GLEESON LAND

PROPOSED RESIDENTIAL DEVELOPMENT

LAND EAST OF KNOWLE LANE, CRANLEIGH

AIR QUALITY ASSESSMENT

JANUARY 2023

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Gleeson Land
Proposed Residential Development
Land East of Knowle Lane, Cranleigh
Air Quality Assessment

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1 Introduction

1.1 Mayer Brown Limited has been instructed by Gleeson Land to undertake an Air Quality Assessment (AQA) in support of the planning application for the provision of 162-new residential dwellings at Land East of Knowle Lane, Cranleigh.

1.2 The proposed development site is within the jurisdiction of Waverley Borough Council (WBC) and located adjacent to the south-eastern portion of the village of Cranleigh – approximately 1km from its centre. It is centred around Coldharbour Farm, surrounding the farm to the north and south, with access gained from Knowle Lane to the west.

1.3 The location of the proposed development site in relation to the Local Highway Network is illustrated in **Figure 1.1** below.

Figure 1.1: Site Location in relation to Local Highway Network

1.4 The site comprises several parcels of undeveloped land.

1.5 The surrounding area comprises a mix of character, largely due to the divide between Cranleigh and the countryside. To the north is the village of Cranleigh, hosting the majority of nearby services. To the east, the majority of Cranleigh's residential area is located, separated by a row of trees. To the south and west and beyond is countryside.

1.6 The western boundary of the site abuts Knowle Lane, which provides the main access to Cranleigh and its centre. To the south, Knowle Lane links the site to the villages of Alford and Rudgwick, and further beyond to Broadbridge Heath and Horsham.

1.7 The existing site layout and red line boundary are illustrated in **Figure 1.2** below.

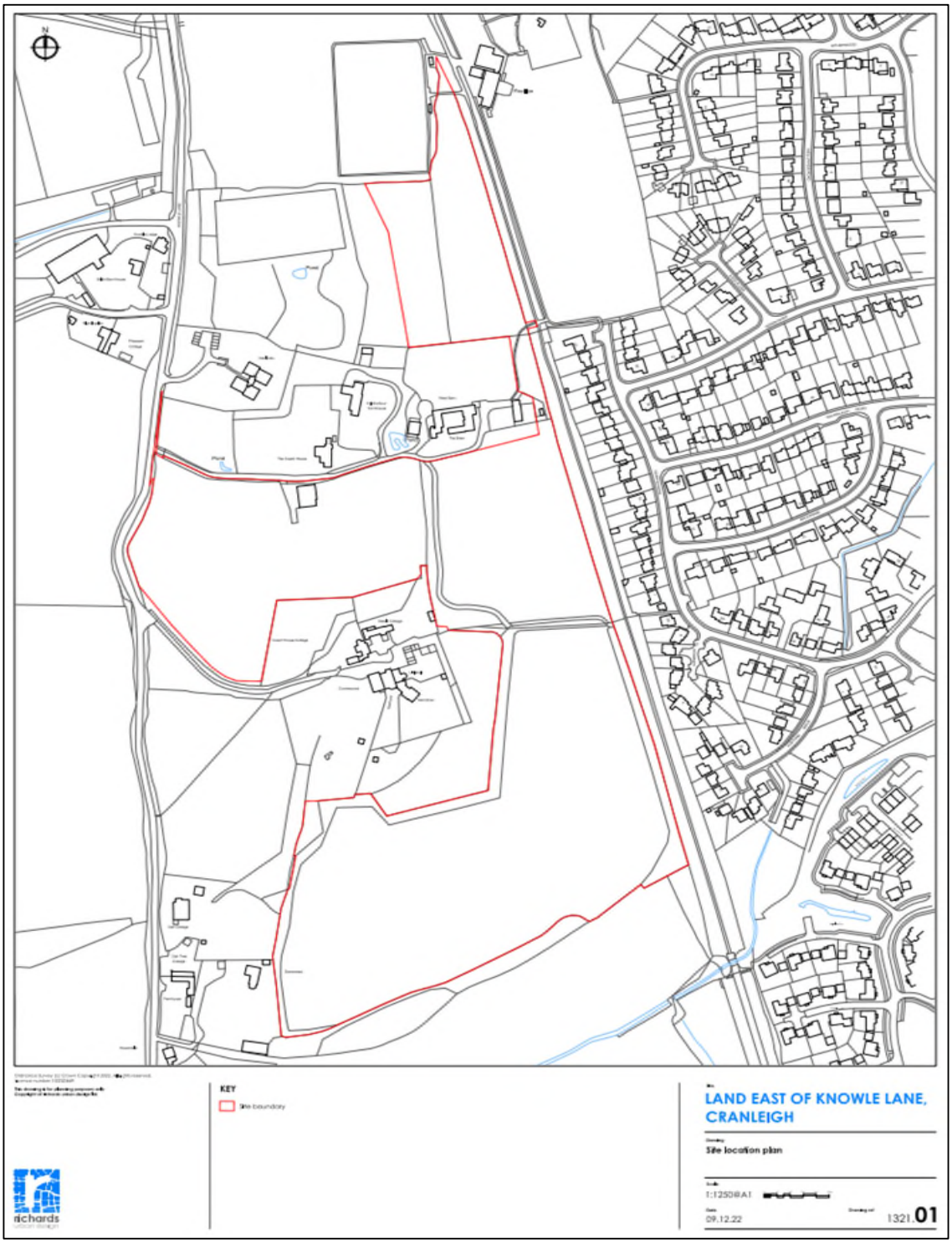

Figure 1.2: Existing Site Layout and Red Line Boundary

1.8 The proposals seeks an *'Outline planning application (with all matters reserved except means of access) for up to 3 phases of residential development of up to 162 dwellings (including 30% affordable dwellings) including the creation of new vehicular access, pedestrian and cycle accesses, parking spaces, public open space, biodiversity enhancement, landscape planting, surface water attenuation, associated infrastructure and other associated works'*.

1.9 An illustrative masterplan for the proposed development is illustrated in **Figure 1.3** below.

Figure 1.3: Proposed Illustrative Masterplan

1.10 This AQA has been undertaken in order to establish whether the site's location is considered suitable for the proposed residential use and to quantify any likely pollution impacts upon the surrounding area or local sensitive receptors as a result of the construction and/or operation of the proposed development.

1.11 In the event that potential impacts are identified, specific mitigation measures will be recommended in order to minimise significant pollution effects and help safeguard the health and well-being of existing and proposed sensitive receptors within the local area.

1.12 The AQA is divided up into the following sections:

- **Section 2 -** Legislation and Policy Context;
- **Section 3 -** Assessment Methodology and Significance Criteria;
- **Section 4 -** Baseline Site Conditions;
- **Section 5 -** Evaluation of Potential Effects;
- **Section 6 -** Road Traffic Emissions;
- **Section 7 -** Mitigation Measures; and
- **Section 8 -** Residual Effects and Conclusions.
- **Appendix A -** Construction Dust Assessment;
- **Appendix B -** Time Variation Hourly Factors; and
- **Appendix C -** Model Verification.

2 Legislation and Policy Context

National Planning Policy

The Air Quality Strategy[1]

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

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

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

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

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

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

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

Pollutant	Air Quality Objectives		Date to be Achieved by
	Concentration	Measured As	
Nitrogen Dioxide (NO_2)	200 µg/m^3	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	40 µg/m^3	Annual mean	31/12/2005
Particles (PM_{10})	50 µg/m^3	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	40 µg/m^3	Annual mean	31/12/2004
Particles ($PM_{2.5}$) (UK – Except Scotland)	20 µg/m^3	Annual mean	2020
Particles ($PM_{2.5}$) (UK – Urban Areas)	Target of 15% reduction in concentrations at urban background		Between 2010 and 2020

Table 2.1: Air Quality Objectives in the UK

Air Quality Standards Regulations, 2010[3]

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

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

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

National Planning Policy Framework (NPPF) 2021[4]

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

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

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

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

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

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

2.11 Additionally, it states:

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

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

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

2.13 Paragraph 186 adds that:

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

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

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

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

required to be discharged before development commences should be avoided, unless there is a clear justification."

Planning Practice Guidance – Air Quality[5]

2.15 The Planning Practice Guidance (PPG) is used to support the National Planning Policy Framework and is published online. The guidance on air quality was originally published in 2014 and updated in November 2019. The PPG provides various principles on how planning can take account of the impact of new development on air quality.

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

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

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

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

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

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

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

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

Regional Planning Policy

Surrey Local Transport Plan 4 LTP4[6]

2.19 The Local Transport Plan LTP4 went into public consultation between July - October 2021,was adopted in July 2022 and supersedes the previous Local Transport Plan (LTP3). A number of policy areas included in the plan will contribute to lower emissions and therefore improved air quality:

- planning for place (through shorter journeys),
- digital connectivity (through reduced journeys),
- active travel/personal mobility (through shifting local car trips to walking and cycling),
- public and shared transport (through shifting local car trips to public and shared transport),
- demand management for cars (through de-incentivising car trips, and encouraging a shift to other, cleaner modes),
- demand management for goods vehicles (through incentivising more efficient and cleaner freight movements locally),
- efficient network management (through reducing congestion and idling),
- promoting zero emission vehicles (through increasing the uptake of EVs and hydrogen and electric buses, and
- supporting behaviour change (through encouraging a shift from private petrol/diesel vehicles to more sustainable modes).

