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RAPLEYS LLP

BP TOLLGATE GRAVESEND

AIR QUALITY ASSESSMENT

MAY 2024

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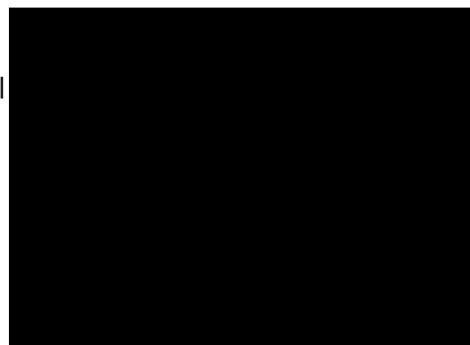
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DRAWINGS	TITLE	SCALE
GM13279-001	Air Quality Receptor Locations Plan	1:7,500

EXECUTIVE SUMMARY

An air quality assessment has been undertaken to accompany a planning application for a proposed development at the former Tollgate Hotel site off Wrotham Road and Watling Street, Gravesend. It is proposed to demolish the former Tollgate Hotel/restaurant buildings and construct a petrol filling station/electric vehicle (EV) charging hub with associated sales building and parking.

The assessment has considered dust and fine particulate matter during the construction phase, and road traffic emissions during the operational phase.

During the construction phase, the risk of dust soiling effects is classed as low for demolition, construction and trackout, and negligible for earthworks; the risk of human health effects is classed as low for demolition, construction and trackout, and negligible for earthworks. Mitigation measures have been proposed, to further reduce any potential impacts, based on best practice guidance.

For the operational phase assessment, annual mean NO₂, PM₁₀ and PM_{2.5} concentrations have been modelled at seven existing receptor locations, using the most recent Emission Factor Toolkit available from DEFRA (EFT v12.0.1). Predicted annual mean concentrations have been compared to the relevant air quality objectives and target level.

The operational phase assessment has concluded that the development will result in concentrations of NO₂, PM₁₀ and PM_{2.5} remaining below the air quality objectives/target values, both without and with the development for the proposed 2025 Opening Year and 2028 Future Year. The impact of the development is predicted to be negligible at all seven existing sensitive receptors that were assessed. Air quality effects are therefore considered to be 'not significant'.

The assessment has demonstrated that the Proposed Development will not lead to an unacceptable risk from air pollution, or to any breach in national objectives. Therefore, there are no material reasons in relation to air quality why the proposed scheme should not proceed, subject to appropriate planning conditions.

1 INTRODUCTION

1.1 Background

- 1.1.1 Wardell Armstrong LLP (WA) has been commissioned by Rapleys LLP to undertake an air quality assessment to accompany a planning application for a proposed development at the Former Tollgate Hotel Site, off Wrotham Road and Watling Street, Gravesend.
- 1.1.2 It is proposed to demolish the former Tollgate Hotel/restaurant buildings and to construct a petrol filling station/electric vehicle (EV) charging hub with associated sales building and parking spaces.
- 1.1.3 This report details the results of the air quality assessment undertaken to accompany a planning application for the proposed development. The report discusses the potential dust and fine particulate matter impacts associated with the construction phase, and an assessment of the potential air quality impacts of the additional road traffic generated by the proposed development. Air pollutant concentrations are considered at seven existing sensitive receptor locations in the vicinity of the proposed development.

2 LEGISLATION AND POLICY CONTEXT

2.1 Relevant Air Quality Legislation and Guidance

2.1.1 The air quality assessment has been undertaken in accordance with the following legislation and guidance:

- The Environment Act 1995, as amended 2021;
- Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, August 2023;
- The Air Quality Standards Regulations 2010;
- Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017;
- Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(22), August 2022;
- The Institute of Air Quality Management (IAQM), Guidance on the Assessment of Dust from Demolition and Construction (v2.2), January 2024;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework, December 2023; and
- Department for Communities and Local Government, Planning Practice Guidance: Air Quality, November 2019.

2.1.2 Further details of these documents are included in **Appendix A**.

2.2 Assessment Criteria

2.2.1 The relevant air quality objectives and limit values for this assessment are included within Table 1.

Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment*			
Pollutant	Objective/Limit Value	Averaging Period	Obligation
Nitrogen Dioxide (NO ₂)	200µg/m ³ , not to be exceeded more than 18 times a year	1-hour mean	All local authorities
	40µg/m ³	Annual mean	All local authorities
Particulate Matter (PM ₁₀)	50µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean	England, Wales and Northern Ireland
	40µg/m ³	Annual mean	England, Wales and Northern Ireland

Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment*

Pollutant	Objective/Limit Value	Averaging Period	Obligation
Particulate Matter (PM _{2.5})	Limit Value of 20µg/m ³	Annual mean	England, Wales and Northern Ireland
<i>*In accordance with the Air Quality Standards Regulations 2010</i>			

2.2.2 Further details of where these objectives and limit values apply are detailed in **Appendix A.**

3 ASSESSMENT METHODOLOGY

3.1 Consultation and Scope of Assessment

3.1.1 The assessment methodology was agreed with Ms. Deborah Wilders at Gravesham Borough Council (GBC) via email correspondence, on the 22nd March and the 23rd March 2023.

3.1.2 A summary of the consultation undertaken is provided in Table 2.

Table 2: Summary of Consultation		
Assessment Stage	Proposed Method	Response
Construction phase assessment to consider dust and fine particulate matter (PM ₁₀)	Qualitative assessment in accordance with Institute of Air Quality Management (IAQM) guidance	No objection to method.
Operational phase assessment to consider nitrogen dioxide (NO ₂) and fine particulate matter (PM ₁₀ and PM _{2.5})	Detailed assessment using the ADMS-Roads atmospheric dispersion model, in accordance with Environmental Protection UK (EPUK)/IAQM guidance, and with all predicted concentrations compared to air quality objectives.	No objection to method.
	Scenarios to be included are a Base Year, an Opening Year and a Future Year (for without and with development).	
	Numerical Weather Prediction (NWP) Meteorological Data centred at the proposed development will be used in the model.	
	Verification will be undertaken using monitoring locations on the A2.	
	NO ₂ , NO _x , PM ₁₀ and PM _{2.5} background concentrations would be obtained from the 2018-based DEFRA default maps.	
	Assessment undertaken using Emission Factor Toolkit 11 (EFT v11)*.	
*Since the methodology was agreed to by GBC, Defra have released an updated EFT; EFT v12.0.1 (December 2023). Therefore, this version has been used in the assessment.		

3.1.4 In addition, GBC requested that topography data is included in the model, and for a damage cost and mitigation assessment to be included within the report.

3.1.5 Topography data has been included in the model; details of which are provided in **Appendix C**. Further details relating to the damage cost and mitigation assessment can be found in Section 5.4.

3.2 Construction Phase Assessment

3.2.1 To assess the impacts associated with dust and fine particulate matter releases during the construction phase of the development, an assessment has been undertaken in accordance with guidance from the Institute of Air Quality Management (IAQM)¹. Further details of the construction assessment methodology are provided in **Appendix B**.

3.2.2 The closest sensitive human receptors to where construction activities will take place are detailed in Table 3. However, it should be noted that the assessment includes consideration of all sensitive receptors within 250m of where these activities occur, in accordance with the IAQM guidance.

Table 3: Closest Existing Sensitive Receptors Considered in the Construction Phase Assessment		
Receptor	Direction from the Site	Approximate Distance from the Site Boundary (m)
Existing Residential Dwellings on Wrotham Road	North	Approximately 56m at closest point
CycloPark, The Tollgate	Northwest	Approximately 170m at closest point

3.2.3 There are no ecological receptors, or potentially dust sensitive statutory designated habitat sites, within 50m of the site and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s). Ecological effects do not therefore need to be considered within this assessment.

3.2.4 The criteria used to assess the construction impact of the proposed development, and the associated significance of effects at existing sensitive receptors, are included in **Appendix B**.

¹ Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (v2.2), January 2024

3.3 Operational Phase Assessment

3.3.1 The air dispersion model ADMS-Roads (CERC, Version 5.0.1) has been used to assess the impacts associated with road traffic emissions during the operational phase assessment. The impacts have been assessed in accordance with guidance from Environmental Protection UK (EPUK) and the IAQM². Further details of the modelling and assessment methodology are provided in **Appendix C**.

3.3.2 NO₂, PM₁₀ and PM_{2.5} concentrations have been predicted at existing and proposed sensitive receptors, as these are the pollutants considered most likely to exceed the objectives and limit values.

3.3.3 Air dispersion modelling has been carried out to estimate pollutant concentrations, due to road traffic emissions, for five assessment scenarios as follows:

- **Scenario 1:** 2019 Verification and Base Year;
- **Scenario 2:** 2025 Opening Year, Without Development, but including committed development;
- **Scenario 3:** 2025 Opening Year, With Development and committed development;
- **Scenario 4:** 2028 Future Year, Without Development, but including committed development; and
- **Scenario 5:** 2028 Future Year, With Development, and committed development.

