Calculated NO_2 Annual Mean (µg/m³)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
R1	30.1	30.2	0%	Negligible
R2	14.8	14.9	0%	Negligible
R3	15.9	15.9	0%	Negligible
R4	15.0	15.0	0%	Negligible
R5	16.9	17.0	0%	Negligible

R6	18.0	18.1	0%	Negligible
R7	22.2	22.4	1%	Negligible
R8	20.8	20.9	0%	Negligible
R9	22.4	22.5	0%	Negligible
R10	24.3	24.6	1%	Negligible
R11	22.0	22.3	1%	Negligible
R12	23.7	24.1	1%	Negligible
R13	16.2	16.3	0%	Negligible
R14	19.0	19.2	0%	Negligible
R15	20.1	20.3	0%	Negligible

Note: **Bold** indicates exceedance of the NO_2 annual mean objective.

Table 6.5: Predicted PM_{10} Impacts at Specified Receptors

Calculated PM_{10} Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
R1	20.1	20.1	0%	Negligible
R2	14.8	14.8	0%	Negligible
R3	15.1	15.1	0%	Negligible
R4	14.9	14.9	0%	Negligible
R5	15.8	15.8	0%	Negligible
R6	15.8	15.9	0%	Negligible
R7	17.8	17.9	0%	Negligible
R8	16.6	16.6	0%	Negligible
R9	18.3	18.4	0%	Negligible
R10	17.9	18.0	0%	Negligible
R11	17.2	17.2	0%	Negligible

R12	18.1	18.2	0%	Negligible
R13	15.6	15.6	0%	Negligible
R14	16.0	16.1	0%	Negligible
R15	17.4	17.5	0%	Negligible

Note: **Bold** indicates exceedance of the PM_{10} annual mean objective.

Table 6.6: Predicted $PM_{2.5}$ Impacts at Specified Receptors

Calculated $PM_{2.5}$ Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
R1	13.1	13.1	0%	Negligible
R2	10.1	10.1	0%	Negligible
R3	10.4	10.4	0%	Negligible
R4	10.2	10.2	0%	Negligible
R5	10.7	10.7	0%	Negligible
R6	10.7	10.7	0%	Negligible
R7	11.7	11.8	0%	Negligible
R8	11.1	11.1	0%	Negligible
R9	12.0	12.0	0%	Negligible
R10	11.8	11.9	0%	Negligible
R11	11.4	11.5	0%	Negligible
R12	12.2	12.2	0%	Negligible
R13	10.8	10.8	0%	Negligible
R14	10.8	10.8	0%	Negligible
R15	11.8	11.8	0%	Negligible

Note: **Bold** indicates exceedance of the $PM_{2.5}$ annual mean objective.

NO_2

6.2.3 The modelled NO_2 concentrations in Table 6.4 show that NO_2 concentration at all specified residential receptor locations, for both options, are below the annual mean objective (40 μg/m³).

6.2.4 Using the matrix in Table 3.2, it can be seen that the impacts associated with the Proposed Development are anticipated to be **negligible (adverse)** at all receptors.

6.2.5 Based on the annual average mean concentration at all reports being below 60 μg/m³, it is unlikely that any receptor identified would experience an exceedance of the 1-hour mean objective.

PM_{10}

6.2.6 The modelled PM_{10} concentrations in Table 6.5 do not predict any exceedances of the annual mean objective (40 μg/m³) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

6.2.7 For PM_{10}, the following equation can be used to derive the number of days that the 24-hour mean objective (50 μg/m³) is likely to be exceeded.

$$No. 24\ hour\ exceedances = -18.5 + 0.00145 \times annual\ mean^3 + \left(\frac{206}{annual\ mean}\right)$$

6.2.8 There are limitations to this calculation, and this is set out in LAQM.TG(16), which states:

"The relationship does have limitations in so far that it should not be applied when the annual mean PM_{10} concentration is lower than 14.8 μg/m³".

6.2.9 On the basis that all receptors are above 14.8 μg/m³, concentrations can be used to inform whether the 24-hour mean objective will be exceeded or not. The highest concentration is predicted to be 20.1 μg/m³ at Receptor R1. Based on the formula above, this predicts 3.6 exceedance days, which is below the 35-days annual limit. It is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of PM_{10}.

$PM_{2.5}$

6.2.10 The modelled $PM_{2.5}$ concentrations for both options in Table 6.6 do not predict any exceedances of the Stage 2 Post 2020 annual mean objective (20 μg/m³) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

Significance of Impacts

6.2.11 As set out above, the impacts on the receptors associated with the Proposed Development are anticipated to be **negligible (adverse)** for NO_2, PM_{10} and $PM_{2.5}$ concentrations. The concentrations do not exceed the relevant national objectives as set out in Table 2.1. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the impacts can be considered '**not significant.**'

6.3 Traffic Emissions – Impacts on the Addlestone and Weybridge AQMAs

6.3.1 As set out in Section 3, the screening process highlighted that a full impact assessment was required, assessing the impacts on the Addlestone and Weybridge AQMAs due to the Proposed Development traffic flows (related to both Option A and Option B) exceeding the EPUK & IAQM (2017) criteria.

6.3.2 The impact assessment has been set out in Appendix B.

Significance of Impacts

6.3.3 As set out in Appendix B, the impacts on the relevant air quality monitoring receptors associated with the Proposed Development for both Option A and B are anticipated to be **negligible (adverse)** for NO_2, PM_{10} and $PM_{2.5}$ concentrations. The concentrations do not exceed the relevant national objectives as set out in Table 2.1. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the impacts on the Addlestone and Weybridge AQMAs can be considered '**not significant.**'

6.4 Plant Emissions

6.4.1 At this stage, it has not been possible to undertake a quantitative assessment of any operational plant, as it is unknown if any will be proposed.

7 Mitigation Measures

7.1 Construction

7.1.1 A construction dust assessment has been undertaken in Section 5 and the outcome of which has been utilised within this section to advise upon the adequate level of mitigation that will be required.

7.1.2 A range of measures are suggested, which could be utilised during the construction phases are set out below. These have been outlined in the IAQM (2016) document, and should be used to reduce the impacts of the construction phases on the local sensitive receptors.

7.1.3 Further general guidance on potential mitigation measures can be found in Appendix E.

Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- 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;
- Avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- Bag and remove any biological debris or damp down such material before demolition.

Earthworks

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

Construction

- Avoid scabbling (roughening of concrete surfaces) if possible;
- 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;
- 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; and
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Trackout

- 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;

- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Record all inspections of haul routes and any subsequent action in a site logbook; and
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

7.2 Operational

Operational Mitigation

7.2.1 The results of the AQA demonstrated that the air quality concentrations at existing residential receptors in 2027 are predicted to be compliant with the relevant annual mean objectives for NO_2 (40 µg/m^3), PM_{10} (40 µg/m^3) and $PM_{2.5}$ (20 µg/m^3).

7.2.2 It should be noted that the Proposed Development is anticipated to be having a **negligible (adverse)** impact for NO_2 , PM_{10} and $PM_{2.5}$ at all receptors for both of the traffic options set out in Section 6. The impacts on the modelled receptors are considered '**not significant'** as set out previously. Any mitigation measures to aid in reducing impacts should be proportionate to the impact of the Proposed Development. This is highlighted in the EPUK & IAQM (2017) guidance, which reiterates the PPG, stating:

> *"Mitigation options where necessary, will depend on the Proposed Development and should be proportionate to the likely impact"*

7.2.3 On the basis the impacts are considered to be '**not significant**' specific measures are not considered necessary.