2.20 Air Quality has been considered within the policy 'Demand for management for goods vehicles policy area', which states;

"Goods vehicles cover a range of vehicles from delivery vans to the largest articulated lorries. Between them, they accounted for over 20% of the traffic on Surrey's roads in 2019. They play an important role in Surreys economy and the wider regional and national economy. However, Heavy Goods Vehicles (HGVs) also have a significant impact on Surrey's environment and people through their carbon emissions, congestion and road maintenance costs, noise and air pollution, road safety effect and severance impact, deterring use of active travel and personal mobility options on our roads…"

[6] Surrey County Council (2022), 'Local Transport Plan (LTP4)'. Available at: https://www.surreycc.gov.uk/roads-and-transport/policies-plans-consultations/transport-plan/policy-areas/goods-vehicles

Local Planning Policy

Waverley Borough Local Plan - Part 1:Strategic Policies and Sites 2018[7]

2.21 The Local Plan is made up from two parts. The Local Plan Part 1: Strategic Policies and Sites (LPP1) which sets out the Council's spatial framework for delivering the development and change needed to realise the vision for development in Waverley up to 2032. LPP1 replaces a number of policies from Local Plan 2002. Some of the Local Plan 2002 policies have been retained until the adoption of Local Plan Part 2.

2.22 Air Quality has been considered within Policy ST1: Sustainable Transport, which states:

"The Council will work in partnership with Surrey County Council, neighbouring authorities, transport providers and other key stakeholders to ensure that development schemes:…

…7. Are consistent with the objectives and actions within the Air Quality Action Plan…"

Waverley Borough Local Plan – Part 2:Site Allocation and Development Management Policies 2022[8]

2.23 Local Plan Part 2 (LPP2) will form the second stage of Waverley's new Local Plan. When adopted, Local Plan Part 2 and Local Plan Part 1 will replace the 2002 Local Plan.

2.24 LPP1 specifies the overall spatial strategy for development and growth in Waverley, and allocated strategic sites. LPP2, when adopted will provide the more detailed 'Development Management' policies, review a suite of local designations and will allocate sites needed for housing or other uses in certain areas of Waverley.

2.25 This air quality assessment has taken into consideration all the above policies and guidelines.

[7]Waverley Borough Council (WBC), (2018), 'Waverley Borough Local Plan Part 1: Strategic Policies and Sites February 2018', WBC, Waverley. Available at: https://www.waverley.gov.uk/Portals/0/Documents/services/planning-and-building/planning-strategies-and-policies/local-plan/LPP1_July_2019_web.pdf?ver=M4C0VK_SH7V54tLWEaTftA%3d%3d
[8]Waverley Borough Council (WBC), (2022), 'Waverley Borough Local Plan Part 2: Site allocation and Development Management Policies', WBC, Waverley. Available at: https://www.waverley.gov.uk/Services/Planning-and-building/Planning-strategies-and-policies/Local-plan/Local-Plan-Part-2

3 Assessment Methodology and Significance Criteria

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

3.2 **Table 3.1** below summarises the key information sources used in this assessment.

Source	Details
Department for Environment, Food and Rural Affairs (Defra)	**COVID-19 Supplementary Guidance – Local Air Quality Reporting in 2021**[9] Prepared in order to inform local authorities in England of the key changes and points of reference with respect to LAQM duties, as described in Part IV of the Environment Act 1995, for the 2021 reporting year.
	Local Air Quality Management (LAQM) – Technical Guidance (TG22)[10] The LAQM (TG22) supersedes all previous versions, the most recent being the April 2021 release of LAQM (TG16). It is designed to support local authorities in carrying out their duties under the Environment Act 1995 as amended by the Environment Act 2021, the Environment (Northern Ireland) Order 2002, and subsequent regulations.
	The Local Air Quality Management (LAQM)Tools.[11] Contain information pertaining to monitoring networks across the UK and provides tools, which aid in the data processing and the estimation of pollutant concentrations with reference to the specific year of study.
	LAQM Background Maps (2018 Reference Year)[12] These provide mapped estimates of background concentrations for specific pollutants (NO_x, NO_2, PM_{10} and $PM_{2.5}$) using a 1x1 km grid. The maps also provide information on how pollutant concentrations change over time or across a wide area, while allowing for the assessment of new pollutant sources that are introduced into an area and the impact they may have upon local air quality.
	The Emissions Factors Toolkit (EFT) – version11.0[13] The EFT allows users to calculate road vehicle pollutant emission rates for NOx, PM_{10}, $PM_{2.5}$ and CO_2 for a specified year, road type, vehicle speed and vehicle fleet composition.
Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM)	**Land-Use Planning & Development Control: Planning for Air Quality (2017)**[14] This document provides advice and guidance to ensure that air quality is adequately considered in the land-use planning and development control processes. This is particularly applicable to assessing the effect of changes in exposure of members of the public resulting from residential and mixed-use developments, especially those within urban areas where air quality is poorer.

[9] Greater London Authority (GLA). (2021). 'Local Air Quality Management Reporting in 2021 COVID-19 Supplementary Guidance'. GLA, London
[10] Department of Environment, Food and Rural Affairs (DEFRA). (2022). 'Local Air Quality Management Technical Guidance (TG22)'. DEFRA, London
[11] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/list-of-available-tools/
[12] Department of Environment, Food and Rural Affairs (DEFRA). (2018), 'Background Mapping data for local authorities – 2018', DEFRA, London. https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018
[13] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/
[14] Environmental Protection UK & Institute of Air Quality Management (EPUK & IAQM) (2017) Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, London

	Guidance on the assessment of Dust from Demolition and Construction (2014 v.1.1)[15] The document provides guidance on how to undertake a construction impact assessment (including demolition and earthworks). The emphasis in the document is on providing the means for classifying the risk of dust impacts from a construction site, which then allows appropriate mitigation measures to be identified.
The National Atmospheric Emissions Inventory (NAEI)	**The UK NAEI**[16] estimates annual pollutant emissions from 1970 to the most current publication year for the majority of pollutants. The NAEI is compiled on an annual cycle, each year the latest set of data are added to the inventory and the full time series is updated to take account of improved data and any advances in the methodology used to estimate the emissions.
London Councils	**Air Quality and Planning Guidance**[17] This guidance is aimed at local authorities, developers and their consultants, and provides technical advice on how to deal with planning applications that could have an impact on air quality.
Local Authorities	**Waverley Borough Council ASR**[18] This Annual Status Report (ASR) highlights the status of the air quality within the Borough, discussing AQMAs, the monitoring strategy and concentrations of pollutants in the air.

Table 3.1: Key Information Sources

Scope of Air Quality Assessment

3.3 This Air Quality Assessment considers the suitability of the site for the proposed residential use and assesses whether any significant air quality impacts are anticipated as a result of the construction and/or the operation of the proposed development.

3.4 A staged assessment approach has been adopted. This ensures that the approach taken for the assessment of risk is proportional to the risk of an unacceptable impact being caused. Where a simple review of the likely impacts associated with the proposed development clearly demonstrates that the risk of a health/annoyance impact is negligible, this will be sufficient to conclude that no further or detailed assessment is necessary.

3.5 In cases where the risk involved cannot be regarded as negligible, a more detailed and quantitative assessment will be undertaken.

3.6 The specific methodology and impact criteria used in this assessment is detailed below.

[15] IAQM, (2014). 'Guidance on the assessment of dust from demolition and construction', IAQM, London.
[16] National Atmosperic Emissions Inventory (NAEI). Available from: https://naei.beis.gov.uk/
[17] London Councils. (2007), Air Quality and Planning Guidance, The London Air Pollution Planning and the Local Environment (APPLE) working group, London
[18] Waverley Borough Council, (2022). 'Waverley Borough Council 2022 Air Quality Annual Status Report. (WBC)

Construction Dust Impacts

3.7 The Institute of Air Quality Management (IAQM) published the 'Guidance on the assessment of dust from demolition and construction' in February 2014 which provides guidance on how to assess and mitigate the impacts of dust emissions from demolition and construction sites. This document was updated in June 2016 (Version 1.1) and supersedes the 2012 IAQM guidance on the assessment of the impacts of construction on air quality and the determination of their significance.

3.8 The potential impacts associated with construction activities will be assessed in accordance with the IAQM Guidance. IAQM Guidance provides a five-step assessment procedure to assess the potential impacts of construction dust pre-mitigation, provide mitigation measures specific to the risk and assess the post-mitigation impacts.

