



Air Quality Assessment

Langstone Park, Havant, PO9 1SA

February 2022

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XLB Property Ltd

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1. Introduction

Background

- 1.1 Phlorum Limited has been commissioned by XLB Property Ltd to undertake an Air Quality Assessment in support of a planning application for the proposed commercial redevelopment of the Langstone Park, Havant, PO9 1SA, in the Borough of Havant. The National Grid Reference for the centre of the site is 471216, 105828. A site location plan is included in Figure 1.
- 1.2 The Masterplan proposals involve the construction of up to 63,290 sqm (including Phase 1) of commercial floorspace, with associated car parking. The proposals also comprise the provision of soft landscaping, as well as 3,000m² of office space (Use Class E(g)(i)), areas of ecological enhancement and enhanced connectivity to wider, existing pedestrian and cycle routes.
- 1.3 Land use in the vicinity of the site comprises primarily residential use to the east, with the site surrounded otherwise by commercial and industrial premises.
- 1.4 The main sources of air pollution in the vicinity of the site are from vehicles travelling on the local road network, particularly the A27 Havant Bypass to the north and connecting A3023 Langstone Road due east.
- 1.5 Havant Borough Council (HBC), the local planning authority, have not yet declared any Air Quality Management Areas (AQMA's) within the borough and the site is not located in proximity to any AQMA's declared by neighbouring local authorities.

Scope of Assessment

- 1.6 This report assesses the potential for traffic generated by the proposed development to impact local air quality at existing sensitive receptor locations in the local area.
- 1.7 This assessment will also assess the suitability of the site, in air quality terms, for the introduction of new, sensitive receptors and assess the potential for dust nuisance impacts during construction.

2. Policy Context

The UK Air Quality Strategy

- 2.1 The UK Air Quality Strategy (UKAQS)¹ sets out air quality standard (AQS) concentrations for a number of key pollutants that are to be achieved at sensitive receptor locations across the UK by corresponding air quality objective (AQO) dates. The sensitive locations at which the standards and objectives apply are those where the population are reasonably expected to be exposed to said pollutants over the particular averaging period.
- 2.2 For those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to compare concentrations against the standards are areas of residential housing. It is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time.
- 2.3 Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to the pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time. A summary of the AQS relevant to this assessment are included in Table 2.1, below.

Table 2.1: UK Air Quality Standards and Objectives

Pollutant	Averaging Period	Air quality standard ($\mu\text{g.m}^{-3}$)	Air quality objective
Nitrogen dioxide (NO_2)	1 hour	200	200 $\mu\text{g.m}^{-3}$ not to be exceeded more than 18 times a year
	Annual	40	40 $\mu\text{g.m}^{-3}$
Particulate Matter (PM_{10})	24-hour	50	50 $\mu\text{g.m}^{-3}$ not to be exceeded more than 35 times a year
	Annual	40	40 $\mu\text{g.m}^{-3}$
Particulate Matter ($\text{PM}_{2.5}$)	Annual	25	25 $\mu\text{g.m}^{-3}$

¹ Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2) July 2007.

- 2.4 The objectives adopted in the UK are based on the Air Quality (England) Regulations 2000², as amended, for the purpose of Local Air Quality Management. These Air Quality Regulations have been adopted into UK law from the limit values required by European Union Daughter Directives on air quality.
- 2.5 Obligations under the Environment Act 1995 require local authorities to declare an AQMA at sensitive receptor locations where an objective concentration has been predicted to be exceeded. In setting an AQMA, the local authority must then formulate an Air Quality Action Plan (AQAP) to seek to reduce pollution concentrations to values below the objective levels.
- 2.6 Air quality is managed locally by HBC, who are yet to declare an AQMA within the borough as there have been no identified exceedances of the UK AQSS. Therefore, a formal AQAP has not been produced and implemented for the borough.

National Planning Policy Framework

- 2.7 The National Planning Policy Framework (NPPF)³, which was updated in July 2021, sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development. A core principle in the NPPF that relates to air quality effects from development is that planning should "contribute to conserve and enhance the natural and local environment" as demonstrated at paragraph 174:

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

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- c) maintaining the character of the undeveloped costs, while improving public access to it where appropriate;*
- d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*

2 The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043.

3 Ministry of Housing, Communities & Local Government. (2021). National Planning Policy Framework.

- e) *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
- f) *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."*

2.8 The NPPF goes on to state the following at paragraph 185:

"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 wider area to impacts that could arise from the development."

2.9 With regard to a compliance with relevant limit values and national objectives for air pollutants, along with assessing cumulative effects the NPPF states the following at paragraph 186:

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

2.10 Regarding potential adverse impacts generated by development, the NPPF states the following:

"[...] Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

- 2.11 The NPPF offers a broad framework but does not afford a detailed methodology for assessments. Specific guidance for air quality continues to be provided by organisations such as the Department for Environment, Food and Rural Affairs (Defra), Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM).

National Planning Practice Guidance

- 2.12 Reference ID 32 (Air Quality) of the National Planning Practice Guidance (PPG)⁴, which was updated in November 2019, provides guiding principles on how planning can take account of the impact of new development on air quality. The PPG summarises the importance of air quality in planning and the key legislation relating to it.
- 2.13 As well as describing the importance of International, National and Local Policies (detailed elsewhere in this report), it summarises the key sources of air quality information. It also explains when air quality is likely to be relevant to a planning decision, stating:

“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. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
-  *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*

4 Planning Practice Guidance (PPG) 32. (Updated November 2019). Air Quality.
<http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/>.

- ☞ *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- ☞ *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- ☞ *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.”*

2.14 Details are also provided of what should be included within an air quality assessment. Key considerations include:

- ☞ Baseline local air quality;
- ☞ Whether the proposed development could significantly affect local air quality during construction/operation; and
- ☞ Whether the development is likely to expose more people to poor air quality.

2.15 Examples of potential air quality mitigation measures are also provided in the PPG.

Local Planning Policy

2.16 HBC are currently working to produce a revised Local Plan which will direct planning permission in the borough. On the 12th February 2021, HBC's draft *Havant Borough Local Plan* was submitted to the Secretary of State for Housing Communities and the Local Government for examination.

2.17 HBC's current statutory development plan consists of the adopted *Havant Borough Core Strategy Local Plan*⁵ and *Local Plan (Allocations)*⁶, which combined comprise the adopted *Havant Borough Local Plan*.

2.18 The Havant Borough Core Strategy⁵ aims to guide development in Havant up to 2026, and promotes sustainable growth within the borough.

2.19 Of direct relevance to air quality and wider pollution, is Policy DM10: *Pollution*, which states the following:

“Development that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:

5 Havant Borough Council. (2011). *Havant Borough Core Strategy Local Plan*. [Adopted March 2011].

6 Havant Borough Council. (2014). *Havant Borough Local Plan (Allocations)*. [Adopted July 2014].

1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.

2. National air quality standards or objectives would not be breached.

- 2.20 Also, of relevance to the proposal is the forthcoming Havant Borough Local Plan (2021), and more specifically, Policy E23: *Air Quality* which states the following:

"Offsetting Emissions:

a. Major development proposals will be expected to provide mitigation measures which offset emissions and are proportionate to the scale and nature of the development.

Threshold based assessment:

In addition to a., development proposals of 150 or more (gross) residential units, 1,000 sqm or more of commercial floorspace, or which are likely to materially alter the traffic flow on the local highway network will be permitted where:

b. Projected levels of air pollution or emissions associated with the development would not result in a significant deterioration of current air quality at a location where national air quality objectives or limit values apply; or

c. Measures are provided which demonstrably mitigate the impact on air quality to an acceptable level."

- 2.21 Furthermore, the emerging Local Plan also contains Policy E22: *Amenity and Pollution*:

"Development proposals will be permitted where:

a. Projected levels of noise, odour, vibration, light, water or air pollution do not have a likely significant negative effect on the amenity of existing and future users of the site, nearby occupiers or the wider environment; or

b. Measures are provided which are suitable for the purposes intended and will ensure that any likely significant negative effect on receptor(s) are mitigated to an acceptable level."

- 2.22 The upcoming Havant Local Plan also contains policies of direct relevance to air quality, as well as Langstone Park itself. For instance, Policy *KP6: Langstone Technology Park* states the following:

"a. Sufficient information is submitted to address the site-specific planning considerations. This is to be agreed at the pre-application stage and is expected to include the following: [...]

i. Air Quality Assessment."

3. Assessment Methodology

Consultation

- 3.1 HBC provided a pre-application response for the proposed development (CONS/21/02682) in August 2021. In summary, it set out the following with regard to air quality:
- That the occupancy of the extant Langstone Technology Park was at 60% of the consented rates and, therefore, that the net reduction in vehicle trip argument suggested by Motion would not be sufficient for air quality, as there would still be a 'real-world' increase in vehicle trips.
 - That an air quality assessment would be required if the applicant intended to introduce a significant combustion activity on-site (e.g. a STOR facility).
 - That air quality on Langstone Road has been in exceedance of air quality objectives during the past 5 years.
 - That the Council considers extant and emerging local policy to be more sensitive to the exceedance of air quality objective or limit values than industry guidance.
 - That proportionate mitigation measures might need to be considered in line with emerging policy E23 a (emissions offsetting).
- 3.2 With regard to the introduction of a significant combustion source, the proposals are for flexible floorspace and as such, there is a possibility that a major combustion source, such as STOR facility, could seek to operate at the site. However, the details of any such installation would be provided at Reserved Matters, and are not available currently.
- 3.3 Further to this pre-application response, HBC's Environmental health department were contacted on 24th November 2021 to confirm the proposed scope of this air quality assessment. At the time of writing, no additional response has been received.