7.2.4 Nevertheless, the following mitigation measures will be provided to aid in reducing the air quality impacts as a result of the Proposed Development:

- Cycle parking will be provided to meet the minimum requirements in local policy;
- EV charging points will be provided on the basis of 10% active and 10% passive; and
- A Travel Plan

8 Summary & Conclusions

8.1 Baseline

8.1.1 The Application Site is situated between Addlestone and Weybridge, off the A317 Weybridge Road, Surrey. The Application Site is not situated with or adjacent to an AQMA, however traffic generated by the Proposed Development will pass through both the Addlestone AQMA and the Weybridge AQMA.

8.1.2 Air quality monitoring carried out close to the Application Site shows a mixture of compliance and non-compliance with the NO_2 annual mean objective. Where non-compliance is concerned, it is mostly concentrated within the AQMAs identified in Section 4. Where automatic monitoring has been carried out within the Weybridge AQMA, the NO_2 1-hour mean objective was not exceeded in any year.

8.1.3 The modelled baseline concentration at the specified receptor locations, identified in Section 3, illustrate that concentrations show compliance with the relevant NO_2 PM_{10} and $PM_{2.5}$ objectives set out in Table 2.1.

8.1.4 The DEFRA background concentrations set out in Table 4.4 show compliance with the NO_2, PM_{10} and $PM_{2.5}$ annual mean objectives

8.2 Construction Phase

8.2.1 A construction dust assessment has been undertaken for the construction phase associated with the Proposed Development, in accordance with IAQM (2016) guidance, as set out in Appendix A.

8.2.2 Following the successful implementation of the suggested mitigation measures, the residual effects of construction dust and emissions from construction activities upon the local area and sensitive receptors, although adverse, will be temporary and '**not significant**.'

8.3 Operational Phase

8.3.1 The air quality modelling exercise indicates that the Proposed Development will result in a **negligible (adverse)** impact on baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations at the specified receptor locations for both traffic scenarios, with concentrations remaining within the relevant objectives as set out in Table 2.1. Therefore, in line with the EPUK & IAQM (2017) guidance and professional judgement, the impacts associated with the development on the modelled human receptor location, are '**not significant**'.

8.3.2 Furthermore, the Proposed Development will result in a **negligible (adverse)** impact on baseline NO_2, PM_{10} and $PM_{2.5}$ concentrations at the relevant local authority monitoring locations for both traffic scenarios, with concentrations remaining within the relevant objectives as set out in Table 2.1. Therefore, in line with the EPUK & IAQM (2017) guidance and professional judgement, the impacts on the Addlestone and Weybridge AQMAs associated with the development on the modelled local authority monitoring locations, are '**not significant**'.

8.3.3 Notwithstanding this, specific mitigation has been outlined in Section 7.

8.3.4 The Proposed Development is therefore expected to comply with all relevant national and local air quality policy.

APPENDICES

Appendix A – Construction Dust Risk Assessment Methodology

The effects associated with the site preparation, earthworks and construction phase of the Proposed Development have been determined qualitatively using criteria provided in the IAQM (2016) guidance and professional judgement.

The significance of effects associated with the site preparation, earthworks and construction phase of the Proposed Development has been determined qualitatively and involved the following tasks:

- Evaluation of the proposed Site layout, to evaluate size of the Site and possible site construction activities that could generate dust and PM_{10}, their likely location and duration. No information on the precise construction plan was available at the time of undertaking the current assessment and hence assumptions were made;
- Collection and appraisal of meteorological data related to wind speed, direction and frequency, and precipitation for the local and wider area;
- Identification of any natural shelters, such as trees, likely to reduce the risk of wind-blown dust;
- In the case of PM_{10}, mapping of local background concentrations;
- Assessing the potential distance which the construction traffic will travel across unpaved roads on the construction Site, prior to accessing the local road network (referred to as 'trackout');
- Identification of the location and type of sensitive receptors within 350m of the boundary of the Site and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the Site entrance(s) (at-risk receptors);
- Indication of the number of receptors and sensitivity types at different distances from the Site boundary (or dust generating activities wherever known);
- Assessment of the risk of dust and PM_{10} effects arising using three risk categories: low risk, medium risk, and high risk. The Site was allocated to a risk category based on two factors:
  - The scale and nature of the works, which determined the magnitude of potential dust emissions classed as: small, medium or large; and
  - The type and proximity of receptors, considered separately for human and ecological receptors, which determined the sensitivity of the area.

The criteria developed by IAQM is divides the activities on construction sites into four different types to assess their different level of impacts upon receptors. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

The assessment procedure includes four steps summarised below:

STEP 1 - SCREENING THE NEED FOR A FULL ASSESSMENT

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

Should this criterion not be met it can be concluded that the level of risk upon receptors is negligible and there the effects are not significant, and therefore no mitigation measures will be required.

STEP 2 - ASSESS THE RISK OF DUST ARISING

The Site is given a risk classification based upon the following two factors:

- The scale and nature of the construction works, to provide the potential dust emission magnitude (Step 2A); and
- The sensitivity of the area / receptors to the dust impacts (Step 2B).

These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

STEP 2A - DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The dust magnitude is categorised by the following:

- Small;
- Medium; or
- Large.

The IAQM provide a brief description upon what could apply for each classification (as set out in Table A1) and should be based upon professional judgement.

Table A1: Dust Magnitude Classification

Magnitude Class	Classification Description
	Demolition
Large	Total building volume >50,000 m^3, potentially dusty material, on-site crushing and screening, activities >20 m above ground level.
Medium	Total building volume 20,000-50,000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level.
Small	Total building volume <20,000 m^3, construction material with low potential for dust release, demolition activities <10 m above ground, works during wetter months.
	Earthworks
Large	Total site area over 10,000 m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved > 100,000 tonnes.
Medium	Total site area between 2,500 to 10,000 m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 - 8 m in height, total material moved 20,000 to 100,000 tonnes.
Small	Total site area less than 2,500 m^2. Soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 10,000 tonnes earthworks during winter months.
	Construction

Large	Total building volume over 100,000 m^3, activities include piling, on-site concrete batching, and sand blasting. Period of activities more than two years.
Medium	Total building volume between 25,000 and 100,000 m^3, use of construction materials with high potential for dust release (e.g. concrete), activities include piling, on-site concrete batching. Period of construction activities between one and two years.
Small	Total building volume below 25,000 m^3, use of construction materials with low potential for dust release (e.g. metal cladding or timber). Period of construction activities less than one year.
Trackout	
Large	> 50 HDV (>3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m. (Trackout may occur up to 500 m from the site entrance).
Medium	10-50 HDV (>3.5 t) outwards movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m. (Trackout may occur up to 200 m from the site entrance).
Small	<10HDV (>3,5 t) outward movements in any one day. (Trackout may occur up to 50 m from the site entrance).

STEP 2B - DEFINE THE SENSITIVITY OF THE AREA

The sensitivity of the area / receptor is defined by taking account of the following factors and the criteria set out in Tables(s) A2 to A5:

- The type of receptors in the area;
- The distance and number of receptors; and
- Background PM_{10} concentrations.

Table A2: Defining Receptor Sensitivity

Receptor Sensitivity	Human	Ecological
High	Very densely populated area, 10-100 dwellings within 20 m 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 20 m of site. Annual mean concentrations of PM_{10} below the national objective (> 28 µg/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 20 m of site. Annual mean concentrations well below the national objectives (<µg/m^3).	Locally designated site where the features may be affected by dust deposition.

	Low sensitivity receptors (e.g. public footpaths, playing fields, shopping streets).

Table A3: Sensitivity of the Area to Effects on People and Property from Dust Soiling

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	Low	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A4: Sensitivity of the Area to Human Health Effects

Receptor Sensitivity	Annual Mean PM$_{10}$	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	-	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A5: Sensitivity of the Area to Ecological Effects

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

STEP 2C – DEFINE THE RISK OF IMPACTS

The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts with no mitigation applied. The IAQM provides the matrix in Table A6 as a method of assigning the level of risk for each activity.

