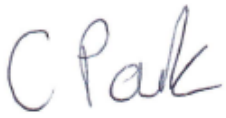
Report for:

XLB Property Ltd

Bartley Wood, Hook

Air Quality Assessment

Status: Final **Date: 15.06.2021**

Author	 Christine Park Senior Air Quality Consultant
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1. INTRODUCTION

ACCON UK Limited (ACCON) has been commissioned by PRC Architecture & Planning on behalf XLB Property Ltd to undertake an Air Quality Assessment for the proposed development at Bartley Wood, Hook.

The proposed development comprises demolition of existing buildings and redevelopment of the site to provide 9 No. industrial units (Flexible Use Class B2/B8/E(g) (i)- (iii)) and 1No. foodstore (Use Class E(a)), together with associated parking, a new vehicular access off Griffin Way South, landscaping and other associated works.

The site is not located within an Air Quality Management Area (AQMA).

This assessment has been completed in order to determine whether the proposed development achieves compliance against the National Air Quality Objectives (NAQOs), along with National and Local Planning Policy. The assessment has been undertaken in accordance with the Department for Environment, Food and Rural Affairs' (DEFRA) current Technical Guidance on Local Air Quality Management (LAQM.TG16.)[1] and covers the effects of local air quality on the development.

The report assesses the overall pollutant concentrations of nitrogen dioxide (NO_2) and particulates (PM_{10} and $PM_{2.5}$) at nearby existing sensitive receptors. A glossary of terms is detailed in **Appendix 1** and the location of the site is shown in **Section 3.1**. **Appendix 4** identifies nearby sensitive receptor locations, modelled to assess the impacts of additional traffic emissions associated with the operation of the development.

The potential air quality impacts of the development have been assessed on the basis of the findings of detailed dispersion modelling using Breeze Roads GIS Pro Version 5.1.8, which has been undertaken in the context of relevant NAQOs, emission limit values and relevant guidance.

[1] DEFRA, Local Air Quality Management Technical Guidance 2016.

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2. AIR POLLUTION POLICY CONTEXT

2.1. Legislation

2.1.1. Air Quality Strategy and Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995 requires the Secretary of State to publish an air quality strategy and local authorities to review and assess the quality of air within their boundaries.[2] The latter has become known as Local Air Quality Management (LAQM), an instrument by which the Government's air quality objectives are to be achieved over a determined period of time.

The Air Quality Strategy provides the policy framework for local air quality management and assessment in the UK. It sets out air quality standards and objectives for key air pollutants which are designed to improve air quality and protect human health and the environment from the effects of pollution. These terms are defined below:

- The 'standards' are set at concentrations below which health effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of a particular pollutant.
- The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of the costs, benefits, feasibility and practicality of achieving the standards. The air quality standards and objectives are outlined in **Appendix 2**.

As part of this LAQM role, Local authorities are required to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. Where a local authority identifies areas of non-compliance with the Air Quality Objectives[3] of pollutants of concern, and there is relevant public exposure, there remains a statutory need to declare the geographic extent of non-compliance as an Air Quality Management Area (AQMA) and to draw up an action plan detailing appropriate measures and policies that can be introduced in order to work towards achieving the objective(s).

The objectives for use by Local Authorities are prescribed within the Air Quality (England) Regulations 2000[4], and the Air Quality (England) (Amendment) Regulations 2002[5]. The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are summarised in **Table 2.1**. The objectives for NO_2 and PM_{10} were to have been achieved by 2005 and 2004 respectively and continue to apply in all future years thereafter. The $PM_{2.5}$ objective is to be

[2] In 1997, the United Kingdom National Air Quality Strategy (NAQS) was published in response to the Environment Act of 1995, setting out a framework of standards and objectives for the air pollutants of most concern (SO_2, PM_{10}, NOx, CO, lead, benzene, 1,3-butadiene and tropospheric ozone), to be achieved by local authorities through a system of Local Air Quality Management (LAQM) by 2005. The aim of the strategy was to reduce the air pollutant impact on human health by reducing airborne concentrations. A review of the NAQS led to the publication of Air Quality Strategy for England, Scotland, Wales and Northern Ireland in January 2000, whilst in July 2007 was further reviewed with various amendments to the Air Quality Objectives for local authorities.
[3] Defra, 2018, Local Air Quality Management Technical Guidance (TG16)
[4] The Stationary Office (2000) Statutory Instrument 2000, The Air Quality (England) Regulations 2000, London
[5] The Stationary Office (2002) Statutory Instrument 2002, The Air Quality (England) (Amendment) Regulations 2002, London

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achieved by 2020. It should be noted that Local Authorities in England have a flexible role in working towards reducing emissions and concentrations of $PM_{2.5}$.