3.9 It recommends that the assessment procedure follows the following framework:

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

3.10 In the process of screening the need for a detailed assessment, the following criteria is used:

"An assessment will normally be required where there is:

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

3.11 When defining the sensitivity of an area/receptor, the factors within **Table 3.2** below are used.

Area Sensitivity	Human Receptors	Ecolgoical Receptors
High	People would be present continuously, 10-100 dwellings within 20m of the site, exposed over a time period relevant to the air quality objective for PM_{10}, very sensitive receptors (e.g. residential properties, hospitals, schools, care homes).	International or national designation, locations where there is a community of a particularly dust sensitive species (e.g. Special Area of Conservation SAC).
Medium	People would not be expected to be present here continously for extended periods, locations where people exposed are workers and exposure is over a time period relevant to the air quality objective for PM_{10}, 1-10 dwellings within 20m of the site, medium sensitive receptors (e.g. parks, place of work- office and shop workers).	Locations where there is particularly important plant species, national designation where the features may be affected by dust deposition (e.g. Sites of Special Scientific Interest SSSI).
Low	People would be expeceted to be present only for limited periods, human exposure is transient, 1 dwelling within 20m of site. Annual mean concentrations well below the national objectives (<28µg/m^3). Low sensitivity receptors (e.g. public footpaths, playing fields, shopping streets).	Locations with a local designation where the features may be affected by dust deposition (e.g. Local Nature Reserve).

Table 3.2: IAQM Factors for Defining the Sensitivity of an Area

Building Emissions

3.12 Any emissions associated with the proposed energy strategy have been assessed in line with the recommendations provided by Daedalus Environmental Limited.

Transport Emissions.

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

3.14 **Table 3.3** below provides the criteria used for screening the need for an Air Quality Assessment.

The Development will:	Indicative Criteria to Proceed to an Air Quality Assessment
Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight).	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.
Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
Realign roads, i.e. changing the proximity of receptors to traffic lanes	Where the change is 5m or more and the road is within an AQMA
Introduce a new junction or remove an existing junction near to relevant receptors	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
Introduce or change a bus station	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere
Have an underground car park with extraction system	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out)

Table 3.3: Indicative Criteria for Requiring an Air Quality Assessment

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

Impact Criteria

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

3.17 This process takes the following into account:

- the magnitude of the change (% change of annual mean concentration);

- the concentration relative to the Air Quality Strategy (AQS) objective (above or below the objective); and
- the direction of change (adverse or beneficial).

3.18 The magnitude of an impact should be described by using the criteria set out in **Table 3.4** below. The criteria are based upon the change in pollutant concentration resulting from the proposed development as a percentage of the Air Quality Action Level (AQAL) which in this case is NO_2 and PM_{10} annual mean objective levels of 40 µg/m^3.

Change Magnitude	NO_2/PM_{10} Annual Mean	No Days PM_{10} >40 µg/m^3
Large	Increase/decrease >10% (>4 µg/m^3)	Increase/decrease >4 days
Medium	Increase/decrease 6-10% (2.4-4 µg/m^3)	Increase/decrease 2-4 days
Small	Increase/decrease 2-5% (0.8-2 µg/m^3)	Increase/decrease 1-2 days
Imperceptible	Increase/decrease <1% (<0.4 µg/m^3)	Increase/decrease <1 day

Table 3.4: Impact Magnitude for Changes in NO_2 and PM_{10} Concentrations

3.19 The significance of the impact will be dependent upon the magnitude of change in relation to the relevant AQAL. This is set out in **Table 3.5** below.

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

*Air Quality Action Level – in this case the objective levels.

Table 3.5: Impact Descriptors for Individual Receptors

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

3.21 The overall significance should be described separately for both the impact of emissions related to the proposed development on existing receptors, and for the impacts of emissions from existing source(s) on new exposure being introduced from the proposed development. This is discussed below.

Exposure Criteria

3.22 The London Councils Air Quality and Planning Guidance takes into account the now superseded Planning Policy Statement 23: Planning and Pollution Control and is aimed at developers, their consultants and local authorities in order to ensure consistency in the approach to dealing with Air Quality and planning in London.

3.23 Whilst this guidance has been developed for London it is consistently adopted across the UK with a view of reducing exposure to air pollution.

3.24 When determining both the significance of exposure to air pollution and the levels of mitigation required, consideration should be given to the Air Pollution Exposure Criteria (APEC). The APEC criteria is set out in **Table 3.6** below.

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

Table 3.6: Air Pollution Exposure Criteria

3.25 It should be noted that air quality is not well suited to the rigid application of a generic significance matrix to determine the overall significance of a development and individual receptor sensitivity should also be taken into account. Therefore, professional judgement

should be employed throughout, and the assessment should take into account any site-specific considerations.

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

4 Baseline Site Conditions

Local Air Quality Management

4.1 The proposed development site falls within the jurisdiction of Waverley Borough Council (WBC).

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

4.3 A review of the Air Quality Assessments undertaken by WBC has indicated there are two Air Quality Management Areas (AQMA) within the Borough (Farnborough and Godalming) which were declared in 2007 as a result of exceedances of the annual mean objective for Nitrogen Dioxide (NO_2). The site is not located in or near either AQMA.

4.4 There are two Sites of Special Scientific Interest (SSSI) within 5km of the site boundary called Chiddingfold Forest (4.5km South-West of the site) and Smokejack Clay Pit (4.5km East of the site).

4.5 The site location in relation to the SSSI's are shown in **Figure 4.1** below.

Figure 4.1: Site Location in Relation to the SSSI's

Background

4.6 The Defra mapping tool (reference year 2018) has been used to establish the pollutant background concentration. The site falls within four 1km grid squares X:505500; Y:137500, X:505500; Y:138500, X:506500; Y:137500 and X:506500; Y:138500 therefore an average all four has been calculated and used.

4.7 The NOx, NO_2, PM_{10} and $PM_{2.5}$ background concentrations for 2019 are provided in **Table 4.1** below.

Pollutant	2019 (µg/m^3)
NOx	10.3
NO_2	7.9
PM_{10}	13.7
$PM_{2.5}$	9.0

Table 4.1: Defra Background Concentrations for 2019

Local Monitoring

4.8 In August 2022, WBC published their latest Air Quality Annual Status Report which provides annual mean monitoring data. Monitored results from 2020 and 2021 are likely to have been impacted by the COVID-19 pandemic and are likely to be less representative of the 'true' baseline concentrations, therefore 2019 concentrations have been used.

Automatic Monitoring

4.9 WBC currently operates three automatic monitoring locations for NO_2 and PM_{10}. However, WA004 was commissioned only in 2021 and subsequently has no annual mean concentrations for 2019 or 2020.

4.10 The closest automatic monitoring location (God 8) is around 10.6km North-West of the site location.

4.11 The latest published results for NO_2 and PM_{10} (where applicable) for tall three automatic monitoring locations are provided within **Table 4.2** below.

ID	Site Name	Coordinates (X,Y)	Site Type	Annual Mean NO_2 Concentration ($\mu g/m^3$)			
				2018	2019	2020	2021
Farn 8	Farnham The Woolmead	484087, 146972	Roadside	*30	29	22	22
God 8	Godalming Ockford Road	496711, 143705	Roadside	-	24	17	18
WA004	South St, Farnham	484166, 146862	Roadside	-	-	-	21
ID	**Site Name**	**Coordinates (X;Y)**	**Site Type**	**Annual Mean PM_{10} Concentration ($\mu g/m^3$)**			
				2018	2019	2020	2021
Farn 8	Farnham The Woolmead	484087, 146972	Roadside	*16	19	17	14
WA004	South St, Farnham	484166, 146862	Roadside	-	-	-	16
*Rounded to the nearest whole number							

Table 4.2: 2019 Annual Mean Concentrations for Automatic Monitoring Locations

4.12 **Table 4.2** above demonstrates that there are no exceedances in the NO_2 and PM_{10} annual mean objectives between 2018 and 2021.

Non-Automatic Monitoring

4.13 Additionally, WBC undertook non-automatic monitoring of NO_2 at various locations. The closest non-automatic monitoring locations in relation to the site are illustrated in **Figure 4.2** below.

