

Air Quality Assessment

Chalcroft 3 – Paddock Land

October 2023

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FIP (West End) Limited

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1. Introduction

Background

- 1.1 Phlorum was commissioned by FIP (West End) Limited to undertake an Air Quality Assessment in support of an outline planning application for the proposed development of up to 4,130m² of commercial floorspace (Use Classes E(g)(ii), E(g)(iii) and B8) to include farm shop (Use Class E(a)) of up to 327m², parking and yard areas (including accessible spaces), landscape buffers and acoustic mitigation, at the Paddock Land, adjacent to Chalcroft Business Park, in Hampshire. The National Grid Reference for the centre of the Site is 448750, 115950. A Site Location Plan has been provided in Figure 1.
- 1.2 The Site is located adjacent to Chalcroft Business Park, bound to the north by the Chalcroft Business Park access, from the roundabout with Chalcroft Way and Burnetts Lane. Burnetts Lane bounds the Site to the east and the South-Western railway line between Eastleigh and Hedge End bounds the Site to the south. The Site will be accessed via the existing Chalcroft Business Park access.
- 1.3 Land use in the vicinity of the Site is mixed, with commercial and industrial uses within the Chalcroft Business Park to the west and residential uses on Burnetts Lane to the east.
- 1.4 The main sources of air pollution in the vicinity of the Site are vehicles travelling on the local road network, particularly the Chalcroft Business Park access route, Burnetts Lane and Chalcroft Way. Although the South-Western railway line between Eastleigh and Hedge End bounds the Site to the south, this railway line is fully electrified and is understood to not host heavy traffic of diesel passenger trains. Therefore, the railway line is not considered to represent a significant source of pollution.
- 1.5 Eastleigh Borough Council (EBC) currently operate four Air Quality Management Areas within the borough, all of which have been declared due to exceedances of the annual mean UK Air Quality Standard (AQS) for nitrogen dioxide (NO₂). The Site is not located within, or adjacent to any of these AQMAs, with the closest of these, The Botley High Street AQMA, located approximately 2.9km south-east of the Site.

Scope of Assessment

- 1.6 This assessment will focus on assessing the potential for traffic generated by the proposed development to impact local air quality at existing and proposed sensitive receptor locations within the local area.
- 1.7 The assessment will also consider the suitability of the site, in air quality terms, for the proposed commercial use, and assess the potential for dust nuisance impacts to be caused during construction.

2. Policy Context

The UK Air Quality Strategy

- 2.1 The UK Air Quality Strategy (UKAQS)¹ sets out 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 a 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	20	20 $\mu\text{g.m}^{-3}$

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 The UK AQS for PM_{2.5} was amended as part of the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020³.
- 2.6 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.
- 2.7 Air quality is managed locally by Eastleigh Borough Council (EBC), who currently operate four AQMAs across the borough. In 2020, EBC published an updated AQAP⁴ outlining the actions the borough will take to improve air quality through to the year 2025. The AQAP recognises that road transport is the major contributor to air pollution across the borough and as such, actions to improve air quality predominantly target vehicle emissions and promoting sustainable methods of travel. Key measures being implemented to improve air quality across the borough include the following:
- Improving air pollution monitoring across the borough;
 - Promoting the use of electric vehicle (EV) uptake and increasing the number and accessibility of EV charging;
 - Promoting walking and cycling by developing a walking and cycling strategy and improving walking and cycling networks;
 - Partnering with bus and rail services to improve routes and services and increase patronage;
 - Promoting and expanding car clubs; and
 - Updating planning guidance to require EV charging and low NO_x boilers in new developments.

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

3 The Environment (Miscellaneous Amendment) (EU Exit) Regulations 2020.

4 Eastleigh Borough Council. (2020). *Air Quality Action Plan*.

National Planning Policy Framework

- 2.8 The National Planning Policy Framework (NPPF)⁵, which was updated in September 2023, 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;*
- 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.”*

- 2.9 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

⁵ Ministry of Housing, Communities & Local Government. (2023). *National Planning Policy Framework*.

the potential sensitivity of the site or wider area to impacts that could arise from the development.”

- 2.10 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.”

- 2.11 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.”

- 2.12 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

- 2.13 Reference ID 32 (Air Quality) of the National Planning Practice Guidance (PPG)⁶, 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.

6 Planning Practice Guidance (PPG) 32. (Updated November 2019). *Reference ID 32 Air Quality*.

- 2.14 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;*
-  *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.”*

- 2.15 Details are also provided as to 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.

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

Local Planning Policy

- 2.17 Planning Policy within Eastleigh is governed by the *Eastleigh Borough Local Plan (2016 – 2036)*⁷, which sets out EBC’s vision and overarching planning policies to guide development in the borough towards this vision, through to the year 2036. The Local Plan identifies the quantity and type of development required in the borough as well as key locations in which development is required and the infrastructure and services required to support this development.
- 2.18 EBC’s Local Plan sets out numerous policies of both direct and indirect relevance to air quality, as follows:

Policy DM8, Pollution:

“Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through:

- a. air pollution (including odours or particulate emissions);*
- b. pollution of surface, underground, coastal waters or other watercourses;*
- c. noise or vibration;*
- d. light intrusion, both generally and with respect to the South Downs National Park’s status as an International Dark Night Skies reserve; or*
- e. land contamination.*

Development susceptible to particular forms of pollution will not be permitted:

- a. where it will be adversely affected by such pollution, unless measures can be taken that adequately mitigate the polluting effects; or*
- b. where it would inhibit existing economic or other activities giving rise to acceptable polluting effects.*

Where a development site is known or suspected to be contaminated, before the site is developed, the Borough Council will require the contamination to be remediated to a standard where as a minimum it cannot be defined as ‘contaminated land’ under Part IIA of the Environmental Protection Act 1990”.

Strategic Policy SP11, Transport Infrastructure:

“The Council will work with the highway authorities, Solent Transport, transport operators, funding bodies and developers to minimise transport emissions, pollution and congestion by:

⁷ Eastleigh Borough Council. (2022). *Eastleigh Borough Local Plan (2016 – 2036)*. [Adopted April 2022].

- a. *ensuring new developments:*
 - i. *encouraging walking, cycling and the use of public transport; and*
 - ii. *minimise congestion and support safety on the highway network as informed by appropriate transport assessments; and*
- b. *safeguarding the routes and securing the funding to deliver new and improved transport infrastructure [...]"*

Strategic Policy S1, Delivering Sustainable Development:

"To be sustainable, new development in the borough should: [...]"

- d. *have regard to the potential impacts of climate change, and the need to limit greenhouse gas emissions including through carbon sequestration and by promoting measures to design buildings and spaces which are adaptable to predicted climate change, and restrict development in areas at risk from flooding, minimise energy use and encourage the generation of renewable energy, and by minimising emissions from motorised transport, industrial activity and domestic uses;*
- e. *minimise the need to travel longer distances and, where travel is necessary, prioritise more sustainable forms of transport, such as active travel, other alternatives to car use, or a combination of active travel and other alternatives to car use;*
- i. *maintain local environmental quality, including avoiding damage to, and where possible enhancing, the existing valued urban and rural environments in the borough and heritage assets;*

2.19 Policy DM4, Zero or Low Carbon Energy:

"The Borough Council will permit the development of infrastructure to:

- a. *generate zero or low carbon energy; and / or*
- b. *make more efficient use of energy sources e.g. installations deploying combined heat and power (CHP technology);*

Subject to general development criteria and provided that the development:

- a. *has no significant adverse impact on the landscape or landscape features, biodiversity or the significance of heritage assets;*
- b. *does not involve the loss of land in public recreational use (see policy DM32);*
- c. *does not involve the permanent loss of the best and most versatile agricultural land (BMV)."*

3. Baseline Air Quality

- 3.1 This chapter is intended to establish prevailing air quality conditions in the vicinity of the Application Site.

Baseline Conditions

- 3.2 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.
- 3.3 Defra provides estimated background concentrations of the UKAQS pollutants at the UK Air Information Resource (UK-AIR) website⁸. 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.
- 3.4 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.
- 3.5 Monitoring data from local pollutant monitoring networks are also considered an appropriate source of data for the purposes of describing baseline air quality. To this end, local air quality monitoring data from EBC's most recent available ASR⁹ and from EBC's My-Air website¹⁰ have been reviewed and included.

UK-AIR Background Pollution

- 3.6 UK-AIR predicted background concentrations of NO₂, PM₁₀ and PM_{2.5} for 2019 to 2030 are presented in Table 3.1. These data were taken from the central grid square location closest to the application site (i.e. grid reference: 448500, 115500).