Table 2.1: UK Air Quality Objectives for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Objectives	Averaging Period
Nitrogen dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3 not to be exceeded more than 35 times a year	24-hour mean
	40µg/m^3	Annual mean
Particulate Matter ($PM_{2.5}$)*	Work towards reducing emissions/ concentrations of fine particulate matter ($PM_{2.5}$)	Annual mean

*The $PM_{2.5}$ objective, which is to be met by 2020, is not in (Air Quality England) Regulations and there is no requirement for local authorities to assess it, although they are encouraged to do so.

The AQS objectives apply at locations where members of the public are likely to be regularly present and exposed over the averaging period of the objective. **Table 2.2** identifies examples of where the annual mean objectives should apply as provided in LAQM.TG16[6], and include: building facades of residential properties[7], schools, hospitals, etc. The annual mean objectives are not relevant for the building facades of offices or other places of work where members of the public do not have regular access, kerbsides or gardens. The 24-hour mean objective applies to all locations where the annual mean objective would apply, together with hotels and gardens of residential properties. The 1-hour mean objective also applies at these locations as well as at any outdoor location where a member of the public might reasonably be expected to stay for 1-hour or more, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

Table 2.2 Examples of where AQS should be applied

Averaging Period	AQS Should Apply	AQS Should Not Apply
Annual Mean	All locations where members of the public might be regularly exposed. Building facades of: • Residential properties* • Schools • Hospitals • Care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. • Hotels, unless people live there as their permanent residence. • Residential gardens • Kerbside sites or any other location where public exposure is expected to be short term.

[6] Such locations should represent parts of the garden where relevant public exposure is likely, for example where there are seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.
[7] Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

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Averaging Period	AQS Should Apply	AQS Should Not Apply
24-hour and 8-hour mean	All locations where the annual mean objective would apply. • Hotels • Residential gardens	Kerbside sites or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. • Kerbside sites (e.g. pavements of busy shopping streets) • Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might spend one hour or more. • Any outdoor locations where members of the public might spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

*Such locations should represent parts of the garden where relevant public exposure is likely, for example where there are seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local adjustment should always be applied.

2.1.2. Clean Air Strategy

The Clean Air Strategy 2019[8] was released in January 2019 and supersedes the policies featured in The National Air Quality Strategy. The strategy mainly deals with how to improve air quality in England but also discusses air quality policy in the devolved administrations. In comparison with the previous strategies it has a more joined-up approach, incorporating transport, domestic, industrial and agricultural emission reduction policies with a combined focus on both ambient and indoor air quality. The plan also has an emphasis on the proposal to use Clean Air Zones (CAZs) and the ULEZ (in London) to quickly bring highly polluted urban centres below the legal limits. Some of the key policies in the plan are a renewed consideration of under-used Smoke Control Areas due to the growth of highly polluting domestic wood burning stoves, new best practices being incorporated into the agricultural sector to reduce ammonia emissions (and their associated secondary particulates) and with a policy to prohibit the sale of new petrol and diesel cars by 2040. However, air quality objective limits outlined in the document are largely unchanged from the previous strategy.

2.2. Planning Policy

2.2.1. National Planning Policy

The first National Planning Policy Framework was introduced by the department of Communities and Local Government in March 2012 and was last revised in February 2019 in respect of the removal of paragraph 209a from the NPPF which in any case only related to minerals planning authorities. The

[8] DEFRA, 2019, The Clean Air Strategy 2019

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NPPF[9] "sets out the Government's planning policies for England and how these should be applied and provides a framework within which locally-prepared plans for housing and other development can be produced." It includes advice on when air quality should be a material consideration in development control decisions. Relevant sections are set out below:

Section 9 - Promoting sustainable transport:

Paragraph 103

> *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making.."*

Section 15 - Conserving and enhancing the natural environment:

Paragraph 170 Bullet point 'e':

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

Paragraph 181:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

The NPPF is accompanied by relevant planning practice guidance (PPG)[10], a web-based resource which brings together planning guidance on various topics into one place. A specific guidance in respect to air quality is provided where the guiding principles on how planning can take account of the impact of new development on air quality is included. The PPG states that:

> *"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air*

[9] Ministry of Housing, Communities and Local Government, 2019, National Planning Policy Framework
[10] GOV.UK. (2014). Air quality. [online] Available at: https://www.gov.uk/guidance/air-quality--3 [Accessed 07 October 2020].

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quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity."

The PPG sets out the information that has to be considered when deciding whether an air quality assessment may be required for a planning application, stating that:

Where air quality is a relevant consideration the local planning authority may need to establish:

1. *the 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
2. *whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
3. *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality.*

It also provides guidance on options for mitigating air quality impacts, and makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met."

Examples of mitigation include:

4. *Where air quality is a relevant consideration the local planning authority may need to establish:*
5. *the 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
6. *whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
7. *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality.*

2.3. Hart Local Plan (Strategy and Sites) 2032

The Hart Local Plan (Strategy and Sites) 2032 sets out the overall vision, objectives and policies to guide future development in the District over the plan period 2014-2032. There is one main policy which references air quality which is Policy NBE11 – Pollution, which states:

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Development will be supported provided:

a) it does not give rise to, or would be subject to, unacceptable levels of pollution (including cumulative effects); and

b) b) it is satisfactorily demonstrated that any adverse impacts of pollution, either arising from the proposed development or impacting on proposed sensitive development or the natural environment will be adequately mitigated or otherwise minimised to an acceptable level.