Table A6: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
	Demolition		
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
	Earthworks		
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
	Construction		
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
	Trackout		
High	High Risk	Medium Risk	Low Risk

Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

STEP 3 – INDENTIFY THE NEED FOR SITE SPECIFIC MITIGATION

From the identification of the risk of impacts with no mitigation, 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 could be utilised. Specific measures of which are included in Section 7 (and general mitigation measures are set out in Appendix E) of this report.

STEP 4 – DETERMINE SIGNIFICANT IMPACTS

The IAQM does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant.'

Appendix B – Local Authority Modelled Concentrations

Option A

The traffic data provided for this assessment has indicated that a proportion of the Proposed Development traffic will pass through the Addlestone and Weybridge AQMAs. As a result of this, the more stringent EPUK & IAQM (2017) criteria should be applied, which results in traffic associated with Option A exceeding the criteria in both AQMAs, and traffic associated with Option B exceeding the criteria with in the Addlestone AQMA. On this basis, an assessment on the impact of the Proposed Development on the monitored concentrations within these AQMAs has been assessed, and is set out below.

Addlestone AQMA

The traffic data suggests that the daily trips generated by the Proposed Development will exceed the criteria in Section 3 for LDV flows within an AQMA, therefore an assessment on the impacts of the Proposed Development on concentrations within the Addlestone AQMA has been assessed.

The '2027 Future Baseline' NO_2, PM_{10} and $PM_{2.5}$ concentrations at diffusion tube locations within the AQMA, as set out in Table 4.1 and illustrated in Figure 4.1, have been compared to the '2027 Future Baseline + Proposed Development' concentrations and the results are set out in Table B1, Table B2 and Table B3 below. The tables also set out the impact descriptor at each receptor location in line with the assessment matrix set out in Table 3.2.

Table B1: Predicted NO_2 Impacts at Specified Receptors

Calculated NO_2 Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
RY14	26.1	26.4	1%	Negligible
RY60	25.3	25.4	0%	Negligible
Note: **Bold** indicates exceedance of the NO_2 annual mean objective.				

Table B2: Predicted PM_{10} Impacts at Specified Receptors

Calculated PM_{10} Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
RY14	20.0	20.1	0%	Negligible
RY60	20.7	20.8	0%	Negligible
Note: **Bold** indicates exceedance of the PM_{10} annual mean objective.				

Table B3: Predicted $PM_{2.5}$ Impacts at Specified Receptors

Calculated $PM_{2.5}$ Annual Mean (µg/m^3)

Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
RY14	13.2	13.3	0%	Negligible
RY60	13.6	13.6	0%	Negligible
Note: **Bold** indicates exceedance of the $PM_{2.5}$ annual mean objective.				

NO_2

The modelled NO_2 concentrations in Table B1 show that NO_2 concentration at all specified diffusion tube locations, are predicted to be below the annual mean objective (40 μg/m^3).

Using the matrix in Table 3.2, it can be seen that the impacts associated with the Proposed Development are anticipated to be **negligible (adverse)** at all receptors.

Based on the annual average mean concentration at all reports being below 60 μg/m^3, it is unlikely that any receptor identified would experience an exceedance of the 1-hour mean objective.

PM_{10}

The modelled PM_{10} concentrations in Table B2 do not predict any exceedances of the annual mean objective (40 μg/m^3) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

For PM_{10}, the following equation can be used to derive the number of days that the 24-hour mean objective (50 μg/m^3) is likely to be exceeded.

$$No. 24\ hour\ exceedances = -18.5 + 0.00145 \times annual\ mean^3 + \left(\frac{206}{annual\ mean}\right)$$

There are limitations to this calculation, and this is set out in LAQM.TG(16), which states:

"The relationship does have limitations in so far that it should not be applied when the annual mean PM_{10} concentration is lower than 14.8 μg/m^3".

On the basis that all receptors are above 14.8 μg/m^3, concentrations can be used to inform whether the 24-hour mean objective will be exceeded or not. The highest concentration is predicted to be 20.8 μg/m^{3}at R60. Based on the formula above, this predicts 4.5 exceedance days, which is below the 35-days annual limit. It is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of PM_{10}.

$PM_{2.5}$

The modelled $PM_{2.5}$ concentrations for both options in Table B3 do not predict any exceedances of the Stage 2 Post 2020 annual mean objective (20 μg/m^3) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

Significance of Impacts

As set out above, the impacts on diffusion tube concentrations associated with the Proposed Development are anticipated to be **negligible (adverse)** for NO_2, PM_{10} and $PM_{2.5}$ concentrations. The concentrations do not exceed the relevant national objectives as set out in Table 2.1. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the impacts can be considered '**not significant.**'

Weybridge AQMA

The traffic data suggests that the daily trips generated by the Proposed Development will exceed the criteria in Section 3 for LDV flows within an AQMA, therefore an assessment on the impacts of the Proposed Development on concentrations within the Weybridge AQMA has been assessed.

The '2027 Future Baseline' NO_2, PM_{10} and $PM_{2.5}$ concentrations at diffusion tube locations within the AQMA, as set out in Table 4.2 and illustrated in Figure 4.2 and Figure 4.3, have been compared to the '2027 Future Baseline + Proposed Development' concentrations and the results are set out in Table B4, Table B5 and Table B6 below. The tables also set out the impact descriptor at each receptor location in line with the assessment matrix set out in Table 3.2.

Table B4: Predicted NO_2 Impacts at Specified Receptors

Calculated NO_2 Annual Mean ($\mu g/m^3$)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
WB7	26.1	26.3	0%	Negligible
WB5	22.4	22.5	0%	Negligible
WB6	23.7	23.8	0%	Negligible
WB10	25.7	25.8	0%	Negligible
WB11	25.7	25.8	0%	Negligible
WB12	25.7	25.8	0%	Negligible
WB13	24.2	24.3	0%	Negligible
WB14	24.2	24.3	0%	Negligible
WB15	24.2	24.3	0%	Negligible
WB1	22.8	22.9	0%	Negligible
WHS1	25.7	25.8	0%	Negligible
WHS2	24.2	24.3	0%	Negligible

Note: **Bold** indicates exceedance of the NO_2 annual mean objective.

Table B5: Predicted PM_{10} Impacts at Specified Receptors

Calculated PM_{10} Annual Mean (µg/m³)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
WB7	18.5	18.6	0%	Negligible
WB5	17.2	17.2	0%	Negligible
WB6	18.7	18.7	0%	Negligible
WB10	19.6	19.7	0%	Negligible
WB11	19.6	19.7	0%	Negligible
WB12	19.6	19.7	0%	Negligible
WB13	18.9	19.0	0%	Negligible
WB14	18.9	19.0	0%	Negligible
WB15	18.9	19.0	0%	Negligible
WB1	18.3	18.3	0%	Negligible
WHS1	19.6	19.7	0%	Negligible
WHS2	18.9	19.0	0%	Negligible

Note: **Bold** indicates exceedance of the PM_{10} annual mean objective.

Table B6: Predicted $PM_{2.5}$ Impacts at Specified Receptors

Calculated $PM_{2.5}$ Annual Mean (µg/m³)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
WB7	12.4	12.4	0%	Negligible
WB5	11.6	11.6	0%	Negligible
WB6	12.4	12.4	0%	Negligible
WB10	12.9	13.0	0%	Negligible
WB11	12.9	13.0	0%	Negligible
WB12	12.9	13.0	0%	Negligible
WB13	12.5	12.6	0%	Negligible

WB14	12.5	12.6	0%	Negligible
WB15	12.5	12.6	0%	Negligible
WB1	12.2	12.2	0%	Negligible
WHS1	12.9	13.0	0%	Negligible
WHS2	12.5	12.6	0%	Negligible

Note: **Bold** indicates exceedance of the $PM_{2.5}$ annual mean objective.