Guidance

- 3.4 Defra's Local Air Quality Management Technical Guidance (LAQM.TG(16))⁷ was followed in carrying out the assessment, in addition to the latest EPUK & IAQM guidance on *Planning for Air Quality*⁸ was also referred to throughout the assessment.

⁷ Defra. (2021). Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management, Technical Guidance LAQM. TG(16). London: Defra.

⁸ EPUK & IAQM. (2017). Land-Use Planning & Development Control: Planning for Air Quality.

- 3.5 Guidance published by the IAQM on the *Assessment of Dust from Demolition and Construction*⁹ was also used to assess the risk of dust emissions during the construction phase of the proposed development.
- 3.6 The Greater London Authority (GLA) Supplementary Planning Guidance¹⁰ on the control of dust from construction has also been referred to, which is considered best practice guidance for the UK. It details a number of mitigation measures that should be adopted to minimise adverse impacts from dust and fine particles.

Baseline Conditions

- 3.7 The baseline air quality conditions in the vicinity of the site are established through the compilation and review of appropriately sourced background concentration estimates and local monitoring data.
- 3.8 Defra provides estimated background concentrations of the UKAQs pollutants at the UK Air Information Resource (UK-AIR) website¹¹. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km² National Grid square locations across the UK. At the time of writing, the most recent background maps were from August 2020 and based on monitoring data from 2018.
- 3.9 Being background concentrations, the UK-AIR data are intended to represent a homogenous mixture of all emissions sources within the general area of a particular grid square location. Concentrations of pollutants at various sensitive receptor locations can, therefore, be calculated by modelling the emissions from a nearby pollution source, such as a busy road, and then adding this to the appropriate UK-AIR background datum.
- 3.10 HBC automatic and non-automatic local pollutant monitoring data are also considered an appropriate source for establishing baseline air quality at the application site. The most recent available data from HBC's *2019 Air Quality Annual Status Report*¹² (ASR) have been included and referenced.

Construction Phase

- 3.11 The construction phase of the proposed development will involve a number of activities that could potentially produce polluting emissions to air. Predominantly, these will be emissions of dust. However, they could also include releases of odours and/or more harmful gases and particles.

9 IAQM. (2014). Guidance on the assessment of dust from demolition and construction.

10 Greater London Authority. (2014). The Control of Dust and Emissions During Construction and Demolition.

11 Defra: UK-AIR. www.uk-air.defra.gov.uk

12 Havant Borough Council. (2020). *Havant Borough Council Air Quality Annual Status Report 2019*.

- 3.12 The IAQM's guidance to assess the impacts of construction on human and ecological receptors has been followed in carrying out this air quality assessment. The guidance suggests that where a receptor is located within 350m (50m for statutory ecological receptors) of a site boundary and/or 50m of a route used by construction vehicles, up to 500m from the site entrance, a dust assessment should be undertaken. High sensitivity receptors are considered particularly sensitive when located within 20m of a works area. Figure 2 shows receptors that could be sensitive to dust that are located within 350m of the boundaries of the site.
- 3.13 The Multi Agency Geographic Information for the Countryside (MAGIC) website¹³, which incorporates Natural England's interactive maps, has been reviewed to identify whether any statutory ecological sensitive receptors are situated within 50m of the site boundary or within 50m of any routes used by construction vehicles on the public highway, up to 500m from the site entrance.

Construction Significance

- 3.14 The IAQM guidance suggests that Demolition, Earthworks, Construction and Trackout should all be assessed individually to determine the overall significance of the construction phase.
- 3.15 In the IAQM dust guidance, the first step in assessing the risk of impacts is to define the potential dust emission magnitude. This can be considered 'Negligible', 'Small', 'Medium' or 'Large' for each of the construction stages. Whilst the IAQM provides examples of criteria that may be used to assess these magnitudes, the vast number of potential variables mean that every site is different and therefore professional judgement must be applied by what the IAQM refer to as a "technically competent assessor". The construction phase assessment therefore relies on the experience of the appraiser.
- 3.16 As such, attempts to define precisely what constitutes a negligible, small, medium or large dust emission magnitude should be treated with caution. Factors such as the scale of the work, both in terms of size and time, the construction materials and the plant to be used must be considered.
- 3.17 The second step is to define the sensitivity of the area around the construction site. As stated in the IAQM guidance:

"the sensitivity of the area takes into account a number of factors:

-  *the specific sensitivities of receptors in the area;*
-  *the proximity and number of those receptors;*

13 Natural England and MAGIC partnership organisations. Multi Agency Geographic Information for the Countryside. <http://www.magic.gov.uk/> [Accessed September 2021].

in the case of PM_{10} , the local background concentrations; and

site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust."

- 3.18 Based on these factors, the area is categorised as being of 'Low', 'Medium' or 'High' sensitivity.
- 3.19 When dust emission magnitudes for each stage and the sensitivity of the area have been defined, the risk of dust impacts can be determined. The IAQM provides a risk of impacts matrix for each construction stage. The overall significance for the construction phase can then be judged from the stages assessed. Again, this is subject to professional judgement.
- 3.20 Combustion exhaust gases from diesel-powered plant and construction vehicles accessing the site will also be released. However, the volumes and periods over which these releases will occur are unlikely to result in any significant peaks in local air pollution concentrations and therefore this has been scoped out of the assessment.

Operational Phase

Road Transport Sources

- 3.21 Vehicle emissions will arise from the combustion of fossil fuels in vehicle engines and their subsequent release to atmosphere via tailpipe exhausts. The most significant pollutants released by cars and other vehicles are oxides of nitrogen (NO_2/NO_x) and particulate matter (PM_{10} and $PM_{2.5}$). Releases of carbon monoxide (CO) and some volatile hydrocarbons (e.g. benzene and 1,3-butadiene) are of less significance and are not assessed further in this report.
- 3.22 As it is elevated annual mean concentrations of NO_2 and PM_{10} that have resulted in the declaration of most AQMAs across the UK, these are the pollutants of most concern and they have therefore been the focus of this air quality assessment. $PM_{2.5}$, which is another fraction of particulate matter, has also been considered.

Existing Receptor Assessment – Human Receptors

- 3.23 The latest EPUK & IAQM planning guidance⁸ provides indicative thresholds for changes in traffic flows which would require a detailed air quality assessment, when not within or adjacent to an AQMA. These are a change in 24-hour average annual daily traffic (AADT) flows exceeding of 500 light duty vehicles (LDV) and/or 100 heavy duty vehicles (HDV) (100 LDV or 25 HDV in AQMAs). Changes below these thresholds can be reasonably considered to have an insignificant impact on air quality.

- 3.24 Information provided by Motion, the projects transport consultants, state that the proposed development is expected to generate a net increase in AADT flows of 2659 (134 HDV), compared to the 60% occupation of the current use
- 3.25 Therefore, a detailed dispersion modelling assessment has been undertaken to assess the impacts of scheme-generated traffic on local air quality at existing receptor locations. The modelling assessment includes emissions from all roads for which the proposed development is expected to exceed the criteria in paragraph 3.22. Figure 4 displays the roads that were modelled in this assessment.
- 3.26 ADMS-Roads In order to assess the impact of the proposed development in the development's projected opening year of 2026, emissions from specified local roads that may exceed the EPUK & IAQM guidance guidelines have been assessed using a detailed atmospheric dispersion model.
- 3.27 The model used in this assessment was ADMS-Roads (version 5.0), which is produced by Cambridge Environmental Research Consultants Limited (CERC) and has been validated and approved by Defra for use as an assessment tool for calculating the dispersion of pollutants from traffic on UK roads. The latest Defra Emissions Factor Toolkit¹⁴ (EFT version 11.0) was used to estimate vehicle emissions within the model.
- 3.28 Detailed, hourly sequential, meteorological data are used by the model to determine pollutant transportation and levels of dilution by the wind and vertical air movements. Meteorological data used in the model were obtained from the Thorney Island meteorological station for 2018. The wind rose for this meteorological dataset has been included in Figure 3 of this report. Local air quality monitoring data from existing Department for Transport (DfT) traffic data from 2018 has also been used for model verification purposes.
- 3.29 The surface roughness applied to the model for the application site was 0.6m. A surface roughness of 0.1m was applied to the meteorological station used for this assessment (Thorney Island).
- 3.30 Only existing receptor points were modelled in this assessment, centred primarily around the A3023 Langstone Road and the major arterial routes into Portsmouth, with all receptor points modelled on the external façade of existing residential properties. The receptor points were all modelled at "breathing height", which is, by convention 1.5m above ground level for adults and 1.0m above ground level for children.
- 3.31 The receptor points located within Portsmouth were selected due to their close proximity to key roads into the city's centre and their presence within AQMA's designated on each of these roads.
- 3.32 All receptor points modelled in this assessment are provided in Figure 4 and detailed in Table 3.1 below.