3.3.4 Markides Associates, the appointed Transport Consultant working on the project has confirmed that the traffic data is a combination of 2019 and 2023 flows. Therefore, to be more robust, a Base Year of 2019 has been used in the assessment (as the predicted emissions and background concentrations will be higher).

Existing Sensitive Receptors

3.3.5 Seven existing sensitive receptors (identified as ESR 1 to ESR 7) have been selected for consideration in the air quality assessment. These have been chosen based on their sensitivity and their proximity to roads which will be affected by development generated traffic.

3.3.6 Details of these receptors considered are provided in Table 4.

² Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

Table 3: Existing Sensitive Receptors Considered in Operational Phase Assessment

Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 1	Residential dwelling off Wrotham Road	564262	171671	Residential
ESR 2	Residential dwelling off Wrotham Road	564258	171639	Residential
ESR 3	Residential dwelling off Wrotham Road	564246	171487	Residential
ESR 4	Residential dwelling off Wrotham Road	564250	171354	Residential
ESR 5	Residential dwelling off Harvest Lane	564061	171599	Residential
ESR 6	Residential dwelling off A227 Wrotham Road	563995	170307	Residential
ESR 7	Residential dwelling off Roman Road	562489	172140	Residential

3.3.7 The criteria used to assess the operational impact of the proposed development, and the associated significance of effects, at existing sensitive receptors are included in **Appendix C**.

Proposed Sensitive Receptors

3.3.8 The proposed petrol filling/EV charging development is commercial in nature and no long-term sensitive uses are proposed. Future users (employees and visitors) will therefore not be exposed to the annual mean air quality objectives or the 24-hour objectives.

3.3.9 LAQM.TG(22) provides the following information in relation to the one-hour NO₂ objective:

- If the annual mean is greater than 60 µg/m³, there is a possibility that the one-hour mean could be exceeded. LAQM.TG(22) suggests that this is the indicative concentration at which a Local Authority should consider detailed monitoring to determine whether a one-hour exceedance may occur.

3.3.10 Local air quality concentrations (determined from GBC local monitoring, see Section 4) are well below the 60µg/m³ annual mean.

3.3.11 The air quality risk to future users to the short term NO₂ objective is considered to be negligible, not significant and does not require further assessment.

3.4 Limitations and Uncertainties

3.4.1 Air quality assessments make use of official sources of information (i.e., vehicle emission factors and background concentrations) which have historically been considered to be overly optimistic. Monitoring data collected by the UK Government and local authorities over the past few years has shown that annual mean NO₂ concentrations remained higher than previously expected (especially in roadside locations). This was widely thought to be due to the lower-than-expected decline in NO_x emissions from diesel vehicles (even as new Euro standards have been introduced), coupled with an overall increase in the number of diesel vehicles on the road.

3.4.2 The vehicle emission factors used in this assessment are from Defra's Emission Factor Toolkit (EFT v12.0.1), which is the most up-to-date version available.

3.4.3 A position statement was produced by the IAQM in 2018 which dealt specifically with the use of EFT v8.0 and the consideration of uncertainties in predicting future air quality. The statement concluded that the approaches for dealing with this uncertainty should be decided on a case-by-case basis, but may include the use of a sensitivity test in which it is assumed that NO_x emissions will not reduce as quickly over time as within the EFT.

3.4.4 A later study provided evidence that EFT v9.0 may be relied upon to predict the 'most likely' future emissions reductions, as long as model verification has been undertaken using monitored data from 2016 or later.

3.4.5 The IAQM has recently withdrawn its 2018 position statement on the consideration of uncertainties in predicting future air quality. A growing body of evidence suggests that the latest COPERT vehicle emission factors used in EFT v9.0 (and later) reflect real-world NO_x emissions more accurately. As a result, the IAQM judges that "an exclusively vehicle emissions-based sensitivity test is no longer necessary". This is provided that the assessment has been verified using monitoring data from 2016 or later.

3.4.6 In accordance with Defra guidance, the air quality assessment has been carried out using EFT v12.0.1. As it has been possible to undertake model verification, a sensitivity analysis is not required. Further details can be found in **Appendix C**.

3.4.7 The proposed development includes the addition of an EV charging hub, meaning vehicles on the site access road are likely to be a mixture of PFS and EV vehicles. Therefore, not all vehicles entering the development will emit NO₂. To account for this in the assessment, separate model runs were carried out to ensure that the PM₁₀ and PM_{2.5} from EV vehicles were included in the results while discounting any NO₂ emissions from these vehicles.

4 BASELINE SITUATION

4.1 Gravesham Borough Council Local Air Quality Management

4.1.1 The proposed development site is located within the administrative area of GBC, which is responsible for the management of local air quality.

4.1.2 There are currently four AQMAs declared within GBC, as a result of exceedances of the annual mean NO₂ objective, two of which are also as a result of exceedances of the annual mean PM₁₀ objective. The four AQMAs are:

- Gravesham A2 AQMA: An area extending either side of the length of the A2 within the borough;
- Northfleet Industrial Area AQMA: An area encompassing the Northfleet Industrial area in Gravesham;
- Gravesham A227 Wrotham Road/B261 Old Road West AQMA: An area encompassing the junction of the A227 Wrotham Road and B261 Old Road West; and
- Gravesham A226 One-way system AQMA: An area incorporating the entirety of the A226 One-way system in Gravesend.

4.1.3 The proposed development site lies within the Gravesham A2 AQMA boundary and is therefore located in a known area of concern with regard to poor air quality.

4.1.4 The GBC 2023 Annual Status Report (ASR - the most recent report available online) has been reviewed. In 2022, GBC undertook air quality monitoring at 66 non-automatic diffusion tubes and 2 automatic monitors across the administrative area. There are no air quality monitors in the vicinity of the proposed development, however the closest monitoring location is ZG2, an automatic monitor approximately 2.25km west of the proposed development site. This monitor measured concentrations of 22.2µg/m³ and 15.3µg/m³ of NO₂ and PM₁₀ in 2022, respectively. Using the PM₁₀ annual averages, the estimated PM_{2.5} annual average for the monitoring location is 8.9µg/m³ (as reported in the GBC 2023 Annual Status Report).

4.2 Background Air Pollutant Concentrations

4.2.1 The air quality assessment needs to take into account background concentrations upon which the local, traffic derived pollution is superimposed.

4.2.2 As there are currently no representative NO₂, PM₁₀ or PM_{2.5} background monitoring locations in the vicinity of the proposed development site, background concentrations have been obtained from the 2018-based Defra default concentration maps, for the appropriate grid squares .

4.2.3 The background pollutant concentrations used in this assessment are detailed in Table 5.

Table 4: Background Pollutant Concentrations Used in the Air Quality Assessment*				
Receptors (x, y Grid Reference)	Oxides of Nitrogen (NO _x)	Nitrogen Dioxide (NO ₂)	Particulate matter (PM ₁₀)	Particulate matter (PM _{2.5})
2019 Annual Mean Concentrations (µg/m ³)				
ESR 1 – ESR 5 (564500, 171500)	27.69	19.41	17.77	11.72
ESR 6 (563500, 170500)	21.33	15.42	16.78	10.93
ESR 7 (562500, 172500)	31.72	19.42	18.45	12.27
2025 Annual Mean Concentrations (µg/m ³)				
ESR 1 – ESR 5 (564500, 171500)	20.79	15.09	16.54	10.75
ESR 6 (563500, 170500)	16.83	12.47	15.57	9.98
ESR 7 (562500, 172500)	23.89	17.00	17.19	11.28
2028 Annual Mean Concentrations (µg/m ³)				
ESR 1 – ESR 5 (564500, 171500)	18.77	13.75	16.56	10.77
ESR 6 (563500, 170500)	15.63	11.65	15.59	10.00
ESR 7 (562500, 172500)	21.61	15.53	17.21	11.30
*Obtained from the Defra 2018-based background maps.				

4.3 Modelled Baseline Concentrations at Existing Sensitive Receptors

4.3.1 The baseline assessment (i.e., scenarios 1, 2 and 4) has been carried out for the seven existing sensitive receptors considered, in accordance with Defra guidance (i.e., using EFT v12.0.1). The adjusted NO₂, and unadjusted PM₁₀ and PM_{2.5} concentrations are detailed in Table 6.

