FICHTNER

Consulting Engineers Limited

Stansted Logistics Facility

Wren Kitchens Ltd

Air Quality Assessment

ENGINEERING CONSULTING

Document approval

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Management Summary

Fichtner Consulting Engineers Ltd (Fichtner) has been engaged by Wren Kitchens Limited (the Client) to undertake an Air Quality Assessment (AQA) to support the planning application for the development of a logistics facility at Land at Tilekiln Green (the Proposed Development), within the administrative area of Uttlesford District Council (UDC).

Based on our analysis of the site and nature of the development the following have been identified as having the potential to have significant effects and as such have been considered within this assessment:

- Generation of dust as a result of construction activities; and
- Generation of exhaust pollutants from operational phase traffic.

The assessment has been carried out in a number of stages.

Review of Legislation and Planning Policy

In the UK, the levels of pollution in the atmosphere are controlled by a number of European Directives, which have been fully implemented, and by the National Air Quality Strategy. These have led to the setting of a number of Air Quality Assessment Levels (AQALs) for pollutants.

There is no prescriptive methodology for air quality assessment outlined in either the National Planning Policy Framework or Planning Practice Guidance. Therefore, practitioners are directed to use guidance provided by other non-governmental organisations. In this case the guidance published by the Institute of Air Quality Management (IAQM) has been applied. In addition, UDC has published a technical guidance document which details the requirements for air quality assessment.

This assessment has been carried out in accordance with the UDC Local Plan and Air Quality Technical Guidance which makes reference to the guidance from the IAQM.

Review of baseline conditions

A review of the local and national monitoring networks has shown that there are no monitoring sites representative of the Proposed Development and potentially affected receptor locations. Therefore, in lieu of this, national modelled background data has been used to determine the baseline concentrations at receptor locations for this assessment. Monitored background and roadside air quality data from nearby Takeley has been used to undertake model verification.

Assessment of dust generating construction activities

An assessment of the impact of dust generating construction activities has been undertaken using the guidance produced by the IAQM. This takes into account the type of activities undertaken and the number of sensitive receptors within set distances from these activities. The site is classified as a “high risk” site due to the location of a small number of high sensitivity receptors close to the boundary of the construction site. In accordance with the IAQM methodology measures have been recommended to ensure that effects are controlled to an acceptable level.

Assessment of operational phase vehicle emissions

An assessment of the impact of operational phase vehicle emissions has been undertaken using the guidance produced by the IAQM supported by detailed modelling. This has included off-site emissions and on-site emissions generated by vehicle movements within the Proposed Development.

The magnitude of change at all receptor locations is predicted to be 'negligible' for human health impacts and 'insignificant' for ecological impacts. Therefore, the overall significance of the effect of the vehicle emissions associated with the operational phase of the Proposed Development on local air quality is deemed to be 'not significant'.

Mitigation

As the Proposed Development is predicted to have a negligible effect on local air quality, only 'Type 1' mitigation measures as recommended in UDC's Air Quality Technical Guidance are required. The Proposed Development includes all recommended mitigation measures except a detailed Travel Plan. The mitigation measures include the provision of electric vehicle charging points as a greater proportion of total parking bays than is recommended by UDC. If a Travel Plan is required by UDC, the Client is amenable to the requirement being included as a suitably worded planning condition.

Summary

In summary, a comprehensive assessment of the impact of the Proposed Development has shown that this would not have a significant impact on local air quality. As such, there should be no air quality constraint to granting planning permission for the Proposed Development.

Contents

1 Introduction

1.1 Background

Fichtner Consulting Engineers Ltd (Fichtner) has been engaged by Wren Kitchens Limited (the Client) to undertake an Air Quality Assessment (AQA) to support the resubmission of the planning application for the development of a logistics facility at Land at Tilekiln Green (the Proposed Development), within the administrative area of Uttlesford District Council (UDC).

The original planning application (ref: UTT/21/0332/FUL) was submitted on 2nd February 2021. A consultation response was received from UDC's Environmental Health Officer (EHO) on 24th May 2021, which stated that an AQA would be required in accordance with UDC's Air Quality Technical Guidance. The planning application was subsequently withdrawn and resubmitted early in 2022.

This assessment has been produced to consider the effect of the development on local air quality. The following have the potential to have significant effects and as such have been considered within this assessment:

- Generation of dust as a result of construction activities; and
- Generation of exhaust pollutants from operational phase traffic.

1.2 Structure of the report

This report has the following structure:

- National and international air quality legislation and guidance, and local planning policies which relate to air quality, are considered in section 2.
- The assessment methodology is outlined in section 3.
- The baseline levels of ambient air quality are described in section 4.
- The sensitive receptors considered in the assessment are detailed in section 5.
- The impact of dust emissions during the construction phase is assessed in section 6..
- The impact of vehicle emissions during the operational phase is explained in section 7.
- The mitigation measures included in the design of the Proposed Development are detailed in section 8.
- The conclusions of the assessment can be found in section 9.
- The Appendices include illustrative figures and detailed assessment methodologies.

2 Legislation and Planning Policy Context

2.1 Legislation

European air quality legislation is consolidated under the Ambient Air Quality Directive (AAD) (Directive 2008/50/EC), which came into force on 11 June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides Ambient Air Directive (AAD) Limit Values for nitrogen dioxide, particulate matter (as PM_{10}) and a new AAD Target Value and Limit Value for fine particulates ($PM_{2.5}$).

The Air Quality Standards Regulations (2010) seek to transpose Directive 2008/50/EC within the United Kingdom (UK). The regulations also extend powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to local authorities for the implementation of these Directives. The UK Air Quality Strategy (2007)[1] is the method of implementation of the AAD Limit Values and Targets in England, Scotland, Wales and Northern Ireland. This document builds on the previous Strategy, published in 2000, and a 2003 Addendum. The UK Clean Air Strategy (CAS) (2019) builds on the UK Air Quality Strategy but does not update any relevant AAD Limit Values or Targets. However, the CAS sets out the actions required across all parks of the government to meet legally binding targets to reduce five key pollutants (fine articulate matter ($PM_{2.5}$), ammonia, oxides of nitrogen, sulphur dioxide, and non-methane volatile organic compounds (NMVOCs)) by 2020 and 2030 and secure health public health benefits. The CAS also makes a commitment to bring forward primary legislation on clean air as outlined in the Environmental Act.

The Air Quality Strategy includes two objectives for nitrogen dioxide, both of which are included in the Air Quality Directive.

- A limit for the one-hour mean of 200 µg/m^3, not to be exceeded more than 18 times a year (equivalent to the 99.79th percentile).
- A limit for the annual mean of 40 µg/m^3.

The Air Quality Directive includes objectives for the protection of sensitive vegetation and ecosystems of 30 µg/m³ for the annual mean nitrogen oxides (NOx). This is also transposed within the AQS. The Air Pollution Information System (APIS) website[2] also defines the daily mean Critical Level as 75 µg/m³ for NOx.

The Air Quality Strategy includes two objectives for PM_{10}, both of which are included in the Air Quality Directive.

- A daily limit of 50 µg/m^3, not to be exceeded more than 35 times a year (the 90.4th percentile).
- A limit for the annual mean of 40 µg/m^3.

The Air Quality Strategy includes an exposure reduction objective for $PM_{2.5}$ in urban areas and a Target Value for $PM_{2.5}$ of 20 µg/m³ as an annual mean. This Target Value is included in the Air Quality Directive.

The Environment Act 2021, passed in November 2021, will deliver key aspects of the UK's Clean Air Strategy. It has introduced a duty on the government to set a legally binding target for $PM_{2.5}$. Although the Environment Act does not stipulate the level it states that the Secretary of State lay a draft of the target for annual average levels of $PM_{2.5}$ before parliament by 31 October 2022. The

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, CM 7169 NIA 61/06-07, July 2007, DEFRA – para 17 of Volume 1.

[2] [redacted]

Environment Act also requires the government to set a target to reduce population exposure to $PM_{2.5}$.

The WHO set an annual mean $PM_{2.5}$ guideline value of 10 µg/m³ in 2005, which was updated to 5 µg/m³ in 2021. It is possible that the Secretary of State will set targets at either of the WHO recommendations or set an independently determined target. Whilst neither the 2005 nor 2021 WHO guideline values are currently legally binding, the impact of the Proposed Development against these guideline values has been considered in this assessment.

There are no objectives for ammonia contained within the AQS. However, The Environment Agency's guidance "Air emissions risk assessment for your EP[3]" (the Air Emissions Guidance) defines the short term EAL as 2,500 µg/m³ and the long term EAL as 180 µg/m³. As these values are far higher than those typically recorded at roadside locations in the UK, the effect of ammonia emissions on human health is considered negligible and has not been considered further in this assessment.

APIS also provides Critical Levels for ammonia for the protection of vegetation and ecosystems. This level is 3 µg/m³ as an annual mean, reduced to 1 µg/m³ where lichens or bryophytes are present.

For the remainder of this report these objectives, Target Values and Limits are collectively referred to as Air Quality Assessment Levels (AQALs). A summary of the AQALs and Critical Levels applicable to this assessment is presented in Table 1 and Table 2.

Table 1: Air Quality Assessment Levels (AQALs)

Pollutant	AQAL (µg/m³)	Averaging Period	Frequency of Exceedances	Source
Nitrogen dioxide	200	1 hour	18 times per year (99.79th percentile)	AAD Limit Value
	40	Annual	-	AAD Limit Value
Particulate matter (PM_{10})	50	24 hours	35 times per year (90.41st percentile)	AQS Objective
	40	Annual	-	AQS Objective
Particulate matter ($PM_{2.5}$)	20	Annual	-	AAD Limit Value
	10	Annual	-	WHO 2005 Guideline
	5	Annual	-	WHO 2021 Guideline

Table 2: Critical Levels for the Protection of Vegetation and Ecosystems

Pollutant	Concentration (µg/m³)	Measured as	Source
NOx (as nitrogen dioxide)	30	Annual mean	AAD Critical Level
	75	Daily mean	APIS
Ammonia	1	Annual mean where lichens and bryophytes are an important part of the ecosystem	APIS

[3] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

Pollutant	Concentration (µg/m³)	Measured as	Source
	3	Annual mean for all other plants	APIS

2.2 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) local authorities are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future ambient pollutant concentrations against AQALs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the local authority is required to declare an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutants levels in pursuit of the relevant AQALs.

2.3 Control of dust and emissions during construction

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting Regulations, which would include the project construction site, are those provided in Section 80 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

"any dust, steam, smell or other effluvia arising on industrial trade or business premises and being prejudicial to health or a nuisance."

Enforcement of the Act, in regard to nuisance, is under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the local authority is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Act requiring abatement and any necessary works to achieve it.

2.4 National Planning Policy Framework

In terms of air quality, paragraph 181 of the National Planning Policy Framework (NPPF) states:

"Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

The Planning Practice Guidance (PPG) was issued on-line on 6th March 2014 and will be updated by the Government as a live document. The latest update was on 1st November 2019. The Air Quality section of the PPG describes the circumstances when air quality, odour and dust can be a planning concern requiring assessment.

It states that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. It acknowledges that they could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation

(including that applicable to wildlife). The steps a local planning authority[4] might take in considering air quality are set out below:

"Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion with a Smoke Control Area; or extraction systems (including chimney) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.".*

Neither the NPPF nor the PPG is prescriptive on the methodology for assessing air quality effects or describing significance, practitioners continue to use guidance provided by Department for Environment Food and Rural Affairs (DEFRA) and non-governmental organisations, including the Institute of Air Quality Management (IAQM). However, it is recommended that the following forms part of an assessment[5]:

- *"a description of baseline conditions and any air quality concerns affecting the area, and how these could change both with and without the proposed development;*
- *sensitive habitats (including designated sites of importance for biodiversity;*
- *the assessment methods to be adopted and any requirement for the verification of modelling air quality;*
- *the basis for assessing impact and determining the significance of an impact;*
- *where relevant, the cumulative or in-combination effects arising from several developments;*
- *construction phase impacts;*
- *acceptable mitigation measures to reduce or remove adverse effects; and*
- *measures that could deliver improved air quality even when legally binding limits for concentrations of major air pollutants are not being breached."*

This assessment includes each of the above recommended aspects.

[4] The Planning Practice Guidance, Air Quality Section, paragraph 006, reference ID 32-006-20191101

[5] The Planning Practice Guidance, Air Quality Section, paragraph 007, reference ID 32-007-20191101

The PPG provides advice on how air quality impacts can be mitigated and notes[6]:

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

Examples of mitigation include:

- *maintaining adequate separation distances between sources of air pollution and receptors;*
- *using green infrastructure, in particular trees, where this can create a barrier or maintain separation between sources of pollution and receptors;*
- *appropriate means of filtration and ventilation;*
- *including infrastructure to promote modes of transport with a low impact on air quality (such as electric vehicle charging points);*
- *controlling dust and emissions from construction, operation and demolition; and*
- *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development".*

This mitigation measures recommended take into account the PPG in that they are proportional to the likely impact and take into account the local planning requirements to ensure the unacceptable risks are prevented.

2.5 UDC Air Quality Technical Guidance

UDC published an Air Quality Technical Guidance document in June 2018. This document details requirements for air quality assessments and measures to mitigate air quality impacts. In terms of assessment of air quality impacts, the guidance refers to the IAQM guidance detailed in section 3 of this report. This air quality assessment has been undertaken in accordance with the IAQM guidance and UDC's Technical Guidance. In addition, consideration has been given to the mitigation measures detailed in section 5 of the Technical Guidance to ensure that the Proposed Development is 'air quality neutral', as far as reasonably practical.

UDC's Air Quality Technical Guidance references the following Local Plan policies which are relevant to the Proposed Development, with the numbering referring to the original numbering of each item in the policy:

Policy EN16 Air Quality:

"1. Development will be permitted where… …It can be demonstrated that it does not lead to significant adverse effects on health, the environment or amenity from emissions to air;

Applicants must also demonstrate that:

3. There is no significant adverse effect on air quality in an Air Quality Management Area (AQMA) from the development;

5: Development has regard to relevant UDC Air Quality Technical Guidance.10

7. The development will not lead to an increase in emissions, degradation of air quality or increase in exposure to pollutants at or above the health based air quality objective;

[6] The Planning Practice Guidance, Air Quality Section, paragraph 008 Reference ID 32-008-20191101

9: The development promotes sustainable transport measures and use of low emission vehicles in order to reduce air quality impacts of vehicles."