14 Defra. (2020). Emissions Factor Toolkit version 10.1

Table 3.1: Modelled Proposed Receptor Points

Receptor Point	Receptor Details	Type	Height (m)	UK Grid Reference	
				X	Y
Existing Receptor Points					
R1	10 Regents Close	Residential	1.5	471643.08	105736.94
R2	3 Woodbury Avenue	Residential	1.5	471636.69	105716.06
R3	1 Langbrook Close	Residential	1.5	471601.50	105555.66
R4	6 Langstone Road	Residential	1.5	471578.87	105468.88
R5	21 Langstone Road	Residential	1.5	471626.87	105513.17
R6	88 Stanley Road	Residential	1.5	464331.47	102197.26
R7	156a London Road	Residential	1.5	464997.92	102479.63
R8	167-169 London Road	Residential	1.5	464996.7	102519.36
R9	93 Eastern Road	Residential	1.5	466774.94	100712.32
R10	90 Eastern Road	Residential	1.5	466744.94	100689.54
R11	330 Highbury Grove	Residential	1.5	466654.69	104354.86

- 3.33 Traffic data used in this assessment were provided by Motion, the transport consultants assigned to the project. All modelled roads are displayed in Figure 4 with model inputs including traffic data and emissions factors provided in Appendix A.

Model Verification

- 3.34 It is recommended, following guidance set out in LAQM.TG(16)⁷ that the model results be compared with measured data to determine whether they need adjusting to reflect local air quality conditions more accurately. This process is known as verification and reduces the uncertainty associated with local effects on pollution dispersion and allows the model results to be more site-specific.
- 3.35 A full model verification study has been undertaken using monitoring data from both HBC's local air quality monitoring networks. Full details of this model verification study are included in Appendix B.
- 3.36 The model was found to be systematically under-predicting NO₂ concentrations at local monitoring sites. Therefore, it was decided to proceed with adjustment of the model in order to ensure conservative results. To this end, an adjustment factor of **2.03** was applied to the modelled results.

- 3.37 Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.TG(16), the RMSE should ideally be within 10% of the relevant AQS, but is acceptable where it is within 25% of the AQS. After application of the adjustment factor, the model verification process resulted in a post-adjusted RMSE of $1.9\mu\text{g.m}^{-3}$, which is equivalent to 4.8% of the $40\mu\text{g.m}^{-3}$ AQS for NO_2 and is therefore within the ideal 10% range.

Model Uncertainty

- 3.38 There are a number of inherent uncertainties associated with the air quality assessment process, including:
-  Model uncertainty – due to model formulations;
 -  Data uncertainty – due to inaccuracies in input data, including emissions estimates, background estimates and meteorology; and
 -  Variability – randomness of measurements used.
- 3.39 Using a validated air quality model such as ADMS-Roads, as well as undertaking model verification takes into account much of this uncertainty. In addition, the most detailed available input data is used and reviewed to ensure accuracy.
- 3.40 Defra's latest EFT¹⁴ (version 11.1) for road transport provides forecasts of NO_x , PM_{10} and $\text{PM}_{2.5}$ emissions up to 2030. This is widely used as an input for dispersion models such as ADMS-Roads, to estimate future pollutant concentrations close to new developments.
- 3.41 The latest version of the EFT was released in November 2021 and is expected to provide a far more reasonable match for real-world emissions in the current UK vehicle fleet than previous versions, however it should be noted that there remains uncertainty regarding future emissions from the vehicle fleet.
- 3.42 To adequately account for this uncertainty when predicting future pollutant concentrations, the precautionary principle has been followed, and a conservative approach has been taken.
- 3.43 Background NO_2 , PM_{10} and $\text{PM}_{2.5}$ concentrations used in the assessment were obtained from the data reported from UKAIR's background database (Grid Reference: 471500, 105500) and these background concentrations were predicted to stay the same beyond this baseline year, despite the decreasing trends in background pollutant concentrations evidenced by Tables 4.1, 4.2 and 4.3.
- 3.44 Vehicle emission factors for 2025 were used to predict pollutant concentrations in the proposed developments completion year of 2026.
- 3.45 Motion carried out no detailed distribution work to assess how the additional 581 AADT (32HDV) from the proposed development would distribute within Portsmouth. As such, it was assumed that the proposed development would cause increases of 581 AADT (inclusive of 30 HDV) within each of Portsmouth's AQMAs heading into the city centre. This is an extreme worst-case assumption.

Existing Receptor Assessment – Ecological Receptors

- 3.46 The proposed development's impact on local designated sites, in isolation and in combination with all other forthcoming development, has been assessed in the May 2021 *Havant Borough Local Plan Habitats Regulation Assessment* (HRA)¹⁵. It is understood that the quantum of the Langstone Park assessed in the HRA was 12,575m² greater than the existing floorspace. This is marginally greater than the quantum of the proposed development plus phase 1 of the XLB scheme and as such, the conclusions of the HRA are considered robust for this assessment.
- 3.47 It was concluded that, through the application of plan-led strategic and embedded proposal-specific mitigation measures, the Local Plan would not result in likely significant effects on the international sites within the Plan's zone of influence and that international site integrity would not be impacted as a result of the Plan.

¹⁵ Havant Borough Council (2021) Havant Borough Local Plan Habitats Regulation Assessment

4. Baseline Assessment

- 4.1 This chapter is intended to establish prevailing air quality conditions in the vicinity of the development site.

UK-AIR Background Pollution

- 4.2 The UK-AIR¹¹ predicted background concentrations for NO₂, PM₁₀ and PM_{2.5} for 2018 to 2023 are presented in Table 4.1. These data were taken from the central grid square location closest to the application site (i.e. grid reference: 471500, 105500).

Table 4.1: 2018 to 2023 Background Concentrations of Pollutants at the site.

Pollutant	Predicted background concentration (µg.m ⁻³)						Averaging Period	Air quality standard concentration (µg.m ⁻³)
	2018	2019	2020	2021	2022	2023		
NO ₂	21.0	20.3	19.5	18.8	18.1	17.6	annual mean	40
PM ₁₀	15.7	15.5	15.2	15.0	14.9	14.7	annual mean	40
PM _{2.5}	10.8	10.6	10.4	10.3	10.1	10.0	annual mean	25

- 4.3 The data in Table 4.1 show that annual mean background concentrations of NO₂, PM₁₀ and PM_{2.5}, in the vicinity of the application site between 2018 and 2023, were predicted to be well below their respective AQSS.
- 4.4 The data show that for 2021, annual mean NO₂, PM₁₀ and PM_{2.5} concentrations were predicted to be below their respective AQSS by 53.0%, 62.5% and 58.8% respectively. As such, annual mean background pollutant concentrations are likely to be below their respective AQSS at, and in the vicinity of, the site.
- 4.5 Concentrations of all pollutants were predicted to decline each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles, but also due to UK national and international plans to reduce emissions across all sectors.

Local Sources of Monitoring Data

- 4.6 Air quality monitoring is considered an appropriate source of data for the purposes of describing baseline air quality. At the time of writing, the most recent ASR¹² released by HBC included local pollutant monitoring data from 2018.

Automatic Monitoring

- 4.7 HBC did not undertake any automatic (continuous) monitoring of NO₂, PM₁₀ or PM_{2.5} within the borough in 2018. However, Defra's Automatic Urban and Rural Network (AURN) operate one monitoring station, C4, within Portsmouth; located 5.7km to the south-east of the proposed development. As this is the closest automatic monitoring site to the site boundary, data from AURN C4 has been included in this report. This was taken from *Portsmouth City Council's Air Quality Annual Status Report 2020*¹⁶
- 4.8 The most recent available NO₂ monitoring data from this automatic monitoring stations are included in Table 4.2 below.

Table 4.2: Long-term NO₂ Monitoring Data from Site C4 (AURN)

Monitor	Type	Distance from the Site (km)	Annual mean NO ₂ concentration (µg.m ⁻³)			
			2016	2017	2018	2019
C4	UB	5.7	20.1	19.4	18.7	17.5

Note: "UB" = Urban Background.

- 4.9 The data in Table 4.2 show that the annual mean NO₂ concentration recorded at C4 was consistently below the 40µg.m⁻³ AQS between 2016 and 2019. Furthermore, C4 displays an overall decrease in NO₂ concentration levels throughout the 2016 to 2019 monitoring period.
- 4.10 In 2019, the monitor recorded a concentration of 17.5µg.m⁻³, which was below the 40µg.m⁻³ AQS by 56.3%. Located within an Urban Background site, this monitor is positioned 119m to the kerb of the nearest major road, and thus conditions here are considered to be representative of background conditions at the application site; based on the extensive distance between the A27 Havant Bypass and the site boundary (approximately 50m).
- 4.11 Furthermore, PM₁₀ monitoring data for 2019 were recorded at AURN monitor C4 (Portsmouth AURN). The most recent available PM₁₀ monitoring data from this monitor is included in Table 4.3 below.

Table 4.3: Long-term PM₁₀ Monitoring Data from Site C4 (AURN)

Monitor	Type	Distance from the Site (km)	PM ₁₀ annual mean concentration (µg.m ⁻³)			
			2016	2017	2018	2019
C4 (AURN)	UB	5.7	18.2	14.7	14.7	15.1

Note: "UB" = Urban Background.