Where development is proposed on or near a site that may be impacted by, or may give rise to, pollution, such a proposal must be accompanied by an assessment that investigates the risks associated with the site and the possible impacts on the development, its future users and the natural and built environment.

The assessment shall propose adequate mitigation or remediation when required to achieve a safe and acceptable development. Impacts on air quality should be considered in combination with other relevant plans or projects.

2.4. Relevant Guidance

2.4.1. Local Air Quality Management Technical Guidance (TG16)

DEFRA's Technical Guidance LAQM (TG16)[11] provides guidance in respect of the local air quality; whilst this primarily addresses LAQM activities, the guidance provides relevant methods concerning treatment and interpretation of data. The methodology in LAQM.TG16. directs air quality professionals to a number of tools published by DEFRA to predict and manage air quality. DEFRA regularly updates its Technical Guidance, with the latest LAQM Technical Guidance (TG16) published in February 2018.

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

This guidance[12] has been produced by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) to ensure that air quality is adequately considered in the land-use planning and development control process. This guidance, of itself, can have no formal or legal status and is not intended to replace other guidance that does have this status. This document has been developed for professionals operating within the planning system. It provides them with a means of reaching sound decisions, having regard to the air quality implications of development proposals. It also is anticipated that developers will be better able to understand what will make a proposal more likely to succeed. This guidance is particularly applicable to assessing the impacts of traffic and energy centre emissions and provides advice how to describe air quality impacts and their significance.

[11] DEFRA, 2018, Local Air Quality Management Technical Guidance (TG16)
[12] Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

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3. SITE DESCRIPTION AND BASELINE CONDITIONS

3.1. Site Description

The site boundary is located approximately 160m to the south of the Southwestern Main Line railway, immediately to the west of Holt Road, on the other side of which lie dwellings and a bed and breakfast accommodation, and immediately to the east of Griffin Way South, beyond which lie commercial premises. The site is located approximately 425m to the north of the M3 motorway with Hook Common & Bartley Heath Nature Reserve (a Site of Special Scientific Interest, SSSI) located between the motorway and the site.

The building 16 Bartley Way, immediately to the north of the site, has been converted into dwellings with a Prior Approval application.

The location and the red line boundary of the site are detailed below in **Figure 3.1**.

Figure 3.1: Site Location Plan

3.2. Air Quality Review and Assessment

As previously indicated, Local Authorities have been required to carry out a review of local air quality within their boundaries to assess areas that may fail to achieve the limit values. Where these objectives are unlikely to be achieved, local authorities must designate these areas as AQMA's and prepare a written action plan to achieve the AQS's.

The review of air quality takes on several prescribed stages, of which each stage is reported. HDC's 2020 Air Quality Annual Status Report (ASR)[13] provides the most recent air quality monitoring results for the Council area (2019). Details of the monitoring data used for model verification purposes is provided in **Section 3.3.**

[13] Hart District Council 2020 Annual Status Report (July 2020)

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3.3. Local Air Quality Monitoring

HDC monitored local air quality through a diffusion tube network. The monitoring sites chosen for verification of the air quality modelling where traffic data was available near the diffusion tubes:

- HO2 Dorchester Arms, Hook; and
- HO3 London Road, Hook.

The 2019 annual mean NO_2 concentrations for the monitoring sites are shown in **Table 3.1** below. The annual mean NO_2 NAQO was not exceeded at either of the monitoring sites.

Table 3.1: Local Monitoring Data Suitable for Model Verification

Monitor Site Number	Distance to nearest Kerb (m)	Grid Reference		2019 Annual Mean NO_2 (µg/m^3)	2019 Data Capture (%)
		X	Y		
HO2 Dorchester Arms (now The Hogget), Hook	2	471382	153407	26.5	92
HO3 London Road, Hook	1.5	472469	154254	29.0	100

3.4. Background Concentration of Air Pollutants

Background concentrations of air pollutants for the modelling were obtained from the DEFRA pollutant concentration maps [14]. The consented development model utilised background concentrations based on data from a base year of 2018. **Table 3.2** identifies the background pollutant concentrations at the diffusion tube monitoring locations and the consented development site. All of the estimated background concentrations for annual mean NO_2 and PM_{10} used in the assessment are below the annual mean objective limit of 40µg/m^3 in 2019 and 2023.

Table 3.2: Background Concentrations of Pollutants

Location and Year	NO_x µg/m^3	NO_2 µg/m^3	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3
Verification HO2 - 2019 4714500, 153500	16.16	12.13	13.45	9.16
Verification HO3- 2019 4724500, 154500	15.69	11.78	14.05	9.77
Opening Year Site - 2023 473500, 153500	18.00	13.41	14.19	9.27

Note: The ratio between PM_{10} and $PM_{2.5}$ at the Existing Receptors is 0.65.