8 Defra. (2020). UK Air Information Resource Website (UK-AIR). www.uk-air.defra.gov.uk

9 Eastleigh Borough Council. (2020). *2020 Air Quality Annual Status Report (ASR)*.

10 Diffusion Tube Data Download: Eastleigh Borough Council My-Air.

Available from: <http://eastleigh.my-air.uk/diffusion-tube-data/>

Table 3.1: Background Concentrations of Pollutants in the Vicinity of the Application Site between 2019 and 2030

Pollutant	Predicted Annual Mean Background Concentration ($\mu\text{g.m}^{-3}$)									
	2019	2020	2021	2022	2023	2024	2025	2026	2028	2030
NO ₂	16.0	15.5	14.9	14.3	13.8	13.4	12.9	12.4	11.9	11.4
PM ₁₀	14.6	14.3	14.0	13.9	13.7	13.6	13.4	13.3	13.3	13.3
PM _{2.5}	10.1	9.9	9.7	9.6	9.4	9.3	9.2	9.1	9.1	9.1

- 3.7 The data in Table 3.1 show that annual mean background concentrations of NO₂, PM₁₀ and PM_{2.5}, in the vicinity of the application site between 2019 and 2030 are predicted to be well below their respective AQs.
- 3.8 The data show that in 2023, NO₂, PM₁₀ and PM_{2.5} concentrations are predicted to be below their respective AQs by approximately 66%, 66% and 53%, respectively. Therefore, annual mean background pollutant concentrations are likely to be below their annual mean AQs in the vicinity of the Application Site.
- 3.9 In the proposed development's projected opening year of 2028, NO₂, PM₁₀ and PM_{2.5} concentrations are predicted to fall further, to approximately 71%, 67% and 55%, below their respective long-term AQs.
- 3.10 Concentrations of all pollutants are generally 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

- 3.11 Local pollutant monitoring is considered an appropriate source of data for the purposes of describing baseline air quality. At the time of writing, the most recent ASR⁹ released by EBC included local pollutant monitoring data from 2019. To supplement this, more recent local pollutant monitoring data available from EBC's My-Air website¹⁰ have also been reviewed, where appropriate.
- 3.12 Due to the uncertainty surrounding impacts associated with COVID-19 on emissions and subsequent levels of pollution across the UK, this baseline review has focused on 2019, which is considered to be the most recent 'normal' year for which baseline conditions can be established.

Automatic Monitoring

- 3.13 Between 2018 and 2022, EBC undertook automatic monitoring for NO₂, PM₁₀, and PM_{2.5} at three locations within the borough. Each of these locations is located within Eastleigh Town Centre and the surrounding area; with the closest automatic monitoring station; ES1 (Southampton Road), located approximately 3.9km west of the Application Site.

- 3.14 Automatic monitoring stations ES1, ES2, and ES3, are located in busy areas of the Town Centre and surrounding area, adjacent to the A335. These automatic monitoring stations are, therefore, not expected to provide insight into baseline air quality in the vicinity of the Application Site and as such, pollutant monitoring data from these monitoring stations have not been reviewed or discussed.

Non-Automatic Monitoring

- 3.15 EBC also operate a non-automatic, NO₂ diffusion tube monitoring network across the borough. From this network, a total of 10 NO₂ diffusion tubes are located within 3km of the Application Site. Monitoring data from these diffusion tubes, obtained from EBC's most recent available ASR⁹ (for 2018 and 2019) and EBC's My-Air website¹⁰ (for 2021 and 2022) are included in Table 3.2, below.

Table 3.2: Monitoring Data from EBC NO₂ Diffusion Tubes

Monitor	Type	Distance to Site (km)	Annual Mean NO ₂ Concentration (µg.m ⁻³)			
			2018	2019	2021	2022
JW	R	1.4	24.7	21.3	17.4	18.1
BOT	R	1.6	32.5	31.9	28.0	26.6
WYV	R	2.3	29.5	24.1	24.7	23.0
FORSL	R	2.5	28.0	28.0	23.9	24.0
WHL	R	2.7	20.3	17.5	16.1	-
PAV	R	2.8	-	-	-	16.0
AL	R	2.8	25.1	23.5	19.8	20.2
SWA	R	2.9	27.7	28.6	23.6	23.9
GR	R	2.9	28.7	26.6	24.0	23.0
KCA(18)	R	3.0	30.7	28.1	26.3	24.5

Note: "R" = roadside. Monitoring data from the year 2020 omitted due to low rates of data capture and unrepresentative pollutant concentrations being recorded due to the various COVID-19 associated lockdowns. Diffusion tube results from EBC's My-Air website for 2021 and 2022 have been treated with Defra's National Bias Adjustment factors for 'Gradko 20% TEA'.

- 3.16 The data in Table 3.2 show that annual mean concentrations of NO₂ recorded at roadside monitoring locations within 3km of the Site have generally been well below the 40µg.m⁻³ AQS for NO₂ between 2018 and 2022.
- 3.17 The closest diffusion tube to the site, JW (Jukes Walk), is located in a roadside location, approximately 1.6m from the kerb of Moorgreen Road, which passes over the M27 between Moorgreen and West End. Despite being located in close proximity to the M27, in 2019 an annual mean NO₂ concentration of 21.3 µg.m⁻³ was recorded at this location, which is below the 40 µg.m⁻³ annual mean AQS by approximately 47%.

- 3.18 Annual mean NO₂ concentrations recorded at the Jukes Walk (JW) diffusion tube were lower in 2021 and 2022 relative to 2019, with monitored concentrations of 17.4 µg.m⁻³ and 18.1 µg.m⁻³, which are below the long-term AQS by approximately 57% and 55%, respectively.
- 3.19 The next closest diffusion tube to the Application Site is 'BOT' (Botley Road), which is located approximately 2m from the kerb of the B3354 Botley Road, approximately 1.6km north-east of the Site. In 2019, this diffusion tube recorded an annual mean NO₂ concentration of 31.9 µg.m⁻³, which is below the long-term AQS by approximately 20%. Annual mean concentrations recorded at this location were lower in 2021 and 2022 relative to 2019, with concentrations of 28.0 µg.m⁻³ and 26.6 µg.m⁻³, which are below the 40 µg.m⁻³ AQS by approximately 30% and 33%, respectively.
- 3.20 Diffusion tube 'WYV' (Wyvern School) is also located on the B3354 Botley Road, positioned outside of Wyvern School, approximately 2.3km north-east of the Site. Concentrations of NO₂ recorded at this location were lower than those recorded on the other Botley Road diffusion tube (BOT) throughout the 2018 to 2022 period. In 2019, an annual mean NO₂ concentration of 24.1 µg.m⁻³ was recorded at this location, which is below the long-term 40 µg.m⁻³ AQS by 40%.
- 3.21 Diffusion tube 'WHL' (Woodhouse Lane) is located on Woodhouse Lane, which is a small, rural lane, similar to roads such as Chalcroft Way, Burnetts Lane and the Chalcroft Business Park access route, in the vicinity of the Application Site. In 2019, the Woodhouse Lane diffusion tube recorded an annual mean NO₂ concentration of 17.5 µg.m⁻³, which is below the 40 µg.m⁻³ AQS by approximately 56%.
- 3.22 Between 2018 and 2022, EBC did not monitor for NO₂ at a background location within 3km of the site.
- 3.23 Overall, the local NO₂ monitoring data presented in Table 3.2 indicate that local concentrations of NO₂ were generally well below the long-term 40 µg.m⁻³ AQS, even at roadside locations, adjacent to local A-roads, B-Roads, minor roads and motorways.

4. Assessment Methodology

Guidance

- 4.1 Defra's latest Local Air Quality Management Technical Guidance (LAQM.TG(22))¹¹ was followed in carrying out this assessment.
- 4.2 The latest (2023) Institute of Air Quality Management (IAQM) *Guidance on the Assessment of Dust from Demolition and Construction*¹² was adopted in assessing the risk of dust emissions during the construction phase of the proposed development.
- 4.3 The Greater London Authority's Control of Dust and Emissions Supplementary Planning Guidance¹³ (SPG) has also been referred to, which is considered best practice guidance for London and the wider UK. It details a number of mitigation measures that should be adopted to minimise adverse impacts from dusts and fine particles.
- 4.4 The latest Environmental Protection UK (EPUK) & IAQM guidance on *Planning for Air Quality*¹⁴ was also referred to throughout the assessment. The criteria used to describe air quality impacts were derived from this guidance, and have been included in Appendix A.
- 4.5 Finally, Defra's *COVID-19 Supplementary Guidance*¹⁵ was also referred to in adopting a conservative approach regarding vehicle emission factors for the pollutant dispersion modelling assessment.

Construction Phase

- 4.6 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.

11 Defra. (2022). Part IV of the Environment Act 1995 as amended by the Environment Act 2021. Environment (Northern Ireland) Order 2002 Part III. Local Air Quality Management Technical Guidance LAQM.TG(22).

12 Institute of Air Quality Management. (2023). *Guidance on the assessment of dust from demolition and construction*.

13 Greater London Authority. (2014). *The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance*.

14 Environmental Protection UK & Institute of Air Quality Management. (2017). *Land-Use Planning & Development Control: Planning for Air Quality*.

15 Defra. (2021). *COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021*. Version 1.0.

- 4.7 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 boundary of the Site.
- 4.8 The Multi Agency Geographic Information for the Countryside (MAGIC) website¹⁶, 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

- 4.9 The IAQM guidance suggests that Demolition, Earthworks, Construction and Trackout should all be assessed individually to determine the overall significance of the construction phase.
- 4.10 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.
- 4.11 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 duration, the construction materials and the plant to be used must be considered.
- 4.12 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 account of a number of factors:

-  *the specific sensitivities of receptors in the area;*
-  *the proximity and number of those receptors;*
-  *in the case of PM₁₀, the local background concentration; and*

¹⁶ Natural England and MAGIC partnership organisations. Multi Agency Geographic Information for the Countryside. Available from: <http://www.magic.gov.uk/> [Accessed September 2022].

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

- 4.13 Based on these factors, the area is categorised as being of 'Low', 'Medium' or 'High' sensitivity.
- 4.14 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.
- 4.15 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 long-term impacts on local air quality and therefore this has been scoped out of the assessment.

Operational Phase

Pollutant Sources

- 4.16 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 motor vehicles are oxides of nitrogen (NO₂/NO_x) and particulate matter (PM₁₀ 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 considered further in this report.
- 4.17 As it is elevated annual mean concentrations of NO₂ and PM₁₀ 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.
- 4.18 Other (background) air pollutant sources contribute to local pollution. These include emissions from domestic, commercial, industrial, and marine sources, and transboundary emissions. These emissions are accounted for in this assessment within the background concentration estimates.
- 4.19 As there were no local pollutant monitoring data available in the vicinity of the site from a suitable and representative urban background monitoring location, the latest available UK-AIR predicted background concentrations for NO₂, PM₁₀ and PM_{2.5}, for the year 2019 were used within the operational phase pollutant dispersion modelling assessment. Concentrations of these pollutants were obtained from each individual UK-AIR 1km² grid square in which modelled receptors were positioned.
- 4.20 A summary of the background pollutant concentrations used within this assessment are provided in Table 4.1 below.

