Vistry Group

BUNTINGFORD WEST

Air Quality Assessment

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EXECUTIVE SUMMARY

WSP has been commissioned by Vistry Group to undertake an air quality assessment to support the planning application for the Proposed Development of land to the west of Buntingford, East Hertfordshire. The application is for an outline planning application (with all matters reserved except for access) for up to 350 dwellings, up to 4,400 sqm of commercial and services floorspace (use class E and B8), and up to 500 sqm of retail floorspace (use classes E) and other associated works including drainage, access into the site from the A10 and Luynes Rise (but not access within the site), allotments, public open space and landscaping.

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational phases of the proposed development. For both phases the type, source and significance of potential impacts were identified, and the measures that should be employed to minimise these proposed. The methodology followed in this study was discussed and agreed with the Environmental Health Officer of East Herts Council.

The assessment of construction phase impacts associated with fugitive dust and fine particulate matter (PM_{10} and $PM_{2.5}$) emissions has been undertaken in line with the relevant Institute of Air Quality Management guidance. This identified that there is a High Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate matter releases would be significantly reduced. The residual effects of the construction phase on air quality are negligible.

The assessment of the potential air quality impacts associated with traffic generated by the operational phase of the proposed development has been completed in line with published methodologies and technical guidance. The pollutants considered in this part of the assessment were nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$. Given the proximity of the proposed development to a main A-road (A10), an assessment of the likely exposure of future occupants to potentially poor air quality has also been undertaken.

The results show that the proposed development would cause an imperceptible increase in concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all the modelled receptors. According to the assessment significance criteria, the residual effects of the proposed development are negligible.

Concentrations of all modelled pollutants were below the relevant UK Air Quality Strategy objectives at all locations within the Proposed Development site, and therefore future residents will not be exposed to poor air quality.

The potential for odour impacts from the Buntingford Wastewater Treatment Works (WwTW) has been considered. Existing odour modelling completed by ARUP for the East of Aspenden Road development (X/20/0428/CND) indicates that the majority of the site is sitting outside of the “most offensive” contour. This indicates that 350 residential units can be accommodated within the Application Site outside of the area of greatest risk with respect to odour, thereby establishing the principle of development within the Application Site. Less sensitive receptors, such as the proposed commercial and retail uses, may be accommodated within the higher odour contour brackets. As the application is currently outline, the final location and choice of commercial and retail uses are not known. However, depending on the final choice of commercial and retail uses, these types of receptors may be suitable to be within the “moderately offensive” contour bracket, indicating that

most of the Application Site is suitable for development. It is understood that the WwTW will undergo some upgrades in 2023. Furthermore, it may be that changes/upgrades to the WwTW are required to accommodate the Proposed Development. Therefore, further odour modelling may be required to reflect these changes and a full odour assessment is expected to form part of a planning condition.

Based on the assessment results, it is considered that the development proposals comply with national and local policy for air quality.

1. INTRODUCTION

1.1.1. WSP has been commissioned by Vistry Group to assess the potential air quality impacts arising from the proposed development at land west of Buntingford, hereafter referred to as the 'Proposed Development' or 'Application Site'.

1.1.2. The Application Site lies within the administrative boundary of East Herts Council (EHC) and is situated to the west of Buntingford town centre. It is bordered by residential dwellings to the north and east, with the A10 running parallel to the western boundary. Buntingford Wastewater Treatment Works (WwTW) border the Application Site to the south-east, beyond which lie industrial units.

1.1.3. The Application Site measures approximately 28.95 hectares and currently comprises agricultural land. The planning application comprises of:

- An outline planning application (with all matters reserved except for access) for up to 350 dwellings, up to 4,400 sqm of commercial and services floorspace (Use Class E and B8), and up to 500 sqm of retail floorspace (Use Classes E) and other associated works including drainage, access into the site from the A10 and Luynes Rise (but not access within the site), allotments, public open space and landscaping.

1.1.4. This report presents the findings of an assessment of the potential air quality impacts of the Proposed Development during both the construction and operational phases. For both phases, the type, source and significance of potential impacts are identified, and the measures that should be employed to minimise these are described.

1.1.5. This report also considers the potential exposure of future residents of the Proposed Development to local pollution concentrations given the Application Site's proximity to the A10.

1.1.6. The potential for future residents/users of the Proposed Development to experience odour given the proximity of the Application Site to Buntingford WwTW has also been considered. The WwTW is located immediately adjacent to the south-eastern corner of the Application Site. The main sources of odour arising from operations at the WwTW are considered to be the sludge holding tanks (the sludge from which is removed from the WwTW by tanker several times a week), the solid screening process (the trapped materials from which are collected into a skip which is removed and replaced, as required) and the primary settlement tanks (all of which form the primary stages of treatment). The inlet channels and septic discharge tanks also represent a potential source of odour, especially during the delivery of septic waste (noting this only happens occasionally).

1.1.7. A glossary of terms used in this report is provided in **Appendix A**.

2. LEGISLATION, POLICY & GUIDANCE

2.1. AIR QUALITY LEGISLATION & POLICY

2.1.1. A summary of the relevant air quality legislation and policy is provided below.

UK AIR QUALITY STRATEGY

2.1.2. The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)[1,2].

2.1.3. The AQS also sets standards and objectives for nine key air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs). The standards and objectives for the pollutants considered in this assessment are given in **Appendix B**.

2.1.4. The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regard to current scientific knowledge about the effects of each pollutant on health and the environment.

2.1.5. The air quality objectives are policy-based targets set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

2.1.6. For the pollutants considered in this assessment, there are both long-term (annual mean) and short-term standards. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example, temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road.

2.1.7. The AQS contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM_{10}.

[1] Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland Volume 1* [online]. Available at: https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1 [Accessed June 2023].

[2] Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland Volume 2* [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69337/pb12670-air-quality-strategy-vol2-070712.pdf [Accessed June 2023].

AIR QUALITY REGULATIONS

2.1.8. Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000[3] and the Air Quality (England) (Amendment) Regulations 2002[4] for the purpose of Local Air Quality Management (LAQM).

2.1.9. These Regulations require that likely exceedances of the AQS objectives are assessed in relation to:

"…the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present…"

2.1.10. The Air Quality Standards Regulations 2010[5] (as amended)[6] and the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[7] set legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM_{10}, $PM_{2.5}$ and NO_2.

CLEAN AIR STRATEGY

2.1.11. Defra published the Government's Clean Air Strategy in 2019[8]. This sets out measures, which aim to reduce emissions from all sources of air pollution, making air healthier to breathe, protecting nature and boosting the economy. The Strategy also proposes tough new goals to cut public exposure to airborne particulate matter, as per the recommendation made by the World Health Organisation.

2.1.12. Furthermore, the Strategy confirms that the Government will set new legislation to 'create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.' New enforcement powers will also be given at a national and local level, across all sectors of society.

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[3] The National Archives (2000) *The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928* [online]. Available at: https://www.legislation.gov.uk/uksi/2000/928/contents/made [Accessed June 2023].

[4] The National Archives (2002) *The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043* [online]. Available at: https://www.legislation.gov.uk/uksi/2002/3043/contents/made [Accessed June 2023].

[5] The National Archives (2010) *The Air Quality Standards Regulations 2010 - Statutory Instrument 2010 No.1001* [online]. Available at: https://www.legislation.gov.uk/uksi/2010/1001/contents/made [Accessed June 2023].

[6] The National Archives, (2010). *The Air Quality Standards Regulations 2010 - Statutory Instrument 2010 No.1001* [online]. Available at: https://www.legislation.gov.uk/uksi/2010/1001/contents/made [Accessed June 2023].

[7] The National Archives, (2020). *The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 - Statutory Instrument 2020 No.1313* [online]. Available at: https://www.legislation.gov.uk/uksi/2020/1313/contents/made [Accessed February 2023].

[8] Defra (2019) *Clean Air Strategy 2019* [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf [Accessed June 2023].

ENVIRONMENTAL PROTECTION ACT 1990 - CONTROL OF DUST AND PARTICULATES ASSOCIATED WITH CONSTRUCTION

2.1.13. Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to dust and particles:

"Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance"; and

"Any accumulation or deposit which is prejudicial to health or a nuisance"

2.1.14. Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.1.15. There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept, and its perception is highly dependent upon the existing conditions and the change which has occurred.

ENVIRONMENT ACT 1995

2.1.16. Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.

ENVIRONMENT ACT 2021

2.1.17. The Environment Act 2021[9] was passed into law in November 2021. This Act sets a legally binding duty on the Secretary of State to bring forward air quality targets into secondary legislation; with specific regard to the annual mean level of $PM_{2.5}$ in ambient air.

2.1.18. In March 2022 and in response to this duty, the UK government proposed a legally binding target to reduce annual mean $PM_{2.5}$ concentrations across England to 10µg/m^3 and achieve a 35% reduction in population exposure (when compared to 2018 levels) by 2040[10].

2.1.19. Schedule 11 of the Environment Act 2021 also provides amendments to the Environment Act 1995 regarding the duty of the Secretary of State to report on air quality in England as well as the functions and duties of relevant public authorities including, but not limited to, the duty of a local authority to prepare an action plan for an Air Quality Management Area *"…for the purpose of securing that air quality standards and objectives are achieved…"*

[9] The National Archives (2021) *Environment Act 2021* [online]. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted [Accessed June 2023].

[10] Defra (2022) *Air Quality Targets in the Environment Act* [online]. Available at: https://uk-air.defra.gov.uk/library/air-quality-targets [Accessed June 2023].

2.1.20. Under the Environment Act 2021 the Office for Environmental Protection was formed to perform the role of an objective and impartial environmental watchdog in the UK. Previously this role was held by the European Commission.

ENVIRONMENTAL IMPROVEMENT PLAN 2023

2.1.21. On 31st January 2023, the UK government published its Environmental Improvement Plan[11] which constitutes the first review of the 25 Year Environment Plan as required under the Environment Act 2021. Of relevance to air quality within this document is the 25 Year Environmental Plan[12] goal to achieve clean air in the UK by cutting air pollution overall by tackling key sources of emissions and specific hotspots and reducing ammonia emissions.

In addition, the document sets out the following commitments:

- *"A legal target to reduce population exposure to $PM_{2.5}$ by 35% in 2040 compared to 2018 levels, with a new interim target to reduce by 22% by the end of January 2028.*
- *Legal concentration limits for a number of other key pollutants. We already meet the majority of these limits including for sulphur dioxide and coarse particulate matter. We are working towards meeting compliance with a 40µg/m^3 limit for nitrogen dioxide.*
- *A legal target to require a maximum annual mean concentration of 10 micrograms of $PM_{2.5}$ per cubic metre (µg/m^3) by 2040, with a new interim target of 12µg/m^3 by the end of January 2028.*
- *Legal emission reduction targets for five damaging pollutants by 2030 relative to 2005 levels:*
  - *Reduce emissions of nitrogen oxides by 73%.*
  - *Reduce emissions of sulphur dioxide by 88%.*
  - *Reduce emission of $PM_{2.5}$ by 46%.*
  - *Reduce emissions of ammonia by 16%.*
  - *Reduce emissions of non-methane volatile organic compounds by 39%."*

2.2. PLANNING POLICY

2.2.1. A summary of the national and local planning policy relevant to the Proposed Development and air quality is provided below.

[11] Defra, (2023). *Environmental Improvement Plan 2023* [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133077/environmental-improvement-plan-2023.pdf [Accessed July 2023].

[12] Defra, (2018). *25 Year Environment Plan* [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf [Accessed July 2023].

NATIONAL PLANNING POLICY

National Planning Policy Framework

2.2.2. The Government's overall planning policies for England are described in the National Planning Policy Framework[13]. The core underpinning principle of the Framework is the presumption in favour of sustainable development, defined as:

- *"… meeting the needs of the present without compromising the ability of future generations to meet their own needs."*

2.2.3. One of the three overarching objectives of the NPPF is that planning should "*… contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*"

2.2.4. In relation to air quality, the following paragraphs in the document are relevant:

- Paragraph 55 - "*Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.*"
- Paragraph 104, which relates to the need to consider transport related issues at the earliest stages of plan making and development proposals, so that "*…c) opportunities to promote walking, cycling and public transport use are identified and pursued; d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains…*".
- Paragraph 105 - "*Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health."*;
- Paragraph 174 - "*Planning policies and decisions should contribute to and enhance the natural and local environment by: …e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."*;
- Paragraph 185 - "*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*"

[13] Ministry of Housing, Communities and Local Government (2021) *National Planning Policy Framework* [online]. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Accessed June 2023].

- Paragraph 186 - "*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or 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*.";
- Paragraph 188 – "*The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."*

LOCAL PLANNING POLICY

East Herts District Plan

2.2.5. Adopted on 23rd October 2018, the East Herts District Plan[14] , sets out the Council's planning framework for the period 2011 to 2033. This document contains Policy EQ4 Air Quality, which states:

"*I. The effect of development upon air quality is a material consideration. All applications should take account of the Council's Air Quality Planning Guidance Document, which details when an air quality assessment is required.*

II. All development should take account of the Council's latest Air Quality Action Plan, local Air Quality Strategies, Local Transport Plans, as well as national air quality guidance.

III. All developments should include measures to minimise air quality impact at the design stage and should incorporate best practice in the design, construction and operation of all developments.

IV. Where development (on its own or cumulatively) will have a negative impact on local air quality during either construction or operation, mitigation measures will be sought that will remove overriding impacts, such as an air quality neutral or negative development. Evidence of mitigation measures will be required upfront.

