Air Quality Assessment:
Land Northeast of Humber Doucy Lane, Ipswich

February 2024

Experts in air quality management & assessment

Document Control

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Executive Summary

The air quality impacts associated with the proposed mixed-use development on land northeast of Humber Doucy Lane in Ipswich have been assessed. The proposals are for up to 660 dwellings, up to 400 m^2 floorspace of Class E and/or Class F2(b), and an Early Years facility.

During the construction works, a range of best practice mitigation measures will be implemented to reduce dust emissions and the overall effect will be 'not significant'; appropriate measures have been set out in this report, to be included in the Dust Management Plan for the works.

The assessment has demonstrated that future occupants will experience acceptable air quality, with pollutant concentrations well below the air quality objectives. The proposals will generate additional traffic on the local road network, but the assessment has shown that there will be no significant effects at any existing, sensitive receptor.

Overall, the construction and operational air quality effects are judged to be 'not significant'.

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1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed mixed-use development on land northeast of Humber Doucy Lane in Ipswich. The proposed development is described as:

"Hybrid Application - Full Planning Permission for the means of external access/egress to and from the site. Outline planning application (all matters reserved) for a mixed use development for up to 660 dwellings (Use Class C3), up to 400 sq m (net) of non-residential floorspace falling within Use Class E and/or Use Class F2(b), an Early Years facility, and associated vehicular access and highway works, formal and informal open spaces, play areas, provision of infrastructure (including internal highways, parking, servicing, cycle and pedestrian routes, utilities and sustainable drainage systems), and all associated landscaping and engineering works."

1.2 There is the potential for the construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and fine particulate matter (PM_{10}).

1.3 Ipswich Borough Council (IBC) has declared a number of Air Quality Management Areas (AQMAs) within its borough for exceedances of the annual mean nitrogen dioxide (NO_2) objective. The proposed development will generate additional traffic on local roads, which may impact on air quality at existing residential properties along the affected road network, including those within the AQMAs. In addition, the suitability of the site for residential development requires consideration. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.4 The energy strategy is based on the installation of Air Source Heat Pumps (ASHPs) which do not have any associated local emissions to air. There are, therefore, no centralised combustion sources that require consideration within the assessment.

1.5 A Greater Anglia railway line runs parallel to the northern boundary of the proposed development; Defra guidance (2022) outlines that large numbers of moving diesel locomotives can give rise to high levels of nitrogen dioxide close to railway tracks, and identifies the locations of railway lines across the UK that carry large numbers of diesel locomotives. The Greater Anglia railway line is not one of these lines, and therefore no further consideration of railway emissions is required.

1.6 The location and setting of the proposed development are shown in Figure 1, along with the locations of the AQMAs declared within Ipswich.

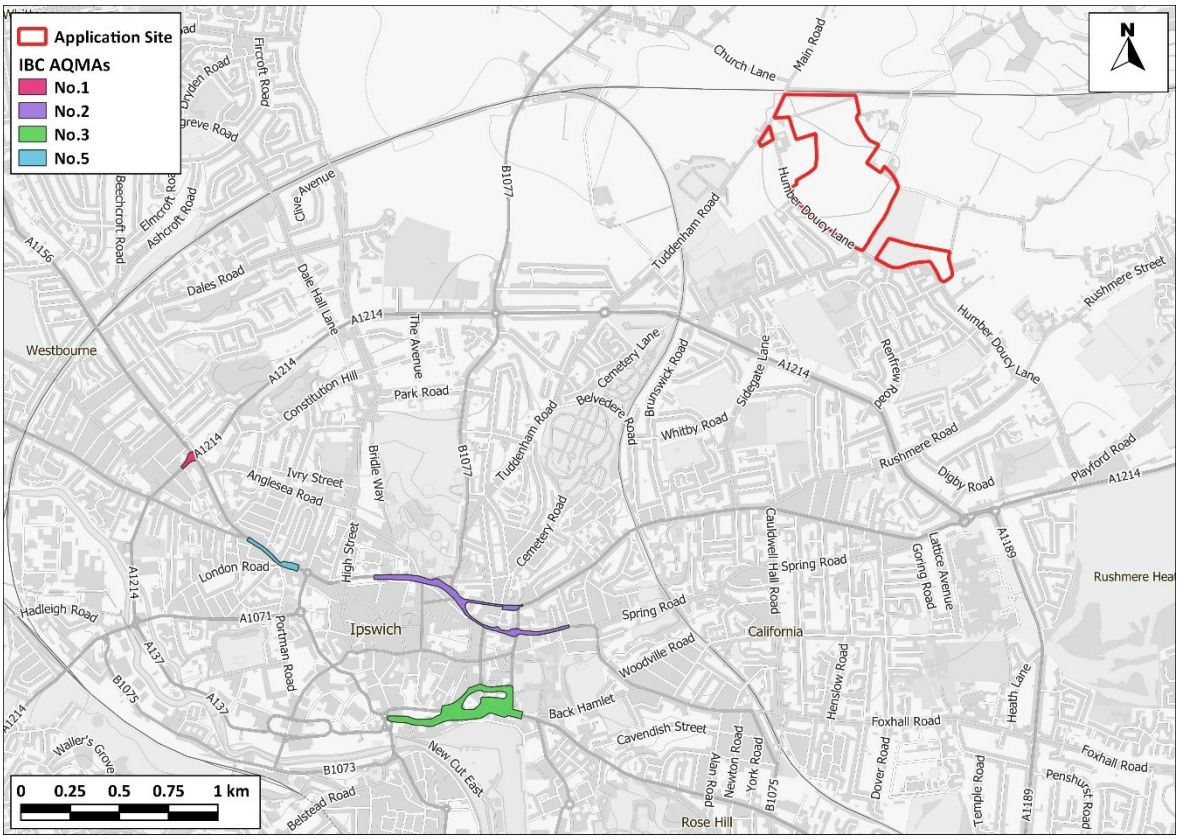

Figure 1: Proposed Development Setting in the Context of Air Quality

1.7 This report describes existing local air quality conditions (base year 2022), and the predicted air quality in the future assuming that the proposed development does, or does not, proceed. The assessment of traffic-related impacts focuses on 2026, which is the earliest anticipated year of occupation of any of the new homes. The assessment of construction dust impacts focuses on the anticipated duration of the works.

1.8 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with IBC. Damage cost calculations have been provided in accordance with IBC's Low Emissions Supplementary Planning Document (SPD) (Ipswich Borough Council, 2021a).

2 Policy Context

2.1 All European legislation referred to in this report is written into UK law and remains in place.

Air Quality Strategy 2007

2.2 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an AQMA, and prepare an Air Quality Action Plan (AQAP) which identifies appropriate measures that will be introduced in pursuit of the objectives.

Air Quality Strategy 2023

2.3 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023a) sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the Government expects them to take. It does not replace other air quality guidance documents relevant to local authorities.

Clean Air Strategy 2019

2.4 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Reducing Emissions from Road Transport: Road to Zero Strategy

2.5 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the Government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have

zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

2.6 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government has recently announced that 80% of new cars and 70% of new vans sold in Great Britain must be zero emission by 2030, increasing to 100% by 2035. If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Environment Act 2021

2.7 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental Protection (OEP), responsible for holding the Government to account and ensuring compliance with these targets.

2.8 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of $PM_{2.5}$. These targets are described in Paragraph 3.5.

Environmental Improvement Plan 2023

2.9 Defra published its 25 Year Environment Plan in 2018 (Defra, 2018a). The Environment Act (2021) requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023 (Defra, 2023b) is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.

2.10 The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of $PM_{2.5}$. These targets, which are described in more detail in Paragraph 3.5, include the long-term targets in the Statutory Instrument described in Paragraph 2.8, and interim targets to be achieved by 2028.

2.11 The 2023 Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It also outlines the respective roles of industry, agricultural sectors, and the DfT in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

Planning Policy

National Policies

2.12 The National Planning Policy Framework (NPPF) (2023a) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

2.13 To prevent unacceptable risks from air pollution, Paragraph 180 of the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality".

2.14 Paragraph 191 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".

2.15 More specifically, on air quality, Paragraph 192 makes clear that:

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

2.16 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified".

2.17 Regarding plan-making, the PPG states:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality".

2.18 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority AQAP "*identifies measures that will be introduced in pursuit of the objectives and can have implications for planning*". In addition, the PPG makes clear that *"Odour and dust can also be a planning concern, for example, because of the effect on local amenity"*.

2.19 Regarding the need for an air quality assessment, the PPG states that:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity".

2.20 The PPG sets out the information that may be required in an air quality assessment, making clear that:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific".

2.21 The PPG also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that:

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

Local Transport Plan

2.22 The Suffolk Local Transport Plan (LTP) 2011-2031 (Suffolk County Council, 2011) was adopted in 2011. It acknowledges that there are air quality issues within Ipswich and proposes a transport strategy aiming to address both congestion and air quality by:

- reducing demand for travel;
- managing road space more efficiently;
- improving infrastructure;
- delivering a new network of cycle routes; and
- rebuilding existing bus stations.

2.23 Suffolk County Council is currently updating its LTP, with consultation commencing in February 2024.

Local Policies

2.24 The Ipswich Local Plan, which comprises the Core Strategy and Policies Development Plan document and Development Management Policies document, was reviewed in 2022. The Adopted Ipswich Local Plan Review 2018 - 2036 (Ipswich Borough Council, 2022) includes Policy DM3 'Air Quality', which states:

"The Council will ensure that the impact of development on air quality is mitigated and ensure that proposals do not negatively impact on existing air quality levels in the Borough.

The Council will take into account the impact of air quality when assessing development proposals, through consideration of both the exposure of occupants to air pollution and the effect of the development on air quality.

Development proposals should not:

a) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits;

b) reduce air quality benefits that result from the Borough Council's activities to improve air quality; and

c) create unacceptable risk of exposure to high levels of poor air quality, for example, through having a negative impact on an existing AQMA.

An Air Quality Assessment (AQA) will be required where development proposals are likely to expose residents to unacceptable levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are

adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

Development should be consistent with the actions identified in the Council's Air Quality Action Plan, where appropriate."

2.25 IBC also adopted a Low Emissions SPD in 2021 (Ipswich Borough Council, 2021a). The main aim of the SPD is to "*improve air quality across Ipswich through new development*", either by "*preventing new emission sources or encouraging emission reductions, physical activity and healthy lifestyle choices*". The SPD outlines what should be included in an air quality assessment for different scales of development and provides a protocol for calculating the damage costs.

Building Standards

2.26 Part F(1) of Schedule 1 of the Building Regulations 2010 as amended June 2022 (Ministry of Housing, Communities & Local Government, 2022) places a duty on building owners, or those responsible for relevant building work[1], to ensure adequate ventilation is provided to building occupants.

2.27 Approved Document F (HM Government, 2021a), which accompanies the Building Regulations, explains that care should be taken to minimise entry of external air pollutants. Specific steps should be taken to manage ventilation intakes where the building is near to a significant source of emissions, or if local ambient concentrations exceed values set in the Air Quality Standards Regulations 2010 (see Paragraph 3.10, later). These steps include maximising the distance between emission source and air intake, considering likely dispersion patterns, and considering the timing of pollution releases when designing the ventilation system.

2.28 Building Bulletin 101 (Education and Skills Funding Agency, 2018) states that *"achieving good indoor air quality in schools depends on minimising the impact of indoor sources of pollutants, as well as reducing outdoor pollutant ingress by effective design of the building and operation of the ventilation systems"*. It advises that performance levels in line with the 2010 World Health Organisation indoor air quality guidelines (WHO, 2010) should be achieved.

2.29 Part S(1) of Schedule 1, and Regulation 44D, of the Building Regulations 2010 (Ministry of Housing, Communities & Local Government, 2022) define a requirement for the provision of infrastructure for

[1] Building work is a legal term for work covered by the Building Regulations. With limited exemptions, the Regulations apply to all significant building work, including erecting or extending a building.

charging electric vehicles. Precise requirements are explained further within Approved Document S (HM Government, 2021b) and depend on the overall number of parking spaces provided and the average financial cost of installation.

2.30 Compliance with the Building Regulations is not required for planning approval, but it is assumed that the Regulations will be complied with in the completed development.

Air Quality Action Plans

National Air Quality Plan

2.31 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018b) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone (CAZ).

2.32 There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in the modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed development.

2.33 This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

2.34 IBC's AQAP (Ipswich Borough Council, 2021b) was updated in 2021, and sets out a series of measures by which it will seek to achieve the air quality objectives in its AQMAs. Actions have been developed under the following four topics:

- public health, behaviours and awareness, including campaigns, promoting travel alternatives, and providing the public with information about air quality;
- transport, including promoting low emission transport, improving vehicle fleet efficiency and traffic management measures;
- policy, planning and infrastructure, including embedding air quality measures into the Local Plan and supporting Suffolk County Council in the development of sustainable transport and climate emergency plans; and

- wider strategic approach, including boiler improvements in local housing stock, including air quality considerations within the renovation grant criteria and campaigns in relation to domestic burning.

2.35 Many of the measures relate to actions that IBC will take, however, the air quality considerations included as part of the Ipswich Local Plan Review and Low Emissions SPD are relevant to the proposed development.

3 Assessment Criteria

3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).

3.2 The UK-wide objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour mean nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m^3 (Defra, 2022). Measurements have also shown that the 24-hour mean PM_{10} objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m^3 (Defra, 2022). The predicted annual mean PM_{10} concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM_{10} objective. Where predicted annual mean concentrations are below 32 µg/m^3 it is unlikely that the 24-hour mean objective will be exceeded.