[14] DEFRA, *Background Mapping Data for Local Authorities- 2017* [online] Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017

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4. METHODOLOGY AND ASSESSMENT CRITERIA

4.1. Methodology

In the UK, DEFRA provides guidance on the most appropriate methods to estimate pollutant concentrations for use in Local Air Quality Management (LAQM). DEFRA regularly updates its Technical Guidance, with the latest LAQM Technical Guidance (TG16) published in April 2016. The methodology in LAQM.TG16, directs air quality professionals to a number of tools published by DEFRA to predict and manage air quality. For example, it is necessary to use the updated NO_x to NO_2 calculator to derive NO_2 concentrations from the NO_x outputs from Breeze Roads modelling. This is because NO_2 concentrations within the model are predicted using the CALINE4 NO_x to NO_2 conversion methodology, which should not be used within the model as current evidence shows that the proportion of primary NO_2 in vehicle exhausts has increased since the model was developed, which would affect the relationship between NO_x and NO_2 at roadside locations.

In order to determine the extent to which air quality issues will affect the development of the site, the study has considered the following:

- Any air quality measurements carried out in the area near the proposed development; and
- The most recent Air Quality Review and Assessment Reports from HDC.

4.2. Breeze Roads Modelling of Pollutant Concentrations

Dispersion modelling has been undertaken using Breeze Roads to determine air quality concentrations across the site. Breeze Roads is an air dispersion modelling software suite that predicts air quality impacts of carbon monoxide (CO), nitrogen dioxide, particulate matter (PM), and other inert pollutant concentrations from moving and idling motor vehicles at or alongside roadways and roadway intersections.

Breeze Roads can be used in conjunction with the MOBILE5, EMFAC emission models or other emissions data, to demonstrate compliance with the UK's National Air Quality Strategy. Breeze Roads predicts air pollutant concentrations near highways and arterial streets due to emissions from motor vehicles operating under free-flow conditions and idling vehicles. In addition, 1-hour and running 8-hour averages of CO or 24-hour and annual block averages of PM_{10} can be calculated.

4.3. Model Set-up Parameters

The most recent Emissions Factor Toolkit (EFT, version 10.1, August 2020) issued by DEFRA was used to derive emissions rates (in grams per kilometre) for vehicle movements along roads incorporated into the model. Version 10.1 provides emission rates for 2018 through to 2030 and takes into consideration the following information available from the National Atmospheric Emissions Inventory (NAEI):

- Fleet composition data for motorways, urban and rural roads in the UK (excluding London);
- Fleet composition based on European emission standards from pre-Euro I to Euro 6/VI (including Euro 6 subcategories);

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- Scaling factors reflecting improvements in the quality of fuel and some degree of retrofitting; and
- Technology conversions in the national fleet.
- Fleet composition data in London for motorways, central, inner and outer areas.

Version 10 incorporates the following changes:

- Use of the latest COPERT 5.3 NO_x and PM emissions factors, updated from COPERT 5.0. Of note, this results in lower NOx emissions for Euro 5 and 6 diesel LGVs, along with lower NOx emissions for motorcycles;
- Outside of London, the default fleet split assumptions, vehicle size distributions and Euro class compositions have been updated. These are based on a set of traffic activity projections from the Department for Transport (DfT) (RTF 2018, rebased to 2017 NAEI) and DfT car sale projections (April 2019) including the uptake of low carbon passenger cars and LGVs with electric and hybrid electric propulsion systems;
- Updated and simplified Advanced Option 'Fleet Projection Tool'. The two different projection calculation options available in EFT v9 have been simplified into a single, refined projection methodology in line with the previous 'Option 1' method. The user interface has also been streamlined to align with the typical resolution of information provided by Automatic Number Plate Recognition (ANPR) surveys, e.g. users are now only required to define Euro 6 vehicles as a single input category, without the need to define by individual sub-category (i.e. Euro 6, 6c, 6d), whilst the projected Euro 6 vehicles are split into sub-categories through application of typical proportional splits as embedded within the EFTs default fleet dataset;
- Updated f-NO_2 values based on the latest available 'Primary NO_2 Emission factors for road transport (2020 version)' from the National Air Emissions Inventory (NAEI); and

Meteorological data from Odiham meteorological station (2019) has been utilised for the dispersion modelling, which is considered representative of the development area, and the wind rose is shown in **Appendix 3**.

4.4. Assessment Criteria

A detailed assessment was considered appropriate for this proposed development with model results being verified against local monitoring data. This was undertaken using the detailed dispersion model Breeze Roads.

For the purposes of this assessment, the limit values assigned to individual pollutants as set out in the Air Quality Standards Regulations 2010 form the basis of the air quality assessment. The limit values are based on an assessment of the effects of each pollutant on public health. Therefore, they are a good indicator in assessing whether, under normal circumstances, the air quality in the vicinity of a development is likely to be detrimental to human health.