- 4.12 C4 recorded PM₁₀ concentrations well below the 40µg.m⁻³ annual mean AQS in 2019, and throughout the remainder of the monitoring period.

16 Portsmouth City Council. (2020). *Portsmouth City Council Air Quality Annual Status Report 2020*.

- 4.13 AURN monitor C4 recorded an annual mean PM₁₀ concentration 62.3% below the 40µg.m⁻³ AQS in 2019. Although annual mean concentrations of PM₁₀ had generally decreased within the monitoring period, it must be noted that an increase of 1.0% was recorded between 2018 and 2019.
- 4.14 Automatic monitoring of PM_{2.5} was only undertaken at the AURN monitor C4 during 2019, the most recent available data from this monitoring station are included in Table 4.4 below.

Table 4.4: Long-term PM_{2.5} Monitoring Data from Holly Place AURN monitor

Monitor	Type	Distance from the Site (km)	PM ₁₀ annual mean concentration (µg.m ⁻³)			
			2016	2017	2018	2019
C4	UB	5.7	11.6	11.2	12.3	9.0

Note: "UB" = Urban Background.

- 4.15 The C4 AURN monitor recorded an annual mean PM_{2.5} concentration of 9.0µg.m⁻³ in 2019, which is 64.0% below the 25µg.m⁻³ AQS. As discussed above, pollutant concentrations recorded at this monitor are considered representative of likely background concentrations in the vicinity of the development site.

Non-Automatic Monitoring

- 4.16 HBC operates an extensive non-automatic NO₂ diffusion tube monitoring network comprising 37 measurement sites, deployed in strategic locations across the borough. The diffusion tubes located within 350m of the application site that recorded the most recent available NO₂ monitoring data for 2018 have been included in Table 4.5, below.

Table 4.5: Monitoring data from WDC NO₂ diffusion tubes

Monitor	Type	Distance from the site (m)	NO ₂ annual mean concentration (µg.m ⁻³)			
			2015	2016	2017	2018
12(B)	R	15	29.8	34.2	30.3	30.5
19(C)	R	35	-	-	37.3	34.8
19(D)	R	80	-	-	-	26.1
19(E)	S	80	-	-	-	33.6
19(B)	K	100	43.4	56.3	46.1	47.7
T2	O	135	-	-	-	25.3
7(B)	UC	145	25.3	28.1	26.7	25.3
2	S	165	24.3	28.0	25.6	25.8
20	UC	185	26.1	28.	30.7	27.1
S4	O	205	-	-	-	31.5

S3	O	290	-	-	-	24.6
22	R	350	29.7	35.8	31.4	33.0

Note: "R" = Roadside; "K" = Kerbside; "UC" = Urban Centre; "S" = Suburban; "O" = Other.

- 4.17 Monitoring data from Table 4.5 demonstrate that air quality in Havant is generally good, with one consistent exceedance of the AQs located at Monitor 19B. This monitor is positioned kerbside to the junction between the A3023 Langstone Road and the A27 Havant Bypass; thus, expectedly, the traffic volume here would be much higher than within the site boundary. Furthermore, based on the tube's kerbside location, annual mean NO₂ levels would expectedly be higher than those at the Langstone Park, which resides within an Urban Background location. The annual mean NO₂ concentration at 19B in 2018 was 47.7µg.m⁻³, which was 19.3% above the 40µg.m⁻³ AQs.
- 4.18 Between 2015 and 2018, the data recorded at HBC's non-automatic diffusion tube monitors fluctuated with little correlation present.

Summary of Background Data Used in Assessment

- 4.19 To ensure conservative predictions of pollutant concentrations, no reduction has been applied to the annual mean background NO₂, PM₁₀ and PM_{2.5} concentrations used in this assessment for future years. Annual mean predictions of NO₂, PM₁₀ and PM_{2.5} for 2018, from UK-AIR (Grid Reference: 471500, 105500) were utilised within the assessment for the entire model domain.

5. Construction Phase Impacts

- 5.1 The construction phase of the proposed development will involve a number of activities that could produce polluting emissions to air. Predominantly, these will be emissions of dust.
- 5.2 The estimates for the dust emission magnitude for demolition, earthworks, construction and trackout below are based on the professional experience of Phlorum's consultants, information provided by the client and Google Earth imagery.

Dust Emission Magnitude

Demolition

- 5.3 The application site is a brownfield site, and as such, demolition is required for the proposed redevelopment. Although no details have been provided concerning the volume of the building/s to be demolished, due to the extensive nature of the project, a worse-case scenario volume of >50,000m² has been estimated. The demolished building height is set to be between 10m-20m high, with mobile pressing equipment set to be on site during the construction phase.
- 5.4 Based on the outlined above and the IAQM's magnitude categorisation, the overall dust emission magnitude for the demolition stage would thus be considered *Large*.

Earthworks

- 5.5 The total site area is approximately 13.8ha, which can be classified as *Large* with reference to the IAQM guidance.
- 5.6 Although the site is not contaminated and there will be no bunds formed on-site, over 10 heavy-earth moving vehicles will be present at any given time during the construction phase. The outline planning application has estimated that between 20,000-100,000 of earth will be moved in total.
- 5.7 Based on the criteria outlined above and the IAQM's magnitude categorisation, the overall dust emission magnitude for the earthworks stage would thus be considered *Large*.

Construction

- 5.8 During construction, activities that have the potential to cause emissions of dust may include metal cladding, piling and vibro compaction. Localised use of cement powder and general handling of construction materials also have the potential to generate dust emissions, as does the effect of wind-blow from stockpiles of friable materials.

- 5.9 It is expected that the total building volume of the proposed commercial redevelopment will exceed 100,000m³, with electrical mains and PV energy to be implemented.
- 5.10 Therefore, with reference to the IAQM guidance, the overall dust emission magnitude for the construction phase is considered to be *Large*.

Trackout

- 5.11 Construction traffic, when travelling over soiled road surfaces, has the potential to generate dust emissions and to also add soil to the local road network. During dry weather, soiled roads can lead to dust being emitted due to physical and turbulent effects of vehicles. It is not yet known whether unpaved road surfaces will be utilised by construction vehicles accessing the site.
- 5.12 It is also not yet known exactly how many HDVs will access the site in any one day. However, using professional judgement it has been assumed that between 10 and 50 HDVs will access the site per day, which falls into the IAQM's *Medium* dust emission magnitude category.
- 5.13 As such, the overall dust emission magnitude for the *trackout* phase has been based on professional judgement, and is considered to be *Medium* with reference to the IAQM guidance.

Emission Magnitude Summary

- 5.14 A summary of the dust emission magnitude as a result of the activities of Demolition, Earthworks, Construction and Trackout as specified in the IAQM guidance, and discussed above, are listed in Table 5.1 below. Overall, the dust emission magnitude is considered to be *Large*.

Table 5.1: Dust Emission Magnitude for the construction activities, based on the IAQM's guidance.

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

Sensitivity of the Area

- 5.15 Having established the emission magnitudes for each phase above, the sensitivity of the area must be considered to establish the significance of effects. The effect of dust emissions depends on the sensitivity of each receptor.

- 5.16 High sensitivity human receptors include residential dwellings, schools and hospitals, but can include locations such as car showrooms when considering the impacts of dust soiling.
- 5.17 The impacts of dust emissions from the sources discussed above have the potential to cause an annoyance to human receptors living in the local area. Within distances of 20m of the site boundary there is a high risk of dust impacts, regardless of the prevailing wind direction. Up to 100m from the construction site, there may still be a high risk, particularly if the receptor is downwind of the dust source.
- 5.18 With the exponential decline in dust with distance from dust generating activities, it is considered that for receptors more than 350m from the site boundary, the risk is negligible. Furthermore, the risks at over 100m only have the potential to be significant in certain weather conditions, e.g. downwind of the source during dry periods.
- 5.19 The approximate number of high sensitivity human receptors in the vicinity of the site is detailed in Table 5.2 below and shown in Figure 2.

Table 5.2: Approximate number of High Sensitivity Receptors close to the site.

Distance to site (m)	Approximate number of receptors	Receptor Details
<20	4	Residential Dwellings
<50	27	Residential Dwellings
<100	50 (Approx.)	Residential Dwellings
<350	500* (Approx.)	Residential Dwellings and Bosmere Primary School

Note: * includes approximate number of pupils / residents at local institutions.

- 5.20 Figure 3 shows that the predominant wind direction at the closest relevant meteorological station at Thorney Island (2018) is from the south-west and west, with additional winds also from the north-east. As shown in Figure 2, there are several residential receptors in close proximity to the application site. As such, the sensitivity of the area to dust soiling impacts is defined as *Medium*.
- 5.21 UK-AIR predicted annual mean concentrations of PM₁₀ are below 24µg.m⁻³ at the site. This provides a good indication that PM₁₀ concentrations for both annual mean and daily mean concentrations are likely to be below the respective AQSs at the site and adjacent uses. Therefore, the sensitivity of the area to human health impacts is defined as *Low*.

- 5.22 The closest statutory ecological site is the Southmoor Local Nature Reserve, which is part of the wider Langstone Harbour; a Ramsar site, Special area of Conservation (SAC) and a Site of Special Scientific Interest (SSSI), which is located approximately 475m to the south of the site boundary and 800m south-west of the site entrance. Therefore, based on distance alone, the construction of the proposed development can be considered to have a *Negligible* effect on ecological sites.

