ARDENT
CONSULTING ENGINEERS

COUNTRYSIDE PROPERTIES (UK) LIMITED

LAND SOUTH OF HENHAM ROAD, ELSENHAM

AIR QUALITY ASSESSMENT

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1.0 INTRODUCTION

Proposed Development

1.1 Ardent Consulting Engineers (ACE) have been commissioned by Countryside Properties (UK) Limited to carry out an air quality assessment (AQA) in support of an outline planning application for a proposed residential development at land south of Henham Road, Elsenham located within the Uttlesford District Council (UDC) area.

1.2 The proposal includes the construction of a new development comprising approximately 130 residential dwelling with associated parking and landscaping.

Scope

1.3 This report describes existing air quality within the study area and considers both the suitability of the Site for the proposed development and the potential impact of the proposed development on local air quality during both the construction phase and the operational phase.

1.4 The main air pollutants of concern related to the construction phase are dust and particulate matter (PM_{10}) from on-site construction activities and as a result of material tracked out by and construction vehicles, and emissions of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) from construction vehicle emissions. There is also a potential for impacts on existing designated ecological sites as a result of emissions of nitrogen oxides (NO_x), NO_2 and ammonia (NH_3) from construction development-generated vehicles.

1.5 The main air pollutants of concern related to the operational phase are emissions of NO_2, PM_{10} and $PM_{2.5}$ associated with operational traffic generation which may impact on existing human receptors. There is also a potential for impacts on nearby designated ecological sites as a result of emissions of NO_x, NO_2 and NH_3 from operational development-generated vehicles. The air pollutants of concern in terms of the suitability of the Site for its proposed end-use are baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ as a result of emissions from the local road network and background concentrations, as well as emissions of NO_2 associated with aircraft using the London Stansted Airport.

1.6 Details of the proposed energy strategy have not yet been determined. Should the proposed energy strategy include on-site combustion plant then further consideration of the potential impacts of such plant should be undertaken once details of such plant are available.

Consultation

1.7 ACE contacted UDC's Environmental Health Department via email correspondence in June 2022 in order to discuss the scope and methodology for this assessment. At the time of undertaking this assessment no response has been received.

2.0 LEGISLATION, POLICY AND GUIDANCE

National Air Quality Legislation and Strategy; Human Health

The Air Quality Strategy

2.1 The Air Quality Strategy (Defra, 2007) established the policy framework for ambient air quality management in the UK, with the objective of ensuring a quality of ambient air for all that would not pose a significant risk to health of quality of life. This document set out the National Air Quality Objectives (NAQOs) and the policy for achieving them. It followed part IV of the Environment Act (UK Government, 1995) which introduced a system of Local Air Quality Management (LAQM) requiring local authorities to regularly review and assess air quality within their boundary and appraise plans in light of these assessments.

2.2 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) which should include measures expected to ensure that the NAQOs are met within the AQMA.

National Air Quality Objectives

2.3 NAQOs were defined by The Air Quality Strategy (Defra, 2007) and enshrined in regulations by the Air Quality Standards Regulation (Statutory Instrument, 2010, No 1001) and Air Quality Standards (Amendment) Regulations (Statutory Instrument, 2016 No. 1184) which implemented the European Union Directive on ambient air quality and cleaner air for Europe (Directive 2008/50/EC). Relevant objectives are set out in **Table 2-1**.

2.4 The Environment Act 2021 (UK Government, 2021) establishes a legally binding duty on government to set a long-term target for at least one air quality matter, in addition to a separate requirement to set a target regarding annual mean $PM_{2.5}$ concentrations, by October 2022. An online consultation was undertaken regarding the proposed new targets[1] (Defra, 2022) between March and June 2022, closing 27th June. As these proposed new targets are still subject to consultation and approval, the consideration of air quality within this AQA is undertaken in the context of the currently approved objectives only, as set out in **Table 2-1**.

Table 2-1: NO_2, PM_{10} and $PM_{2.5}$ Objectives

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO_2)	1-hour mean	200 µg/m³ not to be exceeded more than 18 times a year
	Annual mean	40 µg/m³
Particulate Matter (PM_{10})	24-hour mean	50 µg/m³ not to be exceeded more than 35[2] times a year
	Annual mean	40 µg/m³ [3]
Particulate Matter ($PM_{2.5}$)	Annual mean	25 µg/m³ [4]
	Annual mean	20 µg/m³ [5]
	Exposure reduction target	15% reduction between 2010 and 2020 at Urban Background sites

2.5 Analysis of long-term monitoring data suggests that if the annual mean NO_2 concentration is less than 60 µg/m³ then the 1-hour mean NO_2 objective is unlikely to be exceeded where road transport is the main source of pollution (Defra, 2016). This concentration has therefore been used in this AQA to screen whether an

[1] Proposed air quality targets are 1) Annual Mean $PM_{2.5}$ Concentration Target of 10 µg/m³ to be met across England by 2040; and 2) Population Exposure $PM_{2.5}$ Reduction Target of a 35% reduction in population exposure by 2040 (as compared to a base year of 2018).

[2] 7 times a year for Scotland

[3] 18 µg/m³ for Scotland

[4] 12 µg/m³ for Scotland

[5] Indicative stage 2 limit value post 2020, derived based on the exposure reduction target of a 15% reduction between 2010 and 2020. This value has been used as the relevant air quality objective throughout this assessment in order to ensure a conservative approach.

exceedance of the 1-hour mean NO_2 objective is likely. Similarly, an annual mean PM_{10} concentration of 32 µg/m³ is used to screen whether an exceedance of the 24-hour mean PM_{10} objective is likely.

2.6 Local Air Quality Management Technical Guidance 2016 (LAQM.TG(16)) (Defra, 2016) provides guidance to local authorities as to where objectives apply. These are summarised in **Table 2-2**.

Table 2-2: Relevant Exposure

Averaging Period	Relevant Locations	Objectives should apply	Objectives don't usually apply
Annual mean	Where individuals are exposed for a cumulative period of 6 month in a year	Facades of residential properties, schools and hospitals	Gardens, facades of offices, hotels and shops or kerbside sites
24-hour mean	Where individuals are expected to be exposed for 24-hours or longer	As above, with the addition of hotels and gardens of residences	Kerbside sites and areas where the public is unlikely to spend significant time
1-hour mean	Where individuals are expected to spend one hour or longer	As above, with the addition of locations with regular access such as car parks, bus stations, parks and cafes	Locations not publicly accessible or where occupation is not regular

National Air Quality Plan for Nitrogen Dioxide (NO_2) in the UK

2.7 The National Air Quality Plan (Defra and DfT, 2017) was written as a joint venture between The Department For Environment, Food and Rural Affairs (Defra) and the Department for Transport (DfT) and aims to tackle roadside concentrations of NO_2 in the UK. It includes a number of measures such as those aimed at investing in Ultra Low Emission Vehicles (ULEVs) charging infrastructure, public transport and grants to help local authorities in improving air quality.

2.8 The plan requires all local authorities in England with areas expected not to meet the Objectives by 2020 (known as 'air quality hotspots') to develop plans to bring concentrations within these values in *"the shortest time possible".* These plans are to be reviewed by the government and suggestions included in the plan include actions such as utilising retrofitting technologies, changing road layout and encouraging public transport and ULEV use. Where these approaches are not considered sufficient, the local authority may need to consider implementation of a Clean Air Zone which places restrictions on vehicle access to an area and may include charging certain (or all) vehicles or restrictions on the type of vehicle allowed to access an area.

The Road to Zero Strategy

2.9 The 'Road to Zero' strategy (HM Government, 2018) set out the governments aims regarding zero emissions vehicles. These include the aim that all new cars and vans have zero tailpipe emissions by 2040 and for almost every car to be zero emission by 2050. Measures are aimed at encouraging uptake of the cleanest vehicles and supporting electric charging infrastructure.

Clean Air Strategy

2.10 The Clean Air Strategy (Defra, 2019) sets out policies to lower national emissions of pollutants in order to reduce background pollution and human exposure. It aims to create a strong framework to tackle air pollution and to reduce the number of people living in locations with $PM_{2.5}$ concentrations exceeding 10 $\mu g/m^3$ by 50% by 2025.

National Air Quality Legislation; Ecology

2.11 Poor air quality can have a negative impact on ecological habitats as well as human health. The Conservation of Habitats and Species Regulations (Statutory Instrument, 2017) was put in place in order to protect ecological sites following the publication of European Directive 92/43/EEC (European Economic Community (EEC), 1992) regarding the designation of Special Areas of Conservation (SAC) and 2009/147/EC (European Community, 2009) regarding the designation of Special Protection Areas (SPAs). These regulations require that the competent authority (the planning authority in this case) consider whether a development will have a likely significant effect on an SAC or SPA (known as 'European Sites'). Should this be considered to be likely then an 'appropriate assessment' is required to identify whether the new development will indeed have a significant adverse effect on the ecological site(s).

2.12 The Wildlife and Countryside Act (UK Governmant, 1981) sets out the requirement for the identification of areas of land that are considered to be of 'special interest' (due to flora, fauna and / or geological or physiographical features) as Sites of Special Scientific Interest (SSSIs), and the Countryside and Rights of Way (CROW) Act (HM Government, 2000) sets out the specific protections afforded to SSSI, stating that where a development is 'likely to damage' a SSSI then the appropriate conservation body must be consulted.

2.13 The Environment Act (UK Government, 1995) and the Natural Environment and Rural Communities Act (HM Government, 2006) set out a general requirement for conservation of biodiversity.

Critical Levels

2.14 Critical levels have been set for a number of gaseous pollutants. These are the concentrations of pollutants below which there is no known harmful effects on vegetation or ecosystems. These levels have been set by UK government and are considered to be relevant objectives for all internationally designated sites such as SACs and SPAs, as well as for nationally designated sites such as SSSIs and for locally designated sites such as Ancient Woodland (AW). The relevant critical levels are set out in **Table 2-3**.

Table 2-3: Ecological Critical Levels

Pollutant	Time Period	Objective
Nitrogen Oxides (expressed as NO_2)	Annual Mean	30 µg/m^3
Ammonia (NH_3)	Annual Mean	3 µg/m^3 (unless lichens or bryophytes are present, then 1 µg/m^3)

Critical Loads

2.15 Critical loads represent the amount of pollutant deposited to a given ecosystem over a year, below which it is understood that there is no harmful effect to the ecosystem. Critical loads have been identified for a number of different types of ecosystem, based on their sensitivity to adverse effects. Critical loads for the deposition of nitrogen have been set for the protection from eutrophication, whilst critical loads for the purpose of protection against acidification have been set for deposition of both nitric acid and sulphuric acid, together termed as acid deposition. Critical loads for sensitive ecological sites vary throughout the UK.

Planning Policy

National Planning Policy

2.16 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021) sets out the Government's planning policies for England and how they expect these to be implemented. Consideration of air quality within planning is considered an important element of this framework which recommends that transport and the potential impact on the environment should be considered at an early stage in order to allow for mitigation or even avoidance of impacts through location and layout of developments.

2.17 It is recommended that both the impacts of a potential development on the environment and the risk to new development from existing pollution be taken into account when planning policy is drafted. Furthermore these should contribute to compliance with relevant limit values or objectives and should be consistent with any local AQAP.

2.18 The NPPF also recommends that *"existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. 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."*

2.19 The NPPF also states that:

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

- *Protecting and enhancing…sites of biodiversity or geological values…*
- *minimising impacts on…biodiversity…"*

2.20 The Planning Practice Guidance (PPG) provides guidance on how planning can enact the policies set out in NPPF. It is set out as separate papers for different sectors and, therefore, the 'Air Quality' PPG (Ministry of Housing, Communities and Local Government, 2019) is aimed at addressing policy relating specifically to air quality. This document gives guidelines for when air quality is likely to be relevant to a planning decision:

"Concerns could arise if the development is likely to have an adverse effect on air 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."

2.21 The 'Air Quality' PPG also states that more detailed information such as whether the development could have a significant impact on air quality, baseline air quality and whether occupiers of the development could experience poor air quality may be required in order to make an informed decision. Further, it notes that any assessment should be proportionate, taking into account the scale of the proposed development, as well as any potential impacts.

2.22 Some suggestions on mitigation measures are set out within the PPG, such as separation distances, filtration/ventilation, green infrastructure, promotion of low emission forms of transport, control of dust and emissions from demolition and construction and, finally, contributing funding to measures such as those identified in AQAPs to offset impacts from the development.

Local Policy

UDC Local Plan

2.23 UDC's Local Plan was adopted in 2005 (UDC, 2005) and it seeks to maintain and improve Uttlesford's positive attributes, such as the quality of life and the districts environment. The Local Plan specifically seeks to reduce and control air pollution, and includes the following relevant policies:

- Policy ENV13 – Exposure to Poor Air Quality, states the following:

  "Development that would involve users being exposed on an extended long-term basis to poor air quality outdoors near ground level will not be permitted. A zone 100 metres on either side of the central reservation of the M11 and a zone 35 metres either side of the centre of the new A120 have been identified on the proposals map as particular areas to which this policy applies"; and

- Policy GEN4 – Good Neighbourliness, states the following:

  "Development and uses, whether they involve the installation of plant or machinery or not, will not be permitted where:…

  b) …dust,…fumes,…exposure to other pollutants;

  would cause material disturbance or nuisance to occupiers of surrounding properties".

2.24 UDC is currently in the process of producing a new Local Plan, with a draft anticipated to be available sometime in 2022.

UDC AQAP

2.25 Under LAQM (Defra, 2016), UDC are required to regularly review and assess air quality within the District, and determine whether or not the air quality objectives are likely to be achieved.

2.26 There is currently one AQMA in UDC, the 'UDC AQMA Saffron Walden', which was declared in 2012 as a result of exceedances of the annual mean NO_2 objective.

The Site is located approximately 11 km to the south of this AQMA. The AQMA was declared by UDC to cover the central area of Saffron Wealden and replace the three smaller AQMAs which were declared in 2007 and covered the most congested road junctions in the centre of the town.

2.27 Following the declaration of the 'UDC AQMA Saffron Walden' an AQAP an AQAP was developed in order to tackle poor air quality in the Borough. UDC's most recent AQAP covers the period from 2017 to 2022 (UDC, 2017) and outlines a number of potential actions to be taken to improve air quality. The proposed actions outlined in the AQAP will lead to one or more of the following outcomes: resisting development which will adversely impact on the AQMA; reducing traffic congestion; promoting alternative modes of travel to the private car; and reducing emissions from vehicle and plant.

Assessment Guidance

2.28 This assessment has been based on a number of guidance documents, the most significant of which are set out below:

Local Air Quality Management Technical Guidance (LAQM.TG(16))

2.29 The LAQM guidance (Defra, 2016) was published for use by local authorities in review and assessment work, but also includes a number of technical guidelines on carrying out modelling assessment and management of monitoring data which set out best practice and are, therefore, relevant to all air quality assessments.

Land-Use Planning and Development Control: Planning for Air Quality

2.30 The Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) have published joint guidance on the assessment of air quality impacts for planning purposes (EPUK & IAQM, 2017). This includes information on when an air quality assessment is required, what should be included in an assessment and the assessment of significance.

Guidance on the Assessment of Dust from Demolition and Construction

2.31 The IAQM have produced guidance which includes a methodology for identifying the risk magnitude of potential dust sources associated with demolition, construction, earthworks and trackout (IAQM, 2014). This is then used to identify the level of mitigation necessary in order for the impacts to be not significant.

A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

2.32 The IAQM guidance, 'Assessment of Air Quality Impacts on Designated Nature Conservation Sites' (IAQM, 2020), sets out the appropriate approach for this element of assessment. Due to the complexity of ecological impacts, an air quality professional alone can only identify whether emissions are unlikely to have a significant impact when compared against the relevant critical load / level. Where it cannot be ascertained that emissions are below this level, the combined input of both an air quality professional and an ecologist is required; the former to identify any changes to concentrations of deposition and the latter to consider the overall effect taking into consideration the location and sensitivity of any given habitat.

3.0 METHODOLOGY

3.1 The methodology set out in the following sections has been identified as being the most appropriate approach to assess potential impacts associated with the proposed development and whether these impacts are acceptable, along with any required mitigation.

Baseline Air Quality

Human Health

3.2 Information regarding 'current'[6] and 'future'[7] baseline air quality has been obtained by collating the results of monitoring carried out by UDC, referring to maps of AQMAs, considering any exceedances of the EU Limit Values predicted by Defra's Pollution Climate Mapping (PCM) model (Defra, 2020a) or measured by any nearby Automatic Urban or Rural Network (AURN) monitoring site(s) and considering predicted background concentrations defined based on the national pollution maps published by Defra (Defra, 2020b).

Construction Dust Impacts

3.3 There is a potential for dust from onsite activities and off-site trackout during the construction phase to have an impact on sensitive human and ecological receptors within the study area.

3.4 The suspension of dust and particulate matter is related to weather conditions and wind direction, ground and particle characteristics and on-site activities. There is a potential for impacts to occur when dust generating activities coincide with dry, windy conditions and where sensitive receptors are located downwind of the dust source.

3.5 Separation distance is an important factor as large particles (>30 μm) which are responsible for most dust annoyance largely deposit within 100 m of sources.

[6] The 'current' baseline year for the purposes of this assessment has been taken to be 2019 as this is the most recent year for which representative local monitoring data are available.

[7] The future baseline year has been taken to be 2025 as this is the earliest year that any part of the proposed development is anticipated to be occupied.

Intermediate particles (10-30 µm) can travel 200-500 m but are less likely to trigger annoyance. Significant annoyance is therefore generally limited to a few hundred metres of the source. Small particles (<10 µm) are deposited slowly and may travel up to 1 km. Whilst these particles are responsible for most impacts on human health, impacts are not likely to be experienced at significant distance due to dispersion effects.

3.6 The assessment of construction dust impacts has been carried out following the IAQM's 'Guidance on the Assessment of Dust from Construction and Demolition' (IAQM, 2014). Within the guidance, an 'impact' is described as a change in pollutant concentration or dust deposition and an 'effect' is described as the consequence of an impact.

3.7 The assessment considers three potential dust impacts:

- Loss of amenity due to dust soiling;
- Human health effects due to an increase in concentrations of PM_{10}; and
- Harm caused to ecological receptors due to dust deposition.

3.8 Full details of the approach taken to assessing dust are provided in **Appendix B**. The stages of the assessment are:

- Identify whether there are sensitive receptors within the relevant distances (study area) for site activities during the construction phase;
- Assess the risk of dust impacts for each site activity type (demolition, earthworks, construction and trackout) – this includes identifying the emissions magnitude for each activity type, the sensitivity of the area and then combining these factors to identify risk;
- Identify mitigation measures, based on assessed risk, sufficient to ensure off-site impacts are not significant; and
- Assess impacts with mitigation in place. These should normally be not significant.

3.9 The IAQM guidance makes it clear that no assessment of the significance of impacts without mitigation should be carried out as mitigation measures will be required due to planning conditions as well as best practice for construction companies. The IAQM guidance also states that the residual impact, taking into account the proposed mitigation will usually be 'not significant'.

Development-Generated Construction Road Traffic Impacts

Human Health

3.10 The potential impacts on existing sensitive locations as a result of development-generated construction traffic have been qualitatively assessed, taking into consideration the likely volumes, composition and routing of development-generated construction traffic, the anticipated duration of the construction phase and any anticipated mitigation measures that are likely to be applied.

3.11 Where it is not possible to screen out significant effects from road sources, detailed modelling is then generally required.

Ecology

3.12 The potential impacts on nearby designated ecological sites as a result of development-generated construction traffic have been qualitatively assessed, taking into consideration the likely volumes, composition and routing of construction development-generated traffic, the anticipated duration of the construction period and any anticipated mitigation measures that are likely to be applied.

3.13 Where it is not possible to screen out significant effects from road sources, detailed modelling and / or additional assessment in conjunction with an ecologist is then generally required.

Development-Generated Operational Road Traffic Impacts

Human Health

Screening

3.14 The IAQM/EPUK guidance 'Land Use Planning and Development Control: Planning for Air Quality' (EPUK & IAQM, 2017) includes a list of indicative criteria for where a detailed air quality assessment would be needed. The criteria relating to screening air quality impacts relating to additional traffic are:

- An increase in light duty vehicle (LDV) traffic of >500 annual average daily traffic (AADT) (or >100 AADT within or adjacent to an AQMA); or
- An increase in heavy duty vehicle (HDV) traffic of >100 AADT (or >25 AADT within or adjacent to an AQMA).

3.15 The above criteria apply to any individual link and therefore, a development generating over 500 AADT (or >100 AADT within an AQMA) may be considered to fall below the screening criteria where the increase is spread over a number of different road links.

3.16 Where it is not possible to screen out significant effects from road sources, detailed modelling is then generally required.

Detailed Assessment

3.17 Annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at a range of locations representing existing sensitive receptors in the local area, including worst-case locations. Concentrations and changes in concentrations have then been compared against appropriate assessment criteria in order to determine significance.