NO_2

The modelled NO_2 concentrations in Table B4 show that NO_2 concentration at all specified diffusion tube locations, are predicted to be below the annual mean objective (40 µg/m^3).

Using the matrix in Table 3.2, it can be seen that the impacts associated with the Proposed Development are anticipated to be **negligible (adverse)** at all receptors.

Based on the annual average mean concentration at all reports being below 60 µg/m^3, it is unlikely that any receptor identified would experience an exceedance of the 1-hour mean objective.

PM_{10}

The modelled PM_{10} concentrations in Table B5 do not predict any exceedances of the annual mean objective (40 µg/m^3) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

For PM_{10}, the following equation can be used to derive the number of days that the 24-hour mean objective (50 µg/m^3) is likely to be exceeded.

$$No.24\ hour\ exceedances = -18.5 + 0.00145 \times annual\ mean^3 + \left(\frac{206}{annual\ mean}\right)$$

There are limitations to this calculation, and this is set out in LAQM.TG(16), which states:

"The relationship does have limitations in so far that it should not be applied when the annual mean PM_{10} concentration is lower than 14.8 µg/m^3".

On the basis that all receptors are above 14.8 µg/m^3, concentrations can be used to inform whether the 24-hour mean objective will be exceeded or not. The highest concentration is predicted to be 19.7 µg/m^{3}at WB10/WB11/WB12 (triplicate site) and WHS1. Based on the formula above, this predicts 3.1 exceedance days, which is below the 35-days annual limit. It is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of PM_{10}.

$PM_{2.5}$

The modelled $PM_{2.5}$ concentrations for both options in Table B6 do not predict any exceedances of the Stage 2 Post 2020 annual mean objective (20 µg/m^3) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

Significance of Impacts

As set out above, the impacts on diffusion tube concentrations associated with the Proposed Development are anticipated to be **negligible (adverse)** for NO_2, PM_{10} and $PM_{2.5}$ concentrations. The concentrations do not exceed the relevant national objectives as set out in Table 2.1. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the impacts can be considered '**not significant.**'

Traffic Scenario - Option B

Addlestone AQMA

The traffic data suggests that the daily trips generated by the Proposed Development will exceed the criteria in Section 3 for both LDV and HDV flows within an AQMA, therefore an assessment on the impacts of the Proposed Development on concentrations within the Addlestone AQMA has been assessed.

The '2027 Future Baseline' NO_2, PM_{10} and $PM_{2.5}$ concentrations at diffusion tube locations within the AQMA, as set out in Table 4.1 and illustrated in Figure 4.1, have been compared to the '2027 Future Baseline + Proposed Development' concentrations and the results are set out in Table B7, Table B8 and Table B9 below. The tables also set out the impact descriptor at each receptor location in line with the assessment matrix set out in Table 3.2.

Table B7: Predicted NO_2 Impacts at Specified Receptors

Calculated NO_2 Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
RY14	26.1	26.3	1%	Negligible
RY60	25.3	25.4	0%	Negligible

Note: **Bold** indicates exceedance of the NO_2 annual mean objective.

Table B8: Predicted PM_{10} Impacts at Specified Receptors

Calculated PM_{10} Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
RY14	20.0	20.1	0%	Negligible
RY60	20.7	20.8	0%	Negligible

Note: **Bold** indicates exceedance of the PM_{10} annual mean objective.

Table B9: Predicted $PM_{2.5}$ Impacts at Specified Receptors

Calculated $PM_{2.5}$ Annual Mean (µg/m^3)				
Receptor	2027 Baseline	2027 Baseline + Proposed Development	% Change of Objective	Impact Descriptor
RY14	13.2	13.2	0%	Negligible
RY60	13.6	13.6	0%	Negligible

Note: **Bold** indicates exceedance of the $PM_{2.5}$ annual mean objective.

NO_2

The modelled NO_2 concentrations in Table B7 show that NO_2 concentration at all specified diffusion tube locations, are predicted to be below the annual mean objective (40 µg/m^3).

Using the matrix in Table 3.2, it can be seen that the impacts associated with the Proposed Development are anticipated to be **negligible (adverse)** at all receptors.

Based on the annual average mean concentration at all reports being below 60 µg/m^3, it is unlikely that any receptor identified would experience an exceedance of the 1-hour mean objective.

PM_{10}

The modelled PM_{10} concentrations in Table B8 do not predict any exceedances of the annual mean objective (40 µg/m^3) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

For PM_{10}, the following equation can be used to derive the number of days that the 24-hour mean objective (50 µg/m^3) is likely to be exceeded.

$$No. 24\ hour\ exceedances = -18.5 + 0.00145 \times annual\ mean^3 + \left(\frac{206}{annual\ mean}\right)$$

There are limitations to this calculation, and this is set out in LAQM.TG(16), which states:

"The relationship does have limitations in so far that it should not be applied when the annual mean PM_{10} concentration is lower than 14.8 µg/m^3".

On the basis that all receptors are above 14.8 µg/m^3, concentrations can be used to inform whether the 24-hour mean objective will be exceeded or not. The highest concentration is predicted to be 20.8 µg/m^{3}at R60. Based on the formula above, this predicts 4.5 exceedance days, which is below the 35-days annual limit. It is therefore thought that none of the receptors would be exposed to any material impact from the short-term concentrations of PM_{10}.

$PM_{2.5}$

The modelled $PM_{2.5}$ concentrations for both options in Table B9 do not predict any exceedances of the Stage 2 Post 2020 annual mean objective (20 µg/m^3) at any of the specified receptor locations. Using the matrix in Table 3.2, it can be seen that the impacts are anticipated to be **negligible (adverse)**.

Significance of Impacts

As set out above, the impacts on diffusion tube concentrations associated with the Proposed Development are anticipated to be **negligible (adverse)** for NO_2, PM_{10} and $PM_{2.5}$ concentrations. The concentrations do not exceed the relevant national objectives as set out in Table 2.1. Based on this, and in accordance with the IAQM (2017) guidance and professional judgement, the impacts can be considered '**not significant.**'

Appendix C – Traffic Flows

Verification

Table C.1 – 2019 Verification Traffic Flows

Link	Speed (Kph)	2019 Traffic Flows		
		Total Vehicles	HGV	HGV%
Station Road	48	10878	219	2%
A318	48	20509	318	2%
High Street	48	15732	316	2%
Church Road	48	7652	45	1%

Traffic Scenarios

Table C.2 – 2027 Future Baseline Scenario Traffic Flows

Link	Speed (Kph)	2027 Traffic Flows		
		Total Vehicles	HGV	HGV%
Site Access (Northern site)	32	0	0	0%
Site Access (Southern Site)	32	0	0	0%
Addlestone Road (east of site accesses)	48	2406	33	1%
Addlestone Road (west of site accesses)	48	2406	170	7%
Hamm Moor Lane	48	4464	170	4%
Dashwood Lang Road	32	543	27	5%
Link Road (two way)	48	5182	105	2%
A317 Weybridge Rd (east of Link Rd)	64	24516	682	3%
Link Road (southbound)	48	3704	61	2%
A317 Weybridge Rd (between Link Rd and Link Rd)	64	28669	1071	4%
Link Road (northbound)	48	2332	79	3%
A317 Weybridge Rd (west of Link Rd)	64	28669	1071	4%
Station Road	48	12112	244	2%
Woburn Hill	64	25121	717	3%
A318	48	22164	344	2%
High Street	48	16882	339	2%
Church Road	48	8270	49	1%