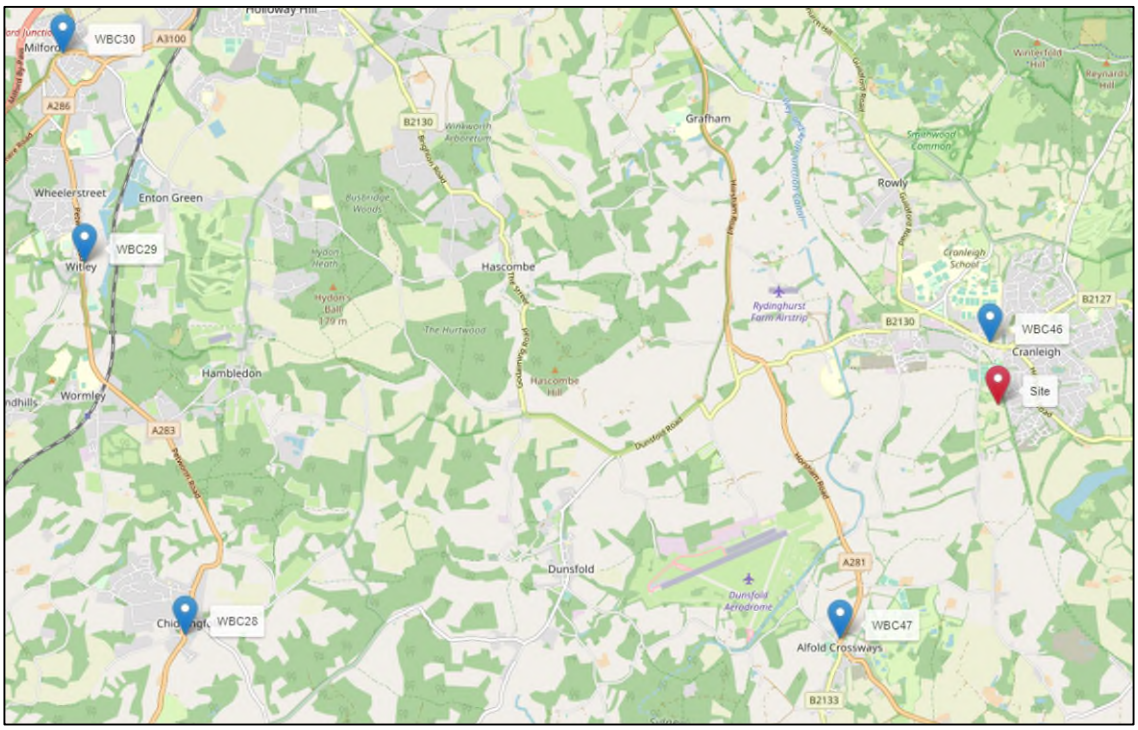

Figure 4.2: Site Location in Relation to the Closest Non-Automatic Monitoring Locations

4.14 The latest NO_2 annual mean concentrations for the closest non-automatic monitoring locations are provided within **Table 4.3** below.

ID	Coordinates (X,Y)	Site Type	Annual NO_2 Mean Concentration ($\mu g/m^3$)			
			2018	2019	2020	2021
WBC28	496067,135318	Roadside	-	21.4	18.7	17.8
WBC29	494751,139812	Roadside	-	31.8	27.2	28.0
WBC30	494448,142342	Roadside	-	21.8	18.6	18.5
WBC46	505795,139054	Roadside	-	34.2	22.4	21.2
WBC47	504045,135425	Roadside	-	27	13.0	13.5

Table 4.3: 2019 Annual Mean NO_2 Concentrations for the Closest Non-Automatic Monitoring Locations

4.15 **Table 4.3** above demonstrates that there were no exceedances of the national annual mean objective for NO_2 between 2018 and 2021 for any of the closest non-automatic monitoring sites.

4.16 All of the closest automatic and non-automatic monitoring locations are >5% below the national annual mean objectives in 2019. Consequently, in accordance with the exposure criteria set out in **Table 3.6,** the proposed development site is likely to fall within APEC – A for site suitability, which states the following:

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

4.17 Suitable mitigation measures have been considered, where required, within **Section 7** of this AQA.

5 Evaluation of Potential Effects

Construction

Construction Dust

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

5.2 Since demolition will not be required (greenfield site), the construction activities associated with the proposed development can be separated into three stages:

- Earthworks;
- Construction; and
- Trackout.

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

5.4 The construction dust assessment is included in **Appendix A.**

Construction Traffic and Plant

5.5 Throughout the construction period, there will be a number of construction vehicles, stationary plant and vehicles used by the construction workforce. These may potentially present an additional source of air pollutants in the vicinity of the proposed development site.

5.6 Any likely pollutant impacts should be addressed through Best Available Techniques (BAT) mitigation measures. Likely BAT are provided in **Section 7**.

Completed Development

Development Traffic

5.7 The transport consultants at Motion have provided us with the daily net traffic impact for the proposed development. This is presented in **Table 5.1** below.

	Morning Peak		Evening Peak		AADT		
	In Movement	Out Movement	In Movement	Out Movement	In Movement	Out Movement	Worst Case Total Trips
Existing	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Proposed	38	35	23	27	355	371	726
Net Impact	**38**	**35**	**23**	**27**	**355**	**371**	**726**

Table 5.1: Daily Net Traffic Impact for the Proposed Development

5.8 **Table 5.1** demonstrates that the proposed development would generate more than 500 daily vehicle trips which meets the EPUK/IAQM criteria in **Table 3.3** for requiring a detailed assessment.

5.9 As such, ddevelopment traffic air quality impacts have been quantitively assessed by modelling the effect of the development traffic flows along the local highway network.

5.10 All modelling undertaken is included in **Section 6** of this report.

Building Emissions

5.11 Daedalus Environmental Limited have indicated that the Energy Strategy is likely to include the use Air Source Heat Pumps (ASHP).

5.12 The ASHP, being electric, are not directly associated with any NOx or Particulate emissions. Therefore, this would be in accordance with the minimum standard/requirements outlined within the EPUK & IAQM criteria and therefore, no further assessment of building emissions is considered required.

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

6 Road Traffic Emissions

Vehicular Traffic Assessment Model

6.1 A quantitative assessment of traffic related air quality impacts has been undertaken. The modelling tool which has been used is the dispersion model ADMS-Roads (Extra) Version 5.0.1.3, which has been developed by the Cambridge Environmental Research Consultants (CERC).

6.2 This model uses the following input data:

- Defra annual average background concentrations for 2019 and 2026 from an average of the four 1km grid squares that the site is located in X:505500; Y:137500, X:505500; Y:138500, X:506500; Y:137500 and X:506500; Y:138500;
- Latest relevant Emission Factor Toolkit (v.11.0)[19];
- Geo-referenced mapping data; and
- 2019 Hourly Sequential ADMS format MET data for the most suitable site (Charlwood).

Emissions

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

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

- **Baseline** - This includes EFT, background concentrations and Traffic data for 2019;
- **Proposed Opening Year 2026 (Do Nothing) DN** - This includes 2026 EFT and background concentrations, 2026 baseline traffic flows which include committed development traffic but exclude the proposed development traffic;
- **Proposed Opening Year 2026 (Do Something) DS** - This includes 2026 EFT and background concentrations, 2026 baseline traffic flows which include committed development traffic and the proposed development traffic.

Traffic Data

6.5 Traffic data for all the above scenarios has been provided by Motion Transport Planners.

[19] Department of Environment, Food and Rural Affairs (DEFRA). (2020), 'Emission Factor Toolkit', DEFRA, London.

6.6 Development traffic has been quantitatively assessed by modelling the effect of the development traffic flows along the proposed routes for the three above mentioned scenarios. The resultant predicted changes in air quality have then been compared against the stated assessment criteria, in **Section 3,** in order to establish the significance of the impact.

6.7 The Annual Average Daily Traffic (AADT) used in this assessment is described in **Table 6.1** below.

ID/Road	Speed (kph)	Baseline 2019 AADT		Observe / Surveyed (2022) AADT		Proposed Completion Year (2026) 'Do Nothing' AADT		Proposed Completion Year (2026) 'Do Something' AADT	
		LDVs	HGVs	LDVs	HGVs	LDVs	HGVs	LDVs	HGVs
Knowle Lane (North of Site Access)	60	1689	151	1726	155	1764	159	2441	159
Knowle Lane (South of Site Access)	60	1689	151	1726	155	1764	159	1813	159
High Street (West of Knowle Lane)	48	10496	80	10728	81	10968	82	11467	82
High Street (East of Knowle Lane)	48	10646	178	10881	181	11125	184	11303	184
Horsham Road	48	7748	142	7920	144	8098	146	8110	146
Ewhurst Road	48	7470	155	7635	158	7805	161	7850	161
Guildford Road	64	7935	182	8110	186	8291	190	8606	190
Horseshoe Lane	48	1546	20	1580	20	1616	20	1616	20
B2130	48	6665	159	6811	162	6963	165	7022	165

Table 6.1: Annual Average Daily Traffic Flows

6.8 The AADT traffic data was then divided by 24 to derive the hourly traffic flows used in the ADMS dispersion models. The hourly traffic data is shown in **Table 6.2** below.

ID/Road	Speed (kph)	Baseline 2019 Hourly		Observe / Surveyed (2022) Hourly		Proposed Completion Year (2026) 'Do Nothing' Hourly		Proposed Completion Year (2026) 'Do Something' Hourly	
		LDVs	HGVs	LDVs	HGVs	LDVs	HGVs	LDVs	HGVs
Knowle Lane (North of Site Access)	60	70	6	72	6	74	7	102	7
Knowle Lane (South of Site Access)	60	70	6	72	6	74	7	76	7
High Street (West of Knowle Lane)	48	437	3	447	3	457	3	478	3
High Street (East of Knowle Lane)	48	444	7	453	8	464	8	471	8
Horsham Road	48	323	6	330	6	337	6	338	6
Ewhurst Road	48	311	6	318	7	325	7	327	7
Guildford Road	64	331	8	338	8	345	8	359	8
Horseshoe Lane	48	64	1	66	1	67	1	67	1
B2130	48	278	7	284	7	290	7	293	7

Table 6.2: Hourly Traffic Flows Used in ADMS Modelling

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

Receptor Types and Locations

6.10 The receptors, which have been assessed, relate to potentially sensitive existing and proposed receptors in the vicinity of the site.