Table 4.1: Background Pollutant Concentrations Used in Operational Phase Assessment

UK-AIR Grid Square		Pollutant	Annual Mean Background Concentration ($\mu\text{g.m}^{-3}$)
X	Y		
448500	115500	NO ₂	15.5
		PM ₁₀	14.3
		PM _{2.5}	9.9
448500	116500	NO ₂	13.9
		PM ₁₀	13.5
		PM _{2.5}	9.4
449500	116500	NO ₂	13.5
		PM ₁₀	13.6
		PM _{2.5}	9.4

Note: Background pollutant concentrations were obtained from each individual UK-AIR grid square in which modelled receptors are located. All concentrations based on UK-AIR predictions for the year 2019.

Air Quality Dispersion Modelling Assessment

- 4.21 The EPUK & IAQM planning guidance¹⁴ provides indicative thresholds for changes in traffic flows which would require a detailed (dispersion modelling) Air Quality Assessment, when within, or not within, an AQMA. When within an AQMA, these are a change in 24-hour annual average daily traffic (AADT) flows exceeding 100 light duty vehicles (LDVs) and/or 25 heavy duty vehicles (HDVs). Elsewhere, these are a change in 24-hour AADT flows of more than 500 LDVs and/or 100 HDVs. Changes below these thresholds can be reasonably considered to have an insignificant impact on air quality.
- 4.22 The application site is not located within, or adjacent to, an AQMA, and as such, where the proposed development is expected to increase traffic flows by more than 500 LDVs and / or 100 HDVs, a detailed (dispersion modelling) Air Quality Assessment is required.
- 4.23 Information provided by PFA Consulting, the transport consultant for the project, indicates that the proposed development would generate AADT flows exceeding 500 LDVs on the section of the Chalcroft Business Park access road, between the application site access and the roundabout connecting the business park with Chalcroft Way, Burnetts Lane and the One Horton Heath link road.

- 4.24 Therefore, a detailed air pollution dispersion modelling assessment has been undertaken to assess the potential impact of traffic generated by the proposed development on air quality at existing sensitive receptor locations in the local area. The impact of traffic generated by the proposed development on proposed residential locations within the One Horton Heath *The Lower Acre* development (planning application reference: F/20/89500), which are expected to be occupied in 2026, has also been assessed.

Model Specification

- 4.25 In order to assess the impact of scheme-generated traffic on local air quality, emissions from local roads have been assessed using a detailed dispersion model.
- 4.26 The model used was ADMS-Road (version 5.0.1.3), which is produced by Cambridge Environmental Research Consultants (CERC), and has been validated and approved by Defra for use as an assessment tool for calculating the emission and subsequent dispersion of pollutants from traffic on UK roads. The latest Defra Emissions Factor Toolkit (version 11.0)¹⁷ was used to estimate vehicle emissions within the model.

Meteorological Data

- 4.27 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.
- 4.28 Meteorological data used in the model were obtained from the Southampton meteorological station for 2019, as it was considered to be the most representative nearby meteorological station to the site. The wind rose for this meteorological dataset has been included in Figure 3 of this report. Local air quality monitoring and traffic data from 2019 have been used for model verification purposes.
- 4.29 The surface roughness applied to the model for the study area was 0.5m, which is the value typically used for open suburbia, to reflect the application site and surrounding area. A surface roughness of 0.0849m was applied to the meteorological measurement site, following recommendations from the meteorological dataset provider.

¹⁷ Defra. (2021). Emissions Factor Toolkit (version 11.0).

Modelled Receptors

- 4.30 Discrete model receptors were positioned on the façades of existing sensitive uses in the local area; predominantly residential dwellings. Model receptors were also positioned on the façades of proposed residential units within The Lower Acre residential development, which is the southern-most residential parcel of the One Horton Heath development, as these residences are due to be occupied in 2026, prior to the opening of the proposed development.
- 4.31 The sensitive receptor locations selected for use within this assessment were those sensitive uses in the local area situated closest to pollution sources (i.e. roads). Receptors are, therefore, positioned in worst-case locations, for a conservative approach. Receptors were modelled at “breathing height” which is, by convention, 1.5m above ground or the relevant floor level.
- 4.32 Three groups of receptor points were modelled within this assessment, divided categorised as existing local sensitive receptors, residential dwellings to be constructed within The Lower Acre development and locations of proposed commercial uses within the application site.
- 4.33 Sensitive receptors modelled within this assessment are presented in Figure 4, with details of these receptors provided in Table 4.2, below.

Table 4.2: Modelled Receptors

Receptor	Details	Type	Height (m)	UK Grid Reference	
				X	Y
Existing Receptors					
E1	Residence adjacent to Business Park	Residential	1.5	448706.3	116013.1
E2	Residence on Burnetts Lane South	Residential	1.5	448859.5	115972.7
E3	Residence off Burnetts Lane North	Residential	1.5	448965.5	116049.5
E4	Residence on Burnetts Lane North	Residential	1.5	449038.8	116147.4
E5	Residence on Burnetts Lane North	Residential	1.5	449056.8	116176.3
E6	Residence on Burnetts Lane North	Residential	1.5	449099.2	116234.7
The Lower Acre Receptors					
TLA1	The Lower Acre Block A.3 (Plots 125-143)	Residential	1.5	448868.9	116072.8
TLA2	The Lower Acre Block A.2 (Plots 119-124)	Residential	1.5	448900.4	116074.7
TLA3	The Lower Acre Plots 96 & 97	Residential	1.5	448965.8	116093.1
TLA4	The Lower Acre Plots 49 & 50	Residential	1.5	449090.6	116260.9
TLA5	The Lower Acre Plot 6	Residential	1.5	449128.2	116325.4
TLA6	The Lower Acre Block A.4 (Plots 144-158)	Residential	1.5	448842.9	116120.6
TLA7	The Lower Acre Block B (Plots 161-180)	Residential	1.5	448841.1	116154.4
TLA8	The Lower Acre Block C	Residential	1.5	448854.2	116271.8

Receptor	Details	Type	Height (m)	UK Grid Reference	
				X	Y
TLA9	The Lower Acre Plot 322	Residential	1.5	448830.4	116358.5
Proposed Receptors within the Application Site					
P1	Proposed Farm Shop	Commercial	1.5	448731.9	115997.3
P2	Proposed Building A	Commercial	1.5	448786.5	116001.8
P3	Proposed Building B	Commercial	1.5	448829.9	115998.6

Traffic Inputs

- 4.34 Traffic data used in this assessment were provided by PFA Consulting. These data were provided in 24-hour AADT format for the base year (2023) and the proposed development's projected opening year (2028).
- 4.35 The following scenarios were assessed:
- 🌿 2023 Base (utilising vehicle emission factors for 2021);
 - 🌿 2028 Without Proposed Development (emission factors for 2024); and
 - 🌿 2028 With Proposed Development (emission factors for 2024).
- 4.36 The scenarios based in the year 2028 take account of cumulative impacts from development in the local area, by accounting for traffic expected to be generated by the following schemes:
- 🌿 West of Horton Heath & Chalcroft Farm development (also referred to as One Horton Heath), detailed under planning application reference *O/14/75735*;
 - 🌿 Boorley Gardens development, detailed under planning application reference *O/15/75953*;
 - 🌿 Land to the North West of Horton Heath, detailed under planning application reference *O/16/79354*;
 - 🌿 Owton's Butchery and commercial floorspace within Chalcroft Business Park, as detailed under planning application reference *F/18/83945*; and
 - 🌿 Extension of Chalcroft Business Park Unit 19, detailed under planning application reference *F/20/89518*.
- 4.37 In addition to taking account of the specific local committed development listed above, the traffic data used within the Operational Phase assessment were projected forward in time from the base year (2023), to the proposed development's projected opening year of 2028 using TEMPro growth factors. The TEMPro database includes developments outlined within the Local Plans of Local Planning Authorities. Therefore, the use of TEMPro factors to adjust traffic flows for future years helps to take account of potential cumulative impacts generated by development in the surrounding area.

- 4.38 All roads modelled within this assessment are displayed in Figure 4, with model inputs, including traffic data and emission factors included in Appendix B.

Model Verification

- 4.39 It is recommended, following guidance set out in LAQM.TG(22)¹¹ 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.
- 4.40 A model verification study has been undertaken using pollutant monitoring data from EBC's local pollutant monitoring network. Full details of this model verification study are included in Appendix C.
- 4.41 The model was found to under-predict NO₂ concentrations at local monitoring sites, which is frequently seen in model verification studies and is likely caused by the local dispersion environment. As most of the modelled NO₂ concentrations were outside 25% of the monitored NO₂ concentrations, it was decided to proceed with adjustment of the model, in order to ensure locally accurate results. To this end, an adjustment factor of 2.93 was applied to modelled road contributions of NO_x.
- 4.42 Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.TG(22), the RMSE is acceptable where it is within 25% of the relevant AQS, but should ideally be within 10% of the AQS. Following adjustment of the model results, an RMSE of 2.4 µg.m⁻³ was calculated for the predicted and observed concentrations of NO₂, which equates to 6.1% with respect to the 40 µg.m⁻³ annual mean AQS and is therefore within the 'ideal' 10% range.

Model Uncertainty

- 4.43 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.
- 4.44 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.
- 4.45 Defra's latest EFT¹⁷ (version 11.0) for road transport provides forecasts of NO_x, PM₁₀ and 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.