3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2022). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

3.4 For $PM_{2.5}$, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value (see Paragraph 3.10), originally set at 25 µg/m^3 and currently set at 20 µg/m^3.

3.5 Defra has also recently set two new targets, and two new interim targets, for $PM_{2.5}$ concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean $PM_{2.5}$ concentration of 10 µg/m^3 by the end of 2040, with the interim target being a

value of 12 µg/m^3 by the start of 2028[2]. The second set of targets relate to reducing overall population exposure to $PM_{2.5}$. By the end of 2040, overall population exposure to $PM_{2.5}$ should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028.

3.6 Defra will assess compliance with the population exposure targets by averaging concentrations measured at its own background monitoring stations. This will not consider small changes over time to precisely where people are exposed (such as would relate to exposure introduced by a new development). Furthermore, as explained in Paragraph 2.11, all four new targets provide metrics against which central Government can assess its own progress. While local authorities have an important role delivering the required improvements, these are expected to relate to controlling emissions and not to directly assessing $PM_{2.5}$ concentrations against the targets.

3.7 In March 2023, the Department for Levelling Up, Housing and Communities (2023b) explained that the new $PM_{2.5}$ targets will:

"need to be integrated into the planning system, and in setting out planning guidance for local authorities and businesses, we will consider the specific characteristics of $PM_{2.5}$. The guidance will be forthcoming in due course, until then we expect local authorities to continue to assess local air quality impacts in accordance with existing guidance."

3.8 Defra has also provided advice (Defra, 2023c) which explains that there is no current requirement to consider the new $PM_{2.5}$ targets in planning decisions and that guidance to local planning authorities will be forthcoming before this position changes. In the future, when planning decisions do need to consider the new targets, the expectation is that this will focus on reducing emissions from new development rather than there being a direct requirement for planning-related air quality assessments to predict $PM_{2.5}$ concentrations.

3.9 For the time being, therefore, no assessment is required, and indeed no robust assessment is possible, in relation to the new $PM_{2.5}$ targets and they are not considered further.

3.10 European Union (EU) Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010)[3]. The limit values for nitrogen dioxide and PM_{10} are the same numerical concentrations as the UK objectives, but achievement of the limit

[2] Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m^3 would not exceed the 10 µg/m^3 target.

[3] As amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

values is a national obligation rather than a local one and concentrations are reported to the nearest whole number.

3.11 In the UK, only monitoring and modelling carried out by Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

3.12 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Value
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [a]
$PM_{2.5}$	Annual Mean	20 µg/m^3 [b]

[a] A proxy value of 32 µg/m^3 as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM_{10} objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM_{10} objective are possible (Defra, 2022).

[b] There is no numerical $PM_{2.5}$ objective for local authorities (see Paragraph 3.4). Convention is to assess against the UK limit value which is currently 20 µg/m^3.

Construction Dust Criteria

3.13 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)[4] (2024) has been used. Full details of this approach are provided in Appendix A1.

Road Traffic Screening Criteria

3.14 Environmental Protection UK (EPUK) and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality effects.

3.15 The approach, as described in Appendix A2, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of

[4] The IAQM is the professional body for air quality practitioners in the UK.

less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.

3.16 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A2) inside an AQMA are a change in flows of more than 25 Heavy Duty Vehicles (HDVs) or 100 Light Duty Vehicles (LDVs) per day; outside an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

3.17 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant effect would occur, and these links can be disregarded.

4 Assessment Approach

Consultation

4.1 The assessment follows a methodology agreed with IBC via email correspondence between Andrew Coleman (Environmental Protection Officer at IBC) and Frances Marshall (Air Quality Consultants (AQC)) in February 2024. Specifically, the following key points were agreed:

- a construction dust risk assessment will be provided, based on the IAQM's latest guidance;
- dispersion modelling will be carried out, verified using local monitoring data from 2022, to assess the impacts of road traffic emissions on the local area, including AQMA No. 1;
- the assessment will also consider the suitability of the site for residential development; and
- damage costs will be calculated, and compared with the implementation costs of measures included as part of the proposed development.

4.2 The Environmental Protection Officer highlighted that exceedances of the annual mean nitrogen dioxide level continue to be measured in AQMAs No. 2 and No. 5, and therefore the assessment should also consider the impacts of traffic generated by the proposed development within these AQMAs.

Study Area

4.3 The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts are anticipated to be greatest.

4.4 The extent of the road traffic network included within the assessment has been determined using data provided by the transport consultants, RSK. In addition to the roads that are adjacent to the proposed development (Humber Doucy Lane and Tuddenham Road), the road traffic network also includes roads along which the proposed development will lead to a potentially significant change in traffic flows. This includes the junction between the A1156 and A1214, within AQMA No. 1. The study area is shown in Figure 2.

4.5 For any roads where the traffic flows do not exceed the EPUK/IAQM criteria (see Paragraph 3.16), such as roads within AQMAs No. 2 and No. 5, the potential for significant effects has been screened out of the assessment, and excluded from the study area, unless they are within 200 m of a junction with an affected road, in which case they have been included to ensure their contribution to emissions is included.

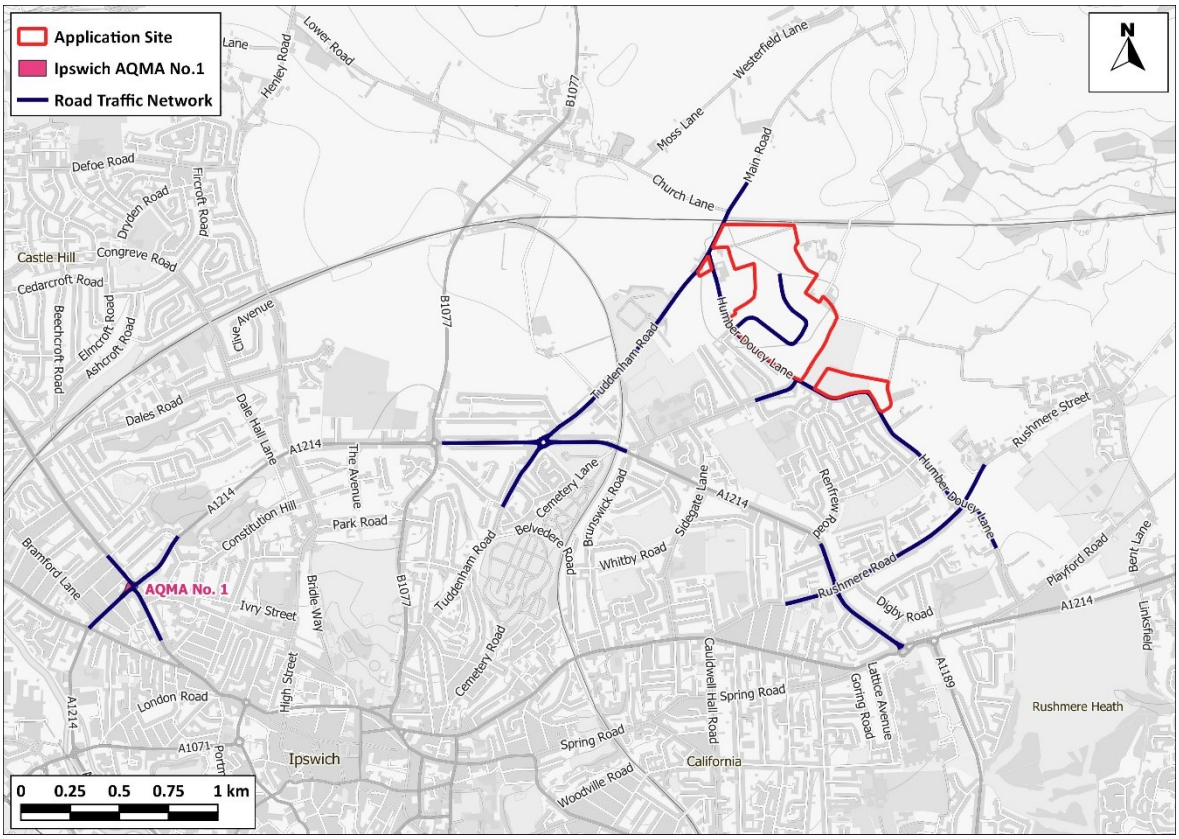

Figure 2: Study Area

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4.6 The construction dust assessment considers the potential for impacts within 250 m of the site boundary, or within 50 m of roads used by construction vehicles within 250 m of the site. The specific areas considered are detailed in Section 6.

Receptors

4.7 Concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ have been predicted at a number of locations both within, and close to, the proposed development. Receptors have been identified to represent a range of exposure, including worst-case locations (these being at the façades of the residential properties closest to the road network). When selecting receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the proposed development will be greatest.

4.8 A total of 33 existing residential properties have been identified as receptors for the assessment. Additional receptor locations have also been included to represent the facades of the proposed

development, which represent exposure to the existing road network. These locations are shown in Figure 3 and described in Table 2.

4.9 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the proposed development and the overall significance of effects.

4.10 In addition, concentrations have been modelled at the automatic monitoring site (IPS3) on Chevallier Street (A1214) and four diffusion tube monitoring sites also located on the A1214 in order to verify the model outputs (see Appendix A3 for verification method).

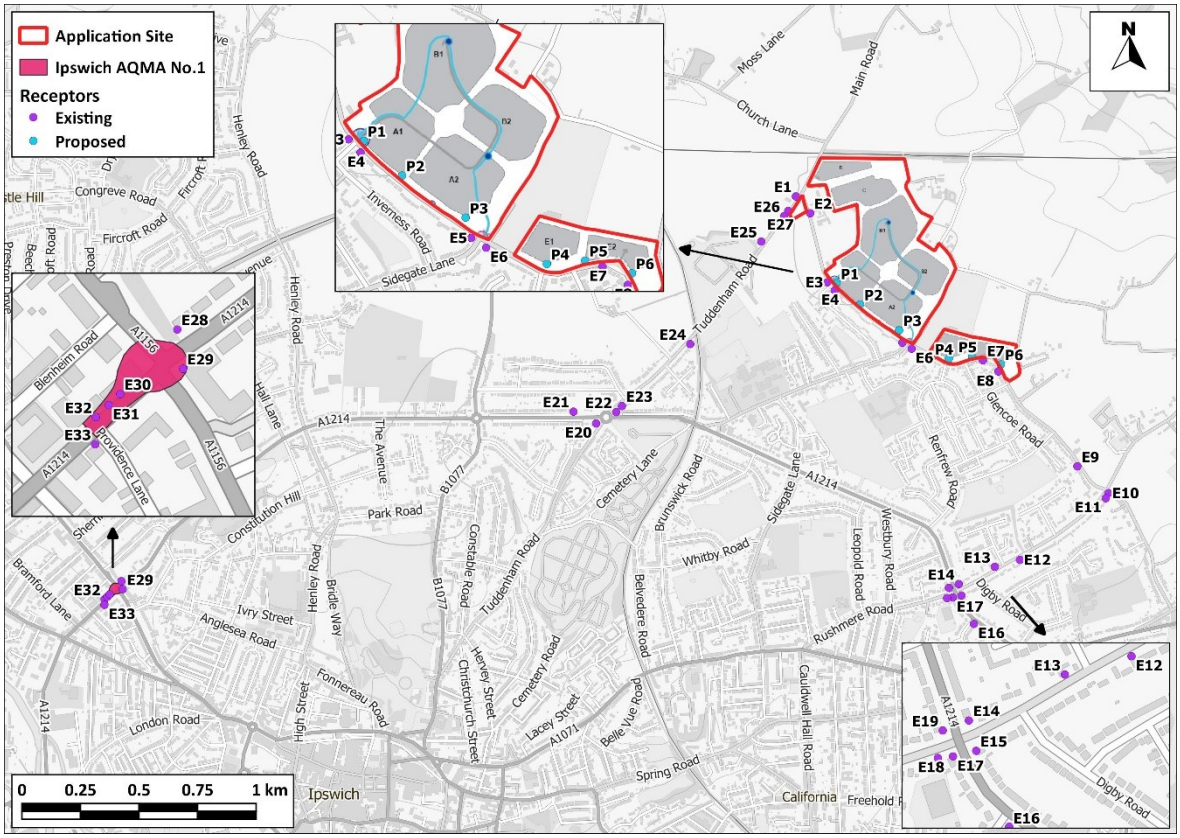

Figure 3: Receptor Locations

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Table 2: Description of Receptor Locations

Receptor	Type	X Coordinate	Y Coordinate	Heights Modelled (m) [a]
Existing Properties				
E1	Residential	618217.3	247094.3	1.5

Receptor	Type	X Coordinate	Y Coordinate	Heights Modelled (m) [a]
E2	Residential	618278.3	247022.4	1.5
E3	Residential	618351.4	246727.7	1.5
E4	Residential	618382.9	246693.1	1.5
E5	Residential	618671.9	246470.0	1.5
E6	Residential	618711.3	246444.7	1.5
E7	Residential	619015.6	246394.9	1.5
E8	Residential	619081.5	246347.2	1.5
E9	Residential	619419.1	245942.4	1.5
E10	Residential	619551.0	245828.1	1.5
E11	Residential	619540.4	245806.5	1.5
E12	Residential	619173.3	245543.2	4.5
E13	Residential	619066.4	245513.8	1.5
E14	Residential	618912.4	245440.1	1.5
E15	Residential	618924.2	245391.5	1.5
E16	Residential	618977.1	245270.1	1.5
E17	Residential	618886.9	245382.6	1.5
E18	Residential	618862.7	245380.1	1.5
E19	Residential	618870.5	245424.2	1.5
E20	Residential	617364.1	246125.5	1.5
E21	Residential	617267.7	246175.9	1.5
E22	Residential	617449.9	246173.8	1.5
E23	Residential	617474.6	246199.8	1.5
E24	Residential	617766.4	246464.2	1.5
E25	Residential	618069.2	246901.6	1.5
E26	Residential	618167.4	247010.0	1.5
E27	Residential	618184.4	247032.3	1.5
E28	Residential	615337.7	245452.8	1.5
E29	Residential	615342.9	245418.1	1.5
E30	Residential	615287.2	245395.7	1.5
E31	Residential	615277.0	245386.0	1.5
E32	Residential	615265.7	245375.4	1.5
E33	Residential	615265.1	245351.3	1.5
New Properties				
P1	Residential	618391.0	246723.4	1.5
P2	Residential	618491.6	246633.1	1.5
P3	Residential	618657.6	246522.9	1.5
P4	Residential	618869.9	246401.7	1.5

Receptor	Type	X Coordinate	Y Coordinate	Heights Modelled (m) [a]
P5	Residential	618969.8	246410.5	1.5
P6	Residential	619092.5	246377.4	1.5

[a] A height of 1.5 m is used to represent ground-floor level exposure. For Receptor E12, a height of 4.5 m has been used to represent exposure at first-floor level.