3.18 Relevant sensitive locations are those where members of the public will be regularly present over the averaging period of the relevant air quality objective(s). For the pollutants of interest in this assessment (i.e. NO_2, PM_{10} and $PM_{2.5}$), sensitive locations considered include the façades of existing residential properties (sensitive to the annual mean NO_2, PM_{10} and $PM_{2.5}$ objectives, the 24-hour mean PM_{10} objective and the 1-hour mean NO_2 objective) and the façade of an existing pub (sensitive to the annual mean NO_2 objective only). When identifying receptors, particular attention has been paid to locations close to local roads, junctions and crossings where the impact of more than one road link, as well as slow and congested traffic may increase emissions, and locations close to road links where the greatest volumes of development-generated traffic will travel.

3.19 Based on the criteria above, six existing receptors have been identified as worst-case receptors for assessment. The receptors have been chosen to represent worst-case locations where baseline pollutant concentrations are likely to be highest (e.g. as a result of increased emissions due to slowed traffic) and the volumes of operational development-generated traffic are likely to be greatest. The locations of these receptors are shown in **Table 3-1** and **Figure 3-1**.

3.20 In addition, concentrations of NO_2 have been modelled at the local UT020 diffusion tube monitoring site for use in model verification. Further details of model verification are provided in **Appendix C**.

Table 3-1: Existing Receptor Locations

Receptor	Description	Coordinates		Height (m) [a]	Approx. No. properties represented
		X	Y		
R1	Façade of existing residential property, fronting onto Henham Road	553950	226403	1.5	~2
R2	Façade of existing residential property, fronting onto Henham Road	553918	226380	1.5	1
R3	Façade of existing residential property, fronting onto Henham Road	553842	226343	1.5	~2
R4	Façade of existing residential property, fronting onto the junction between Henham Road and Hall Road	553838	226329	1.5	1
R5 [b]	Façade of existing pub, fronting onto Henham Road, opposite the High Street and Hall Road junction	553814	226334	1.5	1
R6	Façade of existing residential property, fronting onto the junction between High Street and Hall Road	553813	226321	1.5	~4

[a] Receptors have been modelled at a height of 1.5 m to represent ground floor level conditions.

[b] Only the 1-hour mean NO_2 objective is applicable at this receptor, therefore, only annual mean predicted concentrations are presented for comparison to the proxy 1-hour mean NO2 objective of 60 µg/m³

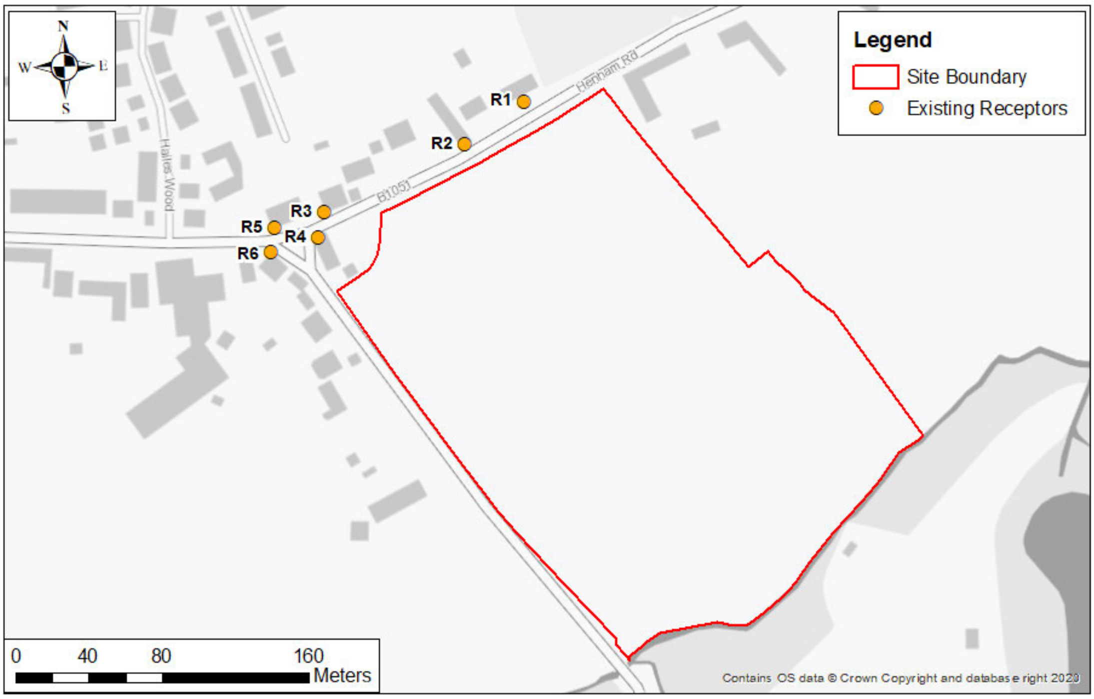

Figure 3-1: Existing Receptor Locations

3.21 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the identified receptors have been modelled using the ADMS-Roads dispersion model (v5.0.1). This model requires a number of inputs including traffic flow (in AADT format), composition (i.e. proportion of HDVs) and average speed data, as well as road characteristics such as width, gradient and street canyons, as applicable.

3.22 Traffic flow and composition data have been obtained from the project's transport consultant; ACE. Traffic data from committed development in the area, as provided by ACE, has been accounted for within the future year scenarios. A summary of the traffic data and the assumptions used in this assessment is provided in **Appendix D**.

3.23 The emissions associated with the traffic have been calculated using the Emissions Factor Toolkit (EFT) v10.1 (Defra, 2020c). This utilises emissions factors taken from the European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA) Air Pollution Emission Inventory Guidebook 2019 (EMEP / EEA, 2019) which is consistent with the COPERT 5.3 emission calculation tool (EMISIA, 2019), fleet composition data collected as part of the National Atmospheric Emissions Inventory (NAEI) and by Transport for London (TfL), along with data relating to the fleet and vehicle turnover in the UK. Traffic data have been entered into the EFT to provide emissions rates for each of the road links modelled for the current[6] and future[7] years, along with road type, vehicle fleet composition and speed. Whilst NO_x emissions rates are related to exhaust only, emissions rates for PM_{10} and $PM_{2.5}$ also include increments for road, tyre and break wear.

3.24 The model also requires meteorological data and inputs. The model has been run utilising 2019 data from the Stansted meteorological station which is considered suitable for the study area. **Appendix C** provides additional information on the meteorological inputs.

Air Quality Impacts Significance Criteria

3.25 As there is no official guidance in the UK on how to assess the significance of the air quality impacts of a new development, the approach developed by the IAQM and EPUK (EPUK & IAQM, 2017) has been followed in this assessment. This approach considers the predicted change in air quality, as a result of the development, on existing receptors, taking into account the absolute concentrations in comparison to the objectives (set out in **Table 2-1**). This guidance sets out three stages of assessment:

1) Determine the magnitude of change at each receptor as a percentage of the objective / Limit Value;

2) Describe the impact at each receptor, taking into account the sensitivity of the receptor to changes in concentration (based on the average concentration in the assessment year); and

3) Assess the overall significance.

3.26 The first two steps are set out **Table 3-2.**

Table 3-2: Impact Descriptors for Individual Receptors [a]

Concentration [b]	% Change [c]			
	1[d]	2-5	6-10	>10
≤75% % [e]	Negligible	Negligible	Slight	Moderate
>75% - ≤95% [f]	Negligible	Slight	Moderate	Moderate
>95%-≤102% [g]	Slight	Moderate	Moderate	Substantial
>102%-<110% [h]	Moderate	Moderate	Substantial	Substantial
≥110% [i]	Moderate	Substantial	Substantial	Substantial

[a] Where concentrations increase, the impact is described as adverse and where it decreases, it is described as beneficial.
[b] Long term average concentration at receptor in assessment year
[c] In relation to Objective / Limit Value
[d] % change rounded to nearest whole number. Where the change is 0 (i.e. <0.5) the impact will be Negligible.
[e] NO_2 or PM_{10} annual mean ≤30μg/m³; $PM_{2.5}$ annual mean ≤18.75μg/m³; PM_{10} daily mean ≤24μg/m³ annual mean
[f] NO_2 or PM_{10} annual mean >30-≤38μg/m³; $PM_{2.5}$ annual mean >18.75-≤23.75μg/m³; PM_{10} daily mean >24-≤30.4μg/m³ annual mean
[g] NO_2 or PM_{10} annual mean >38-≤40.8μg/m³; $PM_{2.5}$ annual mean >23.75-≤25.5μg/m³; PM_{10} daily mean >30.4-≤32.64μg/m³ annual mean
[h] NO_2 or PM_{10} annual mean >40.8-≤44μg/m³; $PM_{2.5}$ annual mean >25.5-≤27.5μg/m³; PM_{10} daily mean >32.64-≤35.2μg/m³ annual mean
[i] NO_2 or PM_{10} annual mean >44μg/m³; $PM_{2.5}$ annual mean >27.5μg/m³; PM_{10} daily mean >35.2μg/m³ annual mean

3.27 The assessment of overall significance (step 3) is made based on professional judgement, taking into account factors such as:

- The number of receptors affected by different levels of impacts;
- The magnitude of any changes and descriptors (as identified in stages 1 and 2);
- Whether a new exceedance of an objective or limit value is predicted to arise or an existing exceedance is removed, or an existing exceedance is substantially increased or reduced;
- The level of uncertainty, including the extent to which worst case assumptions have been made; and
- The extent of any exceedance of an objective or limit value.

3.28 When considered at individual receptors, moderate or substantial impacts at individual receptors may be considered significant, and negligible or slight impacts not significant. Consideration of the overall effect on air quality needs to incorporate consideration of impacts as a whole including the extent to which receptors represent sensitive locations and whether this wider impact is significant or not.

Ecology

Screening

3.29 Based on the IAQM guidance (IAQM, 2020) there is a potential for 'significant' effects on ecology as a result of transport emissions in cases where sensitive designated ecological sites are located within 200 m of a road with an affected road where a development alone, or in combination with other committed developments, will increase traffic flows by >1,000 total AADT and / or >200 HDV AADT.

3.30 In cases where committed development traffic is not available and / or the screening criteria referenced by the IAQM guidance is exceeded, then an alternative screening criteria of >50 total AADT and / or >10 HDV AADT for development-generated operational traffic only is commonly used.

3.31 Where it is not possible to screen out significant effects from road sources, detailed modelling and / or additional assessment in conjunction with an ecologist is then generally required.

Site Suitability

Screening

3.32 The potential for exceedances of the relevant objectives at sensitive locations within the proposed development has been screened qualitatively, taking into consideration the location of the Site in relation to nearby emission sources (e.g. local roads), the layout of the proposed development and baseline air quality conditions within the Site and in the surrounding area.

3.33 The potential for significant effects as a result of emissions associated with aircraft using the nearby airport has been assessed using the screening criteria outlined within the LAQM.TG(16) (Defra, 2016). This guidance outlines that there is only a risk of exceedances of the annual mean NO_2 objective as a result of aircraft in instances where all of the below apply:

- There is relevant exposure within 1 km of the airport boundary; AND
- The airport total equivalent passenger throughput is >10 million passengers per annum (mppa) (freight should also be considered, and converted to equivalent mppa using 100,000 tonnes = 1 mppa); AND
- Background annual mean NO_X concentrations are >25 µg/^{m3}.

3.34 Where it is not possible to screen out the potential for significant effects, further assessment may then be required.

Detailed Assessment

3.35 Annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ associated with background and road vehicle emissions have been predicted at the facades of sensitive areas introduced by the proposed development. Predicted concentrations have then been compared against the relevant national objectives (see **Table 2-1** and **Table 2-2**) in order to determine significance.

3.36 Relevant sensitive locations are those where members of the public will be regularly present over the averaging period of the air quality objective(s). For the pollutants of interest in this assessment (i.e. NO_2, PM_{10} and $PM_{2.5}$), sensitive locations include the façades of proposed residential properties (sensitive to the annual mean NO_2, PM_{10} and $PM_{2.5}$ objectives, the 24-hour PM_{10} objective and the 1-hour NO_2 objective). When identifying receptors, particular attention has been paid to locations close to local roads, junctions and crossings where the impact of more than one road link, as well as slow and congested traffic may increase emissions.

3.37 Based on the criteria above, seven existing receptors have been identified as worst-case receptors for assessment. The receptors have been chosen to represent worst-case locations where baseline pollutant concentrations are likely to be highest. The locations of these receptors are shown in **Table 3-3** and **Figure 3-2**.

3.38 In addition, NO_2 concentrations have been modelled at selected local monitoring sites for use in model verification (as described in Paragraph 3.20). Further details of model verification are provided in **Appendix C.**

Table 3-3: Proposed Receptor Locations

Receptor	Description	Coordinates		Height (m) [a]	Approx. No. properties represented
		X	Y		
P1 [b]	Proposed 'worst-case' receptor at the north Site boundary fronting onto Henham Road	553952	226385	1.5	n/a
P2 [b]	Proposed 'worst-case' receptor at the north Site boundary fronting onto Henham Road	553872	226343	1.5	n/a
P3	Façade of proposed property fronting onto Henham Road	553920	226353	1.5	4
P4 [b]	Proposed 'worst-case' receptor at the west Site boundary fronting onto Hall Road	553848	226300	1.5	n/a
P5	Façade of proposed property fronting onto Hall Road	553869	226290	1.5	3
P6 [b]	Proposed 'worst-case' receptor at the west Site boundary fronting onto Hall Road	553887	226245	1.5	n/a
P7	Façade of proposed property fronting onto Hall Road	553899	226244	1.5	14

[a] Receptors have been modelled at a height of 1.5 m to represent ground floor level conditions.

[b] Receptors P1, P2, P4 and P6 are located at the Site boundary (i.e. closest to the road emissions source) and are, therefore, considered to be worst-case receptors in relation to predicted concentrations, being representative of maximum concentrations within the Site (which are likely to be greater than concentrations experienced at nearby proposed residences).

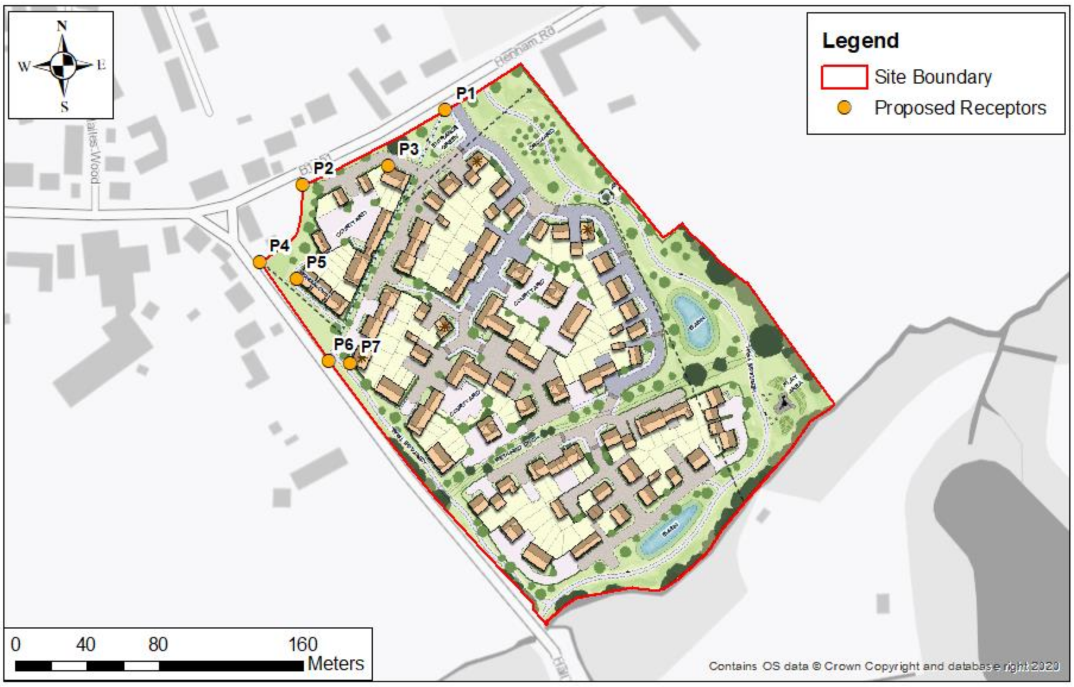

Figure 3-2: Proposed Receptor Locations

Figure includes data taken from GSA (drawing no.: 1669_303_02)

3.39 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the identified receptors have been modelled using the ADMS-Roads dispersion model (v5.0.1) and input data including traffic data provided by ACE, emissions data from Defra's EFT v10.1 (Defra, 2020c) and meteorological data from the Stansted meteorological station (as described in Paragraphs 3.21 to 3.24).

Air Quality Impacts Significance Criteria

3.40 In the absence of official guidance in the UK on how to assess the significance of the air quality impacts on a new development, this assessment has been limited to a comparison of predicted pollutant concentrations within the proposed development, against the relevant objectives (see **Table 2-1** and **Table 2-2**).

Assumptions and Limitations

3.41 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent on the traffic data that have been input which will have inherent uncertainties associated with them.

There is then the uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

3.42 The model relies on meteorological data for 2019 which may not represent conditions in the future, particularly when taking into consideration additional uncertainties introduced as a result of climate change.

3.43 Per-vehicle exhaust emissions are predicted to reduce year-on-year due to technological advances and changes to the vehicle mix such as uptake of Euro VI/6 vehicles as well as Low and Ultra Low emission technology. Whilst there has been uncertainty regarding the accuracy of these predictions in the past, recent evidence (Air Quality Consultants Ltd., 2020) suggests that the current emissions factor predictions reflect real world conditions without the need for a sensitivity test. Additionally, the model has undergone a verification process in order to adjust the model to real-world conditions (i.e. local monitoring). It is, therefore, considered appropriate to use emissions factors as provided by the EFT for this assessment without adjustment beyond appropriate verification.

3.44 It is acknowledged that an updated version of the EFT, EFT v11.0 (Defra, 2021), has recently (November 2021) been released by Defra, however, as there are no changes to NO_X, PM_{10} or $PM_{2.5}$ emission factors that are applicable to the assessment years, the use of EFT v10.1 by this assessment (as opposed to EFT v11.0) will make no difference to the presented model results.

3.45 As emissions in the UK are expected to reduce over time, it is considered a conservative approach to assess the impacts of the proposed development in the earliest year that any part of the development is anticipated to be occupied; i.e. 2025. Since traffic in the UK is generally expected to increase over time, in order to ensure that potential future impacts are considered fully, traffic data relating to 2027 (i.e. when the proposed development will be fully operational) has been used, in conjunction with emissions relating to 2025; this assumption is worst-case and will contribute to an appropriately conservative assessment.

3.46 The earliest year of operation and year of completion for all of the committed developments considered by this assessment are unknown, therefore, the assessment assumes that all committed developments identified are fully operational. This assumptions is worst-case.

3.47 It should be noted that the traffic data used within this assessment and the emissions factors within the EFT are based on assumptions which were current before the occurrence of the Covid-19 pandemic. As such, these data will not reflect any changes that have occurred or may occur in the future as a result of behavioural change caused by the pandemic and / or as a result of measures implemented by governing authorities (e.g. lockdowns, travel restrictions etc.).

4.0 BASELINE CONDITIONS

Site Context and Study Area

4.1 The Site is set within rural surroundings, predominantly consisting of residential properties, agricultural land and some commercial properties. The Site is currently bound to the north by Henham Road (B1051), to the west by Hall Road, to the south by Stansted Brook and to the east by agricultural land. Residential properties are located to the northeast and northwest corners of the Site, as well as beyond Henham Road and Hall Road to the north and west respectively. The Elsenham Church of England Primary School is located approximately 60 m to the west of the Site. The London Stansted airport is located approximately 1.8 km to the south of the Site. The Site currently comprises vacant agricultural land.

4.2 There are several designated ecological sites located in close proximity to the Site, including the 'Alsa Wood' AW located approximately 800 m to the west, the 'Elsenham Woods' SSSI located approximately 1.8 km to the southeast and 1.7 km to the east, the 'Hawland Wood' AW located approximately 2.7 km to the northeast and several areas of AW located approximately 3.5 – 4.4 km to the south of the Site.

4.3 The study area in relation to air quality has been defined as:

- For the construction dust risk assessment, the study area is the area up to 350 m from the Site boundary and up to 50 m of the route(s) used by construction vehicles on the public highway (up to 500 m from the site exit(s));
- For the assessment of the effect of construction and operational development-generated traffic on human health, the study area incorporates all main roads (and adjacent sensitive human receptors) along which vehicles generated by the proposed development may travel;
- For the assessment of the effect of construction and operational development-generated traffic on ecology, the study area incorporates all main roads located within 200 m of a designated ecological site along which vehicles generated by the proposed development may travel, as

well as parts of the designated ecological site located within 200 m of the road; and

- For the assessment of Site suitability, the study area has been identified as the area within the boundary of the Site and sources which will influence this area.

EU Limit Values and Clean Air Zones

4.4 UDC has not been identified by The National Air Quality Plan (Defra and DfT, 2017) as being required to implement a Clean Air Zone / produce a local action plan to address predicted exceedances of the NO_2 EU Limit Value within its area.

4.5 There are no AURN monitoring sites located in close proximity to the Site and, therefore, no exceedances of the EU Limit Values have been measured.

4.6 Defra's PCM model does not predict any exceedances of the NO_2 annual mean EU Limit Value on roads in close proximity to the Site in 2019. No exceedances of the PM_{10} and $PM_{2.5}$ EU Limit Values were predicted on roads in close proximity to the Site in 2018, 2020[8] and 2025.