Table 5: Predicted Adjusted NO₂, and unadjusted PM₁₀ and PM_{2.5} Concentrations at Existing Sensitive Receptors for Scenarios 1, 2 and 4 Using Emission Factor Toolkit Version 12.0.1

Receptor	Calculated Annual Mean Concentrations (µg/m ³)								
	Scenario 1: 2019 Base Year			Scenario 2: 2025 Opening Year, Without Development			Scenario 4: 2028 Future Year, Without Development		
	NO ₂ *	PM ₁₀	PM _{2.5}	NO ₂ *	PM ₁₀	PM _{2.5}	NO ₂ *	PM ₁₀	PM _{2.5}
ESR 1	25.50	18.59	12.21	18.42	17.28	11.16	16.04	17.31	11.18
ESR 2	25.50	18.57	12.20	18.37	17.26	11.14	16.01	17.28	11.16
ESR 3	25.56	18.48	12.15	18.20	17.13	11.08	15.87	17.15	11.09
ESR 4	26.95	18.59	12.23	18.58	17.16	11.10	16.13	17.18	11.12
ESR 5	25.34	18.50	12.16	18.25	17.18	11.11	15.93	17.20	11.12
ESR 6	18.05	17.14	11.14	13.89	15.91	10.16	12.63	15.93	10.18
ESR 7	30.37	19.33	12.87	23.05	17.98	11.76	19.68	18.00	11.78
*NO ₂ concentrations obtained by inputting predicted NO _x concentrations into the NO _x to NO ₂ calculator ³ in accordance with LAQM.TG(22)									

4.3.2 The results show that all predicted NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant objectives and limit values.

³ Defra Local Air Quality Management webpages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

5 IMPACT ASSESSMENT

5.1 Construction Phase Assessment

Step 2- Impact Assessment

- 5.1.1 In accordance with the IAQM guidance, the main activities to be considered during the construction phase of the proposed development are demolition, earthworks, construction and trackout.
- 5.1.2 Demolition activities are focused on the removal of any existing buildings or structures on the site. Demolition of the former Tollgate Hotel/restaurant buildings is included in the proposals; therefore this aspect has been included within the construction phase assessment.
- 5.1.3 Earthworks covers the processes of soil-stripping, ground levelling, excavation and landscaping. Construction activities will focus on the proposed buildings, access roads and car parking areas. Trackout is defined as the transport of dust and dirt by vehicles travelling from a construction site on to the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the site. This dust and dirt can then be deposited and re-suspended by other vehicles.

Step 2A

- 5.1.4 Step 2A of the assessment defines the potential dust emission magnitude from demolition, earthworks, construction and trackout in the absence of site-specific mitigation.
- 5.1.5 Examples of the criteria for the dust emission classes are detailed in **Appendix B**. The results of this step are detailed in Table 7.

Step 2B

- 5.1.6 Step 2B of the construction phase dust assessment defines the sensitivity of the area, taking into account the significance criteria detailed in **Appendix B**, for demolition, earthworks, construction and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling and human health effects and ecological effects.
- 5.1.7 For demolition, there are 10-100 high sensitivity receptors within 100m of where these activities may take place.

5.1.8 For earthworks and construction, there are between 10-100 high sensitivity receptors within 100m of where these activities may take place.

5.1.9 The routing of construction vehicles is unknown at this stage; however it is assumed vehicles would travel east/west along the A2.

5.1.10 As a result, for trackout, there are 10-100 high sensitivity receptors within 50m of where trackout may occur for a distance of up to 250m from the site entrance.

Step 2C

5.1.11 Step 2C of the construction phase dust assessment defines the risk of impacts from each activity, by combining the dust emission magnitude with the sensitivity of the surrounding area.

5.1.12 The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in **Appendix B**. The results of this step are detailed in Table 7.

Summary of Step 2

5.1.13 Table 7 details the results of Step 2 of the construction phase assessment for human receptors.

Table 6: Construction Phase Dust Assessment for Human Receptors				
	Activity			
	Demolition	Earthworks	Construction	Trackout
Step 2A				
Dust Emission Magnitude	Medium ^a	Small ^b	Medium ^c	Medium ^d
Step 2B				
Sensitivity of Closest Receptors	High	High	High	High
Sensitivity of Area to Dust Soiling Effects	Low	Low	Low	Low
Sensitivity of Area to Human Health Effects	Low ^e	Low ^e	Low ^e	Low ^e
Step 2C				
Dust Risk: Dust Soiling	Low Risk	Negligible Risk	Low Risk	Low Risk
Dust Risk: Human Health	Low Risk	Negligible Risk	Low Risk	Low Risk

Table 6: Construction Phase Dust Assessment for Human Receptors

	Activity			
	Demolition	Earthworks	Construction	Trackout
a. Total building volume estimated to be 12,000m³-75,000m³ b. Total site area estimated to be between <18,000m² c. Total building volume estimated to be bet 12,000m³-75,000m³, with potentially dusty construction materials d. Number of construction phase vehicles estimated to be 20-50 movements per day e. Background annual mean PM₁₀ concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid square for 2024				

Step 3- Mitigation

5.1.14 During the construction phase, the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and particulate matter to be generated.

5.1.15 Step 2C of the assessment has identified that the risk of dust soiling and human health effects is not negligible for all the activities and therefore site-specific mitigation will need to be implemented to ensure dust effects from these activities will be not significant, examples of which can be found below.

Recommendations for Site-Specific Mitigation

5.1.16 Specific mitigation relating to dust control may be in the form of construction best practices or could include a dust action plan. Recommendations for mitigation within the IAQM guidance are found in Table 8 below.

Table 7: Dust Control & Mitigation Measures

Issue	Control Measure
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.
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. - 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 logbook.

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 windowsills 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.
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. • 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 active 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 cover as described below. • 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. • 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.

	• 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.
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.
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. • 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. • For smaller supplies of fine power 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. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. • Record all inspections of haul routes and any subsequent action in a site logbook. • Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. • Implement a wheel washing system. • 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. • Access gates to be located at least 10 m from receptors where possible.

5.1.17 It is recognised that the final design solutions will be developed with the input of the Contractor to maximise construction efficiencies, to use modern construction techniques and sustainable materials and to incorporate the particular skills and experience offered by the appointed contractor.

Step 4 - Residual Effects

5.1.18 Step 4 of the construction phase dust assessment has been undertaken to determine the significance of the dust effects arising from demolition, earthworks, construction and trackout associated with the proposed development.

5.1.19 The implementation of effective mitigation measures during the construction phase, such as those detailed in Step 3, will substantially reduce the potential for nuisance dust and fine particulate matter to be generated and any residual impact should be not significant.

5.2 Operational Phase Assessment

Existing Sensitive Human Receptors - 2025 Opening Year

5.2.1 The impact assessment has been carried out for the seven representative existing sensitive receptors considered (ESR 1 to ESR 7) using EFT v12.0.1.

5.2.2 Table 9 details the predicted NO₂ concentrations for the 2025 Opening Year, for both the 'Without Development' and 'With Development' scenarios, in accordance with Defra guidance. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 8: Predicted Adjusted NO₂ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit Version 12.0.1

Receptor	Calculated Annual Mean NO ₂ Concentrations (µg/m ³) ^a				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact ^b
		Concentration	Percentage in Relation to AQAL		
ESR 1	18.42	18.42	<75%	<0.5%	Negligible
ESR 2	18.37	18.38	<75%	<0.5%	Negligible
ESR 3	18.20	18.20	<75%	<0.5%	Negligible
ESR 4	18.58	18.61	<75%	<0.5%	Negligible
ESR 5	18.25	18.25	<75%	<0.5%	Negligible
ESR 6	13.89	13.89	<75%	<0.5%	Negligible
ESR 7	23.05	23.05	<75%	<0.5%	Negligible

a. NO₂ concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO₂ calculator, in

Table 8: Predicted Adjusted NO₂ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit Version 12.0.1

Receptor	Calculated Annual Mean NO ₂ Concentrations (µg/m ³) ^a				
	Without Development	With Development		Concentration Change as Percentage of AQUAL	Impact ^b
		Concentration	Percentage in Relation to AQUAL		
accordance with LAQM.TG(22)					
b. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible					

5.2.3 Table 10 details the PM₁₀ concentrations for the 2025 Opening Year, for both the ‘Without Development’ and ‘With Development’ scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 9: Predicted Unadjusted PM₁₀ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using Emission Factor Toolkit Version 12.0.1

Receptor	Calculated Annual Mean PM ₁₀ Concentrations (µg/m ³)				
	Without Development	With Development		Concentration Change as Percentage of AQUAL	Impact ^a
		Concentration	Percentage in Relation to AQUAL		
ESR 1	17.28	17.28	<75%	<0.5%	Negligible
ESR 2	17.26	17.26	<75%	<0.5%	Negligible
ESR 3	17.13	17.13	<75%	<0.5%	Negligible
ESR 4	17.16	17.17	<75%	<0.5%	Negligible
ESR 5	17.18	17.18	<75%	<0.5%	Negligible
ESR 6	15.91	15.91	<75%	<0.5%	Negligible
ESR 7	17.98	17.98	<75%	<0.5%	Negligible
<i>a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible</i>					

5.2.4 Table 11 details the PM_{2.5} concentrations for the 2025 Opening Year, for both the ‘Without Development’ and ‘With Development’ scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 10: Predicted Unadjusted PM_{2.5} Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using Emission Factor Toolkit Version 12.0.1