4.11 The construction dust risk assessment approach does not require specific receptors to be identified; instead, the numbers of different types of receptors within given distance bands are counted. These receptor counts are provided in Section 6.

Existing Conditions

4.12 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2024a);
- local sources have been identified through examination of IBC's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained by collating the results of monitoring carried out by IBC;
- background concentrations have been defined using Defra's 2018-based background maps (Defra, 2024b). These cover the whole of the UK on a 1 x 1 km grid; and
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra (2020; 2024c). These are the maps used by the Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards, to identify and report exceedances of the limit value. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2024c), which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

Construction Impacts

4.13 The construction dust assessment considers the potential for impacts within 250 m of the site boundary, or within 50 m of roads used by construction vehicles. The assessment methodology is that provided by the IAQM (2024). This follows a sequence of steps:

- Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required.

- Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation.
- Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant effects.

4.14 Appendix A1 explains the approach in more detail.

Road Traffic Impacts

Screening

4.15 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 3.14 and detailed further in Appendix A2.

4.16 Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

Modelling Methodology

4.17 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v12.0) (Defra, 2024b). Details of the model inputs and the model verification are provided in Appendix A3.

Assessment Scenarios

4.18 Nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations have been predicted for the following scenarios:

- base year 2022;
- the proposed year of first occupation of the proposed development (2026) without the development, but including cumulative schemes in the area[5]; and
- 2026 with the proposed development and cumulative schemes[5].

[5] Cumulative schemes that have been included in the traffic data are: Red House Park, Fonnereau Village, Adastral Park, Henley Gate and Westerfield Care Village. Further details are provided in the transport assessment that accompanies the planning application.

Impact Description

4.19 The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective.

4.20 Table 3 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level (AQAL) has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 3: Air Quality Impact Descriptors for Individual Receptors for All Pollutants [a]

Long-Term Average Concentration At Receptor In Assessment Year [b]	Change in concentration relative to AQAL [c]				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

[a] Values are rounded to the nearest whole number.

[b] This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

[c] AQAL = Air Quality Assessment Level, which may be an air quality objective, limit or target value, GLA target or an Environment Agency 'Environmental Assessment Level (EAL)'.

Uncertainty

4.21 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

4.22 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A3). The level of confidence in the verification process is necessarily enhanced when data from an automatic analyser have been used, as has been the case for this assessment (see Appendix A3). Because the model has been verified and adjusted,

there can be reasonable confidence in the prediction of base year (2022) concentrations. LAQM.TG22 (Defra, 2022) provides guidance on the evaluation of model performance. Based on the analysis shown in Table A3.3 in Appendix A3, the model performance is considered to be good.

4.23 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the more recent versions of Defra's EFT carried out by AQC (2020a; 2020b) suggest that, on balance, these versions are unlikely to over-state the rate at which NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NOx concentrations are most likely to decline more quickly in the future, on average, than predicted by previous versions of the EFT, especially against a base year of 2016 or later. Whilst such an analysis has not been undertaken by AQC for EFT v12.0, it is considered that using EFT v12.0 for future-year forecasts in this report provides a robust assessment, given that the model has been verified against measurements made in 2022.

Assumptions

4.24 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:

- the proposed development is complete and fully operational in 2026. This will have overestimated the traffic emissions and hence the 2026 "With Scheme" concentrations and impacts. In reality the development is unlikely to be fully occupied before 2030, thus it will not be generating its full traffic volumes until this year;
- the trip generation assumes up to 675 dwellings, whereas the application seeks permission for up to 660 dwellings, thus the trip generation is likely to be marginally overestimated;
- all cumulative developments are fully operational in 2026. This may have overestimated the traffic emissions and hence the concentrations and impacts in 2026; and
- the Wattisham meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A3).

Assessment of Significance

Construction Dust Significance

4.25 Guidance from the IAQM (2024) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational Significance

4.26 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used.

4.27 The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the report is set out in Appendix A4. Full details of the EPUK/IAQM approach are provided in Appendix A2.

Damage Cost Calculations

4.28 The calculation of damage costs has utilised the most recent EFT (Defra, 2024b) to determine the development's transport emissions. Defra's damage cost toolkit (Defra, 2024d) has then been used to determine the associated damage costs for those emissions.

4.29 The calculation process includes:

- identifying the vehicle trips generated by the proposed development;
- calculating the emissions from these trips for the pollutants of concern (NOx and $PM_{2.5}$) using the EFT, for each of the five years assessed, starting with the year of opening. This calculation has assumed a 10 km trip length and an average speed of 50 kph, in line with the requirements of the Low Emissions SPD (Ipswich Borough Council, 2021a);
- calculating the damage costs for the specific pollutant emissions using the damage cost toolkit, based on the costs for road transport and a price base year of 2024. The toolkit allows for reductions in emissions over time, and applies a health discount rate in line with HM Treasury's Green Book (1.5%); and
- extracting the 'Central' total value for each pollutant and summing these for use as the damage cost total for the development.

4.30 The proposed development will be built out over a period of approximately seven years, with the earliest year of occupation of any property being 2026. Consequently, the total emissions for the additional traffic generation for each year of occupation between 2026 and 2032 have been calculated for their corresponding five year period; for example, the emissions from vehicles

generated by properties occupied in 2026 have been calculated for the period 2026 to 2030, and the emissions from vehicles generated by properties occupied in 2027 have been calculated for the period 2027 to 2031, and so on, and the total emissions from all these five year periods summed.

5 Baseline Conditions

Relevant Features

5.1 The proposed development is located in the northeast of Ipswich, on the boundary between Ipswich and East Suffolk; Ipswich town centre is approximately 3 km away. The site extends across three parcels of land which are currently used for agriculture.

5.2 The land to the north of the application site is primarily rural, whilst land to the south is suburban. The main plot is bound to the north by a Greater Anglia railway line, farm buildings and agricultural land to the east, residential properties to the south, and Humber Doucy Lane to the west.

5.3 The proposed development is located 2.5 km from the nearest AQMA (No. 2), as highlighted in Figure 1.

Industrial Sources

5.4 No significant industrial sources have been identified that are likely to affect the proposed development, in terms of air quality.

Local Air Quality Monitoring

5.5 IBC operates two automatic monitoring stations within its area, one of which (IPS3) is located in AQMA No. 1. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by SOCOTEC, Didcot (using the 50% TEA in acetone method). These include a number of sites located within the study area, principally adjacent to the A1214, and within AQMA No. 1.

5.6 Annual mean results for the years 2018 to 2022[6] are summarised in Table 4, while results relating to the 1-hour mean objective are summarised in Table 5. Exceedances of the annual mean objective are shown in bold. The monitoring locations are shown in Figure 4. The monitoring data have been taken from IBC's 2023 Annual Status Report (Ipswich Borough Council, 2023).

[6] While 2020 and 2021 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of 'typical' air quality conditions due to the impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations.

Table 4: Summary of Annual Mean NO_2 Monitoring ($\mu g/m^3$) [a]

Site ID	Site Type	Location	2018	2019	2020	2021	2022
IPS3	Roadside	Chevallier Street	28.0	26.0	20.7	23.0	20.0
2	Roadside	Chevallier Street	**42.0**	38.0	30.1	30.9	33.7
7	Roadside	Bramford Road	31.0	30.0	23.4	25.4	26.2
8, 9, 10 [b]	Roadside	Bramford Road	34.0	32.0	25.4	29.1	28.4
13	Roadside	Bramford Lane	24.0	23.0	18.3	20.4	19.8
14	Roadside	Chevallier Street	**45.0**	**41.0**	32.1	34.2	33.1
16	Roadside	Valley Road / Westwood Court	35.0	33.0	25.6	27.3	28.3
18	Roadside	Yarmouth Road	-	**41.0**	33.4	36.3	37.4
28	Roadside	Chevallier Street	38.0	35.0	26.4	29.6	29.7
36	Roadside	Valley Road	31.0	31.0	22.8	22.6	24.6
43	Roadside	Bramford Road / Yarmouth Road	38.0	36.0	28.8	30.9	32.4
44	Roadside	Bramford Road	38.0	34.0	26.1	30.4	30.4
45, 46, 47 [b]	Roadside	Chevallier Street; co-located with IPS3	28.0	26.0	19.9	22.3	22.0
48	Roadside	Valley Road	27.0	25.0	19.0	20.7	21.6
60	Roadside	Colchester Road	29.0	28.0	20.5	21.8	22.5
61	Roadside	Valley Road	40.0	38.0	28.3	30.2	31.2
Objective			**40**				

[a] Exceedances of the annual mean objective are shown in bold.

[b] Average of triplicate diffusion tubes.

Table 5: Number of Hours with NO_2 Concentrations Above 200 $\mu g/m^3$

Site ID	Site Type	Location	2018	2019	2020	2021	2022
IPS3	Roadside	Chevallier Street	0	0	0	0	0
Objective			**18**				

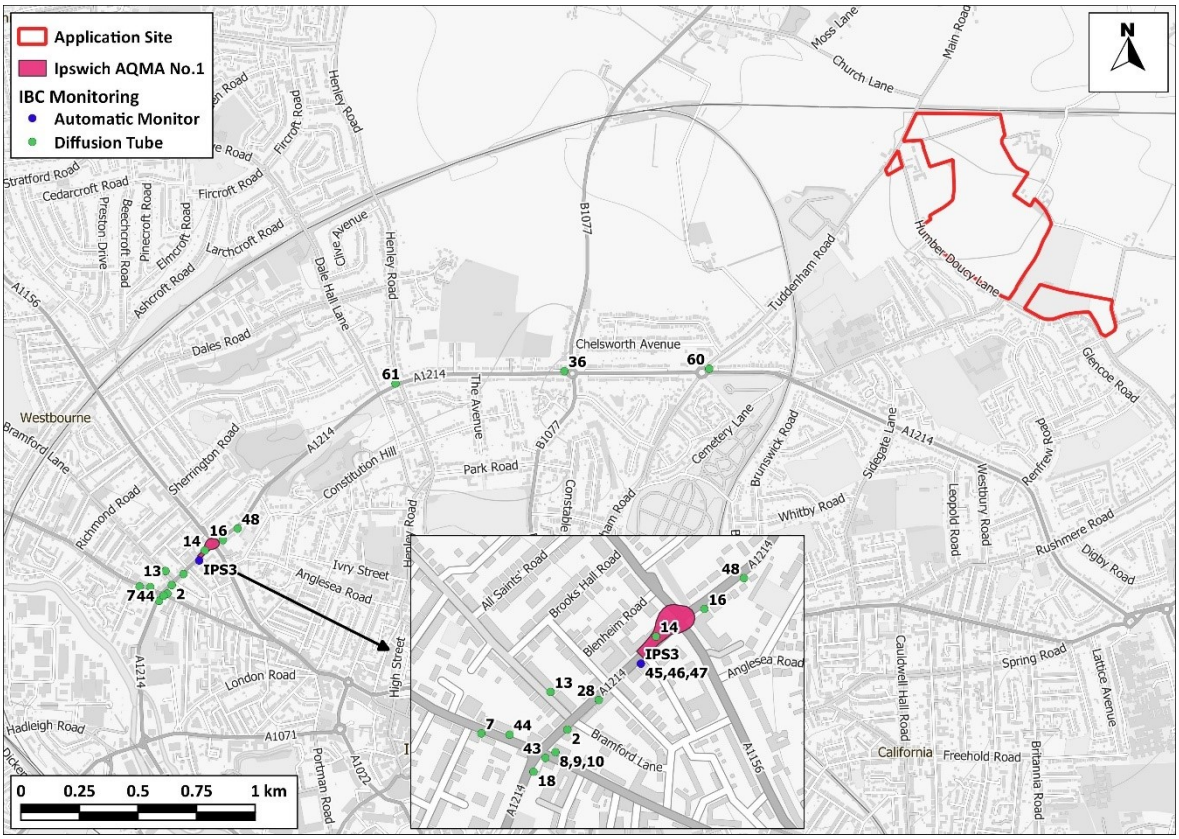

Figure 4: Monitoring Locations

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5.7 All measured concentrations presented were below the objectives in 2022; prior to 2020, exceedances of the objective were measured on the A1214, near to, and within, AQMA No. 1 (Sites 2, 14 and 18). Measured concentrations at all diffusion tube sites have been well below 60 µg/m^3, indicating an exceedance of the 1-hour mean objective is highly unlikely across the study area; this is consistent with direct measurements at the automatic monitor. Overall, concentrations have generally reduced over the past five years.