LAQM

4.7 UDC has assessed air quality within its area as part of its responsibilities under LAQM. There is currently one AQMA declared within the district, the 'UDC AQMA Saffron Walden', which was declared in 2012 as a result of exceedances of the annual mean NO_2 objective. The Site is located approximately 11 km to the south of this AQMA.

Monitoring

4.8 UDC carried out NO_2 monitoring at two automatic and 31 diffusion tube monitoring sites in 2019. The closest and most representative locations are identified in

[8] 2019 data are not available for PM, and so data for 2018 and 2020 have been considered instead.

Figure 4-1 and measured concentrations from 2015 to 2020[9] are shown in **Table 4-1**.

4.9 There were no measured exceedances of the NO_2 annual mean objective at any of the considered monitoring sites between 2015 and 2019. Furthermore, measured concentrations at all monitoring sites were below 60 µg/m^3 between 2015 and 2019, suggesting that exceedances of the 1-hour mean NO_2 objective were not likely during this period at these monitoring sites.

4.10 Overall, a trend of decreasing measured NO_2 concentrations is apparent at diffusion tube monitoring site UT033 from 2016 to 2019. There are insufficient available data to determine a trend at monitoring sites UT018, UT019 and UT020 during this time period.

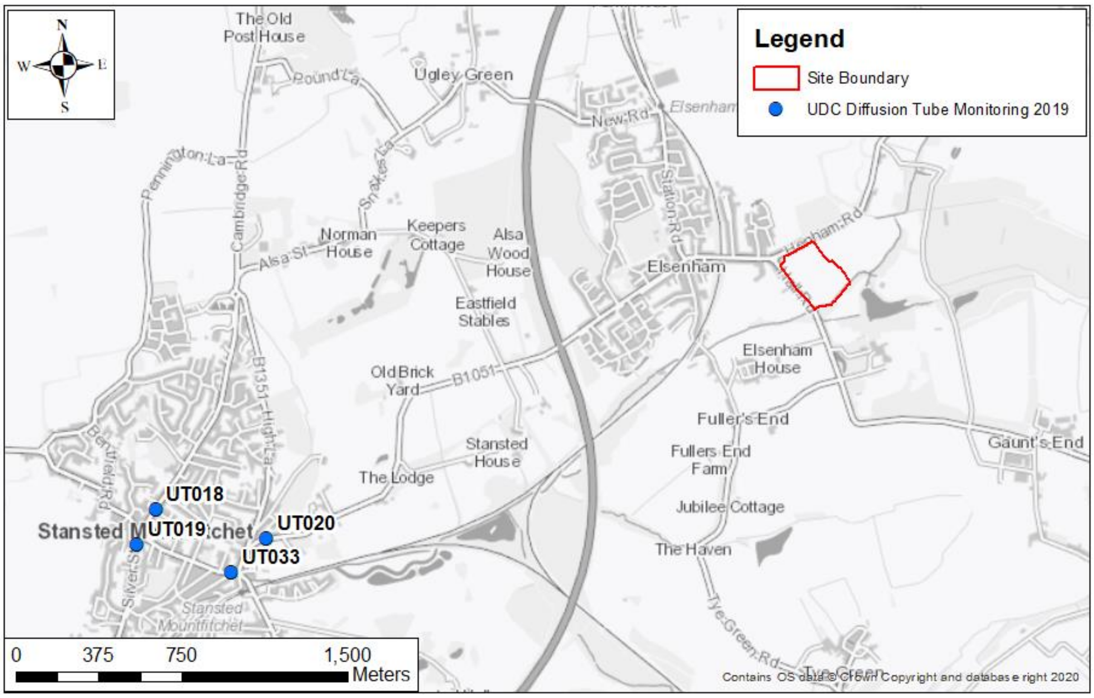

Figure 4-1: Local Monitoring Locations

[9] As a result of the Covid-19 pandemic and associated behavioural changes and measures implemented by the governing authorities (e.g. lockdowns, travel restrictions etc.) measured concentrations during 2020 are not considered to be representative of 'normal' conditions. As such, measured 2020 concentrations are presented for information only, and have not been discussed or given weight in determining the conclusions of this assessment.

Table 4-1: Measured Annual Mean NO_2 Concentrations (µg/m³)

Site ID	Site Name	Site Type	2015	2016	2017	2018	2019	2020
Diffusion Tube Sites								
UT018	17 Cambridge Road, Stansted	Roadside	-*	-*	-*	27	24	19
UT019	Silver Street, Stansted	Roadside	-*	-*	-*	35	32	22
UT020	Grove Hill, Stansted	Roadside	-*	-*	-*	36	31	25
UT033	Chapel Hill, Stansted	Roadside	28	36	27	27	24	18
Objective			**40**					

Exceedances of the annual mean objective are shown in **BOLD.**
Data taken from 2021 Air Quality Annual Status Report (ASR) (UDC, 2021).
*No data available

4.11 UDC also carried out PM_{10} at one automatic site and $PM_{2.5}$ monitoring at two automatic sites in 2019, however, none of these monitoring sites are located in close proximity to the Site.

Predicted Background Concentrations

4.12 Predicted annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for both the 'current'[6] and future[7] year scenarios have been obtained from national maps provided by Defra (Defra, 2020b). The predicted background concentrations are shown in **Table 4-2**.

4.13 The predicted background concentrations are all well below the relevant objectives for both the 'current' and future year scenarios.

Table 4-2: Predicted Annual Mean Background Concentrations (µg/m³)

Year	Location	NO_2	PM_{10}	$PM_{2.5}$
2019	Receptors R1 to R6 and P1 to P7	11	15	10
2025		9	14	9
Objectives		**40**	**40**	**20**

Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the data source as well as the relevant objectives.
The Site overlays two separate Defra background grid squares and, therefore, in order to provide a conservative assessment, the highest pollutant concentrations have been presented with regard to the proposed receptors.

Predicted Baseline Concentrations

4.14 The ADMS-Roads model has been used to predict baseline annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations at each of the existing receptor locations identified in **Table 3-1** and **Figure 3-1** for both the current[6] and future[7] baseline scenarios. The results of these predictions are shown in **Table 4-3**.

4.15 The predicted annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant objectives in both the 'current' and future year scenarios. Furthermore, predicted annual mean concentrations of NO_2 and PM_{10} are below 60 µg/m³ and 32 µg/m³ respectively, indicating that exceedances of the short-term objectives are not likely.

Table 4-3: Predicted Annual Mean Baseline Concentrations (µg/m³)

Receptor	NO_2		PM_{10}		$PM_{2.5}$	
	2019	2025	2019	2025	2019	2025
R1	19	15	16	15	10	10
R2	20	16	16	16	10	10
R3	24	20	17	17	11	10
R4	34	27	18	18	12	11
R5	38	28	19	19	12	12
R6	39	29	19	19	12	11
Objectives	**40**		**40**		**20**	

Exceedances of the objectives are highlighted in **BOLD**.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant objectives.

5.0 PREDICTED IMPACTS

Construction Dust Impacts

Screening Assessment

5.1 The primary potential effects during the construction phase relate to annoyance and loss of amenity caused by dust soiling, health impacts relating to PM_{10} and ecological impacts due to dust deposition. Based on the screening criteria set out by the IAQM, it is considered necessary to carry out a construction dust risk assessment as there are sensitive human receptors located within 350 m of the Site boundary and within 50 m of the roads along which dust may be tracked out by construction vehicles.

5.2 There are no designated ecological sites located within 50 m of the Site boundary and / or roads along which dust may be tracked and, therefore, the assessment of dust deposition on ecological sites can be scoped out.

Further Assessment

Dust Emission Magnitude

5.3 The dust emission magnitude relating to demolition, earthworks and construction activities and as a result of trackout have been determined based on the IAQM guidance (as set out in **Appendix B**).

5.4 There are not anticipated to be any demolition activities associated with the proposed development as the Site currently comprises a vacant agricultural land. The risk of dust emissions associated with demolition activities is, therefore, not considered further.

5.5 Proposed earthworks activities include the excavation for foundations of the proposed development. Works could extend up to approximately 53,500 m^2 (the approximate area of the Site). The soil composition at the northwest area of the Site is deep with a sand to sandy loam texture, with a floodplain sand / gravel subsoil and grains being arenaceous[10] to rudaceous[11] in size (UK Soil Observatory, 2022); this soil composition is considered to have the potential to be slightly to moderately dusty. The soil composition at the southeast area of the Site is deep with a clayey loam to sandy loam texture, with a colluvium subsoil and grains being argillic[12] to arenaceous[10] in size; this soil composition is considered to have the potential to be moderately dusty. The emission magnitude for earthworks activities is therefore considered to be 'large'.

5.6 The proposed development will incorporate the construction of approximately 130 new residential dwellings, with an estimated building volume of between 25,000 and 100,000 m^3 in total. As such, the dust emission magnitude associated with construction activities is considered to be 'medium'.

5.7 The number of vehicles exiting the Site which may track material onto roads during peak construction period will be to be between 10 and 50 HDVs per day. As such, the dust emission magnitude associated with trackout activities is considered to be 'medium'.

Area Sensitivity

5.8 The sensitivity of the area to dust soiling and human health impacts has been assessed based on the criteria shown in **Appendix B**.

5.9 Residential properties are considered to be of 'high' sensitivity to dust soiling impacts. There are between one and 10 residential dwellings located within 20 m of the Site boundary. The sensitivity of the area surrounding the Site to dust soiling impacts is, therefore, considered to be 'medium'.

5.10 The guidance states that trackout can occur on roads up to 500 m from 'large' size sites. As and construction vehicle routing are not currently known, the worst-case assumption has been made that all main roads may be used by HDVs exiting the Site, and that dust and mud may be tracked up to 500 m along these roads from the Site exit(s). There are more than 100 sensitive receptors, including between

[10] Typical grain size between 0.06 and 2.0 mm.

[11] Typical grain size > 2.0 mm.

[12] Typical grain size < 0.06 mm.

10 and 100 residential properties and a school[13], located within 20 m of roads which may be subject to trackout. The sensitivity to dust soiling impacts relating to trackout is, therefore, considered to be 'high'.

5.11 Residential properties are also considered to be of 'high' sensitivity in terms of human health impacts. For the purposes of the construction dust risk assessment, the conservative assumption has been made that annual mean baseline concentrations of PM_{10} at receptors considered by the construction dust risk assessment are comparable to the highest of the modelled current[6] concentrations at any if the identified existing receptors (i.e. 19 µg/m^3 see **Table 5-3**). Taking into account the assumed background PM_{10} concentrations and the number of sensitive receptors located in close proximity to the Site boundary (see Paragraph 5.9) and roads where trackout may occur (see paragraph 5.10), the sensitivity of the surrounding area to human health impacts is, therefore, considered to be 'low' for on-site activities and 'medium' for trackout activities.

Risk of Impacts

5.12 The risk of construction dust impacts, without mitigation, has been assessed based on the tables provided in **Appendix B** and the identified risks are shown in **Table 5-1**.

Table 5-1: Risk of Construction Dust Impacts Without Mitigation

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

5.13 Overall, taking into consideration the risks set out in **Table 5-1**, appropriate mitigation measures corresponding to a 'medium risk' site are required. The recommended list of mitigation measures is set out in **Section 6.0**.

[13] When considering the number of receptors present within affected areas of the Elsenham Church of England Primary School building, the approach of considering each individual within the school as a single receptor has been taken, as this is worst-case and will provide a more conservative assessment.

5.14 The IAQM recommends that no judgement of the significance of demolition and construction dust effects should be made without taking mitigation into account. This is due to the fact that mitigation measures are assumed to be secured by planning conditions and legal requirements as well and construction codes of conduct. Following implementation of the recommended mitigation (as set out in **Section 6.0**), residual impacts will be 'not significant'.

Development-Generated Construction Road Traffic Impacts

Human Health

5.15 The exact average daily volumes of construction traffic generated by the proposed development is not available, however, there is likely to be significant fluctuation in the numbers of vehicle movements associated with proposed development throughout the construction period. When these vehicle movements are averaged over a year, they will be significantly lower than peak movements.

5.16 Volumes of construction traffic generated by the proposed development are anticipated to be lower than volumes of development-generated operational traffic, as this is typically the case for developments of this size and type. This being the case, it is reasonable to expect that impacts associated with emissions from construction vehicles will be less adverse than those described in Paragraphs 5.23 to 5.28.

5.17 It should also be taken into consideration that any impacts associated with the construction phase will be temporary in nature, with the construction phase anticipated to have a maximum duration of four years). Furthermore, it is anticipated that a CEMP will be developed and will include measures to minimise emissions associated with construction vehicles, thus further reducing any potential impacts.

5.18 On the basis of the above, it is considered to be likely that the overall effect of development-generated construction traffic on nearby sensitive existing receptors is likely to be 'not significant'.

Ecology

5.19 As described in Paragraph 5.15, specific details regarding the exact average daily volume and routing of construction traffic generated by the proposed development are not available, however, the average vehicle movements during the construction phase are likely to be significantly lower than peak movements. The volume and routing of construction traffic associated with any committed developments in the local area is also not known.

5.20 It should also be noted that the construction phase will be temporary (with an anticipated duration of approximately four years) and it is anticipated that emissions will be controlled through the implementation of a CEMP.

5.21 On the basis of the above, it is considered to be likely that the overall effect of development-generation construction traffic on nearby sensitive designated ecological sites is likely to be 'not significant'.

Development-Generated Operational Road Traffic Impacts

Human Health

Screening Assessment

5.22 The proposed development will generate a total of 783 AADT (comprising 6 HDV AADT) during the operational phase which will result in an increase of >500 AADT on Henham Road, between the Site access and the junction with Hall Road and High Street. As such, it is not possible to screen out the potential for significant effects on this stretch of road based on the IAQM/EPUK screening criteria (see Paragraphs 3.14 to 3.16) and, and a detailed assessment is, therefore, required and has been undertaken.

Detailed Assessment

5.23 Annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at existing receptors in 2025, both with and without the proposed development in place. The identified receptors are described in **Table 3-1** and shown in **Figure 3-1**. Predicted concentrations, the proportional change relevant to the applicable objective and the impact at each receptor are presented in **Table 5-2**, **Table 5-3** and **Table 5-4**, for NO_2, PM_{10} and $PM_{2.5}$, respectively.

Table 5-2: Predicted Annual Mean Concentrations of NO_2 ($\mu g/m^3$), % Change and Impact at each Existing Receptor

Receptor	2025 Without Development	2025 With Development	Change (%)	Impact
R1	15	15	1	Negligible
R2	16	16	1	Negligible
R3	20	20	2	Negligible
R4	27	28	2	Negligible
R5 [b]	28	29	1	Negligible
R6	29	29	1	Negligible
Objective	**40**		**-**	

Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources.

[a] Only the 1-hour mean NO_2 objective is applicable at this receptor, therefore, annual mean predicted concentrations are presented for comparison to the proxy 1-hour mean NO_2 objective of 60 $\mu g/m^3$ only.

Table 5-3: Predicted Annual Mean Concentrations of PM_{10} ($\mu g/m^3$), % Change and Impact at each Existing Receptor

Receptor	2025 Without Development	2025 With Development	Change (%)	Impact
R1	15	16	0	Negligible
R2	16	16	0	Negligible
R3	17	17	0	Negligible
R4	18	18	1	Negligible
R6	19	19	0	Negligible
Objective	**40**		**-**	

Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources.
Predicted concentrations are shown for receptors applicable to the annual mean PM_{10} objective only. Predicted concentrations of annual mean PM_{10} are not applicable at receptor R5 and, therefore, has not been presented.

Table 5-4: Predicted Annual Mean Concentrations of $PM_{2.5}$ ($\mu g/m^3$), % Change and Impact at each Existing Receptor

Receptor	2025 Without Development	2025 With Development	Change (%)	Impact
R1	10	10	0	Negligible
R2	10	10	0	Negligible
R3	10	10	1	Negligible
R4	11	11	1	Negligible
R6	12	12	0	Negligible
Objective	**40**		-	

Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources.
Predicted concentrations are shown for receptors applicable to the annual mean PM_{10} objective only. Predicted concentrations of annual mean PM_{10} are not applicable at receptor R5 and, therefore, has not been presented.

5.24 The predicted annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations in 2025, both without and with the proposed development in place, are well below the relevant objectives at all existing receptor locations. Furthermore, predicted annual mean concentrations of NO_2 and PM_{10} are below 60 $\mu g/m^3$ and 32 $\mu g/m^3$ respectively, indicating that exceedances of the short-term objectives for NO_2 and PM_{10} are not likely.

5.25 The predicted changes in annual mean NO_2 concentrations (and 1-hour mean NO_2 concentrations where applicable), when rounded to the nearest whole number, are 1% at four receptors and 2% at two receptors. Using the criteria set out in **Table 3-2**, these impacts are described as being 'negligible' at all receptors.

5.26 The predicted changes in annual mean PM_{10} concentrations, when rounded to the nearest whole number, are 1% at one receptor and 0% at four receptors. Using the criteria set out in **Table 3-2**, PM_{10} impacts are considered to be 'negligible' at all receptors.

5.27 The predicted changes in $PM_{2.5}$ concentrations, when rounded to the nearest whole number, are 1% at two receptors and 0% at three receptors. Using the criteria set out in **Table 3-2**, $PM_{2.5}$ impacts are considered to be 'negligible' at all receptors.

5.28 The overall effect on existing receptors has been considered, taking into account the following factors:

- The impacts at individual modelled receptors;
- The number of receptors represented by each modelled receptor;
- The assumptions and limitations of the model, including any conservative / worst-case assumptions;
- The predicted concentrations and how close these are to the relevant objectives; and
- The potential for any change to impact on an existing AQMA and / or to result in the declaration or extension of an AQMA.

5.29 Based on the above, the overall effect of operational road traffic generated by the proposed development on local air quality is considered to be 'not significant'.

Ecology

Screening Assessment

5.30 The 'Elsenham Woods' SSSI, the Eastend Wood AW, 'Hawland Wood' AW and several areas of AW to the south of the Site are located within 200 m of roads along which development-generated operational traffic is anticipated to travel.

5.31 The combined proposed development and nearby committed developments are anticipated to generate 3,037 total AADT (comprising 21 HDV AADT)[14] that will travel along Henham Road within 200 m of the 'Hawland Wood' AW during the operational phase. As such, the combined committed traffic generation is anticipated to be above the IAQM screening criteria (see Paragraph 0). However, taking into consideration the low volume of operational traffic anticipated to be generated by the proposed development in isolation (i.e. 47 total AADT, comprising 0 HDV AADT)[14], it is reasonable to screen out the potential for significant effects based on the alternative screening criteria (see Paragraph 3.30).

[14] Traffic data have been provided by the project's transport consultant; ACE.

5.32 The combined proposed development and nearby committed developments are anticipated to generate 2,509 total AADT (comprising 17 HDV AADT)[14] that will travel along Hall Road within 200 m of the 'Elsenham Woods' SSSI / Eastend Wood AW during the operational phase. As such, the combined committed traffic generation is anticipated to be above the IAQM screening criteria (see Paragraph 0). Furthermore, the proposed development in isolation is anticipated to generate 349 total AADT (comprising 2 HDV AADT) along Hall Road within 200 m of the 'Elsenham Woods' SSSI / Eastend Wood AW during the operational phase. As such, the proposed development-generated traffic alone is also anticipated to be above the alternative screening criteria (see Paragraph 3.30). An Air Quality Ecology Modelling Technical Note has been produced to further consider the potential for significant effects at the 'Elsenham Woods' SSSI / 'Eastend Wood' AW (see **Appendix E**). The conclusions of this Technical Note supersede any conclusions made within the AQA regarding impacts on the 'Elsenham Woods' SSSI / 'Eastend wood' AW.

5.33 The exact volumes of operational traffic that are expected to pass in close proximity to the areas of AW to the south of the Site are unknown, however, they are likely to be similar to volumes travelling within 200 m of the 'Elsenham Woods' SSSI / Eastend Wood AW. As such, it is also not possible to screen out the potential for significant effects at these ecological sites. An Air Quality Ecology Modelling Technical Note has been produced to further consider the potential for significant effects at the 'Elsenham Woods' SSSI / 'Eastend Wood' AW and areas of AW to the south of the Site (see **Appendix E**). The conclusions of this Technical Note supersede any conclusions made within the AQA regarding impacts on the areas of AW to the south of the Site.

5.34 Taking into consideration the above, it is possible to screen out the potential for significant effects at the 'Hawland Wood' AW as a result of development-generated operational traffic as being 'not significant'. However, it is not possible to screen out the potential for significant effects at the 'Elsenham Woods' SSSI / Eastend Wood AW and areas of AW to the south of the Site as a result of development-generated operational traffic without further detailed assessment and potentially also the input of an ecologist.

Site Suitability

Screening Assessment

5.35 The proposed development will introduce new areas of sensitive exposure which are sensitive to the annual mean and short-term NO_2, PM_{10} and $PM_{2.5}$ objectives (i.e. the proposed residences). These sensitive introduced receptors are located in close proximity to nearby emissions sources (i.e. Henham Road (B105) and Hall Road). As such, it is not possible to screen out the potential for significant effects on new residents of the proposed development and, therefore, a detailed assessment has been undertaken.