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4.5. Operation Phase

The main pollutants of concern are generally considered to be NO_2 and PM_{10} for road traffic. The Breeze Roads methodology has been used for this assessment to predict the impacts of any additional traffic generated from the development on surrounding sensitive receptors.

For the assessment, the following scenarios were considered:

- 2019 Model Verification;
- Opening Year without Development; and
- Opening Year with Development.

4.5.1. Traffic Data

The Breeze Roads prediction model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the number of heavy-duty vehicles (HDVs), the distance of the road centreline from the receptors and vehicle speeds.

The traffic information is detailed in **Table 4.1** and **Table 4.2** for the verification and assessment scenarios. For the verification scenario traffic flow and vehicle split data were provided by Motion–Traffic Consultants.

Vehicle speeds were estimated based on local speed limits and traffic conditions and were reduced near junctions and crossings to replicate queuing traffic.

Table 4.1: 2019 Traffic Flow Data for Verification

Road Section	AADT	Speed (km/h)*	HDV%
Griffin Way North of access	9,187	64	1.27
Griffin Way South of access	9,408	64	1.38
A30 Eastbound	12,279	48	3.05
Station Road	5,335	48	2.16
A30 Westbound	9,021	48	3.31
B3349 South	9,427	96	6.86
M3 Northbound	101,494	112	5.83
M3 Southbound	111,834	112	5.66

Note: This is a non-exhaustive summary of the road sections modelled and includes the sections that are likely to contribute the greatest emissions to the existing sensitive receptors.
*these are the speed limits, these have been reduced at junctions, crossing points, bus stops, etc.

Table 4.2 identifies the estimated AADT traffic flows for roads near to the proposed development site, with the proposed development fully operational.

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Table 4.2: 2023 Opening Year Traffic Flow Data

Road	AADT no Development	HDV%	AADT With Development Traffic	HDV%
Griffin Way North of access	9,615	1.27	10,361	1.64
Griffin Way South of access	9,846	1.38	10,933	1.88
A30 Eastbound	12,851	3.05	13,291	3.16
Station Road	5,584	2.16	6,074	2.51
A30 Westbound	9,441	3.31	9,932	3.47
B3349 South	9,867	6.86	10,953	6.82
M3 Northbound	106,224	5.83	106,743	5.83
M3 Southbound	117,045	5.66	117,317	5.66

Note: This is a non-exhaustive summary of the road sections modelled and includes the sections that are most likely to contribute the greatest emissions to the development receptors.

4.6. Model Verification

Model validation undertaken by the software developer will not have been carried out in the vicinity of the site being considered in this assessment. As a result, it is necessary to perform a comparison of the modelled results with local monitoring data at suitable locations. This verification process aims to minimise model uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results. The verification was carried out in accordance with LAQM.TG16. Suitable monitoring data for the purpose of verification is available for concentrations of NO_2 at the monitoring positions detailed in **Section 3.3**.

When the monitored and modelled results are compared as recommended in LAQM.TG16 the road NO_X adjustment factor is **5.2238** (as identified in **Table 4.3**). This factor was applied to all modelled NO_x results prior to calculating modelled NO_2 using the NO_x to NO_2 calculator. In the absence of appropriate PM_{10} monitoring within close proximity to the site, the NO_x adjustment factor has also been applied to the PM_{10} modelled concentrations, in accordance with the guidance provided in LAQM.TG16.

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Table 4.3: NO_2 Annual Mean Verification for 2019

Monitoring Position	Monitored		Modelled		% Difference (NO_x Roads) Before Adjustment	% Difference (NO_2 Total) After Adjustment	Road NO_x Factor
	Road NO_2 µg/m³	Road NO_x[15] µg/m³	Road NO_2 µg/m³	Road NO_x µg/m³			
HO2 Dorchester Arms, Hook	14.37	27.69	3.42	4.83	-82.57	-4.60	**5.2238**
HO3 London Road, Hook	17.22	33.56	3.45	6.76	-79.85	2.90	

4.7. Assessment of $PM_{2.5}$

The 2007 Air Quality Strategy introduced a new exposure reduction regime for $PM_{2.5}$, tiny particles associated with respiratory and cardio-vascular illness and mortality which have no known safe limit for human exposure. The new regime will attempt to reduce the exposure of all urban dwellers, alongside the existing method of reducing hotspots of PM exposure. $PM_{2.5}$ typically makes up two-thirds of PM_{10} emissions and concentrations. However, objectives for $PM_{2.5}$ (as shown in **Table 4.4**) are not currently incorporated into Local Air Quality Management regulations, therefore there is no statutory obligation to review and assess air quality against them.