Option A

Table C.3 – 2027 Future Baseline + Proposed Development Scenario Traffic Flows

Link	Speed (Kph)	2027 Traffic Flows		
		Total Vehicles	HGV	HGV%
Site Access (Northern site)	32	183	10	5%
Site Access (Southern Site)	32	883	48	5%
Addlestone Road (east of site accesses)	48	2427	34	1%
Addlestone Road (west of site accesses)	48	3451	226	7%
Hamm Moor Lane	48	4464	170	4%
Dashwood Lang Road	32	543	27	5%
Link Road (two way)	48	6227	161	3%
A317 Weybridge Rd (east of Link Rd)	64	24687	691	3%
Link Road (southbound)	48	4239	90	2%
A317 Weybridge Rd (between Link Rd and Link Rd)	64	29627	1127	4%
Link Road (northbound)	48	2815	106	4%
A317 Weybridge Rd (west of Link Rd)	64	29627	1127	4%
Station Road	48	12548	267	2%
Woburn Hill	64	25558	740	3%
A318	48	22601	367	2%
High Street	48	17053	348	2%
Church Road	48	8706	72	1%

Option B

Table C.4 – 2027 Future Baseline + Proposed Development Scenario Traffic Flows

Link	Speed (Kph)	2027 Traffic Flows		
		Total Vehicles	HGV	HGV%
Site Access (Northern site)	32	183	58	31%
Site Access (Southern Site)	32	236	84	36%
Addlestone Road (east of site accesses)	48	2414	36	1%
Addlestone Road (west of site accesses)	48	2817	308	11%
Hamm Moor Lane	48	4464	170	4%

Dashwood Lang Road	32	543	27	5%
Link Road (two way)	48	5592	243	4%
A317 Weybridge Rd (east of Link Rd)	64	24583	704	3%
Link Road (southbound)	48	3911	131	3%
A317 Weybridge Rd (between Link Rd and Link Rd)	64	29325	1198	4%
Link Road (northbound)	48	2815	106	4%
A317 Weybridge Rd (west of Link Rd)	64	29325	1198	4%
Station Road	48	12283	301	2%
Woburn Hill	64	25293	774	3%
A318	48	22336	401	2%
High Street	48	16949	362	2%
Church Road	48	8441	106	1%

Appendix D – Verification

Model verification studies are undertaken in order to check the performance of dispersion models and, where modelled concentrations are significantly different to monitored concentrations, a factor can be established by which the modelled results can be adjusted in order to improve their reliability. The model verification process is detailed in LAQM.TG(16).

According to TG(16), no adjustment factor is necessary where the results of the model all lie within 25% of the monitored concentrations, but ideally within 10%.

Model verification can only be undertaken where there is sufficient roadside monitoring data in the vicinity of the subject development being assessed. TG(16) recommends that a combination of automatic and diffusion tube monitoring data is used; although this may be limited by data availability. For this assessment, three separate verifications have been carried out based on the location of the modelled location. The first verification has been carried out to adjust concentrations on modelled human receptors that are not located within an AQMA. The second and third verification processes have been carried out on monitoring locations within the Addlestone and Weybridge AQMAs, so the impact of the Proposed Development on these monitoring locations can be assessed.

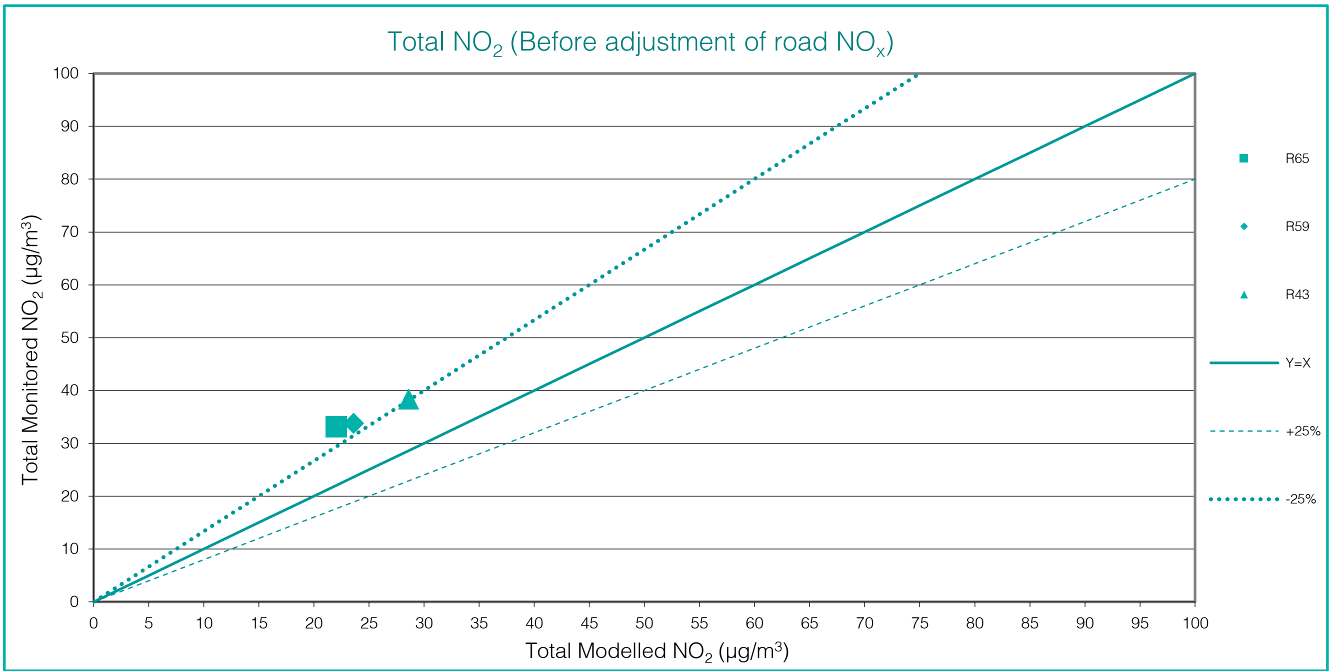
Verification A.

Two monitoring stations are located along Chertsey Road and along Station Road in Addlestone have been used to derive a verification factor. Table D.1 compares the monitored and modelled NO_2 concentrations at the monitoring location.

Table D.1: Comparison of Monitored and Modelled NO_2 Concentrations

Site ID	Type	Concentrations (µg/m^3)		
		Monitored	Modelled	% Difference
R43	Diffusion Tube	33.2	22.03	-33.6
R59	Diffusion Tube	33.8	23.6	-30.2
R55	Diffusion Tube	38.4	28.61	-25.5

Figure D.1: Comparison of Monitored and Modelled NO_2 Concentrations Before Adjustment



The data in Table D.1 shows that the model is under-predicting NO_2 concentrations. This is not unusual and is likely to be the result of local dispersion conditions.

As the difference for all of the sites is greater than +/- 10%, an adjustment factor has been derived to ensure a conservative assessment is undertaken.

As it is primary NO_x rather than secondary NO_2 emissions that are modelled, an adjustment factor must be derived for the road contribution of NO_x. A ratio of the modelled versus monitored NO_x concentrations using the least squares statistical method has been undertaken to derive an adjustment factor, as set out in Table D.2.