Airport Screening Assessment

5.36 The total equivalent passenger throughput for London Stansted Airport was approximately 28 million passengers per annum (mppa) in 2019 (UK Civil Aviation Authority, 2019). However, the proposed development is located approximately 1.8 km to the north of the Stansted airport boundary (i.e. >1 km from the airport boundary) and background annual mean concentrations of NO_X within the Site are predicted to be <25 µg/m³ by the earliest proposed year of operation (i.e. 2025) (see **Table 4-2**). As such, according to the screening criteria set out in LAQM.TG(16) (Defra, 2016) (see Paragraph 3.33), it is possible to screen out the potential risk of exceeding the annual mean NO_2 objective as a result of emissions associated with aircraft.

Detailed Assessment

5.37 Predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2025 at modelled receptor locations (as identified in **Table 3-3** and **Figure 3-2**) are presented in **Table 5-5**.

Table 5-5: Predicted Annual Mean Concentrations at Proposed Receptors within the Site (µg/m³) (2025)

Receptor	NO_2	PM_{10}	$PM_{2.5}$
P1	16	16	10
P2	20	17	10
P3	13	15	9
P4	17	16	10
P5	13	15	9

P6	18	16	10
P7	14	15	9
Objectives	**40**	**40**	**20**

Predicted concentrations are rounded to zero decimal places taking into consideration the level of accuracy of the model and data sources.

5.38 Predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2025 are well below the annual mean objectives at all proposed receptors. Furthermore, predicted annual mean concentrations of NO_2 and PM_{10} fall below 60 $\mu g/m^3$ and 32 $\mu g/m^3$ respectively at all receptors, indicating that exceedances of the short-term NO_2 and PM_{10} objectives are not likely to occur at these locations.

5.39 Based on the predicted concentrations of pollutants in relation to the relevant objectives, it is considered that future residents of the proposed development will experience good air quality and, therefore, that the Site is suitable for the proposed end-use.

6.0 MITIGATION

Construction Dust

6.1 The following standard mitigation measures have been identified as being appropriate for a 'medium risk' site, (see **Table 5-1**). This is based on the recommendations within the IAQM's 'Guidance on the assessment of dust from demolition and construction' (IAQM, 2014).

6.2 A Dust Management Plan (DMP) should be submitted to UDC prior to works commencing on site.

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; and
- Display the head or regional office contact information.

Dust Management

- Develop and implement a DMP, which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} 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; and

- Record any exceptional incidents that cause dust and/or air quality pollutant emissions, either on- or off- site, and the action taken to resolve the situation in the log book.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary;

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked;

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and

- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Preparing and maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;

- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;

- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives 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; and
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate);
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;

- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- 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.

Earthworks

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

Construction

- Avoid scabbling (roughening of concrete surfaces) if possible;
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and

- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site 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 to 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; and
- Access gates to be located at least 10 m from receptors where possible.

Development-Generated Traffic Impacts

Construction Traffic

6.3 The overall effects, without mitigation, of construction traffic generated by the proposed development during the construction phase on existing sensitive human and ecological receptors are likely to be ‘not significant’. Therefore, no further mitigation measures are considered to be necessary.

Operational Traffic

Human Health

6.4 The overall effects, without mitigation, of operational traffic generated by the proposed development on existing sensitive human receptors will be 'not significant'. Therefore, no further mitigation is considered to be necessary.

Ecology

6.5 The overall effects, without mitigation, of operational traffic generated by the proposed development on the 'Hawland Wood' AW will be 'not significant'. Therefore, no further mitigation is considered to be necessary to prevent significant effects at this ecological site.

6.6 It is currently not possible to screen out the potential for overall 'significant' effects at the 'Elsenham Woods' SSSI / Eastend Wood AW and areas of AW to the south of the Site. As such, a further detailed assessment has been undertaken, including consideration of the potential need for mitigation measures (see **Appendix E**). The conclusions of this Technical Note supersede any conclusions made within the AQA regarding impacts on the 'Elsenham Woods' SSSI / 'Eastend wood' AW and areas of AQ to the south of the Site.

Site Suitability

6.7 Concentrations of pollutants at sensitive receptors within the proposed development are predicted to be well below the relevant objectives by the earliest year of operation. Therefore, air quality for future residents is considered to be good and no additional mitigation is recommended as being necessary.

7.0 CONCLUSIONS

7.1 The potential air quality impacts associated with the proposed development at Land south of Henham Road, Elsenham in UDC have been assessed.

7.2 There is the potential for dust and PM_{10} impacts during the construction phase. However, with the proposed mitigation measures in place, the overall residual effect will be 'not significant'.

7.3 Taking into consideration anticipated volumes of construction traffic, the maximum duration of the construction phase and the anticipated implementation of a CEMP, it is judged that the overall effect of emissions from development-generated construction traffic on existing sensitive human and ecological receptors is likely to be 'not significant'.

7.4 The impacts of operational traffic generation associated with the proposed development on nearby existing sensitive human receptors has been considered, with modelling of pollutant concentrations having been undertaken at worst-case locations. Predicted changes in concentrations as a result of operational development-generated traffic are 'negligible' at all receptors and do not result in any exceedances of the relevant objectives. As such, the overall effect of operational development-generated traffic on nearby existing sensitive human receptors will be 'not significant'.

7.5 The impacts of operational traffic generation associated with the proposed development on nearby designated ecological sites have been considered. It is possible to screen out the potential for significant impacts at the 'Hawland Wood' AQ, but not the 'Elsenham Woods' SSSI / 'Eastend Wood' AW and areas of AW to the south of the Site. As such, a further detailed assessment has been undertaken in the form of a Air Quality Detailed Ecological Modelling Technical Note (see **Appendix E**); the conclusions of this Technical Note supersede any conclusions made within the AQA regarding impacts on the 'Elsenham Woods' SSSI / 'Eastend wood' AW and areas of AQ to the south of the Site.

7.6 The impact of local air quality on future residents of the proposed development has been considered, with modelling of pollutant concentrations having been undertaken at sensitive receptors within the proposed development.

Concentrations of pollutants at sensitive locations within the proposed development are predicted to be well below the relevant objectives. As such, it is judged that future residents of the proposed development will experience good air quality and that the Site is suitable for its proposed end-use without mitigation.

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Appendix A Glossary

Abbreviations	Meaning
AADT	Annual Average Daily Traffic
ACE	Ardent Consulting Engineers
ADMS	Air Dispersion Modelling System
AQAP	Air Quality Action Plan
AQA	Air Quality Assessment
AQMA	Air Quality Management Area
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
AW	Ancient Woodland
BST	British Summer Time
CAZ	Clean Air Zone
CEMP	Construction Environmental Management Plan
CROW Act	Countryside and Rights of Way Act
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Diffusion Tube	A passive sampler used for collecting NO_2 in the air
DMP	Dust Management Plan
EC	European Commission
EEA	European Environment Agency
EEC	European Economic Community
EFT	Emission Factor Toolkit
EMEP	European Monitoring and Evaluation Programme
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes, includes Heavy Goods Vehicles and buses
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle; a vehicle with a gross vehicle weight equal to or less than 3.5 tonnes, includes Light Goods Vehicles, cars and motorbikes
LGV	Light Goods Vehicle
NAEI	National Atmospheric Emissions Inventory
NAQO	National Air Quality Objective as set out in Air Quality Strategy and the Air Quality Regulations

Abbreviations	Meaning
NH_3	Ammonia
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides, generally considered to be nitric oxide and NO_2. The main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles and natural gas used in gas-fired boilers.
NPPF	National Planning Policy Framework
NRMM	Non-road mobile machinery
PCM	Pollution Climate Mapping
PM_{10} or $PM_{2.5}$	Small airborne particles less than 10/2.5 µg in diameter
PPG	Planning Practice Guidance
Receptor	A location where the effects of pollution may occur
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TfL	Transport for London
ULEV	Ultra-Low Emission Vehicle

Appendix B IAQM Dust Assessment Approach

B1 Step 1: Screen the need for an assessment

B1.1 Step 1 is the screen the need for an assessment against the following criteria:

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

B1.2 Where there are no sensitive receptors within these distances, it can be concluded that the impact is negligible and no further assessment relating to construction dust impacts is required.

B2 Step 2: Assess the risk of dust impacts

B2.1 The risk of dust at sufficient quantum to cause annoyance/health/ecological impacts should be based on:

- The scale and nature of the works (potential dust emission magnitude) (**Table B.1**); and
- The sensitivity of the area to dust impacts based on the matrices shown in **Table B.2** and **Table B.3**.

B2.2 These factors are then combined to determine the risk of dust impacts without mitigation applied for each of the four activities (Demolition, Earthworks, Construction and Trackout) following the matrices shown in **Table B.4**, **Table B.5** and **Table B.6**.

Table B.1: Potential Dust Emission Magnitude

Size	Definition
Demolition	
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level.
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. Concrete), on-site crushing and screening, demolition activities >20 m above ground level.
Earthworks	
Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes earthworks during wetter months.
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height.
Construction	
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.
Large	Total building volume >100, 000 m^3, on site concrete batching, sandblasting.
Trackout	
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.

Table B.2: Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Table B.3: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<350
High	>32 µg/m³ [a]	>100	High	High	High	Low
		10-100	High	High	Medium	Low
		<10	High	Medium	Low	Low
	28-32 µg/m³ [b]	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		<10	High	Medium	Low	Low
	24-28 µg/m³ [c]	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		<10	Medium	Low	Low	Low
	<24 µg/m³ [d]	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		<10	Low	Low	Low	Low
Medium	>32 µg/m³ [a]	>100	High	Medium	Low	Low
		10-100	Medium	Low	Low	Low
		<10	Medium	Low	Low	Low
	28-32 µg/m³ [b]	>100	Low	Low	Low	Low
		10-100	Low	Low	Low	Low
		<10	Low	Low	Low	Low
	24-28 µg/m³ [c]	>100	Low	Low	Low	Low
		10-100	Low	Low	Low	Low
		<10	Low	Low	Low	Low
	<24 µg/m³ [d]	>100	Low	Low	Low	Low
		10-100	Low	Low	Low	Low
		<10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

Table B.4: Risk of Impacts – Demolition

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

Table B.5: Risk of Impacts – Earthworks and Construction

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

Table B.6: Risk of Impacts – Trackout

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

B3 Step 3: Site-specific Mitigation

B3.1 Based on the outcome of Step 2, appropriate mitigation measures are recommended. The guidance includes a list of mitigation measures for Low, Medium and High Risk sites but final recommendations should be based on professional judgement and take into account particular site sensitivities and differences in risk for different activities or areas of the site. The mitigation recommended in the guidance are shown in **Table C.7**.

Table B.7: Mitigation Measures

Mitigation Measure	Low Risk	Medium Risk	High Risk
Communications			
1. Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	N	H	H
2. 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.	H	H	H
3. Display the head or regional office contact information.	H	H	H
Dust Management			
4. Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	D	H	H
Site Management			
5. Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H	H	H
6. Make the complaints log available to the local authority when asked.	H	H	H
7. 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.	H	H	H
8. Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.	N	N	H
Monitoring			
9. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	D	D	H

Mitigation Measure	Low Risk	Medium Risk	High Risk
10. Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	H	H	H
11. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H	H	H
12. Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	N	H	H
Preparing and maintaining the site			
13. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H	H	H
14. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H	H	H
15. Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	D	H	H
16. Avoid site runoff of water or mud.	H	H	H
17. Keep site fencing, barriers and scaffolding clean using wet methods.	D	H	H
18. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	D	H	H
19. Cover, seed or fence stockpiles to prevent wind whipping.	D	H	H
Operating vehicle/machinery and sustainable travel			
20. Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.	H	H	H
21. Ensure all vehicles switch off engines when stationary - no idling vehicles.	H	H	H
22. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H	H	H
23. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	D	D	H

Mitigation Measure	Low Risk	Medium Risk	High Risk
24. Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	N	H	H
25. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	N	D	H
Operations			
26. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	H	H	H
27. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H	H	H
28. Use enclosed chutes and conveyors and covered skips.	H	H	H
29. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H	H	H
30. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	D	H	H
Waste Management			
31. Avoid bonfires and burning of waste materials.	H	H	H
Demolition			
32. Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	D	D	H
33. Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	H	H	H
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	H	H	H
35. Bag and remove any biological debris or damp down such material before demolition.	H	H	H
Earthworks			
36. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	N	D	H
37. Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	N	D	H

Mitigation Measure	Low Risk	Medium Risk	High Risk
38. Only remove the cover in small areas during work and not all at once.	N	D	H
Construction			
39. Avoid scabbling (roughening of concrete surfaces) if possible.	D	D	H
40. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	D	H	H
41. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	N	D	H
42. For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	N	D	D
Trackout			
43. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	D	H	H
44. Avoid dry sweeping of large areas.	D	H	H
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D	H	H
46. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	N	H	H
47. Record all inspections of haul routes and any subsequent action in a site log book.	D	H	H
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	N	H	H
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D	H	H
50. Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	N	H	H
51. Access gates to be located at least 10 m from receptors where possible.	N	H	H

(H = Highly Recommended, D = Desirable and N = Not Recommended)

B4 Step 4: Determine Significant Effects

B4.1 Recommended mitigation measures should be sufficient to ensure that the impact is normally 'not significant'. There may at times be limitations to appropriate mitigation measures (such as a lack of water) and therefore, an assessment should always be made based on the characteristic of each site and the surrounding area.

B5 Step 5: Dust Assessment Report

B5.1 The dust assessment report should include enough detail to ensure that the basis for the determination of emission magnitude and sensitivity of the area, and therefore the site risk, are clear. The required mitigation so also be set out within the report, along with a description of the mechanism that will ensure that the appropriate level of mitigation will be implemented (such as through a planning condition).

Appendix C Road Model Inputs and Results Processing

C1 Model Inputs and Results Processing Tools

Model Version	ADMS-Roads v5.0.1, February 2022
Street Canyons	The ADMS Advanced Street Canyon Module was used to represent the effect of reduced dispersion and recirculating pollutants in street canyons. The canyons are shown in **Appendix D**.
British Summer Time (BST)	Adjustment for BST was made within the model, based on the following dates and times: BS BST begins – 01:00 on 31/03/2019 BST ends – 02:00 on 27/10/2019
Emission Factor Toolkit (EFT)	V10.1, August 2020 **(Defra, 2020c)**
Time Varying Emissions Factors	Based on Department for Transport (DfT) statistics, Table TRA0307: Motor Vehicle Traffic Distributed by Time of Day and Day of the Week on all roads, Great Britain:2019.
Meteorological Data	2019 hourly meteorological data from the Stansted Airport has been used in the model. The wind rose is shown in **Figure C.1**.
Latitude	51.5°
Surface Roughness	A value of 0.3 for 'Agricultural areas (max)' was used to represent the modelled area. A value of 0.05 was used to represent the meteorological station site.

Minimum Monin-Obukhov Length	A value of 10 for 'Small towns <50,000' was used to represent the modelled area. A value of 22.568 was used to represent the meteorological station site.
Surface Albedo	A value of 0.23 (default) was used to represent the modelled area. A value of 0.203 was used to represent the meteorological station site.
NO_x to NO_2 conversion	NO_2 from NO_x calculator version 8.1 **(Defra, 2020d)**
Background Maps	2018 reference year background maps **(Defra, 2020b)**

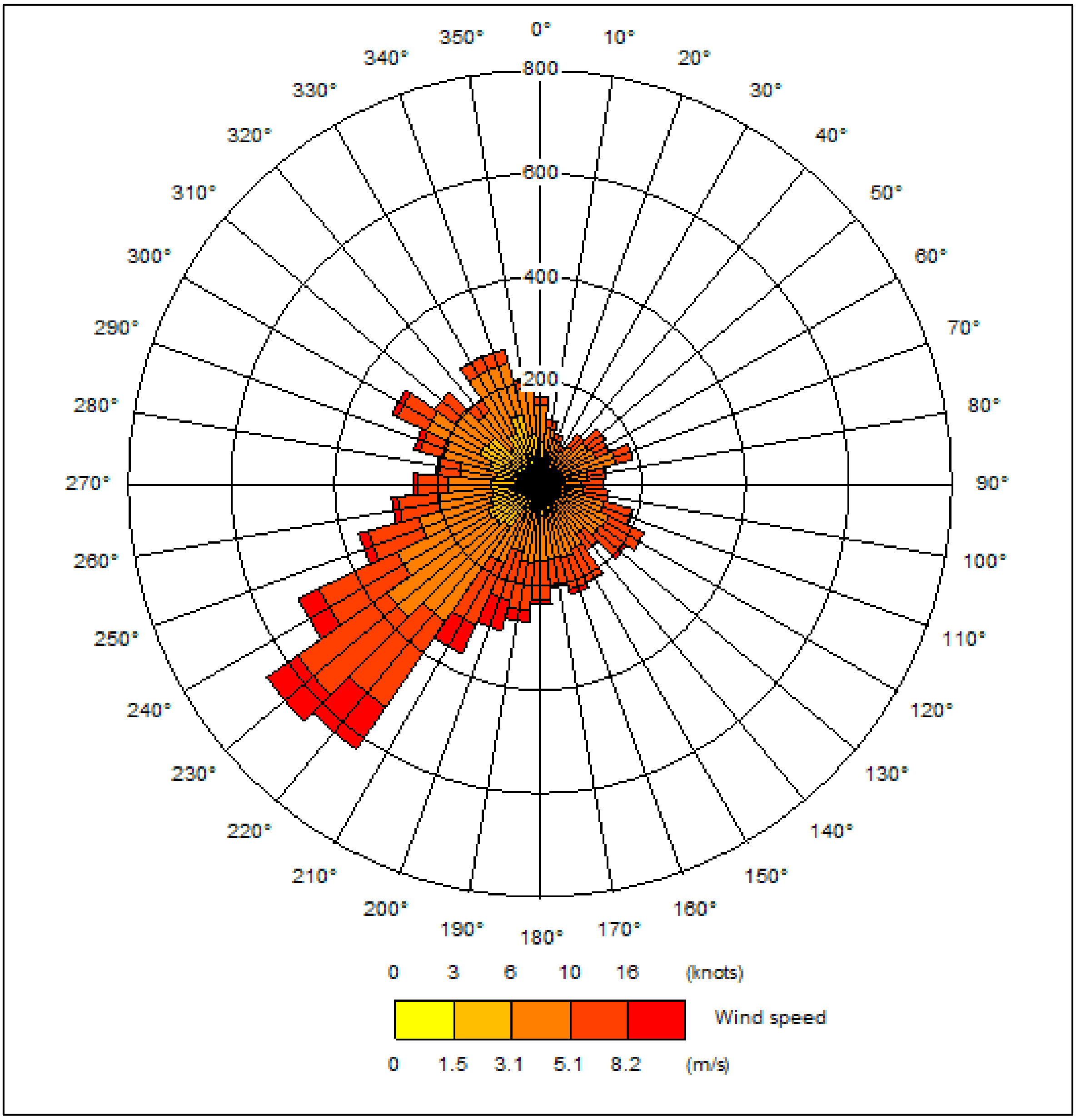

Figure C.1: 2019 Stansted Airport Wind Rose

C2 Verification

Nitrogen Dioxide

C2.1 Most nitrogen dioxide (NO_2) is produced in the atmosphere by a reaction between nitric oxide (NO) and ozone. It is, therefore, most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides (NO_x) (i.e. NO_x = NO + NO_2). The model has been run to predict the annual mean road-NO_x contribution in 2019 at the UT020 diffusion tube monitoring site (see **Figure 4-1** and **Table 4-1**). Concentrations at monitoring site UT020 have been modelled at a height of 2.2 m.

C2.2 The choice of appropriate monitoring sites for verification has been based on:

- Appropriateness of site (roadside rather than background sites, presence of additional emission sources etc.);
- Distance from study area;
- Availability of traffic data for modelling; and
- Data capture (monitoring site UT020 recorded 91.7% data capture respectively in 2019).

C2.3 Annual mean background NO_2 concentrations at the UT020 monitoring site used for verification purposes have been predicted as described in Paragraphs 4.12 to 4.13, and are presented in **Table D.3** below. Predicted annual mean concentrations have then been used for further verification calculations (including within the NO_x from NO_2 calculator).

Table C.1: Predicted 2019 Annual Mean Background Concentrations (μg/m^3)

Year	Location	NO_x	NO_2
2019	UT020 (551535, 225065)	14	11

Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the data source.

C2.4 'Measured' road-NO_x was calculated by subtracting calibrated background NO_2 from measured NO_2 within the NO_x from NO_2 calculator. The model output of road-NO_x was then compared with this 'measured' road-NO_x, using the following calculation:

'Measured' road-NO_x (38.9) / Modelled road-NO_x (13.3) = **NO_x verification factor (2.932)**

PM_{10} and $PM_{2.5}$

C2.5 There are no suitable PM_{10} or $PM_{2.5}$ monitoring sites located in close proximity to the development Site. Therefore, the primary adjustment factor calculated for road-NO_x concentrations has been applied to the modelled road-PM_{10} and road-$PM_{2.5}$ concentrations.