- 4.46 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.
- 4.47 To adequately account for this uncertainty when predicting future pollutant concentrations, the precautionary principle has been followed, and a conservative approach has been taken.
- 4.48 Modelled receptor locations selected for use within this assessment were positioned on the closest façades of both existing and proposed sensitive uses to the adjacent road network, thereby representing worst-case locations in terms of exposure to pollutants from road sources.
- 4.49 Background NO_2 , PM_{10} and $\text{PM}_{2.5}$ concentrations used in this assessment were obtained from the UK-AIR predicted background concentrations for each individual UK-AIR grid square in which modelled receptor points were located, for the year 2019, as displayed in Table 4.1. These background concentrations were predicted to stay the same beyond the year 2019, despite the decreasing trends in pollutant concentrations evidenced by Tables 3.1 and 3.2. This provides a highly conservative approach by assuming that there will be no future improvement in background pollutant conditions beyond 2019, despite these being expected to improve due to local, national, and international efforts to reduce emissions across all sectors.
- 4.50 Furthermore, in order to account for the impact of COVID-19 on the progression of the UK vehicle fleet, vehicle emission factors for 2021 were used to predict pollutant concentrations in the baseline year of 2023 and emission factors for 2024 were used to predict pollutant concentrations in the development's projected completion year of 2028, which is even more conservative an approach than recommended within Defra's *COVID-19: Supplementary Guidance*¹⁵.

Consultation

- 4.51 EBC's Pollution Department were initially contacted on 15th September 2023 to discuss and agree the scope of this Air Quality Assessment.
- 4.52 A response was received from EBC's Pollution Control Department on 17th October 2023, in which the principle of the scope of assessment was agreed, with the following statement:

"This seems a sensible decision considering the traffic generation in the area, with many development projects.."

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 (discussed 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 There are no existing structures at the Site which will need to be demolished in order to make way for the proposed development. Therefore, there will be no demolition phase required for this proposed development and as such, the demolition phase has not been considered further within this assessment.

Earthworks

- 5.4 The IAQM guidance states that when the total area of a site is below 18,000m², a site can be considered to have a *Small* potential dust emission magnitude, and when the total area of a site is between 18,000m² and 110,000m², a site can be considered to have a *Medium* potential dust emission magnitude.
- 5.5 The total area of the Application Site is 1.8 hectares, which equates to 18,000m², which is the threshold between the *Small* and *Medium* dust emission magnitude categories.
- 5.6 It is expected that fewer than 5 heavy-earth moving vehicles will operate on-Site at any one time during the earthworks phase and wider construction, which falls within the IAQM's *Small* dust emission magnitude category.
- 5.7 There will be no formation of bunds on-Site.
- 5.8 Considering the factors discussed above, the overall dust emission magnitude for the earthworks phase is considered to be *Small*, following IAQM guidance.

Construction

- 5.9 During construction, activities that have the potential to cause emissions of dust may include concrete batching, sandblasting and piling. 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.

- 5.10 Construction methods and materials to be used include standard concrete strip foundations with steel frame assembly, blockwork and panelling.
- 5.11 It is anticipated that on-Site concrete batching will be required on-Site during construction, which falls within the IAQM's *Medium* dust emission magnitude category.
- 5.12 Upon completion, the total volume of the structures to be erected at the Site would be between 12,000m³ and 75,000m³, which also falls within the IAQM's *Medium* dust emission magnitude category.
- 5.13 Considering the above, the overall dust emission magnitude for the construction phase is considered to be *Medium* with reference to the IAQM guidance.

Trackout

- 5.14 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.
- 5.15 During construction, it is anticipated that fewer than 20 HDVs would access the Site per day. This aspect of the trackout phase falls within the IAQM's *Small* dust emission magnitude category.
- 5.16 It is anticipated that an unpaved internal haul route of 100m in length will be required during construction, and this haul route will comprise surface material with a low potential for dust release.
- 5.17 Considering the above, the overall dust emission magnitude for the trackout phase can be classified as *Medium*, with reference to the IAQM guidance.

Emission Magnitude Summary

- 5.18 A summary of the dust emission magnitude as a result of the activities of Demolition, Earthworks, Construction and Trackout are listed in Table 5.1 below.

Table 5.1: Dust Emission Magnitude for Each Construction Stage

Activity	Dust Emission Magnitude
Demolition	N/A
Earthworks	Small
Construction	Medium
Trackout	Medium

Sensitivity of the Area

- 5.19 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.
- 5.20 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.
- 5.21 Medium sensitivity receptors include locations where individuals would expect to enjoy a reasonable level of amenity, but not the same level as would be expected in their homes, examples include workplaces and parks.
- 5.22 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.
- 5.23 With the exponential decline in dust levels 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.
- 5.24 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.
- 5.25 New residences under construction within The Lower Acre phase of the One Horton Heath development (expected to be completed in 2026), as detailed under planning application reference F/20/89500 have been considered within the number of sensitive receptors detailed in Table 5.2 below.

Table 5.2: Approximate number of High Sensitivity Receptors within 350m of the Site

Distance to Site (m)	Number of High Sensitivity Receptors	Receptor Details
<20	7	Residences on Burnetts Lane and adjacent to the Chalcroft Business Park Access
<50	10	Residences on Burnetts Lane and adjacent to the Chalcroft Business Park Access
<100	50	Residences within the south of The Lower Acre Site
<350	130	Residences on Burnetts Lane (north & south) and within The Lower Acre Site; Wessex Vale Crematorium

- 5.26 Figure 3 shows that the predominant wind direction at the closest relevant meteorological station at Southampton (2019) is from the south-west. As shown in Figure 2 and detailed in Table 5.2, there are fewer than 10 high sensitivity receptors within 20m of the Site, with some of these being located downwind of the prevailing wind direction. Therefore, the sensitivity of the area to dust soiling impacts can be defined as *Medium*.
- 5.27 The IAQM guidance indicates that where annual mean concentrations of PM₁₀ are below 24µg.m⁻³, the sensitivity of an area to particulate matter related human health impacts can be defined as *Low*, providing that there are less than 100 highly sensitive receptors within 20m of the Site. UK-AIR predicted annual mean concentrations of PM₁₀ are well below 24µg.m⁻³ in the vicinity of the Application Site and as such, the sensitivity of the area to human health impacts is defined as *Low*.
- 5.28 Review of the MAGIC website¹⁶, which incorporates Natural England's interactive maps, has identified no statutory ecological receptors within 50m of the Site, or 50m of roads to be used by construction traffic, up to 500m from the Site entrance. The closest statutory ecological site is the Moorgreen Meadows Site of Special Scientific Interest (SSSI), located approximately 1km south of the Application Site.
- 5.29 Although there are no statutory ecological receptors in the vicinity of the Site, there is one non-statutory ecological receptor in the vicinity of the Site; the Chalcroft Distribution Park (West End) Site of Importance for Nature Conservation (SINC). This SINC is located within 20m of the Site, as demonstrated in Figure 2. The Chalcroft Business Park SINC is a local designation, and as such, can be considered a *Low Sensitivity* receptor, with reference to the IAQM guidance. As this *Low Sensitivity* receptor is located within 20m of the Site, the sensitivity of the local area to ecological impacts is defined as *Low*.

Risk of Impacts

- 5.30 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

Stage	Dust Impact Risk		
	Nuisance Dust	PM ₁₀ Health Effects	Ecological Impacts
Demolition	-	-	-
Earthworks	Low Risk	Negligible	Negligible
Construction	Medium Risk	Low Risk	Low Risk
Trackout	Medium Risk	Low Risk	Low Risk

- 5.31 Overall, the proposed development is considered to be *Medium Risk* for nuisance dust soiling effects and *Low Risk* for both PM₁₀ health effects and ecological effects, in the absence of mitigation.

Site Specific Mitigation

- 5.32 GLA guidance¹³ suggests a number of mitigation measures that should be adopted in order to minimise impacts from dust and fine particles. Appropriate measures that could be adopted 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.
- 5.33 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 D of this report.
- 5.34 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

- 5.35 After the implementation of the mitigation measures listed above and in Appendix D, 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 of the Operational Phase of the proposed development are presented below. Modelled road links and receptor points are displayed in Figure 4, with further details of the receptor points modelled in this assessment provided in Table 4.2 and model inputs provided in Appendix B.

Air Quality Impacts at Local Receptors

- 6.2 As the proposed development is expected to generate a volume of traffic in excess of the traffic generation threshold prescribed by the EPUK & IAQM guidance¹⁴ on the Chalcroft Business Park access road, it was considered necessary to assess the impact of traffic generated by the proposed development on existing and proposed sensitive receptor locations in the local area.
- 6.3 Receptors E1 to E6 represent existing sensitive receptor locations (residential dwellings) in the local area, whilst receptors TLA1 to TLA9 represent residential dwellings to be constructed and occupied in 2026, as part of The Lower Acre development, within the wider One Horton Heath scheme.
- 6.4 Results from the assessment of air quality impacts at existing and proposed sensitive receptor locations in the local area are presented below.

Nitrogen dioxide (NO₂)

- 6.5 Modelled NO₂ concentrations at local existing receptors, located on the closest façades of existing and proposed sensitive uses to the adjacent road network, in the areas surrounding the application site are shown in Table 6.1, below.