Table 4.4: National Exposure Reduction Target, Target Value and Limit Value for $PM_{2.5}$

Time Period	Objective/Obligation	To be achieved by
Annual Mean	Target value of 25µg/m³	2010
Annual Mean	Limit value of 25µg/m³	2015
Annual Mean	Stage 2 indicative limit value of 20µg/m³	2020
3-year Average Exposure Indicator (AEI)[a]	Exposure reduction target relative to the AEI depending on the 2010 value of the 3-year AEI (ranging from a 0% to a 20% reduction)	2020
3-year Average Exposure Indicator (AEI)[a]	Exposure concentration obligation of 20µg/m³ (of vegetation)	2015

[a] The 3-year running mean of AEI is calculated from the $PM_{2.5}$ concentration averaged across all urban background monitoring locations in the UK e.g. the AEI for 2010 is the mean concentration measured over 2008, 2009 and 2010.

Presently, Breeze Roads does not predict the concentration of $PM_{2.5}$ as part of the methodology, therefore, the future concentration of $PM_{2.5}$ will be calculated using the typical ratio between the background concentrations of PM_{10} and $PM_{2.5}$ for the opening year of development. This predicted concentration will then be compared against the annual mean Objective Limit value of 25µg/m³.

[15] Obtained from NO_x to NO_2 Calculator Spreadsheet available from www.laqm.Defra.gov.uk

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5. IMPACTS AND CONSTRAINTS OF AIR QUALITY

5.1. Air Quality Impact of Development Traffic - Acceptability Criteria

It is common in the UK to use the Environmental Protection UK's (EPUK) Guidance[16] on Air Quality Assessments for Planning Applications to assess the impact of a development. This advises that an air quality assessment will be required where the development is anticipated to give rise to significant changes in air quality. There will also be a need to assess air quality implications of a development where a significant change in relevant exposure is anticipated. A full air quality assessment should normally be undertaken where proposals give rise to significant changes in traffic flows, typically a change in annual average daily traffic (AADT) of 100 LDV flows in or adjacent to an AQMA or 500 LDV flows elsewhere. Other changes caused by a development such as a major new junction, significant road realignment or a substantial increase in HDV traffic may also warrant a full impact assessment.

5.2. Air Quality Impacts

In January 2017, Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) updated their guidance on "Land-Use Planning and Development Control: Planning for Air Quality". The guidance provides a methodology for determining the impacts of increased pollutant concentrations at sensitive receptor locations resulting from emission sources such as the generation of traffic from development sites.

To characterise the impacts of the proposed development on local air quality, predictions of air pollutant concentrations have been made using the Breeze Roads dispersion model.

Table 5.1: Impacts of Pollutant Concentrations as a result of the Development

Long-Term Average Concentration in Assessment Year	% Change in Concentration relative to the Air Quality Assessment Level (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
The AQAL is the Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level'				

5.3. Air Quality Impact of Development Traffic - Assessment

The proposals for the construction of new distribution park will result in 745 vehicle movements per day north of the site and 1,087 vehicle movements per day south of site (6.4% HDV), as replicated in **Table 4.2**.

Holt Farm Cottages is a long-established residential property and is the closest such property to the north-east of the development site. Providence House is also an established residential development

[16] Environmental Protection UK and IAQM (2017) – Land-Use Planning and Development Control: Planning for Air Quality

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which was converted from a commercial property some time ago and is located to the immediate west of the site.

Two other buildings considered as sensitive receptors have Prior Approval to convert to residential use and therefore there is potential for residential use in the future. Hartley House and Enterprise House have been assumed to be residential for the purposes of the air quality assessment.

These existing sensitive receptor locations are identified in **Appendix 4** and the modelled predicted NO_2 and particulate matter pollutant concentrations at these existing receptors are identified in **Tables 5.2** and **5.3**.

5.4. Predicted Air Quality Constraints on the Development

As the Proposed Development does not include any residential development, a constraints assessment is not required.

5.5. Pollutant Concentrations

5.5.1. Annual Mean NO_2 Concentrations

Table 5.2 identifies the modelled NO_2 concentrations at existing receptors for the worst-case scenario for which there will be no exceedances of the AQO. All impacts are classified based on the criteria found in **Table 5.1**.

All of the receptors have pollutant concentrations which are 75% or less of the AQAL and therefore all the modelled changes are classified as negligible and none of the receptors have pollutant concentrations which are above the AQO.

All of the pollutant concentrations will remain significantly below the annual NO_2 AQO. In respect of the NO_2 1-hour AQO, there is only a risk that the NO_2 1-hour objective (200µg/m^3) could be exceeded at local sensitive receptors if the annual mean NO_2 concentration is greater than 60µg/m^3. Therefore, exceedances of NO_2 1-hour AQO would not be expected as the worst-case annual mean predicted concentration is 19.7µg/m^3 (ER5).