Appendix D Traffic Data and Road Network

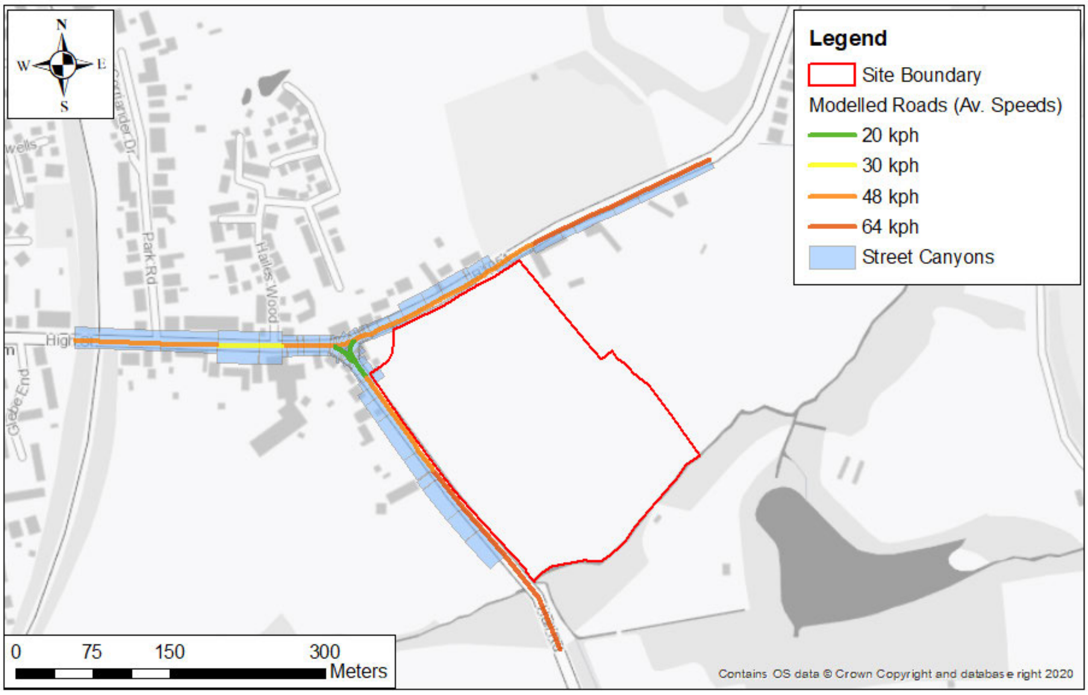

Figure D.1: Modelled Study Area Road Network (inc. Average Speeds (kph) and Modelled Street Canyons)

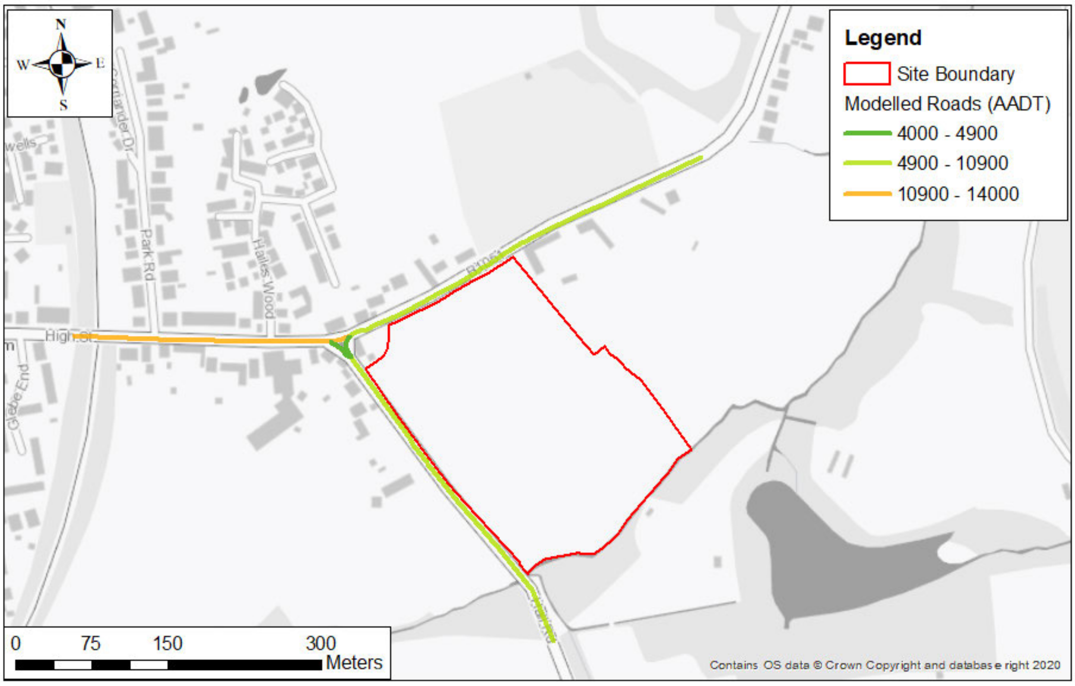

Figure D.2: Modelled Study Area – AADT (2027 'With Scheme' Scenario)

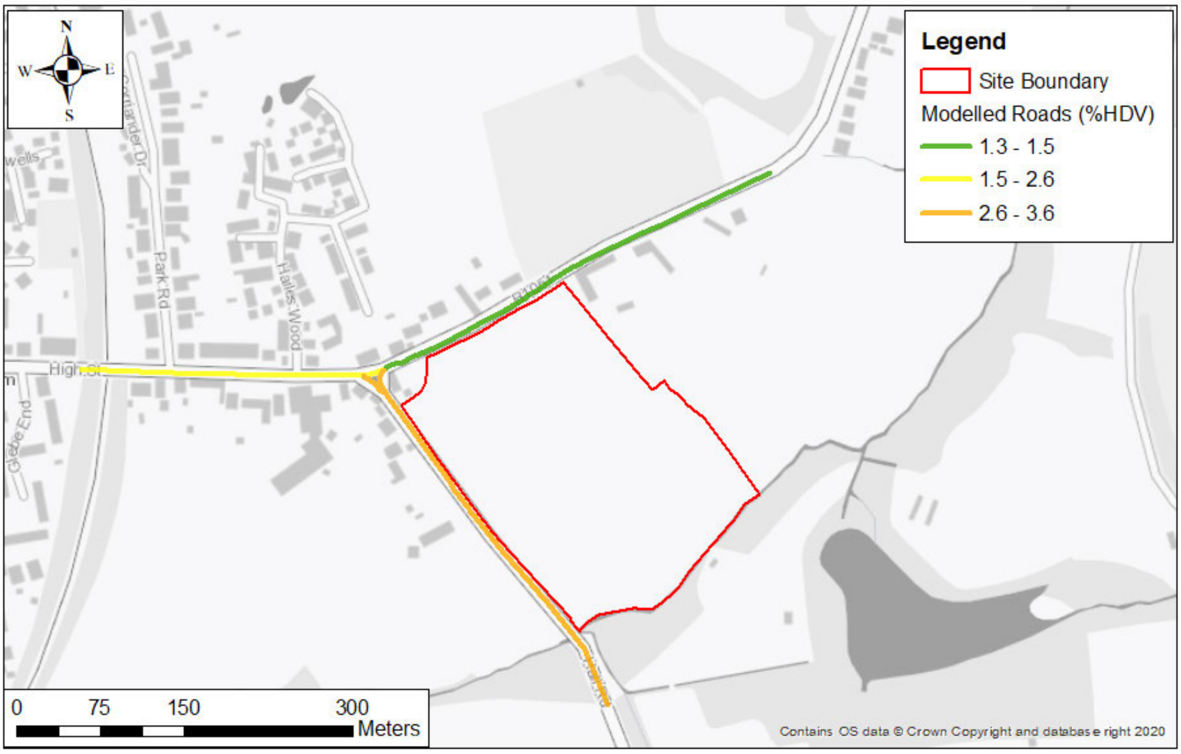

Figure D.3: Modelled Study Area - %HDV (2027 'With Scheme' Scenario)

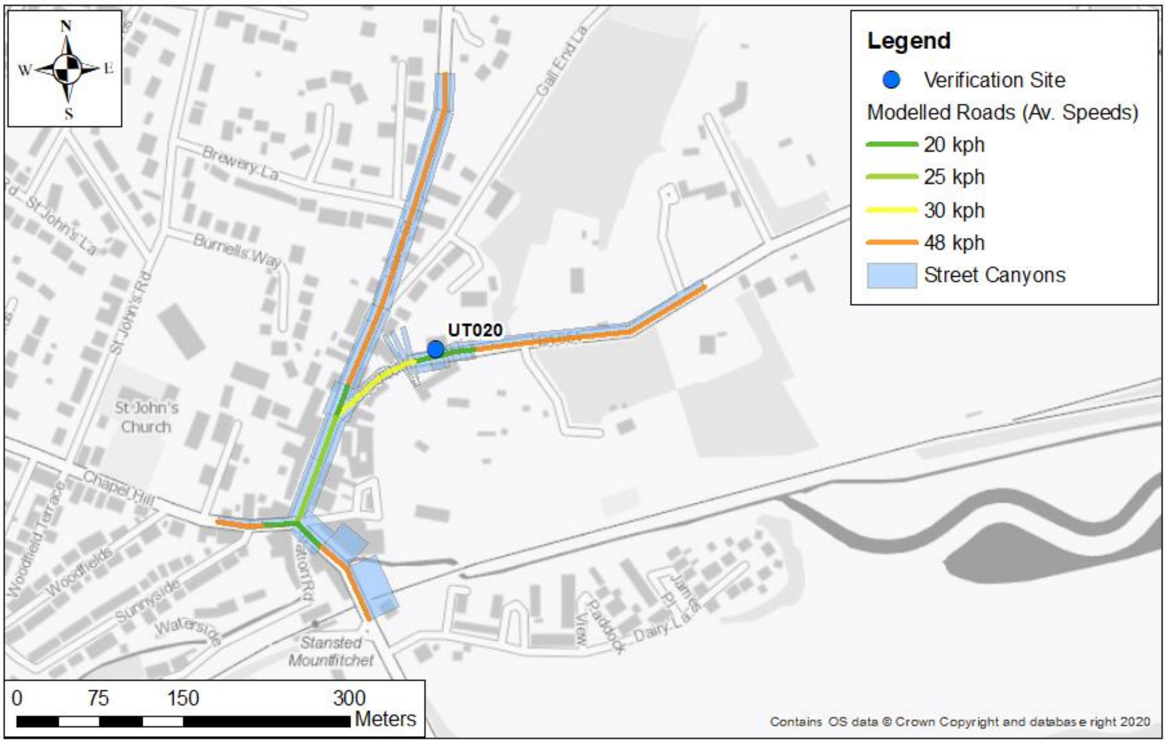

Figure D.4: Modelled Verification Road Network (inc. Average Speeds (kph) and Modelled Street Canyons)

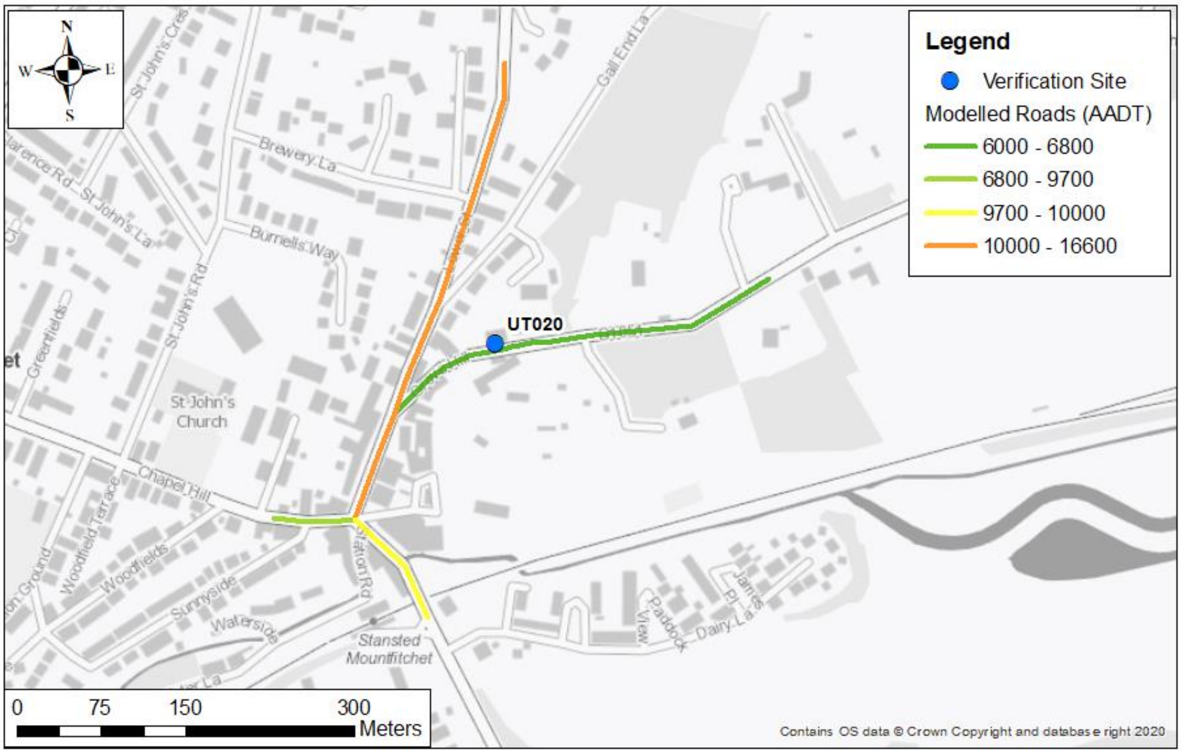

Figure D.5: Modelled Verification Area Road Network - AADT (2019)

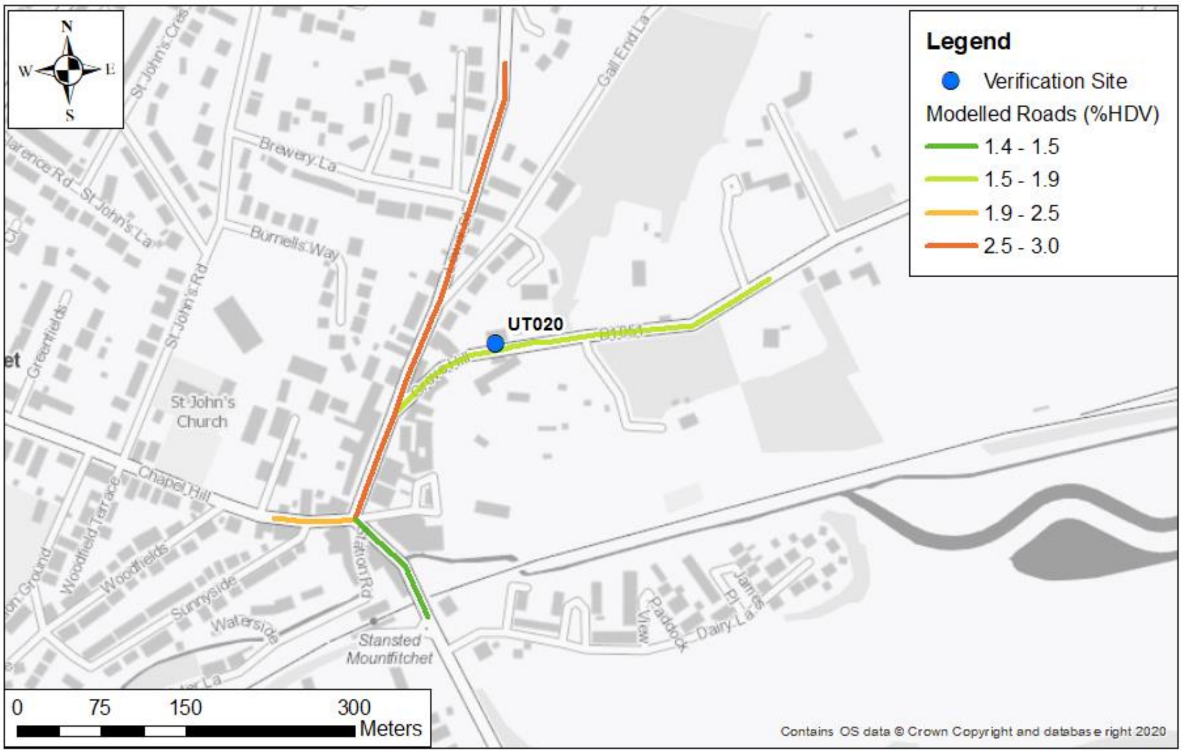

Figure D.6: Modelled Verification Road Network – HDV% (2019)

Appendix E Air Quality Ecology Modelling Technical Note

ARDENT
CONSULTING ENGINEERS

COUNTRYSIDE PROPERTIES (UK) LIMITED

LAND SOUTH OF HENHAM ROAD, ELSENHAM

AIR QUALITY DETAILED ECOLOGICAL ASSESSMENT TECHNICAL NOTE

REPORT REF - 2008170-09

JULY 2022

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DOCUMENT CONTROL SHEET

REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
-	Draft	ET	NH	-	27/07/2022
-	Final	ET	[redacted]		28/07/2022

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1.0 INTRODUCTION

Proposed Development

1.1 Ardent Consulting Engineers (ACE) have been commissioned by Countryside Properties (UK) Limited to produce an Air Quality Detailed Ecological Assessment Technical Note in support of a planning application for a proposed residential development at Land south of Henham Road, Elsenham located within the Uttlesford District Council (UDC) area.

1.2 The proposal includes the construction of a new development comprising approximately 130 residential dwellings with associated parking and landscaping.

1.3 This document is designed to supplement the main Air Quality Assessment (AQA) undertaken by ACE (ACE, 2022). The AQA concluded that is not possible to screen out the potential for significant effects on the 'Elsenham Woods' Site of Special Scientific Interest (SSSI) / 'Eastend Wood' Ancient Woodland (AW) designated ecological site and several areas of AW located approximately 3.5 – 4.4 km to the south of the Site without further detailed assessment (including atmospheric dispersion modelling).

Scope

1.4 This report describes existing and future baseline air quality and quantifies process contributions (PCs) associated with operational traffic generated by the proposed development (both in isolation and in combination with nearby committed developments) at sensitive locations within the 'Elsenham Woods' SSSI / 'Eastend Wood' AW designated ecological sites and provides context for and an initial interpretation of results.

1.5 The air pollutants of concern during the operational phase are nitrogen oxides (NO_x) and ammonia (NH_3) concentrations and acid and nutrient nitrogen deposition.

1.6 This Technical Note has been prepared taking into account relevant local and national guidance, policy and legislation.

2.0 LEGISLATION, POLICY AND GUIDANCE

European and National Air Quality Legislation

2.1 An overview of relevant policy and guidance that are directly applicable to this Technical Note is set out below.

Critical Levels

2.2 Critical levels have been set for a number of gaseous pollutants. These are the concentrations of pollutants below which there is no known harmful effects on vegetation or ecosystems. These levels have been set by UK government and are considered to be relevant objectives for all internationally designated sites, as well as for nationally designated sites such as SSSIs, and for locally designated sites such as AWs. The relevant critical levels are set out in **Table 2-1**.

Table 2-1: Relevant Ecological Critical Levels

Pollutant	Time Period	Objective
Nitrogen Oxides (expressed as NO_2)	Annual Mean	30 µg/m^3
	24-hour Mean	75 µg/m^3
Ammonia (NH_3)	Annual Mean	3 µg/m^3 (unless lichens or bryophytes are present, then 1 µg/m^3)

[a] Lichens and bryophytes are known to be present in Elsenham Woods SSSI so the 1 µg/m^3 is applicable.

Critical Loads

2.3 Critical loads represent the amount of pollutant deposited to a given ecosystem over a year, below which it is understood that there is no harmful effect to the ecosystem. Critical loads have been identified for a number of different types of ecosystem, based on their sensitivity to adverse effects. Critical loads for deposition of nitrogen have been set for protection from eutrophication, whilst critical loads for the purpose of protection against acidification have been set for deposition of both nitrogen acid and sulphur acid, together termed as acid deposition.

2.4 The relevant site-specific critical loads for the 'Elsenham Woods' SSSI and the 'Eastend Wood' AW have been identified using the Air Pollution Information System (APIS) (APIS, 2022) and are set out in **Table 2-2** for sites relevant to this assessment.

Table 2-2: Ecological Critical Loads

Designated Ecological Site	Critical Load	
	Nutrient Nitrogen Deposition (kgN/ha/yr)	Total Acid Deposition (keq/ha/yr)
Elsenham Woods SSSI	15-20	2.43
Eastend Wood AW	15-20	2.43

Planning Policy

National Planning Policy

2.5 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021) sets out the Government's planning policies for England and how they expect these to be implemented. Consideration of air quality within planning is considered an important element of this framework which recommends that transport and the potential impact on the environment should be considered at an early stage in order to allow for mitigation or even avoidance of impacts through location and layout of developments.

2.6 It is recommended that both the impacts of a potential development on the environment be taken into account when planning policy is drafted. The NPPF states that:

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

- *Protecting and enhancing…sites of biodiversity or geological values…*
- *minimising impacts on…biodiversity…"*

2.7 Planning Practice Guidance (PPG) provides guidance on how planning can enact the policies set out in NPPF. It is set out as separate papers for different sectors and therefore PPG Air Quality (Ministry of Housing, Communities and Local Government, 2019) is aimed at addressing policy relating specifically to air quality. This document gives guidelines for when air quality is likely to be relevant to a planning decision:

"Concerns could arise if the development is likely to have an adverse effect on air 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)..."