V. Where on-site mitigation is not sufficient, appropriate off-site mitigation measures may be required. Where adequate mitigation cannot be provided, development will not normally be permitted.

VI. Developments must not:

[14] East Herts Council (2018) *East Herts District Plan 2018* Available at: https://www.eastherts.gov.uk/planning-building/east-herts-district-plan/east-herts-district-plan-2018 [Accessed June 2023]

- *lead to a breach or worsening of a breach of UK or EU limit values;*
- *lead to a breach or worsening of a breach of an Air Quality objective or cause the*
- *declaration of an Air Quality Management Area or;*
- *prejudice the implementation of any Air Quality Action Plan or local air quality strategy.*"

Buntingford Community Area Neighbourhood Plan

2.2.6. The Buntingford Community Area Neighbourhood Plan[15] was adopted in 2017 and sets out the vision for the Buntingford Community Area and includes details such as detailed planning policies, site allocations and key areas for improvement. An adopted Neighbourhood Plan carries significant weight in determining development proposals for the local area.

2.2.7. There is no policy provision for the emissions from road vehicles as a result of new development.

2.3. GUIDANCE

2.3.1. A summary of the publications referred to in the undertaking of this assessment is provided below.

Local Air Quality Management Review and Assessment Technical Guidance

2.3.2. The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work[16]. This guidance is referred to in this document as LAQM.TG(22), has been used where appropriate in the assessment presented herein.

Land-use Planning & Development Control: Planning for Air Quality

2.3.3. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance[17] that offers comprehensive advice on when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and, the possible mitigation measures that may be implemented to minimise these impacts.

Guidance on the Assessment of Dust from Demolition and Construction

2.3.4. This document[18] published by the IAQM was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

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[15] Buntingford Town Council (2017) *Buntingford Community Area Neighbourhood Plan 2014 – 2031* Available at: https://www.eastherts.gov.uk/planning-building/planning-policy/neighbourhood-planning-activity-east-herts/buntingford-community-area [Accessed June 2023]

[16] Defra (2022) *Part IV The Environment Act 1995 as amended by the Environment Act 2021 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG(22)* [online]. Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf [Accessed June 2023].

[17] Environmental Protection UK and Institute of Air Quality Management (2017) *Land Use Planning & Development Control: Planning for Air Quality (version 1.2)* [online]. Available at: https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf [Accessed June 2023].

[18] Institute of Air Quality Management (2016) *Guidance on the Assessment of Dust from Demolition and Construction (version 1.1)* [online]. Available at: https://iaqm.co.uk/guidance/ [Accessed June 2023].

Guidance on the Assessment of Odour for Planning

2.3.5. This document[19] published by the IAQM provides guidance for assessing odour impacts for planning purposes. The guidance presents a range of methodologies that can be adopted for an odour assessment and highlights that some degree of professional judgement is required throughout the assessment.

East Herts Air Quality Planning Guidance

2.3.6. This guidance[20] provides guidance on air quality assessments within EHC. The guidance includes a three-stage approach to follow when assessing potential air quality implications for a development. These three stages are determining the classification of the proposed development, assessing and quantifying impacts and determining the level of mitigation required.

[19] Institute of Air Quality Management (2018) Guidance on the Assessment of Odour for Planning (version 1.1). Available at: www.iaqm.co.uk/text/guidance/odour-guidance-2018 [Accessed June 2023]

[20] East Herts District Council (Date unknown). *Air Quality Planning Guidance*. [online]. Available at: http://democracy.eastherts.gov.uk/documents/s36485/Air%20Quality%20-%20ERP%20B%20planning%20guidance.pdf?J=1 [Accessed June 2023]

3. CONSULTATION, SCOPE & METHODOLOGY

3.1. CONSULTATION

3.1.1. This section summarises the consultation process undertaken in the preparation of this assessment.

Table 3-1 – Summary of consultation

Body/organisation	Individual/organisation	Summary of consultation
Thames Water	Mark Dickinson Development Planning Manager	WSP issued an outline of the proposed scope and methodology of the odour assessment via email on 5th June 2023. The email was followed up with a telephone call on 16th June 2023. The Development Planning Manager at Thames Water confirmed that the proposed methodology was acceptable via email on 19th June 2023.
East Herts Council	Claire Spendley Environmental Health Officer	WSP issued an outline of the proposed scope and methodology of the air quality and odour assessment via email on 5th June 2023. The email was followed up by a telephone call on 22nd June 2023. The Environmental Health Officer confirmed via phone that the air quality assessment methodology and scope were acceptable. However, she expressed concerns regarding odour from the adjacent WwTW. The Environmental Health Officer confirmed it is acceptable that a detailed odour assessment is prepared as part of a pre-commencement planning condition.
East Herts Council	Conservation and Urban Design team	WSP issued an outline of the proposed scope and methodology of the odour assessment via email on 19th June 2023. At the time of writing, no response has been received.

3.2. SCOPE

3.2.1. The scope of the assessment has been determined in the following way:

- Consultation with the Environmental Health Officer (EHO) at EHC, Conservation and Design Officer at EHC and Thames Water to agree the scope of the assessment and the methodology to be applied (as given above);

- Review of EHC's latest Air Quality Annual Status Report[21] and air quality data for the area surrounding the Application Site, including data from EHC, Defra[22], the Environment Agency (EA)[23];
- Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality; and
- A review of the traffic data provided by the Project Transport Consultants (WSP).

3.2.2. Impacts scoped in or out of this assessment are given in **Table 3-2** below.

Table 3-2 - Impacts scoped in or out of the assessment

Impact	Scoped in or out?	Justification
Construction Phase		
Fugitive dust emissions from construction activities affecting amenity.	In	There are sensitive human receptors within 350m of construction activities and within 50m of the routes used by construction vehicles on the public highway, up to 500m from the site entrance. Determination of the risk of dust impacts from the Proposed Development will inform the identification of proposed mitigation measures commensurate to the risk identified. (Note: The dust risk beyond 500m of construction activities will be negligible and any effects will not be significant.)
Emissions of NO_x, PM_{10} and $PM_{2.5}$ from non-road mobile machinery (NRMM) affecting local air quality at existing receptors.	Out	As the operation of NRMM will be limited to working hours and then only when and where required within the Application Site, the exhaust emissions are unlikely to have a substantial impact on pollutant concentrations at receptors. In line with paragraph 7.30 of LAQM.TG(22), a quantitative assessment of this impact was scoped out and a qualitative assessment was undertaken.
Emissions of NO_x, PM_{10} and $PM_{2.5}$ from construction traffic affecting local air quality.	In	A qualitative assessment of the likely effects of construction traffic on local air quality has been undertaken.
Operational Phase		

[21] East Herts Council (2021) *2022 Air Quality Annual Status Report (ASR)* [online]. Available at: https://cdn-eastherts.onwebcurl.com/s3fs-public/2023-04/2022%20Air%20Quality%20Annual%20Status%20Report.pdf [Accessed June 2023]

[22] Defra (2021) *Background Mapping data for local authorities* [online] Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html [Accessed June 2023].

[23] Environment Agency (2022) *Environmental Permitting Regulations – Installations* [online]. Available at: https://environment.data.gov.uk/public-register/view/search-industrial-installations [Accessed June 2023].

Impact	Scoped in or out?	Justification
Emissions of NO_x, PM_{10} and $PM_{2.5}$ from operational traffic affecting local air quality at existing receptors.	In	A scoping exercise was undertaken using criteria given in Table 6.2 of the EPUK/IAQM Land-Use Planning Guidance and the vehicle trip generation for the operational phase of the Proposed Development. The predicted change in traffic flows during the operational phase exceeds the EPUK/IAQM Land-Use Planning Guidance indicative scoping criteria for air quality assessments. Therefore, a quantitative dispersion modelling assessment of impacts due to changes in operational traffic has been scoped in.
Exposure of future receptors (building occupants) to emissions of NO_x and PM_{10}.	In	The potential exposure of future residents of the Proposed Development to poor air quality will be assessed given the location of the Application Site in relation to the A10.
Air quality neutral assessment	Out	An air quality neutral assessment will be required to comply with policy EQ4 in East Herts District Plan 2018. However, the air quality neutral assessment is dependent on final gross floor area and land-use classes for the proposed development. As the current application is outline, this information is not currently available. Therefore, an air quality neutral assessment has been scoped out at this stage and is expected to be carried out at full application stage.
Energy centre emissions of NO_x on local air quality.	Out	As part of the energy strategy for the Proposed Development, an air source heat pump systems will provide space heating and cooling for the Proposed Development with an ambient loop system supplying heating and cooling to office. No combustion sources form part of the proposals.
Odour nuisance from adjacent WwTW	Out	There is the potential for future occupants of the Proposed Development to experience odour due to the proximity of the Buntingford WwTW to the Application Site. However, it is understood that the WwTW will undergo some upgrades in 2023. Furthermore, it may be that changes/upgrades to the WwTW are required to accommodate the Proposed Development (outside of the proposed 2023 growth upgrade works). Therefore, further odour modelling may be required to reflect these changes (N.B. no requirement for upgrades has been confirmed at this stage). Whilst this means that the potential for odour within the Application Site cannot be ruled out at this stage (due to the potential for WwTW upgrades changing the odour contours), the existing odour modelling completed by ARUP[24] for the East of Aspenden Road (X/20/0428/CND) indicates that majority of the Application Site outside of the $1.5ou_E/m^3$ contour (see **Figure 1**).

[24]Arup (2022). *Buntingford STW – Technical Note on Mitigation Options* [Online]. Available at: https://publicaccess.eastherts.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=QH7Z23GLIO300 [Accessed June 2023]

Impact	Scoped in or out?	Justification
		This gives the indication that 350 residential units can be accommodated within the Application Site outside of the area of greatest risk with respect to odour, thereby establishing the principle of development within the Application Site. Given that majority of the Application Site lie outside of the 1.5ou$_E$/m^3 contour, this position is considered unlikely to change, even in the event that updated modelling is undertaken. Less sensitive receptors, such as the proposed commercial and retail uses, may be accommodated within the higher odour contour brackets. As the application is currently outline, the final location and choice of commercial and retail uses are not known. However, depending on the final choice of commercial and retail uses, these types of receptors may be suitable to be within a 3-5ou$_E$/m^3 contour bracket, indicating that most of the Application Site is suitable for development. Furthermore, any upgrades to the WwTW will be required to demonstrate use of Best Available Techniques (BAT) such that the odour contours are not anticipated to change significantly. Taking into account the above, no further assessment of odour has been undertaken for the purpose of the Outline Planning Application.

3.3. METHODOLOGY

CONSTRUCTION PHASE

3.3.1. Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust, therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

3.3.2. The smaller particles of dust (less than 10µm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released; this includes a finer fraction, known as $PM_{2.5}$ (with an aerodynamic diameter less than 2.5µm). As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area. PM_{10} and $PM_{2.5}$ are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health. However, it is worth noting that, according to the IAQM guidance, the majority of fugitive particulate emissions arising from construction sites are expected to relate to the coarser fractions (i.e. $PM_{2.5-10}$) with just 10-15% expected to comprise $PM_{2.5}$. The IAQM guidance therefore focusses on PM_{10} for the purposes of assessment.

3.3.3. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken using: the relevant

assessment methodology published by the IAQM; the available information for this phase of the Proposed Development provided by the Client and Project Team; and, professional judgement.

3.3.4. The IAQM methodology assesses the risk of potential dust and PM_{10} impacts from the following four sources: demolition; earthworks; general construction activities and track-out. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in **Appendix C**.

3.3.5. In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Application Site and in the vicinity of the Application Site itself. As information on the number of vehicles and plant associated with the construction phase was not available at the time of writing, a qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:

- The number and type of construction traffic and plant likely to be generated by this phase of the Development;
- The number and proximity of sensitive receptors to the Application Site and along the likely routes to be used by construction vehicles; and
- The likely duration of the construction phase and the nature of the construction activities undertaken.

OPERATIONAL PHASE

3.3.6. The modelling outlined within this section was carried out in 2022 as part of the original hybrid planning application for the site. Through discussions with the transport consultant for the project, it is understood that minimal changes are predicted to traffic flows and distribution between the previous and the current application. Therefore, the modelling set up and traffic data used in the previous assessment are still valid. However, since the previous assessment was carried out, a new Annual Status Report (ASR) has been published by EHC. The monitoring data outlined in the latest ASR provides different monitoring data for 2019 than what was published at the time of the original modelling assessment. It has been confirmed with the EHO at EHC that the latest ASR contains the correct 2019 monitoring data. Therefore, the model verification and result processing have been updated since the original modelling assessment. This approach has been discussed and agreed with the EHO at EHC.

3.3.7. Of the pollutants included in the AQS, concentrations of NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) have been considered in this assessment as road traffic is a major source of these pollutants and their concentrations tend to be close to, or in exceedance of, the objectives in urban locations.

3.3.8. For the prediction of impacts due to emissions arising from road traffic during the operation of the Proposed Development, the dispersion model ADMS Roads (version 5.0.1.1) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptor locations, as determined by the user.

3.3.9. Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Met Office observing station at London Stansted Airport for 2019. This station is considered to provide representative data for the assessment.

3.3.10. A summary of the traffic data and pollutant emission factors used in the assessment can be found in **Appendix D**. It includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (kph) and the percentage of Heavy-Duty Vehicles (HDVs) for the local road network in all assessment years considered. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG(22), and using professional judgement.

3.3.11. For the assessment, three scenarios were modelled, as follows:

- 2019 – Model Verification and Baseline;
- 2029 – Without Development; and
- 2029 – With Development.