Risk of Impacts

- 5.23 Having established the potential dust emission magnitudes and sensitivity of the area, the risk of impacts can be determined in accordance with the IAQM guidance. These are summarised in Table 5.3.

Table 5.3: Summary of Impact Risk by Construction Stage based on the IAQM's dust guidance.

Stage	Impact Risk		
	Nuisance Dust	Ecology	PM ₁₀
Demolition	High	Negligible	Medium
Earthworks	Medium	Negligible	Low
Construction	Medium	Negligible	Low
Trackout	Low	Negligible	Low

- 5.24 The risk assessment assumes demolition would occur on the boundary and hence a *High* risk of nuisance dust soiling from demolition was predicted. However, no building demolition will actually take place within 70m of high or medium sensitivity receptors and as such, the risk from demolition is considered to be Medium.
- 5.25 Overall, and using professional judgement, the proposed development is considered to be *Medium Risk* for nuisance dust soiling effects, *Medium Risk* for PM₁₀ health effects and to be *Negligible* for ecology, in the absence of mitigation.

Site Specific Mitigation

- 5.26 The GLA guidance¹⁰ suggests a number of mitigation measures that should be adopted in order to minimise impacts from dusts and fine particles. Appropriate measures that could be included during construction of the proposed development include:

- ideally cutting, grinding and sawing should not be conducted on-site and pre-fabricated material and modules should be brought in where possible;
 - where such work must take place, water suppression should be used to reduce the amount of dust generated;
 - skips, chutes and conveyors should be completely covered and, if necessary, enclosed to ensure that dust does not escape;
 - no burning of any materials should be permitted on site;
 - any excess material should be reused or recycled on-site in accordance with appropriate legislation;
 - developers should produce a waste or recycling plan;
 - following earthworks, exposed areas and soil stockpiles should be re-vegetated to stabilise surfaces, or otherwise covered with hessian or mulches;
 - stockpiles should be stored in enclosed or bunded containers or silos and kept damp where necessary;
 - hard surfaces should be used for haul routes where possible;
 - haul routes should be swept/washed regularly;
 - vehicle wheels should be washed on leaving the site;
 - all vehicles carrying dusty materials should be securely covered; and
 - delivery areas, stockpiles and particularly dusty items of construction plant should be kept as far away from neighbouring properties as possible.
- 5.27 In addition, the IAQM lists recommended mitigation measures for low, medium and high Dust Impact Risks. The highly recommended mitigation measures for *Medium Risk* sites are included in Appendix C of this report.
- 5.28 Where dust generation cannot be avoided in areas close to neighbouring properties, additional mitigation measures should be put in place, such as: windbreaks, sprinklers, and/or time/weather condition limits on the operation of some items of plant or the carrying out of activities that are likely to generate a particularly significant amount of dust.

Residual Effects

- 5.29 After the implementation of the mitigation measures listed above and in Appendix C, the significance of each phase of the construction programme will be reduced and the residual significance of impact for the construction phase is expected to be *Negligible*.

6. Operational Phase

- 6.1 Results from the ADMS-Roads assessment for the proposed scheme are presented below. Modelled Road links and receptor points are displayed in Figure 4.

Air Quality Impacts at Local Receptors

- 6.2 The impact of scheme generated traffic at local receptors (residential dwellings) has also been assessed.
- 6.3 Receptor points R1-R11 represent existing local sensitive receptors, all of which represent the façades of existing residential dwellings in the local area (A3020 Langstone Road) and within close proximity to major, local road networks into Portsmouth City Centre.
- 6.4 Based on data inputted into the ADMS model, three potential 'pollutant' scenarios have been generated. These include:
- 🌿 2019 Baseline (based on the occupancy of the park and traffic generated within that year);
 - 🌿 2025 Without (expected future pollutant levels excluding the operation of the scheme); and
 - 🌿 2025 With (expected future pollutant levels including the operation of the scheme).

The results of each scenario are included within Tables 6.1, 6.2 and 6.3 below.

Nitrogen dioxide (NO₂)

- 6.5 Modelled NO₂ concentrations at local existing receptors located on the façades of sensitive uses in the areas surrounding the development site are shown in Table 6.1 below.

Table 6.1: Predicted annual mean concentrations of NO₂ at local receptors

Receptor Point	Annual Mean NO ₂ (µg.m ⁻³)			Changes due to proposed development		
	2019 Baseline	2025 Without	2025 With	µg.m ⁻³	As a % of the AQS	EPUK & IAQM Significance
R1	34.7	28.6	28.9	0.3	0.7	Negligible
R2	35.6	29.3	29.6	0.3	0.8	Negligible
R3	32.5	27.5	27.8	0.3	0.7	Negligible
R4	27.6	24.6	24.7	0.2	0.4	Negligible
R5	28.8	25.3	25.5	0.2	0.5	Negligible

R6	40.9	33.9	34.0	0.1	0.3	Negligible
R7	33.7	29.3	29.5	0.2	0.6	Negligible
R8	32.7	28.7	28.9	0.2	0.5	Negligible
R9	27.2	23.9	24.0	0.1	0.2	Negligible
R10	32.3	27.0	27.2	0.1	0.4	Negligible
R11	40.7	33.8	33.9	0.1	0.4	Negligible

- 6.6 The data in Table 6.2 show that the operation of the proposed development is predicted to have a *Negligible* impact on annual mean NO₂ concentrations at all receptor points in the local area. Furthermore, none of the receptors were predicted to be in exceedance of the annual mean AQS for NO₂ under the 2025 With Development scenario.
- 6.7 The largest change in NO₂ concentrations predicted due to the operation of the proposed development was 0.3µg.m⁻³ (0.7%-0.8% of the AQS), at receptor points R1-R3. This is considered to be a *Negligible* increase with reference to EPUK/IAQM impact descriptors.
- 6.8 The highest predicted NO₂ concentration under the 2025 With Development scenario was predicted at receptor point R6, which represents residential receptors at 88 Stanley Road; located adjacent to the M275 carriageway. An annual mean NO₂ concentration of 34.0µg.m⁻³ was predicted at this receptor point under the 2025 With Development scenario and an increase in NO₂ concentrations of 0.1µg.m⁻³ (0.3% of the AQS) was predicted relative to the 2025 Without Development scenario. This is considered to be a *Negligible* increase with reference to EPUK/IAQM impact descriptors.
- 6.9 As the annual mean NO₂ concentrations predicted at all receptor points were below 60µg.m⁻³, following LAQM.TG(16) guidance, it is expected that the hourly AQS for NO₂ would be achieved.
- 6.10 Overall, the proposed development is expected to have a *Negligible* impact on local NO₂ concentrations.

Particulate Matter (PM₁₀ and PM_{2.5})

- 6.11 Modelled results for PM₁₀ concentrations at local receptor locations are shown in Table 6.2, below.

Table 6.2: Predicted annual mean concentrations of PM₁₀ at local receptors

Receptor Point	Annual Mean PM ₁₀ (µg.m ⁻³)			Changes due to proposed development		
	2019 Baseline	2025 Without	2025 With	µg.m ⁻³	As a % of the AQS	EPUK & IAQM Significance
R1	18.2	18.3	18.4	0.1	0.3	Negligible
R2	18.6	18.6	18.8	0.1	0.3	Negligible

R3	18.1	18.1	18.2	0.1	0.3	Negligible
R4	17.0	17.0	17.1	0.1	0.2	Negligible
R5	17.2	17.3	17.3	0.1	0.2	Negligible
R6	20.7	20.6	20.6	0.0	0.0	Negligible
R7	20.6	20.6	20.7	0.1	0.2	Negligible
R8	20.4	20.4	20.5	0.1	0.2	Negligible
R9	19.2	19.2	19.2	0.0	0.1	Negligible
R10	20.3	20.3	20.4	0.1	0.2	Negligible
R11	20.5	20.4	20.5	0.1	0.2	Negligible

- 6.12 The data in Table 6.3 show that the operation of the proposed development is expected to have a *Negligible* impact on PM₁₀ concentrations at all local sensitive receptors.
- 6.13 Predicted PM₁₀ concentrations under the 2025 With Development scenario ranged between 17.1µg.m⁻³ and 20.7µg.m⁻³; 57.3% and 48.3% below the relevant AQS respectively. The highest predicted concentration was recorded at receptor point R7 and the lowest concentration predicted at receptor point R4.
- 6.14 A concentration of 31.8µg.m⁻³ is likely to result in an exceedance of the short-term AQS for PM₁₀. The data in Table 6.3 show that annual mean PM₁₀ concentrations are predicted to be below 20.7.m⁻³ at all receptor points. Therefore, it is unlikely that this short-term AQS would be exceeded.
- 6.15 Overall, the operation of the proposed development is predicted to have a *Negligible* impact on local PM₁₀ concentrations.
- 6.16 Results for PM_{2.5} concentrations predicted at local receptors are shown in Table 6.4 below.