2.8 PPG Air Quality also states that more detailed information such as whether the development could have a significant impact on air quality, baseline air quality and whether occupiers of the development could experience poor air quality may be required in order to make an informed decision. Further, it notes that any assessment should be proportionate, taking into account the scale of the proposed development, as well as any potential impacts.

Assessment Guidance

2.9 This assessment has been based on a number of guidance documents, the most significant of which are set out below:

Local Air Quality Management Technical Guidance (LAQM.TG(16))

2.10 Defra's LAQM.TG(16) guidance document (Defra, 2021a) was published for use by local authorities in review and assessment work but includes a number of technical guidelines on carrying out modelling assessment and management of monitoring data which set out best practice and are therefore relevant to all air quality assessments.

A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

2.11 The Institute of Air Quality Management (IAQM) guidance on 'Assessment of Air Quality Impacts on Designated Nature Conservation Sites' (IAQM, 2020) sets out the appropriate approach for this element of assessment. Due to the complexity of ecological impacts, an air quality professional alone can only identify whether emissions are unlikely to have a significant impact when compared against the relevant critical load / level. Where it cannot be ascertained that emissions are below this level, the combined input of both an air quality professional and an ecologist is required; the former to identify any changes to concentrations of deposition and the latter to consider the overall effect taking into consideration the location and sensitivity of any given habitat.

AQTAG06; Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air

2.12 The Air Quality Technical Advisory Group (AQTAG) AQTAG06 'Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air' (AQTAG, 2014) details the recommended approach to undertaking a quantitative modelling assessment of emissions to determine the potential for an adverse effect on the integrity of a designated European Site. The guidance includes recommended dry deposition velocities for a number of pollutants, including NO_2 and NH_3.

AQTAG21; Likely Significant Effect

The AQTAG AQTAG21 guidance on 'Likely Significant Effect' (AQTAG, 2015) outlines screening assessment thresholds for impacts on ecological sites, below which emissions are not considered to be likely to have a significant effect. Whilst this technical guidance is intended to apply to environmental permit applications and European designated ecological sites, the screening criteria provided within it are also commonly used within AQAs submitted as part of planning applications to determine the potential for significant effects on local, national and European designated ecological sites.

3.0 METHODOLOGY

The methodology set out in the following sections has been identified as being the most appropriate approach to consider potential impacts on the identified designated ecological sites as a result of operational traffic generated by proposed development and nearby committed developments.

Baseline Air Quality

3.1 Information regarding background air quality has been obtained using the national pollution maps published by Defra (Defra, 2020a) and information provided on the APIS website (APIS, 2022). In addition, baseline concentrations of pollutants have been modelled at a number of locations following the methodology set out in Paragraphs 3.2 to 3.20.

Development-Generated Operational Road Traffic Impacts

3.2 PCs of NO_x and NH_3 concentrations and nutrient and acid nitrogen deposition rates have been predicted for a range of existing sensitive locations within the 'Elsenham Woods' SSSI / 'Eastend Wood' AW. PCs in concentrations and deposition rates have then been compared against relevant screening criteria in order to determine whether it is possible to screen out impacts as being 'not significant'. In cases where PCs exceed the relevant screening criteria, further input by an ecologist is often required in order to determine the significance of overall effects.

3.3 Sensitive locations relevant to this assessment include areas within the 'Elsenham Woods' SSSI / 'Eastend Wood' AW (as shown in **Figure 3-1**) which have the potential to be negatively impacted by increased concentrations of NO_x and / or NH_3 and / or by increased nutrient and / or acid deposition rates.

3.4 Two receptor transects extending to 200 m from the nearest modelled road have been identified. The locations of these receptors have been chosen to represent sensitive locations within the 'Elsenham Woods' SSSI / 'Eastend Wood' AW where the impacts of additional operational traffic associated with the proposed development in combination with traffic generated by nearby committed developments are likely to be greatest. Modelled receptor locations are described in **Table 3-1** and shown in **Figure 3-2**. All receptors have been modelled at a height of 0 m.

3.5 A proportion of the operational development-generated traffic that flows within 200 m of the 'Eastend Wood' AW site is also anticipated to pass within 200 m of additional areas of AW located approximately 3.5 – 4.4 km to the south of the Site, However, receptors within these designated ecological sites have not been modelled as identified receptors within the 'Eastend Wood' AW are considered to be suitably representative of worst-case conditions within these sites.

3.6 In addition, concentrations of NO_x have been modelled at one nearby diffusion tube monitoring sites (sites UT020) for use in model verification. The same approach to model verification of NO_2 as outlined within the main AQA (ACE, 2022) has been taken by this assessment.

Table 3-1: Ecological Receptor Locations

Receptor	Designated Ecological Site(s)	Coordinates		Distance from Hall Road (m)
		X	Y	
R1.1[a]	Elsenham Woods SSSI and Eastend Wood AW	555882	225037	6.72
R1.2		555884	225040	10
R1.3		555887	225044	15
R1.4		555891	225048	20
R1.5		555894	225051	25
R1.6		555910	225071	50
R1.7		555926	225090	75
R1.8		555942	225109	100
R1.9		555974	225148	150
R1.10		556005	225186	200
R2.1[a]	Elsenham Woods SSSI	555804	225137	7.95
R2.2		555806	225139	10
R2.3		555810	225142	15
R2.4		555813	225145	20
R2.5		555817	225148	25
R2.6		555836	225165	50
R2.7		555855	225181	75
R2.8		555873	225198	100
R2.9		555911	225231	150
R2.10		555949	225264	200

[a] These receptors have been chosen to represent the closest points of the SSSI and AW Hall Road.

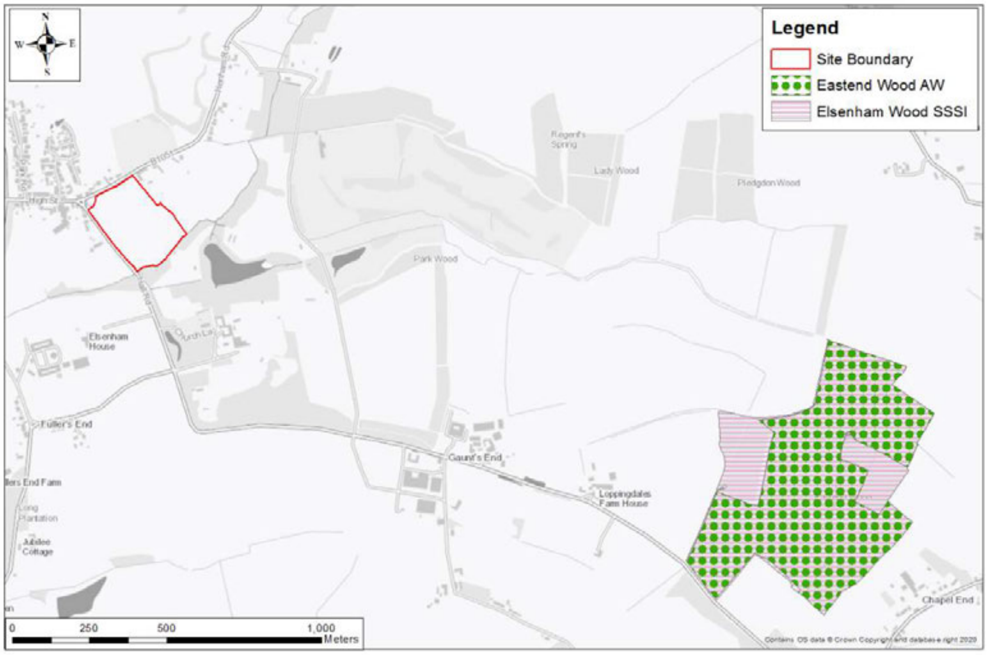

Figure 3-1: 'Elsenham Woods' SSSI / 'Eastend Wood' AW

Figure 3-2: Modelled Ecological Receptors

3.7 Concentrations of NO_x and NH_3 at the identified receptors have been modelled using the ADMS-Roads dispersion model (v5.0.1). This model requires a number of inputs including traffic flow volumes (in Annual Average Daily Traffic (AADT) format), composition (percentage Heavy Duty Vehicles (HDVs)) and average speeds as well as road characteristics such as width, gradient and street canyons, as applicable.

3.8 Traffic flow volumes and traffic composition data have been provided by the project's transport consultant (ACE). Average speeds for each road link have been estimated based on road conditions (including speed limits). The following traffic scenarios have been modelled (a summary of traffic data used in this assessment is provided in **Appendix C** and relevant assumptions and limitations are discussed in Paragraphs 3.13 to 3.20):

- 'current'[1] baseline (i.e. 2019);
- Future 'Without Scheme' baseline (i.e. future baseline (2027[2]), including anticipated traffic growth only);
- Future 'Without Scheme' baseline + Committed Developments (i.e. future baseline (2027[2]), including anticipated traffic growth + committed development operational traffic flows);
- Future 'With Scheme' scenario (i.e. future baseline (2027), including anticipated traffic growth + committed development operational traffic flows + proposed development operational traffic flows).

3.9 The model also requires meteorological data and inputs. The model has been run utilising 2019 data from the Stansted Airport meteorological station which is considered to be suitable for the study area. **Appendix B** provides additional information on the meteorological inputs.

---

[1] The 'current' baseline year for the purposes of this assessment has been taken to be 2019 as this is the most recent year for which representative local NO_2 monitoring data are available.

[2] The future baseline traffic data has been modelled for 2027 as this is the anticipated year of completion of the proposed development.

3.10 The emissions of NH_3 associated with the modelled traffic have been calculated using the Air Quality Consultants Ltd. CREAM V1A tool (Air Quality Consultants Ltd., 2020b). This tool utilises emission factors derived from a combination of results from remote sensing, real-world fuel consumption data and ambient measurements of NH_3 (Air Quality Consultants Ltd., 2020c). Traffic data have been entered into the CREAM V1A tool to provide emissions rates for each of the road links modelled for a specified year road type and vehicle fleet composition.

3.11 The emissions of NO_x associated with the modelled traffic have been calculated using the EFT v10.1 (Defra, 2020b). This utilises emissions factors taken from the European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA) Air Pollution Emission Inventory Guidebook 2019 (EMEP / EEA, 2019) which is consistent with the COPERT 5.3 emission calculation tool (EMISIA, 2019), fleet composition data collected as part of the National Atmospheric Emissions Inventory (NAEI) and by Transport for London (TfL), along with data relating to the fleet and vehicle turnover in the UK. Traffic data have been entered into the EFT to provide emissions rates for each of the road links modelled for the current and future years, along with road type, vehicle fleet composition and speed.

3.12 Rates of nitrogen and acid deposition have been calculated from modelled NO_x and NH_3 using appropriate dry deposition velocities[3] as provided by AQTAG06 (AQTAG, 2014) (see **Appendix B**).

Assumptions and Limitations

3.13 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent on the traffic data that have been input which will have inherent uncertainties associated with them.

[3] Wet deposition has not been considered explicitly as part of the conversion of NO_2 and NH_3 to nutrient and acid deposition rates as wet deposition occurs significant distances from the emissions source and, therefore, will experience significant dispersion and, as such, is not anticipated to materially affect the outcome of this assessment. This approach is commonly used in assessments for developments of this nature and scale.

There is then the uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

3.14 The model relies on meteorological data for 2019 which may not represent conditions in the future, particularly when taking into consideration additional uncertainties introduced as a result of climate change.

3.15 Per-vehicle exhaust emissions of NO_x are predicted to reduce year-on-year due to technological advances and changes to the vehicle mix such as uptake of Euro VI/6 vehicles as well as Low and Ultra Low emission technology. Whilst there has been uncertainty regarding the accuracy of these predictions in the past, recent evidence (Air Quality Consultants Ltd., 2020a) suggests that the current emissions factor predictions are likely to sufficiently reflect real world conditions without the need for a sensitivity test. Additionally, the model has undergone a verification process in order to adjust the modelled NO_x to real-world conditions (i.e. local NO_2 monitoring). It is, therefore, considered appropriate to use NO_x emissions factors as provided by the EFT for this assessment without further adjustment beyond appropriate verification. It is acknowledged that an updated version of the EFT, EFT v11.0 (Defra, 2021b), has recently (November 2021) been released by Defra, however, as there are no changes to NO_X emission factors that are applicable to the assessment years, the use of EFT v10.1 by this assessment (as opposed to EFT v11.0) will make no difference to the results.

3.16 As vehicle emissions and background concentrations of NO_x in the UK are generally expected to reduce over the coming decade it is, therefore, considered a conservative approach to assess the impacts of NO_x emissions (including as a contributing factor to acid and nutrient nitrogen deposition) based on the earliest year that any part of the proposed development is anticipated to be operational; i.e. 2025. Operational development-generated traffic data used in the assessment assumes that the proposed development is fully operational, even though the proposed development is not anticipated to be completed until 2027. By considering traffic-generation associated with the completed development in combination with emissions factors and background concentrations associated with the earliest year of opening, the model provides a worst-case approach in this respect.

3.17 The emissions factors used in the CREAM V1A tool predict that pre-vehicle exhaust emissions of NH_3 will increase from 2020[4]. As such, the selection of the earliest possible year of occupation (2025) would not provide a worst-case scenario and, therefore, NH_3 emission factors associated with a future year of 2035 have been used in order to provide a more conservative approach. It is not possible to model emission factors within the study area post-2035 as detailed data are not provided by the CREAM V1A tool for this purpose. The UK government has recently announced a target phase out date for the sale of new conventional petrol and diesel cars and vans of 2030 (brought forward from an initial target of 2040) and a target requirement that all new cars and vans will have zero tailpipe emissions by 2035; as such, it is reasonable to anticipate that NH_3 emissions associated with vehicle traffic will begin to reduce during the 2030's – 2040's. As such, it is considered that the use of 2035 emissions factors within this AQA provides a sufficiently conservative approach.

3.18 The year of completion for all of the committed developments considered by this assessment are not known, therefore, the assessment assumes that all committed developments are fully operational. This assumption is worst-case.

3.19 It has been assumed that annual mean background concentrations of NH_3 and nutrient nitrogen and acid deposition rates will remain unchanged between the 'current'[1] year (2019) and the future[2] year (2025), as robust predictions regarding future concentrations / deposition rates for these pollutants are not currently available. Data on background 24-hour mean NO_x concentrations are also not currently available, and so background and total baseline 24-hour mean concentrations of NO_x have not been predicted within this assessment.

3.20 It should be noted that the traffic data used by this assessment and the emissions factors within the EFT and CREAM V1A tool are based on assumptions which were current before the occurrence of the Covid-19 pandemic. As such, these data will not reflect any changes that have occurred or may occur in the future as a result

[4] At low proportions of HDVs, NH_3 emissions are predicted to fall between 2017 and 2020; with high proportions of HDVs (as a minimum 8%) they are predicted to increase during this time period.

of behavioural change caused by the pandemic and / or as a result of measures implemented by governing authorities (e.g. lockdowns, travel restrictions etc.).

Air Quality Impacts Significance Criteria

3.21 The IAQM guidance (IAQM, 2020) acknowledges that a screening criterion of a ≤1% increase in the relevant long-term critical levels / critical loads at internationally and nationally designated ecological sites (e.g. SSSIs) is recommended by the IAQM guidance (IAQM, 2020) to define a reasonable quantum of long-term pollution which is not likely to be discernible from fluctuations in background levels / measurements. As such, effects at receptors within the 'Elsenham Woods' SSSI where the in-combination PC of long-term pollutants[5] associated with the proposed development and nearby committed developments is ≤1% may be screened out as being 'not significant'. It should be noted that the 1% screening criterion is not a threshold of harm and that exceeding this criterion does not necessarily imply that damage to a habitat and a 'significant' impact will occur.

3.22 A screening criteria of a ≤10% increase in the relevant short-term critical levels at internationally and nationally designated ecological sites (e.g. SSSIs) is recommended by the IAQM guidance (IAQM, 2020) as the change below which effects may be screened out as being 'not significant'. This screening criterion may be applied to the in-combination PC of short-term pollutants[6] associated with development-generated operational traffic and traffic generated by nearby committed developments. This screening criterion is intended to be used to screen the potential impacts of industrial point sources (IAQM, 2020), however, in the absence of any alternative criteria recommended by relevant guidance, it is generally considered to be appropriate to use for other sources.

3.23 A screening criteria of ≤100% increase in the relevant long-term and short-term critical levels / critical loads at locally designated ecological sites (e.g. SSSIs) is

[5] i.e. in the case of this assessment, annual mean NO_x concentrations, annual mean NH_3 concentrations, annual mean nutrient nitrogen deposition rates and annual mean acid deposition rates.

[6] i.e. in the case of this AQA, 24-hour mean NO_x concentrations.

commonly used as the change below which effects may be screened out as being 'not significant'[7]. This screening criterion may be applied to the in-combination PC of long-term[5] and short-term[6] pollutants associated with development-generated operational traffic and traffic generated by nearby committed developments.

3.24 Where the in-combination PC of long-term pollutants exceeds the relevant screening criteria impacts (as outlined above) may still be screened out in instances where the Predicted Environmental Concentration (PEC)[8] is <70% of the relevant critical level / critical load[7].

3.25 Where the in-combination PC and PEC[9] exceed the relevant screening criteria (as outlined above) it is not possible to screen out effects as being 'not significant' on this basis alone. In such cases further assessment of the significance of the overall effect on the integrity of the habitat by an ecologist is often required.

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[7] This screening criteria is based on the screening criteria used by the Environment Agency and Defra in permitting decisions (Environment Agency & Defra, 2022).

[8] The total predicted 'with scheme' concentrations / deposition rate.

[9] Applicable to long-term pollutants only.

4.0 BASELINE CONDITIONS

Predicted Background Concentrations

NO_x and NH_3 Concentrations

4.1 Predicted annual mean background concentrations of NO_x have been obtained from national maps provided by Defra (Defra, 2020a) . The predicted background concentrations are presented in **Table 4-1**.

4.2 Predicted annual mean background concentrations of NH_3 have been obtained from the APIS website (APIS, 2022) and are presented in **Table 4-1**.

4.3 The predicted annual mean background concentrations of NO_x fall below the critical level in both the 'current'[1] and future year scenarios at all modelled receptors. The annual mean background concentrations of NH_3 exceed the critical level at all modelled receptors.

Table 4-1: Annual Mean NO_x and NH_3 Background Concentrations (µg/m³)

Receptor	NO_x [a]		NH_3
	2022	2025	
Elsenham Woods SSSI and (all modelled receptors)	19	16	**2.08**
Critical Level	**30**		**1**

Exceedances of the relevant critical levels are highlighted in **BOLD**.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the data sources as well as the relevant critical levels.
[a] In instances where a transect is split between two 1x1 Defra background squares, the worst-case (i.e. highest) predicted concentrations has been applied to the entire transect.

Nitrogen and Total Acid Deposition Rates

4.4 Predicted annual mean background deposition rates of nutrient nitrogen and total acid deposition at identified ecological receptors have been obtained from the APIS website (APIS, 2022) and are presented in **Table 4-2**.

4.5 The annual mean background average nitrogen deposition rate exceeds the relevant critical load at all ecological receptors, while the annual mean background total acid deposition rate falls below the relevant critical load at all ecological receptors.

Table 4-2: Annual Mean Background Deposition Rates at Ecological Receptors

Receptor ID	Average Nitrogen Deposition (kgN/ha/yr)	Average Total Acid Deposition (keq/ha/yr) [a]
Elsenham Woods SSSI and (all modelled receptors)	**33**	2.43
Critical Load:	15	11.02

Exceedances of the relevant critical loads are highlighted in **BOLD**.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the data source as well as the relevant critical loads.
[a] Average background total acid deposition has been calculated using the APIS website's Critical Load Function Tool using input average background nitrogen acid deposition (2.4 keq/ha/yr) and average background sulphur acid deposition (0.2 keq/ha/yr) rates taken from the APIS website.

Predicted Baseline Concentrations

4.6 Predicted baseline annual mean NO_x and NH_3 concentrations at each identified ecological receptors for all baseline scenarios (see Paragraph 3.8) are presented in **Table 4-3** and **Table 4-4** respectively. Predicted baseline annual mean nitrogen and acid deposition rates at each identified ecological receptors for all baseline scenarios (see Paragraph 3.8) are presented in **Table 4-5 and Table 4-6**.

4.7 Predicted annual mean concentrations of NO_x are above the critical level at receptors R1.1, R1.2, R2.1 and R2.2 in the current[1] baseline scenario. Predicted annual mean concentrations of NO_x are below the critical levels at all receptors for both future scenarios.

4.8 Predicted annual mean concentrations of NH_3 are above the relevant critical level at all receptors in both the current and both future baseline scenarios.

4.9 Predicted annual mean deposition rates for nutrient nitrogen are above the relevant critical load at all receptors for all scenarios.

4.10 Predicted annual mean total acid deposition rates are below the relevant critical load at all receptors for all scenarios.