6.11 For the purpose of this air quality assessment, sensitive receptors have been identified where the public might regularly be present and likely to be exposed over the averaging period of the objective. This assessment focuses on modelling annual mean concentrations.

6.12 All the receptor locations assessed are listed in **Table 6.3** and illustrated in **Figure 6.1** below.

Receptor	Coordinates (X, Y)		Height (m)	Address
R1	505738	136929	1.5	Knowle Lane House
R2	505673	137160	1.5	Cloud Value, Knowle Lane
R3	505690	137286	1.5	Snowball Cottage, Knowle Lane
R4	505661	137770	1.5	Knowle Lane Cottage
R5	505677	138555	1.5	Knowle Lodge, Knowle Lane
R6	505651	138938	1.5	2 Newlands, Colley Gardens
R7	505904	139024	1.5	Flo & Fawn Ltd Pre-school
R8	505974	139010	1.5	Cranleigh Village Hospital
R9	506113	139065	1.5	3 Ewhurst Road
R10	506171	138945	1.5	2 Horsham Road
R11	505374	139262	1.5	254 High Street
R12	505330	139283	1.5	Bright Care Home
R13	505256	139675	1.5	2 Horseshoe Lane
P1	505686	138318	1.5	North façade of Proposed Development
P2	505674	138278	1.5	North-West façade of Proposed Development
P3	505701	138232	1.5	West Façade of Proposed Development
P4	505774	138006	1.5	South-West Façade of Proposed Development
P5	505773	137976	1.5	South Façade of Proposed Development

Table 6.3: Receptor Locations

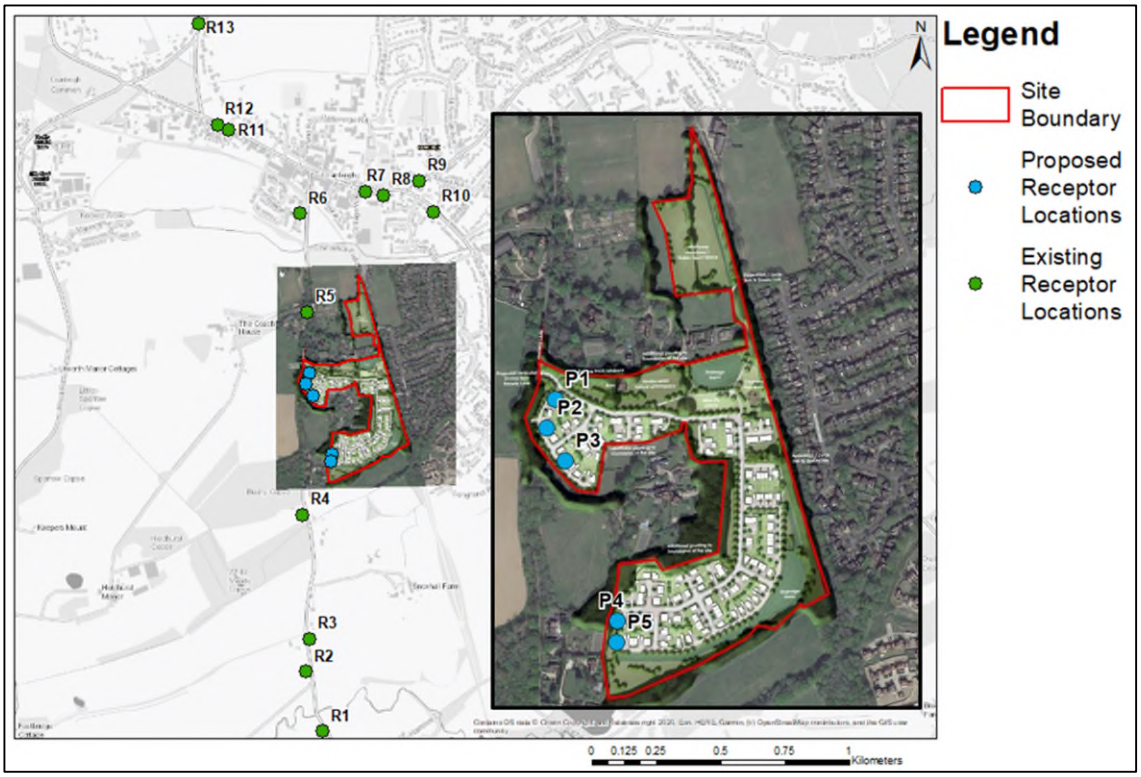

Figure 6.1: Receptor Locations

Meteorological Data

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

6.14 The MET office has advised that the most suitable site with the most complete/representative set of data is located at Charlwood. Subsequently, 2019 data has been obtained and used.

6.15 Charlwood 2019 Windrose is illustrated in **Figure 6.2** below.

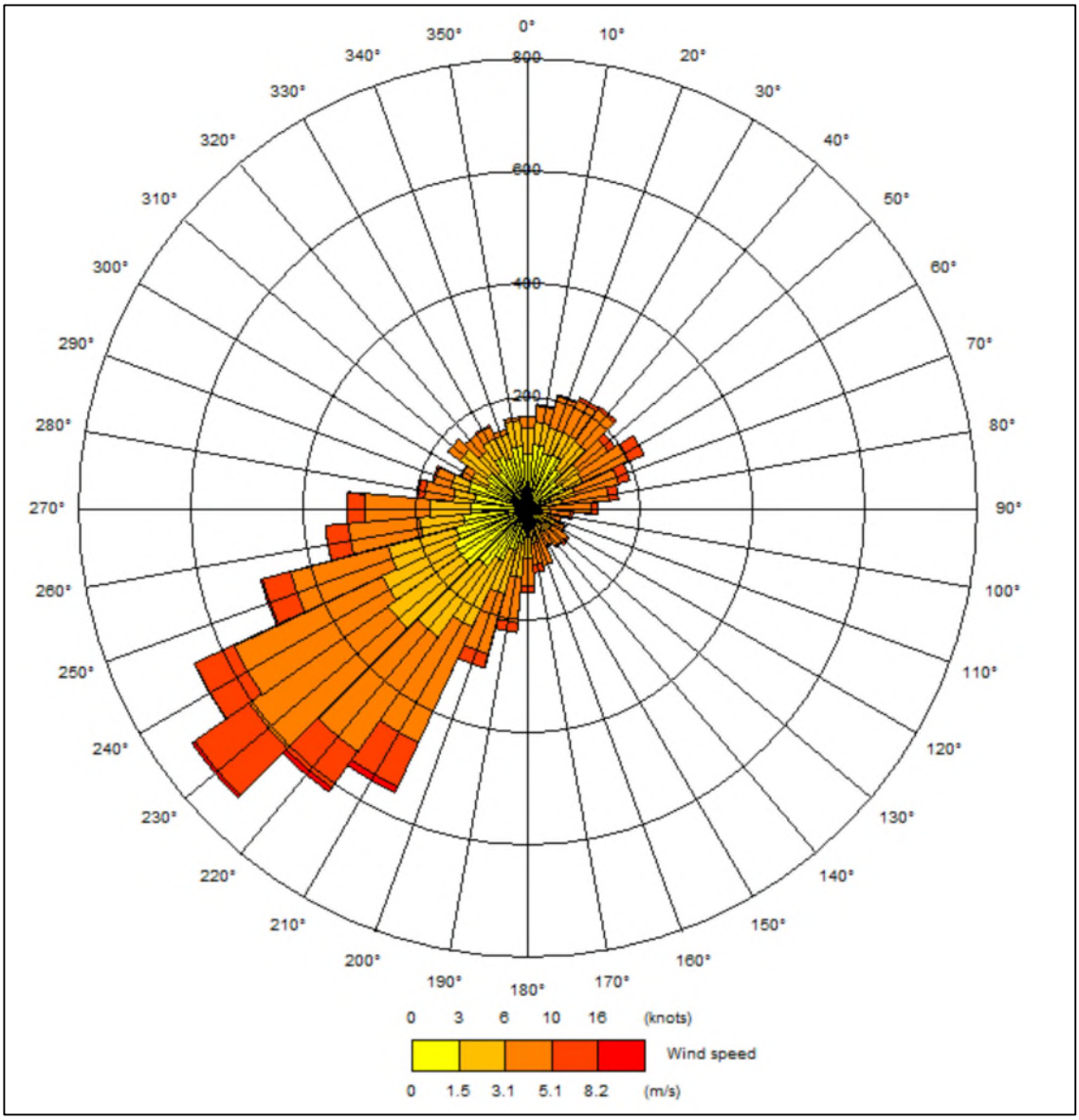

Figure 6.2: Charlwood Windrose, 2019

Background

6.16 The following background data has been used.

Pollutant	2019 (µg/m^3)	2026 (µg/m^3)
NO_x	10.3	8.1
NO_2	7.9	6.4
PM_{10}	13.7	12.6
$PM_{2.5}$	9.0	8.2

Table 6.4: Annual Mean Background Concentrations Used in Dispersion Models

NO_x: NO_2 Chemistry

6.17 Vehicles emit NO_x with different proportions of NO_2. In the atmosphere, chemical reactions take place between NO, NO_2 and Ozone. In this assessment the screening of 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[20].