Table 6.3: Predicted annual mean concentrations of PM_{2.5} at local receptors

Receptor Point	Annual Mean PM _{2.5} (µg.m ⁻³)			Changes due to proposed development		
	2019 Baseline	2025 Without	2025 With	µg.m ⁻³	As a % of the AQS	EPUK & IAQM Significance
R1	12.3	12.2	12.2	0.1	0.2	Negligible
R2	12.4	12.4	12.5	0.1	0.3	Negligible
R3	12.1	12.1	12.2	0.1	0.3	Negligible
R4	11.5	11.5	11.5	0.0	0.1	Negligible
R5	11.6	11.6	11.7	0.0	0.2	Negligible
R6	15.0	14.9	14.9	0.0	0.0	Negligible
R7	14.8	14.7	14.8	0.1	0.2	Negligible

R8	14.7	14.6	14.7	0.0	0.2	Negligible
R9	13.8	13.7	13.8	0.0	0.1	Negligible
R10	14.4	14.4	14.4	0.0	0.1	Negligible
R11	13.8	13.7	13.8	0.0	0.1	Negligible

- 6.17 The data in Table 6.4 show that the operation of the proposed development is, again, expected to have a negligible impact on PM_{2.5} concentrations at local sensitive receptors.
- 6.18 Annual mean PM_{2.5} concentrations were predicted to be well below the 25µg.m⁻³ AQS at all modelled receptor points, across all modelled scenarios. Predicted PM_{2.5} concentrations under the 2025 With Development scenario ranged between 11.5µg.m⁻³ and 14.9µg.m⁻³, which is between 54% and 40.4% below the AQS.
- 6.19 Overall, the operation of the proposed development is expected to have a *Negligible* impact on local PM_{2.5} concentrations.

Mitigation

- 6.20 Numerous methods of pollutant mitigation will be implemented upon the completion of the planned redevelopment. At this stage, the following measures have been committed to:
- 🌱 The provision of electric vehicle charging infrastructure;
 - 🌱 The use of alternative heat/energy sources (Air Source Heat Pumps);
 - 🌱 A travel plan, including mechanisms to discourage high emission vehicle use and the encouragement uptake of low emission technologies;
 - 🌱 The provision of a car club or financial support to an existing scheme;
 - 🌱 Cycle storage; and
 - 🌱 Green infrastructure (through the planting of vegetation).
- 6.21 Given the comprehensive list of measures above, it is considered that the proposed development includes a sufficient amount of mitigation to contribute to the offsetting of emissions generated by the planned scheme.

7. Discussion

- 7.1 HBC are yet to declare an AQMA within the borough and as such, the development site is not located within, or adjacent to any AQMAs.
- 7.2 Local pollutant monitoring data from HBC's non-automatic monitoring network and Defra's AURN sites suggest that pollutant concentrations in the local area are generally good. The only exceedance recorded of the annual mean AQS for NO₂ was recorded at Monitor 19(B); a non-automatic monitoring station positioned kerbside adjacent to a major roundabout between the A3023 Langstone Road and the A27 Havant Bypass. Data from the UK-AIR predicted background concentrations indicate that background pollutant concentrations in the vicinity of the site are likely to be well below the key AQSs for NO₂, PM₁₀ and PM_{2.5}.
- 7.3 An air quality assessment was principally required to assess the following:
- ➊ Potential impacts of the construction phase of the development;
 - ➋ Potential operational impacts of generated traffic on local sensitive receptors; and
 - ➌ The potential for new receptors to be introduced into an area of existing poor air quality.
- 7.4 The construction phase of the development could give rise to emissions which could cause dust soiling effects on adjacent uses. With reference to the IAQM guidance, the construction phase of the development can be considered to be *Medium Risk*. After the implementation of appropriate mitigation measures to reduce emissions and their potential impact, as detailed in Appendix C, emissions from the construction programme will be reduced, and the residual significance of impact for the construction phase is expected to be *Negligible*.
- 7.5 A detailed dispersion model has been used to predict pollutant concentrations both at the development site and at local existing sensitive receptor locations in the surrounding area in the proposed development's projected completion year of 2025. The assessment uses a conservative approach to assess air quality by:
- ➊ Assuming that there will be no improvement in background pollutant concentrations beyond 2019;
 - ➋ Positioning model receptor points in worst-case locations (i.e., external façades of receptors at their closest points to nearby roads); and
 - ➌ Accounting for the impact of COVID-19 on the progression of the UK vehicle fleet by using vehicle emission factors for 2025 to predict pollutant concentrations in the development's projected opening year of 2026.

- 7.6 The assessment of site suitability found that the proposed development should not result in the exposure of new, sensitive receptors to levels of air pollution at risk of exceeding the UK AQs. Overall predicted NO₂, PM₁₀ and PM_{2.5} concentrations were found to be below the UK AQs at all existing receptor points. As such, the site is considered to be suitable for its intended purpose, and no further assessment of site suitability is considered necessary.
- 7.7 It has been shown that marginal increases in NO₂, PM₁₀ and PM_{2.5} concentrations have been predicted due to the operation of the proposed development. All impacts on local air quality were considered to be *Negligible* with reference to the EPUK & IAQM impact descriptors. Therefore, the overall impact of the proposed development on local air quality is not considered to be significant.
- 7.8 Current plans to offset potential air quality impacts include the use of ASHPs for on-site energy and heating. With regards to transportation, in addition to the provision of secure cycle storage spaces and EV charging points, a travel plan will also be formulated, with green infrastructure (vegetation) used to absorb nearby dust and other pollutants.

8. Conclusions

- 8.1 Phlorum Limited was commissioned by XLB Property Ltd to undertake an Air Quality Assessment in support of a planning application for the proposed commercial redevelopment of the Langstone Park, Havant, PO9 1SA. The Masterplan proposals involve the construction of up to 63,290 sqm (including Phase 1) of commercial floorspace, with associated car parking and 3,000m² of office floorspace (Use Class E(g)(i)).
- 8.2 Local pollutant monitoring data suggests that whilst air quality within the borough is generally good, even at the majority of roadside measurement sites situated in close proximity to the major roads comprising Havant's strategic road network. Furthermore, data from UK-AIR indicate that background pollution concentrations across the site are likely to be well below the relevant UK Air Quality Standard concentrations.
- 8.3 The construction phase of the development could give rise to emissions which could cause dust soiling effects on adjacent uses. However, by adopting the appropriate mitigation measures to reduce emissions and their potential impact, there should be no significant residual effects, thus complying with the requirements of the National Planning Policy Framework.
- 8.4 The operation of the proposed development is not expected to introduce new, sensitive receptors into an area of existing poor air quality, nor is it anticipated to significantly impact on local air quality.
- 8.5 The proposed development will implement air quality mitigation measures including a Travel Plan whilst providing secure cycle storage spaces, electric vehicle charging units and Air Source Heat Pumps for heating and hot water generation; amongst other measures.
- 8.6 As such, the proposed development is expected to comply with all relevant local and national air quality policy. Air quality should not, therefore, pose any significant obstacles to the planning process.