5.8 No monitoring of PM_{10} or $PM_{2.5}$ concentrations is undertaken in Ipswich.

Exceedances of Limit Value

5.9 There are no AURN (Defra, 2024e) monitoring sites within the study area with which to identify exceedances of the annual mean nitrogen dioxide limit value.

5.10 Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2024c), which are used to identify and report exceedances of the limit value, do not identify any exceedances within the study

area in either 2022 or 2026. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

Background Concentrations

5.11 Estimated background concentrations in the study area are set out in Table 6 and are all well below the objectives. A range of values is presented as the study area covers multiple 1 x 1 km grid squares.

Table 6: Estimated Annual Mean Background Pollutant Concentrations in 2022 and 2026 (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2022	8.8 – 12.8	14.7 – 15.8	9.4 – 10.7
2026	7.9 – 11.3	14.2 – 15.2	8.9 - 10.3
Objective	**40**	**40**	**20** [a]

[a] The 20 µg/m^3 $PM_{2.5}$ objective is not in Regulations and there is no requirement for local authorities to meet it.

Baseline Dispersion Model Results

5.12 Baseline concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ have been modelled at each of the existing receptor locations (see Figure 3 and Table 2 for receptor locations). The results, which cover both the existing (2022) and future year (2026) baseline (Without Scheme), are set out in Table 7 for nitrogen dioxide and Table 8 for PM_{10} and $PM_{2.5}$.

5.13 The modelled road components of nitrogen oxides have been increased from those predicted by the model based on a comparison with local measurements (see Appendix A3 for the verification methodology).

Table 7: Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide (µg/m^3) at Existing Receptors

Receptor	2022	2026 Without Scheme
E1	10.6	9.1
E2	11.6	9.8
E3	10.8	9.3
E4	10.8	9.4
E5	11.3	9.7
E6	11.0	9.5
E7	10.5	9.1
E8	10.4	9.0
E9	12.9	11.2
E10	14.0	11.9
E11	13.1	11.4
E12	12.5	11.0
E13	13.3	11.5
E14	17.7	14.2
E15	18.6	14.8
E16	15.0	12.5
E17	17.1	13.9
E18	14.7	12.3
E19	17.0	13.7
E20	15.6	13.0
E21	15.1	12.7
E22	19.1	15.5
E23	15.4	12.8
E24	12.1	10.4
E25	11.2	9.6
E26	11.4	9.6
E27	11.0	9.4
E28	24.8	19.9
E29	29.6	23.3
E30	34.4	27.1
E31	33.8	26.7
E32	34.0	26.8
E33	21.4	17.5
Objective	**40**	

Table 8: Modelled Annual Mean Baseline Concentrations of PM_{10} and $PM_{2.5}$ at Existing Receptors (µg/m^3)

Receptor	PM_{10} [a]		$PM_{2.5}$	
	2022	2026 Without Scheme	2022	2026 Without Scheme
E1	15.8	15.2	9.5	9.0
E2	15.9	15.3	9.5	9.1
E3	14.8	14.3	9.5	9.1
E4	14.9	14.3	9.5	9.1
E5	14.9	14.4	9.6	9.1
E6	14.9	14.3	9.5	9.1
E7	15.2	14.6	9.5	9.1
E8	15.2	14.6	9.5	9.0
E9	14.8	14.3	9.8	9.3
E10	14.9	14.4	9.8	9.4
E11	14.8	14.3	9.8	9.3
E12	14.8	14.2	9.7	9.3
E13	14.9	14.3	9.8	9.3
E14	15.6	15.0	10.5	10.0
E15	15.7	15.1	10.5	10.1
E16	15.4	14.8	10.4	9.9
E17	15.5	15.0	10.4	10.0
E18	15.3	14.7	10.3	9.9
E19	15.5	14.9	10.4	10.0
E20	16.2	15.7	10.0	9.6
E21	16.2	15.7	10.0	9.6
E22	16.5	16.0	10.2	9.7
E23	16.2	15.6	10.0	9.5
E24	15.9	15.3	9.8	9.4
E25	14.9	14.3	9.6	9.1
E26	15.8	15.3	9.5	9.1
E27	15.8	15.3	9.5	9.1
E28	16.9	16.4	11.3	10.9
E29	17.4	16.9	11.6	11.2
E30	17.9	17.5	11.9	11.5
E31	17.9	17.5	11.9	11.5
E32	18.0	17.6	11.9	11.5
E33	16.7	16.2	11.2	10.8
Assessment Criterion	**32 [a]**		**20 [b]**	

[a] While the annual mean PM_{10} objective is 40 µg/m^3, 32 µg/m^3 is the annual mean concentration above which an exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG22 (Defra, 2022). A value of 32 µg/m^3 is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

[b] The 20 µg/m^3 $PM_{2.5}$ objective is not in Regulations and there is no requirement for local authorities to meet it.

5.14 The predicted annual mean concentrations of nitrogen dioxide are below the objective at all receptors in both 2022 and 2026. The annual mean nitrogen dioxide concentrations are also well below 60 µg/m^3 at every receptor; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 3.2). The results for 2022 are consistent with the conclusions of IBC in the outcome of its air quality review and assessment work, in that there were no exceedances measured outside an AQMA, and that concentrations measured within AQMA No. 1 were below the objective in 2022.

5.15 The predicted annual mean concentrations of PM_{10} and $PM_{2.5}$ are well below the objectives in both 2022 and 2026 at all receptors. The annual mean PM_{10} concentrations are below 32 µg/m^3 and it is, therefore, unlikely that the 24-hour mean PM_{10} objective will be exceeded (see Paragraph 3.2).

6 Construction Phase Impact Assessment

Construction Traffic

6.1 The construction works will generate HDV movements, primarily through waste removal from the site and delivery of construction materials, however, these will be temporary.

6.2 The construction works are anticipated to generate approximately 28 HDV and 94 LDV movements as Annual Average Daily Traffic (AADT) flows, which are well below the screening criteria of 100 HDV movements and 500 LDV movements recommended by EPUK/IAQM guidance outside an AQMA (Moorcroft and Barrowcliffe et al, 2017). Whilst the routing of the vehicles has not been finalised, where practicable, they will avoid travelling south from the site toward the town centre to avoid travelling through any AQMA.

6.3 It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase and it can be concluded that the proposed development will have a negligible impact on local roadside air quality as a result of construction traffic emissions.

On-Site Exhaust Emissions

6.4 The IAQM guidance (2024) states:

"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur".

6.5 The site is relatively large and covers approximately 31.6 hectares; sensitive receptors are principally located along the southwest boundary with Humber Doucy Lane, with a small number of isolated receptors adjacent to the northern boundary, thus NRMM emissions will mostly occur away from sensitive properties.

6.6 The site layout will take account of the location of sensitive receptors, and the distance between NRMM and sensitive properties will be maximised, as far as possible. Further, all vehicles and plant will be switched off when not in use.

6.7 It is judged that there is no risk of significant effects at existing receptors as a result of on-site machinery emissions.

Construction Dust and Particulate Matter Emissions

6.8 The construction works will give rise to a risk of dust impacts during earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment

procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A1), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

6.9 The site is currently agricultural land, thus there is no requirement for demolition on site.

Earthworks

6.10 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2024), as set out in Table 9. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 9: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Mixed (Argillaceous [a] – Rudaceous [b])
European Soil Bureau Description	Glacial Till
Soil Group	Medium to Light (Silty) to Heavy
Soil Texture	Loam [c] to Clayey Loam, Locally Chalky

[a] grain size < 0.06 mm.

[b] grain size > 2.0 mm.

[c] a loam is composed mostly of sand and silt.

6.11 The site covers approximately 316,000 m^2 and most of this will be subject to earthworks; dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil).

6.12 Based on the example definitions set out in Table A1.1 in Appendix A1, the dust emission class for earthworks is considered to be *large*.

Construction

6.13 The proposals involve the construction of up to 660 residential units, ranging in height between two and three storeys, and 400 m^2 non-residential use; it is anticipated the building volume will exceed 75,000 m^3. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete.

6.14 Based on the example definitions set out in Table A1.1 in Appendix A1, the dust emission class for construction is considered to be *large*.

Trackout

6.15 The number of heavy vehicles accessing the site, which may track out dust and dirt, is currently unknown, but given the size of the site, during the peak construction period it is judged that there could be between 20 and 50 outward heavy vehicle movements per day.

6.16 Based on the example definitions set out in Table A1.1 in Appendix A1, the dust emission class for trackout is considered to be *medium*.

6.17 Table 10 summarises the dust emission magnitude for the proposed development.

Table 10: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	None
Earthworks	Large
Construction	Large
Trackout	Medium

Sensitivity of the Area

6.18 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

6.19 The IAQM guidance explains that residential properties and care homes are 'high' sensitivity receptors to dust soiling and human health effects, while the business park is a 'medium' sensitivity receptor (Table A1.2 in Appendix A1).

6.20 There are up to 100 residential properties and Westerfield House care home within 20 m of the site, most of which are located adjacent to Humber Doucy Lane, while the business park is 50 m from the site (see Figure 5).

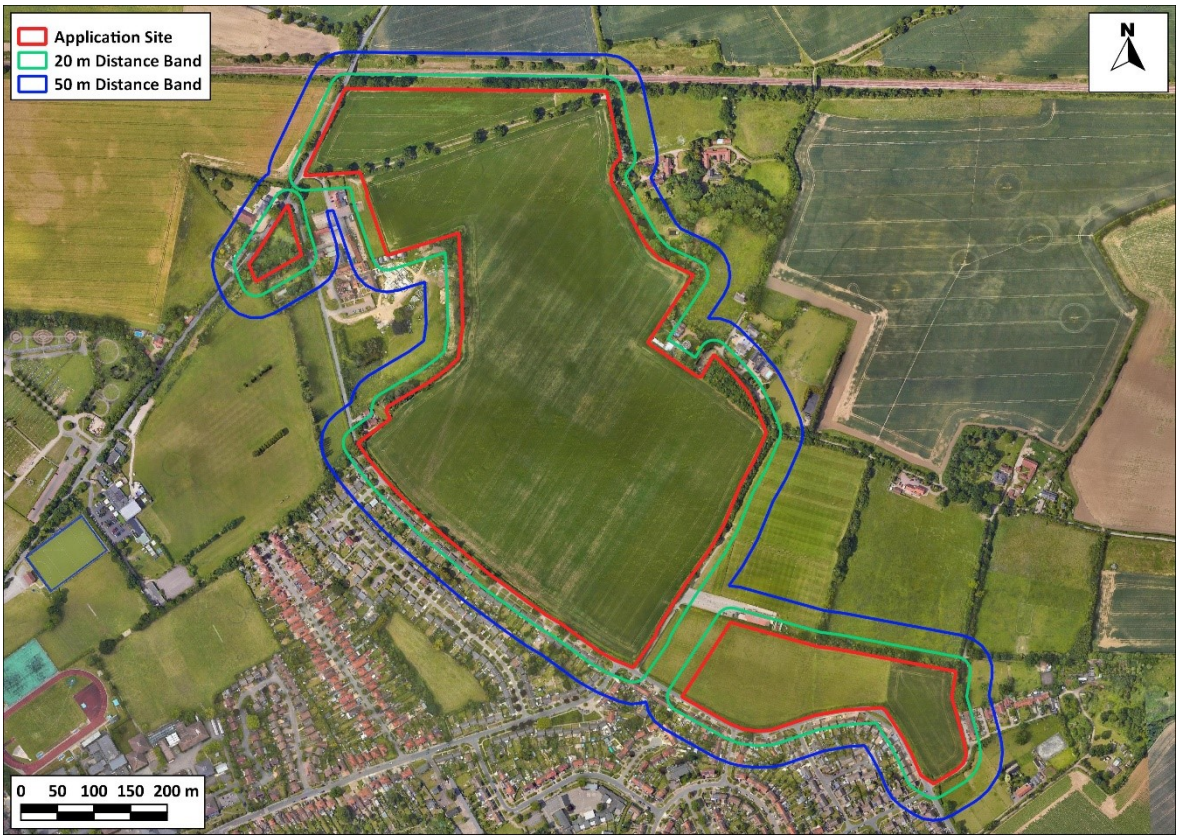

Figure 5: 20 m and 50 m Distance Bands around Site Boundary

Imagery ©2024 Airbus, Bluesky, CNES / Airbus, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies.

6.21 The IAQM guidance (2024) explains that there is a risk of material being tracked 250 m from the site exit.

6.22 Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are just over 100 residential properties within 20 m of the roads along which material could be tracked, the majority of which are on Humber Doucy Lane, directly opposite the site (see Figure 6).