Table 6.1: Predicted Annual Mean Concentrations of NO₂ at Local Receptors

Receptor	Annual Mean NO ₂ Concentration (µg.m ⁻³)			Changes due to Proposed Development		
	2023 Baseline	2028 Without	2028 With	µg.m ⁻³	As a % of the AQS	EPUK & IAQM Significance
E1	14.3	14.6	14.7	0.18	0.4	Negligible
E2	16.3	17.2	17.3	0.13	0.3	Negligible
E3	15.1	15.8	15.9	0.10	0.2	Negligible
E4	17.2	17.3	17.4	0.12	0.3	Negligible
E5	17.3	17.4	17.5	0.11	0.3	Negligible
E6	16.0	16.0	16.1	0.07	0.2	Negligible
TLA1	-	19.4	19.7	0.29	0.7	Negligible
TLA2	-	18.3	18.5	0.21	0.5	Negligible
TLA3	-	17.6	17.7	0.13	0.3	Negligible

Receptor	Annual Mean NO ₂ Concentration (µg.m ⁻³)			Changes due to Proposed Development		
	2023 Baseline	2028 Without	2028 With	µg.m ⁻³	As a % of the AQS	EPUK & IAQM Significance
TLA4	-	15.6	15.7	0.06	0.1	Negligible
TLA5	-	15.3	15.4	0.05	0.1	Negligible
TLA6	-	18.3	18.4	0.14	0.4	Negligible
TLA7	-	18.8	18.9	0.12	0.3	Negligible
TLA8	-	18.3	18.3	0.08	0.2	Negligible
TLA9	-	18.8	18.9	0.08	0.2	Negligible

Note: Changes in concentrations predicted due to the operation of the proposed development are presented to two decimal places to highlight the magnitude of any impacts. Any discrepancies due to rounding.

- 6.6 The model results presented in Table 6.1 show that annual mean NO₂ concentrations were predicted to be well below the 40 µg.m⁻³ annual mean AQS at all receptors, across all scenarios.
- 6.7 The highest NO₂ concentration predicted for the modelled receptors was 19.7 µg.m⁻³ at proposed receptor TLA1, which represents residential receptors to be constructed within the nearby 'The Lower Acre' development; namely Block A.3 (Plots 125-143). The annual mean NO₂ concentration predicted at this receptor in the '2028 With Development' scenario is below the annual mean AQS by approximately 51%.
- 6.8 Receptor TLA1 was also predicted to experience the largest change in annual mean NO₂ concentration due to the operation of the proposed development. To this end, the operation of the proposed development was predicted to increase the annual mean NO₂ concentration at this receptor by 0.29 µg.m⁻³, which equates to 0.7% with respect to the 40 µg.m⁻³ annual mean AQS. A change in NO₂ concentration of this magnitude is considered *Negligible* with reference to the EPUK & IAQM impact descriptors.
- 6.9 Of the existing local receptors, the highest predicted annual mean NO₂ concentration was 17.5 µg.m⁻³, at receptor E5, which represents a residential dwelling on Burnetts Lane, north of the Chalcroft Business Park / Chalcroft Way roundabout. The NO₂ concentration predicted at this receptor is below the 40 µg.m⁻³ annual mean AQS by approximately 56%. A change in annual mean NO₂ concentration of 0.11 µg.m⁻³ (0.3% with respect to the 40 µg.m⁻³ AQS) was predicted at this receptor due to the operation of the proposed development and can be considered *Negligible*, following the aforementioned impact descriptors.

- 6.10 The greatest change in annual mean NO₂ concentration predicted for the existing receptors was 0.18 µg.m⁻³, which equates to 0.4% with respect to the 40 µg.m⁻³ AQS. This was predicted at receptor E1, which represents the residential dwelling adjacent to the Chalcroft Business Park. Despite being predicted to experience the greatest change in NO₂ concentration of the existing receptors, the annual mean NO₂ concentration predicted at this receptor in the '2028 With Development' scenario was below the AQS by approximately 63%.
- 6.11 For the hourly NO₂ AQS (200 µg.m⁻³ not to be exceeded more than 18 times a year), LAQM.TG(22)¹¹ states that if the annual mean concentration is below 60 µg.m⁻³, this AQS should be met. The data in Table 6.1 show that modelled annual mean NO₂ concentrations are well below this threshold at all modelled existing and future sensitive receptor locations, and therefore it is anticipated that the hourly AQS would be achieved.
- 6.12 The significance of air quality impacts in relation to annual mean NO₂ concentrations at all receptors is considered *Negligible* in accordance with the EPUK & IAQM impact descriptors.

Particulate Matter (PM₁₀ and PM_{2.5})

- 6.13 Modelled results for PM₁₀ are presented in Table 6.2 below.

Table 6.2: Predicted Annual Mean Concentrations of PM₁₀ at Local Receptors

Receptor	Annual Mean PM ₁₀ Concentration (µg.m ⁻³)			Changes due to Proposed Development		
	2023 Baseline	2028 Without	2028 With	µg.m ⁻³	As a % of the AQS	EPUK & IAQM Significance
R1	13.6	13.7	13.8	0.05	0.1	Negligible
R2	14.5	14.8	14.9	0.04	0.1	Negligible
R3	13.8	14.1	14.2	0.03	0.1	Negligible
R4	14.5	14.8	14.8	0.04	0.1	Negligible
R5	14.5	14.8	14.8	0.04	0.1	Negligible
R6	14.1	14.3	14.4	0.02	0.1	Negligible
TLA1	-	15.1	15.2	0.08	0.2	Negligible
TLA2	-	14.8	14.9	0.06	0.2	Negligible
TLA3	-	14.7	14.8	0.04	0.1	Negligible
TLA4	-	14.2	14.2	0.02	0.1	Negligible
TLA5	-	14.1	14.1	0.02	0.0	Negligible
TLA6	-	14.8	14.9	0.04	0.1	Negligible
TLA7	-	15.0	15.0	0.04	0.1	Negligible
TLA8	-	14.8	14.9	0.03	0.1	Negligible
TLA9	-	15.0	15.0	0.0	0.1	Negligible

Note: Changes in concentrations predicted due to the operation of the proposed development are presented to two decimal places to highlight the magnitude of any impacts. Any discrepancies due to rounding.

- 6.14 The model results presented in Table 6.2 show that annual mean PM₁₀ concentrations were predicted to be well below the 40 µg.m⁻³ annual mean AQS at all receptors, across all scenarios.
- 6.15 The highest annual mean PM₁₀ concentration predicted for the modelled receptors was 15.2 µg.m⁻³ at proposed receptor TLA1 (Block A.3 of the proposed The Lower Acre development). However, this PM₁₀ concentration is well below the annual mean AQS, by approximately 62%.
- 6.16 Receptor TLA1 was also predicted to experience the largest change in PM₁₀ concentration due to the operation of the proposed development. To this end, the operation of the proposed development was predicted to increase the annual mean PM₁₀ concentration at this receptor by of 0.08 µg.m⁻³, which equates to 0.2% with respect to the 40 µg.m⁻³ annual mean AQS. A change in PM₁₀ concentration of this magnitude is considered *Negligible* with reference to the EPUK & IAQM impact descriptors.
- 6.17 Of the existing local receptors, the highest predicted annual mean NO₂ concentration was 14.9 µg.m⁻³, at receptor E2, which represent residences on Burnetts Lane (South). The PM₁₀ concentration predicted at this receptor is below the 40 µg.m⁻³ annual mean AQS by approximately 63%. A change in PM₁₀ concentration of 0.04 µg.m⁻³ (0.1% with respect to the 40 µg.m⁻³ AQS) was predicted at this receptor due to the operation of the proposed development. A change of this magnitude is considered *Negligible*, with reference to the impact descriptors.
- 6.18 The greatest change in annual mean PM₁₀ concentration predicted for the existing receptors was 0.05 µg.m⁻³, which equates to 0.1% with respect to the 40 µg.m⁻³ AQS. This was predicted at receptor E1 (residence adjacent to the Chalcroft Business Park). Despite being predicted to experience the greatest change in PM₁₀ concentration of the existing receptor, the annual mean PM₁₀ concentration predicted at this receptor in the '2028 With Development' scenario was well below the annual mean AQS (being below the AQS by approximately 66%).
- 6.19 For PM₁₀, the following equation can be used to derive the number of days that the daily mean AQS of 50 µg.m⁻³ is likely to be exceeded:
- $$\text{No. 24 hour exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + \left(\frac{206}{\text{annual mean}} \right)$$
- 6.20 Using this equation, an annual mean concentration of approximately 32 µg.m⁻³ or above may indicate an exceedance of the short-term (daily mean) AQS. The data in Table 6.2 show that the maximum annual mean PM₁₀ concentration predicted at the local modelled receptors was 15.2 µg.m⁻³, and therefore it is not likely that the short-term AQS would be exceeded at local receptor locations.
- 6.21 The significance of air quality impacts in relation to annual mean PM₁₀ concentrations at all receptors is considered *Negligible* with reference to the EPUK & IAQM impact descriptors.
- 6.22 Modelled results for PM_{2.5} are displayed in Table 6.3 below.