Assumptions and Limitations

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

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

6.20 An important stage in the process is model verification, which involves comparing the model output with measured concentrations. Because the model has been verified, there can be reasonable confidence in the prediction of baseline year concentrations.

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

6.22 There were no monitoring locations along Knowle Lane/the main access route to the site. Additionally, there was very limited traffic data available at locations where air pollutions levels are known (monitoring locations). Therefore, verification was undertaken at the only monitoring location where traffic data was available for (WBC46).

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

Model Verification

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

6.25 The verification model used one roadside location; WBC46.

[20] Department of Environment, Food and Rural Affairs (DEFRA). (2020), 'NOx to NO_2 calculator v8.1', DEFRA, London.

6.26 As previously stated, we were unable to verify the model against further monitoring locations due to the unavailability of traffic data.

6.27 The initial verification process demonstrated that the modelling result for the monitoring location was >25% margin of error before adjustment.

6.28 In accordance with the LAQM TG22, an adjustment correction factor 11.8 has been calculated and applied to the modelled road contribution NOx.

6.29 The verification process following adjustment, demonstrated that the modelling result for the monitoring location was <10% margin of error when compared to the monitoring value at the same location.

6.30 Therefore, a correction factor of 11.8 has been applied to all modelled results for all pollutants assessed.

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

Potential Impacts

6.32 The likely significant impacts of traffic from the development on potentially sensitive receptors have been assessed. The Baseline and 2026 NO_2 modelling results for all receptors are represented in **Table 6.5** below.

ID	'Baseline' NO_2 (µg/m^3)	2026 'Do Nothing' NO_2 (µg/m^3)	2026 'Do Something' NO_2 (µg/m^3)	Impact between 'Do Nothing' and 'Do Something'	% Difference in Relative to Annual Mean Objective (40 µg/m^3)	Impact Significance
R1	14.94	9.77	9.85	0.08	0%	Negligible
R2	10.37	7.52	7.54	0.02	0%	Negligible
R3	16.02	10.32	10.41	0.09	0%	Negligible
R4	11.16	7.92	7.96	0.04	0%	Negligible
R5	15.34	10.02	11.10	1.08	3%	Negligible
R6	11.53	8.17	8.45	0.28	1%	Negligible
R7	38.79	23.13	23.41	0.28	1%	Negligible
R8	24.58	15.14	15.30	0.16	0%	Negligible
R9	**53.51**	31.73	31.89	0.16	0%	Negligible
R10	30.12	18.10	18.16	0.06	0%	Negligible
R11	39.40	23.63	24.33	0.70	2%	Negligible
R12	39.24	23.53	24.22	0.69	2%	Negligible
R13	12.84	8.88	8.90	0.02	0%	Negligible
P1	11.26	7.98	8.07	0.09	0%	Negligible
P2	12.23	8.46	8.54	0.08	0%	Negligible
P3	10.59	7.65	7.70	0.05	0%	Negligible

ID	'Baseline' NO_2 ($\mu g/m^3$)	2026 'Do Nothing' NO_2 ($\mu g/m^3$)	2026 'Do Something' NO_2 ($\mu g/m^3$)	Impact between 'Do Nothing' and 'Do Something'	% Difference in Relative to Annual Mean Objective (40 $\mu g/m^3$)	Impact Significance
P4	9.25	6.98	7.01	0.03	0%	Negligible
P5	9.25	6.99	7.01	0.02	0%	Negligible

Table 6.5: Baseline and 2026 Modelled Annual Mean Concentrations for NO_2

6.33 **Table 6.5** demonstrates that NO_2 levels for 'Do Something (DS)' are likely to have a 0-3% increase relative to the annual mean objective, when compared to the 'Do Nothing (DN)'. Additionally, the modelled results for 2026 (proposed completion year) demonstrate that NO_2 levels are considerably under the national objective levels for all the receptors assessed, existing and proposed.

6.34 Therefore, in accordance with **Table 3.4** and **Table 3.5** in **Section 3**, NO_2 impacts are considered to be of imperceptible magnitude and negligible significance.

6.35 The PM_{10} modelling results for all receptors are represented in **Table** 6. **6.6** below.

ID	'Baseline' PM_{10} ($\mu g/m^3$)	2026 'Do Nothing' PM_{10} ($\mu g/m^3$)	2026 'Do Something' PM_{10} ($\mu g/m^3$)	Impact between 'Do Nothing' and 'Do Something'	% Difference in Relative to Annual Mean Objective (40 $\mu g/m^3$)	Impact Significance
R1	14.78	13.70	13.72	0.02	0%	Negligible
R2	14.05	12.96	12.97	0.01	0%	Negligible
R3	14.96	13.88	13.90	0.02	0%	Negligible
R4	14.17	13.09	13.10	0.01	0%	Negligible
R5	14.84	13.77	14.06	0.29	1%	Negligible
R6	14.19	13.11	13.19	0.07	0%	Negligible
R7	18.47	17.27	17.35	0.08	0%	Negligible
R8	16.10	14.96	15.00	0.04	0%	Negligible
R9	21.23	19.96	20.01	0.05	0%	Negligible
R10	16.99	15.79	15.81	0.02	0%	Negligible
R11	18.54	17.31	17.52	0.20	1%	Negligible
R12	18.52	17.29	17.49	0.20	1%	Negligible
R13	14.35	13.25	13.26	0.01	0%	Negligible
P1	14.18	13.11	13.13	0.02	0%	Negligible
P2	14.34	13.26	13.28	0.02	0%	Negligible
P3	14.08	13.00	13.01	0.01	0%	Negligible
P4	13.87	12.79	12.80	0.01	0%	Negligible
R5	13.87	12.79	12.80	0.01	0%	Negligible

Table 6.6: Baseline and 2026 Modelled Annual Mean Concentrations for PM_{10}

6.36 **Table 6.6** demonstrates that PM_{10} levels for 'Do Something' are likely to have a 0-1% increase relative to the annual mean objective, when compared to the 'Do Nothing'. In addition, all modelled results are still considerably under the annual mean objective level for all the receptors assessed, existing and proposed.

6.37 Therefore, in accordance with **Table 3.4** and **Table 3.5** in **Section 3**, PM_{10} impacts are considered to be of imperceptible magnitude and negligible significance.

6.38 The $PM_{2.5}$ modelling results for all receptors are represented in **Table 6.7** below.

ID	'Baseline' $PM_{2.5}$ ($\mu g/m^3$)	2026 'Do Nothing' $PM_{2.5}$ ($\mu g/m^3$)	2026 'Do Something' $PM_{2.5}$ ($\mu g/m^3$)	Impact between 'Do Nothing' and 'Do Something'	% Difference in Relative to Annual Mean Objective (20 $\mu g/m^3$)	Impact Significance
R1	9.70	8.81	8.82	0.01	0%	Negligible
R2	9.25	8.38	8.39	0.00	0%	Negligible
R3	9.81	8.91	8.93	0.01	0%	Negligible
R4	9.33	8.46	8.46	0.01	0%	Negligible
R5	9.73	8.85	9.02	0.17	1%	Negligible
R6	9.34	8.47	8.51	0.04	0%	Negligible
R7	11.98	10.91	10.96	0.05	0%	Negligible
R8	10.52	9.55	9.58	0.03	0%	Negligible
R9	13.69	12.49	12.52	0.03	0%	Negligible
R10	11.07	10.04	10.05	0.01	0%	Negligible
R11	12.03	10.94	11.06	0.12	1%	Negligible
R12	12.02	10.93	11.05	0.12	1%	Negligible
R13	9.44	8.55	8.56	0.00	0%	Negligible
P1	9.33	8.47	8.48	0.01	0%	Negligible
P2	9.43	8.56	8.57	0.01	0%	Negligible
P3	9.27	8.40	8.41	0.01	0%	Negligible
P4	9.14	8.28	8.28	0.00	0%	Negligible
P5	9.14	8.28	8.28	0.00	0%	Negligible

Table 6.7: Baseline and 2026 Modelled Annual Mean Concentrations for $PM_{2.5}$

6.39 **Table 6.7** demonstrates that $PM_{2.5}$ levels for 'Do Something' are likely to have a 0-1% increase relative to the annual mean objective, when compared to the 'Do Nothing'. In addition, all modelled results are still considerably under the annual mean objective level for all the receptors assessed, existing and proposed.

6.40 Therefore, in accordance with **Table 3.4** and **Table 3.5** in **Section 3**, $PM_{2.5}$ impacts are considered to be of imperceptible magnitude and negligible significance.

6.41 **Tables 6.5**, **6.6** and **6.7** clearly demonstrate that NO_2, PM_{10} and $PM_{2.5}$ concentration for all existing and proposed receptors modelled are >5% below national objectives in the completion year. Which, in accordance with the exposure criteria in **Table 3.6** means the

site would fall within APEC-A for site suitability once the development is completed and fully operational in 2026.