Policy SP12 Environmental Protection (in relation to AQ):

"The Council will support development which ensures the prudent and sustainable management of the District's towns, villages and countryside by:-

- *employing best practice in sustainable design and construction*
- *promoting development which is located and designed to be energy efficient"*

Policy EN15 Pollutants:

"The potential impacts of exposure to pollutants must be taken into account in locating development, during construction and in use.

Planning permission will not be granted where the development and uses would cause adverse impact to occupiers of surrounding land uses or the historic and natural environment, unless the need for development is judged to outweigh the effects caused and the development includes mitigation measures to minimise the adverse effects."

Policy TA1 – Accessible Development:

"Development and transport planning will be co-ordinated to reduce the need to travel by car, increase public transport use, cycling and walking and improve accessibility and safety in the District while accepting the rural nature of the District. The overall need to travel (especially by car) to meet the day to day service needs will be minimised. Development proposals will be located in close proximity to services and make use of sustainable forms of travel (walking, cycling and public transport)."

Policy TA3 – Provision of Electric Charging Points for Vehicles

"The following provision of charging points will be required:

Other Development (>50 bays) – Further dedicated charging bays totalling 2% of the total provision."

Compliance with the relevant Local Plan policies has been considered as part of this assessment.

3 Assessment Methodology

3.1 Construction phase dust generating activities

There is the potential for dust to be released into the atmosphere as a result of construction and demolition phase activities. These fugitive dust emissions have been assessed on a qualitative basis in accordance with the methodology outlined within the IAQM guidance document 'Guidance on the assessment of dust from demolition and construction' (2014). This guidance sets out the methodology for assessing the air quality impacts of construction and demolition and identifies good practice for mitigating and managing air quality impacts. The quantity of dust emitted will be related to the area of land being worked and the nature, magnitude and duration of construction activities.

The assessment methodology is based on the risk of a site giving rise to dust impacts and the sensitivity of the surrounding area. Activities are divided into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

“Trackout” is a less well-known term. It is defined by IAQM as:

"The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when lorries leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when lorries transfer dust and dirt onto the road having travelled over muddy ground on site."

The assessment methodology considers three separate dust effects:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to significant increase in exposure to PM_{10} (particulate matter with a diameter less than 10 µm).

The first stage of the assessment of the impact of fugitive emissions of dust during construction is to determine whether the impact can be screened out as ‘negligible’, or whether a more detailed assessment is required. The IAQM recommends that the developer will normally be required to undertake a detailed assessment where there is:

- a human receptor within 350 m of the boundary of the Site;
- an ecological receptor within 50 m of the boundary of the Site; or
- a human or ecological receptor within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

A human receptor, in this context, is any location where a person may experience the annoyance effects of airborne dust or dust soiling or suffer exposure to PM_{10} over a period of time relevant to the AQALs. This includes:

- residential dwellings;
- schools;

- hospitals;
- care homes;
- hotels;
- gardens (where relevant public exposure is likely i.e. excluding extremities of gardens or front gardens); and
- sensitive commercial premises including vehicle showrooms, food manufacturers, and electronics manufacturers.

Ecological receptors should include European, UK and locally designated sites.

If the development can be screened out from undertaking a detailed assessment, the developer is to provide a clear description of the proposed demolition and construction activities, their location and duration, and any phasing of the development.

If a detailed assessment is required, the second stage is to assess the risk of dust effects arising. A site is allocated to a risk category based on two factors; dust emission magnitude; and the sensitivity of the area. These factors are combined to give the risk of dust impact. Full details of the methodology for assessing the risk of dust effects arising is presented in Appendix B.

The third stage is to define appropriate, site-specific, mitigation measures.

The final stage is to determine whether significant effects are likely. For almost all construction activities, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience has shown that this is normally possible through the implementation of suitable mitigation. Hence the residual effect would normally be 'not significant'.

3.2 Operational phase traffic emissions

In 2017 the IAQM published the guidance document "Land-Use Planning & Development Control: Planning for Air Quality" (referred to within this report as the IAQM 2017 guidance). This has been developed for professionals operating within the planning system. It provides them with a means of reaching sound decisions, having regard to the air quality implications of development proposals. The IAQM 2017 guidance states that an air quality assessment is required where a development would cause a "significant change" in Light Duty Vehicles < 3.5t (LDV) or Heavy Duty Vehicles >3.5 t (HDVs). The indicative criteria to progress to an assessment are:

- A change in LDV flows of:
  - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA; or
  - more than 500 AADT elsewhere.
- A change in HDV flows of:
  - more than 25 AADT within or adjacent to an AQMA; or
  - more than 100 AADT elsewhere.
- Realignment of a road by more than 5 m or introduce/remove a junction near to relevant receptors.

In addition, UDC's Air Quality Technical Guidance requires that an air quality assessment is required for proposals that would significantly alter the traffic composition in an area (e.g. by more than 25 HDVs AADT), i.e., the same screening criteria as presented in the IAQM 2017 guidance for proposals within or adjacent to an AQMA.

The traffic data provided by the Transport Consultant for the project (Inter-Modal), has shown that UDC's criteria would be exceeded as a result of the Proposed Development. In addition, the proposals include the re-alignment of Tilekiln Green and that the junction of Tilekiln Green and the B1256 be widened and moved slightly to the west. Therefore, the Proposed Development requires an air quality assessment under both UDC's and the IAQM's screening criteria.

Detailed dispersion modelling has been undertaken using the model ADMS Roads 5.0, developed and supplied by Cambridge Environmental Research Consultants (CERC). ADMS-Roads is routinely used for modelling of emissions of traffic for planning purposes. The model has been used to predict the concentration of pollutants on a long and short term basis at the identified sensitive receptors. The effect of vehicle movements within the Proposed Development has also been assessed by including area sources within the model. Full details of the modelling methodology are presented in Appendix C.

In order to investigate the impact of the Proposed Development on the surrounding area, the following modelling assessment scenarios have been considered:

- Scenario 1: 2018 baseline, including model verification.
- Scenario 2: 2023 do-minimum: including Tempro growth;
- Scenario 3: 2023 do-something: as scenario 2, plus the Proposed Development flows;
- Scenario 4: 2028 do-minimum; including Tempro growth; and
- Scenario 5: 2028 do-something: as scenario 4, plus the Proposed Development flows.

The impacts have been predicted for 2023 and 2028 to align with the scenarios presented in the Transport Assessment. The marginal effect of the Proposed Development is defined as the difference between the 'do-something' and 'do-minimum' scenarios.

3.2.1 Human health assessment criteria

The IAQM 2017 guidance includes the following matrix which should be used to describe the magnitude of impact based on the change in concentration relative to the AQAL and the overall predicted concentration with the scheme – i.e. the future baseline plus the process contribution.

Table 3: IAQM Magnitude of Change Descriptors

Long term average concentration at receptor in assessment year	**% change in concentration relative to AQAL**			
	1	**2 – 5**	**6 – 10**	**> 10**
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial

It is intended that the change in concentration relative to the AQAL (the process contribution) is rounded to the nearest whole number. Therefore, any impact which is between 0.5% and 1.5% will be classified as a 1% change in concentration.

The above table sets out the criteria for defining the magnitude of change. In accordance with the IAQM 2017 guidance, this considers the sensitivity of the receptor to additional pollution. The significance of the effect should then be determined based on professional scientific judgement taking into consideration the spatial extent of impacts and number of receptors impacted by the

Proposed Development. A 'moderate' or greater magnitude of change at a receptor location is classified as a significant effect for the purpose of this assessment.

This assessment has focused on the impact in relation to the annual mean AQALs for nitrogen dioxide, PM_{10} and $PM_{2.5}$. As outlined in section 2.1, there are also short term AQALs for nitrogen dioxide and PM_{10}. Local Air Quality Management Technical Guidance Note 16 (LAQM.(TG16)) states that if annual mean nitrogen dioxide concentrations are above 60 µg/m^3 (i.e. 150% of the AQAL), analysis should be undertaken of short term nitrogen dioxide concentrations as there is the potential for exceedances of the 1-hour AQAL.

With regard to daily mean PM_{10}, LAQM(TG16) states that the number of exceedances of the AQAL per year can be predicted from the annual mean concentration using the following relationship:

$$No.24-hour\ mean\ exceedances\ =$$
$$-18.5\ +\ 0.00145\ \times annual\ mean^3 +\ (206/annual\ mean)$$

If an exceedance of a short-term AQAL is predicted either using the criteria above based on annual mean concentrations, or from short-term modelled results, consideration is given to the change in short-term concentrations due to the Proposed Development. The criteria detailed in Table 3 are only designed to be used with annual mean concentrations. For short-term concentrations the IAQM 2017 guidance states that the following descriptors of change should be used to describe the severity of the impact:

- < 10% - negligible;
- 10 – 20% - slight;
- 20 – 50% - moderate; and
- > 50% - substantial.

The approach for assessing the impact of short-term emissions has been carried out in line with the IAQM 2017 guidance and does not consider the background concentrations as these are less important in determining the severity of impact for short-term concentrations.

3.2.2 Ecological assessment criteria

The Environment Agency's Air Emissions Guidance states that to screen out impacts as 'insignificant' at European and UK statutory designated sites:

- the long-term impact must be less than 1% of the long-term environmental standard (i.e. the Critical Level or Load); and
- the short-term impact must be less than 10% of the short-term environmental standard.

If the above criteria are met, no further assessment is required. If the long-term impact exceeds 1% of the long-term environmental standard, the total concentration must be calculated and compared to the standard. If the resulting total concentration is less than 70% of the long-term environmental standard, the emissions are 'insignificant' and further assessment is not required. In accordance with the guidance, calculation of the total concentration for short-term standards is not required.

The Air Emissions Guidance states further that to screen out impacts as 'insignificant' at local nature sites[7]:

- the long-term impact must be less than 100% of the long-term environmental standard; and
- the short-term impact must be less than 100% of the short-term environmental standard.

[7] National Nature Reserves (NNRs), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and ancient woodlands

In accordance with the Environment Agency guidance, calculation of the total concentration for local nature sites is not required. However, in 2020 the IAQM published the most recent version of the guidance document "A guide to the assessment of air quality impacts on designated nature conservation sites" (the IAQM 2020 guidance), which draws on the permitting guidance above, but states:

"For local wildlife sites and ancient woodlands, the Environment Agency uses less stringent criteria in its permitting decisions. Environment Agency policy for its permitting process is that if either the short-term or long-term PC is less than 100% of the critical level or load, they do not require further assessment to support a permit application. In ecological impact assessments of projects and plans, it is, however, normal practice to treat such sites in the same manner as SSSIs and European Sites, although the determination of the significance of an effect may be different. It is difficult to understand how the Environment Agency's approach can provide adequate protection."

As such, it is considered appropriate to apply the screening criteria for SSSIs and European Sites to local nature sites for the assessment of significance for planning.

4 Baseline Conditions

4.1 Description of site and surroundings

The Proposed Development is located close to junction 8 of the M11 near Stansted Airport in Essex, as shown in Figure 1 of Appendix A. In this section, we have reviewed the baseline air quality and defined appropriate baseline concentrations to be used within this assessment.

4.2 Air quality review and assessment

Local authorities are required to periodically review and assess air quality within their area of jurisdiction. The 2020 Air Quality Annual Status Report prepared by UDC, which is the most recent report available, shows that UDC has declared one AQMA (which is located in Saffron Walden), however, in 2019 no exceedances of any AQAL were recorded in UDC's administrative area. No traffic generated by the Proposed Development will travel through the Saffron Walden AQMA, and the traffic from the Proposed Development will disperse to very low levels before approaching any other AQMAs, so the effect of the Proposed Development on AQMAs has been screened out from further assessment.

4.3 National modelling – mapped background data

In order to assist local authorities with their responsibilities under LAQM, DEFRA provides modelled background concentrations of pollutants throughout the UK on a 1 km by 1 km grid. This model is based on known pollution sources and background measurements and is used by local authorities in lieu of suitable monitoring data. The mapped background data is calibrated against monitoring data. For instance, the 2018 mapped backgrounds are based on 2018 meteorological data and are calibrated against monitoring undertaken in 2018. Due to the proximity of the M11 and A120, a significant portion of the background nitrogen dioxide concentration in the local area is due to vehicle emissions from road sources. Emissions from vehicles are predicted to reduce as introduction of newer, cleaner vehicles are introduced to the fleet and older vehicles are removed. Therefore, background concentrations of nitrogen dioxide (and, to a lesser extent, PM_{10} and $PM_{2.5}$) in the vicinity of the Proposed Development are expected to decline in future years. A summary of the concentrations at the Proposed Development site (grid square X = 551500, Y = 221500) for 2018, 2023 and 2028 is presented in Table 4.

Table 4: Mapped Background Data - Concentrations at Proposed Development

Pollutant	Annual mean concentration (µg/m³)			Dataset
	2018	2023	2028	
Nitrogen dioxide	29.56	22.37	17.07	DEFRA 2018 Dataset
Oxides of nitrogen	44.80	32.14	23.66	DEFRA 2018 Dataset
Particulate matter (as PM_{10})	17.57	16.38	16.02	DEFRA 2018 Dataset
Particulate matter (as $PM_{2.5}$)	11.17	10.20	9.89	DEFRA 2018 Dataset

Source: © Crown 2022 copyright Defra via uk-air.defra.gov.uk, licenced under the Open Government Licence (OGL)

As shown, background nitrogen dioxide levels at the Proposed Development site are relatively high, at almost 75% of the AQAL in 2018. This is due to the proximity of both the M11 and Stansted Airport. The section of the M11 contained within the closest grid square to the Proposed

Development has been explicitly included in the dispersion modelling. To prevent double-counting of emissions, the contribution from the section of the M11 within the grid square has been removed. For nitrogen dioxide this has been calculated using DEFRA's NO_2 Adjustment for NOx Sector Removal Tool (v8.0), subtracting the 'motorway in' contribution in the tool, while particulate matter has been adjusted simply by subtracting the 'motorway in' contribution from the total concentration. The adjusted background concentrations are presented in Table 5.