Table 6.3: Predicted Annual Mean Concentrations of PM_{2.5} at Local Receptors

Receptor	Annual Mean PM _{2.5} Concentration (µg.m ⁻³)			Changes due to Proposed Development		
	2023 Baseline	2028 Without	2028 With	µg.m ⁻³	As a % of the AQS	EPUK & IAQM Significance
R1	9.4	9.5	9.5	0.03	0.1	Negligible
R2	10.0	10.2	10.2	0.02	0.1	Negligible
R3	9.5	9.7	9.7	0.02	0.1	Negligible
R4	9.9	10.1	10.1	0.02	0.1	Negligible
R5	10.0	10.1	10.1	0.02	0.1	Negligible
R6	9.8	9.9	9.9	0.01	0.1	Negligible
TLA1	-	10.3	10.3	0.05	0.2	Negligible
TLA2	-	10.1	10.1	0.03	0.2	Negligible
TLA3	-	10.0	10.1	0.02	0.1	Negligible
TLA4	-	9.8	9.8	0.01	0.1	Negligible
TLA5	-	9.8	9.8	0.01	0.0	Negligible
TLA6	-	10.1	10.1	0.02	0.1	Negligible
TLA7	-	10.2	10.2	0.02	0.1	Negligible
TLA8	-	10.1	10.1	0.01	0.1	Negligible
TLA9	-	10.2	10.2	0.01	0.1	Negligible

Note: Changes in concentrations predicted due to the operation of the proposed development are presented to two decimal places to highlight the magnitude of any impacts. Any discrepancies due to rounding

- 6.23 The model results presented in Table 6.2 show that annual mean PM_{2.5} concentrations were predicted to be well below the 20 µg.m⁻³ annual mean AQS at all receptors, across all scenarios.
- 6.24 The highest annual mean PM_{2.5} concentration predicted for the modelled receptors was 10.3 µg.m⁻³ at proposed receptor TLA1 (Block A.3 of the proposed The Lower Acre development). This PM_{2.5} concentration is below the 20 µg.m⁻³ annual mean AQS by approximately 49%.
- 6.25 The greatest change in PM_{2.5} concentrations predicted for the local receptors was 0.05 µg.m⁻³, equating to 0.2% with respect to the 20 µg.m⁻³ AQS, again, predicted at receptor TLA1. A change of this magnitude is considered *Negligible*, with reference to the EPUK & IAQM impact descriptors.
- 6.26 The significance of air quality impacts in relation to annual mean PM_{2.5} concentrations at all receptors is considered *Negligible* with reference to the EPUK & IAQM impact descriptors.

Proposed New Receptors

- 6.27 It was also considered necessary to assess air quality within the application site, to ensure that the proposed commercial uses are not being introduced into an area of unacceptable air quality.
- 6.28 Modelled annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} in the proposed development's expected completion year (2028) for the proposed receptors, as described in Table 4.2 and shown in Figure 4, are provided in Table 6.4 below.

Table 6.4: Predicted Pollutant Concentrations at the Application Site in 2032

Receptor	Location	Pollutant	Annual Mean Concentration (µg.m ⁻³)
P1	Proposed Farm Shop	NO ₂	16.3
		PM ₁₀	14.6
		PM _{2.5}	10.0
P2	Proposed Building A	NO ₂	15.6
		PM ₁₀	14.0
		PM _{2.5}	9.7
P3	Proposed Building B	NO ₂	17.5
		PM ₁₀	14.9
		PM _{2.5}	10.2

- 6.29 The model results presented in Table 6.4 show that annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} at the façades of the closest proposed commercial uses to the adjacent road network are predicted to be well below their respective AQSs in the proposed development's projected opening year; 2028.
- 6.30 Annual mean NO₂ concentrations at the locations of proposed commercial uses within the application site were predicted to range between 15.6 µg.m⁻³ and 17.5 µg.m⁻³, which are below the 40 µg.m⁻³ AQS by between approximately 61% and 56%.
- 6.31 As noted previously, LAQM.TG(22)¹¹ states that if the annual mean NO₂ concentration is below 60 µg.m⁻³, then the short-term AQS should be met. The data in Table 6.4 show that annual mean NO₂ concentrations are well below this threshold at the proposed receptors. Therefore, it is anticipated that the hourly AQS would be achieved.
- 6.32 Predicted annual mean PM₁₀ concentrations at the proposed commercial uses ranged between 14.0 µg.m⁻³ and 14.9 µg.m⁻³, which are below the 40 µg.m⁻³ AQS by between approximately 65% and 63%.

- 6.33 Using the equation in Section 6.19, an annual mean PM_{10} concentration of approximately $32\mu g.m^{-3}$ or more may indicate an exceedance of the short-term (daily mean) AQS. The data in Table 6.4 show that the maximum annual mean PM_{10} concentration predicted at the application site was $14.9\mu g.m^{-3}$, and therefore it is not likely that the short-term AQS would be exceeded at commercial uses proposed within the application site.
- 6.34 Annual mean $PM_{2.5}$ concentrations at the site were predicted to range between $9.7\mu g.m^{-3}$ and $10.2\mu g.m^{-3}$, which are below the $20\mu g.m^{-3}$ AQS by between approximately 52% and 49%.
- 6.35 Overall, modelled concentrations of NO_2 , PM_{10} and $PM_{2.5}$ at proposed commercial uses within the application site are predicted to be well below their respective AQSs.

7. Discussion

Construction Phase Impacts

- 7.1 The construction phase of the proposed development could potentially give rise to emissions which could cause dust soiling effects on adjacent uses. Following the latest IAQM guidance¹², the construction phase of the proposed development can be considered to be *Medium Risk* with regard to dust soiling effects and *Low Risk* for both PM₁₀ health effects and ecological effects.
- 7.2 Following the implementation of the mitigation measures provided in Appendix A and listed in Section 5.32, emissions from the construction programme will be reduced and the residual significance of impact for the construction phase is expected to be *Negligible*, thus complying with the requirements of the NPPF.

Operational Phase Impacts

- 7.3 Pollutant dispersion modelling (using ADMS-Roads) was undertaken, primarily to assess the impact of traffic expected to be generated by the proposed development, in its operation, on air quality at sensitive receptor locations in the local area. Sensitive use locations assessed included existing residential dwellings in the local area and residential dwellings proposed within The Lower Acre development, which forms part of the One Horton Heath scheme. The assessment adopted a conservative approach to assess air quality by:
- 👁 Positioning model receptors at worst-case locations (i.e. façades of sensitive uses closest to roads), to represent maximum exposure to pollution;
 - 👁 Assuming that there would be no improvement in background pollutant concentrations beyond the year 2019;
 - 👁 Accounting for cumulative traffic impacts from a number of committed developments in the local area, as detailed in Section 4.36; and
 - 👁 Accounting for the impact of COVID-19 on the progression of the UK vehicle fleet by using vehicle emission factors for 2024 to predict pollutant concentrations in the scheme's projected opening year of 2028, thereby adopting an approach even more conservative than recommended within Defra's *COVID-19 Supplementary Guidance*.
- 7.4 The pollutant dispersion modelling assessment also assessed air quality at the locations of proposed commercial units within the application site.

- 7.5 The assessment of air quality at the application site found that the proposed development should not result in the exposure of new receptors to levels of air pollution at risk of exceeding the UK AQs. Therefore, the site is considered suitable, in air quality terms, for the introduction of new receptors associated with the proposed commercial use.
- 7.6 It has been shown that minor increases in NO₂, PM₁₀ and PM_{2.5} concentrations are predicted due to traffic expected to be generated by the proposed development, in its operation. However, all impacts on air quality at existing and proposed sensitive receptor locations in the local area are considered to be *Negligible* with reference to the EPUK & IAQM impact descriptors, which is not significant.
- 7.7 Therefore, the overall impact of the proposed development on local air quality is not considered to be significant.

8. Conclusions

- 8.1 FIP (West End) Limited commissioned Phlorum Limited to undertake an Air Quality Assessment in support of an outline planning application for the proposed development of the Paddock Land, adjacent to Chalcroft Business Park, comprising up to 4,130m² of commercial floorspace (use classes E(g)(ii), E(g)(ii), E(g)(iii) and B8, to include a farm shop (E(a)), parking and yard areas, and other associated works.
- 8.2 UK Air Information Resource background concentrations and local air quality monitoring results from the wider area indicate that air quality in the local area is generally good, with pollutant concentrations in the vicinity of the Site and surrounding area expected be below 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 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 Detailed air pollution dispersion modelling was undertaken to assess the proposed development's potential impact on local air quality at the locations of sensitive uses in the local area and to consider the suitability of the site, in air quality terms, for the proposed commercial uses.
- 8.5 The pollutant dispersion modelling assessment found that the operation of the proposed development is not expected to significantly impact upon local air quality.
- 8.6 The assessment also found that air quality at the application site is expected to comply with the UK Air Quality Standards, and thus, the site is considered suitable for the proposed commercial uses.
- 8.7 Therefore, 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

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Figure 2: Construction Phase