3.3.12. 2019 is the most recent year for which monitoring data and meteorological data are available to enable verification of the model results, and so this year has been used as the baseline year for this assessment. 2029 is the anticipated opening year of the Proposed Development.

3.3.13. The traffic data comprises survey data for 2018 at locations around the Application Site, supplemented with 2019 DfT count point data. In the absence of a complete dataset for the 2019 baseline case, this approach is considered to provide sufficient traffic data for the 2019 baseline case.

3.3.14. To calculate traffic flows for 2029, a TEMPro factor was applied to replicate expected growth and development in the area. As such, the traffic flows for the 'without development' scenario includes for expected growth in traffic between 2019 and 2029 (plus committed developments) but does not include any contribution to road traffic from the Proposed Development itself. The traffic flows for the 'with development' scenario includes the predicted trips that the Proposed Development will generate in addition to the 'without development' flows.

3.3.15. Two committed developments were considered following Hertfordshire County Council's (HCC) advice:

- Silkmead: Outline planning application for E(g), B2 and B8 for up to 25,200sqm; and
- East of Aspenden Road: 23 dwellings.

3.3.16. The modelled road network is shown on **Figure 2**.

Vehicle Emission Factors

3.3.17. Vehicle emission factors for use in the assessment have been obtained using the Emission Factor Toolkit (EFT) version 11.0 (published in November 2021) available on the Defra website[25]. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2018 and 2030. For the predictions of future year emissions, the toolkit takes into account factors such as

[25] Defra, (2021). *Emission Factor Toolkit version 11.0* [online]. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [Accessed June 2022].

anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time.

Selection of Background Concentrations

3.3.18. Background pollutant concentrations used in the assessment have been taken from the national maps provided on the Defra website, where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2018 and 2030. The maps assume that background concentrations will improve (i.e. reduce) over time, in line with the predicted reduction in vehicle emissions and emissions from other sources.

3.3.19. It should be noted that for NO_x and PM_{10}, the background maps present both the 'total' estimated background concentrations and the individual contributions from a range of emission sources (for example, motorways, aircraft, domestic heating etc.). When detailed modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for 'double-counting'. However, as the available transport data did not cover all roads within each sector, removal of specific sectors has not taken place.

3.3.20. Further details on the background concentrations are provided in **Section 4** of this report.

Model Verification and Processing of Results

3.3.21. The ADMS Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the Development.

3.3.22. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results, and was carried out following the methodology specified in Chapter 7, Section 4, of LAQM.TG(22).

3.3.23. Details of the verification factor calculations are presented in **Appendix E**. A factor of 3.28 was obtained during the verification process, which indicated that the model was under-predicting. It is acknowledged that this is higher than most verification factors, however it is reflective of use of diffusion tubes within street canyon locations. As such the results are likely to be conservative outside of these locations as a result. This factor was applied to the model road-NOx outputs prior to conversion to annual mean NO_2 concentrations utilising the NO_x to NO_2 calculator (version 8.1, released August 2020) provided by Defra[26].

3.3.24. The monitoring locations used for the model verification process are shown on **Figure 3**.

3.3.25. As local roadside monitoring data are not available for PM_{10} or $PM_{2.5}$, the modelled road-PM_{10} and road-$PM_{2.5}$ components have been adjusted by the verification factor obtained for NO_x before adding to the appropriate background concentration. The number of days with PM_{10} concentrations greater

[26] Defra, (2020). *NOx to NO_2 Calculator version 8.1* [online]. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc [Accessed June 2022].

than 50µg/m^3 was then estimated using the relationship with the annual mean concentration described in LAQM.TG(22).

3.3.26. LAQM.TG(22) advises that exceedances of the 1 hour mean NO_2 objective are unlikely to occur where annual mean concentrations are below 60µg/m^3, and it provides guidance on the approach that should be taken if either measured or predicted annual mean NO_2 concentrations are 60µg/m^3 or above.

3.3.27. Once processed, the predicted concentrations were compared against the relevant AQS objective levels for NO_2, PM_{10} and $PM_{2.5}$ set out in **Appendix B**.

SELECTION OF SENSITIVE RECEPTORS

3.3.28. Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Development. These will include locations sensitive to an increase in dust deposition and particulate matter exposure as a result of on-site construction activities, and locations sensitive to exposure to gaseous pollutants emitted from the exhausts of construction and operational traffic associated with the Proposed Development

Construction Phase

3.3.29. The IAQM assessment is undertaken where there are: 'human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or 'ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

Operational Phase

3.3.30. In terms of locations that are sensitive to pollutants emitted from engine exhausts, these will include places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15 minute mean or 1 hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24 hour mean or annual mean) may be more appropriate. Box 1-1 of LAQM.TG(22) provides examples of the locations where the air quality objectives should/should not apply.

3.3.31. To complete the assessment of operational phase impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have been located adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) concentrations, as a result of the Proposed Development.

3.3.32. To complete the exposure assessment, pollution concentrations were also predicted at a number of locations within the Application Site. The receptors have been positioned at the closest possible location to the A10 where built development may occur, and receptors have modelled at typical breathing height (i.e. 1.5m).

3.3.33. The locations of the assessment receptors are shown on **Figure 4** and listed in **Table 3-3** below.

Table 3-3 - Receptor Locations Used in the Assessment

Modelled Receptors	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
ER1	Residential Receptor on Skipps Meadow	535650.6	229501.5	1.5
ER2	Residential Receptor on Skipps Meadow	535547.2	229458.0	1.5
ER3	Residential Receptor on Tylers Close	535579.4	229439.9	1.5
ER4	Residential Receptor on Tylers Close	535594.4	229440.3	1.5
ER5	Residential Receptor on Longmead	535587.1	229290.3	1.5
ER6	Residential Receptor on Baldock Road	535882.1	229430.0	1.5
ER7	Residential Receptor on Baldock Road	535908.6	229404.9	1.5
ER8	Residential Receptor on Baldock Road	535919.2	229417.1	1.5
ER9	Residential Receptor on Baldock Road	536044.8	229413.0	1.5
ER10	Residential Receptor on Baldock Road	536169.0	229428.0	1.5
ER11	Residential Receptor on Baldock Road	536217.6	229424.4	1.5
ER12	Residential Receptor on Baldock Road	536220.7	229441.0	1.5
ER13	Residential Receptor on Abrahams Drive	536443.4	228405.4	1.5
ER14	Residential Receptor on High Street	536234.4	229471.5	1.5
ER15	Residential Receptor on High Street	536242.6	229478.7	1.5
ER16	Residential Receptor on B1038 High Street	536267.9	229421.6	1.5
ER17	Residential Receptor on B1038 High Street	536293.9	229368.7	1.5
ER18	Residential Receptor on Market Hill	536286.8	229341.1	1.5
ER19	Residential Receptor on B1038 High Street	536330.3	229335.5	1.5
ER20	Residential Receptor on Chapel End	536322.3	229303.7	1.5
ER21	Residential Receptor on Station Road	536331.4	229270.7	1.5
ER22	Residential Receptor on Station Road	536372.6	229191.5	1.5
ER23	Residential Receptor on Downhall Ley	536404.5	229126.9	1.5
ER24	Residential Receptor on Hare Street	536387.3	229289.8	1.5

Modelled Receptors	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
ER25	Residential Receptor on Snells Mead	536423.0	229147.6	1.5
ER26	Residential Receptor on Hare Street	536405.0	229304.8	1.5
ER27	Residential Receptor on Snells Mead	536451.7	229071.5	1.5
ER28	Residential Receptor on Nut Slip	536454.0	228988.9	1.5
ER29	Residential Receptor on Snells Mead	536509.7	228980.4	1.5
ER30	Residential Receptor on London Road	536489.4	228941.6	1.5
ER31	Residential Receptor on London Road	536509.6	228903.8	1.5
ER32	Residential Receptor on Layston Meadow	536532.9	228909.5	1.5
ER33	Residential Receptor on Hare Street	536471.4	229304.1	1.5
ER34	Residential Receptor on Hare Street	536505.8	229330.5	1.5
ER35	Residential Receptor on Crouch Gardens	536636.2	228667.1	1.5
ER36	Residential Receptor on London Road	536678.6	228660.6	1.5
ER37	Residential Receptor on Olvega Drive	536711.8	228522.7	1.5
ER38	Residential Receptor on Stearn Way	536727.4	228569.3	1.5
ER39	Residential Receptor off Stearn Way	536787.3	228441.2	1.5
ER40	Residential Receptor off Parker Drive	536819.3	228395.5	1.5
ER41	Residential Receptor on Luynes Rise	535901.1	228955.6	1.5
DR1	Proposed Development (1)	535650.6	229064.9	1.5
DR2	Proposed Development (2)	535752.5	228828.9	1.5
DR3	Proposed Development (3)	535996.8	228612.7	1.5

3.4. SIGNIFICANCE CRITERIA

CONSTRUCTION PHASE

3.4.1. The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

3.4.2. For the assessment of the impact of exhaust emissions from plant used on-site and construction vehicles accessing and leaving the Site on local concentrations of NO_2 and particulate matter (PM_{10} and $PM_{2.5}$), the significance of residual effects has been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance, which are described below.

OPERATIONAL PHASE

3.4.3. The approach provided in the EPUK/IAQM guidance has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Proposed Development once operational.

3.4.4. This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in **Table 3-4**.

Table 3-4 - Impact Descriptors for Individual Receptors

Long term average concentration at receptors in assessment year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Notes

AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy objectives.

Where the %change in concentrations is <0.5%, the change is described as 'Negligible' regardless of the concentration.

When defining the concentration as a percentage of the AQAL, 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme;' concentration where there is an increase.

Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

3.4.5. The EPUK/IAQM guidance notes that the criteria in **Table 3-4** should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

3.4.6. The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean NO_2 concentrations or daily mean PM_{10} concentrations. The significance of effects of hourly mean NO_2 and daily mean PM_{10} concentrations arising from the operational phase have therefore been determined qualitatively using professional judgement and the principles described above.

3.4.7. The EPUK/IAQM guidance says that "*Where the air quality is such that an air quality objective at the building facade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means. 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*."

3.5. LIMITATIONS & ASSUMPTIONS

3.5.1. Information for the construction phase of the Proposed Development was provided by the client and has been used to in addition to professional judgement where required in the completion of this part of the assessment.

3.5.2. There are uncertainties associated with both measured and predicted concentrations. The model (ADMS Roads) used in this assessment relies on input data (including predicted traffic flows), which also have uncertainties associated with them. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS Roads model will not take into account.

3.5.3. In order to reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in LAQM.TG(22). The monitoring locations within Buntingford are in locations where dispersion is inhibited by buildings and therefore 'street canyon' effects are likely to be present. To replicate this, the ADMS Roads basic street canyon functionality was used to best represent the pollutant dispersion as these locations and any other similar locations. However, as there are no diffusion tubes outside of a street canyon setting, only one verification factor could be derived and therefore, it is likely that the factor when applied to receptors outside of the street canyons is conservative. As such, there can be reasonable confidence that the in the predicted concentrations within the street canyon locations are representative and outside of the canyons they are conservative.

4. BASELINE CONDITIONS

4.1. EHC'S REVIEW & ASSESSMENT OF AIR QUALITY

4.1.1. EHC has designated three AQMAs within its administrative area as a result of its review and assessment work. These are as follows:

- Gascoyne Way, Hertford;
- Hockerill Junction, Bishop's Stortford; and
- London Road, Sawbridgeworth.

4.1.2. All the above AQMAs have been designated on the basis of exceedances of the AQS objective for annual mean NO_2 concentrations. The Application Site is not located within any of the AQMAs. The nearest AQMA, which is the Bishops Stortford AQMA, is located approximately 15km southeast of the Application Site.

4.1.3. EHC published an updated Air Quality Action Plan (AQAP) in June 2017 for the period 2017 - 2020. This details a number of measures proposed to reduce annual mean NO_2 concentrations within its administrative area. Measures include promoting and enabling the uptake of electric vehicles, providing support to residents to reduce their contributions to air pollution and redesigning services to reduce pollution.

4.2. LOCAL EMISSION SOURCES

4.2.1. The Application Site is in an area where air quality is mainly influenced by emissions from road transport, namely traffic using the A10, Baldock Road (A507) and London Road.

4.2.2. There are no industrial pollution sources in the immediate vicinity of the Application Site that will influence the local air quality.

4.3. BACKGROUND AIR QUALITY DATA

4.3.1. **Table 4-1** summarises the background pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ for 2019 and 2029 that were utilised in the assessment. All the annual mean background concentrations are well below the relevant objectives.

Table 4-1 - Background Concentrations (µg/m^3)

Grid Square (centre on O.S. Grid Reference)	NO_2 (µg/m^3)		PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)	
	2019	2029	2019	2029	2019	2029
536500, 229500	9.0	6.7	14.7	13.5	9.4	8.5
536500, 228500	9.3	6.7	14.8	13.6	9.3	8.4
535500, 228500	8.4	6.2	14.6	13.4	9.2	8.3
535500, 229500	9.0	6.5	14.9	13.7	9.4	8.4
534500, 229500	8.0	5.9	15.5	14.1	9.4	8.5

4.4. LOCAL AUTHORITY AIR QUALITY MONITORING DATA

4.4.1. Annual mean concentrations of NO_2 recently measured by EHC in the vicinity of the Application Site are provided in **Table 4-2**.