Receptor	Calculated Annual Mean PM _{2.5} Concentrations (µg/m ³)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact ^a
		Concentration	Percentage in Relation to AQAL		
ESR 1	11.16	11.16	<75%	<0.5%	Negligible
ESR 2	11.14	11.14	<75%	<0.5%	Negligible
ESR 3	11.08	11.08	<75%	<0.5%	Negligible
ESR 4	11.10	11.11	<75%	<0.5%	Negligible
ESR 5	11.11	11.11	<75%	<0.5%	Negligible
ESR 6	10.16	10.16	<75%	<0.5%	Negligible
ESR 7	11.76	11.76	<75%	<0.5%	Negligible

a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible

Existing Sensitive Human Receptors - 2028 Future Year

5.2.5 Table 12 details the predicted NO₂ concentrations for the 2028 Future Year, for both the 'Without Development' and 'With Development' scenarios, in accordance with Defra guidance. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 11: Predicted Adjusted NO₂ Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit Version 12.0.1

Receptor	Calculated Annual Mean NO ₂ Concentrations (µg/m ³) ^a				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact ^b
		Concentration	Percentage in Relation to AQAL		
ESR 1	16.04	16.04	<75%	<0.5%	Negligible
ESR 2	16.01	16.01	<75%	<0.5%	Negligible
ESR 3	15.87	15.87	<75%	<0.5%	Negligible
ESR 4	16.13	16.14	<75%	<0.5%	Negligible
ESR 5	15.93	15.93	<75%	<0.5%	Negligible
ESR 6	12.63	12.63	<75%	<0.5%	Negligible
ESR 7	19.68	19.68	<75%	<0.5%	Negligible

a. NO₂ concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO₂ calculator, in accordance with LAQM.TG(22)

b. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible

5.2.6 Table 13 details the PM₁₀ concentrations for the 2028 Future Year, for both the 'Without Development' and 'With Development' scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 12: Predicted Unadjusted PM ₁₀ Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using Emission Factor Toolkit Version 12.0.1					
Receptor	Calculated Annual Mean PM ₁₀ Concentrations (µg/m ³)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact ^a
		Concentration	Percentage in Relation to AQAL		
ESR 1	17.31	17.31	<75%	<0.5%	Negligible
ESR 2	17.28	17.28	<75%	<0.5%	Negligible
ESR 3	17.15	17.15	<75%	<0.5%	Negligible
ESR 4	17.18	17.19	<75%	<0.5%	Negligible
ESR 5	17.20	17.20	<75%	<0.5%	Negligible
ESR 6	15.93	15.93	<75%	<0.5%	Negligible
ESR 7	18.00	18.00	<75%	<0.5%	Negligible
a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible					

5.2.7 Table 14 details the PM_{2.5} concentrations for the 2028 Future Year, for both the 'Without Development' and 'With Development' scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

Table 13: Predicted Unadjusted PM _{2.5} Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using Emission Factor Toolkit Version 12.0.1					
Receptor	Calculated Annual Mean PM _{2.5} Concentrations (µg/m ³)				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact ^a
		Concentration	Percentage in Relation to AQAL		
ESR 1	11.18	11.18	<75%	<0.5%	Negligible
ESR 2	11.16	11.16	<75%	<0.5%	Negligible
ESR 3	11.09	11.09	<75%	<0.5%	Negligible
ESR 4	11.12	11.12	<75%	<0.5%	Negligible
ESR 5	11.12	11.12	<75%	<0.5%	Negligible
ESR 6	10.18	10.18	<75%	<0.5%	Negligible
ESR 7	11.78	11.78	<75%	<0.5%	Negligible
a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible					

5.2.8 The results of the assessment show that all predicted NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant objectives and limit values. Additionally, the impact of the development is predicted to be negligible at all seven existing sensitive receptors that were assessed, in both the 2025 Opening and 2028 Future Year.

Proposed Sensitive Human Receptors

5.2.9 Due to the commercial nature of the development, there will not be any proposed sensitive receptors within the development, therefore, proposed sensitive human receptors not been considered in the air quality assessment.

5.3 Assessment of Significance for Human Receptors

5.3.1 The significance of the overall effects of the proposed development has been assessed in accordance with the EPUK/IAQM guidance. This assessment is based on professional judgement and details of the assessor's experience is included in **Appendix D**.

5.3.2 The assessment of significance has taken into account a number of factors, including:

- Baseline pollutant concentrations in the 2019 Base Year, 2025 Opening Year and 2028 Future Year scenarios are below the relevant annual mean objectives and limit values at all existing sensitive receptors considered; and
- The assessment predicts a negligible impact on concentrations of NO₂, PM₁₀ and PM_{2.5} at all existing sensitive receptors considered, with the development in place, in both the 2025 Opening and 2028 Future Year. Pollutant concentrations are also predicted to be below the relevant objectives and limit value.

5.3.3 Based on the above factors, in accordance with the EPUK/IAQM guidance, the air quality effect of the proposed development is considered to be **not significant**.

Recommendations for Mitigation

5.3.4 The impact of the proposed development is predicted to be not significant for human receptors. However, mitigation measures will assist in reducing any potential impact and general best practice measures in relation to air quality could be implemented.

5.3.5 It is understood that the proposed development is to incorporate the following air quality mitigation measures:

- Traffic assessment; and

- Sustainable Travel Plans.

5.4 Emissions Mitigation Assessment

5.4.1 A damage cost assessment was requested by GBC, which provides a basis for quantifying a financial commitment required to offset potential development-generated traffic emissions. An air pollution damage cost assessment would use the current DEFRA EFT (v12.0.1), to estimate the annual link emissions associated with **additional development generated vehicle trips** over a 5-year period. The appointed transport consultant, Markides Associates, confirmed that all visitors to the proposed development will be vehicles already on the highway, and therefore the development **will not generate any new trips**. Additionally, the proposed development will include an EV charging facility, meaning the development itself is mitigating against poor air quality. It is therefore not possible or appropriate to generate a damage cost and this has not been included as part of the assessment.

5.5 Petrol Filling Station – Benzene Emissions

- 5.5.1 The proposed development will introduce petrol filling points/pumps at the site. It is assumed each filling point will include a number of pumps either side of the divide (e.g. petrol, diesel).
- 5.5.2 Petrol stations are capable of contributing to localised emissions of benzene (C₆H₆). Benzene emissions in the United Kingdom are generally very low and are mostly accounted for in the previous rounds of Local Air Quality Management Reviews. No AQMA has been declared for Benzene since 2010 (when the last AQMA for benzene was revoked).
- 5.5.3 Table 7.3 of LAQM.TG(22) provides further guidance for screening benzene emissions from petrol filling stations.
- 5.5.4 Within the notes section of the table it states *“ignore petrol stations fitted with Stage 2 recovery systems”*. In 2009, a European Union Directive for petrol storage and distribution was released. This EU Directive (Directive 2009/126/EC)^[1], and subsequent minor updates to the Directive from Directive 2014/99/EU^[2], states Stage 2 recovery are now required for all petrol filling premises. The EU Directive wording also states existing premises may need to adapt their existing

[1] Directive 2009/126/EC of the European Parliament and of the Council of 21 October 2009 on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations

[2] Commission Directive 2014/99/EU of 21 October 2014 amending, for the purposes of its adaptation to technical progress, Directive 2009/126/EC on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations

infrastructure. Therefore, it is assumed that any new developments will now include Stage 2 recovery systems as standard.

- 5.5.5 The United Kingdom has exited the European Union and is progressing the transition agreement^[3]. During this transition, EU laws will be brought to Parliament and a decision will be made to either invoke or revoke the law to a United Kingdom law. The details of this are not yet known. The development would be built with the latest technology complying to EU regulations. Regardless, the UK has committed to not worsen environmental standards post-‘Brexit’.
- 5.5.6 In addition to the above, Table 7.3 also provides three criteria for when an assessment of benzene emissions is required; these include, >2 million litres per year, near a road with >30,000 vehicles/day and sensitive exposure within 10m of the pumps.
- 5.5.7 Following a review of the fuelling station it is determined that there are no sensitive receptors within 10m of fuel pumps and Stage 2 Recovery Systems will be installed at the development. The Stage 2 recovery system ensures there are no significant releases from the fuel pump and/or during deliveries.
- 5.5.8 Benzene emissions from the proposed development are considered to be not significant at sensitive receptors surrounding the site.

^[3] <https://www.gov.uk/transition>

6 CONCLUSIONS

6.1 Construction Phase

6.1.1 The construction phase assessment has been undertaken to determine the risk and significance of dust and fine particulate matter effects from demolition, earthworks, construction and trackout associated with the proposed development, in accordance with guidance published by the IAQM.

6.1.2 With site specific mitigation in place, the significance of dust and fine particulate matter effects from demolition, earthworks, construction and trackout is considered to be **not significant**.

6.2 Operational Phase

6.2.1 An air quality assessment has been undertaken to consider the potential impact of development generated vehicle trips on air quality at seven existing sensitive human receptors.

6.2.2 The assessment has been undertaken in accordance with Defra guidance, by using the latest vehicle emission factors from EFT v12.0.1.

6.2.3 Pollutant concentrations in the 2025 Opening and 2028 Future Year, with the development in place, are below the relevant annual mean objectives and limit values at the receptors considered.