Table 5: Mapped Background Data - Adjusted Concentrations at Proposed Development

Pollutant	Annual mean concentration (µg/m³)			Dataset
	2018	2023	2028	
Nitrogen dioxide	17.71	13.30	10.93	DEFRA 2018 Dataset
Oxides of nitrogen	24.64	17.89	14.45	DEFRA 2018 Dataset
Particulate matter (as PM_{10})	17.40	16.65	15.97	DEFRA 2018 Dataset
Particulate matter (as $PM_{2.5}$)	11.00	10.41	9.85	DEFRA 2018 Dataset

Source: © Crown 2022 copyright Defra via uk-air.defra.gov.uk, licenced under the Open Government Licence (OGL)

All sensitive receptors considered in this assessment lie within the same grid square as the Proposed Development, i.e., the grid square for which the data above is presented.

4.4 Automatic monitoring data

The UK Automatic Urban and Rural Network (AURN) is a country-wide network of air quality monitoring stations operated on behalf of the DEFRA. There are no AURN monitoring sites within 10 km of the Proposed Development. In addition, no automatic monitoring is undertaken within 10 km of the Proposed Development by UDC or the neighbouring local authority of Hertfordshire and Bedfordshire. As there are no representative local automatic monitoring locations, automatic monitoring data has not been considered further in this assessment.

4.5 Non-automatic monitoring data

UDC undertook non-automatic (diffusion tube) monitoring of nitrogen dioxide at 31 sites during 2019 and 2020, and at 28 sites during 2018. Of these, one roadside site and one rural site lie within 5 km of the Proposed Development. Monitoring results at these locations are presented in Table 6 below.

Table 6: Non-automatic Roadside Nitrogen Dioxide Monitoring Results (µg/m³)

Ref	X	Y	Type	Mapped bg - 2018	2016	2017	2018	2019	2020
UT024	554671	221010	Rural	18.69	17.01	15.49	13.06	11.39	8.97
UT034	556101	221243	Roadside	11.86	35.15	29.79	26.23	24.61	17.49

Source: Uttlesford District Council Annual Status Report 2021

As shown, the monitored concentrations were all below the AQAL of 40 µg/m³. The highest concentrations were recorded in 2016 and the monitored concentrations have shown a decreasing trend at both locations. This trend is likely to be exaggerated by the effect of the Covid-19 pandemic on traffic volumes in 2020. The 2020 monitoring data has not been used to inform the baseline air quality for this assessment as it is unlikely to be representative of long-term trends.

The background concentration for 2018 for the grid square containing the rural monitoring location UT024 has been extracted from the DEFRA background maps. The 2018 mapped background concentration of 18.69 µg/m³ is significantly higher than the monitored concentration. However, UT024 lies 10 m north of the adjoining grid square to the south, in which the 2018 mapped background concentration is much lower at 11.28 µg/m³. The A120 and Stansted Airport lie to the north of the UT024, which accounts for the elevated mapped background concentration in the grid square containing UT024. Overall, the mapped background concentrations are broadly consistent with the monitored concentration at UT024.

Monitoring location UT034 is the only roadside monitoring location available for model verification. The monitored concentration at UT024 is considered appropriate to provide the background concentration for model verification. Details of the model verification procedure are provided in Appendix D.

4.6 Summary

The analysis of baseline monitoring has shown that there are two non-automatic monitoring locations within 5 km of the Proposed Development. These have been used for model verification but are not representative of concentrations at the Proposed Development or the sensitive receptors considered in this assessment. Therefore, the adjusted mapped background concentrations presented in Table 5 have been applied as the background concentrations at all receptors considered in this assessment, noting that the contribution from the road sources has been explicitly modelled as part of this assessment.

5 Sensitive receptors

5.1 Human receptors

The AQALs only apply at locations where the public may be exposed to pollution for a sufficient period for there to be any measurable health effect. The averaging period and AQAL involved will determine which locations are considered to be sensitive receptors. For annual mean nitrogen dioxide and particulate matter AQALs, LAQM.TG(16) considers typical locations for sensitive receptors to include:

- Residential properties;
- Hospitals;
- Schools; and,
- Care homes.

There are relatively few sensitive receptors along Tilekiln Green and the B1256 along which vehicles associated with the Proposed Development will travel before joining the motorway network. The receptor selected are those where the impact of the Proposed Development is likely to be greatest. These are displayed in Figure 5 of Appendix A and set out in Table 7.

Table 7: Vehicle Emissions Sensitive Receptors

ID	Description	X (m)	Y (m)	Height (m)
R1	Accuro Care Services	551807	221497	1.5
R2	The Old Elm 1	551847	221454	1.5
R3	The Old Elm 2	551856	221423	1.5
R4	Brookside Front	551898	221328	1.5
R5	Brookside Rear	551883	221327	1.5

5.2 Ecological receptors

With regard to which ecological receptors should be included in an air quality assessment, The IAQM 2020 guidance references the Highways Agency Design Manual for Roads and Bridges (DMRB) guidance[8] which states:

> *"Internationally, nationally and locally designated sites of ecological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity (known as designated habitats) within 200m of the ARN [affected road network] shall be included in the air quality assessment."*

The only designated site within 200 m of the roads affected by the Proposed Development is the Flitch Way Local Nature Reserve (LNR). The extent of the LNR and the discrete receptor points used in the assessment are shown in Figure 5 of Appendix A, and the discrete receptor locations listed in Table 8.

[8] Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA 105 Air Quality. Highways Agency, 2019.

Table 8: Sensitive Ecological Receptors

ID	Site	Designation	Location (m)		
			X	Y	Height
E1	Flitch Way	LNR	551680	221227	0
E2			551723	221238	0
E3			551826	221262	0

Natural England describes the Flitch Way LNR as 'Rural and Urban fringe', and a review of the available information indicates that the Flitch Way LNR contains both woodland and grassland habitats. In addition to the Critical Levels for pollutants detailed in section 2.1, APIS defines nutrient nitrogen and acid deposition Critical Loads for different habitats. The Critical Loads applicable for the Flitch Way LNR have been obtained using the APIS 'search by location' tool and are presented in Table 9 and Table 10.

Table 9: Nitrogen Deposition Critical Loads

Habitat Type	NCL Class	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Background (kgN/ha/yr)
Grassland	Non-mediterranean dry acid and neutral closed grassland	10	15	17.36
Woodland	Broadleaved deciduous woodland	10	20	30.38

Table 10: Acid Deposition Critical Loads

Habitat Type	Acidity Class	Critical Load Function (keq/ha/yr)			Background (keq/ha/yr)	
		CLminN	CLmaxN	CLmaxS	N	S
Grassland	Acid Grassland	0.233	4.363	4.140	1.24	0.16
Woodland	Broadleafed/Coniferous unmanaged woodland	0.142	8.510	8.368	2.17	0.20

6 Construction Phase Impact Assessment

There are two aspects of the construction phase which will potentially affect air quality:

- Emissions from construction vehicles travelling to and from the site; and
- Dust emissions from on-site construction phase activities.

It is anticipated that the number of road vehicle movements generated by the construction phase will be lower than during the operational phase. In addition, the construction phase is temporary. Therefore, the assessment of operational phase vehicle emissions represents a 'worst-case' assessment, and any impacts due to construction phase road vehicle exhaust emissions will be less. Therefore, construction phase road vehicle emissions have not been considered further in this assessment.

The assessment of dust emissions during the construction phase has been undertaken in accordance with the methodology contained within Appendix B.

6.1 Stage one – screening

Figure 2 of Appendix A presents the site boundary proximity zones based on the methodology presented in Section 3.1. As shown, there are a number of residential properties with the specified distances from the site boundary and potential dust generation areas.

The IAQM methodology outlined in section 3.1 is based on:

- The risk category for the site – which is based on the type of activity and the distance to the nearest receptor; and
- The sensitivity of the area – which is based on the number of properties within certain distances of the boundary of the works.

The methodology assesses the significance of the site rather than the significance of the impact on an individual receptor. As such, individual receptors have not been identified. However, the following table outlines how many residential properties have been identified in the relevant distance bands. For clarity, the IAQM methodology states that one residential unit is one receptor.

For the assessment of trackout it has been assumed that no HGVs or tracked vehicles will need to access the site from the south along Tilekiln Green. Otherwise, no information is available yet regarding the routing of construction traffic, so it has been assumed that traffic will travel both east and west along the B1256. Traffic travelling west will access the Birchanger Green Roundabout (i.e., flyover section of M11 junction 8) where there are no sensitive receptors within 50 m of the road up to 500 m from the site access, so the receptor locations considered for the assessment of dust risks from trackout lie along Tilekiln Green and the B1256 east of the site.

Table 11: Dust Sensitive Receptors - Number of Residential Properties

Distance from the source (m)	Estimated number of human receptors	
	From main dust generating areas	From site access routes
<20	~3	~13
<50	~8	~30
<100	~15	-
<200	~30	-
<350	~50	-

Distance from the source (m)	Estimated number of human receptors	
	From main dust generating areas	From site access routes

Note:

Distance from site access routes is used in the assessment of trackout, and only receptors within 50m of the edge of the road (up to 500m from the Site entrance) need to be considered.

This shows there are a number of residential properties within the human receptor screening distances (i.e. within 350 m of the site boundary, or 50 m by any route used by construction vehicles on the public highway, up to 500 m from the site entrance). Residential dwellings are considered high sensitivity receptors because people would be expected to be continuously present and expect enjoyment of a high level of amenity.

The Flitch Way LNR is located within 20 m of the potential dust generation area. This is considered to be a low risk sensitivity receptor because it is a locally designated site. Due to its proximity to the Proposed Development this has been included in this assessment.

6.2 Stage two - risk of dust emissions

6.2.1 Description of activities

The Proposed Development site comprises mainly hardstanding for car and truck parking, and associated earthworks and landscaping. The total area of hardstanding and landscaping is approximately 30,000 m². As part of the Proposed Development it is also proposed to realign Tilekiln Green and its junction with the B1256. The potential for dust generation from these works has also been taken into account.

The site is currently undeveloped, so no demolition works will be required. The construction of buildings will be limited to small portacabins which will have a negligible risk of dust emissions; however, the laying of hardstanding has been considered to be a construction activity for the purpose of this assessment.

6.2.2 Dust emission magnitude

The dust emission magnitude is based on the scale of anticipated works and is classified as small, medium or large. The criteria for these definitions are set out in Appendix B.2.

As a worst-case It has been assumed that dust generating activities will occur in all parts of the site that will be developed. The dust emission magnitude for each type of activity has been assessed and is displayed in the following table.

Table 12: Dust emission magnitudes

Activity	Dust emission magnitude	Justification
Demolition	N/A	The site is currently undeveloped, so there will be no demolition activities during the construction phase. The impact of demolition activities does not need to be considered further in this assessment.

Activity	Dust emission magnitude	Justification
Earthworks	Large	The total area that may require earthworks is > 10,000 m^3. Although the quantity of material to be moved has not yet been established, the proposed landscaping suggests it may be significant and therefore the dust emission magnitude is deemed to be large.
Construction	Medium	The laying of hardstanding covers a large area >10,000 m^2, but is likely to generate less dust than the construction of buildings on an equivalent footprint. The dust emission magnitude has conservatively been deemed to be medium.
Trackout	Large	During the construction phase there are likely to be long stretches of unpaved road within the site, which could result in a large quantity of dust being deposited onto the public highway by vehicles exiting the site.

6.2.3 Sensitivity of area

The area has been assessed for its sensitivity to dust soiling effects, human health effects to PM_{10} and ecological effects, using the criteria set out in Section B.3. These are displayed for each type of dust emission activity:

Table 7: Sensitivity of the Area to Dust

Effect	Sensitivity	Justification
Earthworks and Construction		
Dust soiling	Medium	There are fewer than 10 high sensitivity human receptors (residential properties) located within 20 m of the dust generating areas.
Human health impacts	Low	The baseline PM_{10} concentrations for the area are less than 24 µg/m^3 and there are fewer than 10 residential properties within 20 m of the dust generating areas.
Ecological effects	Low	There is an ecological receptor within 20 m of the site, but due to its designation as a local nature reserve it is considered a low sensitivity receptor.
Trackout		
Dust soiling	High	There are more than 10 residential properties within 20 m of the routes used by construction vehicles on public highway up to 500 m from site entrance.
Human health impacts	Low	The baseline PM_{10} concentrations for the area are less than 24 µg/m^3 and there are fewer than 100 residential properties within 20 m of the routes used by construction vehicles on public highway up to 500 m from site entrance.
Ecological effects	Low	There are no ecological sites within 50 m of the routes used by construction vehicles on public highway up to 500 m from site entrance(s).

6.2.4 Summary

The risk of dust impacts from construction and earthworks is summarised as using the criteria outlined in Table 33. This is based on the dust emission magnitude and the sensitivity of the area.

Table 8: Summary of Dust Risk

Potential Impact	Demolition	Earthworks	Construction	Trackout
Dust Soiling	-	Medium Risk	Medium Risk	High Risk
Human Health	-	Low Risk	Low Risk	Low Risk
Ecological	-	Low Risk	Low Risk	Low Risk

6.3 Stage three – identification of mitigation measures

The dust assessment has identified that the highest risk category for the Proposed Development is 'high risk', for dust soiling effects from trackout. The IAQM guidance recommends that general mitigation measures be applied according to the highest risk rating for the site. Appendix C presents the mitigation measures recommended for the risk category of the site. These are indicative measures and the final measures to be implemented should be agreed with the construction contractor and UDC.

6.4 Stage four - summary

The assessment has screened out the need for a detailed assessment of dust impacts as a result of the demolition activities associated with the Proposed Development. When considering earthworks, construction and trackout activities the site has been assessed to be of high risk for dust soiling impact, and low risk for human health and ecological impact. Appropriate mitigation measures have been identified. It is considered that with the implementation of the measures identified any residual effect would not be significant.

7 Operational Phase Vehicle Emissions Impact Assessment

The impact of vehicle emissions associated with the operational phase of the Proposed Development has been assessed on a quantitative basis. The dispersion modelling has focused on the receptors along the roads for which there is an increase in vehicle movements as a result of the proposals, and receptors close to the Proposed Development site which may be affected by emissions from vehicle movements within the site itself.