Table 4-3: Predicted Annual Mean NO_x Baseline Concentrations (µg/m³)

Receptor ID	Current Baseline (2019 traffic & emissions)	Future Baseline (2027 background traffic only, 2025 emissions & backgrounds)	Future Baseline + Committed Developments (2027 background traffic + committed development traffic, 2025 emissions & backgrounds)
R1.1	**36**	25	28
R1.2	**33**	24	26
R1.3	30	22	24
R1.4	28	21	22
R1.5	26	20	21
R1.6	23	18	19
R1.7	22	18	18
R1.8	21	17	18
R1.9	20	17	17
R1.10	20	17	17
R2.1	**34**	25	27
R2.2	**33**	24	26
R2.3	29	22	24
R2.4	27	21	22
R2.5	26	20	21
R2.6	23	18	19
R2.7	21	17	18
R2.8	21	17	17
R2.9	20	17	17
R2.10	20	17	17
Critical Level:	**30**		

Exceedances of the critical level are highlighted in **BOLD**.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical levels.

Table 4-4: Predicted Annual Mean NH_3 Baseline Concentrations (µg/m³)

Receptor ID	Current Baseline (2019 traffic & 2035 emissions)	Future Baseline (2027 background development traffic, 2035 emissions)	Future Baseline + Committed Developments (2027 background traffic + committed development traffic, 2035 emissions)
R1.1	**2.5**	**2.7**	**2.8**
R1.2	**2.4**	**2.5**	**2.7**
R1.3	**2.4**	**2.4**	**2.5**
R1.4	**2.3**	**2.4**	**2.4**
R1.5	**2.3**	**2.3**	**2.4**
R1.6	**2.2**	**2.2**	**2.3**
R1.7	**2.1**	**2.2**	**2.2**
R1.8	**2.1**	**2.1**	**2.2**
R1.9	**2.1**	**2.1**	**2.1**
R1.10	**2.1**	**2.1**	**2.1**
R2.1	**2.5**	**2.6**	**2.7**
R2.2	**2.4**	**2.5**	**2.7**
R2.3	**2.3**	**2.4**	**2.5**
R2.4	**2.3**	**2.4**	**2.4**
R2.5	**2.3**	**2.3**	**2.4**
R2.6	**2.2**	**2.2**	**2.2**
R2.7	**2.1**	**2.2**	**2.2**
R2.8	**2.1**	**2.1**	**2.2**
R2.9	**2.1**	**2.1**	**2.1**
R2.10	**2.1**	**2.1**	**2.1**
Critical Level:	**1**		

Exceedances of the critical level are highlighted in **BOLD**.

Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical levels.

Table 4-5: Predicted Annual Mean Baseline Nutrient Nitrogen Deposition Rates

Receptor ID	Current Baseline (2019 traffic)	Future Baseline (2027 background traffic)	Future Baseline + Committed Developments (2027 background traffic + committed development traffic)
R1.1	**39**	**39**	**41**
R1.2	**38**	**38**	**39**
R1.3	**37**	**37**	**38**
R1.4	**36**	**36**	**37**
R1.5	**36**	**36**	**36**
R1.6	**34**	**34**	**35**
R1.7	**34**	**34**	**34**
R1.8	**34**	**34**	**34**
R1.9	**33**	**33**	**34**
R1.10	**33**	**33**	**33**
R2.1	**38**	**38**	**40**
R2.2	**38**	**38**	**39**
R2.3	**37**	**37**	**38**
R2.4	**36**	**36**	**37**
R2.5	**36**	**35**	**36**
R2.6	**34**	**34**	**35**
R2.7	**34**	**34**	**34**
R2.8	**34**	**34**	**34**
R2.9	**33**	**33**	**34**
R2.10	**33**	**33**	**33**
Critical Load:	**15**		

Table 4-6: Predicted Annual Mean Baseline Total Acid Deposition Rates

Receptor ID	Current Baseline (2019 traffic)	Future Baseline (2027 background traffic)	Future Baseline + Committed Developments (2027 background traffic + committed development traffic)
R1.1	2.9	2.9	3.0
R1.2	2.8	2.8	2.9
R1.3	2.7	2.7	2.8
R1.4	2.6	2.6	2.7
R1.5	2.6	2.6	2.7
R1.6	2.5	2.5	2.6
R1.7	2.5	2.5	2.5
R1.8	2.5	2.5	2.5
R1.9	2.5	2.5	2.5
R1.10	2.5	2.5	2.5
R2.1	2.8	2.8	2.9
R2.2	2.8	2.8	2.9
R2.3	2.7	2.7	2.8
R2.4	2.6	2.6	2.7
R2.5	2.6	2.6	2.7
R2.6	2.5	2.5	2.5
R2.7	2.5	2.5	2.5
R2.8	2.5	2.5	2.5
R2.9	2.5	2.5	2.5
R2.10	2.4	2.4	2.5
Critical Load:	**11.02**		

5.0 PREDICTED IMPACTS

In-combination Effects

5.1 In-combination (i.e. proposed development + committed developments[10]) PCs of annual mean and 24-hour mean NO_x and annual mean NH_3 concentrations, and annual mean deposition rates of nutrient nitrogen and acid have been predicted at ecological receptors in 2025. Predicted concentrations / deposition rates and PCs at each receptor are shown in **Table 5-1**, **Table 5-2**, **Table 5-3**, **Table 5-4** and **Table 5-5** for annual mean NO_x, 24-hour mean NO_x, annual mean NH_3, nitrogen deposition and total acid deposition respectively.

5.2 Future annual mean concentrations of NO_x are predicted to be below the critical level at all receptors, with or without the proposed development; i.e. the proposed development will not cause any exceedances. PCs are <100% at all receptors and, therefore, the potential impacts of annual mean NO_x on 'Eastend Wood' AW may be screened out as being 'not significant'. PCs are >1% at receptors R1.1 to R1.8 and R2.1 to 2.8, however, 'with scheme' PECs are only >70% at receptors R1.1 to R1.5 and R2.1 to R2.5. As such, it is possible to screen out the potential for 'significant' annual mean NO_x impacts on the 'Elsenham Woods' SSSI at a distance of at least 50 m from Hall Road.

5.3 PCs of 24-hour mean NO_x are <100% at all receptors and, therefore, the potential impacts of 24-hour mean NO_x on 'Eastend Wood' AW may be screened out as being 'not significant'. PCs are >10% at receptors R1.1 to R1.3 and R2.1 to 2.3. As such, it is possible to screen out the potential for 'significant' annual mean NO_x impacts on the 'Elsenham Woods' SSSI at a distance of at least 20 m from Hall Road.

5.4 Future annual mean concentrations of NH_3 are predicted to be above the critical level at all receptors, with or without the proposed development; i.e. the proposed development will not cause any exceedances. PCs are <100% at all receptors and, therefore, the potential impacts of annual mean NH_3 on 'Eastend Wood' AW may

[10] Comparison of 'future baseline' scenario (i.e. baseline traffic) VS 'with scheme' scenario (i.e. baseline traffic + committed development traffic + proposed development traffic).

be screened out as being 'not significant'. PCs are >1% at receptors R1.1 to R1.9 and R2.1 to 2.9. As such, it is possible to screen out the potential for 'significant' annual mean NH_3 impacts on the 'Elsenham Woods' SSSI at a distance of at least 200 m from Hall Road.

5.5 Future annual mean nutrient nitrogen deposition rates are predicted to be above the critical load at all receptors, with or without the proposed development; i.e. the proposed development will not cause any exceedances. PCs are <100% at all receptors and, therefore, the potential impacts of nutrient nitrogen deposition on 'Eastend Wood' AW may be screened out as being 'not significant'. PCs are >1% at receptors R1.1 to R1.8 and R2.1 to 2.8. As such, it is possible to screen out the potential for 'significant' annual mean nutrient nitrogen deposition rate impacts on the 'Elsenham Woods' SSSI at a distance of at least 150 m from Hall Road.

5.6 Future annual mean total acid deposition rates are predicted to be below the critical level at all receptors, with or without the proposed development; i.e. the proposed development will not cause any exceedances. PCs are <100% at all receptors and, therefore, the potential impacts of annual mean total acid deposition on 'Eastend Wood' AW may be screened out as being 'not significant'. PCs are >1% at receptors R1.1 and R2.1, however, 'with scheme' PECs are <70% at all receptors. As such, it is possible to fully screen out the potential for 'significant' annual mean total acid deposition impacts on the 'Elsenham Woods'.

Table 5-1: Predicted Annual Mean Concentrations of NO_x, In-Combination PC and % Change at each Receptor (2027 traffic data, 2025 emissions factors & backgrounds)

Receptor	Without Development (µg/m³)	With Committed & Proposed Development (µg/m³)	PC (µg/m³)	Change (% of Critical Level)
R1.1	*25*	*28*	3.1	**10.4**
R1.2	*24*	*26*	2.5	**8.4**
R1.3	*22*	*24*	2.0	**6.5**
R1.4	21	*22*	1.6	**5.3**
R1.5	20	*21*	1.3	**4.5**
R1.6	18	19	0.7	**2.5**
R1.7	18	18	0.5	**1.7**
R1.8	17	18	0.4	**1.2**
R1.9	17	17	0.2	0.8
R1.10	17	17	0.2	0.5
R2.1	*25*	*27*	2.8	**9.4**
R2.2	*24*	*26*	2.5	**8.3**
R2.3	*22*	*24*	1.9	**6.4**
R2.4	21	*22*	1.5	**5.2**
R2.5	20	*21*	1.3	**4.3**
R2.6	18	19	0.7	**2.3**
R2.7	17	18	0.5	**1.5**
R2.8	17	17	0.3	**1.1**
R2.9	17	17	0.2	0.7
R2.10	17	17	0.1	0.5
Critical Level / Screening Criteria:	**30**		**-**	**1 / 100 [a]**

Exceedances of the critical level / screening criteria are shown in **BOLD**.
Predicted concentrations >70% of the critical level are shown in *italics*.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical level.
A screening criterion of 1% increment is applicable for Elsenham Woods SSSI and a screening criterion of 100% increment is applicable for Eastend Wood AW.

Table 5-2: Predicted 24-hour Mean NO_x In-Combination PC and % Change at each Receptor (2027 traffic data, 2025 emissions factors)

Receptor	PC (µg/m³) [a]	Change (% of Critical Level) [a]
R1.1	11.6	**15.5**
R1.2	9.7	**13.0**
R1.3	7.9	**10.5**
R1.4	6.6	8.8
R1.5	5.8	7.7
R1.6	3.6	4.8
R1.7	2.6	3.5
R1.8	2.1	2.7
R1.9	1.3	1.7
R1.10	0.9	1.3
R2.1	11.6	**15.5**
R2.2	10.4	**13.9**
R2.3	8.4	**11.1**
R2.4	7.0	9.3
R2.5	6.0	8.0
R2.6	3.4	4.5
R2.7	2.2	3.0
R2.8	1.7	2.3
R2.9	1.2	1.6
R2.10	0.9	1.2
Screening Criteria:	**-**	**10 / 100**

Exceedances of the screening criteria are shown in **BOLD**.

Predicted PCs are rounded as appropriate taking into consideration the level of accuracy of the model and data sources.

A screening criterion of 10% increment is applicable for nationally and internationally designated sites (i.e the Elsenham Woods SSSI) and a screening criterion of 100% increment is applicable for locally designated sites (i.e. Eastend Wood AW).

Table 5-3: Predicted Annual Mean Concentrations of NH_3 (μg/m³), In-Combination PC and % Change at each Receptor (2027 traffic data, 2035 emissions factors)

Receptor	Without Development (μg/m³)	With Committed & Proposed Development (μg/m³)	PC (μg/m³)	Change (% of Critical Level)
R1.1	***2.7***	***2.8***	0.18	**17.7**
R1.2	***2.5***	***2.7***	0.14	**14.4**
R1.3	***2.4***	***2.6***	0.11	**11.1**
R1.4	***2.4***	***2.5***	0.09	**9.1**
R1.5	***2.3***	***2.4***	0.08	**7.6**
R1.6	***2.2***	***2.3***	0.04	**4.2**
R1.7	***2.2***	***2.2***	0.03	**2.8**
R1.8	***2.1***	***2.2***	0.02	**2.1**
R1.9	***2.1***	***2.1***	0.01	**1.3**
R1.10	***2.1***	***2.1***	0.01	0.9
R2.1	***2.6***	***2.8***	0.16	**16.1**
R2.2	***2.5***	***2.7***	0.14	**14.1**
R2.3	***2.4***	***2.5***	0.11	**10.9**
R2.4	***2.4***	***2.4***	0.09	**8.8**
R2.5	***2.3***	***2.4***	0.07	**7.3**
R2.6	***2.2***	***2.2***	0.04	**3.9**
R2.7	***2.2***	***2.2***	0.03	**2.6**
R2.8	***2.1***	***2.2***	0.02	**1.9**
R2.9	***2.1***	***2.1***	0.01	**1.2**
R2.10	***2.1***	***2.1***	0.01	0.8
Critical Level / Screening Criteria:	**1**		**-**	**1 / 100** [a]

Exceedances of the critical level / screening criteria are shown in **BOLD**.
Predicted concentrations >70% of the critical level are shown in *italics*.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical levels.
A screening criterion of 1% increment is applicable for Elsenham Woods SSSI and a screening criterion of 100% increment is applicable for Eastend Wood AW.

Table 5-4: Predicted Future Annual Mean Nutrient Nitrogen Deposition Rates, In-Combination PCs and % Change at each Receptor

Receptor	Without Development (kgN / ha / yr)	With Committed & Proposed Development (kgN / ha / yr)	PC (kgN / ha / yr)	Change (% of Critical Load)
R1.1	***39***	***41***	1.8	**12.3**
R1.2	***38***	***39***	1.5	**10.0**
R1.3	***37***	***38***	1.2	**7.8**
R1.4	***36***	***37***	1.0	**6.3**
R1.5	***36***	***36***	0.8	**5.3**
R1.6	***34***	***35***	0.4	**3.0**
R1.7	***34***	***34***	0.3	**2.0**
R1.8	***34***	***34***	0.2	**1.5**
R1.9	***33***	***34***	0.1	0.9
R1.10	***33***	***33***	0.1	0.6
R2.1	***38***	***40***	1.7	**11.2**
R2.2	***38***	***39***	1.5	**9.9**
R2.3	***37***	***38***	1.1	**7.6**
R2.4	***36***	***37***	0.9	**6.1**
R2.5	***35***	***36***	0.8	**5.1**
R2.6	***34***	***35***	0.4	**2.7**
R2.7	***34***	***34***	0.3	**1.8**
R2.8	***34***	***34***	0.2	**1.3**
R2.9	***33***	***34***	0.1	0.8
R2.10	***33***	***33***	0.1	0.6
Critical Load / Screening Criteria:	**15**		**-**	**1 / 100 [a]**

Exceedances of the critical level / screening criteria are shown in **BOLD**.
Predicted concentrations >70% of the critical load are shown in *italics*.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical loads.
[a] A screening criterion of 1% increment is applicable for Elsenham Woods SSSI and a screening criterion of 100% increment is applicable for Eastend Wood AW.

Table 5-5: Predicted Future Annual Mean Total Acid Deposition Rates, In-Combination PCs and % Change at each Receptor

Receptor	Without Development (keq/ha/yr)	With Committed & Proposed Development (keq/ha/yr)	PC (keq / ha / yr)	Change (% of Critical Load)
R1.1	2.9	3.0	0.13	**1.2**
R1.2	2.8	2.9	0.11	1.0
R1.3	2.7	2.8	0.08	0.8
R1.4	2.6	2.7	0.07	0.6
R1.5	2.6	2.7	0.06	0.5
R1.6	2.5	2.6	0.03	0.3
R1.7	2.5	2.5	0.02	0.2
R1.8	2.5	2.5	0.02	0.1
R1.9	2.5	2.5	0.01	0.1
R1.10	2.5	2.5	0.01	0.1
R2.1	2.8	2.9	0.12	**1.1**
R2.2	2.8	2.9	0.11	1.0
R2.3	2.7	2.8	0.08	0.7
R2.4	2.6	2.7	0.07	0.6
R2.5	2.6	2.7	0.05	0.5
R2.6	2.5	2.6	0.03	0.3
R2.7	2.5	2.5	0.02	0.2
R2.8	2.5	2.5	0.01	0.1
R2.9	2.5	2.5	0.01	0.1
R2.10	2.4	2.5	0.01	0.1
Critical Load / Screening Criteria:	**11.02**		**-**	**1 / 100 [a]**

Exceedances of the critical level / screening criteria are shown in **BOLD**.
Predicted concentrations >70% of the critical load are shown in *italics*.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical loads.
[a] A screening criterion of 1% increment is applicable for Elsenham Woods SSSI and a screening criterion of 100% increment is applicable for Eastend Wood AW.

Proposed Development In Isolation Effects

5.7 The IAQM guidance (IAQM, 2020) specifies that 'in-combination' (i.e. proposed development + committed development) PCs should be assessed against the relevant screening criteria. However, this approach does not acknowledge that, in some cases, proposed development traffic flows may form only a small proportion of 'in-combination' flows. In such instances, the approach recommended by the

IAQM may result in impacts attributed directly to the proposed development appearing to be more severe than is realistically the case. As such, further assessment work has been done to isolate the PC of the proposed development only (though emissions associated with committed developments in the local area are still accounted for in both the future baseline and 'with scheme' scenarios).

5.8 Predicted concentrations / deposition rates and proposed development only PCs are presented in **Table 5-6**, **Table 5-7**, **Table 5-8** and **Table 5-9** for annual mean NO_x, 24-hour mean NO_x, annual mean NH_3 and nitrogen deposition.

5.9 Total acid deposition is not considered further as it is possible to screen out the potential for 'significant' effects based on the more conservative 'in-combination' approach (see Paragraph 5.6). Only potential effects on the 'Elsenham woods' SSSI are considered, as it is possible to screen out the potential for 'significant' effects on the 'Eastend Wood' AW based on the more conservative 'in-combination' approach (see Paragraphs 5.2 to 5.6).

5.10 Future annual mean concentrations of NO_x are predicted to be below the critical level at all receptors, with or without the proposed development; i.e. the proposed development will not cause any exceedances. Proposed development only PCs are >1% at receptors R1.1, R1.2, R2.1 and R2.2, and PECs are only >70% at these receptors also. As such, consideration of the proposed development in isolation would not indicate 'significant' annual mean NO_x impacts on the 'Elsenham Woods' SSSI at a distance of at least 15 m from Hall Road.

5.11 Future 24-hour mean NO_x proposed development only PCs are >10% at all receptors. As such, consideration of the proposed development in isolation would not indicate any 'significant' 24-hour mean NO_x impacts on the 'Elsenham Woods' SSSI.

5.12 Future annual mean concentrations of NH_3 are predicted to be above the critical level at all receptors, with or without the proposed development; i.e. the proposed development will not cause any exceedances. Proposed development only PCs are >1% at receptors R1.1 to R1.5 and R2.1 and R2.5. As such, consideration of the proposed development in isolation would not indicate 'significant' annual mean NO_x impacts on the 'Elsenham Woods' SSSI at a distance of at least 50 m from Hall Road.

5.13 Future annual mean nutrient nitrogen deposition rates are predicted to be below the critical load at all receptors, with or without the proposed development; i.e. the proposed development will not cause any exceedances. Proposed development only PCs are >1% at receptors R1.1 to R1.3 and R2.1 to R2.3. As such, consideration of the proposed development in isolation would not indicate 'significant' annual mean NO_x impacts on the 'Elsenham Woods' SSSI at a distance of at least 20 m from Hall Road.

Table 5-6: Predicted Annual Mean Concentrations of NO_x, Proposed Development Only PC and % Change at each Receptor (2027 traffic data, 2025 emissions factors & backgrounds)

Receptor	With Committed Development (µg/m³)	With Committed & Proposed Development (µg/m³)	PC (µg/m³)	Change (% of Critical Level)
R1.1	*28*	*28*	0.4	**1.4**
R1.2	*26*	*26*	0.4	**1.2**
R1.3	*24*	*24*	0.3	0.9
R1.4	*22*	*22*	0.2	0.7
R1.5	*21*	*21*	0.2	0.6
R1.6	19	19	0.1	0.3
R1.7	18	18	0.1	0.2
R1.8	18	18	0.1	0.2
R1.9	17	17	0.0	0.1
R1.10	17	17	0.0	0.1
R2.1	*27*	*27*	0.4	**1.3**
R2.2	*26*	*26*	0.3	**1.2**
R2.3	*24*	*24*	0.3	0.9
R2.4	*22*	*22*	0.2	0.7
R2.5	*21*	*21*	0.2	0.6
R2.6	19	19	0.1	0.3
R2.7	18	18	0.1	0.2
R2.8	17	17	0.0	0.2
R2.9	17	17	0.0	0.1
R2.10	17	17	0.0	0.1
Critical Level / Screening Criteria:	**30**		**-**	**1**

Exceedances of the critical level / screening criteria are shown in **BOLD**.
Predicted concentrations >70% of the critical level are shown in *italics*.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical level.