Table 4-2 - Local Authority Air Quality Monitoring Data

Site Name	Coordinates (based on OS grid reference, m)		Site Type	Distance from Application Site (m)	Annual Mean NO_2 Concentration (µg/m^3)				
	X	Y			2017	2018	2019	2020	2021
EH70 – Outside No. 38 High St	536205	229558	Roadside	490 - ENE	19.6	21.1	23.7	18.9	18.2
EH73 – Opp. Horseshoe Cottage	536186	229430	Roadside	430 – E	33.1	33.6	28.2	23.2	22.5
NO_2 AQS Objective (µg/m^3)					**40**				

4.4.2. The data in the **Table 4-2** shows that annual mean NO_2 concentrations at all monitoring sites near to the Application Site have been consistently below the AQS objective of 40µg/m^3 in all years between 2017 and 2021.

4.4.3. Monitoring data from 2020, and to some extent 2021, should be treated with caution as pollutant concentrations were impacted by Covid-19 travel restrictions.

4.4.4. There was no particulate monitoring available in the vicinity of the Proposed Development.

4.5. SUMMARY

4.5.1. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the vicinity of the Application Site are well below the relevant objectives. Furthermore, monitoring data at roadside locations collected locally shows that air quality is below the AQS objective.

5. ASSESSMENT OF IMPACTS

5.1. CONSTRUCTION PHASE

DUST AND PM_{10} ARISING FROM ON-SITE ACTIVITIES

5.1.1. Construction activities that have the potential to generate and/or re-suspend dust and PM_{10} include:

- Site clearance and preparation;
- Preparation of temporary access/egress to the Application Site and haulage routes;
- Earthworks;
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles and construction traffic within the Application Site;
- Use of crushing and screening equipment/plant;
- Exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
- Construction of buildings, roads and areas of hardstanding alongside fabrication processes;
- Internal and external finishing; and
- Site landscaping after completion.

5.1.2. The majority of the releases are likely to occur during the 'working week'. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

5.1.3. The IAQM assessment methodology has been used to determine the potential dust emission magnitude for the following four different dust and PM_{10} sources: demolition; earthworks; construction; and, trackout. The findings of the assessment are presented below.

Demolition

5.1.4. No demolition activities will occur at the Application Site as part of the construction phase of the Proposed Development. Therefore, consideration of the impact of this source on dust soiling and ambient PM_{10} is not required.

Earthworks

5.1.5. The total area of the Application Site is more than 10,000m^2. The soil size ranges from loam to clay, therefore having a medium to high potential for dust release. It is anticipated that there will be 5 to 10 heavy earth moving vehicles active at any one time during the initial phases of groundworks. The client has estimated that between 20,000-100,000 tonnes of material will be moved and there will be 4m heigh earth bunds. Based on the above, the potential dust emission magnitude is **large** for earthwork activities.

Construction

5.1.6. The total volume of buildings to be constructed on the Application Site will be more than 100,000m^3, however no on-site concrete batching or sand blasting activities are proposed. Therefore, the potential dust emission magnitude is **large** for construction activities.

Trackout

5.1.7. Based on the information provided by Vistry Group, there will be more than 50 HDV (>3.5t) outward movements in any one day travelling on potentially dusty surface materials. In addition, the length of unpaved roads within Application Site will be >100m. Therefore, the potential dust emission magnitude is **large** for trackout.

5.1.8. **Table 5-1** provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 5-1 - Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction Activities	Large
Trackout	Large

ASSESSMENT OF SENSITIVITY OF THE STUDY AREA

5.1.9. A windrose generated using the meteorological data used for the dispersion modelling of operational phase impacts is provided in **Appendix F**. This shows that the prevailing wind direction is from the south-west. Therefore, receptors located to north-east of the Application Site are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

5.1.10. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. There are a number of existing residential dwellings within 350m of the Application Site. The majority of these lie to the east and north-east of the Application Site (i.e. within the direction of the prevailing wind), with approximately 10 – 100 dwellings falling within 20m of the site boundary. There are no existing residential dwellings to the west of the Application Site.

5.1.11. There are no ecological receptors within 50m of the Application Site, which may be sensitive to increases in dust and PM_{10} as a result of on-site construction activities.

5.1.12. In addition to the above, properties within 50m of the roads edge may experience increases in dust and PM_{10} due to trackout associated with HDVs accessing and leaving the Application Site, although these effects will be limited to 500m either side of the site access.

5.1.13. Annual mean background PM_{10} concentrations within the vicinity of the Application Site are less than 14.9µg/m^3. As such, the sensitivity of the area to human health impacts is low, regardless of how many high sensitivity receptors there are near to a source. This is because the background concentrations are well below 24 µg/m^3 as outlined within the IAQM assessment methodology.

5.1.14. Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes in dust and PM_{10} has been derived for each of the construction activities considered. The results are shown in **Table 5-2**.

Table 5-2 - Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	High	High	High
Human Health	N/A	Low	Low	Low
Ecological	N/A	N/A	N/A	N/A

Risk of Impacts

5.1.15. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. **Table 5-3** below provides a summary of the risk of dust impacts for the Proposed Development. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 5-3 - Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	High Risk	High Risk	High Risk
Human Health	N/A	Low Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

Construction Vehicles & Plant

5.1.16. The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the site via the new A10 junction.

5.1.17. Final details of the exact plant and equipment likely to be used on Site will be determined by the appointed contractor, it is considered likely to comprise dump trucks, tracked excavators, diesel generators, asphalt spreaders, rollers, compressors and trucks. The number of plant and their location within the Application Site are likely to be variable over the construction period.

5.1.18. Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be used, the impacts are therefore of **negligible** significance according to the assessment significance criteria.

5.2. OPERATION PHASE

5.2.1. Full results of the dispersion modelling are presented in **Appendix G** and a summary is provided below.

ANNUAL MEAN NO_2 CONCENTRATIONS

5.2.2. The AQS objective for annual mean NO_2 concentrations is 40µg/m^3. The results of the assessment show that in the 2019 baseline case concentrations are all below the annual mean objective, with no receptors being within 10% of the AQS. The highest predicted concentration is 34.1µg/m^3 at ER12 (a residential receptor on Baldock Road).

5.2.3. In 2029, the opening year of the Proposed Development, predicted annual mean NO_2 concentrations, both with and without the Proposed Development, are well below the relevant AQS objective at all the existing assessment receptors. The highest concentrations are predicted at ER12 (a residential receptor on Baldock Road) where the predicted concentrations are 17.0µg/m^3 'without development' and 17.6µg/m^3 'with development'. The greatest increase in concentrations due to the Proposed Development is 0.9µg/m^3 at ER41 (a residential Receptor on Luynes Rise). As such, the predicted changes in annual mean NO_2 concentrations at all the existing receptors are all <5% of the relevant AQS objective and the future year annual mean NO_2 concentration are <75% of the relevant AQS. Therefore, in accordance with the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean NO_2 concentrations is negligible.

HOURLY MEAN NO_2 CONCENTRATIONS

5.2.4. The annual mean NO_2 concentrations predicted by the model were all below 60µg/m^3, and therefore hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Development on hourly mean NO_2 concentrations at existing sensitive receptors will be negligible.

ANNUAL MEAN PM_{10} CONCENTRATIONS

5.2.5. The AQS objective for annual mean PM_{10} concentrations is a concentration of 40µg/m^3. The results of the assessment show that in the 2019 baseline case predicted concentrations at all of the assessment receptors considered are predicted to easily meet this objective. The highest predicted concentration is 18.7µg/m^3 at ER10 (a residential receptor on Baldock Road).

5.2.6. In 2029, the opening year of the Proposed Development, annual mean PM_{10} concentrations, both with and without the Proposed Development, are predicted to be well below the relevant AQS objectives at all the existing assessment receptors. The highest concentration is predicted at ER10 (a residential receptor on Baldock Road), where the predicted concentrations are 18.0µg/m^3 'without development' and 18.3µg/m^3 'with development'. The greatest increase in concentrations due to the Proposed Development is 0.3µg/m^3 at Receptor ER10 (a residential receptor on Baldock Road). As such, the predicted changes in annual mean PM_{10} concentrations are all <1% of the relevant AQS objective. Therefore, based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean PM_{10} concentrations is negligible.

DAILY MEAN PM_{10} CONCENTRATIONS

5.2.7. The AQS objective for daily mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The results of the dispersion modelling indicate that in 2019, the number of days exceeding 50µg/m^3 is two (at two receptors, namely ER10 and ER12 on Baldock Road). In 2029, the number of days exceeding is 50µg/m^3 is a maximum of one day in the 'with development' and two days exceeding 50µg/m^3 in the 'with development' scenario. At ER5 and ER10 (residential receptors on Longmead and Baldock Road respectively), the number days exceeding is 50µg/m^3 increases by

one. The impact of the Proposed Development on daily mean PM_{10} concentrations at existing sensitive receptors is negligible.

ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS

5.2.8. Predicted annual mean concentrations of $PM_{2.5}$ are all well below the AQS objective of 20µg/m^3 in all modelled scenarios. In the 2019 baseline case, the highest concentration is 11.7µg/m^3, predicted at ER10 (a residential receptor on Baldock Road).

5.2.9. In 2029, the opening year of the Proposed Development, annual mean $PM_{2.5}$ concentrations, both with and without the Proposed Development, are predicted to be well below the relevant AQS objectives at all of the existing assessment receptors. The highest concentration is predicted at Receptor ER10 (a residential receptor on Baldock Road), where the predicted concentrations are 11.0µg/m^3 'without development' and 11.1µg/m^3 'with development'. The greatest increase in concentrations due to the Proposed Development is 0.1µg/m^3 at 26 receptors. As such, the predicted changes in annual mean $PM_{2.5}$ concentrations are all <0.5% of the relevant AQS objective. Therefore, based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean $PM_{2.5}$ concentrations is negligible.

EXPOSURE OF FUTURE RESIDENTS

5.2.10. Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are all below the relevant objectives at all proposed receptors located along the Application Site boundary.

5.2.11. The highest predicted annual mean NO_2 concentration is 11.2µg/m^3, whilst the predicted annual mean PM_{10} concentration is 15.5µg/m^3, with no days exceeding 50µg/m^3. The highest predicted $PM_{2.5}$ concentration is 9.4µg/m^3.

6. MITIGATION & RESIDUAL EFFECTS

6.1. CONSTRUCTION PHASE

6.1.1. Based on the assessment results, mitigation proportionate to a 'high risk' site will be required. Recommended mitigation measures are given below and should be implemented by the appointed contractor.

General Communication

- A stakeholder communications plan that includes community engagement before work commences on site should be developed and implemented.
- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

General Dust Management

- A Dust Management Plan (DMP), which may include measures to control other emissions, in addition to the dust and PM_{10} mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority.

Site Management

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in-place to avoid reoccurrence.
- The complaints log should be made available to the local authority on request.
- Any exceptional incidents that cause dust and/or air emissions, either on-or offsite should be recorded, and then the action taken to resolve the situation recorded in the log book.
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

Monitoring

- Daily on-site and off-site inspections should be undertaken, where receptors (including roads) are nearby to monitor dust. The inspection results should be recorded and made 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 100m of site boundary, with cleaning to be provided if necessary.
- Regular site inspections to monitor compliance with the DMP should be carried out, inspection results recorded, and an inspection log made available to the local authority when asked.
- The frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust monitoring with the Local Authority.

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 practicable.

- Where practicable, erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Where practicable, 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 appropriately.
- Where practicable, cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicle operators switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- A maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas should be imposed (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).
- A Construction Logistics Plan should be produced to manage the sustainable delivery of goods and materials.
- A Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) should be considered.

Operations

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

Waste Management

- No 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 tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Where practicable, only remove the cover in small areas during work and not all at once.
- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.

- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Application Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.
- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

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.
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

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 in frequent use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Where practicable, hard surfaced haul routes should be installed, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10m from receptors where possible.

6.1.2. Detailed mitigation measures to control construction traffic should be discussed with EHC to establish the most suitable access and haul routes for the site traffic. The most effective mitigation will be achieved by ensuring that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) where possible, and that vehicles are kept clean (through the use of wheel washers, etc.) and sheeted when on public highways. Therefore, as soon as the Proposed Development access is constructed, vehicles should use the A10 to reduce site traffic past sensitive residential receptors. The timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

RESIDUAL EFFECTS

6.1.3. The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice are considered to be negligible and not significant.

6.1.4. The residual effects of emissions to air from construction vehicles and plant on local air quality are considered to be negligible and not significant.

6.2. OPERATIONAL PHASE

MITIGATION

6.2.1. The change in pollutant concentrations attributable to traffic emissions associated with the operation phase of the Proposed Development (i.e. impacts on local air quality) are negligible (and themselves do not warrant the need for mitigation).

RESIDUAL EFFECTS

6.2.2. The residual effects of the Proposed Development on air quality are negligible for NO_2, PM_{10} and $PM_{2.5}$ according to the EPUK assessment criteria.

6.2.3. Future users of the Proposed Development will not be exposed to pollutant concentrations that exceed the relevant AQS objectives.

7. CONCLUSIONS

7.1.1. A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the IAQM methodology. This identified that there is a High Risk of dust soiling impacts and a Low Risk of increases in particulate matter concentrations due to construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM_{10} releases would be significantly reduced. The residual effects of dust and PM_{10} generated by construction activities on air quality are therefore considered to be insignificant. The residual effects of emissions to air from construction vehicles and plant on local air quality will be **negligible** and insignificant.

7.1.2. In addition, a quantitative assessment of the potential impacts during the operational phase was undertaken using ADMS Roads to predict the changes in NO_x, NO_2 and PM_{10} concentrations that would occur due to traffic generated by the Proposed Development.