Figures and Appendices

Figure 1: Site Location Plan

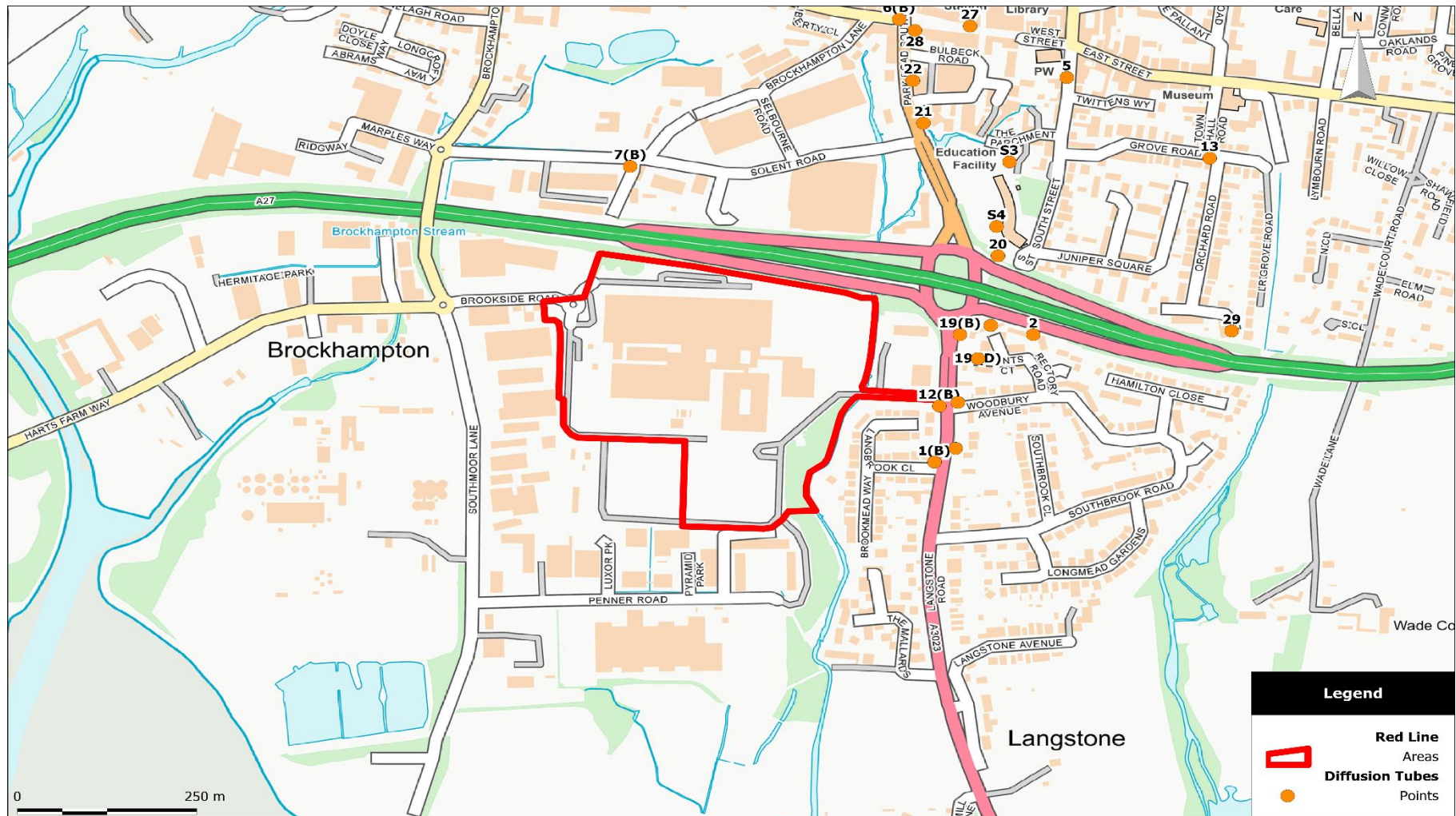


Figure 1: Site Location Plan

Contains Ordnance Survey data © Crown copyright and database right 2021

Figure 2: Construction Phase

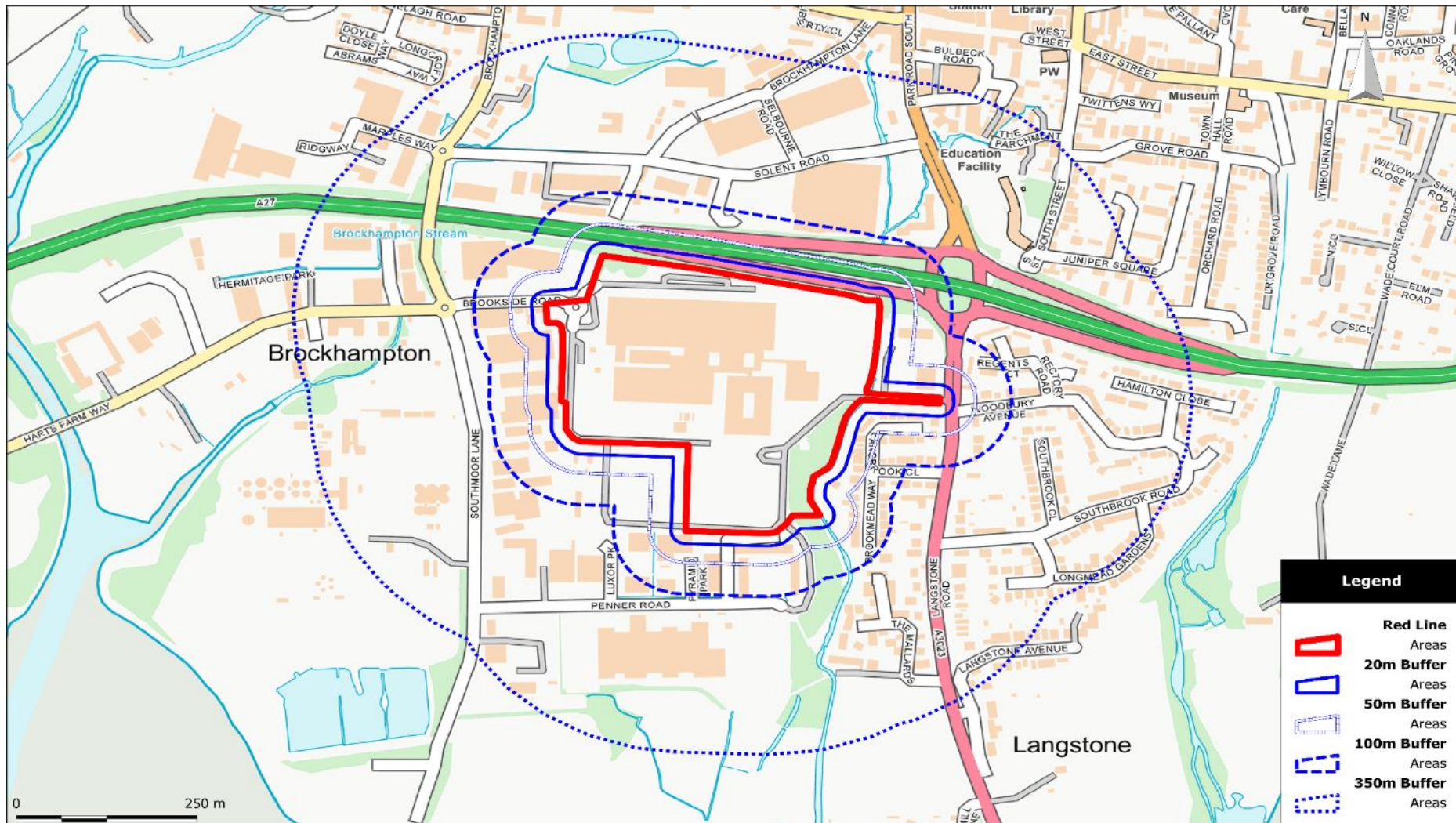


Figure 2: Construction phase

Contains Ordnance Survey data © Crown copyright and database right 2021

Figure 3: Wind Rose for Thorney Island (2018)

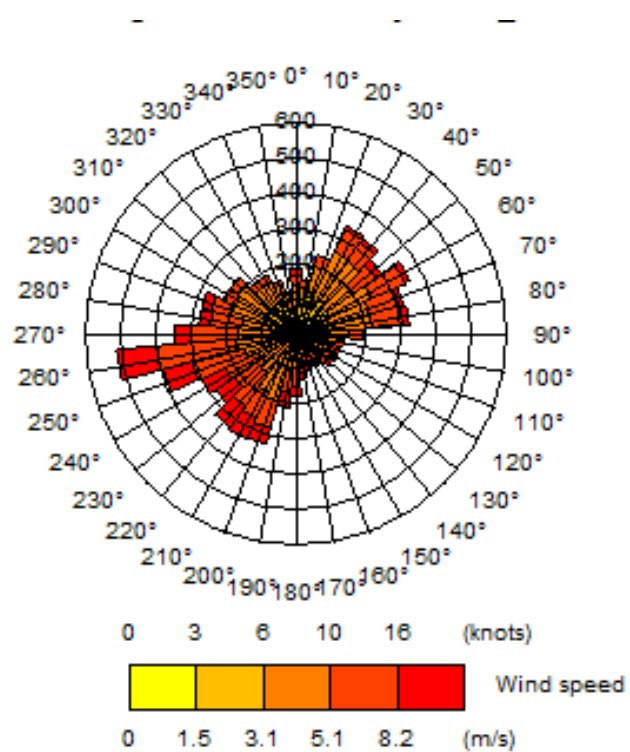
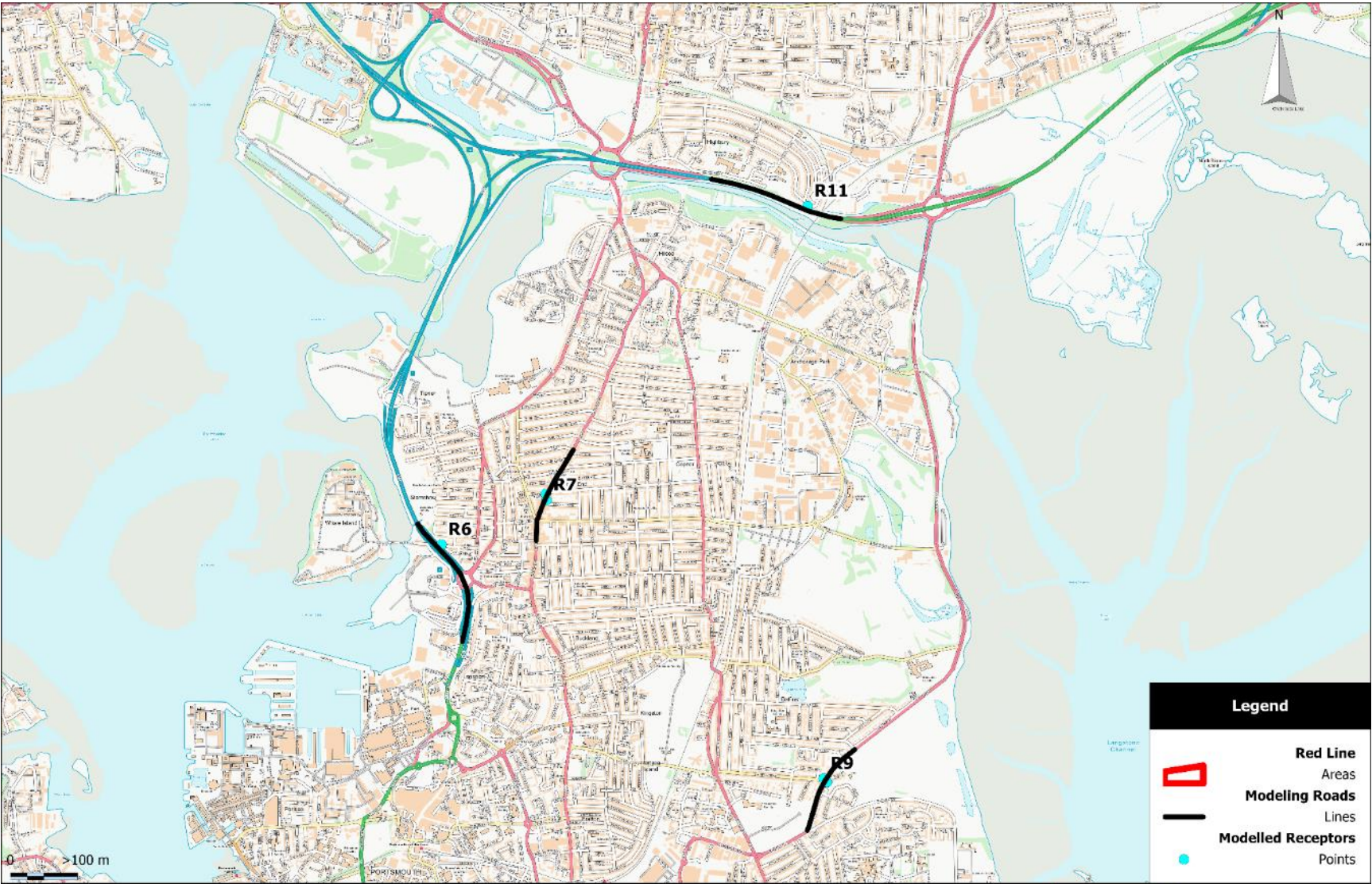