7.1 Human health

The 2018 baseline concentrations for each pollutant are presented in Table 13 and the impact of the Proposed Development in the 2023 Opening Year and 2028 Future Year scenarios is presented in Table 14 to Table 17. This includes an assessment against the AQALs contained in UK legislation, and the WHO air quality guidelines for $PM_{2.5}$ (WHO-AQGs) listed in section 2.1.

Table 13: Annual Mean Baseline Concentrations (2018)

Receptor	Nitrogen dioxide			PM_{10}			$PM_{2.5}$				
	Bg (µg/m³)	Baseline (µg/m³)	Baseline (% AQAL)	Bg (µg/m³)	Baseline (µg/m³)	Baseline (% AQAL)	Bg (µg/m³)	Baseline (µg/m³)	Baseline (% AQAL)	Baseline (% 2005 WHO-AQG)	Baseline (% 2021 WHO-AQG)
R1	17.71	39.71	99.3%	17.40	20.17	50.4%	11.00	12.80	64.0%	**128.0%**	**256.0%**
R2	17.71	38.59	96.5%	17.40	20.05	50.1%	11.00	12.72	63.6%	**127.2%**	**254.3%**
R3	17.71	36.88	92.2%	17.40	19.69	49.2%	11.00	12.50	62.5%	**125.0%**	**250.0%**
R4	17.71	29.93	74.8%	17.40	18.85	47.1%	11.00	11.95	59.7%	**119.5%**	**239.0%**
R5	17.71	29.80	74.5%	17.40	18.81	47.0%	11.00	11.93	59.6%	**119.3%**	**238.6%**

Table 14: Annual Mean Nitrogen Dioxide

Receptor	Background	Do-minimum		Do-something		Impact		
	µg/m³	µg/m³	% AQAL	µg/m³	% AQAL	µg/m³	% AQAL	Impact Descriptor
2023 Opening Year								
R1	13.30	27.70	69.3%	27.90	69.8%	0.20	0.50%	Negligible
R2	13.30	26.78	67.0%	26.45	66.1%	0.22	-0.82%	Negligible
R3	13.30	25.57	63.9%	24.88	62.2%	-0.69	-1.73%	Negligible
R4	13.30	21.09	52.7%	21.31	53.3%	0.22	0.55%	Negligible
R5	13.30	21.01	52.5%	21.30	53.3%	0.29	0.72%	Negligible
2028 Future Year								
R1	10.93	19.72	49.3%	19.85	49.6%	0.13	0.33%	Negligible*
R2	10.93	19.16	47.9%	18.97	47.4%	-0.19	-0.48%	Negligible*
R3	10.93	18.43	46.1%	18.02	45.1%	-0.41	-1.03%	Negligible
R4	10.93	15.61	39.0%	15.80	39.5%	0.19	0.48%	Negligible*
R5	10.93	15.56	38.9%	15.81	39.5%	0.25	0.62%	Negligible

Note:
**Negligible irrespective of the total concentration*

Table 15: Annual Mean PM_{10}

Receptor	Background	Do-minimum		Do-something		Impact		
	µg/m³	µg/m³	% AQAL	µg/m³	% AQAL	µg/m³	% AQAL	Impact Descriptor
2023 Opening Year								
R1	16.31	18.98	47.5%	19.02	47.6%	0.04	0.09%	Negligible*
R2	16.31	18.87	47.2%	18.81	47.0%	-0.05	-0.13%	Negligible*
R3	16.31	18.51	46.3%	18.40	46.0%	-0.11	-0.27%	Negligible*
R4	16.31	17.70	44.2%	17.73	44.3%	0.03	0.08%	Negligible*
R5	16.31	17.66	44.2%	17.70	44.3%	0.04	0.10%	Negligible*
2028 Future Year								
R1	15.98	18.70	46.7%	18.74	46.8%	0.04	0.09%	Negligible*
R2	15.98	18.58	46.5%	18.53	46.3%	-0.05	-0.14%	Negligible*
R3	15.98	18.21	45.5%	18.10	45.3%	-0.11	-0.28%	Negligible*
R4	15.98	17.39	43.5%	17.42	43.6%	0.03	0.08%	Negligible*
R5	15.98	17.35	43.4%	17.39	43.5%	0.04	0.10%	Negligible*

Note:
**Negligible irrespective of the total concentration*

Table 16: Annual Mean $PM_{2.5}$ – Assessment Against AQAL

Receptor	Background	Do-minimum		Do-something		Impact		
	µg/m³	µg/m³	% AQAL	µg/m³	% AQAL	µg/m³	% AQAL	Impact Descriptor
2023 Opening Year								
R1	10.13	11.74	58.7%	11.77	58.8%	0.02	0.12%	Negligible*
R2	10.13	11.67	58.3%	11.64	58.2%	-0.03	-0.15%	Negligible*
R3	10.13	11.46	57.3%	11.40	57.0%	-0.06	-0.32%	Negligible*
R4	10.13	10.97	54.8%	10.99	55.0%	0.03	0.13%	Negligible*
R5	10.13	10.95	54.7%	10.98	54.9%	0.03	0.16%	Negligible*
2028 Future Year								
R1	9.85	11.46	57.3%	11.49	57.4%	0.02	0.11%	Negligible*
R2	9.85	11.39	56.9%	11.36	56.8%	-0.03	-0.15%	Negligible*
R3	9.85	11.18	55.9%	11.12	55.6%	-0.06	-0.31%	Negligible*
R4	9.85	10.69	53.5%	10.72	53.6%	0.02	0.12%	Negligible*
R5	9.85	10.67	53.4%	10.70	53.5%	0.03	0.16%	Negligible*

Note:
**Negligible irrespective of the total concentration*

Table 17: Annual Mean $PM_{2.5}$ - Assessment against 2005 WHO Air Quality Guideline

Receptor	Background	Do-minimum		Do-something		Impact		
	µg/m³	µg/m³	% 2005 WHO-AQG	µg/m³	% 2005 WHO-AQG	µg/m³	% 2005 WHO-AQG	Impact Descriptor
2023 Opening Year								
R1	10.13	11.74	**117.4%**	11.77	**117.7%**	0.02	0.23%	Negligible*
R2	10.13	11.67	**116.7%**	11.64	**116.4%**	-0.03	-0.30%	Negligible*
R3	10.13	11.46	**114.6%**	11.40	**114.0%**	-0.06	-0.63%	Moderate Beneficial
R4	10.13	10.97	**109.7%**	10.99	**109.9%**	0.03	0.25%	Negligible*
R5	10.13	10.95	**109.5%**	10.98	**109.8%**	0.03	0.33%	Negligible*
2028 Future Year								
R1	9.85	11.46	**114.6%**	11.49	**114.9%**	0.02	0.23%	Negligible*
R2	9.85	11.39	**113.9%**	11.36	**113.6%**	-0.03	-0.30%	Negligible*
R3	9.85	11.18	**111.8%**	11.12	**111.2%**	-0.06	-0.63%	Moderate Beneficial
R4	9.85	10.69	**106.9%**	10.72	**107.2%**	0.02	0.25%	Negligible*
R5	9.85	10.67	**106.7%**	10.70	**107.0%**	0.03	0.32%	Negligible*

Note:

**Negligible irrespective of the total concentration*

Table 18: Annual Mean $PM_{2.5}$ - Assessment against 2021 WHO Air Quality Guideline

Receptor	Background	Do-minimum		Do-something		Impact		
	µg/m³	µg/m³	% 2021 WHO-AQG	µg/m³	% 2021WHO-AQG	µg/m³	% 2021 WHO-AQG	Impact Descriptor
2023 Opening Year								
R1	10.13	11.74	**234.9%**	11.77	**235.3%**	0.02	0.46%	Negligible*
R2	10.13	11.67	**233.4%**	11.64	**232.8%**	-0.03	-0.61%	Negligible*
R3	10.13	11.46	**229.2%**	11.40	**227.9%**	-0.06	-1.27%	Moderate Beneficial
R4	10.13	10.97	**219.4%**	10.99	**219.9%**	0.03	0.50%	Negligible*
R5	10.13	10.95	**219.0%**	10.98	**219.6%**	0.03	0.66%	Negligible*
2028 Future Year								
R1	9.85	11.46	**229.2%**	11.49	**229.7%**	0.02	0.46%	Negligible*
R2	9.85	11.39	**227.8%**	11.36	**227.2%**	-0.03	-0.60%	Negligible*
R3	9.85	11.18	**223.6%**	11.12	**222.3%**	-0.06	-1.26%	Moderate beneficial
R4	9.85	10.69	**213.8%**	10.72	**214.3%**	0.02	0.49%	Negligible*
R5	9.85	10.67	**213.4%**	10.70	**214.1%**	0.03	0.65%	Negligible*

Note:

**Negligible irrespective of the total concentration*

7.1.1 Assessment against AQALs

As shown, no exceedances of any annual mean AQAL are predicted in any scenario, although the modelled nitrogen dioxide concentration exceeds 90% of the AQAL at receptors R1 – R3 in the 2018 baseline scenario. The majority of the contribution at these locations is from the M11, and the modelled 2023 do-minimum concentration does not exceed 70% of the AQAL, indicating that there is currently no potential for exceedance of the annual mean AQAL at the receptor locations considered (in the absence of the Proposed Development).

As the maximum modelled annual mean nitrogen dioxide concentration is well below 60 µg/m³, there is no potential for exceedance of the hourly mean AQAL in accordance with the criteria detailed in section 3.2.

The maximum predicted PM_{10} concentration at a receptor location is 20.17 µg/m³, which occurs in the 2018 baseline scenario. Applying the formula in section 3.2, the predicted number of exceedances of the daily mean AQAL per year is 3.6, well below the 35 exceedances allowable. Therefore, there is no potential for any exceedance of a short-term AQAL, either with or without the Proposed Development in place.

7.1.2 Assessment against WHO $PM_{2.5}$ guideline values

Although the WHO guideline values are not currently included in UK legislation, this assessment has considered the impact of the Proposed Development against these lower WHO guideline values as a conservative measure.

The results show that exceedances of the guideline values for $PM_{2.5}$ are predicted for the 2018 baseline year. For $PM_{2.5}$ this is due to the 2018 background concentration of 11.0 µg/m³ which is 110% of the 2005 guideline value and 220% of the 2021 guideline value.

Exceedances of the annual mean guideline values for $PM_{2.5}$ are predicted at all receptors in all scenarios, albeit concentrations are predicted to decrease slightly from the 2018 baseline values. These exceedances for $PM_{2.5}$ occur because the baseline (i.e., background plus existing traffic contribution) already exceeds the guideline values, and are not caused by the operation of the Proposed Development.

7.1.3 Description of impacts

As shown in Table 14 to Table 18 the Proposed Development is predicted to result in a slight increase in concentrations at R1, R4 and R5, and a slight reduction in concentrations at R2 and R3 (The Old Elm on Tilekiln Green). The reduction at R2 and R3 is due to the proposed realignment of Tilekiln Green, which results in vehicle emissions from Tilekiln Green being moved further away from the receptor locations.

However, when compared against the AQALs, in all scenarios the increase or reduction in concentrations for all pollutants is described as ‘negligible’ in accordance with the assessment criteria in Table 3, as the change in concentrations either rounds to 1% of the AQAL or less with the total concentration being less than 94.5% of the AQAL, or rounds to 2-5% of the AQAL with the total concentration being less than 75.5% of the AQAL. For particulate matter as PM_{10} and $PM_{2.5}$ the impact at all receptor locations is less than 0.5% of the AQAL and is described as ‘negligible’ irrespective of the total concentration.

When compared against the annual mean WHO 2005 or 2021 guideline values, the increase or reduction in concentrations of $PM_{2.5}$ at all receptor locations is less than 0.5% of the guideline values and is described as 'negligible' irrespective of the total concentration, except for the reduction at R3 which is described as 'moderate beneficial'.

7.2 Ecological impact

7.2.1 Airborne emissions

The impact of the Proposed Development on airborne NOx and ammonia (NH_3) concentrations at the three discrete receptor locations within the Flitch Way LNR is presented in Table 19. Background concentrations for the assessment of ecological impacts would usually be taken from APIS; however, this dataset does not include a prediction of background concentrations for future years. Therefore, the background concentrations of NOx have been taken from the DEFRA 2018 dataset as presented in Table 5, while it has been assumed that the ammonia background concentrations taken from APIS do not decrease in future years as a conservative measure. Exceedances of the Critical Level or the screening criteria in section 3.2.2 are highlighted.

Table 19: Impact on Annual Mean NOx Concentrations at Flitch Way LNR

Receptor	2023 opening year				2028 future year			
	Impact		Total conc.		Impact		Total conc.	
	µg/m³	% CL	µg/m³	% CL	µg/m³	% CL	µg/m³	% CL
E1	0.15	0.49%	34.53	**115.11%**	0.11	0.35%	24.25	80.84%
E2	0.18	0.61%	33.89	**112.95%**	0.14	0.45%	23.87	79.55%
E3	0.39	**1.29%**	32.30	**107.66%**	0.33	**1.10%**	22.82	76.08%

Table 20: Impact on Maximum Daily NOx Concentrations at Flitch Way LNR

Receptor	2023 opening year				2028 future year			
	Impact		Total conc.		Impact		Total conc.	
	µg/m³	% CL	µg/m³	% CL	µg/m³	% CL	µg/m³	% CL
E1	2.89	3.85%	240.8	**321.1%**	2.27	3.02%	149.3	**199.0%**
E2	3.46	4.61%	239.0	**318.6%**	2.73	3.65%	148.4	**197.9%**
E3	9.19	**12.25%**	261.2	**348.2%**	8.42	**11.23%**	162.3	**216.4%**

Table 21: Impact on Annual Mean Ammonia Concentrations at Flitch Way LNR

Receptor	2023 opening year				2028 future year			
	Impact		Total conc.		Impact		Total conc.	
	µg/m³	% CL	µg/m³	% CL	µg/m³	% CL	µg/m³	% CL
E1	0.006	0.18%	2.721	90.71%	0.006	0.19%	2.879	95.98%
E2	0.007	0.23%	2.685	89.51%	0.007	0.23%	2.837	94.58%
E3	0.013	0.42%	2.591	86.35%	0.013	0.43%	2.726	90.87%

The impact is below 1% of the long-term and 10% short-term screening criteria at all receptor locations in all scenarios and can be screened out as 'insignificant' in accordance with the assessment criteria detailed in section 3.2.2, except for:

- Annual mean NOx at E3; and
- Maximum daily NOx at E3.