6.2.4 The assessment predicts that the development will have a negligible impact on concentrations of NO₂, PM₁₀ and PM_{2.5} at all seven existing sensitive receptors considered in the 2025 Opening and 2028 Future Year. Pollutant concentrations are predicted to be below the air quality objectives in all scenarios considered.

6.2.5 The effect of the proposed development on existing human receptors is therefore considered to be **not significant**.

Recommendations for Mitigation

6.2.6 The impact of the proposed development is predicted to be not significant for human receptors. However, the mitigation measures will assist in reducing any potential air quality impact. The scheme itself incorporates an EV charging hub meaning future emissions will be reduced, therefore the proposed development is a form of air quality mitigation.

Summary

- 6.2.7 The assessment has demonstrated that the proposed development will not lead to an unacceptable risk from air pollution, nor will it lead to any breach of national objectives as required by national policy. The proposed development will be in accordance with all relevant national policy and there are no material reasons in relation to air quality why the proposed scheme should not proceed.

APPENDICES

Appendix A: Air Quality Legislation and Guidance

National Air Quality Strategy

- A.1 The Environment Act 1995 requires the UK government to prepare a national Air Quality Strategy. The first UK strategy was published in March 1997, setting out policies for the management of ambient air quality. This was subsequently updated in 2007¹.
- A.2 The 2007 strategy establishes the framework for air quality management in England, Scotland, Wales and Northern Ireland. Air quality standards and objectives are set out for eight pollutants which may potentially occur at levels that give cause for concern. The strategy also provides details of the role that local authorities are required to take in working towards improvements in air quality, known as the Local Air Quality Management (LAQM) regime.
- A.3 Defra published an updated air quality strategy in April 2023, and updated in August 2023². The revised strategy supersedes the 2007 strategy in England only and provides a framework to enable local authorities to make the best use of their powers and make improvements for their communities. It also includes guidance on the new fine particulate matter targets for England.

Air Quality Standards and Objectives

- A.4 Air quality standards and objectives are set out in the strategy for the following pollutants: nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO), lead (Pb), fine particulate matter (PM₁₀), benzene (C₆H₆), 1, 3-butadiene (C₄H₆) and ozone (O₃).
- A.5 Objectives for each pollutant, except O₃, were first given statutory status in the Air Quality Regulations 2000³ and Air Quality (Amendment) Regulations 2002⁴. These objectives are defined in the strategy as:

“the maximum ambient concentration not to be exceeded, either without exception

¹ Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007

² Department of Environment, Food and Rural Affairs, Air quality strategy: framework for local authority delivery, August 2023

³ The Air Quality Regulations 2000. SI No 928

⁴ The Air Quality (Amendment) Regulations 2002

or with a permitted number of exceedances, within a specified timescale.”

- A.6 EU limit values, set out within the Ambient Air Quality Directive 2008/50/EC⁵ (i.e. the CAFE Directive), were transposed into UK legislation on 11th June 2011 as The Air Quality Standards Regulations 2010. These are mostly the same as the air quality objectives in terms of concentrations; however, there are differences in determining how compliance is achieved. Although the UK is no longer part of the EU, no changes have yet been made to the objectives and limit values used in the management and assessment of air quality.
- A.7 Whilst there is no specific objective for PM_{2.5} in England and Wales, a limit value of 20µg/m³ is referred to in the regulations, which has been adopted for use in this assessment (as recommended by the LAQM Helpdesk). An objective has been set for PM_{2.5} in Scotland since early 2016. The Environment Act 2021 sets out a requirement to establish a target objective for PM_{2.5}, and this has now been set through the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. Annual mean concentrations of PM_{2.5} must now meet a target of 10 µg/m³ across England by 2040.
- A.8 Examples of where these objectives and limit values apply are detailed in the Defra LAQM Technical Guidance document LAQM.TG(22)⁶ and are included in Table A1.

Table A1: Examples of Where the Air Quality Objectives Should Apply		
Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes, etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean objectives would apply, together with hotels. Gardens of residential properties ^a	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term

⁵ Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

⁶ Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(22), August 2022

Table A1: Examples of Where the Air Quality Objectives Should Apply

Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
1-hour mean	All locations where the annual mean and 24 and 8-hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend one hour or longer	Kerbside sites where public would not be expected to have regular access
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	
^a. Such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied		

Local Air Quality Management

- A.9 LAQM legislation in the Environment Act 1995 requires local authorities to conduct the periodic review and assessments of air quality. These aim to identify all those areas where the objectives are being, or are likely to be, exceeded. Where exceedances are likely to occur, local authorities are required to declare an Air Quality Management Area (AQMA).
- A.10 LAQM.TG(22) presents a streamlined approach for LAQM in England and Scotland; however, Northern Ireland is still considering changes to LAQM and therefore works according to the previous regime.
- A.11 The Welsh Government amended the LAQM regime in Wales in 2017 by issuing new statutory policy guidance in order to bring the system into line with the Well-being of Future Generations (Wales) Act 2015⁷. This aims to achieve compliance with the national air quality objectives in specific hotspots and to reduce exposure to pollution more widely, so as to achieve the greatest public health benefit.
- A.12 Local authorities in England are required to produce Annual Status Reports (ASRs), and in Scotland and Wales, Annual Progress Reports (APRs). These replace all other reports which previously had to be submitted including Updating and Screening Assessments,

⁷ Well-being of Future Generations (Wales) Act 2015 (anaw 2)

Progress Reports and Detailed Assessments (which would be produced to assist with an AQMA declaration).

- A.13 Local authorities now have the option of a fast-track AQMA declaration option. This allows more expert judgement to be used and removes the need for a Detailed Assessment where a local authority is confident of the outcome. Detailed Assessments should however still be used if there is any doubt.
- A.14 As part of the UK Government's requirement to improve air quality, selected local authorities in England are also currently investigating the feasibility of setting up Clean Air Zones (CAZs). These are areas where targeted action and co-ordinated resources aim to improve air quality within an urban setting, in order to achieve compliance with the EU limit values within the shortest possible time.
- A.15 The first CAZs were implemented in Bath in March 2021, and in Birmingham in June 2021. Since then, CAZ's have also been declared in Bradford, Bristol, Portsmouth, Sheffield and Tyneside (Newcastle and Gateshead). In addition, the London Ultra Low Emission Zone (ULEZ) has now been expanded to incorporate all London Boroughs. The Greater Manchester CAZ, due to be introduced from 30 May 2022, has been delayed and is currently under review.

National Planning Policy Framework

- A.16 The National Planning Policy Framework (NPPF)⁸, introduced in March 2012 and most recently updated in December 2023, requires 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 AQMAs and CAZs, 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 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 AQMAs and CAZs is

⁸ Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2021

consistent with the local air quality action plan.”

Planning Practice Guidance

- A.17 The Planning Practice Guidance (PPG)⁹, updated in November 2019, states that whether or not 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 generate air quality impacts in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).
- A.18 Where a proposed development is anticipated to give rise to concerns about air quality, an appropriate assessment needs to be carried out. Where the assessment concludes that the proposed development (including mitigation) will not lead to an unacceptable risk from air pollution, prevent sustained compliance with national objectives or fail to comply with the requirements of the Habitats Regulations, then the local authority should proceed to decision with appropriate planning conditions and/or obligations.

⁹ Department for Communities and Local Government. Planning Practice Guidance: Air Quality, November 2019

Appendix B: Methodology for Construction Phase Assessment

Institute of Air Quality Management Guidance

- B.1 The methodology for the construction phase dust assessment is set out in guidance from the Institute of Air Quality Management (IAQM)¹⁰.

Step 1

- B.2 Step 1 is to screen the requirement for a more detailed assessment. The guidance states that an assessment will normally be required where there are existing sensitive human receptors within 250m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s).
- B.3 With regards to ecological receptors, the guidance states that an assessment will normally be required where there are existing receptors within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s).
- B.4 Where any of these criteria are met, it is necessary to proceed to Step 2.

Step 2

- B.5 Step 2 determines the potential risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological impacts. The risk is related to:
- The activities being undertaken (demolition, number of vehicles and plant etc);
 - The duration of these activities;
 - The size of the site;
 - The meteorological conditions (wind speed, direction and rainfall);
 - The proximity of receptors to the activity;
 - The adequacy of the mitigation measures applied to reduce or eliminate dust; and
 - The sensitivity of receptors to dust.

¹⁰ Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, January 2024

B.6 The risk of dust impacts is determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based upon the following two factors (known as Step 2A and Step 2B).

B.7 **Step 2A** assesses the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large. Examples of how the magnitude may be defined are included in Table B1.