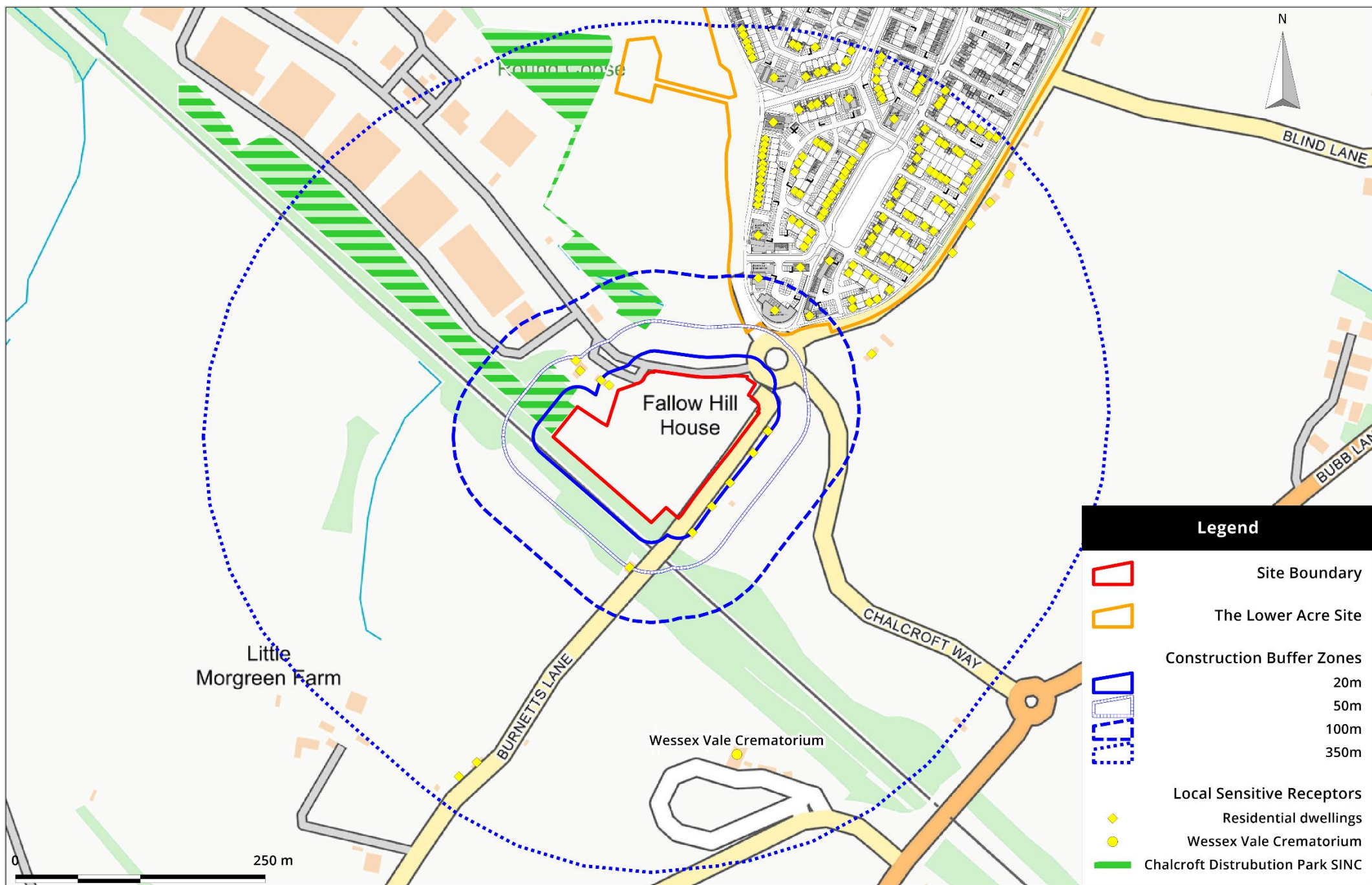


Figure 2: Construction Phase

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Figure 3: Wind Rose for Southampton (2019)

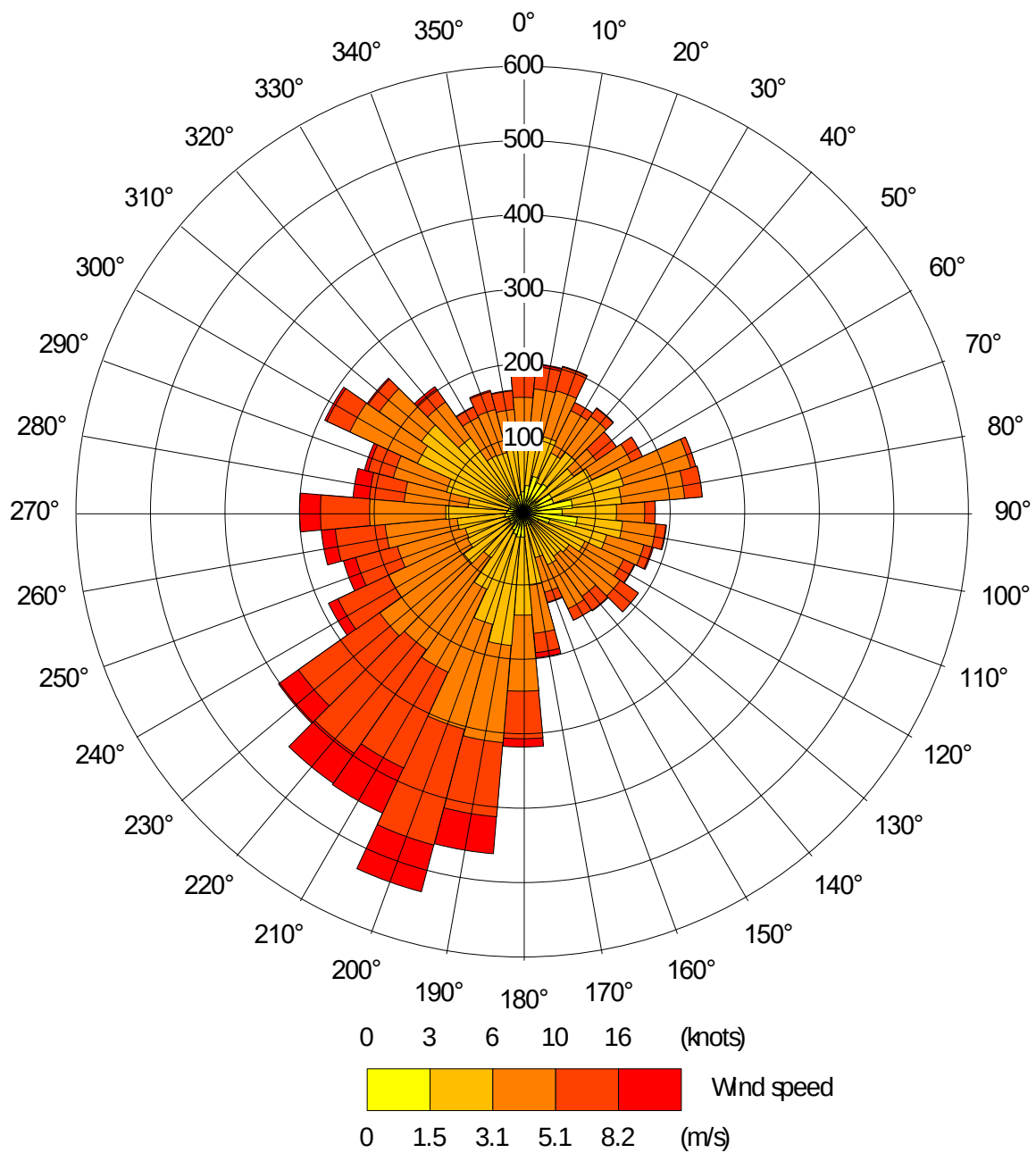


Figure 4: Modelled Roads & Receptors

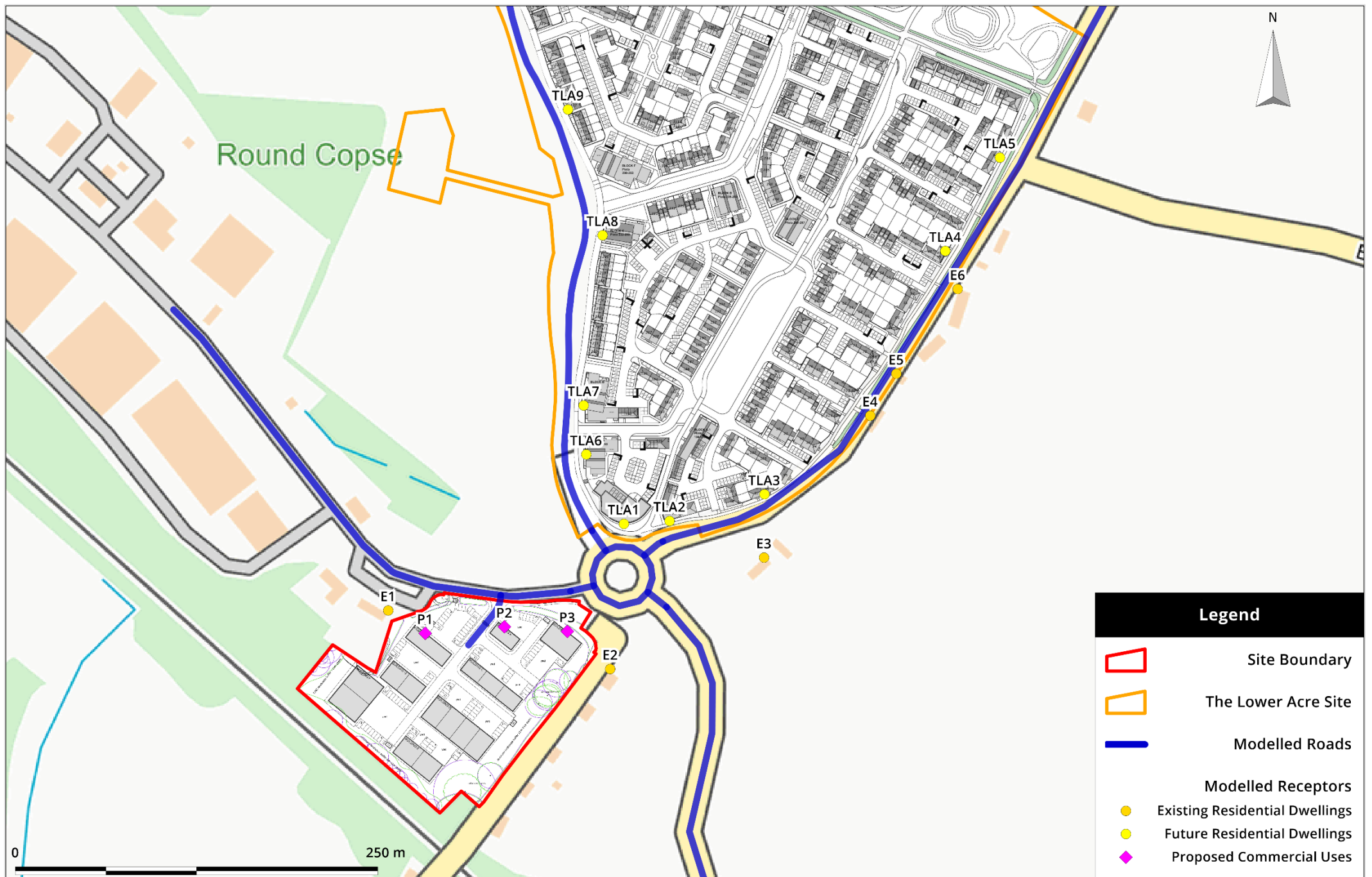


Figure 4: Modelled Roads & Receptors

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Appendix A: EPUK & IAQM Significance Criteria

EPUK & IAQM Significance Criteria

Table A.1: IAQM Impact Descriptors for Individual Receptors (Based on EPUK & IAQM guidance¹⁴ Table 6.3)

Long-term average concentration at receptor in assessment year	% Change in concentration relative to AQAL			
	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
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

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.
2. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.
3. The Table is only designed to be used with annual mean concentrations.
4. Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.
6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.
7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

Appendix B: Model Input Data

ADMS-Roads Model Inputs

Operational phase ADMS-Roads model inputs for are provided below in Table B.3.