The Proposed Development results in a maximum impact of 1.29% of the annual mean Critical Level at E3 in the 2023 opening year scenario, decreasing to 1.10% in the 2028 future year scenario. In addition, the Critical Level is predicted to be exceeded in 2023, but the concentration is predicted to decrease such that the total concentration is below the Critical Level before 2028. As the impact cannot be screened out, commentary on the significance of effect has been provided by Ecology Solutions, the ecology consultant for the project. This is included as Appendix E. The most likely impacts due to NOx will be deposition of nitrogen contained in nitrogen dioxide. A summary of the predicted effect of nitrogen deposition is presented in section 7.5.

The total maximum daily mean concentration exceeds the short-term Critical Level of 75 µg/m³ in all scenarios. However, in the IAQM 2020 guidance states that the Critical Level of 75 µg/m³ is applicable where concentrations of ozone or sulphur dioxide are also at or above their Critical Levels. The IAQM 2020 guidance continues:

> *"Ozone and sulphur dioxide concentrations are typically low in the UK compared to many other countries… …given the low UK sulphur dioxide concentrations IAQM consider it is most appropriate to use 200 µg/m³ as the short term critical level."*

Applying 200 µg/m³ as the Critical Level, the Critical Level is predicted to be exceeded in the 2023 Opening Year scenario, but concentrations are predicted to fall to below the Critical Level by 2028. Furthermore, the impact of the Proposed Development at E3, which is 9.19 µg/m³ in 2023 and 8.42 µg/m³ in 2028, is well below 10% of the Critical Level of 200 µg/m³ and is screened out as 'insignificant'.

7.3 Deposition of emissions

Emissions of NOx and ammonia can also affect ecological habitats via nutrient nitrogen and acid deposition. The deposition calculation is detailed below.

7.3.1 Calculation methodology – nitrogen deposition

The impact of deposition has been assessed using the methodology detailed within the Habitats Directive AQTAG 06[9] (March 2014). The steps to this method are as follows.

1. Determine the annual mean ground level concentrations of nitrogen dioxide.
2. Calculate the dry deposition flux (µg/m^2/s) at each site by multiplying the annual mean ground level concentration by the relevant deposition velocity presented in Table 22.
3. Convert the dry deposition flux into units of kgN/ha/yr using the conversion factors presented in Table 22.
4. Compare this result to the nitrogen deposition Critical Load.

[9] Air Quality Advisory Group, AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air, March 2014

Table 22: Deposition Factors

Pollutant	Deposition Velocity (m/s)		Conversion Factor (µg/m²/s to kg/ha/year)
	Grassland	Woodland	
Nitrogen dioxide	0.0015	0.003	96.0
Ammonia	0.0200	0.030	259.7

7.3.2 Calculation methodology – acidification

Deposition of nitrogen can cause acidification. The steps to determine the acid deposition flux are as follows.

1. Determine the dry deposition rate in kg/ha/yr of nitrogen (from both nitrogen dioxide and ammonia) using the methodology outlined in Section 7.3.1.
2. Apply the conversion factor for N outlined in Table 23 to the nitrogen deposition rate in kg/ha/year to determine the total keq N/ha/year.
3. Plot the results against the Critical Load functions.

Table 23: Deposition Factors

Pollutant	Conversion Factor (kg/ha/year to keq/ha/year)
Nitrogen	Divide by 14

The contribution from the Proposed Development has been calculated using the APIS formula:

Where total nitrogen (N) Deposition < CLminN:

Deposition as % of CL function = Sulphur (S) deposition / CLmaxS

Where PEC N Deposition > CLminN:

PC as % of CL function = (PC S + N deposition) / CLmaxN

The above formula means that, where total nitrogen deposition is less than CLminN, any incremental nitrogen contribution would not result in acidification of the habitat. However, as shown in Table 10 at the Flitch Way LNR, the background nitrogen acid deposition already exceeds CLminN, so additional nitrogen will contribute to acidification of the habitats.

7.3.3 Results – deposition of emissions

The results of the deposition analysis at the Flitch Way LNR are presented in Table 24. The maximum contribution at any of the three receptor points assessed (which occurs at E3) has been presented as a percentage of the Critical Loads presented in Table 9 and Table 10.

Table 24: Detailed Results – Deposition

Habitat	Deposition velocity	Impact					
		NO_2 µg/m³	NH_3 µg/m³	Nitrogen deposition		Acid deposition	
				kgN/ha/yr	% of lower Critical Load	keq/ha/yr	% of CLmaxN
2023 Opening Year							
Acid Grassland	Grassland	0.20	0.013	0.094	0.94%	0.0067	0.15%
Woodland	Woodland			0.156	**1.56%**	0.0111	0.13%
2028 Future Year							
Acid Grassland	Grassland	0.17	0.013	0.092	0.92%	0.0066	0.15%
Woodland	Woodland			0.150	**1.50%**	0.0107	0.13%

As shown, the process contribution is less than 1% of Critical Loads, except for nitrogen deposition at woodland habitats. At E3 the maximum predicted nitrogen deposition rate is 1.56% of the lower Critical Load (in the 2023 Opening Year scenario). The total rate of nitrogen deposition is predicted to be 39.63 kgN/ha/yr, which is 396.3% of the Critical Load. As the impact cannot be screened out and the background deposition already exceeds the Critical Load, further assessment is required by a qualified ecologist. Commentary on the effect of nitrogen deposition has been provided by Ecology Solutions. This is included as Appendix E. A summary of the predicted effect of nitrogen deposition as assessed by Ecology Solutions is presented in section 7.5.

The impact of the operation of the Proposed Development on nitrogen deposition rates for grassland habitats, and acid deposition rates on grassland and woodland habitats, can be screened out as 'insignificant'.

7.4 Source apportionment

The 'do-something' scenarios include the impact of emissions from off-site vehicle movements on the public highway as a result of the proposals and the re-alignment of Tilekiln Green (off-site sources), and emissions from on-site vehicle movements within the Proposed Development. The relative contributions of off-site traffic and the realignment of Tilekiln Green compared to on-site vehicle movements has been calculated. The results presented in Table 25 show the relative contributions from off-site and on-site emissions. These have been calculated for annual mean NOx only without conversion to nitrogen dioxide.

Table 25: Comparison of Impact of Off-Site and On-Site Sources – Annual Mean NOx (µg/m³)

Receptor	2023 opening year		2028 future year	
	Off-Site	On-Site	Off-Site	On-Site
R1	0.20	0.06	0.12	0.05
R2	-0.53	0.11	-0.33	0.09
R3	-1.04	0.16	-0.64	0.14
R4	0.06	0.21	0.04	0.19
R5	0.07	0.28	0.05	0.26
E1	0.02	0.07	0.01	0.05

Receptor	2023 opening year		2028 future year	
	Off-Site	On-Site	Off-Site	On-Site
E2	0.03	0.09	0.02	0.07
E3	0.05	0.20	0.03	0.18

As shown, at R2 and R3 the contribution is dominated by a reduction in concentrations due to the realignment of Tilekiln Green. The on-site sources make a contribution at all receptors, but off-site road sources dominate at R1 and on-site sources make a greater relative contribution at R4 and R5 and at ecological receptors E1, E2 and E3. This is expected, as R4 and R5 and E1-E3 are located fairly close to the Proposed Development, and almost no development traffic is predicted to travel south along Tilekiln Green past R4 and R5.

7.5 Significance of effect

The significance of effect has been assessed using professional judgement, taking into account the results of the assessment in relation to the IAQM 2017 criteria.

Regarding human health effects, no exceedance of any AQAL is predicted. The magnitude of change at all receptor locations is predicted to be 'negligible' for all pollutants in both the 2023 Opening Year and 2028 Future Year scenarios.

Eexceedances of the WHO guideline values for $PM_{2.5}$ are predicted. The WHO guideline values are more stringent than the AQALs included in UK legislation. Even so, the impact of the Proposed Development is described as 'negligible' when assessed against the WHO guideline values, except for annual mean concentrations of $PM_{2.5}$ at R3, where the realignment of Tilekiln Green results in a reduction in concentrations and a 'moderate beneficial' impact. This in isolation is not viewed as a significant benefit of the scheme, particularly as the WHO guideline values are not currently included in UK legislation.

Regarding ecological effects, the impact of airborne emissions and deposition on the Flitch Way LNR can be screened out as 'insignificant' in all scenarios, except for annual mean NOx and nitrogen deposition at E3. The most likely pathway for a significant effect due to NOx is via the contribution from nitrogen dioxide to nitrogen deposition. Ecology Solutions, the ecologist for the project, has assessed the significance of effect of nitrogen deposition (included as Appendix E). Ecology Solutions has concluded that:

> *"The predicted effects of Nitrogen deposition should be considered as not significant given the existing background concentrations generated from the motorway, as well as other considerations. The background concentration is already at a high level and the addition of this development, downwind of the LNR/LWS in the prevailing wind direction, is not considered significant in this context. The LNR/LWS is some 25m to the south of the proposed development area at its closest point in the southwest of the site (the southeast area is further away from the LNR/LWS boundary), and the former railway line is sited on an embankment. Moreover, there is existing intervening woodland between the proposed development boundary and the boundary of the LNR/LWS, and further new planting is to be established as part of the landscape strategy.*
>
> *For these reasons it is reasonable to conclude that air quality effects on the LNR/LWS should be considered not significant."*

Based on the above, the air quality effect of the operation of the Proposed Development is considered to be 'not significant'.

8 Mitigation

The risk of dust impacts during the construction phase of the Proposed Development has been assessed in accordance with IAQM guidance. The site has been assessed to be a 'high risk' site. Appropriate mitigation measures have been recommended to control dust emissions during the construction phase (see Appendix C). With the implementation of appropriate mitigation measures, it is considered that any residual effect would not be significant.

The impact of the operational phase of the Proposed Development on local air quality has been assessed in accordance with IAQM guidance as 'negligible' at all human receptors and 'insignificant' at all ecological receptors. As such, the overall effect has been assessed as 'not significant'. Section 5 of UDC's Air Quality Technical Guidance splits mitigation measures into 'Type 1' and 'Type 2' measures, with Type 1 mitigation appropriate for small scale developments and those classified as having a negligible impact following an air quality assessment. Therefore, the Type 1 mitigation measures listed in the Technical Guidance are appropriate for the Proposed Development. A summary of the Type 1 mitigation measures listed is provided below:

- Secure cycle storage;
- Points suitable for charging plug-in vehicles. It is recommended that points are provided at the rate of 1 point per 10 spaces.
- Provision of a Travel Plan for employees.

The following mitigation measures are included in the design of the Proposed Development:

- A secure cycle shelter with 20 cycle parking spaces;
- 13 electric HGV charging points; and
- 20 car electric vehicle charging points.

The Client has confirmed that if a Travel Plan is required, they would not object to an appropriately worded planning condition requiring that such a document be provided.

According to the Transport Assessment, the Proposed Development would be expected to generate approximately 217 one-way HGV movements per week. Assuming these all occur on weekdays, this equates to 43 HGVs accessing the site daily. Therefore, the provision of 13 HGV charging points would allow for 1 in 3 of the HGVs accessing the site daily to be charged at any one time, well above the 1 in 10 requirement. Electric HGVs are currently a developing technology. The provision of HGV charging points will 'future-proof' the Proposed Development for the Client's planned investment in a high-tech and low carbon electric urban fleet, as detailed in the Planning Statement for the Proposed Development.

For car parking spaces, 20 of the 107 spaces proposed (approximately 1 in 5) will include an electric vehicle charging point. Again, this is above the 1 in 10 requirement.

As detailed in the Transport Assessment, the traffic generation figures for the Proposed Development are based on figures from the existing temporary operations at Stansted Airport, and do not take into account the mitigation measures detailed above. The emissions factors used in the assessment (detailed in Appendix D) are based on the assumption that the uptake of electric vehicles will be the same as in the general UK fleet mix. Therefore, the assessment has not taken into account the additional electric vehicle uptake that will result from the provision of on-site electric vehicle charging points, or the effect of the Client's investment in a low carbon electric HGV fleet. As such, although the assessment has concluded that the effect of the operational phase on air quality will be 'negligible' and 'not significant', the residual effect will be even less if the effect of the proposed mitigation measures were to be accounted for.

9 Conclusions

This Air Quality Assessment has been undertaken to support the planning application for the development of a logistics facility at Land at Tilekiln Green.

The following air quality effects have been considered in this assessment:

1. Generation of dust as a result of construction activities; and
2. Generation of exhaust pollutants from operational phase traffic.

In conclusion:

1. The assessment of dust generating activities has deemed that the site is of high risk for dust soiling and low risk for human health effects and ecological effects. Suitable mitigation measures have been recommended and with the implementation of these measures the effect of the construction phase on air quality will not be significant.
2. The assessment of the impact of vehicle emissions at receptors against the AQALs set in UK legislation has predicted that the magnitude of change at all human receptor locations is 'negligible'. Therefore, the overall significance of the effect of the vehicle emissions associated with the operational phase of the Proposed Development on local air quality is deemed to be 'not significant'.
3. The impact at the identified ecological site, the Flitch Way LNR, has concluded that impact on airborne ammonia and acid deposition can be screened out as 'insignificant'. The impact on airborne NOx and nitrogen deposition cannot be screened out as 'insignificant', so the significance of effect has been assessed by Ecology Solutions. The conclusion of the assessment is that the effect will be 'not significant'.
4. The assessment has not taken into account the effect of any mitigation measures embedded in the design of the Proposed Development. With the implementation of these mitigation measures, the impact of the operational phase of the Proposed Development will be even less than presented in this assessment.

As the impact of the Proposed Development is 'negligible' at all receptor locations and the overall significance of effect is 'not significant', the Proposed Development is considered to comply with all national and local planning policies with regard to air quality impacts. In addition, the provision of the mitigation measures detailed in section 8 shows that the design of the Proposed Development promotes sustainable transport measures, the use of low emission vehicles, and best practice sustainable design. The Proposed Development is therefore compliant with the relevant UDC Local Plan policies SP12, EN15, TA1 and TA3 (as detailed in section 2.5).

In summary, this assessment has shown that the Proposed Development will not have a significant impact on local air quality. As such, there should be no air quality constraint to granting planning permission for the Proposed Development.