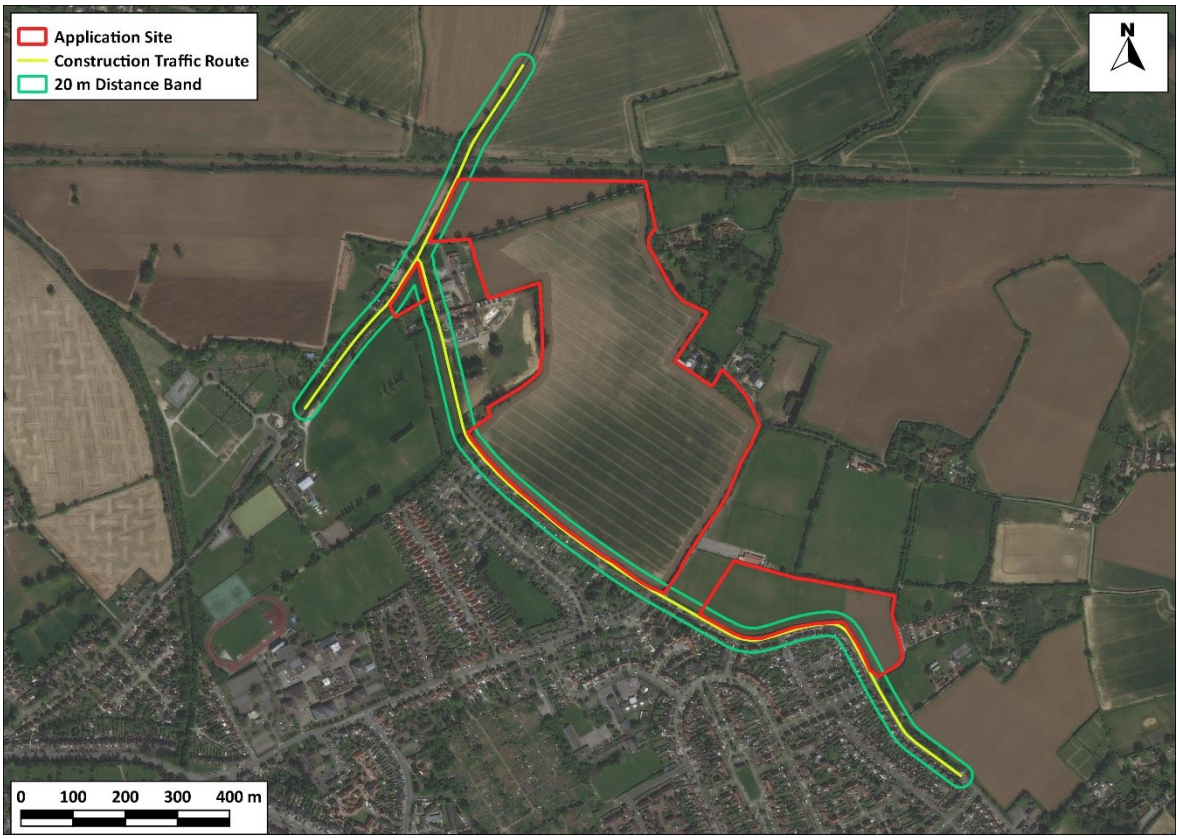

Figure 6: 20 m Distance Band around Roads Used by Construction Traffic Within 250 m of the Site Exits

Imagery ©2024 Airbus, Bluesky, CNES / Airbus, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies.

Sensitivity of the Area to Effects from Dust Soiling

6.23 Using the information set out in Paragraph 6.20 and Figure 5 alongside the matrix set out in Table A1.3 in Appendix A1, the area surrounding the onsite works is of 'high' sensitivity to dust soiling.

6.24 Using the information set out in Paragraph 6.22 and Figure 6 alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

6.25 The matrix in Table A1.4 in Appendix A1 requires information on the baseline annual mean PM_{10} concentration in the area.

6.26 Receptors E1 to E8, E26 and E27 (Figure 3) are all within 50 m of the site. The maximum predicted baseline PM_{10} concentration at these receptors in 2022 is 15.9 µg/m^3 (Table 8), and this value has been used.

6.27 Using the information set out in Paragraph 6.20 and Figure 5 alongside the matrix in Table A1.4 in Appendix A1, the area surrounding the onsite works is of 'low' sensitivity to human health effects.

6.28 Using the information set out in Paragraph 6.22 and Figure 6 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is of 'medium' sensitivity.

Sensitivity of the Area to any Ecological Effects

6.29 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

6.30 Table 11 summarises the sensitivity of the area around the proposed construction works.

Table 11: Summary of the Area Sensitivity

Effects Associated with:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Low Sensitivity	Medium Sensitivity

Risk and Significance

6.31 The dust emission magnitudes in Table 10 have been combined with the sensitivities of the area in Table 11 using the matrix in Table A1.6 in Appendix A1, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 12. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 9 (Step 3 of the assessment procedure).

Table 12: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Demolition	N/A	N/A
Earthworks	High Risk	Low Risk
Construction	High Risk	Low Risk
Trackout	Medium Risk	Medium Risk

6.32 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2024).

7 Operational Phase Impact Assessment

Impacts at Existing Receptors

7.1 The assessment focuses on locations where the IAQM/EPUK screening criteria are exceeded (see Paragraph 3.16). At locations where the traffic volumes generated by the proposed development are lower than the screening criteria, such as on roads within AQMAs No. 2 and No. 5, it can be concluded that emissions from road traffic will lead to negligible impacts, regardless of the existing air quality conditions, and there will be no significant air quality effects.

7.2 The impacts at sensitive locations outside of the study area will, therefore, be negligible. At locations where the screening criteria are exceeded, predicted concentrations are provided below.

7.3 Additionally, as set out in Paragraph 4.18, the future traffic data include vehicle flows associated with five cumulative schemes, thus the assessment accounts for potential cumulative impacts.

Nitrogen Dioxide

7.4 Predicted annual mean concentrations of nitrogen dioxide in 2026 for existing receptors are set out in Table 13 for both the "Without Scheme" and "With Scheme" scenarios. The impact at each receptor is also described using the impact descriptors given in Table 3.

Table 13: Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2026 (µg/m^3)

Receptor	Without Scheme	With Scheme	% Change [a]	Impact Descriptor
E1	9.1	9.3	1	Negligible
E2	9.8	10.2	1	Negligible
E3	9.3	9.7	1	Negligible
E4	9.4	9.8	1	Negligible
E5	9.7	10.1	1	Negligible
E6	9.5	9.7	1	Negligible
E7	9.1	9.4	1	Negligible
E8	9.0	9.3	1	Negligible
E9	11.2	11.5	1	Negligible
E10	11.9	12.4	1	Negligible
E11	11.4	11.7	1	Negligible
E12	11.0	11.1	0	Negligible
E13	11.5	11.8	1	Negligible
E14	14.2	14.4	1	Negligible
E15	14.8	15.1	1	Negligible
E16	12.5	12.6	0	Negligible

Receptor	Without Scheme	With Scheme	% Change [a]	Impact Descriptor
E17	13.9	14.0	0	Negligible
E18	12.3	12.4	0	Negligible
E19	13.7	13.9	0	Negligible
E20	13.0	13.1	0	Negligible
E21	12.7	12.8	0	Negligible
E22	15.5	15.6	0	Negligible
E23	12.8	13.0	1	Negligible
E24	10.4	10.5	0	Negligible
E25	9.6	9.8	0	Negligible
E26	9.6	9.9	1	Negligible
E27	9.4	9.6	1	Negligible
E28	19.9	20.1	0	Negligible
E29	23.3	23.5	0	Negligible
E30	27.1	27.4	1	Negligible
E31	26.7	27.1	1	Negligible
E32	26.8	27.2	1	Negligible
E33	17.5	17.7	0	Negligible
Objective	**40**		-	-

[a] % changes are relative to the objective and have been rounded to the nearest whole number.

7.5 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors, both with and without the proposed development. The change in concentrations ranges from 0% to 1% (when rounded) and the impacts are all described as *negligible*.

7.6 The annual mean nitrogen dioxide concentrations are below 60 µg/m^3 at every receptor; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 3.2).

PM10 $PM_{2.5}$M2.5

7.7 Predicted annual mean concentraPM$_{10}$sPM$_{2.5}$M$_{10}$ and PM$_{2.5}$ in 2026 for existing receptors are set out in Table 14 for both the “Without Scheme” and “With Scheme” scenarios. The impacts at each receptor are also described using the impact descriptors given in Table 3.

Table 14: Predicted ImpacPM$_{10}$nPM$_{2.5}$al Mean PM$_{10}$ and PM$_{2.5}$ Concentrations in 2026

Receptor	Annual Mea$_{PM2.50}$ (µg/m^3)				Annual Mean PM$_{2.5}$ (µg/m^3)			
	Without Scheme	With Scheme	% Change [a]	Impact Descriptor	Without Scheme	With Scheme	% Change [a]	Impact Descriptor
E1	15.2	15.2	0	Negligible	9.0	9.0	0	Negligible
E2	15.3	15.4	0	Negligible	9.1	9.1	0	Negligible
E3	14.3	14.4	0	Negligible	9.1	9.1	0	Negligible
E4	14.3	14.4	0	Negligible	9.1	9.1	0	Negligible
E5	14.4	14.4	0	Negligible	9.1	9.2	0	Negligible
E6	14.3	14.4	0	Negligible	9.1	9.1	0	Negligible
E7	14.6	14.7	0	Negligible	9.1	9.1	0	Negligible
E8	14.6	14.7	0	Negligible	9.0	9.1	0	Negligible
E9	14.3	14.3	0	Negligible	9.3	9.3	0	Negligible
E10	14.4	14.4	0	Negligible	9.4	9.4	0	Negligible
E11	14.3	14.3	0	Negligible	9.3	9.3	0	Negligible
E12	14.2	14.3	0	Negligible	9.3	9.3	0	Negligible
E13	14.3	14.4	0	Negligible	9.3	9.4	0	Negligible
E14	15.0	15.0	0	Negligible	10.0	10.0	0	Negligible
E15	15.1	15.1	0	Negligible	10.1	10.1	0	Negligible
E16	14.8	14.8	0	Negligible	9.9	9.9	0	Negligible
E17	15.0	15.0	0	Negligible	10.0	10.0	0	Negligible
E18	14.7	14.8	0	Negligible	9.9	9.9	0	Negligible
E19	14.9	15.0	0	Negligible	10.0	10.0	0	Negligible
E20	15.7	15.7	0	Negligible	9.6	9.6	0	Negligible
E21	15.7	15.7	0	Negligible	9.6	9.6	0	Negligible
E22	16.0	16.0	0	Negligible	9.7	9.7	0	Negligible
E23	15.6	15.7	0	Negligible	9.5	9.6	0	Negligible
E24	15.3	15.4	0	Negligible	9.4	9.4	0	Negligible
E25	14.3	14.4	0	Negligible	9.1	9.1	0	Negligible
E26	15.3	15.3	0	Negligible	9.1	9.1	0	Negligible
E27	15.3	15.3	0	Negligible	9.1	9.1	0	Negligible
E28	16.4	16.4	0	Negligible	10.9	10.9	0	Negligible
E29	16.9	16.9	0	Negligible	11.2	11.2	0	Negligible
E30	17.5	17.6	0	Negligible	11.5	11.5	0	Negligible
E31	17.5	17.5	0	Negligible	11.5	11.5	0	Negligible
E32	17.6	17.7	0	Negligible	11.5	11.5	0	Negligible
E33	16.2	16.3	0	Negligible	10.8	10.8	0	Negligible

Receptor	Annual Mea$PM_{2.50}$ (µg/m³)				Annual Mean $PM_{2.5}$ (µg/m³)			
	Without Scheme	With Scheme	% Change [a]	Impact Descriptor	Without Scheme	With Scheme	% Change [a]	Impact Descriptor
Criterion	**32 [b]**		**-**	**-**	**20 [c]**		**-**	**-**

[a] % changes are relative to the criterion and have been rounded to the nearest whole nPM_{10}r.

[b] While the annual mean PM_{10} objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above whicPM_{10} exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG22 (Defra, 2022). A value of 32 µg/m³ is thus used as a proxy to determine the likelPM_{10}d of exceedance of the 24-hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

[c] The $PM_{2.5}$ objective is not in Regulations and there is no requirement for locaPM_{10}t$PM_{2.5}$ies to meet it.

7.8 The annual mean PM_{10} and $PM_{2.5}$ concentrations are well below the relevant criteria at all receptors, with or without the proposed development. The predicted changes in concentrations are 0% (when rounded) and the impacts are all descrPM_{10} as *negligible*.

7.9 Furthermore, as the annual mean PM_{10} concentrationsPM_{10} below 32 µg/m³ it is unlikely that the 24-hour mean PM_{10} objective will be exceeded at any of the receptors.

Impacts of Road Traffic Emissions on Future Residents of the Development

7.10 Predicted air quality conditions for future occupants of the proposed development, taking account of emissions from the adjacent road network, are set out in Table 15 for Receptors P1 to P6 (see Table 2 and Figure 3 for receptor locations).

7.11 All of the values are well below the objectives. Air quality for future occupants within the development, taking into account cumulative development in the area, will thus be acceptable.

Table 15: Predicted Annual Mean Concentrations of Nitrogen Dioxide (NO_2), PM_{10} and $PM_{2.5}$ in 2026 for New Receptors in the Proposed Development (µg/m³)

Receptor	NO_2	PM_{10}	$PM_{2.5}$
P1	10.6	14.5	9.2
P2	10.2	14.4	9.2
P3	9.7	14.4	9.1
P4	9.6	14.3	9.1
P5	10.0	14.4	9.1
P6	9.6	14.7	9.1
Objective / Criterion	**40**	**32 [a]**	**20 [b]**

[a] While the annual mean PM_{10} objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG22 (Defra,

2022). A value of 32 µg/m^3 is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

[b] The 20 µg/m^3 $PM_{2.5}$ objective is not in Regulations and there is no requirement for local authorities to meet it.