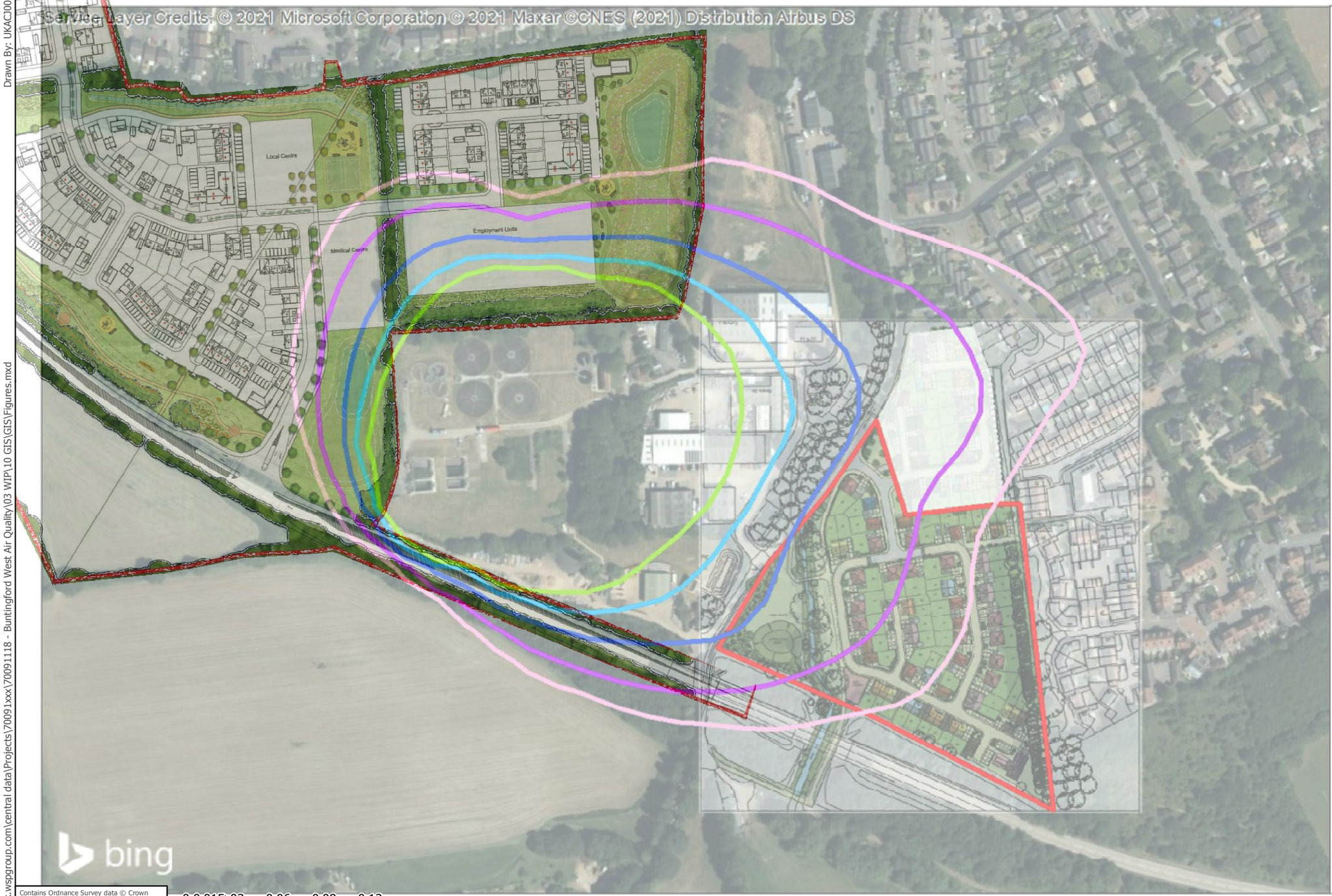
7.1.3. The results show that the Proposed Development would cause an imperceptible increase in pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$), and would not result in any exceedances of the statutory objectives for these pollutants.

7.1.4. Predicted concentrations within the Application Site are well below the relevant AQS objectives for NO_2, PM_{10} and $PM_{2.5}$.

7.1.5. Based on the assessment significance criteria, the residual effects of the Proposed Development is **negligible** for NO_2, PM_{10} & $PM_{2.5}$.

7.1.6. Furthermore, it is considered that the development proposals comply with national and local policy for air quality.

Figure 4: Base case with terrain data: Predicted 98th percentile odour concentrations with proposed development layout using 2017 meteorological data



TITLE: BUNTINGFORD WEST - INDICATIVE ODOUR CONTOURS (ADAPTED FROM ARUP NOTE - PLANNING REF: X/20/0428/CND)

FIGURE No: FIGURE 1

Date Modified: 18/05/2022

Drawn By: UKACJ001

File: \\uk.wspgroup.com\central data\Projects\70091xxx\70091118 - Buntingford West Air Quality\03 WIP\10 GIS\GIS\Figures.mxd

Key

- Red Line Boundary
- Modelled Roads (Model Link IDs)

Newtown

BUNTINGFORD

Facility

Police Station

Education Facility

Fire Station

PO

PW

SKIPPS MDW

OLD BALDOCK ROAD

GREENWAYS

DIXON PLACE

YEW TREE CT

CHURCH ST

GARDEN ROAD

DELL SPRINGS

MILES WAY

ALDRIDGE WAY

PIPKIN DR

ARCHERS

SUNNY HILL

THE TANNERY

BOWLERS MEAD

DEACONS PLACE

LONGMEAD

THE FOLLY

BELL BARNS

MARKET HL

CHAPEL END

MONKS WALK

RIB WAY

SNELLS MEAD

DRAY GARDENS

DOWNHALL LEY

OAK END

CAMPBELL CL

MILL CL

MEADOW WAY

PEASMEAD

KNIGHTS CL

NUT SLIP

AYSTON MDW

STATION YARD

FAIRFIELD

FLASHES DR

OWLES LANE

CROUCH GARDENS

ST FRANCIS CL

OLVEGA DR

WINDMILL HL

PARKER DRIVE

CORNWELL CL

BRICE GARDENS

STEARN WAY

KEEN AVENUE

14 27 38 26 48 37 20 28 31 36 13 30 29 41 25 34 61 60 24 21 62 59 16 15 10 11 12 40 56 57 58 52 55 32 17 5 42 43 50 51 3 19 18 22 6 39 49 45 35 7 2 8 1 44 9 33 46 47 23

0 0.030.06 0.12 0.18 0.24 Kilometres

wsp

TITLE:

BUNTINGFORD WEST - MODELLED ROAD LINKS

FIGURE No:

FIGURE 2

Date Modified: 18/05/2022

Drawn By: UKACJ001

File: \\uk.wspgroup.com\central data\Projects\70091xxx\70091118 - Buntingford West Air Quality\03 WIP\10 GIS\GIS\Figures.mxd

Key

- Red Line Boundary
- Monitoring Locations
- Modelled Roads (Model Link IDs)

EH70

EH73

Newtown

BUNTINGFORD

Education Facility

Police Station

PO

PW

Fire Station

WHITE HART CLOSE

GREEN LANE

DIXON PLACE

BOWLERS MEAD

YEW TREE CT

HIGH STREET

DELL SPRINGS

PADDOCK ROAD

GARDEN ROAD

SPENCER CL

MILES WAY

ALDRIDGE WAY

PIPKIN DR

ARCHERS

SUNNY HILL

THE TANNERY

MARKET HL

THE FOLLY

BELL ARNS

SKIPPS MDW

GREENWAYS

OLD BALDOCK ROAD

DEACONS PLACE

LONGMEAD

MONKS WALK

CHAPEL END

RIB WAY

SNELLS MEAD

DRAY GARDENS

DOWNHALL LEY

OAK END

CAMPBELL CL

MILL CL

MEADOW VW

PEASMEAD

KNIGHTS CL

LUYNES RISE

NUT SLIP

STATION YARD

FAIRFIELD

AYSTON MDW

PLASHES DR

OWLES LANE

CROUCH GARDENS

ST FRANCIS CL

OLVEGA DR

WINDMILL HL

0 0.030.06 0.12 0.18 0.24 Kilometres

wsp

TITLE:

BUNTINGFORD WEST - MODEL VERIFICATION LOCATIONS

FIGURE No:

FIGURE 3

Date Modified: 18/05/2022

Drawn By: UKACJ001

File: \\uk.wspgroup.com\central data\Projects\70091xxx\70091118 - Buntingford West Air Quality\03 WIP\10 GIS\GIS\Figures.mxd

Key

- Red Line Boundary
- Modelled Receptors
- Modelled Roads (Model Link IDs)

Newtown

BUNTINGFORD

ER1 ER2 ER3 ER4 ER5 ER6 ER7 ER8 ER9 ER10 ER11 ER12 ER13 ER14 ER15 ER16 ER17 ER18 ER19 ER20 ER21 ER22 ER23 ER24 ER25 ER26 ER27 ER28 ER29 ER30 ER31 ER32 ER33 ER34 ER35 ER36 ER37 ER38 ER39 ER40 ER41

DR1 DR2 DR3

Police Station

Education Facility

Fire Station

PO

PW

SKIPPS MDW

OLD BALDOCK ROAD

DEACONS PLACE

LONGMEAD

BOWLERS MEAD

DIXON PLACE

THE FOLLY

BELL BARNS

MARKET HL

THE TANNERY

ARCHERS

SUNNY HILL

PIPKIN DR

CHAPEL END

RIB WAY

MONKS WALK

SNELLS MEAD

DRAY GARDENS

DOWNHALL LEY

NUT SLIP

STATION YARD

OAK END

CAMPBELL CL

MILL CL

MEADOW WAY

PEASMEAD

KNIGHTS CL

FAIRFIELD

OWLES LANE

CROUCH GARDENS

ST FRANCIS CL

OLVEGAR

WINDMILL HL

PARKER DRIVE

CORNWELL CL

BRICE GARDENS

STEARN WAY

KEEN AVENUE

0 0.030.06 0.12 0.18 0.24 Kilometres

wsp

TITLE:

BUNTINGFORD WEST - MODELLED RECEPTOR LOCATIONS

FIGURE No:

FIGURE 4

Appendix A

GLOSSARY

Term	Definition
AADT Annual Average Daily Traffic	A daily total traffic flow (24 hrs), expressed as a mean daily flow across all 365 days of the year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
Conservative	Tending to over-predict the impact rather than under-predict.
Data capture	The percentage of all the possible measurements for a given period that were validly measured.
Defra	Department for Environment, Food and Rural Affairs.
DfT	Department for Transport.
Dust	Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials
Emission rate	The quantity of a pollutant released from a source over a given period of time.
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
LAQM	Local Air Quality Management.
Minor roads	Non A roads of Motorways.

Term	Definition
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
ou_E/m^3	European odour unit per cubic metre.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
Road link	A length of road which is considered to have the same flow of traffic along it. Usually, a link is the road from one junction to the next.
Trackout	The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.
$\mu g/m^3$ microgrammes per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1ug/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.
WwTW	Wastewater Treatment Works

Appendix B

RELEVANT UK AIR QUALITY STRATEGY OBJECTIVES

Pollutant	Concentration in micrograms per cubic metre (µg/m^3)	Measured as	Objective
Nitrogen dioxide (NO_2)	40	Annual mean	Limit value not to be exceeded.
	200	1-hour (hourly) mean	Not to be exceeded more than 18 times a year.
Particulate matter less than 10 micrometres in diameter (PM_{10})	40	Annual mean	Limit value not to be exceeded.
	50	24-hour (daily) mean	Not to be exceeded more than 35 times a year.
Particulate matter less than 2.5 micrometres in diameter ($PM_{2.5}$)	20	Annual mean	Limit value not to be exceeded.
	12	Annual mean	Interim target concentration not to be exceeded by the end of January 2028.
	10	Annual mean	Target concentration not to be exceeded by the end of 2040.

Appendix C

IAQM CONSTRUCTION ASSESSMENT METHODOLOGY

Step 1 – Screening the need for a Detailed Assessment

An assessment will normally be required where there are:

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

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible".

Step 2A – Define the Potential Dust Emission Magnitude

The following are examples of how the potential dust emission magnitude for different activities can be defined. (Note that not all the criteria need to be met for a particular class.) Other criteria may be used if justified in the assessment.