Appendices

A Figures

Legend

Site boundary

Client:	Wren Kitchens
Site:	3349-02 Air Quality Assessment
Project:	Stansted Logistics Centre
Title:	

Figure 1: Site Location

Drawn by: Stuart Nock	Date: 17/01/2022

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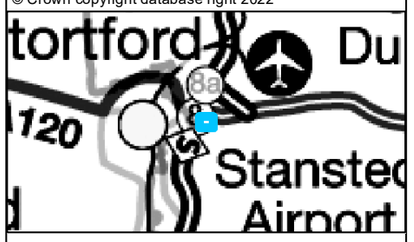

0 0.02 0.04 0.08 km

Scale: 1:2,000

N

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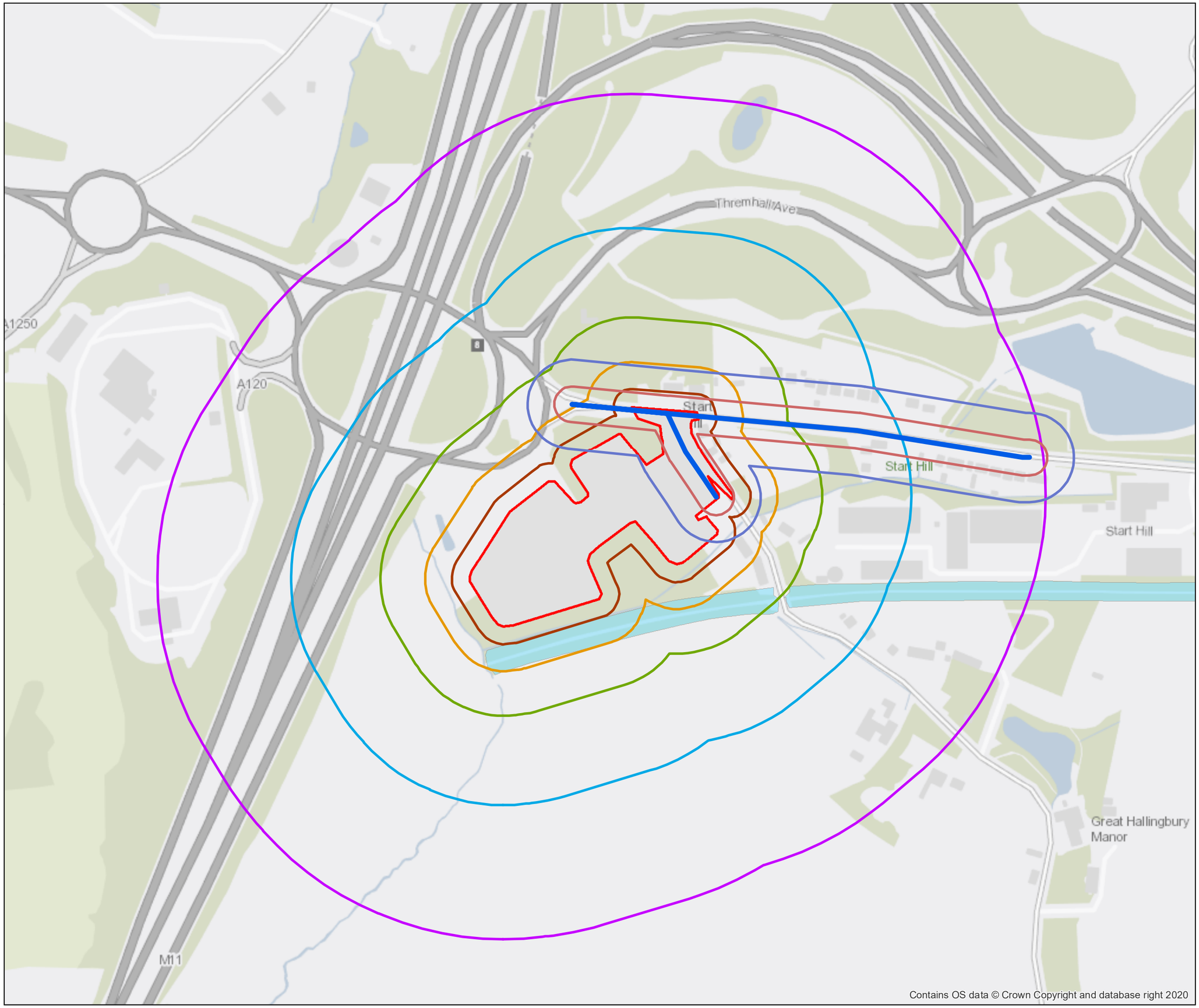
Stockport, Cheshire, SK4 1LW
Tel: 0161 476 0032
Fax: 0161 474 0618



Legend

- Potential dust generating area
- 350 m dust screening
- 200 m dust screening
- 100 m dust screening
- 50 m dust screening
- 20 m dust screening
- Potential trackout routes
- 20 m trackout dust screening
- 50 m trackout dust screening
- Flitch Way LNR

Client:	Wren Kitchens
Site:	3349-02 Air Quality Assessment
Project:	Stansted Logistics Centre
Title:	Figure 2: Dust Generation Proximity Zones
Drawn by: Stuart Nock	Date: 17/01/2022

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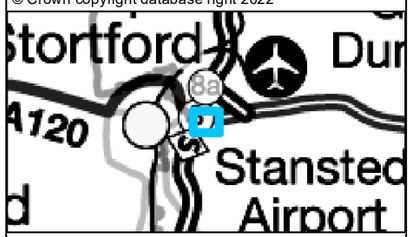

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N

Scale: 1:4,000

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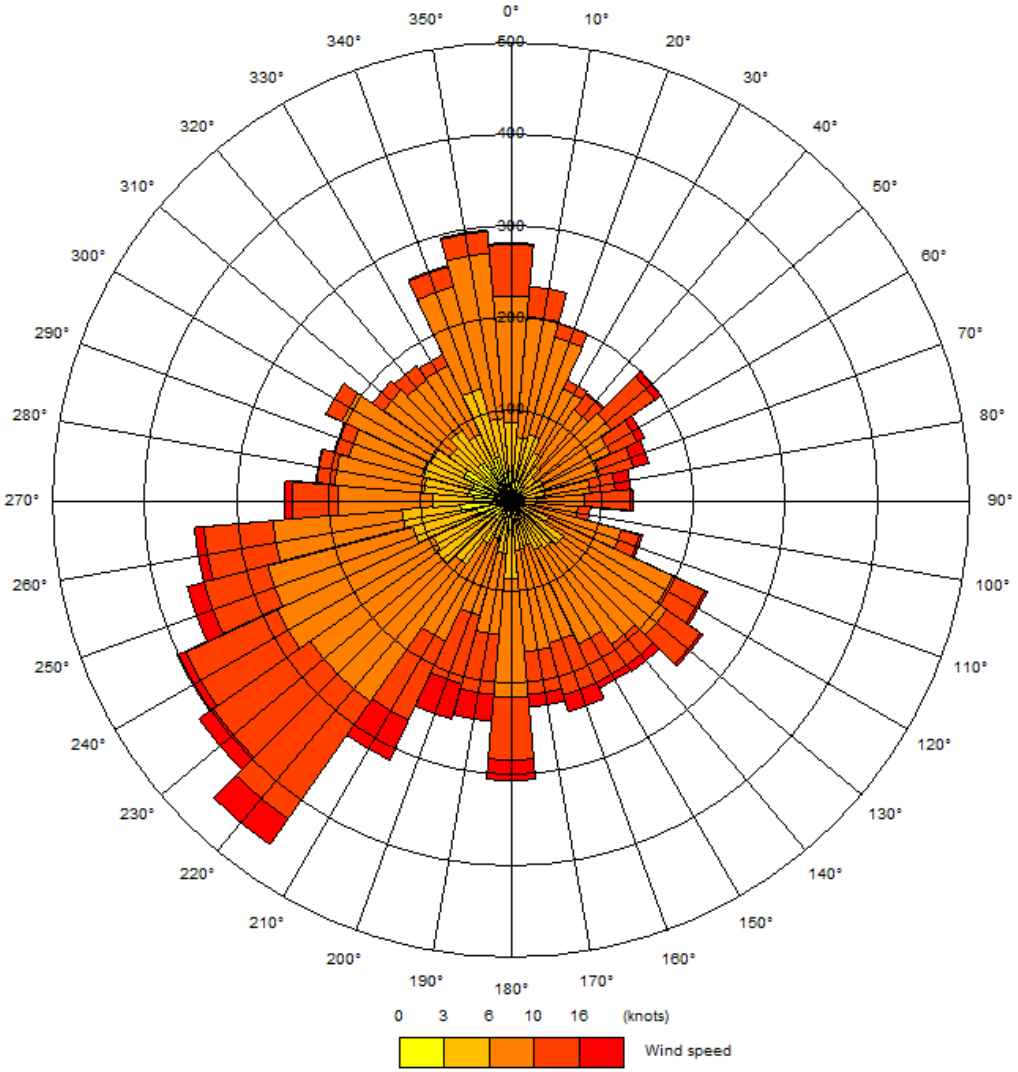
Figure 3: Wind Rose Stansted 2018



552500

555000

222000

219500

UT024

UT034

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Legend

- Monitoring locations
- Site boundary
- 10 kph
- 20 kph
- 40 kph
- 48 kph
- 56 kph
- 69 kph
- 112 kph

Client:	Wren Kitchens
Site:	3349-02 Air Quality Assessment
Project:	Stansted Logistics Centre
Title:	

Figure 4: Modelled Road Network

Drawn by: Stuart Nock	Date: 17/01/2022

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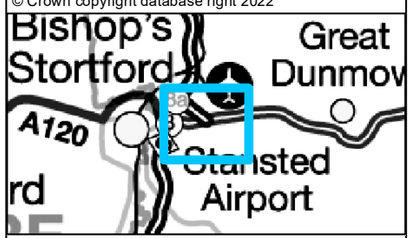

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Scale: 1:17,000

N

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Legend

- Site boundary
- Car parking area
- Truck parking areas
- 10 kph
- 20 kph
- 40 kph
- 56 kph
- 69 kph
- 112 kph
- Human receptors
- Flitch Way LNR - discrete receptors
- Flitch Way LNR

Client:	Wren Kitchens
Site:	3349-02 Air Quality Assessment
Project:	Stansted Logistics Centre
Title:	

Figure 5: Modelled Area Sources and Sensitive Receptor Locations

Drawn by: Stuart Nock	Date: 17/01/2022

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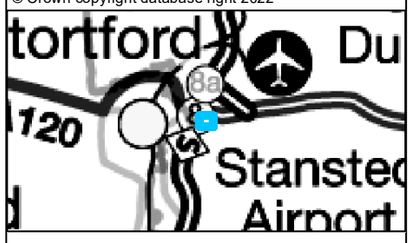

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Scale: 1:2,000

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B Construction Phase Dust Assessment Methodology

B.1 Background

The assessment is based on the risk of a construction site giving rise to dust impacts and the sensitivity of the surrounding area. The risk of dust emissions from a construction site causing loss of amenity and / or health or ecological effects is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc.);
- The duration of these activities;
- The size of the Site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of the receptors to dust.

The quantity of dust emitted is related to the area of land being worked and the level of construction activities, in terms of the nature, magnitude and duration of those activities. The wind direction, wind speed and rainfall at the time when a construction activity is taking place will also influence whether there is likely to be a dust impact. Atmospheric conditions which promote adverse impacts can occur in any direction from a site. However, adverse impacts are more likely to occur downwind of the prevailing wind direction and / or close to the worked areas. Impacts are also more likely to occur during drier periods as rainfall acts as a natural dust suppressant.

For developments where a detailed assessment is required, a risk category is determined based on two factors;

1. dust emission magnitude (Table 1); and
2. the sensitivity of the area (Tables 2, 3, 4, 5, 6 and 7).

These factors are combined to give the risk of dust impacts (Table 8) in the absence of any mitigation measures.

B.2 Dust emission magnitude

The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium or Large. The following are example of how the potential dust emissions magnitude for different activities can be defined:

Table 26: Dust Emission Magnitude Criteria

Magnitude	Description
Demolition Activities	
Large	total building volume > 50,000m^3, potentially dusty construction material (i.e. concrete), on-site crushing and screening, demolition activities > 20m above ground level
Medium	total building volume 20,000 - 50,000m^3, potentially dusty construction material, demolition activities 10 – 20m above ground level

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

Only receptors within 50 m of the routes(s) used by vehicles on the public highway and up to 500 m from the Site entrance(s) are considered to be at risk from the effects of dust.

B.3 Sensitivity of the area

The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees or other vegetation, to reduce the risk of wind-blown dust.

The type of receptors at different distances from the site boundary or, if known, from the dust generating activities, should be included. Consideration should also be given to the number of `human receptors'. Exact counting of the number of `human receptors' is not required. Instead the guidance recommends that judgement is used to determine the receptors (a residential unit is one receptor) within each distance band.

There is no unified sensitivity classification scheme that covers the different potential effects on property, human health and ecological receptors. However, the following guidance is provided on the sensitivity of different types of receptors. For the sensitivity of people and their property to soiling, it is recommended that professional judgement is used to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the principles presented in Table 27.

Table 27: Sensitivity to Dust Soiling Effects

Sensitivity	Justification
High	Users can reasonably expect an enjoyment of a high level of amenity; or The appearance, aesthetics or value of their property would be diminished by dust deposition; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land. Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.
Medium	Users would expect to enjoy a reasonable level of amenity but would not reasonably expect to enjoy the same level of amenity as in their home; or The appearance, aesthetic or value of their property could be diminished by dust deposition; or The people or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land; Indicative examples include parks and places of work.
Low	The enjoyment of amenity would not reasonably be expected; or Property would not reasonably be expected to be diminished in appearance, aesthetics or value by dust deposition; or There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short-term car parks and roads.

For the sensitivity of people to the health effects of PM_{10} the IAQM Guidance recommends that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period as presented in Table 28.

Table 28: Sensitivity to Heath Effects of PM10

Sensitivity	Justification
High	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
Medium	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24- hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
Low	Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets

Table 29 provides an example of possible sensitivities of receptors to ecological effects.