Table B1: Determining the Dust Emission Magnitude of Construction Phase Activities			
Activity	Dust Emission Class		
	Large	Medium	Small
Demolition	Total building volume >75,000m ³ ; Potentially dusty construction material (e.g. concrete); On-site crushing and screening; Demolition activities >12m above ground level	Total building volume 12,000 - 75,000m ³ ; Potentially dusty construction material; Demolition activities 6-12m above ground level	Total building volume <12,000m ³ ; Construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months
Earthworks	Total site area >110,000m ² ; Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size); >10 heavy earth moving vehicles active at any one time; Formation of bunds >6m in height;	Total site area 18,000-110,000m ² ; Moderately dusty soil type (e.g. silt); 5-10 heavy earth moving vehicles active at any one time; Formation of bunds 3-6m in height;	Total site area <18,000m ² ; Soil type with large grain size (e.g. sand); <5 heavy earth moving vehicles active at any one time; Formation of bunds <4m in height;
Construction	Total building volume >75,000m ³ ; On-site concrete batching; Sandblasting	Total building volume 12,000 - 75,000m ³ ; Potentially dusty construction material (e.g. concrete); On-site concrete batching	Total building volume <12,000m ³ ; Construction material with a low potential for dust release (e.g. metal cladding or timber)
Trackout	>50 HDV (>3.5t) outward movements ^a in any one day ^b ; Potentially dusty surface material (e.g. high clay content); Unpaved road length >100m	20-50 HDV (>3.5t) outward movements ^a in any one day ^b ; Moderately dusty surface material (e.g. high clay content); Unpaved road length 50-100m	<20 HDV (>3.5t) outward movements ^a in any one day ^b ; Surface material with low potential for dust release; Unpaved road length <50m

Table B1: Determining the Dust Emission Magnitude of Construction Phase Activities

Activity	Dust Emission Class		
	Large	Medium	Small
<i>a. A vehicle movement is a one way journey i.e. from A to B, and excludes the return journey</i> <i>b. HDV movements during a construction project may vary over its lifetime, and the number of movements is the maximum not the average</i>			

B.8 **Step 2B** considers the sensitivity of the area to dust impacts which is defined as low, medium or high. The sensitivity categories for different types of receptors are described in Table B2.

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects

Sensitivity Category	Dust Soiling Effects	Health effects of PM ₁₀	Ecological Effects
High	Users can reasonably expect to enjoy a high level of amenity; Appearance, aesthetics or value of a property would be diminished; Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car show rooms	Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM ₁₀ ; Examples include residential properties, hospitals, schools, and residential care homes	Locations with an international or national designation and the designated features may be affected by dust soiling; Locations where there is a community of a particularly dust sensitive species; Examples include a Special Area of Conservation with dust sensitive features
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; The appearance, aesthetics or value of their property could be diminished; People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time; Examples include parks and places of work	Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM ₁₀ ; Examples include office and shop workers but will generally not include workers occupationally exposed to PM ₁₀	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; Locations with a national designation where the features may be affected by dust deposition; Examples include a Site of Special Scientific Interest with dust sensitive features

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects

Sensitivity Category	Dust Soiling Effects	Health effects of PM ₁₀	Ecological Effects
Low	Enjoyment of amenity would not reasonably be expected; Property would not be diminished in appearance, aesthetics or value; People or property would be expected to be present only for limited periods of time; Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads	Locations where human exposure is transient; Examples include public footpaths, playing fields, parks and shopping streets	Locations with a local designation where the features may be affected by dust deposition; Examples include a Local Nature Reserve with dust sensitive features

B.9 Based on the sensitivity of individual receptors, the overall sensitivity of the area to dust soiling, human health and ecological effects is then determined using the criteria detailed in Tables B3 to B5, respectively.

Table B3: Sensitivity of the Area to Dust Soiling Effects on People and Property^{ab}

Receptor Sensitivity	Number of Receptors	Distance from Source (m) ^c			
		<20m	<50m	<100m	<250m
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

a. The sensitivity to the area should be derived for each of the four activities

b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered

c. For trackout, distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur for up to 250m from sites. The impact declines with distance from the site and it is only necessary to consider trackout impacts up to 50m from the edge of the road

Table B4: Sensitivity of the Area to Human Health Impacts^{ab}

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration ^c	Number of Receptors ^d	Distance from Source (m) ^e			
			<20m	<50m	<100m	<250m
High	>32µg/m ³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32µg/m ³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28µg/m ³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24µg/m ³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32µg/m ³	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32µg/m ³	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28µg/m ³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24µg/m ³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

a. The sensitivity to the area should be derived for each of the four activities

b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered

c. Most straightforwardly taken from the national background maps, but should also take account of local sources. The values are based on 32µg/m³ being the annual mean concentration at which an exceedance of the 24-hour mean objective is likely in England, Wales and Northern Ireland. In Scotland, there is an annual mean objective of 18µg/m³

d. In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties

e. For trackout, distances should be measured from the side of the roads used by construction traffic

Table B5: Sensitivity of the Area to Ecological Impacts^{ab}

Receptor Sensitivity	Distance from the Source (m) ^c	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low
a. The sensitivity to the area should be derived for each of the four activities b. Only the highest level of sensitivity from the table needs to be considered c. For trackout, distances should be measured from the side of the roads used by construction traffic		

- B.10 These two factors are combined in **Step 2C** to determine the risk of dust impacts with no mitigation applied.
- B.11 The risk of dust effects is determined for four types of construction phase activities, with each activity being considered separately. If a construction phase activity is not taking place on the site, then it does not need to be assessed. The four types of activities to be considered are:
- Demolition;
 - Earthworks;
 - Construction; and
 - Trackout.
- B.12 The risk of dust being generated by demolition activities at the site is determined using the criteria in Table B6.

Table B6: Risk of Dust Impacts for Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

- B.13 The risk of dust being generated by earthworks and construction at the site is determined using the criteria in Table B7.

Table B7: Risk of Dust Impacts for Earthworks and Construction			
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

- B.14 The risk of dust being generated by trackout at the site is determined using the criteria in Table B8.

Table B8: Risk of Dust Impacts for Trackout			
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Step 3

- B.15 Step 3 of the assessment determines the site-specific mitigation required for each of the activities, based on the risk determined in Step 2. Mitigation measures are detailed in guidance published by the Greater London Authority¹¹, recommended for use outside the capital by LAQM guidance, and the IAQM guidance document itself. Professional judgement should be used to determine the type and scale of mitigation measures required.
- B.16 If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

Step 4

¹¹ Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance, 2006

- B.17 Step 4 assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

Professional Judgement

- B.18 The IAQM guidance makes reference to the use of professional judgement when assessing the risks of dust and fine particulate matter from demolition and construction sites. Details of the experience of the personnel involved with the project are provided in **Appendix D**.

Appendix C: Methodology for Operational Phase Assessment

Air Dispersion Modelling Inputs

- C.1 The air dispersion model ADMS-Roads (CERC, Version 5.0.1) has been used to assess the potential air quality impacts associated with development-generated road traffic emissions. This dispersion model is widely used and accepted for the purpose of undertaking assessments to support both planning and Environmental Permit applications.

Traffic Flow Data

- C.2 The ADMS-Roads model requires the input of detailed road traffic flow data for those routes which may be affected by the proposed development. Traffic flow data has been provided for this project by Markides Associated Ltd, the appointed transport consultants for the project. The study extent of the model is shown in Figure C.1



Figure C.1: Study Extent of Air Dispersion Model. The roads modelled in the assessment can be seen in blue ('Reproduced from Ordnance Survey Maps © Crown Copyright All Rights Reserved Licence No. 0100031673')

- C.3 The traffic flow data used in the assessment is included in Table C1. Included in Table C7 is also EV vehicle movements generated by the proposed development. Only particulate matter emissions from these have been included in the impact assessment.

Table C1: 24-hour AADT traffic data used in the assessment

Link	Link Name	Speed Info (kph)	Assessment Scenarios													
			2019 Verification and Base Year		2025 Opening Year Without Development + Cumulative		2025 Opening Year With Development, Cumulative + PFS		2025 Opening Year With Development, EV Only		2028 Future Year Without Development + Cumulative		2028 Future Year With Development, Cumulative + PFS		2028 Future Year With Development, EV Only	
			LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV
1	A227 Wrotham Road (North)	64	20280	459	20736	474	20736	474	0	0	21279	480	21279	480	0	0
2	Coldharbour Road	64	20667	193	21134	199	21134	199	0	0	21684	202	21684	202	0	0
3	Wrotham Road (leading to Cyclopark)	48	3916	199	3916	199	3916	199	0	0	3916	199	3916	199	0	0
4	A227 Wrotham Road (south of Coldharbour Road RB)	64	33139	707	33885	729	33885	729	0	0	34772	739	34772	739	0	0
5	A2 Eastbound Off Slip	112	10255	248	10744	260	11182	277	97	0	11109	268	11547	286	97	0
6	A2 Westbound On-Slip	112	9741	324	10204	341	10657	358	101	0	10556	347	11009	364	101	0
7	A2 Westbound Off-Slip	112	7008	169	7341	178	7793	195	101	0	7594	181	8045	198	101	0
8	A2 Eastbound On Slip	112	8146	180	8534	189	8974	206	98	0	8827	193	9266	210	98	0
9-N	A227 Wrotham Road (south of site access RB) (Northbound)	64	11929	157	12198	162	12718	179	101	0	12516	164	13036	181	101	0
9-S	A227 Wrotham Road (south of site access RB) (Southbound)	64	12973	557	13469	368	13991	385	101	0	13823	373	14344	390	101	0
10	A227 Wrotham Road (South)	64	17645	314	18043	324	18043	324	0	0	18515	328	18515	328	0	0