These data relate to the ADMS-Roads inputs for the operational phase assessment modelling and the model verification study.

Table B.3: ADMS-Roads Modelling Inputs

Modelling Scenario	Emissions Dataset	Emission Factor Toolkit Year	Road Type
Model Verification (2019)	UK EFT v11.0	2019	England (Urban)
Base (2023)	UK EFT v11.0	2021	England (Urban)
Completion Year (2028) With & Without Proposed Development	UK EFT v11.0	2024	England (Urban)

Traffic Data

Traffic data used within this ADMS-Roads modelling assessment were provided by the project's transport consultant (PFA Consulting). These data were informed by traffic counts undertaken by the transport consultant for roads in the vicinity of the site in 2023.

The traffic count data were projected forward in time to the proposed development's expected completion year of 2028 using TEMPro factors. The TEMPro database includes developments outlined within Local Plans of Local Authorities, thereby taking into account the potential for cumulative impacts to be generated by these developments.

Furthermore, the 2028 scenarios took account of traffic expected to be generated by a number of specific local committed developments. These are detailed below:

- Chalcroft Farm and Land west of Horton Heath development (O/14/75735) (also referred to as One Horton Heath), comprising up to 950 residential dwellings, primary & secondary schools, village centre, change of use of existing farm buildings to commercial uses and a local centre including a community building and approximately 6ha of employment uses;
- Boorley Gardens development (O/15/75953), comprising up to 680 residential units, retail / community / healthcare uses, two-form entry primary school and sports pitches;
- Land to the North West of Horton Heath (also referred to as Fir Tree farm and Victoria Farmhouse) (O/16/79354), comprising up to 450 residential dwellings;
- Owton's Butchery and commercial floorspace within Chalcroft Business Park (F/18/83945), comprising the construction of a two-storey industrial building for a commercial butchery (2,064m² of Use Class B1(c)), 767m² of B1b / B1c floorspace and café; and
- Extension of Chalcroft Business Park Unit 19 (F/20/89518), comprising a first-floor extension of the existing unit for use as office space.

The AADT data used in the Operational Phase ADMS-Roads assessment are included in Table B.1, below.

Table B.1: Traffic inputs for ADMS-Roads Assessment

Link ID	Road	2023 Baseline		2028 Without Development		2028 With Development	
		AADT	HDVs	AADT	HDVs	AADT	HDVs
1	Site Access	-	-	-	-	698	7.0%
2	Chalcroft Business Park	839	7.0%	1,397	7.0%	2,077	7.0%
3	West Horton Heath Link Road	-	-	8,203	0%	8,325	0%
4	Burnetts Lane (North)	3,306	0%	4,184	0%	4,306	0%
5	Chalcroft Way	3,994	1.5%	12,413	0.8%	12,862	1.1%

The model verification study utilised Department for Transport (DfT) traffic data for Botley Road, Kings Copse Avenue, and the A334 Grange Road & Broad Oak. Traffic inputs used within the model verification study are provided in Table B.2, below.

Table B.2: Traffic inputs for Model Verification Study

DfT ID	Road	Model Verification (2019)	
		AADT	HDVs
945147	Botley Road	13,696	2.7%
945240	Kings Copse Avenue	7,763	1.0%
78315	A334 Grange Road	18,564	2.7%
56720	A334 Broad Oak	18,041	3.1%

Appendix C: 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(22)¹¹. According to LAQM.TG(22), no adjustment factor is necessary where the results of the model all lie within 25% of monitored concentrations.

Model verification can only be undertaken where there are sufficient roadside monitoring data in the vicinity of the subject scheme being assessed. LAQM.TG(22) recommends that a combination of automatic and diffusion tube monitoring data are used; although this may be limited by data availability.

Three roadside diffusion tube monitoring locations in the local area, with suitable and available traffic data from the Department for Transport (DfT) were selected for this model verification study based in the year 2019. These diffusion tubes were selected for use as they are located on B-Roads and unclassified roads, which are generally less busy than A-Roads and are considered to better represent likely traffic flows on roads in the vicinity of the application site.

Table C.1 compares monitored and modelled NO₂ concentrations at the four monitoring locations.

Table C.1: Monitored and Modelled Concentrations of NO₂ at Local Monitoring Sites (2019)

Monitor	Monitor Type	Site Type	Annual Mean NO ₂ Concentrations (µg.m ⁻³)		
			Monitored	Modelled	% Difference
WYV (Wyvern School)	DT	R	24.1	18.2	-24.5%
BOT (Botley Road)	DT	R	31.9	19.0	-40.4%
KCA (18) (Kings Copse Avenue (18))	DT	R	28.1	19.9	-29.2%

Note: "DT" = Diffusion tube; "R" = Roadside.

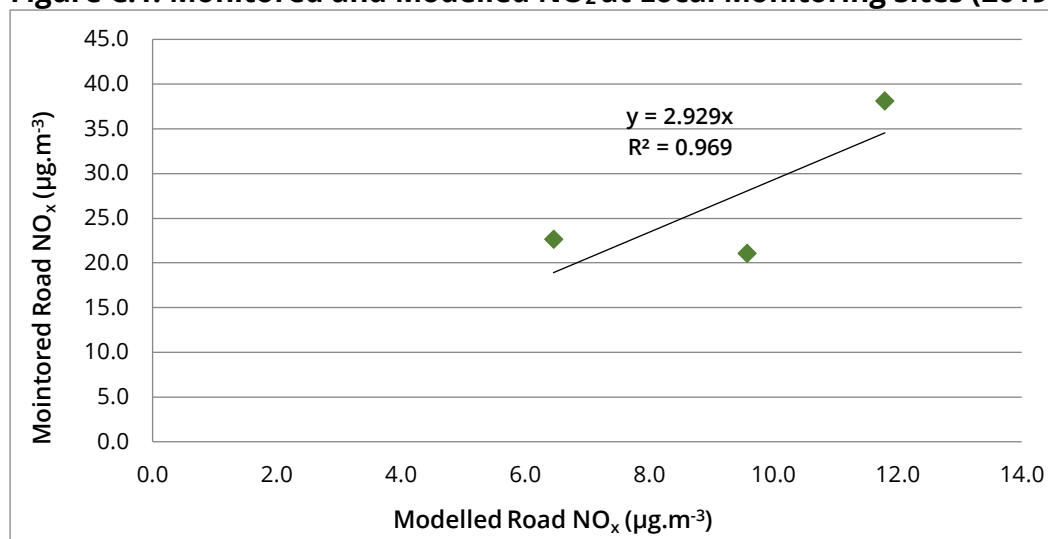
The data in Table C.1 show that the model was consistently under-predicting annual mean NO₂ concentrations at local monitoring sites. This is frequently seen in model verification studies and is likely the result of local dispersion characteristics.

As the model shows a tendency to under-predict, it was decided to proceed with adjustment of the model in order to ensure locally accurate 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.

A plot of modelled and monitored road NO_x contributions on a graph shows a positive correlation. This graph is included in Figure C.1, below.

Figure C.1: Monitored and Modelled NO₂ at Local Monitoring Sites (2019)



By plotting a trendline through the points on the graph, an adjustment factor of 2.93 was derived. Table C.2 shows monitored and modelled concentrations of NO₂ at local monitoring sites, following the adjustment of the road contribution of NO_x by this factor.

Table C.1: Monitored and Adjusted Modelled Concentrations of NO₂ at Local Monitoring Sites (2019)

Monitor	Monitor Type	Site Type	Annual Mean NO ₂ Concentrations (µg.m ⁻³)		
			Monitored	Modelled	% Difference
WYV (Wyvern School)	DT	R	24.1	27.5	14.1%
BOT (Botley Road)	DT	R	31.9	30.2	-5.3%
KCA (18) (Kings Copse Avenue (18))	DT	R	28.1	26.3	-6.4%

Note: "DT" = Diffusion tube; "R" = Roadside.

Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.TG(22), the RMSE should ideally be within 10% of the relevant AQS, but is acceptable where it is within 25% of the AQS.

Following adjustment of the model results, an RMSE of 2.4 µg.m⁻³ was calculated, which equates to 6.1% of the annual mean AQS for NO₂ and is therefore considered to be acceptable.

As there are no suitable roadside PM₁₀ or PM_{2.5} monitoring data in the study area, it was not possible to perform model verification for these pollutants. Consequently, the adjustment factor for road contributions of NO_x has also been applied to contributions of PM₁₀ and PM_{2.5}, in accordance with LAQM.TG(22).

Appendix D: IAQM Recommended Construction Mitigation Measures for Medium Risk Sites

IAQM Recommended Construction Mitigation Measures for sites with a Medium Risk of Dust Impacts

Please refer to the IAQM's latest *Guidance on the assessment of dust from demolition and construction*¹² and *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018)*¹⁸ 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 exceptional 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 IAQM on monitoring during

¹⁸ Institute of Air Quality Management. (2018). *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*.

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.
- 🌱 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.

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.

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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