Table 29: Sensitivity to Ecological Effects

Sensitivity	Justification
High	Locations with an international or national designation and the designated features may be affected by dust deposition; or Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain. Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or Locations with a national designation where the features may be affected by dust deposition. Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	Locations with a local designation where the features may be affected by dust deposition. Indicative example is a local Nature Reserve with dust sensitive features.

Table 30, Table 31 and Table 32 show how sensitivity of the area should be determined for dust deposition, human health and ecosystem impacts respectively. The sensitivity of these is then derived for construction, earthworks and trackout.

Table 30: Sensitivity of the Area to Dust and Soiling Impacts 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
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 31: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	No. of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 - 32 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 – 28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28 – 32 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24 - 28 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 32: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

B.4 Risk of dust impacts

The dust magnitude and sensitivity of the area are then combined using the following matrices to determine the risk of impacts with no mitigation applied. For the cases where the risk category is 'negligible', no mitigation measures beyond those required by accepted best practice would be necessary.

Table 33: Risk of Dust Impacts – Level of Mitigation Required

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

C Construction Dust Mitigation Measures

The maximum dust emission risk category for the site has been assessed to be 'high risk'. The following mitigation measures are highly recommended for 'high risk' sites in the IAQM guidance. The actual measures to be implemented should be site-specific and confirmed by the construction contractor using professional judgment.

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) account-able for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

Dust Management:

- Develop and implement a Dust Management Plan (DMP) as part of a Construction Environmental Management Plan (CEMP).

Site Management:

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

Monitoring:

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and maintaining the site:

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is 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.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel:

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations:

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management:

- Avoid bonfires and burning of waste materials.

Measures specific to construction (for sites with ‘medium risk’ of dust impacts from construction):

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Measures specific to trackout (for sites with ‘high risk’ of dust impacts from construction):
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Cover vehicles entering and leaving sites 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.
- Access gates to be located at least 10 m from receptors where possible.

D Vehicle Emissions Modelling Methodology

D.1 Model used

All traffic modelling was undertaken using the ADMS-Roads (version 5.0) dispersion modelling package. The ADMS-Roads model is a version of ADMS, which was developed by Cambridge Environmental Research Consultants (CERC) and is commonly used throughout the UK for environmental assessment purposes. ADMS-Roads is routinely used for modelling of emissions for planning purposes to the satisfaction of local authorities.

D.2 Input data

The model requires input data that details the following parameters:

- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Discrete receptor points;
- Meteorological data;
- Roughness length; and,
- Monin-Obukhov length.

D.2.1 Traffic flow dHata

24-hour AADT flows and HDV numbers have been provided by Inter-Modal, the transport consultant for the project, for the following scenarios:

- Scenario 1: 2018 baseline;
- Scenario 2: 2023 do-minimum: including Tempro growth;
- Scenario 3: 2023 do-something: as scenario 2, plus the Proposed Development flows;
- Scenario 4: 2028 do-minimum; including Tempro growth; and
- Scenario 5: 2028 do-something: as scenario 4, plus the Proposed Development flows.

Inter-Model has provided traffic flow data for Tilekiln Green and the B1256, including vehicle speeds obtained from Automated Traffic Count (ATC) points. Traffic data has been obtained from the Department for Transport (DfT) website[10] for a wider road network to allow emissions from nearby major roads (the M11 and A120) to be modelled, and to allow model verification using air quality monitoring data from Takeley. The traffic flows obtained from the DfT website for 2018 have been increased by the following growth factors which were provided by Inter-Modal:

- 2018 – 2023: 1.082
- 2018 – 2028: 1.138

The traffic data used in the assessment is presented in Table 34.

[10] https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints

Table 34: Traffic Data (AADT)

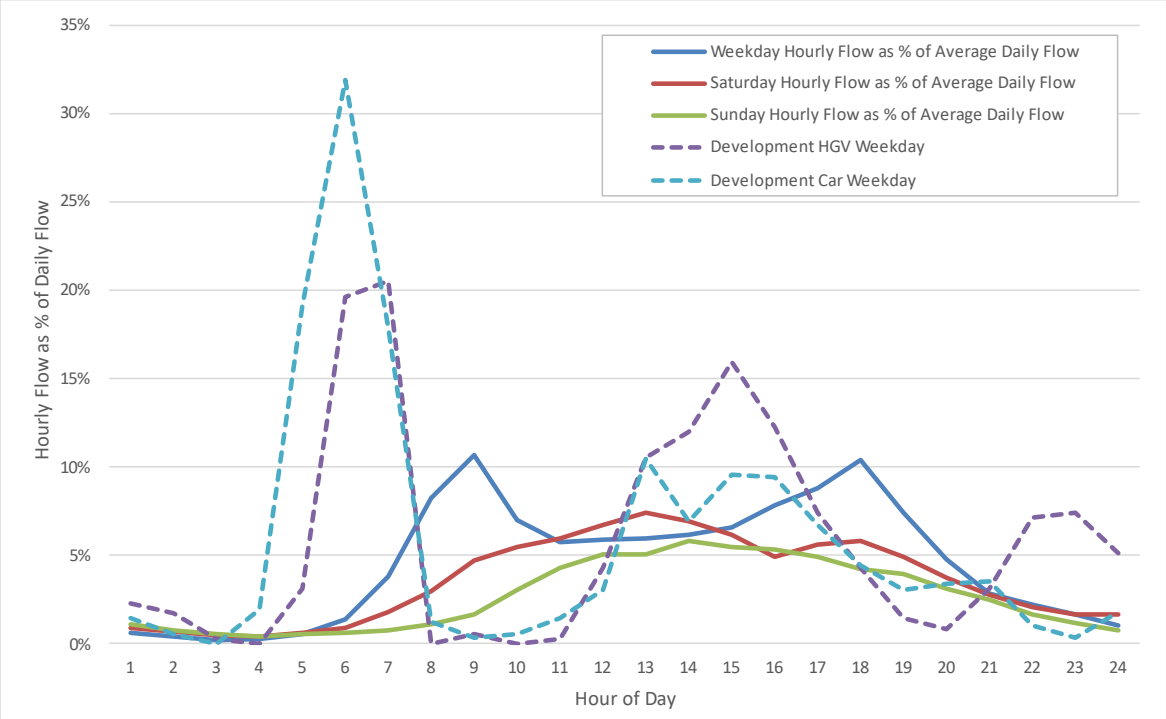
Road link	Speed (kph)	Baseline 2018		Do-min 2023		Do-min 2028		Development trips		Do-something 2023		Do-something 2028	
		LDVs	HDVs	LDVs	HDVs	LDVs	HDVs	LDVs	HDVs	LDVs	HDVs	LDVs	HDVs
Tileklin Green N of site	20	2,723	328	2,947	355	3,100	373	215	62	3,162	417	3,315	435
Tileklin Green S of site	56	2,723	328	2,947	355	3,100	373	9	-	2,956	355	3,109	373
B1256 E of Tilekiln Green	69	8,613	1,073	9,320	1,161	9,805	1,222	13	-	9,333	1,161	9,818	1,222
B1256 W of Tilekiln Green	69	12,127	823	13,123	891	13,805	937	202	62	13,325	953	14,007	999
B1256 E of Takeley	48	7,808	277	8,449	300	8,889	315	13	-	8,462	300	8,902	315
Parsonage Road, Takeley	48	4,248	293	4,597	317	4,836	334	-	-	4,597	317	4,836	334
A120	112	62,402	3,313	67,525	3,585	71,038	3,772	-	-	67,525	3,585	71,038	3,772
M11 South of J8	112	96,719	11,489	104,660	12,432	110,105	13,079	-	-	104,660	12,432	110,105	13,079
M11 N of J8	112	56,183	11,677	60,796	12,636	63,959	13,293	-	-	60,796	12,636	63,959	13,293
M11 J8 Flyover	40	37,265	2,068	40,324	2,238	42,422	2,354	101	31	40,425	2,269	42,523	2,385

The modelled vehicle speed on free-flowing road sections has been taken from traffic count data presented in the Transport Assessment. Where this information is not available, the vehicle speed has been assumed to be the speed limit. Junction approaches have been modelled at 20 kph. Reference should be made to Figure 4 of Appendix A which shows the vehicle speeds used on each road link.

D.2.2 Daily profile of traffic volume

The traffic count data shows that existing traffic flows are not evenly distributed throughout the day, and data on the trip generation from the existing Stansted site movements taken from the Transport Assessment shows that there are almost no movements at weekends. Therefore, a time-varying emission profile has been applied to the traffic data. The following graph shows the diurnal profile of baseline and development-generated traffic for weekdays, Saturdays and Sundays (excluding development generated traffic on weekends as the data in the TA shows that this is negligible).

Figure 6: Traffic Diurnal Profile



As shown, the expected profile of traffic generated by the development is somewhat different to the monitored profile, with most development-generated traffic expected in the early morning hours. However, as the development traffic makes up a small percentage of the total traffic it is unlikely that this sight difference would significantly affect the results of the modelling. For the purpose of the dispersion modelling the baseline profile has been applied to all traffic.

D.2.3 Vehicle emission factors

Emission factors for NO_X, PM_{10} and $PM_{2.5}$ have been determined for each scenario using the traffic data and the Emissions Factors Toolkit (EFT) v 11.0 (2VC) database of road traffic emission factors within ADMS Roads. All roads were classified as either “England (Rural)” or “England (Motorway)

as appropriate. The EFT predicts that emissions from road vehicles will reduce in future years as newer cleaner vehicles enter the fleet. Therefore, overall emissions of NOx, PM_{10} and $PM_{2.5}$ from road vehicles are lower in the 2028 Future Year scenario than in the 2023 Opening Year scenario, despite the predicted increase in baseline traffic between 2023 and 2028.

The EFT does not include emissions of ammonia from vehicles. However, petrol vehicles emit ammonia due to the degradation of catalytic converters, and diesel vehicles emit ammonia due to measures to reduce NOx emissions. This has been shown to be a significant source of nitrogen deposition at roadside locations[11]. Air Quality Consultants (AQC) has published the Calculator for Realistic Emissions of Ammonia (CREAM V1A[12]) for the calculation of emissions of ammonia from vehicles, which has been used to calculate ammonia emissions for each road link and scenario for the assessment of the effect of ammonia on ecological receptors. Ammonia emissions from vehicles are not a concern with regard to human health as the AQALs are set at an annual mean of 180 µg/m³ and hourly mean of 2,500 µg/m³. Annual mean monitored concentrations across the UK are typically less than 5 µg/m³.

As with emissions of NOx, PM_{10} and $PM_{2.5}$ emissions of ammonia are predicted to change in future years. However, the emissions are not necessarily predicted to decrease in the future and when calculating nitrogen deposition, reductions in NOx may be counteracted by increases in ammonia.

D.2.4 Spatial co-ordinates of vehicle emissions

D.2.4.1 Road sources

Street locations and widths were estimated from a desk-top mapping study and referenced to UK National Grid Reference (NGR) co-ordinates.

It is not possible to enter building dimension data into the ADMS-Roads dispersion modelling software to calculate building downwash. However, it is possible to define some roads as 'street canyons', where tall buildings (relative to the road width) on one or both sides of the road result in elevated pollutant concentrations. A desk-stop study has been carried out through a review of aerial and streetside photos. No sections of road within the study area have been classified as street canyons.

D.2.4.2 Area sources

Emissions from vehicle movements within the Proposed Development have been modelled as 'area sources' in accordance with the CERC guidance note number 54, 'Modelling Car Parks'. The procedure is as follows:

1. Select a representative emission factor (g/km) assuming a typical vehicle speed.
2. Estimate the average distance travelled by each vehicle. The guidance note provides the example assumption that each vehicle travels from the exit to the centre of the car park on arrival, and from the centre of the car park to the exit on departure.
3. Emissions from cold starts and hot soaks (which result in increased emissions at the start and end of journeys) are to be taken into account using the emission factors from the National Atmospheric Emissions Inventory (NAEI) website[13].

[11] Air Quality Consultants, Ammonia Emissions from Roads for Assessing Impacts on Nitrogen-sensitive Habitats, February 2020

[12] Available from [redacted]

[13] Fleet weighted road transport emission factors 2019, NAEI, available at https://naei.beis.gov.uk/data/ef-transport

a. Hot soak emissions are only elevated for volatile organic compounds (VOCs). It is not considered necessary to include VOCs in the modelling study due to the low level of emissions, which are extremely unlikely to have a significant environmental effect. Therefore, hot soak emissions have been excluded.
b. Cold start emission factors are only available for cars, so have been excluded for HGVs.

4. The total emission rate from the car park is then calculated using the following equation:

$$\text{Emission rate}\,(\text{g m}^{-2}\ \text{s}^{-1}) = \frac{(\text{EF}\times\text{D}\times\text{M}) + \left(\text{HS}\times \text{M}/2\right) + \left(\text{CS}\times \text{M}/2\right)}{60\times 60\times 24\times \text{CP}}$$

Where:

EF = emission factor (g/km);

D = average distance travelled (km);

HS = hot soak emission factor (g/trip);

CS = cold start emission factor (g/trip);

M = vehicle movements (per day); and

CP = car park area (m²).

For the purpose of this assessment, the hardstanding areas of the Proposed Development have been split into four areas, as shown on Figure 5 of Appendix A. These are:

1. Car Parking Area;
2. HGV Area 1 (due to the layout of the site, all HGVs anticipated to travel into this area);
3. HGV Area 2, the northernmost area of HGV parking; and
4. HGV Area 3, the large westernmost area of HGV parking.

The calculation of the pollutant emission rate for each area has been undertaken based on the following assumptions:

- Vehicles within the Proposed Development will travel at an average of 10 kph;
- Cold start emissions have been included at the emission rates per trip taken from the NAEI database;
- Cold start emissions of NOx are higher for diesel cars than for petrol cars. It has been assumed that there is a 50/50 split between diesel and petrol cars accessing the Proposed Development. This is a conservative assumption, as demonstrated by the following:
  - It is assumed that no electric vehicles access the Proposed Development. In reality, it is expected that electric vehicle uptake among users accessing the Proposed Development by car will the same as or higher than the UK average due to the provision of electric vehicle charging points; and
  - In recent years diesel sales have fallen. As of 2020, on average across the UK 58.4% of the total number of registered cars on the road were petrol fuelled and 38.2% were diesel fuelled[14].