Table 2A: Examples of Human Receptor Sensitivity to Construction Phase Impacts

Dust Emission Magnitude	Activity
Large	Demolition >50,000m^3 building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m^2 site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m^3 building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty surface material (e.g. clay), >100m unpaved roads
Medium	Demolition 20,000 - 50,000m^3 building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m^2 site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 - 100,000m^3 building volume, dusty material e.g. concrete, on site concrete batching
	Trackout

Dust Emission Magnitude	Activity
	10 - 50 HDVs out / day, moderately dusty surface material (e.g. clay), 50 -100m unpaved roads
Small	Demolition <20,000m^3 building demolished, non-dusty material (e.g metal cladding), <10m above ground level, work during wetter months
	Earthworks <2,500m^2 site area, soil with large grain size (e.g. sand), <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved, earthworks during wetter months
	Construction <25,000m^3, non-dusty material (e.g. metal cladding or timber)
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

Step 2B – Define the Sensitivity of the Area

The tables below present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table 2Ba: Sensitivity of the Area to Dust Soiling Effects

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

Table 2Bb: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 2Bc: Sensitivity of the Area to Ecological Impacts

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

Step 2C – Define the Risk of Impacts

The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

Table 2C: Risk of Dust Impacts

Sensitivity of surrounding 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 and Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Step 3 –Site Specific Mitigation

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high risk site. The IAQM guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

Step 4 – Determine Significant Effects

Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

Appendix D

TRAFFIC DATA

2019 BASELINE

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
1	20	3335	7.11	0.023418591	0.00164437	0.000991869
2	20	3335	7.11	0.023418591	0.00164437	0.000991869
3	20	5432	7.39	0.038639396	0.002698857	0.001628561
4	20	2643	10.49	0.021469828	0.001423763	0.000862533
5	20	2643	10.49	0.021469828	0.001423763	0.000862533
6	20	6446	8.02	0.047175352	0.003257478	0.001967331
7	20	3335	7.11	0.023418591	0.00164437	0.000991869
8	48	3335	7.11	0.014763014	0.001550542	0.000898041
9	20	6337	4.6	0.039316656	0.002909831	0.001748538
10	64	7071	9.38	0.029387992	0.003439029	0.001976297
11	64	7071	9.38	0.029387992	0.003439029	0.001976297
12	20	7071	9.38	0.054882546	0.003703137	0.002240405
13	20	7329	15.13	0.070614949	0.004407136	0.002682903
14	97	7329	15.13	0.035574514	0.004095391	0.002371158
15	48	1830	8.12	0.008346546	0.000872838	0.000505666
16	48	1830	8.12	0.008346546	0.000872838	0.000505666
17	20	955	3.36	0.005539292	0.000422532	0.000253371
18	20	5432	7.39	0.038639396	0.002698857	0.001628561
19	48	5432	7.39	0.024247971	0.002543618	0.001473322
20	20	5432	7.39	0.038639396	0.002698857	0.001628561
21	20	10702	14.57	0.101161244	0.006354514	0.003866342
22	20	3029	8.02	0.022167878	0.001530701	0.000924456
23	32	3029	8.02	0.017146729	0.00147705	0.000870805
24	20	10702	14.57	0.101161244	0.006354514	0.003866342

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
25	20	10702	14.57	0.101161244	0.006354514	0.003866342
26	20	6621	13.61	0.060514512	0.00384554	0.002337576
27	97	6621	13.61	0.031529208	0.003584832	0.002076868
28	20	7409	12.96	0.066147645	0.004238208	0.002574557
29	20	6984	12.81	0.062011929	0.003980951	0.002417906
30	20	7922	13.32	0.071656879	0.00457016	0.002777233
31	20	7722	13.29	0.069772343	0.004451654	0.002705136
32	20	10702	14.57	0.101161244	0.006354514	0.003866342
33	48	6337	4.6	0.02593751	0.0027568	0.001595507
34	97	10702	14.57	0.051584353	0.005911755	0.003423583
35	20	6446	8.02	0.047175352	0.003257478	0.001967331
36	20	7329	15.13	0.070614949	0.004407136	0.002682903
37	20	5432	7.39	0.038639396	0.002698857	0.001628561
38	20	6621	13.61	0.060514512	0.00384554	0.002337576
39	48	6446	8.02	0.02931422	0.003066811	0.001776665
40	20	7071	9.38	0.054882546	0.003703137	0.002240405
41	20	10702	14.57	0.101161244	0.006354514	0.003866342
42	20	2643	10.49	0.021469828	0.001423763	0.000862533
43	48	955	3.36	0.00375142	0.00040135	0.000232189
44	48	3335	7.11	0.014763014	0.001550542	0.000898041
45	48	6446	8.02	0.02931422	0.003066811	0.001776665
46	48	6337	4.6	0.02593751	0.0027568	0.001595507
47	48	6337	4.6	0.02593751	0.0027568	0.001595507
48	48	5432	7.39	0.024247971	0.002543618	0.001473322
49	48	6446	8.02	0.02931422	0.003066811	0.001776665

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
50	48	5432	7.39	0.024247971	0.002543618	0.001473322
51	20	5432	7.39	0.038639396	0.002698857	0.001628561
52	20	15597	10.05	0.124462912	0.008309336	0.005031274
53	97	15597	10.05	0.070914469	0.00781062	0.004532558
54	20	15597	10.05	0.124462912	0.008309336	0.005031274
55	97	15597	10.05	0.070914469	0.00781062	0.004532558
56	20	8454	11.99	0.072805711	0.004725285	0.002867486
57	20	7217	12.19	0.062622951	0.00405336	0.002460268
58	20	9237	10.28	0.074402752	0.004949711	0.002997854
59	97	10702	14.57	0.051584353	0.005911755	0.003423583
60	97	10702	14.57	0.051584353	0.005911755	0.003423583
61	5	0	0.0	0.000000000	0.000000000	0.000000000
62	5	0	0.0	0.000000000	0.000000000	0.000000000

2029 WITHOUT DEVELOPMENT

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
1	20	4584	6.2	0.010131541	0.001992066	0.001113578
2	20	4584	6.2	0.010131541	0.001992066	0.001113578
3	20	6618	6.95	0.015012909	0.002929471	0.001636653
4	20	3172	9.9	0.007923052	0.001504938	0.000839044
5	20	3172	9.9	0.007923052	0.001504938	0.000839044
6	20	7949	7.46	0.018347408	0.003562331	0.001989467
7	20	4584	6.2	0.010131541	0.001992066	0.001113578
8	48	4584	6.2	0.006547366	0.001946983	0.001068495
9	20	7182	4.56	0.014958052	0.002994139	0.001675979
10	64	7965	9.29	0.010440204	0.003619123	0.001971053
11	64	7965	9.29	0.010440204	0.003619123	0.001971053
12	20	7965	9.29	0.019517374	0.003726588	0.002078518
13	20	8683	14.35	0.024692043	0.00453602	0.002522239
14	97	8683	14.35	0.011986846	0.004392465	0.002378684
15	48	2276	7.51	0.003317976	0.00099767	0.000546757
16	48	2276	7.51	0.003317976	0.00099767	0.000546757

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
17	20	1071	3.36	0.002130684	0.000432644	0.000242428
18	20	6618	6.95	0.015012909	0.002929471	0.001636653
19	48	6618	6.95	0.009564325	0.002862457	0.001569639
20	20	6618	6.95	0.015012909	0.002929471	0.001636653
21	20	11919	14.56	0.034088895	0.006253489	0.003476837
22	20	3578	7.69	0.008322496	0.001612344	0.0009003
23	32	3578	7.69	0.006488772	0.001590298	0.000878254
24	20	11923	14.56	0.034100335	0.006255587	0.003478004
25	20	11923	14.56	0.034100335	0.006255587	0.003478004
26	20	7380	13.58	0.020544946	0.003794088	0.002110587
27	97	7380	13.58	0.010187883	0.003674786	0.001991286
28	20	8535	12.61	0.023116763	0.004298655	0.002392597
29	20	8099	12.38	0.021791073	0.004058988	0.002259506
30	20	9037	13.05	0.024785503	0.00459434	0.002556522
31	20	8893	12.93	0.024307605	0.004509631	0.002509559
32	20	11919	14.56	0.034088895	0.006253489	0.003476837
33	48	7182	4.56	0.009992857	0.002928078	0.001609918

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
34	97	11923	14.56	0.016459731	0.006057271	0.003279688
35	20	7949	7.46	0.018347408	0.003562331	0.001989467
36	20	8683	14.35	0.024692043	0.00453602	0.002522239
37	20	6618	6.95	0.015012909	0.002929471	0.001636653
38	20	7380	13.58	0.020544946	0.003794088	0.002110587
39	48	7949	7.46	0.011579181	0.003480266	0.001907402
40	20	7965	9.29	0.019517374	0.003726588	0.002078518
41	20	11923	14.56	0.034100335	0.006255587	0.003478004
42	20	3172	9.9	0.007923052	0.001504938	0.000839044
43	48	1071	3.36	0.00146122	0.000423291	0.000233076
44	48	4584	6.2	0.006547366	0.001946983	0.001068495
45	48	7949	7.46	0.011579181	0.003480266	0.001907402
46	48	7182	4.56	0.009992857	0.002928078	0.001609918
47	48	7182	4.56	0.009992857	0.002928078	0.001609918
48	48	6618	6.95	0.009564325	0.002862457	0.001569639
49	48	7949	7.46	0.011579181	0.003480266	0.001907402
50	48	6618	6.95	0.009564325	0.002862457	0.001569639

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
51	20	6618	6.95	0.015012909	0.002929471	0.001636653
52	20	17435	10.01	0.04369839	0.008292607	0.004623021
53	97	17435	10.01	0.024066594	0.008040456	0.00437087
54	20	17435	10.01	0.04369839	0.008292607	0.004623021
55	97	17435	10.01	0.024066594	0.008040456	0.00437087
56	20	9451	11.94	0.025105499	0.004691756	0.002612431
57	20	8073	12.13	0.021564232	0.004024207	0.002240476
58	20	10335	10.23	0.026079975	0.004940139	0.002753669
59	97	11919	14.56	0.016454209	0.006055239	0.003278588
60	97	11923	14.56	0.016459731	0.006057271	0.003279688
61	5	0	0.0	0.000000000	0.000000000	0.000000000
62	5	0	0.0	0.000000000	0.000000000	0.000000000

2029 WITH DEVELOPMENT

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
1	20	4943	5.92	0.010817415	0.00213316	0.001192714
2	20	4943	5.92	0.010817415	0.00213316	0.001192714
3	20	7027	6.68	0.015793242	0.003090069	0.00172673
4	20	3172	9.9	0.007923052	0.001504938	0.000839044
5	20	3172	9.9	0.007923052	0.001504938	0.000839044
6	20	8153	7.33	0.01873588	0.003642331	0.00203434
7	20	4943	5.92	0.010817415	0.00213316	0.001192714
8	48	4943	5.92	0.00702896	0.002085084	0.001144637
9	20	7386	4.5	0.015348477	0.00307441	0.001720998
10	64	8170	9.12	0.010693172	0.003697918	0.002014295
11	64	8170	9.12	0.010693172	0.003697918	0.002014295
12	20	8170	9.12	0.019911741	0.003807533	0.002123911
13	20	9254	13.6	0.025776301	0.004759513	0.002647608
14	97	9254	13.6	0.012774894	0.004609829	0.002497923
15	48	2276	7.51	0.003317976	0.00099767	0.000546757
16	48	2276	7.51	0.003317976	0.00099767	0.000546757
17	20	1071	3.36	0.002130684	0.000432644	0.000242428
18	20	7027	6.68	0.015793242	0.003090069	0.00172673
19	48	7027	6.68	0.010112683	0.00301965	0.001656311
20	20	7027	6.68	0.015793242	0.003090069	0.00172673
21	20	12924	13.61	0.036008848	0.006648459	0.003698364
22	20	3833	7.33	0.008808368	0.001712383	0.000956412
23	32	3833	7.33	0.006891345	0.001689109	0.000933138

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
24	20	13283	13.3	0.03668901	0.006788761	0.00377707
25	20	13283	13.3	0.03668901	0.006788761	0.00377707
26	20	7761	13.03	0.021273791	0.003943959	0.002194643
27	97	7761	13.03	0.01071371	0.003820535	0.002071218
28	20	9169	11.89	0.024320761	0.004546823	0.002531806
29	20	8661	11.72	0.02285884	0.004279042	0.002382943
30	20	9829	12.18	0.026292982	0.00490483	0.002730681
31	20	9612	12.13	0.025675139	0.004791364	0.00266759
32	20	12924	13.61	0.036008848	0.006648459	0.003698364
33	48	7386	4.5	0.010266718	0.003006644	0.001653233
34	97	13283	13.3	0.018336694	0.006575809	0.003564118
35	20	8153	7.33	0.01873588	0.003642331	0.00203434
36	20	9254	13.6	0.025776301	0.004759513	0.002647608
37	20	7027	6.68	0.015793242	0.003090069	0.00172673
38	20	7761	13.03	0.021273791	0.003943959	0.002194643
39	48	8153	7.33	0.011852475	0.003558571	0.00195058
40	20	8170	9.12	0.019911741	0.003807533	0.002123911
41	20	13283	13.3	0.03668901	0.006788761	0.00377707
42	20	3172	9.9	0.007923052	0.001504938	0.000839044
43	48	1071	3.36	0.00146122	0.000423291	0.000233076
44	48	4943	5.92	0.00702896	0.002085084	0.001144637
45	48	8153	7.33	0.011852475	0.003558571	0.00195058
46	48	7386	4.5	0.010266718	0.003006644	0.001653233
47	48	7386	4.5	0.010266718	0.003006644	0.001653233
48	48	7027	6.68	0.010112683	0.00301965	0.001656311

Road Link	Speed (kph)	AADT	% HDV	NO_x Emission Rate (g/km/s)	PM_{10} Emission Rate (g/km/s)	$PM_{2.5}$ Emission Rate (g/km/s)
49	48	8153	7.33	0.011852475	0.003558571	0.00195058
50	48	7027	6.68	0.010112683	0.00301965	0.001656311
51	20	7027	6.68	0.015793242	0.003090069	0.00172673
52	20	18235	9.67	0.04522154	0.008606294	0.004798972
53	97	18235	9.67	0.02517069	0.008345531	0.004538209
54	20	18235	9.67	0.04522154	0.008606294	0.004798972
55	97	18235	9.67	0.02517069	0.008345531	0.004538209
56	20	9993	11.43	0.026149097	0.004905897	0.002732514
57	20	8547	11.59	0.022471591	0.004210745	0.002345095
58	20	10812	9.88	0.026989508	0.005127363	0.002858682
59	97	12924	13.61	0.017841232	0.006439351	0.003489255
60	97	13283	13.3	0.018336694	0.006575809	0.003564118
61	5*	2366	2.28	0.009930186	0.00095853	0.000550944
62	5*	2366	2.28	0.009930186	0.00095853	0.000550944

* Representing a worst-case speed throughout the Proposed Development to account for Outline Application internal road alignment uncertainty

Appendix E

MODEL VERIFICATION

The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations, which can arise due to the presence of inaccuracies and/or uncertainties in model input data, modelling and monitoring data assumptions. The following are examples of potential causes of such discrepancy:

a) Estimates of background pollutant concentrations;

b) Meteorological data uncertainties;

c) Traffic data uncertainties;

d) Model input parameters, such as 'roughness length'; and

e) Overall limitations of the dispersion model.