Figure 4a: Modelled Roads and Receptors in Langstone



Figure 4b: Modelled Roads and Receptors in Portsmouth



Appendix A: Model Input Data

Traffic Data

Traffic data used in this assessment were provided by Motion, the transport consultants assigned to the project for the baseline year of 2019 and proposed development's expected completion year of 2026, with and without the proposed development.

The AADT data used in the ADMS-Roads assessment are included in Table A.1 below.

Table A.1: Traffic Inputs for the ADMS-Roads Assessment

Road	2019 Baseline		2026 Without Development		2026 With Development	
	AADT	% HDVs	AADT	% HDV	AADT	% HDV
A3023 Langstone Road	24,634	1.34%	26,405	1.34%	27,652	1.89%
A27 (W)	130,949	4.88%	140,364	4.88%	142,152	4.10%
M275	86,291	2.88%	92,496	2.88%	93,108	2.90%
A2047	12,109	6.04%	12,980	6.14%	13,592	6.0%
A2030	31,436	1.39%	33,696	1.41%	34,308	1.46%

Model Inputs

Model Inputs are provided below in Tables A.3 and A.4. These data relate to ADMS-Roads inputs for model verification and the assessment modelling.

Table B.2: Model Verification Inputs

Inputs	
Dataset	UK EFT v11.0
Emission Year	2019
Road Type	England (Urban)

Table B.3: Operational Inputs

Inputs	
Dataset	UK EFT v11.0
Emission Year	2019 (Baseline). 2025 (Future Baseline) & 2025 (Future With)
Road Type	England (Urban)

Appendix B: Model Verification Study

Model Verification

Model verification studies are undertaken in order to check the performance of dispersion models and, where modelled concentrations are significantly different to monitored concentrations, a factor can be established by which the modelled results can be adjusted in order to improve their reliability. The model verification process is detailed in LAQM.TG(16)⁷.

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

Model verification can only be undertaken where there is sufficient roadside monitoring data in the vicinity of the subject scheme being assessed. LAQM.TG(16) recommends that a combination of automatic and diffusion tube monitoring data is used; although this may be limited by data availability.

Three monitoring location within the administrative boundary of Havant Borough Council (HBC) were selected for this model verification study based in the year 2018. Table B.1 compares monitored and modelled NO₂ concentrations at the monitoring locations.

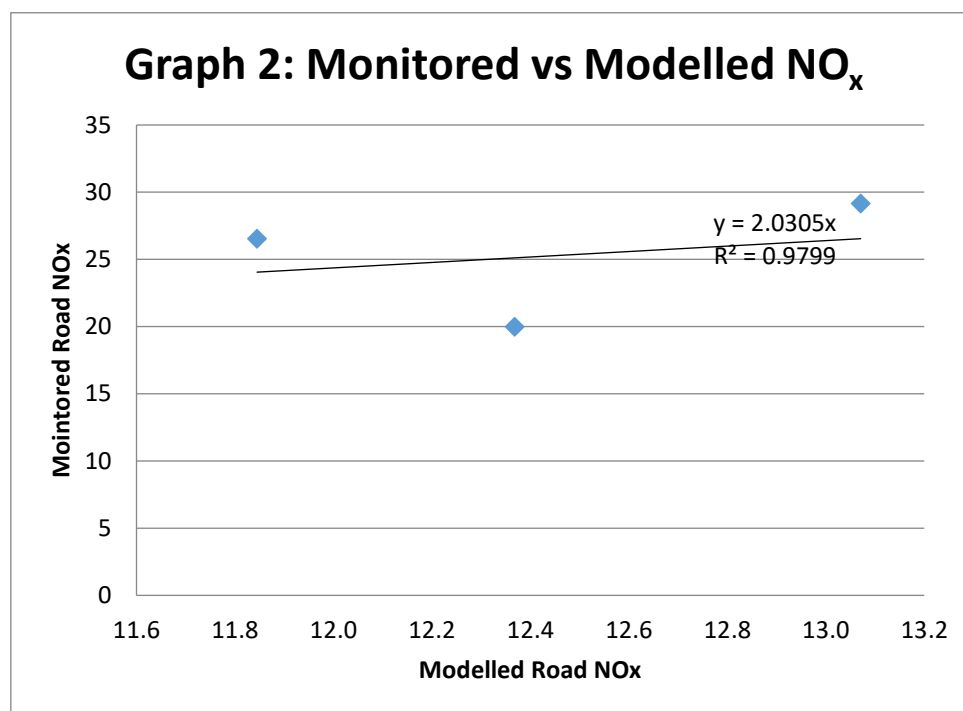
Table B.1: Monitored and Modelled Road Contributions of NO₂ at Local Monitoring Sites (2018).

Monitor	Type	NO ₂ Concentration (µg.m ⁻³)		
		Monitored	Modelled	% Difference
19(E)	DT	33.6	27.1	-19.3%
19(C)	DT	34.8	27.7	-20.4%
19(B)	DT	30.5	27.4	-10.1%

The data in Table B.1 show that the model was consistently under-predicted annual mean NO₂ concentrations. This is frequently seen in model verification studies and is likely the result of local dispersion characteristics. As the majority of the modelled concentrations were outside 25% of the monitored results, was decided to proceed with adjustment of the model, as the model was systematically under-predicting NO₂ concentrations. This was done in order to ensure conservative results.

As it is primary NO_x, rather than secondary NO₂, emissions that are modelled, an adjustment factor must be derived for the road contribution of NO_x. Plots of modelled versus monitored NO_x concentrations on a graph shows a positive correlation. The graph is included in Figure B.1.

Figure B.1 Monitored vs Modelled Road NO_x (2019)



By plotting a trend line through the points on the graph, an adjustment factor of **2.03** was derived. Table B.2 shows total monitored versus modelled NO₂ following the adjustment of the road contribution of NO_x by this factor.

Table B.2: Monitored and adjusted Modelled Road Contributions of NO₂ at Local Monitoring Sites (2019).

Monitor	Type	NO ₂ Concentration (µg.m ⁻³)		
		Monitored	Modelled	% Difference
19(E)	DT	33.6	33.1	-1.51%
19(C)	DT	34.8	34.3	-1.61%
19(B)	DT	30.5	33.6	10.25%

The data in Table B.2 show that following the adjustment, all modelled concentrations of NO₂ are within 10.3% of monitored concentrations at the measurement sites. As a result, the adjustment factors were considered appropriate for the adjustment of modelled road contributions of NO_x for the proposed development.

Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.(TG)16, the RMSE should ideally be within 10% of the relevant AQS, but is acceptable where it is within 25% of the AQS. The model verification process resulted in a post-adjusted RMSE of 1.9µg.m⁻³, which equates to 4.8% of the annual mean AQS for NO₂ and is therefore considered to be acceptable.

Appendix C: IAQM Highly Recommended Mitigation Measures for Medium Risk Sites

Appendix C: IAQM Highly Recommended Mitigation Measures for sites with a Medium Risk of Dust Impacts

Please refer to the IAQM's *Guidance on the assessment of dust from demolition and construction (2014)*⁹ and *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018)*¹⁷ for further, "desirable", mitigation measures.

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.
- 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 Appendix. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exception incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of 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.
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by the IAQM¹⁸ on *monitoring during demolition, earthworks and construction*.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.

¹⁷ IAQM. (2018). *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*.
https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf

- 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.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

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 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

- 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.
- Bag and remove any biological debris or damp down such material before demolition.

Construction

- 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.

Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

- 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 log book.
- 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 (with rumble grids to dislodge accumulated dust and mud prior leaving the site where reasonably practicable).
- 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 10m from receptors where possible.



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