[14] https://www.gov.uk/government/statistical-data-sets/veh02-licensed-cars

- The NAEI does not provide predictions for cold start emissions in future years. The most recent data is for 2019. It has been assumed that cold start emission factors do not change in future years;
- The NAEI does not provide emissions factors for PM_{10} and $PM_{2.5}$ from petrol vehicles. Therefore, these emissions have been excluded;
- For the car parking area, it has been assumed that the average distance of each vehicle movement is from the entrance to the centre of the car park. For the HGV areas, it has been assumed that the average distance is twice the distance from the entrance to the centre of the area. This assumption has been made due to the nature of the Proposed Development as a logistics operation rather than just an HGV parking area, which will likely necessitate additional internal movements;
- All HGVs accessing the site will travel through HGV Area 1;
- The number of HGVs accessing HGV Areas 2 and 3 will be proportional to their area as a percentage of the total HGV parking areas;
- Emissions from the on-site car and HGV movements have been factored using the time-varying emissions factors for the Proposed Development traffic shown on Figure 6.

The calculation of the emission rate has been undertaken for the parameters shown in Table 35 and Table 36. The final emission rates in g/m²/s for input into the dispersion model are summarised at the bottom of Table 36.

Table 35: Inputs for Calculation of Area Source Emissions

Item	Units	Car Parking Area	HGV Area 1	HGV Area 2	HGV Area 3
Area	m²	2,565	3,630	2,685	11,845
2-way movements	/day	224	62	9	39
Distance per trip	m	40	130	50	150
Diesel/petrol car split	%	50/50	-	-	-
Vehicle speed	kph	10	10	10	10

Table 36: Calculation of Area Source Emissions

Item	Units	2023 opening year				2028 future year			
		NOx	PM10	PM2.5	NH_3	NOx	PM10	PM2.5	NH_3
Car Parking Area									
Emissions/vehicle	g/km	0.321	0.023	0.015	0.024	0.271	0.024	0.015	0.026
Cold start – diesel	g/trip	0.431	0.032	0.032	0.005	0.431	0.032	0.032	0.005
Cold start – petrol	g/trip	0.049	-	-	0.017	0.049	-	-	0.017
HGV Areas									
Emissions/vehicle	g/km	2.235	0.113	0.071	0.105	1.622	0.107	0.065	0.106
Overall Emission Rate									
Car Parking Area	g/m²/s	$1.3x10^{-7}$	$9.0x10^{-9}$	$8.7x10^{-9}$	$5.4x10^{-9}$	$1.3x10^{-7}$	$9.0x10^{-9}$	$8.6x10^{-9}$	$5.4x10^{-9}$
HGV Area 1	g/m²/s	$5.7x10^{-8}$	$2.9x10^{-9}$	$1.8x10^{-9}$	$2.7x10^{-9}$	$4.2x10^{-8}$	$2.8x10^{-9}$	$1.7x10^{-9}$	$2.7x10^{-9}$
HGV Area 2	g/m²/s	$4.3x10^{-9}$	$2.2x10^{-10}$	$1.4x10^{-10}$	$2.0x10^{-10}$	$3.1x10^{-9}$	$2.1x10^{-10}$	$1.3x10^{-10}$	$2.0x10^{-9}$
HGV Area 3	g/m²/s	$1.3x10^{-8}$	$6.5x10^{-10}$	$4.1x10^{-10}$	$6.0x10^{-10}$	$9.3x10^{-9}$	$6.2x10^{-10}$	$3.8x10^{-10}$	$6.1x10^{-9}$

D.2.5 Discrete receptor points

The dispersion modelling study was undertaken for 5 receptor points representing residential properties along the roads affected by traffic generated by the Proposed Development. These receptor locations are presented in Table 7 and shown in Figure 5 of Appendix A.

D.2.6 Meteorological data

To calculate pollutant concentrations at identified receptor locations, the model uses sequential hourly meteorological data, including wind direction, wind speed, temperature, cloud cover and stability, which exert significant influence over atmospheric dispersion.

Sequential 1-hour meteorological data used in this assessment were obtained from ADM Limited for Stansted Airport, which is located less than 1 km northeast of the study area at the closest point, for the period 1st January 2018 to 31st December 2018 (inclusive). UDC's Air Quality Technical Guidance recommends that data from Stansted Airport will usually be the most representative data for dispersion modelling within their administrative area. Given the proximity of the Proposed Development to Stansted Airport it is likely that conditions would be very similar to that monitored at the airport. A wind rose of the 2018 meteorological data used as input to the model is provided in Figure 3 of Appendix A.

D.2.6.1 Roughness length

The roughness length z_0 is an important variable for dispersion models. Many studies in the past into the derivation of aerodynamic roughness for urban areas have been based upon an analysis of the city's geometrical properties or morphology.

A roughness length z_0 of 0.5 m was used within the dispersion modelling study area. This value of z_0 is recommended by CERC as appropriate for 'parkland and open suburbia' and is considered appropriate for the mix of woodland, fields and suburbs which lie close to the modelled roads. A roughness length z_0 of 0.2 m was used for the meteorological site, which is considered appropriate for the surroundings of Stansted Airport.

D.2.6.2 Monin-Obukhov length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. In rural areas under very stable atmospheric conditions the Monin-Obukhov length would typically be in the range 2 m to 20 m. In urban areas, there is a significant amount of heat generated from buildings and traffic, which warms the air above the town/city. For large urban areas this is known as the urban heat island. It has the effect of preventing the atmosphere from ever becoming very stable. In general, the larger the area, the more heat is generated and the stronger this effect becomes. This means that in stable conditions the Monin-Obukhov length will never fall below some minimum value; the larger the city, the larger the minimum value.

A minimum Monin-Obukhov length of 1 m has been used for the dispersion and meteorological sites, which is recommended by CERC for 'rural' areas where the urban heat island effect is not significant. This is considered appropriate for the area around the modelled road network and Stansted Airport.

A summary of the meteorological parameters used in the dispersion modelling is shown in Table 37

Table 37: Meteorological parameters

Parameter	Dispersion Site Value (m)	Met Site Value (m)
Surface roughness length	0.5	0.2
Minimum Monin-Obukhov length	1	1

D.3 Post modelling - conversion from NOx to nitrogen dioxide (NO_2)

The modelled road-NOx and the mapped background concentrations have been used as inputs in DEFRA's NOx to NO_2 calculator (V8.1) to convert modelled NOx to NO_2 in accordance with the methodology outlined in LAQM.(TG16).

When converting from NOx to NO_2 the following inputs have been used:

- The year has been taken as the same as the emissions data, i.e. 2018, 2023 or 2028 as appropriate;
- The local authority has been selected as "Uttlesford District"; and
- The traffic mix has been selected as "All non-urban UK traffic".

D.4 Verification

The ADMS Model has been validated against real world monitoring, however LAQM.TG(16) recommends that the model output is verified. The verification process should involve the comparison between predicted and measured concentrations at one or more suitable local sites and forms an essential component of a detailed assessment for road traffic models. Part of the verification process involves improvements to the base model to provide a better representation of the monitored data. This includes checks on:

- Traffic data;
- Road widths;
- Distance between sources and monitoring locations;
- Speed estimates;
- Street canyons;
- Background concentrations; and
- Monitoring data.

All of these have been reviewed and the model refined to increase the accuracy as much as possible.

LAQM.(TG16) recommends that ideally at least three points are used and the results plotted. The regression correction factor (the m value in y = mx) of the data should then be used as the verification factor. Analysis of a number of data points can be used to see if the model is not performing well in a given area and highlight issues within the modelling such as incorrect traffic data.

There is only one monitoring location available for model verification, located close to the junction of the B1256 and Parsonage Road in Takeley. This lies outside of the area covered by the Transport Assessment, and relies on data obtained from DfT count points to undertake verification. Although the use of at least three monitoring sites is recommended (if possible), it is considered appropriate to undertake the verification procedure using the one available site, rather than not undertake any model verification. The results of the verification procedure are detailed below. In the first instance

the monitored road-NOx contribution at the monitoring location has been calculated from the monitoring data.

Table 38: Verification Procedure: Monitored Road NOx

Location	2018 monitored NO_2 (µg/m³)	Background NO_2 (µg/m³)	2018 calculated road NOx (µg/m³)
UT034	26.23	13.06(1)	25.28

Notes:

(1) Background NO_2 concentration taken from monitoring location UT024, a 'rural' site approximately 1.5 km west of monitoring location UT034.

All NOx to NO_2 conversions undertaken using DEFRA's NOx to NO_2 calculator V8.1, for 2018 emissions and using the 'All non-urban UK traffic' traffic mix setting.

The modelled road-NOx output is then compared to the calculated road-NOx concentration, and the modelled total NO_2 compared to the monitored NO_2 concentration.

Table 39: Verification Procedure: Raw Model Results Comparison

Location	2018 modelled road NOx (µg/m³)	Ratio of monitored to modelled road NOx	2018 modelled total NO_2 (µg/m³)	Ratio of monitored to modelled total NO_2
EDDC14	15.87	1.59	21.49	1.22

Note:

All NOx to NO_2 conversions undertaken using DEFRA's NOx to NO_2 calculator V8.1, for 2018 emissions and using the 'All non-urban UK traffic' traffic mix setting.

The results have not been plotted as this is not necessary when only one datapoint is available. As shown, the model is under-predicting road-NOx by over 50%, and under-predicting total NO_2 by over 20%.

The factor of 1.59, taken from the ratio of monitored to modelled road NOx, has been applied to the modelled road-NOx to account for the potential model under-prediction.

No representative monitoring of PM_{10} or $PM_{2.5}$ is available. To ensure a robust assessment of the impact on human health, the adjustment factor calculated for NOx has also been applied to the modelled concentrations of road PM_{10} and $PM_{2.5}$, in line with approach set out in LAQM.TG(16).

The supporting documentation for AQC's CREAM V1A explains that the ammonia emissions factors obtained from CREAM V1A will often be used as inputs to ADMS-Roads, but model users will often not be able to verify calculation of ammonia emissions from vehicles due to a lack of roadside ammonia monitoring. This is the case in the vicinity of the Proposed Development.

As AQC acknowledge that users will typically not be able to undertake model verification, the documentation includes details of calibration against measurements taken from summer 2014 to summer 2016 at 29 sites in the Ashdown Forest. This shows that the emissions factors obtained using CREAM V1A align well with measurements. This is in contrast to emissions of NOx, which have historically been shown to be under-predicted by DEFRA's EFT. Therefore, it is not considered appropriate to apply the adjustment factor for NOx to emissions of ammonia, as this would likely result in significant over-prediction of ammonia emissions from vehicles.

E Ecological Interpretation

Provided by Ecology Solutions via email:

The Flitch Way is designated as a Local Wildlife Site (LWS) as well as a Local Nature Reserve (LNR). No specific reasons for the LNR designation are available, but the designation information for the LWS is as follows:

"This disused railway line has been taken over by the County Council as a bridle/pathway which in addition acts as a valuable wildlife corridor throughout the south of the district, as well providing a good series of habitats in its own right. At nearly 34 hectares it is effectively one of the largest woodland/scrub/grassland habitats of high nature conservation value in the district. N.B. This LoWS includes a small number of woodland fragments adjacent to the Flitch Way that are in private ownership.

*Woodland and hedgerow species include: Wild Clematis (*Clematis vitalba*), Dog's Mercury (*Mercurialis perennis*), Yellow Archangel (*Lamiastrum galeobdolon*), Primrose (*Primula vulgaris*), Bluebell (*Hyacinthoides non-scripta*), Sweet Violet (*Viola odorata*), Opposite-leaved Golden-saxifrage (*Chrysosplenium oppositifolium*), Remote Sedge (*Carex remota*), Wood Millet (*Milium effusum*), Early dog-violet (*Viola reichenbachiana*) and Ramsons (*Allium ursinum*).*

*The varied ground conditions that result from the various embankments and cuttings as well as the importation of artificial substrates gives rise to a high diversity of grassland types. Typical species include: Black Knapweed (*Centaurea nigra*), Greater Knapweed (*Centaurea *scabiosa*), Cowslip (*Primula veris*), Salad Burnet (*Sanguisorba minor*), Burnet Saxifrage (*Pimpinella saxifraga*), Marsh Thistle (*Cirsium palustre*), Meadowsweet (*Filipendula ulmaria*), Bog Stitchwort (*Stellaria uliginosa*) and Sheep's Sorrel (*Rumex acetosella*).*

*The invertebrate populations include some interesting records, including many Nationally Scarce species, such as the Hornet Moth (*Sesia apiformis*), the Pimpinel Pug moth (*Eupithecia pimpinellata*) and the digger wasp* Crossocerus distinguendus."

The habitats cited are woodland, scrub and grassland, and the plant species listed are higher plants rather than lower plants (i.e. lichens and bryophytes). This is not to say that lower plants will not be present (and it is noted that the Friends of the Flitch Way and Associated Woodlands website carries a list of non-vascular and bryophyte species recorded in the Dunmow Cutting and Boardwalk section at the eastern end of the Flitch Way), but they are not given as notable features in the designation information.

IAQM guidance on the sensitivity of plant species to Ammonia is as follows:

Higher plants are considered to be less sensitive and, for this reason, the annual critical level for higher plants is 3 µg/m3 but is reduced to 1 µg/m3 where lower plants (lichens and bryophytes. Including mosses, landworts and hornworts) are a particular interest feature of a habitat.

Lower plants have not been identified as a particular interest feature of the habitats of Flitch Way LNR/LWS, and therefore, following the IAQM guidance, the higher critical level of 3 µg/m3 should be applied.

My view is that the predicted effects of Nitrogen deposition should be considered as not significant given the existing background concentrations generated from the motorway, as well as other considerations. The background concentration is already at a high level and the addition of this development, downwind of the LNR/LWS in the prevailing wind direction, is not considered significant in this context. The LNR/LWS is some 25m to the south of the proposed development area at its closest point in the southwest of the site (the southeast area is further away from the LNR/LWS boundary), and the former railway line is sited on an embankment. Moreover, there is existing intervening woodland between the proposed development boundary and the boundary of the LNR/LWS, and further new planting is to be established as part of the landscape strategy. Further mitigation measures could be implemented on site, such as instructions to drivers not to lave engines idling.

For these reasons it is reasonable to conclude that air quality effects on the LNR/LWS should be considered not significant.

Kind regards

Peter

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