Nitrogen Dioxide

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of the primary pollutant emissions of nitrogen oxides (NO_x = NO + NO_2), in line with the guidance provided within LAQM.TG(22).

The model has been run to predict the 2019 annual mean road-NO_x contribution at two roadside diffusion tubes within the modelled road network. The model outputs of road-NO_x have been compared with the 'measured' road-NO_x, which was determined from the NO_2 concentrations measured using diffusion tubes at the monitoring locations, utilising the NO_x from NO_2 calculator provided by Defra and the NO_2 background concentration (from the Defra background map).

As discussed in the methodology section, the most recent suitable data available for model verification purposes is 2019 data.

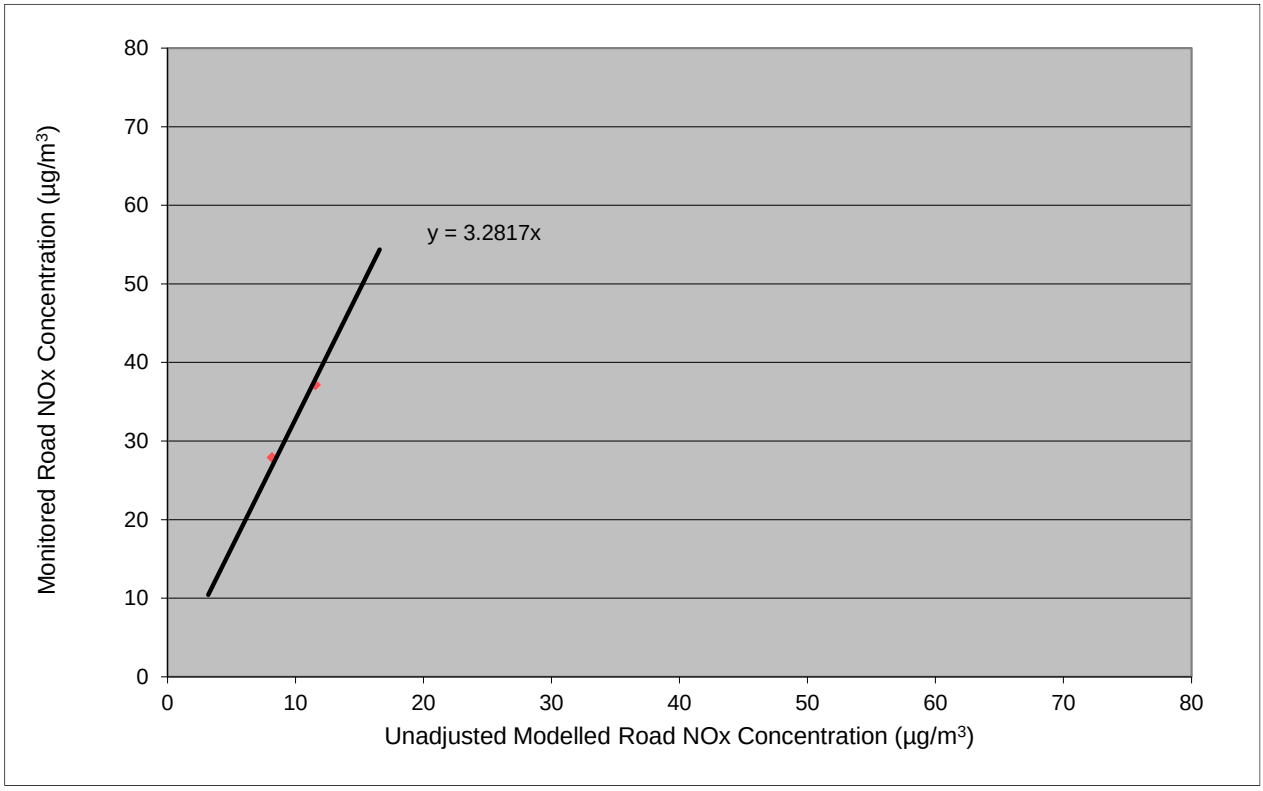
The table and figure below present the data used in the verification.

Table E1 – Data used in model verification

Monitoring Site	Measured Annual Mean NO_2 Concentration ($\mu g/m^3$)	Background NO_2 ($\mu g/m^3$)	Measured Road-NO_x ($\mu g/m^3$) (from NO_x:NO_2 calculator)	Modelled Road-NO_x ($\mu g/m^3$)	Ratio
EH70	23.7	9.0	27.9	8.2	3.4
EH73	28.2	9.0	37.2	11.6	3.2

The road-NO_x adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (**Figure E1**). This factor was then applied to the modelled road-NO_x concentration for each monitoring site to provide adjusted modelled road-NO_x concentrations. The total nitrogen dioxide concentrations were then determined by inputting the adjusted modelled road-NO_x concentrations and the background NO_2 concentration into the NO_x to NO_2 calculator.

Figure E1: Comparison of Measured Road-NOx with Unadjusted Modelled Road-NOx



PM_{10} and $PM_{2.5}$

There are no local PM_{10} or $PM_{2.5}$ monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-NO_x contribution has been applied to the predicted road-PM_{10} and road-$PM_{2.5}$ contributions, consistent with guidance set out in LAQM.TG(22).

Model Uncertainty

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG(22) identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include:

a) Root mean square error (RMSE);

b) Fractional bias (FB); and

c) Correlation coefficient (CC).

These parameters estimate how the model results agree or diverge from the observations. These calculations can be carried out prior to, and after adjustment, or based on different options for adjustment, and can provide useful information on model improvement. A brief for explanation of each statistic is provided in Table E2, and further details can be found in Box 7.17 of LAQM.TG(22).

Table E2 – Methods for describing model uncertainty

Statistical Parameter	Comments	Ideal value
Root Mean Square Error (RMSE)	RMSE is used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. For example, if the model predictions are for the annual mean NO_2 objective of 40 µg/m^3, if an RMSE of 10µg/m^3 or above is determined for a model it is advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/m^3 for the annual mean NO_2 objective.	0.01
Fractional Bias (FB)	It is used to identify if the model shows a systematic tendency to over or under predict. FB values vary between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.	0.00
Correlation Coefficient (CC)	It is 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. This statistic can be particularly useful when comparing a large number of model and observed data points.	1.00

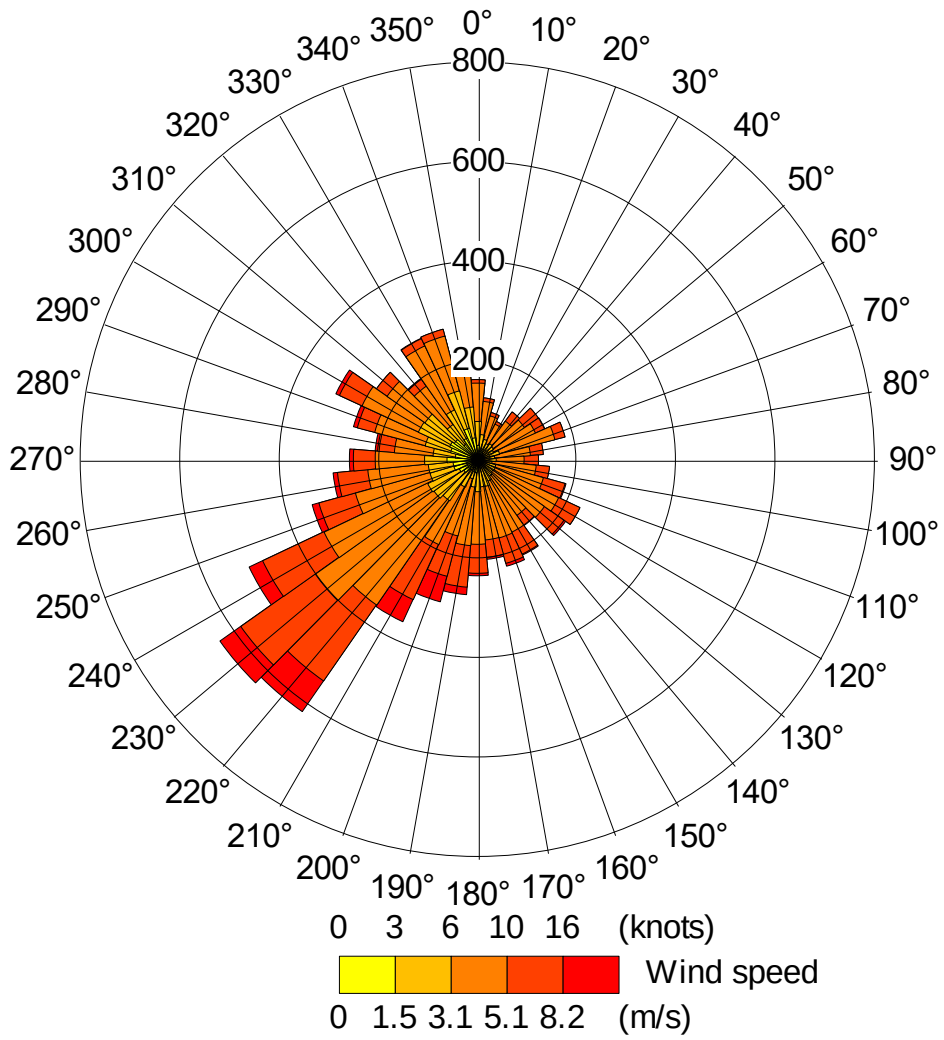
To assess the uncertainty of a model, the RMSE is the simplest parameter to calculate providing an estimate of the average error of the model in the same units as the modelled predictions. It is also often easier to interpret the RMSE than the other statistical parameters and therefore it has been calculated in this assessment to understand the model uncertainty.

The RMSE value calculated after verification was 0.5 and therefore the final predictions are considered to be robust.

Appendix F

WIND ROSE

Wind Rose for Stanstead airport (2019)



Appendix G

MODEL RESULTS

NO_2

Receptor ID	Receptor Location	Annual Mean NO_2 Concentrations (µg/m^3)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (µg/m^3)	% Change Relative to Objective	Impact
ER1	Residential Receptor on Skipps Meadow	14.7	8.6	8.7	0.1	0	Negligible
ER2	Residential Receptor on Skipps Meadow	32.0	14.9	15.3	0.4	1	Negligible
ER3	Residential Receptor on Tylers Close	26.7	13.0	13.4	0.4	1	Negligible
ER4	Residential Receptor on Tylers Close	26.2	13.0	13.3	0.3	1	Negligible
ER5	Residential Receptor on Longmead	23.1	11.4	11.9	0.5	1	Negligible
ER6	Residential Receptor on Baldock Road	20.5	11.1	11.4	0.3	1	Negligible
ER7	Residential Receptor on Baldock Road	18.3	10.2	10.5	0.3	1	Negligible
ER8	Residential Receptor on Baldock Road	20.4	11.0	11.4	0.4	1	Negligible
ER9	Residential Receptor on Baldock Road	21.5	11.6	11.9	0.3	1	Negligible

Receptor ID	Receptor Location	Annual Mean NO_2 Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
ER10	Residential Receptor on Baldock Road	30.0	15.3	15.8	0.5	1	Negligible
ER11	Residential Receptor on Baldock Road	32.4	16.3	16.8	0.5	1	Negligible
ER12	Residential Receptor on Baldock Road	34.1	17.0	17.6	0.6	2	Negligible
ER13	Residential Receptor on Abrahams Drive	17.5	9.3	9.6	0.3	1	Negligible
ER14	Residential Receptor on High Street	32.7	16.2	16.7	0.5	1	Negligible
ER15	Residential Receptor on High Street	30.8	15.4	15.9	0.5	1	Negligible
ER16	Residential Receptor on B1038 High Street	26.6	13.8	14.1	0.3	1	Negligible
ER17	Residential Receptor on B1038 High Street	24.7	13.0	13.3	0.3	1	Negligible
ER18	Residential Receptor on Market Hill	15.7	9.3	9.5	0.2	1	Negligible
ER19	Residential Receptor	21.6	11.7	11.9	0.2	1	Negligible

Receptor ID	Receptor Location	Annual Mean NO_2 Concentrations (µg/m^3)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (µg/m^3)	% Change Relative to Objective	Impact
	on B1038 High Street						
ER20	Residential Receptor on Chapel End	18.5	10.4	10.6	0.2	1	Negligible
ER21	Residential Receptor on Station Road	15.9	9.3	9.5	0.2	1	Negligible
ER22	Residential Receptor on Station Road	15.4	9.1	9.3	0.2	1	Negligible
ER23	Residential Receptor on Downhall Ley	17.0	9.8	10.0	0.2	1	Negligible
ER24	Residential Receptor on Hare Street	23.6	12.8	13.2	0.4	1	Negligible
ER25	Residential Receptor on Snells Mead	17.6	10.0	10.2	0.2	1	Negligible
ER26	Residential Receptor on Hare Street	21.1	11.8	12.2	0.4	1	Negligible
ER27	Residential Receptor on Snells Mead	18.0	10.1	10.3	0.2	1	Negligible
ER28	Residential Receptor on Nut Slip	15.2	8.8	9.0	0.2	1	Negligible