Significance of Operational Air Quality Effects

7.12 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A2, and takes account of the assessment that:

- pollutant concentrations at worst-case locations within the proposed development will all be well below the objectives, thus future occupants will experience acceptable air quality; and
- pollutant concentrations at all of the selected worst-case existing receptors alongside the affected local road network will be well below the air quality objectives, and all of the impacts are predicted to be *negligible*.

8 Damage Cost Calculations

Background

8.1 Defra developed the damage cost approach to enable proportionate analysis when assessing relatively small impacts on air quality. The damage costs are a set of impact values which were derived using the more detailed Impact Pathway Approach. These values estimate the societal costs associated with small changes in pollutant emissions. Combined with emission change estimates, they provide an approximate valuation of the aggregate societal impacts of a policy. Such impacts can then be set against the direct monetary costs of a scheme to provide a cost-benefit calculation. Thus, damage costs do not provide a figure for the abatement of emissions to a given level.

8.2 Abatement costs are usually derived from a marginal abatement cost curve (MACC) which gives the incremental cost of measures to achieve a certain outcome, such as the removal of an exceedance of the air quality objectives. However, the measures available and their associated costs are quite time-specific which means that they need to be updated on a regular basis. Defra's last MACC for NO_2 exceedances was produced several years ago and has now been withdrawn. There are therefore no Defra approved abatement costs for air quality currently available. Thus, while damage costs are not the same as abatement costs, they provide a current and available resource for assigning value to air pollution emissions.

Calculations

8.3 RSK, who have undertaken the Transport Assessment for the proposed development, have advised that the development will generate 2,734 additional vehicle trips per day[7], on average, on the local road network, none of which will be Heavy Duty Vehicles (HDVs).

8.4 The annual emissions from these trips have been calculated using the EFT and entered into Defra's damage cost toolkit, as described in Paragraphs 4.28 to 4.30. The calculations and results are presented in Table 16.

[7] Based on 675 homes (and 400 m^2 of non-residential floorspace); this is therefore a conservative damage cost calculation, as the proposed development will only provide up to 660 homes (and 400 m^2 of non-residential floorspace).

Table 16: Damage Cost Calculation

Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
NOx											
Total Emissions (tonnes)	0.235	0.414	0.540	0.621	0.665	0.568	0.450	0.306	0.196	0.110	0.038
Central Damage Cost (£) [a]	12,295	12,295	12,295	12,295	12,295	12,295	12,295	12,295	12,295	12,295	12,295
Discounted Central Cost (£)	2,890	5,010	6,448	7,302	7,700	6,486	5,055	3,393	2,143	1,180	406
Total Central Present Value (£)	**48,013**										
$PM_{2.5}$											
Total Emissions (tonnes)	0.027	0.053	0.078	0.104	0.129	0.128	0.117	0.092	0.066	0.041	0.015
Central Damage Cost (£) [a]	88,984	88,984	88,984	88,984	88,984	88,984	88,984	88,984	88,984	88,984	88,984
Discounted Central Cost (£)	2,366	4,612	6,758	8,815	10,789	10,583	9,560	7,348	5,214	3,154	1,163
Total Central Present Value (£)	**70,362**										

[a] Road transport.

8.5 Summing the values for NOx and $PM_{2.5}$ gives a total damage cost of **£118,375**.

9 Mitigation

Good Design and Best Practice

9.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. In line with the Low Emissions SPD, the following Type 1, Type 2 and Type 3 mitigation measures are proposed:

Type 1

- Electric Vehicle Charging Points for every new dwelling, and communal chargers for the apartments;
- Links to Public Rights of Way, and pedestrian and cycle routes through the site to facilitate access to the site boundary;
- Secure cycle storage for every property, as well as secure storage for the non-residential uses;
- Measures to support sustainable transport, including subsidies for new residents for the public transport network and the provision of new bus stops (all properties will be within approximately 400 m of a bus stop);
- Extensive green infrastructure across the site, acting as a buffer to transport emissions;
- ASHPs, thus avoiding the use of on-site combustion; and
- Employing mitigation during the construction phase in line with the IAQM guidance (2024).

Type 2

- Preparation of a Travel Plan, including a Welcome Pack available to all new residents;
- 'Full Fibre to property' broadband provision to each residential unit; and
- Electric Vehicle (EV) charging infrastructure throughout the development.

Type 3

- Bus service provision.

9.2 The Ipswich Low Emissions SPD (Ipswich Borough Council, 2021a) explains that:

"The pollutant emissions costs calculation will identify the environmental damage costs associated with the proposal and determine the amount (value) of mitigation that is expected to be spent on measures to mitigate the impacts."

9.3 Table 17 describes the good design and best practice measures that have been incorporated into the proposed development, and the approximate monetary cost of their implementation; this covers

Type 1, 2 and 3 mitigation set out within the Low Emissions SPD. The financial costs have been estimated by the project team.

Table 17: Key Measures and Costs

Item	Description	Approximate Cost (£)
1	EV charging will be provided on plot for every property other than apartments. Apartments to have communal charging points (at a ratio of 50%).	~£650,000
2	Pedestrian and cycle routes are embedded within the design to facilitate walking and cycling to the site boundaries for accessing local facilities and services.	~£355,000
3	Secure cycle storage at 100% provision i.e. at least one space per residential property, as well as spaces for the non-residential uses.	~£420,000
4	Green infrastructure, including a combination of on-site walking/play areas and off-site links to Public Right of Ways.	~£545,000
5	A bus route will be provided within the site giving every property access to a bus stop within approximately 400 m.	~£725,000
6	ASHPs are proposed to provide all heating and hot water to the proposed development; this will be supplemented by solar photovoltaics.	>£3,000,000
7	A Travel Plan will be prepared and submitted with the application setting out a range of measures to encourage and provide sustainable travel at the site. The Final Travel Plan will be developed in consultation with Suffolk County Council's Travel Plan Team. Measures are likely to include a New Residents 'Welcome Pack', which will promote car sharing, bike sharing, car clubs and car-pooling initiatives.	~£37,000
8	Superfast broadband will be provided to all residential units.	~£356,000
Total		**>£6,088,000**

9.4 The calculated damage cost in Section 8 amounts to £118,375. The minimum estimated costs of the measures proposed for the development far exceeds the damage cost. No additional measures are therefore required.

9.5 The Scheme Mitigation Statement required by the SPD is presented in Appendix A5.

Recommended Mitigation

Construction Impacts

9.6 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.

9.7 The site has been identified as a *High* Risk during earthworks and construction, and *Medium* Risk for trackout, as set out in Table 12. Comprehensive guidance has been published by the IAQM (2024) that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction (IAQM, 2018). This reflects best practice experience and has been used, together with the professional experience of the

consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A6.

9.8 The mitigation measures should be written into a Dust Management Plan (DMP). The DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan, and may require monitoring.

9.9 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Road Traffic Impacts

9.10 The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant'; it will not introduce any new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant effect on local air quality. It is, therefore, not considered appropriate to propose mitigation measures for this development beyond those outlined in Table 17.

9.11 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law).

10 Residual Impacts and Effects

Construction

10.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out in Section 9 and Appendix A6 are based on the IAQM guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

10.2 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall, the effects will be 'not significant'.

Road Traffic

10.3 The residual impacts will be the same as those identified in Section 7. The overall effects of the proposed development will be 'not significant'.

11 Conclusions

11.1 The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction and emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future occupants will experience. Damage cost calculations have been carried out in accordance with IBC's Low Emissions SPD.

Construction Impacts

11.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.

Operational Impacts

Impacts

11.3 Air quality conditions for future occupants of the proposed development have been shown to be acceptable, with concentrations well below the air quality objectives throughout the site.

11.4 The assessment has demonstrated that pollutant concentrations will be well below the objectives at all existing receptors in 2026, with or without the proposed development; this also accounts for cumulative development in the area. Emissions from the additional traffic generated by the proposed development will have a *negligible* impact on air quality conditions at all existing receptors along the local road network.

Damage Cost Calculation

11.5 Damage cost calculations for NOx and $PM_{2.5}$, carried out in accordance with IBC's Low Emissions SPD, give a total damage cost of **£118,375**.

11.6 It should be noted that the damage cost approach was not developed to provide a figure for the abatement of emissions to a given level (see Paragraphs 8.1 and 8.2).

Mitigation

11.7 It has been demonstrated that the approximate implementation costs of mitigation measures proposed will exceed the damage cost. There is, therefore, no need for further mitigation measures.

Significance

11.8 The overall operational air quality effects of the proposed development are judged to be 'not significant'.

Policy Implications

11.9 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 191 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 192, as it will not affect compliance with relevant limit values or national objectives.

11.10 The proposed development is also consistent with Policy DM3 of the Adopted Ipswich Local Plan Review, as an air quality assessment has demonstrated that the proposals will not negatively impact on existing air quality levels and has embedded suitable measures as part of the scheme design to mitigate the impact on air quality. In addition, the assessment has considered the risk of dust impacts during the construction phase and sets out appropriate mitigation measures.

11.11 The proposed development will also not conflict with any of the measures outlined in IBC's AQAP.

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13 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
IBC	Ipswich Borough Council
JAQU	Joint Air Quality Unit
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
µg/m^3	Microgrammes per cubic metre
MACC	Marginal Abatement Cost Curve
NO	Nitric oxide

NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
NRMM	Non-road Mobile Machinery
OEP	Office for Environmental Protection
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
SPD	Supplementary Planning Document
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide
WHO	World Health Organisation

14 Appendices

A1 Construction Dust Assessment Procedure

A1.1 The criteria developed by IAQM (2024) divide the activities on construction sites into four types to reflect their different potential impacts. These are:

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

A1.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A1.3 An assessment is required where there is a human receptor within 250 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s).

A1.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A1.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A1.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A1.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A1.1.

Table A1.1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >12 m above ground level
Medium	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6 - 12 m above ground level
Small	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height
Medium	Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3 m – 6 m in height
Small	Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height
Construction	
Large	Total building volume >75,000 m^3, on site concrete batching; sandblasting
Medium	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching
Small	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A1.8 The sensitivity of the area is defined taking 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 to reduce the risk of wind-blown dust.

A1.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in

Table A1.2. These receptor sensitivities are then used in the matrices set out in Table A1.3, Table A1.4 and Table A1.5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A1.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A1.6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A1.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix A6.

STEP 4: Determine Significant Effects

A1.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

A1.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A1.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; 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	dwellings, museum 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, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; 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	playing fields, farmland (unless commercially-sensitive horticulture), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
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	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A1.3: Sensitivity of the Area to Dust Soiling Effects on People and Property [8]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
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 A1.4: Sensitivity of the Area to Human Health Effects [8]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32 µg/m^3	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

[8] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 250 m, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table A1.5: Sensitivity of the Area to Ecological Effects [8]

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

Table A1.6: Defining the Risk of Dust Impacts

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

A2 EPUK & IAQM Planning for Air Quality Guidance

A2.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

A2.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A2.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

A2.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;

- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
    - Spark ignition engine: 250 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A2.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

A2.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Impacts of the Development on the Local Area

A2.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

A2.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A2.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A2.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A2.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

A2.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

"The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

A2.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

A2.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A2.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

A2.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A2.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A2.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A4.

A3 Modelling Methodology

Model Inputs

A3.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, street canyon width, street canyon height and porosity, where applicable).

A3.2 Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 12.0) published by Defra (2024b). Model input parameters are summarised in Table A3.1 and, where considered necessary, discussed further below.

Table A3.1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	No
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	Yes
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Wattisham Airfield
Meteorological Data Year	2022
Dispersion Site Surface Roughness Length (m)	0.5
Dispersion Site Minimum MO Length (m)	30
Met Site Surface Roughness Length (m)	0.2
Met Site Minimum MO Length (m)	1
Gradients?	No

Traffic Data

A3.3 AADT flows and the proportions of HDVs have been provided by RSK, who have undertaken the transport assessment for the proposed development. The traffic data also include flows associated with five cumulative developments identified by the project team[9]. The traffic data used in this assessment are summarised in Table A3.2.

A3.4 Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2023).

[9] Cumulative schemes that have been included in the traffic data are: Red House Park, Fonnereau Village, Adastral Park, Henley Gate and Westerfield Care Village.

Table A3.2: Summary of Traffic Data used in the Assessment

ID	Road Link	2022		2026 (Without Scheme)		2026 (With Scheme)	
		AADT	%HDV	AADT	%HDV	AADT	%HDV
1	Tuddenham Road (South of Humber Doucy Lane)	5,015	0.8	5,186	0.8	6,116	0.7
2	Tuddenham Road (North of Humber Doucy Lane)	6,540	0.4	6,782	0.4	7,155	0.4
3	Humber Doucy Lane (Between Inverness Road and Tuddenham Road)	4,149	0.3	4,350	0.3	5,414	0.3
4	Humber Doucy Lane (Between Inverness Road and Sidegate Lane)	4,149	0.3	4,350	0.3	6,830	0.2
5	Humber Doucy Lane (Between Sidegate Lane and Rushmere Road)	3,690	0.6	3,790	0.6	5,403	0.4
6	Rushmere Street	3,287	0.4	3,379	0.4	3,461	0.4
7	Rushmere Road (between Humber Doucy Lane and Colchester Road)	2,953	0.3	3,033	0.3	4,291	0.2
8	Humber Doucy Lane (South of Rushmere Road)	1,950	0.6	2,088	0.6	2,361	0.5
9	Sidegate Lane	2,811	2.0	2,884	1.9	2,994	1.9
10	Colchester Road (East of Tuddenham Road)	22,962	0.8	26,344	0.7	26,344	0.7
11	Colchester Road (North of Rushmere Road)	18,739	0.7	19,146	0.7	19,146	0.7
12	Rushmere Road (West of Colchester Road)	3,934	0.6	4,039	0.5	4,559	0.5
13	Colchester Road (South of Rushmere Road)	19,113	0.9	19,612	0.9	20,350	0.9
14	Valley Road (A1214) (West of Tuddenham Road)	22,545	0.7	25,734	0.7	26,609	0.6
15	Tuddenham Road (South of Colchester Road)	4,993	0.6	5,260	0.5	5,315	0.5
16	A1156 (North of Colchester Road)	20,370	1.9	21,557	2.8	21,744	2.8
17	A1156 (South of Colchester Road)	20,370	1.9	21,557	2.8	21,557	2.8
18	Colchester Road (East of A1156)	21,998	1.2	25,285	1.0	26,169	1.0
19	Chevallier Street	21,998	1.2	25,285	1.0	25,982	1.0
20	Internal Road	0	0.0	0	0.0	2,734	0.0

A3.5 Figure A3.1 shows the road network included within the model, along with the speed at which each link was modelled and corresponding ID from Table A3.2.