6.42 As previously stated, APEC-A states the following:

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

6.43 Suitable mitigation measures, where required, have been considered within **Section 7** of this AQA.

7 Mitigation Measures

Construction

Construction Dust

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

7.2 The role of air quality monitoring within the package of mitigation measures that is proposed has also been considered since monitoring proposals are frequently incorporated into planning conditions.

7.3 The mitigation measures outlined in **Appendix A** should make up part of a Construction Environmental Management Plan (CEMP) that should be implemented to minimise the potential adverse construction dust impacts throughout all the relevant construction stages.

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

Dust Monitoring:

7.5 The dust monitoring requirements are usually split in three categories as follows:

- **Negligible/Low risk** category sites- should not normally be necessary to undertake any quantitative air quality monitoring, although in some circumstances it may be applicable to undertake occasional surveys in the vicinity of the site boundary at least once on each working day.
- **Medium risk** category sites- should normally be adequate to undertake surveys of dust flux over the site boundary, and/or dust deposition/soiling rates around the site at nearby receptors, although this may have resource implications, and an approach based on continuous particulate matter monitoring may be preferred.
- **High risk** category sites- normally be necessary to supplement the monitoring for medium risk sites with monitoring of ambient PM concentrations. It is recommended that priority be assigned to the measurement of PM_{10}, as emissions of dust from construction sites are predominantly in the coarser fractions.

7.6 The proposed development site has been classified as having a **high risk** of dust soiling.

7.7 Therefore, dust monitoring, as specified above, should be undertaken during the relevant stages of construction to ensure that:

- The construction activities do not give rise to any exceedances of the air quality objectives for PM_{10} or $PM_{2.5}$.
- The agreed mitigation measures to control dust emissions are being applied and are effective.
- Any high levels of dust are attributed to specific activities on site to ensure that appropriate corrective measures take place.

7.8 The implementation of the specific mitigation measures given above within the CEMP will ensure that any potential adverse impacts from construction dust during all construction stages are avoided. It is noted by the IAQM that, through the use of effective mitigation, the effects of dust from construction activity will normally not be considered significant.

Construction Traffic and Plant

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

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

Operational

Traffic Emissions

7.10 The AQA has demonstrated that the predicted net traffic associated with the proposed development is unlikely to result in a detrimental pollution impact upon the local highway network and the local pollution levels.

7.11 Therefore, it is not anticipated that mitigation measures will be required.

Building Emissions

7.12 Daedalus Environmental Limited have indicated that the Energy Strategy is likely to include the use Air Source Heat Pumps (ASHP).

7.13 The ASHP, being electric, are not directly associated with any NOx or Particulate emissions. Therefore, this would comply with the minimum standard/requirements outlined within the EPUK & IAQM criteria and as such no mitigation measures are envisaged to be required.

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

Site Suitability

7.15 The monitored annual mean concentrations for the closest automatic and non-automatic monitoring locations, and the modelled concentration for all the existing and proposed sensitive receptors has demonstrated that the proposed development site is likely to fall within APEC-A for site suitability.

7.16 In accordance with the exposure criteria in **Table 3.6**, APEC-A means that there should be no air quality grounds for refusal and the local air quality should be suitable to safeguard the health and amenity of new residents without mitigation.

8 Residual Effects and Conclusions

8.1 The proposed development site falls within the jurisdiction of Waverley Borough Council (WBC).

8.2 A review of the Air Quality Assessments undertaken by WBC has indicated there are two Air Quality Management Areas (AQMA) within the Borough (Farnborough and Godalming) which were declared in 2007 as a result of exceedances of the annual mean objective for Nitrogen Dioxide (NO_2).

8.3 The latest monitored annual mean concentrations for the closest automatic and non-automatic monitoring locations are below the annual mean objective for NO_2 and PM_{10}. In accordance with the exposure criteria in **Table 3.6**, the site is likely to fall within APEC-A for site suitability.

8.4 Additionally, the site-specific dispersion modelling also confirms that proposed development site is likely to fall within APEC-A for site suitability**,** which states the following:

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

8.5 A construction dust assessment has been undertaken for the three stages of construction activities associated with the proposed development in accordance with IAQM guidance on the assessment of dust from construction activities (**Appendix A**).

8.6 Mitigation measures have been proposed for construction traffic and stationary plant associated with the proposed development.

8.7 Following the successful implementation of the specific mitigation measures, the residual effects of construction dust and emissions from construction plant/vehicles upon the local area and sensitive receptors although adverse, will be temporary and considered to be 'not significant'.

8.8 The predicted net traffic associated with the proposed development is unlikely to result in a detrimental pollution impact upon the local highway network and the local pollution levels.

8.9 Daedalus Environmental Limited have indicated that the Energy Strategy is likely to include the use Air Source Heat Pumps (ASHP).

8.10 The ASHP, being electric, are not directly associated with any NOx or Particulate emissions. As such, the proposed energy strategy would be fully compliant with the minimum standard/requirements outlined within the EPUK & IAQM criteria.

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

Conclusion

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

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

Appendix A: Construction Dust Assessment

CONSTRUCTION DUST ASSESSMENT

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

Screen the Need for a Detailed Assessment

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

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

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

Assess the Risk of Dust Impacts

A.4 Since demolition will not be required (greenfield site), the construction activities associated with the proposed development have been separated into three stages:

- Earthworks;
- Construction; and
- Trackout.

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

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

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

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

Table A.1: Dust Emission Magnitude Criteria

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

Construction Activity	Dust Emission Magnitude	Justification
Earthworks	Large	Estimated total site area >10,000m^2 (116,084m^2)
Construction	Medium	Estimated total building volume between 25,000m^3 – 100,000m^3 (95,000m^3).
Trackout	Medium	Estimated to be 10-50 HDV outward movements in any one day based on the scale of the development site.

Table A.2: Dust Emission Magnitude Assessment

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

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

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

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

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

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

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

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

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

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors; and

- the duration of the potential impact, as a receptor may become more sensitive over time.

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

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

Table A.6: Sensitivity of the Surrounding Area Assessment

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

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

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

A.13 The risk of dust soiling has been considered **high** due to the risk of a primary school and other human receptors located in close proximity to the proposed site. The human health risk was considered **medium** due to the low PM_{10} background concentrations in the local area for 2019 (13.7µg/m^3) and nearby high sensitivity receptors, there are no ecological sites within 50m of the proposed site, therefore ecological sensitivity has been assessed as **low**.

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

Site-specific Mitigation

A.15 From the identification of the risk of impacts with no mitigation applied in **Table A.7**, it is possible to determine the specific mitigation measures that can be applied in relation to the level of risk associated with the construction activity. The mitigation measures described below are suggested as measures that should be included in a site-specific Construction Environmental Management Plan (CEMP). Due to the site being considered **High** Risk, the following mitigation measures are either D=Desirable, H=Highly Recommended or N=Not Required.

Earthworks:

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

Table A.8: Site Specific Mitigation Measures for Earthwork Activities

Construction:

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

Table A.9: Site Specific Mitigation Measures for Construction Activities

Trackout:

Mitigation Measures	Low Risk	Medium Risk	High Risk
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	D	H	H
Avoid dry sweeping of large areas.	D	H	H
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D	H	H
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	N	H	H
Record all inspections of haul routes and any subsequent action in a site log book.	D	H	H
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	N	H	H
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D	H	H
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	N	H	H
Access gates to be located at least 10 m from receptors where possible.	N	H	H

Table A.10: Site Specific Mitigation Measures for Trackout Activities

General Mitigation Measures:

Mitigation Measures	Low Risk	Medium Risk	High Risk
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	N	H	H
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary.	H	H	H
Display the head or regional office contact information	H	H	H

Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, realtime PM_{10} continuous monitoring and/or visual inspections.	D	H	H
Site Management			
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H	H	H
Make the complaints log available to the local authority when asked.	H	H	H
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	H	H	H
Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	N	N	H
Monitoring			
9. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	D	D	H
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked	H	H	H

Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H	H	H
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	N	H	H
Preparing and Maintaining the Site			
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H	H	H
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H	H	H
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	D	H	H
Avoid site runoff of water or mud.	H	H	H
Keep site fencing, barriers and scaffolding clean using wet methods.	D	H	H
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	D	H	H
Cover, seed or fence stockpiles to prevent wind whipping.	D	H	H
Operating Vehicle/Machinery and Sustainable Travel			
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable	H	H	H
Ensure all vehicles switch off engines when stationary - no idling vehicles.	H	H	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H	H	H

Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	D	D	H
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	N	H	H
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)	N	D	H
Operations			
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	H	H	H
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H	H	H
Use enclosed chutes and conveyors and covered skips.	H	H	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H	H	H
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	D	H	H
Waste Management			
Avoid bonfires and burning of waste materials.	H	H	H

Table A.11: Site Specific Mitigation Measures for General Activities

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

Determine Significant Effects

A.17 Prior to the implementation of any mitigation measures the highest significance of adverse effects was **high** risk for dust soiling, **medium** risk for human health and **low** risk for ecology, with dust emissions magnitude considered to be **large**.