Table 5.2: Modelled 2023 NO_2 Concentrations – Existing Receptors

Receptor	Air Quality Objective (µg/m^3)	Without Development Total NO_2 (µg/m^3)	With Development Total NO_2 (µg/m^3)	Change in Concentration (µg/m^3)	% Change in Concentration relative to the Air Quality Assessment Level (AQAL)	Impact Descriptor
ER1	40	15.5	15.6	0.1	0	Negligible
ER2		16.5	16.8	0.3	1	Negligible
ER3		15.9	16.1	0.2	0	Negligible
ER4		15.1	15.1	0.0	0	Negligible
ER5		19.1	19.7	0.6	2	Negligible

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5.5.2. Annual Mean Particulate Matter Concentrations

Table 5.4 identifies the modelled PM_{10} and $PM_{2.5}$ concentrations both with and without the development completed and fully operational. The highest predicted annual mean PM_{10} concentration with the development is 15.2µg/m^3 at ER5. The highest predicted annual mean $PM_{2.5}$ concentration with the development is 9.9µg/m^3 at ER5. The largest predicted change in PM_{10} is 0.1µg/m^3 and no change for $PM_{2.5}$, which are both considered to be negligible impacts.

Table 5.3: Modelled 2023 PM_{10} and $PM_{2.5}$ Concentrations – Existing Receptors

Receptor	Total PM_{10} Without Development µg/m^3 (Days >50 µg/m^3)	Total PM_{10} With Development µg/m^3 (Days >50 µg/m^3) [17]	Change in PM_{10} (µg/m^3)	Total $PM_{2.5}$ Without Development µg/m^3	Total $PM_{2.5}$ With Development µg/m^3	Change in $PM_{2.5}$ (µg/m^3)
ER1	14.7 (0)	14.7 (0)	0.0 (0)	9.6	9.6	0.0
ER2	14.8 (0)	14.9 (0)	0.1 (0)	9.7	9.7	0.0
ER3	14.8 (0)	14.8 (0)	0.0 (0)	9.7	9.7	0.0
ER4	14.6 (0)	14.6 (0)	0.0 (0)	9.6	9.6	0.0
ER5	15.1 (0)	15.2 (0)	0.1 (0)	9.9	9.9	0.0

[17] Not to be exceeded more than 35 times a year.

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6. MITIGATION

6.1. Operation Phase

As identified by the impact assessment, there are no exceedances of the NAQO's for PM_{10} or $PM_{2.5}$ at any of the existing sensitive receptors.

There are negligible expected increases in NO_2, PM_{10} and $PM_{2.5}$ concentrations at the existing receptors with the development in place. Of the existing receptors, the highest resultant NO_2 pollutant concentration was at ER5 with a concentration of 19.7µg/m^3 which has a negligible increase as a result of the development scheme. Of these existing receptors, the highest resultant PM_{10} pollutant concentration was at ER5 with a concentration of 15.2µg/m^3.

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7. CONCLUSIONS

The air pollutant concentration modelling has identified that there will be negligible increases in nitrogen dioxide concentrations and negligible increases in particulate matter concentrations at existing sensitive receptors as a result of the development scheme. There are no existing sensitive locations which will exceed the AQO, as a result of the proposed development.

Accordingly, air quality impacts of the proposed development scheme are considered to be acceptable.

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APPENDICES

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Appendix 1: Glossary of Terms

AADT	Annual Average Daily Traffic
AAHT	Annual Average Hourly Traffic
AQMA	Air Quality Management Area -An area that a local authority has designated for action, based upon predicted exceedances of Air Quality Objectives.
AQS/ NAQOs	Air Quality Standard/ National Air Quality Objectives - The concentrations of pollutants in the atmosphere, which can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive sub groups.
AURN	Automatic Urban and Rural Network Air Quality Monitoring Site.
Calendar Year	The average of the concentrations measured for each pollutant for one year. In the case of the AQS this is for a calendar year.
Concentration	The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air (for example, micrograms per cubic metre, µg/m^3) or a volume of gaseous pollutant per unit volume of air (parts per million, ppm).
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emissions Factor Toolkit
Exceedance	A period of time where the concentration of a pollutant is greater than the appropriate Air Quality Objective.
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
LAQM	Local Air Quality Management
Nitrogen Oxides	Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO_2), which is harmful to health. NO_2 and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NO_x).
PM_{10}/$PM_{2.5}$	Fine Particles are composed of a wide range of materials arising from a variety of sources including combustion sources (mainly road traffic), and coarse particles, suspended soils and dust from construction work. Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focused on PM_{10} (less than 10 microns in aero-dynamic diameter), but the finer fractions such as $PM_{2.5}$ (less than 2.5 microns in aero-dynamic diameter) is becoming of increasing interest in terms of health effects.
TEMPro	TEMPro is software produced by the DfT to calculate the expected growth of traffic by year on roads throughout the country. The factor varies depending on the region and type of road.
µg/m^3	Micrograms per cubic metre of air - A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollution.