Table 5-7: Predicted 24-hour Mean NO_x, Proposed Development Only PC and % Change at each Receptor (2027 traffic data, 2025 emissions factors)

Receptor	PC (µg/m^3) [a]	Change (% of Critical Level) [a]
R1.1	1.6	2.1
R1.2	1.3	1.8
R1.3	1.1	1.4
R1.4	0.9	1.2
R1.5	0.8	1.1
R1.6	0.5	0.7
R1.7	0.4	0.5
R1.8	0.3	0.4
R1.9	0.2	0.2
R1.10	0.1	0.2
R2.1	1.6	2.1
R2.2	1.4	1.9
R2.3	1.2	1.5
R2.4	1.0	1.3
R2.5	0.8	1.1
R2.6	0.5	0.6
R2.7	0.3	0.4
R2.8	0.2	0.3
R2.9	0.2	0.2
R2.10	0.1	0.2
Screening Criteria:	-	**10**

Predicted PCs are rounded as appropriate taking into consideration the level of accuracy of the model and data sources.

Table 5-8: Predicted Annual Mean Concentrations of NH_3 (μg/m³), Proposed Development Only PC and % Change at each Receptor (2027 traffic data, 2035 emissions factors)

Receptor	With Committed Development (μg/m³)	With Committed & Proposed Development (μg/m³)	PC (μg/m³)	Change (% of Critical Level)
R1.1	**2.8**	**2.8**	0.02	**2.5**
R1.2	**2.7**	**2.7**	0.02	**2.0**
R1.3	**2.5**	**2.6**	0.02	**1.5**
R1.4	**2.4**	**2.5**	0.01	**1.3**
R1.5	**2.4**	**2.4**	0.01	**1.1**
R1.6	**2.3**	**2.3**	0.01	0.6
R1.7	**2.2**	**2.2**	0.00	0.4
R1.8	**2.2**	**2.2**	0.00	0.3
R1.9	**2.1**	**2.1**	0.00	0.2
R1.10	**2.1**	**2.1**	0.00	0.1
R2.1	**2.7**	**2.8**	0.02	**2.2**
R2.2	**2.7**	**2.7**	0.02	**2.0**
R2.3	**2.5**	**2.5**	0.02	**1.5**
R2.4	**2.4**	**2.4**	0.01	**1.2**
R2.5	**2.4**	**2.4**	0.01	**1.0**
R2.6	**2.2**	**2.2**	0.01	0.5
R2.7	**2.2**	**2.2**	0.00	0.4
R2.8	**2.2**	**2.2**	0.00	0.3
R2.9	**2.1**	**2.1**	0.00	0.2
R2.10	**2.1**	**2.1**	0.00	0.1
Critical Level / Screening Criteria:	**1**		**-**	**1**

Exceedances of the critical level / screening criteria are shown in **BOLD**.
Predicted concentrations >70% of the critical level are shown in *italics*.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical levels.

Table 5-9: Predicted Future Annual Mean Nutrient Nitrogen Deposition Rates, Proposed Development Only PCs and % Change at each Receptor

Receptor	With Committed Development (kgN / ha / yr)	With Committed & Proposed Development (kgN / ha / yr)	PC (kgN / ha / yr)	Change (% of Critical Load)
R1.1	**41**	**41**	0.3	**1.7**
R1.2	**39**	**39**	0.2	**1.4**
R1.3	**38**	**38**	0.2	**1.1**
R1.4	**37**	**37**	0.1	0.9
R1.5	**36**	**36**	0.1	0.7
R1.6	**35**	**35**	0.1	0.4
R1.7	**34**	**34**	0.0	0.3
R1.8	**34**	**34**	0.0	0.2
R1.9	**34**	**34**	0.0	0.1
R1.10	**33**	**33**	0.0	0.1
R2.1	**40**	**40**	0.2	**1.6**
R2.2	**39**	**39**	0.2	**1.4**
R2.3	**38**	**38**	0.2	**1.1**
R2.4	**37**	**37**	0.1	0.8
R2.5	**36**	**36**	0.1	0.7
R2.6	**35**	**35**	0.1	0.4
R2.7	**34**	**34**	0.0	0.3
R2.8	**34**	**34**	0.0	0.2
R2.9	**34**	**34**	0.0	0.1
R2.10	**33**	**33**	0.0	0.1
Critical Load / Screening Criteria:	**15**		**-**	**1**

Exceedances of the critical level / screening criteria are shown in **BOLD**.
Predicted concentrations >70% of the critical level are shown in *italics*.
Predicted concentrations are rounded as appropriate taking into consideration the level of accuracy of the model and data sources as well as the relevant critical loads.

Further Discussion of Impacts

5.14 Predicted in-combination PCs and PECs (where applicable) indicate that parts of the 'Elsenham Woods' SSS1 set back from Hall Road will experience potentially significant impacts as a result of annual mean NO_x concentrations (restricted to within a maximum of within 50 m of Hall Road), 24-hour mean NO_x concentrations (restricted to within a maximum of within 20 m of Hall Road), annual mean NH_3 concentrations (restricted to within a maximum of within 200 m of Hall Road) and annual mean nutrient nitrogen deposition rates (restricted to a maximum of within 150 m of Hall Road). When the predicted PCs of the proposed development in isolation are considered, the indicated potential pollutants and areas of significant impacts are reduced to annual mean NO_x concentrations (restricted to a maximum of within 15 m of Hall Road), annual mean NH_3 concentrations (restricted to a maximum of within 50 m of Hall Road) and annual mean nutrient nitrogen deposition (restricted to a maximum of within 20 m of Hall Road).

5.15 The proposed development is not predicted to cause any additional exceedances of critical levels and / or critical loads in any scenario considered.

5.16 It should be taken into consideration that of the 'in-combination' total of 2,160 AADT, only a small percentage of this operational traffic (i.e. 14%) is directly associated with the proposed development. Furthermore, out of the total future flows travelling by the 'Elsenham Woods' SSSI, 22% are associated with committed development traffic and only 3.5% are associated with proposed development traffic. This being the case any adverse effects would occur predominantly as a result of committed developments and existing baseline traffic, not the proposed development.

5.17 It should also be noted that the Elsenham Woods SSSI covers an area of approximately 400,000 m^2 and only very a small proportion of this area is predicted to be affected by potentially non-significant impacts associated with the proposed (i.e. a maximum area of within 200 m of Hall Road when 'in-combination' impacts are considered, and a maximum area of within 50 m of Hall Road when the impacts of the proposed development in isolation are considered).

5.18 Finally, it is acknowledged that in order to provide a suitably robust and conservative assessment, several worst-case assumptions have been made (see Paragraphs 3.13 to 3.20 for further details). As such, there is a potential for the predicted concentrations and PCs to have been slightly over-estimated.

5.19 The potential effects as a result of emissions associated with operational development-generated traffic on the 'Eastend Wood' AW may be screened out as being 'not significant'. Taking into consideration that air quality impacts modelled receptors at the 'Eastend Wood' AW are considered to be more worst-case than at areas of AW located approximately 3.5 – 44 km to the south of the Site, it is also reasonable to screen out the potential effects of these AW sites as being 'not significant'.

6.0 MITIGATION

6.1 There is a potential for significant impacts to occur at a small proportion of the 'Elsenham woods' SSSI. As such, there is a potential for additional mitigation measures to be, unless it can be confirmed by an ecologist that the overall effect on the SSSI will be 'not significant'.

8.0 CONCLUSIONS

8.1 The potential impacts of emissions associated with operational traffic generated by the proposed residential development located at land south of Henham Road and committed developments in the nearby area on local sensitive ecological receptors have been assessed.

8.2 A detailed atmospheric modelling assessment has been undertaken in order to predict PCs and PECs of annual mean and 24-hour mean NO_x concentrations, annual mean NH_3 concentrations, annual mean nutrient nitrogen deposition rates and total acid deposition rates.

8.3 Operational traffic generated by the proposed development, both 'in-combination' with traffic generated by nearby committed developments and in isolation, exceeds the initial screening criteria for ecological impacts for annual mean NO_x, 24-hour mean NO_x ('in-combination' scenario only), annual mean NH_3 and annual mean nutrient nitrogen deposition within parts of the 'Elsenham Woods' SSSI set back from Hall Road (up to a maximum distance of within 200 m and 50 m for the 'in-combination' and 'proposed development in isolation' scenarios respectively). The proposed development is not predicted to cause any additional exceedances of critical levels and / or critical loads in any scenario considered.

8.4 The following factors should be taken into consideration in order to provide appropriate context to the model results:

- only a small percentage of 'in-combination' operational traffic (i.e. 14%) is directly associated with the proposed development. Furthermore, of the total modelled flows only 3.5% are associated with proposed development traffic. This being the case any adverse effects would occur predominantly as a result of emissions associated with the committed developments and existing baseline traffic;

- Elsenham Woods SSSI covers an area of approximately 400,000 m^2 and, therefore, only very a small proportion of this area has the potential to be adversely affected by the proposed development; and

- in order to provide a suitably robust and conservative assessment, several worst-case assumptions have been made. As such, there is a potential for the predicted concentrations and PCs to have been slightly over-estimated.

8.5 The potential effects as a result of emissions associated with operational development-generated traffic on the 'Eastend Wood' AW and areas of AW to the south of the Site may be screened out as being 'not significant'.

8.6 There is a potential for significant impacts to occur at a small proportion of the 'Elsenham woods' SSSI. As such, there is a potential for additional mitigation measures to be, unless it can be confirmed by an ecologist that the overall effect on the SSSI will be 'not significant'.

9.0 REFERENCES

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Appendix A Glossary

Abbreviations	Meaning
AADT	Annual Average Daily Traffic
ACE	Ardent Consulting Engineers
ADMS	Air Dispersion Modelling System
APIS	Air Pollution Information System
AQTAG	Air Quality Technical Advisory Group
BST	British Summer Time
CREAM	Centre of Research for Environmental Assessment and Management
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Diffusion Tube	A passive sampler used for collecting NO_2 in the air
EA	Environment Agency
EC	European Commission
EFT	Emission Factor Toolkit
EEA	European Environment Agency
EEC	European Economic Community
EMEP	European Monitoring and Evaluation Programme
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes, includes Heavy Goods Vehicles and buses
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LGV	Light Goods Vehicle
LLAQM	London Local Air Quality Management
NAEI	National Atmospheric Emissions Inventory
NE	Natural England
NH_3	Ammonia
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides, generally considered to be nitric oxide and NO_2. The main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles and natural gas used in gas-fired boilers.
NPPF	National Planning Policy Framework
O_3	Ozone
OGV	Other Goods Vehicle

Abbreviations	Meaning
PC	Process Contribution
PPG	Planning Practice Guidance
Receptor	A location where the effects of pollution may occur
SAC	Special Area of Conservation
TfL	Transport for London

Appendix B Model Inputs and Results Processing

B1 Model Inputs and Results Processing Tools

Model Version	ADMS-Roads v5.0.1, February 2022
British Summer Time (BST)	Adjustment for BST was made within the model, based on the following dates and times: BS BST begins – 01:00 on 31/03/2019 BST ends – 02:00 on 27/10/2019
Emission Factor Toolkit (EFT)	V10.1, August 2020 **(Defra, 2020c)**
Time Varying Emissions Factors	Based on Department for Transport (DfT) statistics, Table TRA0307: Motor Vehicle Traffic Distributed by Time of Day and Day of the Week on all roads, Great Britain:2019.
Meteorological Data	2019 hourly meteorological data from the Stansted Airport has been used in the model. The wind rose is shown in **Figure B.1**.
Latitude	51.5°
Surface Roughness	A value of 0.3 for 'Agricultural areas (max)' was used to represent the modelled area. A value of 0.05 was used to represent the meteorological station site.
Minimum Monin-Obukhov Length	A value of 10 for 'Small towns <50,000' was used to represent the modelled area. A value of 22.568 was used to represent the meteorological station site.

Surface Albedo	A value of 0.23 (default) was used to represent the modelled area. A value of 0.203 was used to represent the meteorological station site.
NO_x to NO_2 conversion	NO_2 from NO_x calculator version 8.1 **(Defra, 2020d)**
Background Maps	2018 reference year background maps **(Defra, 2020b)**
Deposition velocities used for ecological results processing:	NO_2 forest deposition velocity: 0.003 **(AQTAG, 2014)** NH_3 forest deposition velocity: 0.03 **(AQTAG, 2014)**

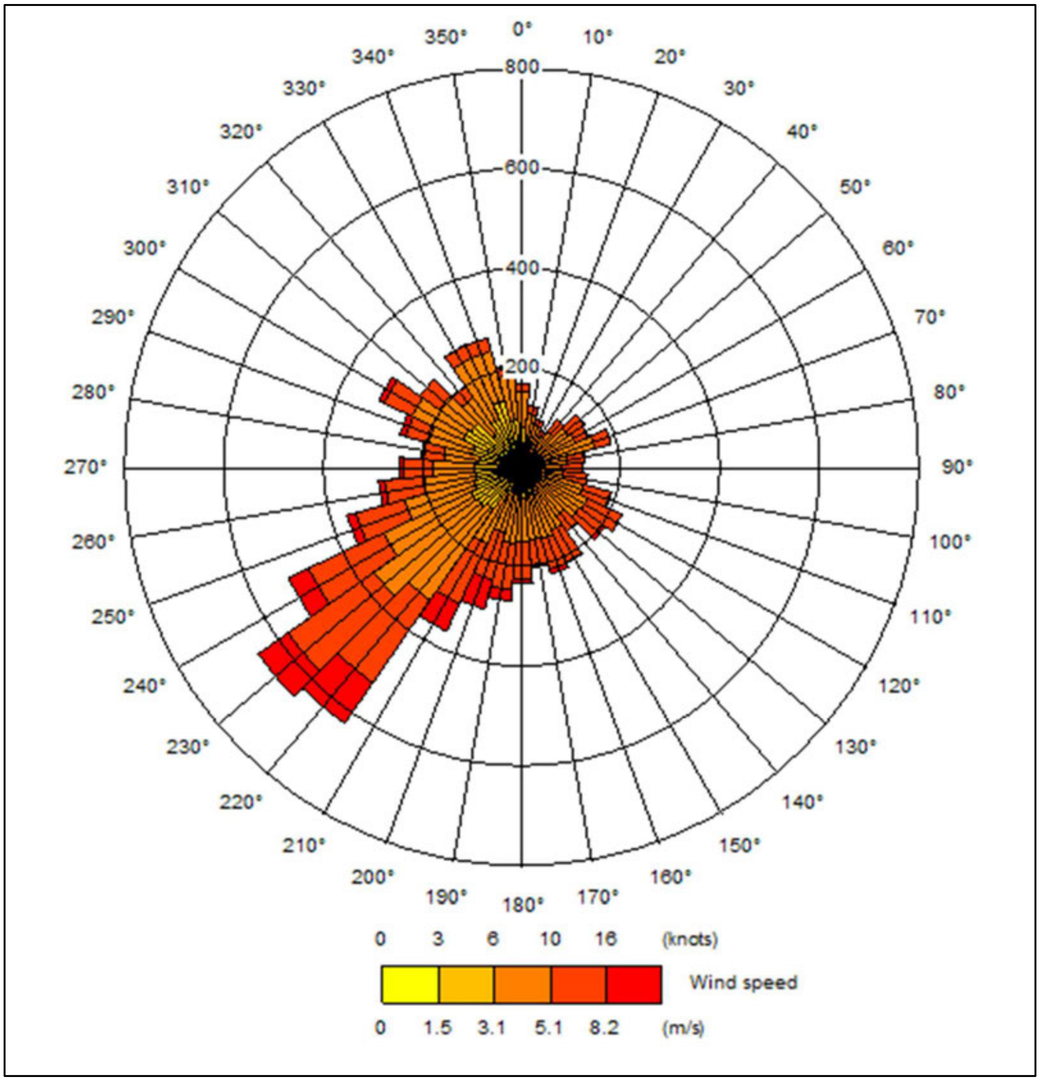

Figure B.1: 2019 Stansted Airport Wind Rose

Appendix C Traffic Data and Road Network

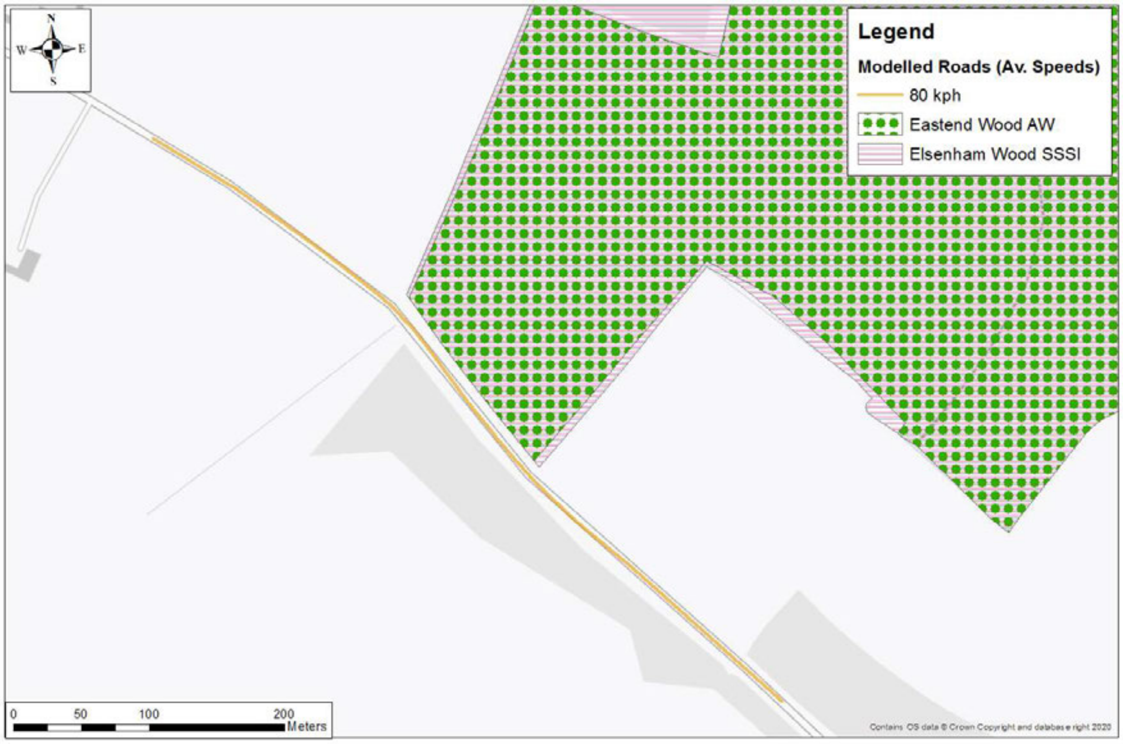

Figure C.1: Modelled Study Area Road Network (including 2027 'With Scheme' Scenario Average Speeds (kph))

Figure C.2: Modelled Study Area Traffic Volumes (2027 'With Scheme' Scenario)

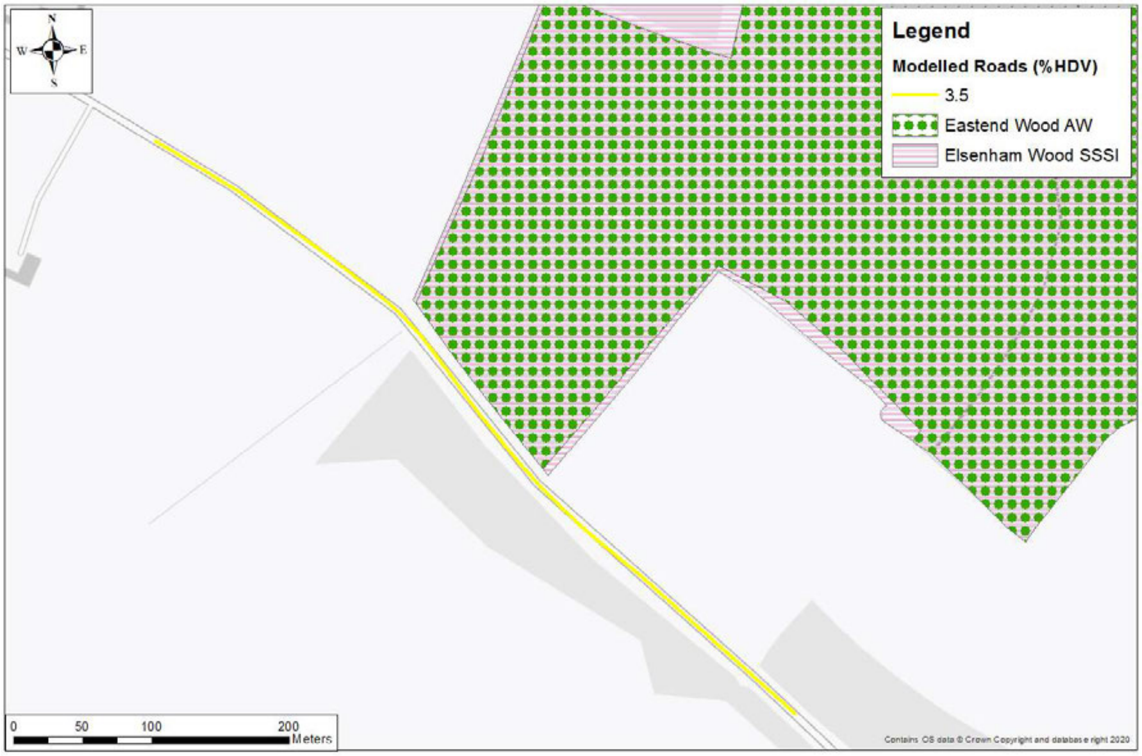

Figure C.3: Modelled Study Area %HDVs (2027 'With Scheme' Scenario)