Table C1: 24-hour AADT traffic data used in the assessment

Link	Link Name	Speed Info (kph)	Assessment Scenarios													
			2019 Verification and Base Year		2025 Opening Year Without Development + Cumulative		2025 Opening Year With Development, Cumulative + PFS		2025 Opening Year With Development, EV Only		2028 Future Year Without Development + Cumulative		2028 Future Year With Development, Cumulative + PFS		2028 Future Year With Development, EV Only	
			LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV
11-W	A2 West (Westbound)	112	70246	5649	77771	5944	77771	5944	0	0	80516	6044	80516	6044	0	0
11-E	A2 West (Eastbound)	112	74256	5648	73572	5943	73572	5943	0	0	76174	6043	76174	6043	0	0
12-W	A2 (between slip roads) (Westbound)	112	59149	5996	65671	6310	65220	6293	-101	0	68012	6415	67560	6398	-101	0
12-E	A2 (between slip roads) (Eastbound)	112	62513	6191	61737	6515	61299	6498	-97	0	63948	6624	63509	6607	-97	0
13-W	A2 East (Westbound)	112	64546	5660	72916	5956	72916	5956	0	0	75496	6056	75496	6056	0	0
13-E	A2 East (Eastbound)	112	69322	5959	67284	6271	67284	6271	0	0	69678	6376	69678	6376	0	0
14	Site Access	48	0	0	0	0	2792	69	0	0	0	0	2792	69	0	0
15	A2 West Slip Road	64	8837	709	-	-	-	-	-	-	-	-	-	-	-	-
16	A2 East	112	122478	10944	-	-	-	-	-	-	-	-	-	-	-	-
16 W/E	A2 East	112	61239	5472	-	-	-	-	-	-	-	-	-	-	-	-
17	Thong Lane	112	3012	5	-	-	-	-	-	-	-	-	-	-	-	-
RA1	Coldharbour Road RB	20	16570	354	16943	365	16943	365	0	0	17386	370	17386	370	0	0
RA2	Site Access RB	20	5127	124	5372	130	5591	138	0	0	5554	134	5774	143	0	0
RA3	Wrotham Road RB	20	8823	157	9021	162	9021	162	0	0	9257	164	9257	164	0	0

Vehicle Emission Factors

- C.4 The air quality assessment has used vehicle emission factors calculated using the Emissions Factor Toolkit (EFT) version 12.0.1, released in December 2023. This is the most up-to-date version of the EFT currently available.
- C.5 As discussed in the section 3.4 of the report, there are uncertainties involved with the prediction of future NO₂ concentrations. However, in accordance with the latest guidance from the IAQM, a sensitivity analysis has not been undertaken as model verification has been possible using data from later than 2016¹².
- C.6 As a result, vehicle emission factors from EFT v12.0.1 have been used for the assessment, with the appropriate year factors applied to the modelling scenarios.

Terrain Data

- C.7 Terrain data obtained from Ordnance Survey has been used within the model. The effect of complex terrain is modelled by changing the dispersion of vehicle emissions to account for disturbances in the air flow. This may increase or decrease the modelled concentrations.

Meteorological Data

- C.8 The meteorological data used in the air quality modelling has been obtained from Air Pollution Services (APS) and is a Numerical Weather Prediction (NWP) at grid reference 564243, 171223, which is centred on the development site. The NWP dataset has a resolution of 3km, therefore it is representative of the study network.
- C.9 The meteorological data is for 2019, covering the period between 1st January and 31st December 2019.
- C.10 There are some locations in the UK, and many overseas, where representative observed data are not available. In these circumstances data from Numerical Weather Prediction (NWP) models can provide representative meteorological data. When determining whether observed data are representative, several factors need to be considered, these include; separation difference, difference in elevation, proximity to the coast, local influence of terrain and quality/completeness of the observed data. Due to the location of the site, there are no nearby meteorological stations or stations representative of the site itself. Therefore it was found NWP data would be more

¹² Available on the Institute of Air Quality Management website (https://iaqm.co.uk/wp-content/uploads/2013/02/iaqm_uncertainty_vehicle_NOx_emission_withdrawn-02.pdf)

appropriate.

- C.11 NWP data has been continuously improved driven by the demand for more accurate weather forecasts — which is the principal reason for the development of weather forecasting models that generate NWP data. The NWP data that APS provides is modelled using calibrated modelled data including the assimilation of measured data from stations around the world.
- C.12 The 2019 wind rose for the site is shown in Figure C2.

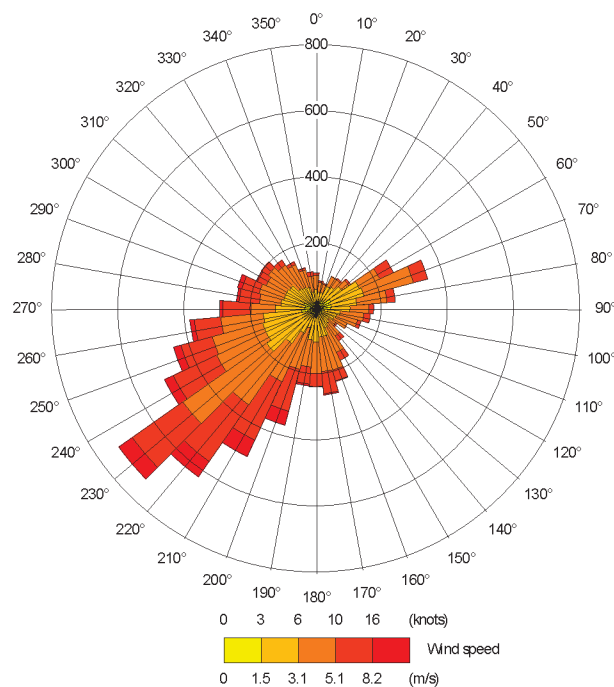


Figure C.2: 2019 Wind Rose for the site

Dispersion and Meteorological Site Characteristics

- C.13 The characteristics for the dispersion site and meteorological sites, included in the ADMS-Roads model, are detailed in Table C2.

Table C2: Site Characteristics	
Setting	Dispersion Site
Surface Roughness	0.5m
Surface Albedo	0.23
Minimum Monin-Obukhov Length	30m
Priestley-Taylor Parameter	1

NO_x to NO₂ Conversion

- C.14 In accordance with the guidance within LAQM.TG(22), the ADMS-Roads model has been run to predict the road-contribution NO_x concentrations for each receptor location. These have then been converted to NO₂ concentrations using the Defra NO_x to NO₂ calculator¹³.

Model Validation and Verification

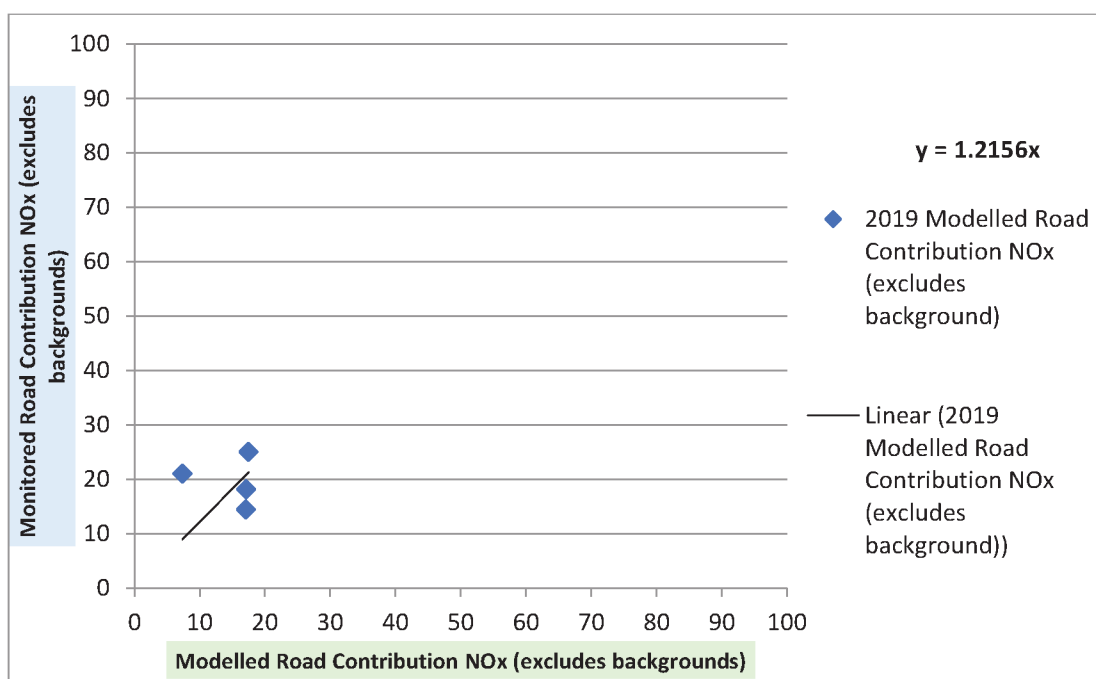
- C.15 LAQM.TG(22) refers to model validation as *“the general comparison of modelled results against monitoring data carried out by model developers”*. ADMS-Roads is widely accepted by regulatory authorities for use in this type of assessment.
- C.16 Model verification is used to check the performance of the model at a local level. The verification of the ADMS-Roads air dispersion model is achieved by modelling concentration(s) at existing monitoring location(s) in the vicinity of the proposed development, and comparing the modelled concentration(s) with the measured concentration(s).
- C.17 Some diffusion tubes in the study network area have not been included in the assessment. The tubes excluded and reasoning is as follows:
- GR92, GR107, GR110, GR142 and GR146 - Traffic data was not available for the roads adjacent to these monitoring locations, therefore, these could not be included.
- C.18 The monitoring data that has been used in the model verification procedure is detailed in Table C4.