A.18 The mitigation measures listed above are chosen based on their suitability to the site and to reduce the risk of adverse effects from the three stages of construction.

A.19 Through the implementation of site-specific mitigation measures (secured by planning condition), which are designed to mitigate potential dust impact, will ensure that potential significant adverse dust effects will not occur, and the residual effect will normally be 'not significant'.

Dust Monitoring:

A.20 The dust monitoring requirements are usually split in three categories as follows:

- **Negligible/Low risk** category sites- should not normally be necessary to undertake any quantitative air quality monitoring, although in some circumstances it may be applicable to undertake occasional surveys in the vicinity of the site boundary at least once on each working day.
- **Medium risk** category sites- should normally be adequate to undertake surveys of dust flux over the site boundary, and/or dust deposition/soiling rates around the site at nearby receptors, although this may have resource implications, and an approach based on continuous particulate matter monitoring may be preferred.
- **High risk** category sites- normally be necessary to supplement the monitoring for medium risk sites with monitoring of ambient PM concentrations. It is recommended that priority be assigned to the measurement of PM_{10}, as emissions of dust from construction sites are predominantly in the coarser fractions.

A.21 The proposed development site has been classified as having a **high risk** of dust soiling.

A.22 Therefore, dust monitoring, as specified above, should be undertaken during the relevant stages of construction to ensure that:

- The construction activities do not give rise to any exceedances of the air quality objectives for PM_{10} or $PM_{2.5}$.
- The agreed mitigation measures to control dust emissions are being applied and are effective.

- Any high levels of dust are attributed to specific activities on site to ensure that appropriate corrective measures take place.

A.23 The implementation of the specific mitigation measures given above within the CEMP will ensure that any potential adverse impacts from construction dust during all construction stages are avoided. It is noted by the IAQM that, through the use of effective mitigation, the effects of dust from construction activity will normally not be considered significant.

A.24 Compliance should be secured through planning conditions, where necessary.

Conclusions of Construction Dust Assessment

A.25 The completion of the construction dust assessment has shown that the residual effect of the proposed development in the context of construction dust emissions will be 'not significant' after mitigation. This conclusion has been made based on the **large** dust emissions magnitude related to the scale of development and the assumption that the suggested mitigation measures will be implemented (secured by planning condition) and is relevant for all sensitive receptors within 350m of the site.

A.26 It should be noted that even with a rigorous CEMP in place, it is not possible to guarantee that all mitigation measures will be effective at all times. If there is an interruption in the water supply used for dust suppression or adverse weather conditions are experienced that exacerbate dust emissions, the receptors may experience occasional, short term dust annoyance.

A.27 However, the likely scale of this would not normally be considered sufficient to change the conclusion of this assessment. It is therefore important to consider all mitigation measures and provide a frequent review and assessment procedure at each stage, to ensure that mitigation measures continue to provide the maximum attenuation level possible.

Appendix B: Time Variation Hourly Factors

Time Variation Hourly Factors

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

Table B.1: Time Variation Hourly Factors

Appendix C: Model Verification

Model Verification

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

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

C.3 Additionally, there was very limited traffic data available at locations where air pollutions levels are known (monitoring locations). Therefore, verification was undertaken at the only roadside monitoring location where traffic data was available for (WBC46).

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

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

C.6 The initial model verification result, before adjustment, is set out in **Figure C.1** which clearly demonstrates that the monitoring location was underestimating.

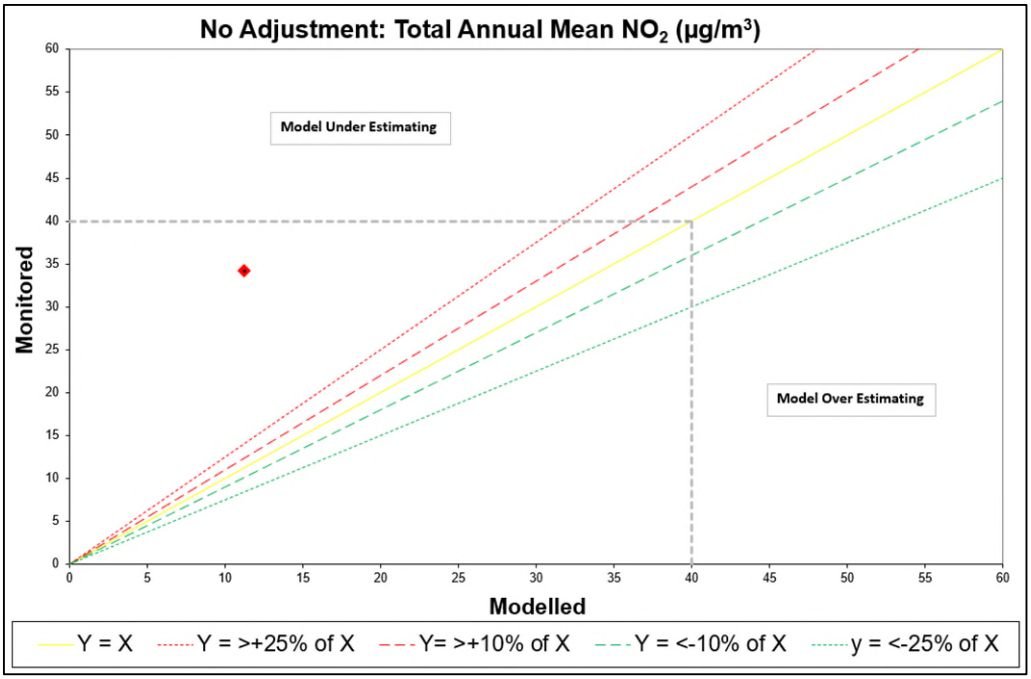

Figure C.1: Verification Model Before Adjustment

C.7 In accordance with the LAQM TG22, an adjustment correction factor of 11.8 has been calculated and applied to the modelled road contribution NO_x.

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

C.9 The verification process, following adjustment, demonstrated that the modelling result for the location was <10% margin of error when compared to the monitoring value at the same location. This is demonstrated in **Table C.1** below.

Site	Coordinates	Total Monitored NO_2	Total Modelled NO_2 (Adjusted)*	% Difference**
WBC46	505795, 139054	34.2	36.8	7.4
*calculated using modelled results for road-NO_x and NOx to NO_2 calculator. ** Percentage Difference = Absolute difference / Average x 100				

Table C.1: Results of Verification Exercise Model Following Adjustment

C.10 **Figure C.2** below demonstrates the model performance following adjustment. The location now lies within <10% margin of error.

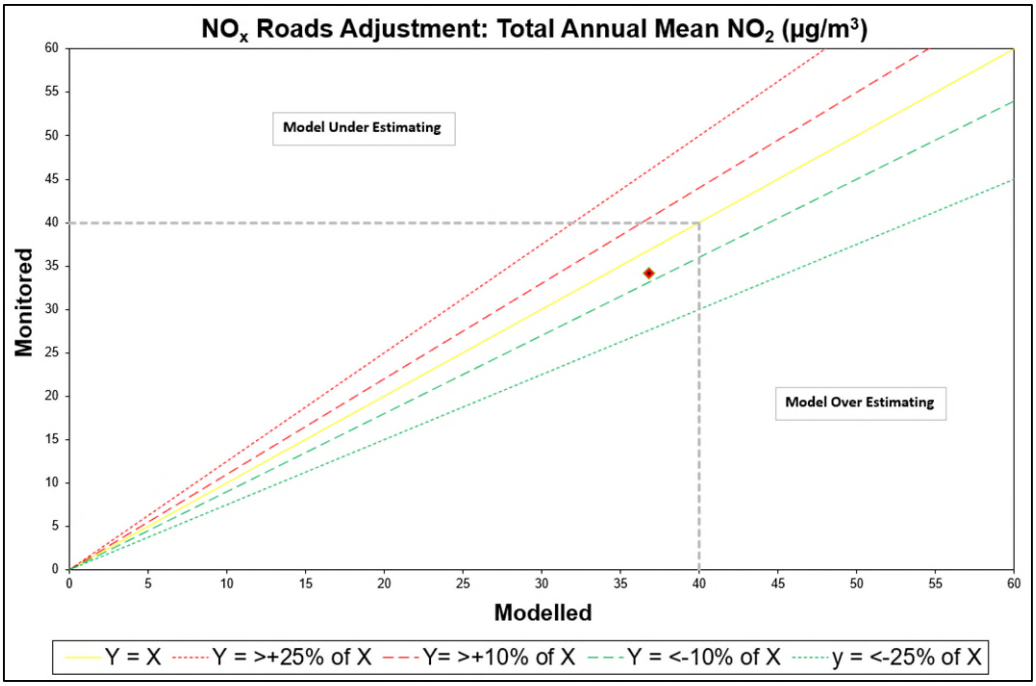

Figure C.2: Verification Model After Adjustment

C.11 Subsequently and in accordance with the LAQM TG22, a correction factor of 11.8 has been applied to all modelled results for all pollutants assessed (applied to NOx then converted to NO_2, PM_{10} and $PM_{2.5}$).