Table D.2: Deriving the Adjustment Factor

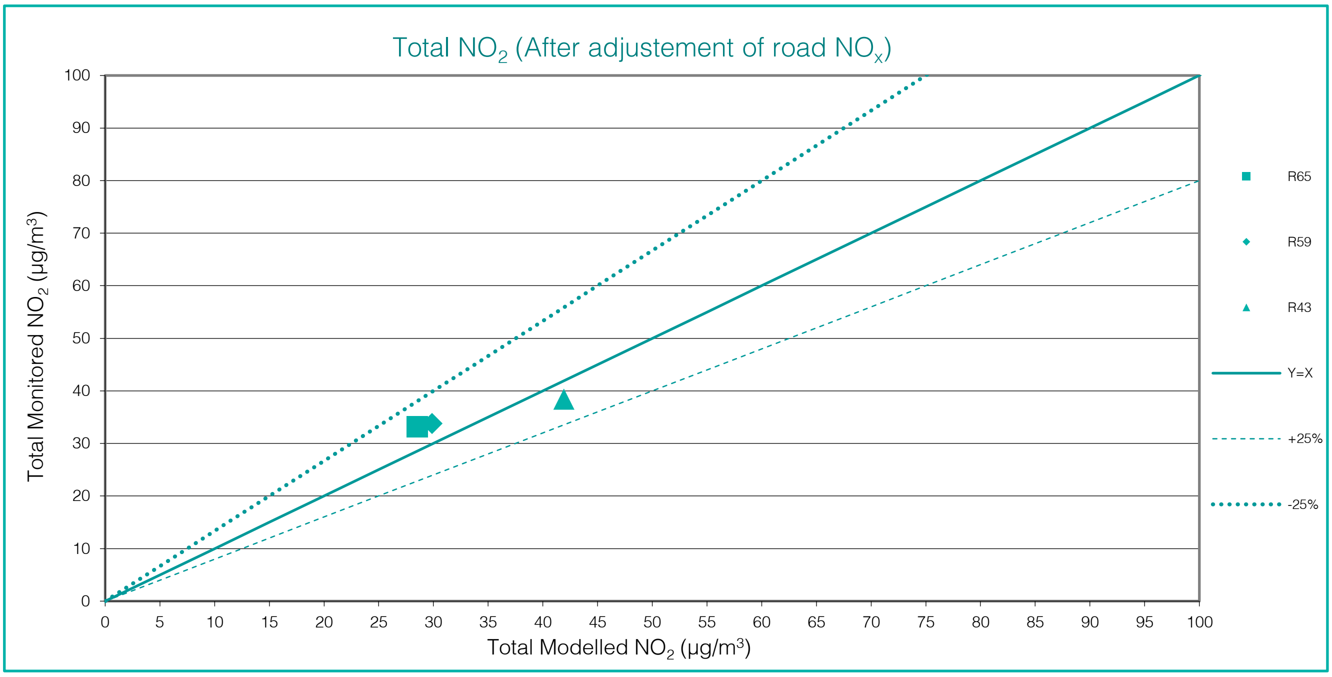
Site	Monitored Road NO_x (µg/m^3)	Modelled Road NO_x (µg/m^3)	Ratio
R43	30.47	7.85	2.639
R59	28.29	7.61	
R55	38.29	17.52	

Table D.3 compares monitored and modelled NO_2 concentrations at the monitoring location after the adjustment factor has been applied.

Table D.3: Comparison of Monitored and Adjusted Modelled NO_2 Concentrations

Site ID	Type	Concentrations (µg/m^3)		
		Monitored	Modelled	% Difference
R43	Diffusion Tube	33.2	28.52	-14.1
R59	Diffusion Tube	33.8	29.86	-11.7
R55	Diffusion Tube	38.4	41.92	9.2

Figure D.2: Comparison of Monitored and Modelled NO_2 Concentrations After Adjustment



The data in Table D.3 shows that one NO_2 concentrations in the model are now within 10% of the monitored concentration, with all now within 25%, indicating that the model is performing acceptably.

A Root Mean Square Error (RMSE) has been calculated in Table D.4 to determine the error within the calculations after Road-NO_x adjustment, based upon the following calculation:

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(Obs_i - Pred_i)^2}$$

Table D.4: Root Mean Squared Error

Site	Observations	Predictions	Difference
R65	33.2	28.5	-4.7
R59	33.8	29.9	-3.9
R43	38.4	41.9	3.5
		RMSE:	4.1

The calculated RMSE is 4.1 µg/m³, which correlates to a 10.2% error ratio. The RMSE means that modelled results could be under or over predicting pollution concentrations between +/- 4.1 µg/m³. The RMSE means that modelled results are acceptable, as they are close to the ideal 10% margin of error, but within the 25% margin of error (as advised in TG(16)).

As there are no appropriate PM_{10} or $PM_{2.5}$ monitoring locations within the study area, the predicted road-PM_{10} and road-$PM_{2.5}$ components have been adjusted using the road EFT NO_x factor before adding the appropriate background concentration.

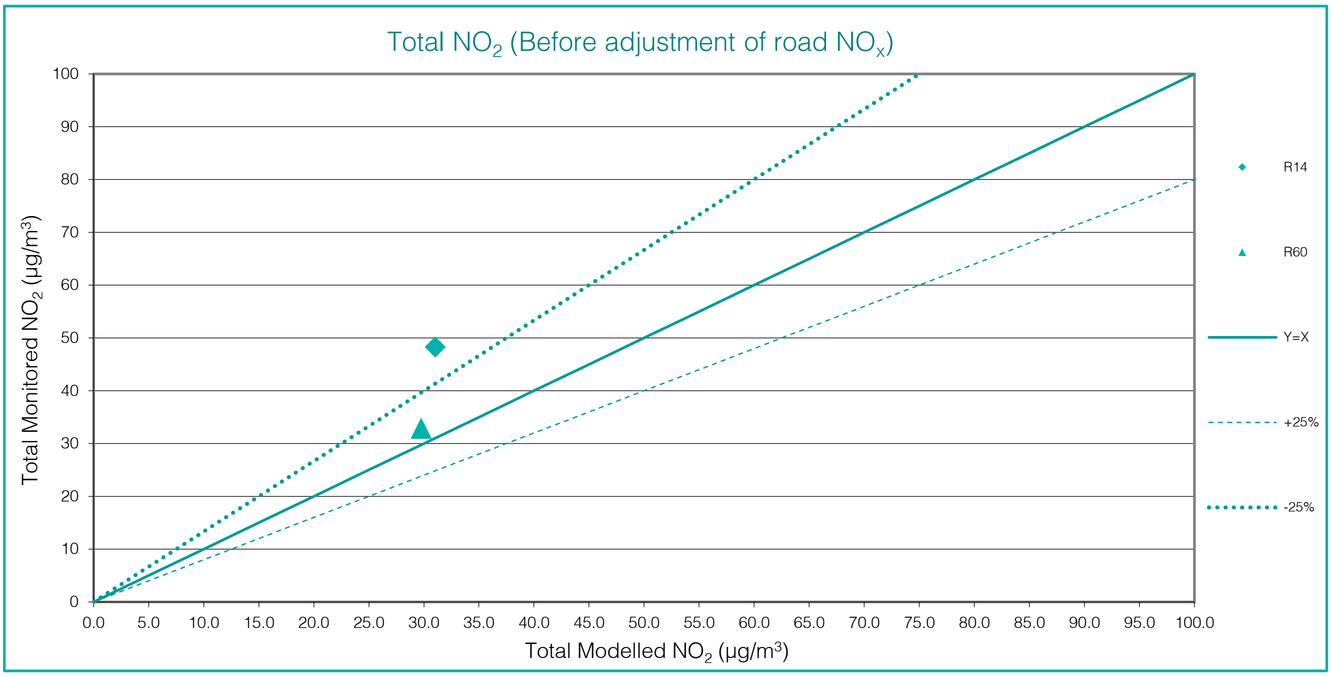
Verification B

Three monitoring stations located within the Addlestone AQMA, located along Chertsey Road in Addlestone have been used to derive a verification factor. Table D.5 compares the monitored and modelled NO_2 concentrations at the monitoring location.

Table D.5: Comparison of Monitored and Modelled NO_2 Concentrations

Site ID	Type	Concentrations (µg/m³)		
		Monitored	Modelled	% Difference
RY14	Diffusion Tube	48.3	32.2	-35.8
RY60	Diffusion Tube	32.9	29.8	-9.5

Figure D.3: Comparison of Monitored and Modelled NO_2 Concentrations Before Adjustment



The data in Table D.5 shows that the model is under-predicting NO_2 concentrations. This is not unusual and is likely to be the result of local dispersion conditions.