Table C4: NO ₂ Monitoring Data Used for Verification Purposes						
Monitoring Location Reference	Type	Approximate Grid Reference		2019 Bias Adjusted NO ₂ Annual Average Concentration (µg/m ³)		
		Easting	Northing	NO ₂	PM ₁₀	PM _{2.5}
ZG2	Roadside Automatic Monitor	562589	172076	29.1	15.3	10.71
GR08	Roadside Diffusion Tube	562589	172076	30.9	N/A	
GR104	Roadside Diffusion Tube	562465	172153	34.2		
GR116	Roadside Diffusion Tube	562480	172225	32.3		

¹³ Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

NO₂

- C.19 The modelled road-contribution NO_x concentrations for the monitoring locations have been compared against the measured road-contribution NO_x concentrations for the same locations. The measured concentrations have been derived using the Defra NO_x to NO₂ calculator, taking into account the background NO_x concentration for the local area.
- C.20 The comparison is shown in the below graph. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 1.2156.



- C.21 A final comparison has been made between the total measured NO₂ concentrations and total modelled NO₂ concentrations, as shown in Table C5.

Monitoring Location Reference	Measured Total NO ₂ Concentration (µg/m ³)	Modelled Total NO ₂ Concentration (µg/m ³)	Difference (%)
ZG2	29.10	32.20	10.65
GR08	30.90	32.20	4.21
GR104	34.20	32.41	-5.23

Table C5: Comparison Between Measured and Monitored NO₂ Concentrations

Monitoring Location Reference	Measured Total NO ₂ Concentration (µg/m ³)	Modelled Total NO ₂ Concentration (µg/m ³)	Difference (%)
GR116	32.30	26.34	-18.45

C.22 A Root Mean Square Error (RMSE) calculation has been undertaken as part of the model verification for NO₂ concentrations. This has been carried out for the monitoring location included within the model verification, in accordance with the guidance detailed in LAQM.TG(22).

C.23 The RMSE calculation following adjustment is detailed in Table C6.

Table C6: RMSE Calculation for Nitrogen Dioxide Concentrations

Monitoring Tube Location Reference	After Verification			
	Observed Value	Predicted Value	Difference	RMSE
ZG2	29.10	32.20	3.10	3.54
GR08	30.90	32.20	1.30	
GR104	34.20	32.41	-1.79	
GR116	32.30	26.34	-5.96	

C.24 LAQM.TG(22) states that “ideally an RMSE value within 10% of the objective would be derived”, a value of within 25% is considered acceptable. The results of the calculation show that following model verification, the RMSE value is within 10% (i.e. 4µg/m³) of the objective (i.e. 40µg/m³). Therefore, the model is considered to be performing to an acceptable standard.

PM₁₀ and PM_{2.5}

C.25 The modelled road-contribution PM₁₀ concentration for the automatic monitor (ZG2) has been compared against the measured road-contribution PM₁₀ concentration for the same location.

- C.26 As the 2019 PM₁₀ background concentration (18.5µg/m³) at this location is higher than the 2019 PM₁₀ monitored concentration (15.3µg/m³), an adjustment factor of -4.1283 was calculated. As the adjustment factor being a negative value, an adjustment factor of 1 has been used instead of -4.1283 to produce a worst-case scenario result and to avoid underpredicting pollutant concentrations. Therefore, PM₁₀ is technically unadjusted.
- C.27 In accordance with LAQM.TG(22), concentrations of PM_{2.5} have been obtained by multiplying the measured PM₁₀ concentrations at monitoring location ZG2 by 0.7, resulting in a 2019 PM_{2.5} monitored concentration of 10.71µg/m³. As the 2019 PM₁₀ background concentration (12.27µg/m³) at this location is higher than the 2019 PM_{2.5} monitored concentration, an adjustment factor of -2.1741 was calculated. As the adjustment factor being a negative value, an adjustment factor of 1 has been used instead of -2.1741 to produce a worst-case scenario result and to avoid underpredicting pollutant concentrations. Therefore, PM_{2.5} is technically also unadjusted.

Assessment Criteria

Assessing the Impact of a Proposed Development on Human Receptors

- C.28 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM¹⁴ with relation to the assessment of the air quality impacts of proposed developments and their significance.
- C.29 The impact of a development is usually assessed at specific receptors, and takes into account both the long-term background concentrations, in relation to the relevant Air Quality Assessment Level (AQAL) at these receptors, and the change with the development in place.
- C.30 The impact descriptors for individual receptors are detailed in Table C11.

Table C11: Impact Descriptors for Individual Receptors				
Long Term Average Concentration at Receptor in Assessment Year*	Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)*			
	1%	2-5%	6-10%	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate

¹⁴ Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

Table C11: Impact Descriptors for Individual Receptors				
Long Term Average Concentration at Receptor in Assessment Year*	Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)*			
	1%	2-5%	6-10%	>10
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
*Percentage pollutant concentrations have been rounded to whole numbers, to make it easier to assess the impact. Changes of 0% (i.e. less than 0.5% or 0.2µg/m³) should be described as Negligible				

Determining the Significance of Effects

- C.31 Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as either 'significant' or 'not significant'.
- C.32 Once the impact of the proposed development has been assessed for the individual impacts, the overall significance is determined using professional judgement. This takes into account a number of factors such as:
- The existing and future air quality in the absence of the development;
 - The extent of the current and future population exposure to the impacts; and
 - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Appendix D: Professional Experience of Assessors

- D.1 The assessment of air quality impacts, and the significance of the associated effects, takes into account the professional judgement of the assessor. Details of the experience of the personnel involved with the project are provided below:

Rachael Stiles

BSc (Hons), MSc, MIAQM, AMIEnvSc

**Principal Environmental
Scientist (Air Quality)**

Rachael is a Principal Air Quality Consultant at Wardell Armstrong. Rachael joined Wardell Armstrong in October 2021 but started her career as an air quality consultant in April 2018, after completing a BSc Physical Geography at Newcastle University and MSc in Sustainability (Environmental Consultancy and Project Management) at the University of Leeds.

Rachael has worked on a variety of infrastructure projects and has developed technical experience in air quality monitoring, detailed air quality assessments using dispersion modelling software such as ADMS roads, as well as construction dust assessments to support planning assessments (including extensive experience in Environmental Impact Assessments).

Malcolm Walton

BSc (Env Health) Dip (Acoustics & Noise Control)

MCIEH AMIOA

Technical Director

Malcolm holds a Bachelor of Science degree in Environmental Health and the Diploma in Acoustics and Noise Control. Malcolm is a Member of the Chartered Institute of Environmental Health and an Associate Member of the Institute of Acoustics.

Malcolm joined Wardell Armstrong in September 2001 following 12 years working as an Environmental Health Officer in several local authorities, responsible for the enforcement of environmental legislation and, in particular, air pollution and noise nuisance. Malcolm has experience in the technical co-ordination of environmental appraisal of large schemes to UK and international standards. Malcolm regularly carries out and co-ordinates noise and air quality assessment work associated with planning applications including EIA work and PPC permit application/compliance. He

also regularly acts as expert witness in planning inquiries in respect of noise, air quality and odour.

DRAWINGS



DO NOT SCALE FROM THIS DRAWING

KEY

Approximate Site Boundary

Existing Sensitive Receptor (ESR) Locations

A2 AQMA

A	FIRST ISSUE	0624	AS
REVISION	DETAILS	DATE	DRN
CLIENT	RAPLEYS LLP		

PROJECT

BP TOLLGATE GRAVESEND

DRAWING TITLE

AIR QUALITY RECEPTOR PLAN

DRG No.	GM13279-001		REV	A	SUIT.	-
DRG SIZE	A3	SCALE	1:5,500	DATE	May 2024	
DRAWN	AS	CHECKED BY	APPROVED BY			



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