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Appendix 2: Air Quality Standards

Pollutant	Averaging Period	Limit Value	Margin of Tolerance
Benzene	Calendar Year	5µg/m^3	
Carbon Monoxide	Maximum daily running 8 Hour Mean	10mg/m^3	
Lead	Calendar Year	0.5µg/m^3	100%
Nitrogen Dioxide	One Hour	200µg/m^3 Not to be exceeded more than 18 times per year	
	Calendar Year	40µg/m^3	
Particulates (PM_{10})	One day	50µg/m^3 Not to be exceeded more than 35 times per year	50%
	Calendar Year	40µg/m^3	20%
Particulates ($PM_{2.5}$)	Calendar Year	25µg/m^3	20%
Sulphur Dioxide	One Hour	350µg/m^3 Not to be exceeded more than 24 times per calendar year	150µg/m^3
	One Day	150µg/m^3 Not to be exceeded more than 3 times per calendar year	

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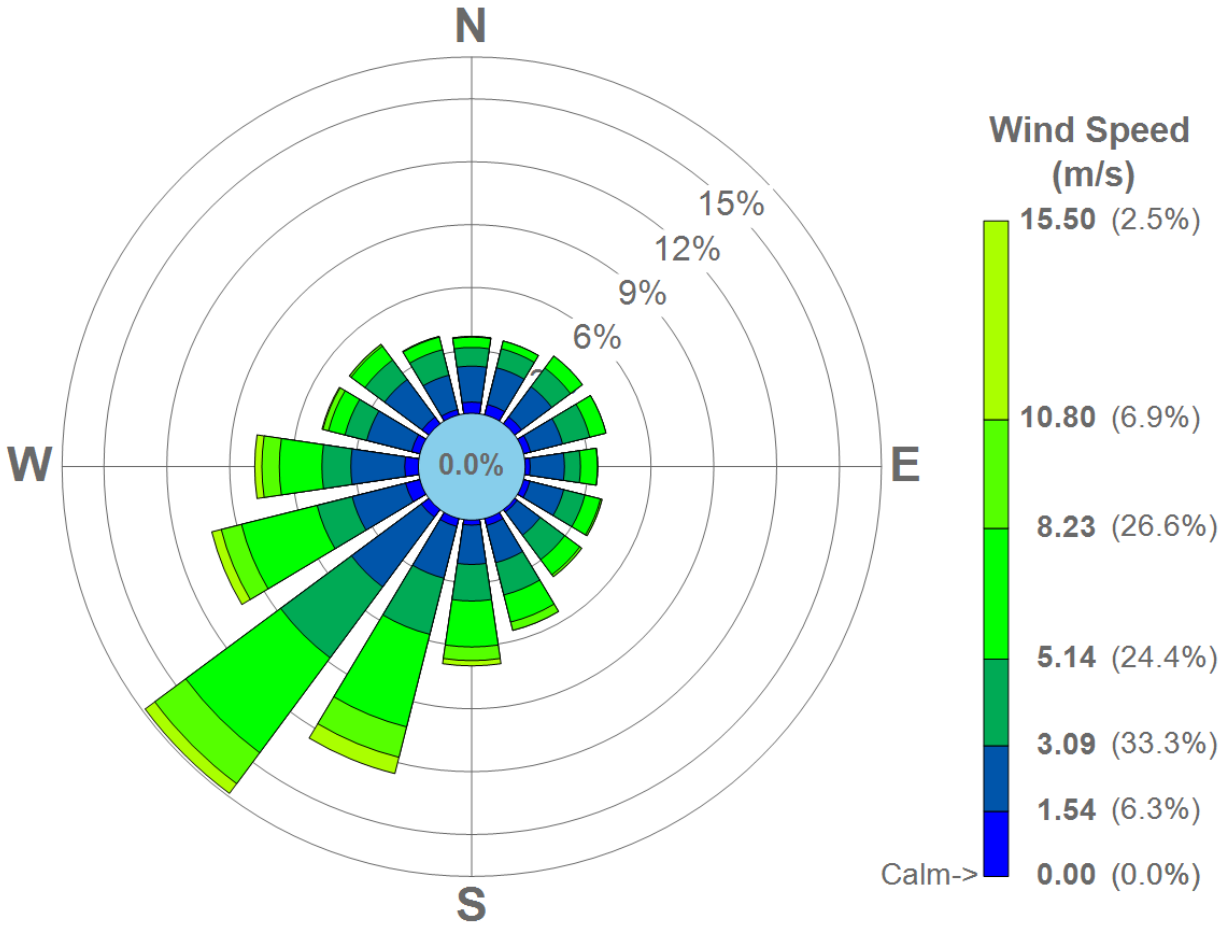
Appendix 3: 2019 Odiham Airfield Meteorological Station Wind Rose



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Appendix 4: Proposed Development - Nearby Existing Receptor Locations

LEGEND

Existing Receptor Location and Number

Application Site Boundary

N
W
E
S

Client: XLB Property Ltd		Proposed Development - Nearby Existing Receptors		Design:	CP
				Drawn:	CP
Rev: A	Description: FINAL	Project: Bartley Wood, Hook		Checked:	GP
				Approved:	GP

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Appendix 4

Scale: On Map

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