As the difference for all but one of the sites is greater than +/- 10%, an adjustment factor has been derived to ensure a conservative assessment is undertaken.

As it is primary NO_x rather than secondary NO_2 emissions that are modelled, an adjustment factor must be derived for the road contribution of NO_x. A ratio of the modelled versus monitored NO_x concentrations using the least squares statistical method has been undertaken to derive an adjustment factor, as set out in Table D.6.

Table D.6: Deriving the Adjustment Factor

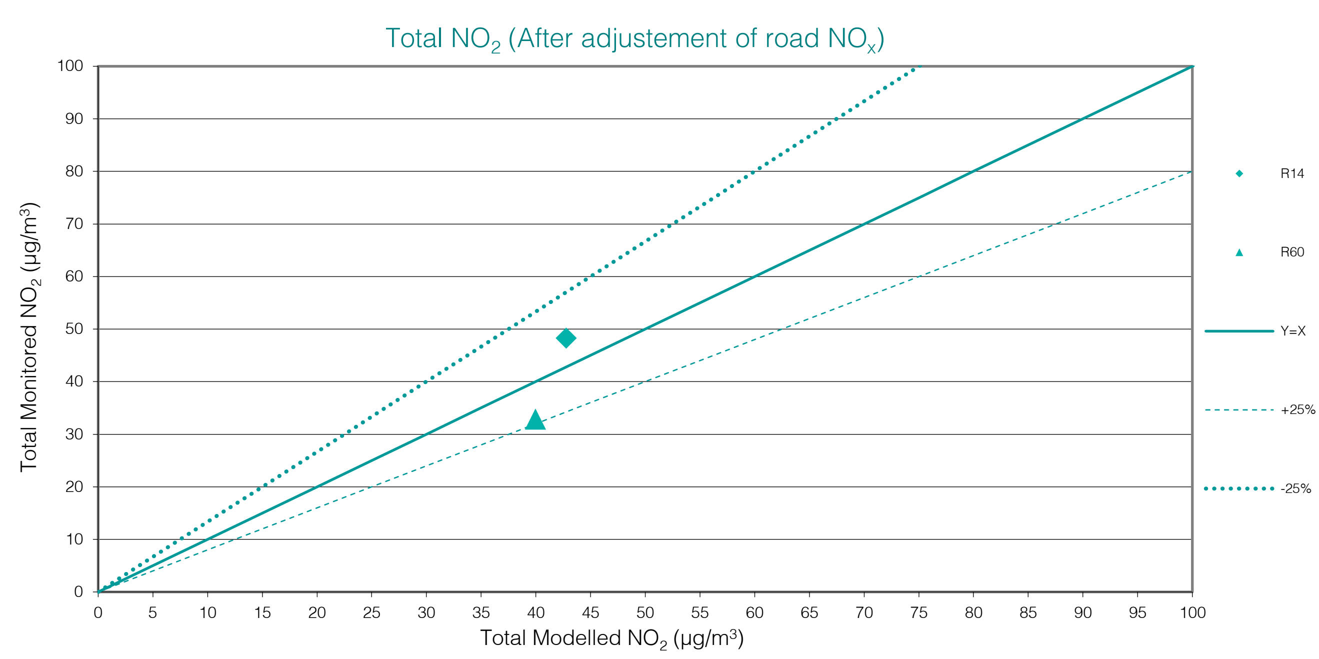
Site	Monitored Road NO_x (µg/m³)	Modelled Road NO_x (µg/m³)	Ratio
RY14	55.77	17.37	2.462
RY60	21.26	14.80	

Table D.7 compares monitored and modelled NO_2 concentrations at the monitoring location after the adjustment factor has been applied.

Table D.7: Comparison of Monitored and Adjusted Modelled NO_2 Concentrations

Site ID	Type	Concentrations (µg/m³)		
		Monitored	Modelled	% Difference
RY14	Diffusion Tube	48.3	42.8	-11.4
RY60	Diffusion Tube	32.9	40.0	21.5

Figure D.4: Comparison of Monitored and Modelled NO_2 Concentrations After Adjustment



The data in Table D.7 shows that although the NO_2 concentrations in the model are not within 10% of the monitored concentration, they are with all now within 25%, indicating that the model is performing acceptably.

A Root Mean Square Error (RMSE) has been calculated in Table D.8 to determine the error within the calculations after Road-NO_x adjustment, based upon the following calculation:

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(Obs_i - Pred_i)^2}$$

Table D.8: Root Mean Squared Error

Site	Observations	Predictions	Difference
R14	48.3	42.8	-5.5
R60	32.9	40.0	7.1
		RMSE:	6.3

The calculated RMSE is 6.3 µg/m^3, which correlates to a 15.9% error ratio. The RMSE means that modelled results could be under or over predicting pollution concentrations between +/- 6.3 µg/m^3. The RMSE means that modelled results are acceptable, as they are close to the ideal 10% margin of error, but within the 25% margin of error (as advised in TG(16)).

As there are no appropriate PM_{10} or $PM_{2.5}$ monitoring locations within the study area, the predicted road-PM_{10} and road-$PM_{2.5}$ components have been adjusted using the road EFT NO_x factor before adding the appropriate background concentration.

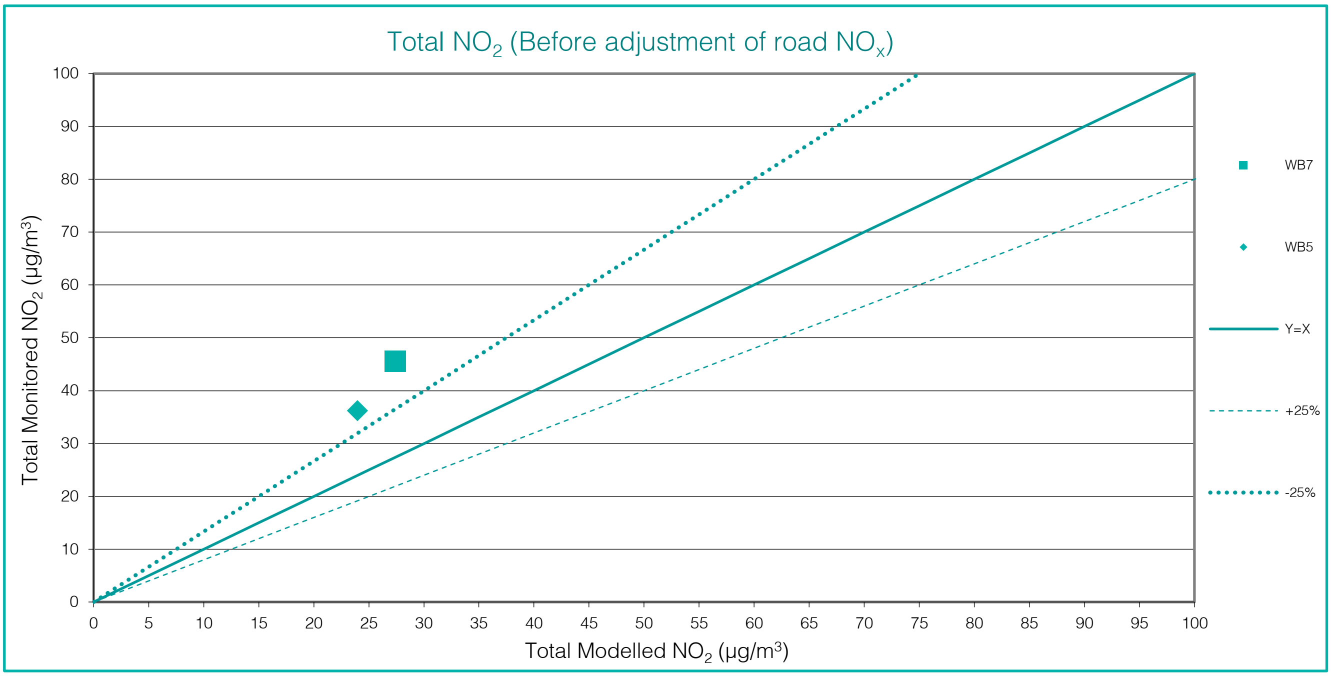
Verification C

Two monitoring stations located within the Weybridge AQMA, located along High Street in Weybridge have been used to derive a verification factor. Table D.9 compares the monitored and modelled NO_2 concentrations at the monitoring location.