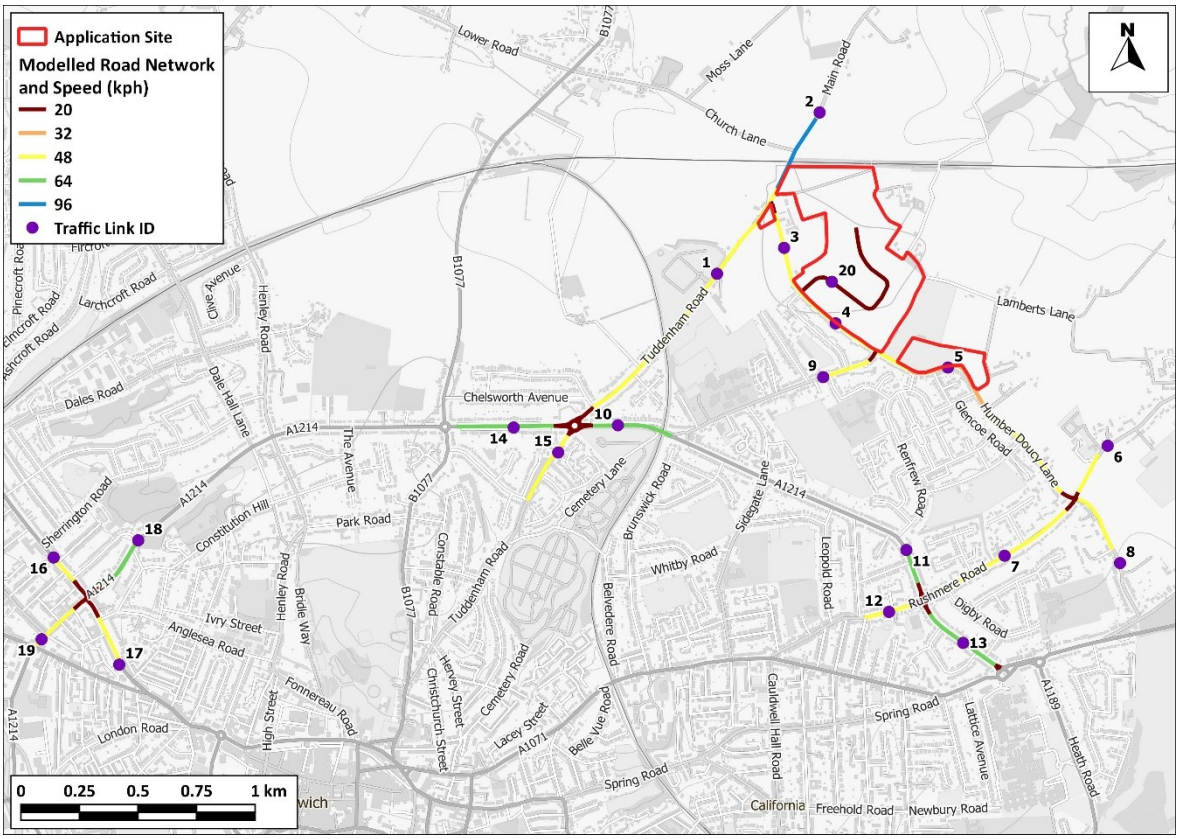

Figure A3.1: Modelled Road Network & Speed

Canyons

A3.6 For the purposes of modelling, it has been assumed that the section of the A1214, between Providence Lane and Norwich Road (A1156) is a one-sided street canyon, formed by the buildings on the northern side. This road has a number of canyon-like features, which reduce dispersion of traffic emissions, and can lead to concentrations of pollutants being higher here than they would be in areas with greater dispersion.

A3.7 This section of the A1156 has, therefore, been modelled as a street canyon using ADMS-Roads' advanced canyon module, with appropriate input parameters determined from local mapping. Other roads in the study area have not been modelled as canyons, as properties are set further back from the road edge with low level buildings, which will not inhibit dispersion of vehicle emissions.

A3.8 The modelled canyons are shown in Figure A3.2.

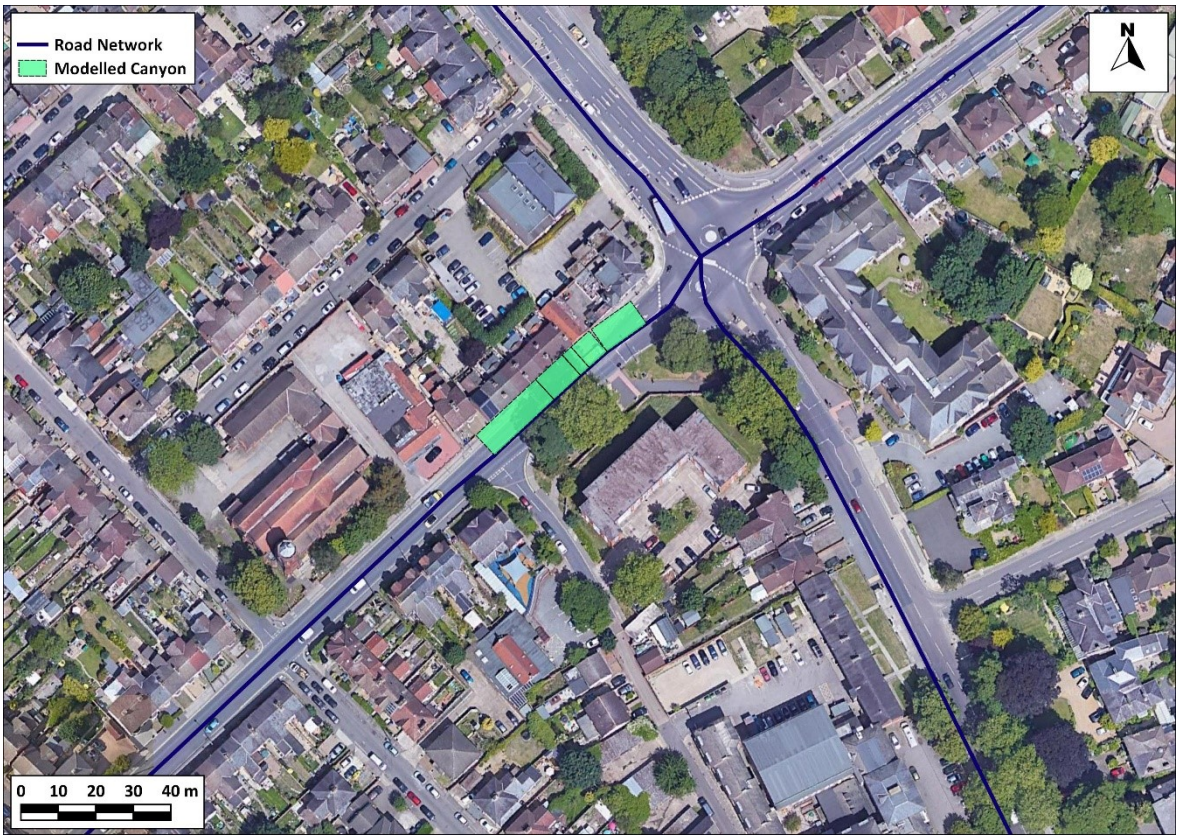

Figure A3.2: Modelled Canyons

Imagery ©2024 Airbus, Bluesky, CNES / Airbus, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies.

Meteorology

A3.9 Hourly sequential meteorological data in sectors of 10 degrees from Wattisham Airfield for 2022 have been used in the model. The Wattisham Airfield meteorological monitoring station is located approximately 17 km to the northwest of the proposed development.

A3.10 It is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of the proposed development; both the application site and the Wattisham meteorological monitoring station are located in the southeast of England where they will be influenced by the effects of inland meteorology over flat-lying topography. The topography of the model domain is, therefore, similar to that around the meteorological monitoring station and measurements from this site are considered to provide the most robust basis to predict meteorology within the model domain.

A3.11 A wind rose for the site for 2022 is provided in Figure A3.3. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

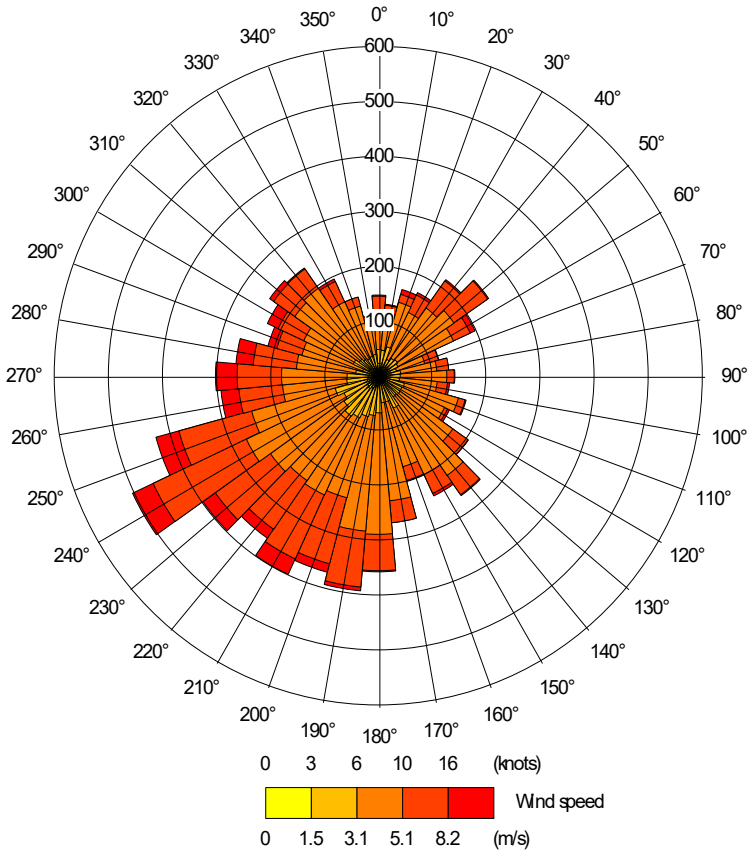

Figure A3.3: Wind Rose for Wattisham Airfield for 2022

Model Verification

Nitrogen Dioxide

A3.12 Evidence collected over many years has shown that, in most urban areas, dispersion modelling relying upon Defra's EFT has tended to systematically under-predict roadside nitrogen dioxide concentrations. To account for this, it is necessary to adjust the model against local measurements.

A3.13 The model has been run to predict annual mean nitrogen dioxide concentrations during 2022 at five locations in the study area (diffusion tube sites 14, 16, 48 and 60, and the IPS3 automatic monitor).

A3.14 Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NOx = NO + NO_2).

A3.15 The model output of road-NOx (i.e. the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO_2 concentrations and the predicted background NO_2 concentration using the NOx from NO_2 calculator (Version 8.1) available on the Defra LAQM Support website (Defra, 2024b).

A3.16 The unadjusted model has under predicted the road-NOx contribution; this is a common experience with this and most other road traffic emissions dispersion models. An adjustment factor has been determined as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure A3.4). The calculated adjustment factor of 2.4355 has been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations.

A3.17 The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx to NO_2 calculator. Figure A3.5 compares final adjusted modelled total NO_2 at each of the monitoring sites to measured total NO_2, and shows a close agreement.

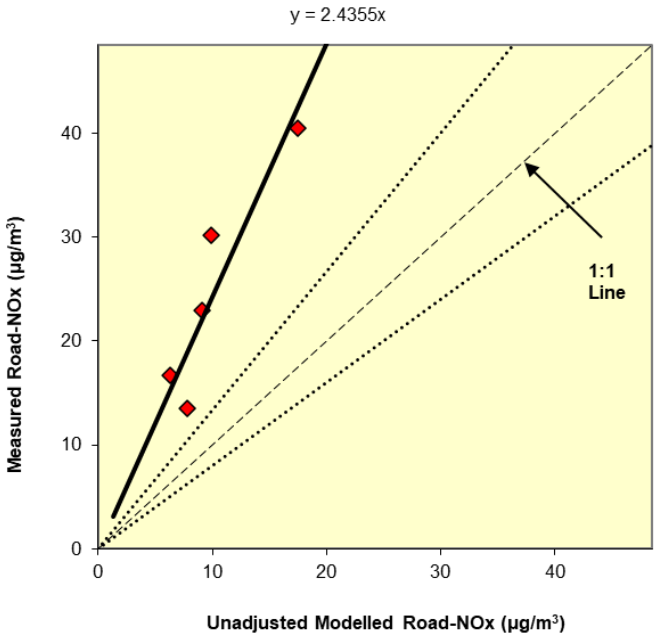

Figure A3.4: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations. The dashed lines show ± 25%.

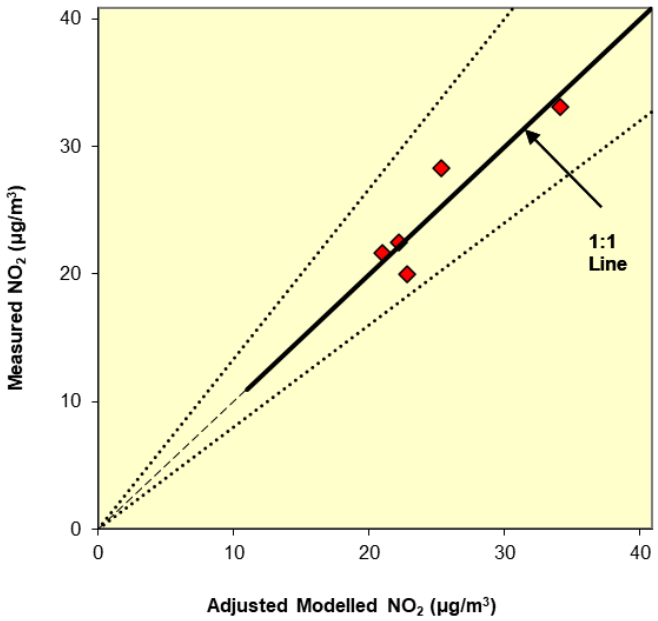

Figure A3.5: Comparison of Measured Total NO_2 to Final Adjusted Modelled Total NO_2 Concentrations. The dashed lines show ± 25%.

3.17.1 Table A3.3 shows the statistical parameters relating to the performance of the model, as well as the 'ideal' values (Defra, 2022). The values calculated for the model demonstrate that it is performing well.

Table A3.3: Statistical Model Performance

Statistical Parameter	Model-Specific Value	'Ideal' Value
Correlation Coefficient [a]	0.92	**1**
Root Mean Square Error (RMSE) [b]	1.91	**0**
Fractional Bias [c]	0.00	**0**

[a] Used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship.

[b] Used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared (i.e. µg/m^3). LAQM.TG22 (Defra, 2022) outlines that, ideally, a RMSE value within 10% of the air quality objective (4 µg/m^3) would be derived. If RMSE values are higher than 25% of the objective (10 µg/m^3) it is recommended that the model is revisited.

[c] Used to identify if the model shows a systematic tendency to over or under predict. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.

PM_{10} and $PM_{2.5}$

A3.18 The approach described above for NOx and nitrogen dioxide determines the road increment of concentrations by subtracting the predicted local background from the roadside measurements. This

works well for NOx because the differences between roadside and background concentrations typically represent a large proportion of the total measured value. The same is not true for PM_{10} and $PM_{2.5}$ concentrations, which are dominated by non-road emissions, even at the roadside. In practice, the influence of a local road on concentrations can often be smaller than the uncertainty in the mapped background concentration. As an example of this, 31% of all roadside and kerbside sites in London which measured $PM_{2.5}$ in 2019 with >75% data capture, recorded an annual mean concentration lower than the equivalent Defra mapped background value. Using measured background concentrations does not provide any significant benefit, owing largely to the spatial resolution of available measurements, but also because of measurement uncertainty. For example, hourly-mean $PM_{2.5}$ concentrations measured at roadside sites are often lower than those measured at nearby urban background sites, while concentrations at urban background sites are often lower than those measured at rural sites.

A3.19 For these reasons, it is not appropriate to calculate the annual mean road-increment to PM_{10} and $PM_{2.5}$ concentrations by subtracting either the mapped background or a local measured background concentration. This, in turn, means that the approach to model adjustment which is described for NOx and NO_2 is not appropriate for PM_{10} and $PM_{2.5}$. Historically, many studies have derived a model adjustment factor for NOx and applied this to PM_{10} and $PM_{2.5}$. This is also not appropriate, since there is no reason to expect the same bias in emissions of NOx, PM_{10} and $PM_{2.5}$.

A3.20 While there is very strong evidence that EFT-based models have consistently under-predicted road-NOx concentrations in urban areas, there is no equivalent evidence for PM_{10} and $PM_{2.5}$. There is currently no strong basis for applying any adjustment to the model outputs. Predicted concentrations of PM_{10} and $PM_{2.5}$ have thus not been adjusted.

Post-processing

A3.21 The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO_2, has been processed through the NOx to NO_2 calculator available on the Defra LAQM Support website (Defra, 2024b). The traffic mix within the calculator has been set to “All other urban UK traffic”, which is considered suitable for the study area. The calculator predicts the component of NO_2 based on the adjusted road-NOx and the background NO_2.

A4 Professional Experience

Dr Denise Evans, BSc (Hons) PhD MIEnvSc MIAQM

Dr Evans is an Associate Director with AQC, with more than 24 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.

Dr Frances Marshall, MSci PhD MIEnvSc MIAQM

Dr Marshall is a Principal Consultant with AQC with ten years' relevant experience. Prior to joining AQC, she spent four years carrying out postgraduate research into atmospheric aerosols at the University of Bristol. Dr Marshall has experience preparing air quality assessments for a range of projects, including residential and commercial developments, road traffic schemes, energy centres, energy from waste schemes and numerous power generation schemes. She has experience in producing air quality assessments for EIA schemes, and has also assessed the impacts of Local Plans on designated ecological areas, prepared Annual Status Reports for Local Authorities, and undertaken diffusion tube monitoring studies. She is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

A5 Scheme Mitigation Statement

A5.1 The Ipswich Low Emissions SPD (Ipswich Borough Council, 2021a) requires the completion of an "*Air Quality Exposure Assessment Template*". This lists specific mitigation measures under the categories of Types 1, 2, and 3 mitigation. The SPD states that developments should incorporate as many types of mitigation as are appropriate and deliverable. The template for "*Large*" developments is reproduced below. The table showing the mitigation proposed has been altered from that in the template only to add a final 'reference' column. This indicates where additional information can be found.

Checklist for Submission	Included	Reference
Air Quality Assessment (if relevant exposure)	Yes	This Report
Damage Cost Calculations	Yes	Table 16
Mitigation Proposed	Yes	Table 17, Section 9 and table below

Name and address of site:	Land Northeast of Humber Doucy Lane Ipswich Suffolk
Description of proposed development: • Size (number of dwellings or area in m^2) • Type (residential/commercial/industrial)	Outline planning application (all matters reserved except for the means of vehicular access from Humber Doucy Lane and Tuddenham Road) for a mixed use development for up to 660 dwellings (Use Class C3), up to 400 sq m (net) of non-residential floorspace falling within Use Class E and/or Use Class F2(b), an Early Years facility, and associated vehicular access and highway works, formal and informal open spaces, play areas, provision of infrastructure (including internal highways, parking, servicing, cycle and pedestrian routes, utilities and sustainable drainage systems), and all associated landscaping and engineering works.

Mitigation Measure	Included	Reference
Type 1 Mitigation		
Provision of Electric Vehicle Charging Points and future infrastructure as per the Ipswich Local Plan, where appropriate	Yes	Table 17, Item 1
Measures to support and improve walking infrastructure (or other non-motorised users where appropriate), e.g. encourage links to existing Rights of Way (ROW) in order to improve opportunities for walking.	Yes	Table 17, Item 2
Design measures that make the best use of location and site layout and help reduce trip demand and total emissions generated by a development (see also design measures under step 3 such as set backs)	Yes	Table 17, Items 2&5
Improved cycle paths to link cycle network	Yes	Table 17, Item 2

Mitigation Measure	Included	Reference
Adequate provision of secure cycle storage	Yes	Table 17, Item 3
Using, where appropriate, trees and green infrastructure to absorb dust and other pollutants (the NPPF now requires new streets to be tree lined – para. 131)	Yes	Table 17, Item 4
Measures to support the use of public transport	Yes	Table 17, Item 5
Low NOx heating to meet a minimum standard of <40mgNOx/kWh	Yes	Table 17, Item 6
Adherence to Construction Good Practice, including: Mitigation in accordance with the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction. Ensure all Non-Road Mobile Machinery (NRMM) comply with the requirements of the NRMM regulations.	Yes	Appendix A6
Type 2 Mitigation (Residential)		
Travel plan (where required) including mechanisms for discouraging high emission vehicle use and encouraging modal shift as well as the uptake of low emission fuels and technologies, which could include: • A Welcome Pack available to all new residents online and as a booklet, containing information and incentives to encourage the use of sustainable transport modes from new occupiers; • Eco-driver advice to aid to all residents; • Designation of parking spaces for low emission vehicles	Yes	Table 17, Item 7
'Full Fibre to property' broadband provision to enable working from home	Yes	Table 17, Item 8
EV charging infrastructure within the development (wall mounted or free standing in-garage or off-street points)	Yes	Table 17, Item 1
Car club provision within the development or support given to local car club/EV car clubs	No	Para A5.3
Contributing funding to measures, including those identified in the Council's current Air Quality Action Plan and low emission strategies, designed to offset the impact on air quality arising from new development.	No	Para A5.3
Type 2 Mitigation (Commercial)		
Travel plan (where required) including mechanisms for discouraging high emission vehicle use and encouraging modal shift as well as the uptake of low emission fuels and technologies, which could include: • Differential parking charges depending on vehicle emissions; • Public transport subsidy for employees; • All commercial vehicles should comply with current European Emission Standard, to be progressively maintained for the lifetime of the development • Fleet operations should provide a strategy for considering reduced emissions, low emission fuels and technologies	Yes	Table 17, Item 7
Use of ultra-low emission service vehicles	No	Para A5.2
Provision of high-quality workplace shower and locker facilities	No	Para A5.2
On-street EV charging	Yes	Table 17, Item 1
Contributing funding to measures, including those identified in the Council's current Air Quality Action Plan and low emission strategies, designed to offset the impact on air quality arising from new development	No	Para A5.3
Type 3 Mitigation		

Mitigation Measure	Included	Reference
Low emission and ultra-low public transport, including bus service provision (see also SCC Transport Mitigation Strategy)	Yes/No	Table 17, Item 5 Para A5.2
Low emission waste collection services	No	Para A5.2
Contribution to low emission vehicle refuelling infrastructure e.g. refuse collection and community transport services	No	Para A5.2
Cycling hubs and corridors, including bicycle/e-bike hire schemes;	Yes	Table 17, Item 2
Incentives for the take-up of low emission technologies and fuels	No	Para A5.2
Transport network improvements (e.g. signal improvements and traffic management) – that can be shown to benefit air quality	No	Para A5.2
Air Quality Monitoring programmes	No	Para A5.2

A5.2 Under Type 2 measures for the commercial element, the mitigation template suggests the use of low emission service vehicles. This is not within the control of the applicant. It also suggests the provision of workplace shower and locker facilities. Given the small-scale nature of the commercial elements (400 m^2), it is unlikely that this would be provided. Under Type 3 mitigation, the template suggests provision of low emission public transport. Row 5 of Table 17 explains that significant investment will be made in public transport including provision of a bus service through the proposed development. However, the types of buses which will be used is not within the control of the applicant. The mitigation template also suggests low emission waste collection services. The waste collection services will be provided by the Council and therefore this is also not within the control of the applicant. Whilst low emission vehicle refuelling infrastructure will be provided (in the form of electric vehicle charging points for residential properties) this is primarily for residents.

A5.3 Finally, the template suggests incentives to take up low emissions and fuels, transport network improvements, and air quality monitoring programmes. The SPD is clear that there is no expectation that every development will include every form of mitigation and that the requirement for additional mitigation should be defined by the damage cost calculation. As is shown in Section 9, the monetary cost of the mitigation which will be provided is significantly greater than the damage costs for this development. Thus, no additional mitigation is required.

A6 Construction Mitigation

A6.1 Table A6.1 sets out a list of best-practice measures from the IAQM guidance (IAQM, 2024) that should be incorporated into the specification for the works. These measures should ideally be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Table A6.1: Best-Practice Mitigation Measures Recommended for the Works

Measure	Desirable	Highly Recommended
Communications		
Develop and implement a stakeholder communications plan that includes community engagement before and during work on site		✓
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager		✓
Display the head or regional office contact information		✓
Dust Management Plan		
Develop and implement a Dust Management Plan (DMP) approved by the Local Authority which documents the mitigation measures to be applied, and the procedures for their implementation and management		✓
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		✓
Hold regular liaison meetings with other high risk construction sites within 250 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes		✓
Monitoring		
Undertake daily on-site and off-site inspections where receptors (including roads) are nearby, to monitor dust. Record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of the 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		✓
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction **(IAQM, 2018)**		✓
Preparing and Maintaining the Site		
Plan the 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 active for an extensive period		✓
Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods		✓
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below		✓
Cover, seed, or fence stockpiles to prevent wind whipping		✓
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all vehicles switch off their 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 un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)		✓
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
Implement a Travel Plan that supports and encourages sustainable staff 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, 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 Earthworks		
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable		✓
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable		✓
Only remove the cover from small areas during work, not all at once		✓
Measures Specific to Construction		
Avoid scabbling (roughening of concrete surfaces), if possible		✓
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place		✓
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery		✓
For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust	✓	
Measures Specific to Trackout		
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use		✓
Avoid dry sweeping of large areas		✓
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport		✓
Access gates should be located at least 10 m from receptors, where possible		✓