Table D.9: Comparison of Monitored and Modelled NO_2 Concentrations

Site ID	Type	Concentrations (µg/m³)		
		Monitored	Modelled	% Difference
WB7	Diffusion Tube	45.6	27.41	-39.9
WB5	Diffusion Tube	36.2	23.97	-33.8

Figure D.5: Comparison of Monitored and Modelled NO_2 Concentrations Before Adjustment



The data in Table D.9 shows that the model is under-predicting NO_2 concentrations. This is not unusual and is likely to be the result of local dispersion conditions.

As the difference for all of the sites is greater than +/- 10%, an adjustment factor has been derived to ensure a conservative assessment is undertaken.

As it is primary NO_x rather than secondary NO_2 emissions that are modelled, an adjustment factor must be derived for the road contribution of NO_x. A ratio of the modelled versus monitored NO_x concentrations using the least squares statistical method has been undertaken to derive an adjustment factor, as set out in Table D.10.

Table D.10: Deriving the Adjustment Factor

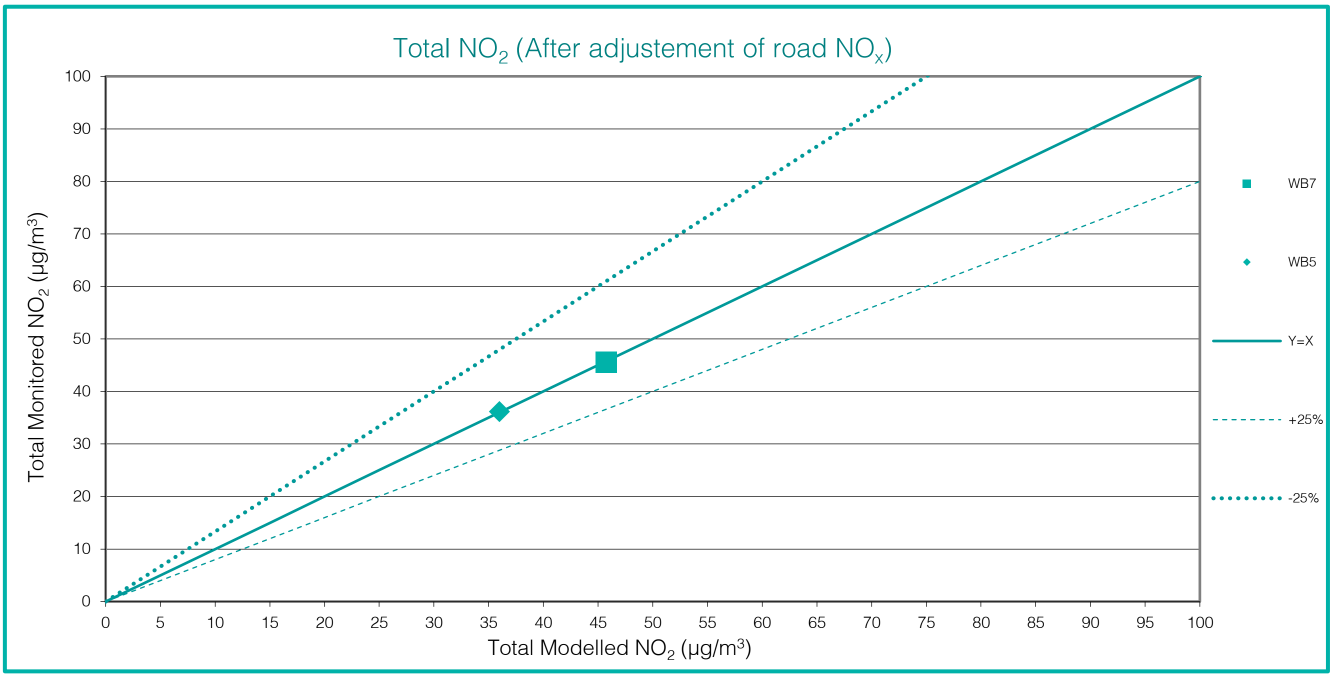
Site	Monitored Road NO_x (µg/m³)	Modelled Road NO_x (µg/m³)	Ratio
WB7	57.80	17.87	3.250
WB5	36.31	11.03	

Table D.11 compares monitored and modelled NO_2 concentrations at the monitoring location after the adjustment factor has been applied.

Table D.11: Comparison of Monitored and Adjusted Modelled NO_2 Concentrations

Site ID	Type	Concentrations (μg/m³)		
		Monitored	Modelled	% Difference
WB7	Diffusion Tube	45.6	45.7	0.3
WB5	Diffusion Tube	36.2	36.0	-0.6

Figure D.6: Comparison of Monitored and Modelled NO_2 Concentrations After Adjustment



The data in Table D.11 shows that all modelled NO_2 concentrations in the model are now within 10% of the monitored concentration, indicating that the model is performing acceptably.

A Root Mean Square Error (RMSE) has been calculated in Table D.12 to determine the error within the calculations after Road-NO_x adjustment, based upon the following calculation:

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(Obs_i - Pred_i)^2}$$

Table D.12: Root Mean Squared Error

Site	Observations	Predictions	Difference
WB7	45.6	45.7	0.1
WB5	36.2	36.0	-0.2
		RMSE:	0.2

The calculated RMSE is 0.2 µg/m^3, which correlates to a 0.4% error ratio. The RMSE means that modelled results could be under or over predicting pollution concentrations between +/- 0.2 µg/m^3. The RMSE means that modelled results are acceptable, as they are within the ideal 10% margin of error (as advised in TG(16)).

As there are no appropriate PM_{10} or $PM_{2.5}$ monitoring locations within the study area, the predicted road-PM_{10} and road-$PM_{2.5}$ components have been adjusted using the road EFT NO_x factor before adding the appropriate background concentration.

Appendix E – General Construction Mitigation Measures

The following highly recommended and desirable best practice measures have been taken from the IAQM (2016) *Guidance on the Assessment of Dust from Demolition and Construction* document. Developers should implement the appropriate dust and pollution control measures set out below to ensure the air quality impacts of construction and demolition are minimised and any mitigation measures employed are effective.

These will need to be written into a dust management plan (DMP), which should be approved by the local planning authority prior to commencement of work on site. For major sites, the DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan, and compliance monitoring may be required.

The following measures are based on 'Medium Risk' sites, which has been determined in the Construction Dust Impact Assessment section.

COMMUNICATIONS

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;
- Display the head or regional office contact information; and
- 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, real time PM_{10} continuous monitoring and/or visual inspections.

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;
- Make the complaints log available to the local authority when asked; and
- 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.

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;
- 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;
- 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; and
- 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.

PREPARING AND MAINTAING THE SITE

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- 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 ensure they are kept covered; and
- Cover, seed or fence stockpiles to prevent wind whipping.

OPERATING VEHICLE/MACHINERY AND SUSTAINABLE TRAVEL

- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- 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);
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

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;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- 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.

WASTE MANAGEMENT

- Avoid bonfires and burning of waste materials.

Birmingham
0121 389 1472

London
0203 968 9817

info@airandacoustics.co.uk
airandacoustics.co.uk