Receptor ID	Receptor Location	Annual Mean NO_2 Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
ER29	Residential Receptor on Snells Mead	16.8	9.4	9.6	0.2	1	Negligible
ER30	Residential Receptor on London Road	22.3	11.5	11.7	0.2	1	Negligible
ER31	Residential Receptor on London Road	19.0	10.2	10.3	0.1	0	Negligible
ER32	Residential Receptor on Layston Meadow	19.6	10.4	10.6	0.2	1	Negligible
ER33	Residential Receptor on Hare Street	17.5	10.2	10.5	0.3	1	Negligible
ER34	Residential Receptor on Hare Street	19.5	11.2	11.5	0.3	1	Negligible
ER35	Residential Receptor on Crouch Gardens	17.3	9.5	9.6	0.1	0	Negligible
ER36	Residential Receptor on London Road	16.9	9.3	9.5	0.2	1	Negligible
ER37	Residential Receptor on Olvega Drive	17.4	9.5	9.7	0.2	1	Negligible
ER38	Residential Receptor	17.0	9.4	9.5	0.1	0	Negligible

Receptor ID	Receptor Location	Annual Mean NO_2 Concentrations (µg/m^3)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (µg/m^3)	% Change Relative to Objective	Impact
	on Stearn Way						
ER39	Residential Receptor off Stearn Way	19.5	10.3	10.4	0.1	0	Negligible
ER40	Residential Receptor off Parker Drive	20.1	10.4	10.6	0.2	1	Negligible
ER41	Residential Receptor on Luynes Rise	11.6	7.3	8.2	0.9	2	Negligible
DR1	Proposed Development (1)	N/A		9.4	N/A		
DR2	Proposed Development (2)			8.8			
DR3	Proposed Development (3)			11.2			

Results rounded to 1 decimal place

PM_{10}

Receptor ID	Receptor Location	Annual Mean PM_{10} Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
ER1	Residential Receptor on Skipps Meadow	15.8	14.8	14.8	0.0	0	Negligible
ER2	Residential Receptor on Skipps Meadow	18.1	17.1	17.2	0.1	0	Negligible
ER3	Residential Receptor on Tylers Close	17.4	16.3	16.5	0.2	1	Negligible
ER4	Residential Receptor on Tylers Close	17.4	16.4	16.5	0.1	0	Negligible
ER5	Residential Receptor on Longmead	17.5	16.5	16.7	0.2	1	Negligible
ER6	Residential Receptor on Baldock Road	17.1	16.3	16.4	0.1	0	Negligible
ER7	Residential Receptor on Baldock Road	16.7	15.8	15.9	0.1	0	Negligible
ER8	Residential Receptor on Baldock Road	17.1	16.2	16.4	0.2	1	Negligible
ER9	Residential Receptor on Baldock Road	16.4	15.4	15.6	0.2	1	Negligible

Receptor ID	Receptor Location	Annual Mean PM_{10} Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
ER10	Residential Receptor on Baldock Road	18.7	18.0	18.3	0.3	1	Negligible
ER11	Residential Receptor on Baldock Road	18.1	17.3	17.5	0.2	1	Negligible
ER12	Residential Receptor on Baldock Road	18.4	17.6	17.8	0.2	1	Negligible
ER13	Residential Receptor on Abrahams Drive	16.5	15.4	15.5	0.1	0	Negligible
ER14	Residential Receptor on High Street	18.1	17.2	17.4	0.2	1	Negligible
ER15	Residential Receptor on High Street	17.8	16.9	17.1	0.2	1	Negligible
ER16	Residential Receptor on B1038 High Street	17.6	16.8	17.0	0.2	1	Negligible
ER17	Residential Receptor on B1038 High Street	17.7	17.0	17.1	0.1	0	Negligible
ER18	Residential Receptor on Market Hill	15.9	14.8	14.9	0.1	0	Negligible
ER19	Residential Receptor	16.8	15.9	16.0	0.1	0	Negligible

Receptor ID	Receptor Location	Annual Mean PM_{10} Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
	on B1038 High Street						
ER20	Residential Receptor on Chapel End	16.1	15.1	15.2	0.1	0	Negligible
ER21	Residential Receptor on Station Road	15.7	14.7	14.7	0.0	0	Negligible
ER22	Residential Receptor on Station Road	15.8	14.8	14.8	0.0	0	Negligible
ER23	Residential Receptor on Downhall Ley	16.2	15.2	15.2	0.0	0	Negligible
ER24	Residential Receptor on Hare Street	16.8	16.0	16.1	0.1	0	Negligible
ER25	Residential Receptor on Snells Mead	16.3	15.3	15.4	0.1	0	Negligible
ER26	Residential Receptor on Hare Street	16.6	15.8	15.9	0.1	0	Negligible
ER27	Residential Receptor on Snells Mead	16.4	15.4	15.5	0.1	0	Negligible
ER28	Residential Receptor on Nut Slip	15.8	14.8	14.8	0.0	0	Negligible

Receptor ID	Receptor Location	Annual Mean PM_{10} Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
ER29	Residential Receptor on Snells Mead	16.2	15.1	15.2	0.1	0	Negligible
ER30	Residential Receptor on London Road	17.1	16.1	16.1	0.0	0	Negligible
ER31	Residential Receptor on London Road	16.7	15.7	15.7	0.0	0	Negligible
ER32	Residential Receptor on Layston Meadow	16.9	15.9	16.0	0.1	0	Negligible
ER33	Residential Receptor on Hare Street	15.9	15.0	15.1	0.1	0	Negligible
ER34	Residential Receptor on Hare Street	16.2	15.3	15.4	0.1	0	Negligible
ER35	Residential Receptor on Crouch Gardens	16.4	15.4	15.5	0.1	0	Negligible
ER36	Residential Receptor on London Road	16.3	15.3	15.3	0.0	0	Negligible
ER37	Residential Receptor on Olvega Drive	16.5	15.4	15.5	0.1	0	Negligible
ER38	Residential Receptor	16.4	15.3	15.4	0.1	0	Negligible

Receptor ID	Receptor Location	Annual Mean PM_{10} Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
	on Stearn Way						
ER39	Residential Receptor off Stearn Way	16.8	15.8	15.8	0.0	0	Negligible
ER40	Residential Receptor off Parker Drive	16.7	15.6	15.7	0.1	0	Negligible
ER41	Residential Receptor on Luynes Rise	15.2	14.1	14.3	0.2	1	Negligible
DR1	Proposed Development (1)	N/A		15.5	N/A		
DR2	Proposed Development (2)			15.1			
DR3	Proposed Development (3)			15.2			

Results rounded to 1 decimal place

PM_{10} (daily)

Receptor ID	Receptor Location	Days with PM_{10} Concentrations >50µg/m^3				
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (days)	Impact
ER1	Residential Receptor on Skipps Meadow	0	0	0	0	Negligible
ER2	Residential Receptor on Skipps Meadow	1	1	1	0	Negligible
ER3	Residential Receptor on Tylers Close	1	0	0	0	Negligible
ER4	Residential Receptor on Tylers Close	1	0	0	0	Negligible
ER5	Residential Receptor on Longmead	1	0	1	1	Negligible
ER6	Residential Receptor on Baldock Road	1	0	0	0	Negligible
ER7	Residential Receptor on Baldock Road	1	0	0	0	Negligible
ER8	Residential Receptor on Baldock Road	1	0	0	0	Negligible
ER9	Residential Receptor on Baldock Road	0	0	0	0	Negligible
ER10	Residential Receptor on Baldock Road	2	1	2	1	Negligible
ER11	Residential Receptor on Baldock Road	1	1	1	0	Negligible
ER12	Residential Receptor on Baldock Road	2	1	1	0	Negligible

Receptor ID	Receptor Location	Days with PM_{10} Concentrations >50µg/m^3				
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (days)	Impact
ER13	Residential Receptor on Abrahams Drive	0	0	0	0	Negligible
ER14	Residential Receptor on High Street	1	1	1	0	Negligible
ER15	Residential Receptor on High Street	1	1	1	0	Negligible
ER16	Residential Receptor on B1038 High Street	1	1	1	0	Negligible
ER17	Residential Receptor on B1038 High Street	1	1	1	0	Negligible
ER18	Residential Receptor on Market Hill	0	0	0	0	Negligible
ER19	Residential Receptor on B1038 High Street	1	0	0	0	Negligible
ER20	Residential Receptor on Chapel End	0	0	0	0	Negligible
ER21	Residential Receptor on Station Road	0	0	0	0	Negligible
ER22	Residential Receptor on Station Road	0	0	0	0	Negligible
ER23	Residential Receptor on Downhall Ley	0	0	0	0	Negligible
ER24	Residential Receptor on Hare Street	1	0	0	0	Negligible

Receptor ID	Receptor Location	Days with PM_{10} Concentrations >50µg/m^3				
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (days)	Impact
ER25	Residential Receptor on Snells Mead	0	0	0	0	Negligible
ER26	Residential Receptor on Hare Street	1	0	0	0	Negligible
ER27	Residential Receptor on Snells Mead	0	0	0	0	Negligible
ER28	Residential Receptor on Nut Slip	0	0	0	0	Negligible
ER29	Residential Receptor on Snells Mead	0	0	0	0	Negligible
ER30	Residential Receptor on London Road	1	0	0	0	Negligible
ER31	Residential Receptor on London Road	1	0	0	0	Negligible
ER32	Residential Receptor on Layston Meadow	1	0	0	0	Negligible
ER33	Residential Receptor on Hare Street	0	0	0	0	Negligible
ER34	Residential Receptor on Hare Street	0	0	0	0	Negligible
ER35	Residential Receptor on Crouch Gardens	0	0	0	0	Negligible
ER36	Residential Receptor on London Road	0	0	0	0	Negligible

Receptor ID	Receptor Location	Days with PM_{10} Concentrations >50µg/m^3				
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (days)	Impact
ER37	Residential Receptor on Olvega Drive	0	0	0	0	Negligible
ER38	Residential Receptor on Stearn Way	0	0	0	0	Negligible
ER39	Residential Receptor off Stearn Way	1	0	0	0	Negligible
ER40	Residential Receptor off Parker Drive	1	0	0	0	Negligible
ER41	Residential Receptor on Luynes Rise	0	0	0	0	Negligible
DR1	Proposed Development (1)	N/A		0	N/A	
DR2	Proposed Development (2)			0		
DR3	Proposed Development (3)			0		

$PM_{2.5}$

Receptor ID	Receptor Location	Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change ($\mu g/m^3$)	% Change Relative to Objective	Impact
ER1	Residential Receptor on Skipps Meadow	9.9	9.0	9.0	0.0	0	Negligible
ER2	Residential Receptor on Skipps Meadow	11.3	10.3	10.4	0.1	1	Negligible
ER3	Residential Receptor on Tylers Close	10.9	9.9	10.0	0.1	1	Negligible
ER4	Residential Receptor on Tylers Close	10.9	9.9	10.0	0.1	1	Negligible
ER5	Residential Receptor on Longmead	10.9	10.0	10.1	0.1	1	Negligible
ER6	Residential Receptor on Baldock Road	10.7	9.8	9.9	0.1	1	Negligible
ER7	Residential Receptor on Baldock Road	10.4	9.6	9.6	0.0	0	Negligible
ER8	Residential Receptor on Baldock Road	10.6	9.8	9.9	0.1	1	Negligible
ER9	Residential Receptor on Baldock Road	10.5	9.6	9.6	0.0	0	Negligible
ER10	Residential Receptor on Baldock Road	11.7	11.0	11.1	0.1	1	Negligible

Receptor ID	Receptor Location	Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (µg/m^3)	% Change Relative to Objective	Impact
ER11	Residential Receptor on Baldock Road	11.5	10.6	10.7	0.1	1	Negligible
ER12	Residential Receptor on Baldock Road	11.6	10.8	10.9	0.1	1	Negligible
ER13	Residential Receptor on Abrahams Drive	10.3	9.4	9.4	0.0	0	Negligible
ER14	Residential Receptor on High Street	11.5	10.6	10.7	0.1	1	Negligible
ER15	Residential Receptor on High Street	11.3	10.4	10.5	0.1	1	Negligible
ER16	Residential Receptor on B1038 High Street	11.2	10.3	10.4	0.1	1	Negligible
ER17	Residential Receptor on B1038 High Street	11.2	10.4	10.4	0.0	0	Negligible
ER18	Residential Receptor on Market Hill	10.1	9.2	9.3	0.1	1	Negligible
ER19	Residential Receptor on B1038 High Street	10.7	9.8	9.9	0.1	1	Negligible
ER20	Residential Receptor on Chapel End	10.3	9.4	9.4	0.0	0	Negligible
ER21	Residential Receptor on Station Road	10.0	9.1	9.2	0.1	1	Negligible

Receptor ID	Receptor Location	Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (µg/m^3)	% Change Relative to Objective	Impact
ER22	Residential Receptor on Station Road	10.1	9.2	9.2	0.0	0	Negligible
ER23	Residential Receptor on Downhall Ley	10.3	9.4	9.5	0.1	1	Negligible
ER24	Residential Receptor on Hare Street	10.7	9.9	10.0	0.1	1	Negligible
ER25	Residential Receptor on Snells Mead	10.4	9.5	9.5	0.0	0	Negligible
ER26	Residential Receptor on Hare Street	10.6	9.8	9.8	0.0	0	Negligible
ER27	Residential Receptor on Snells Mead	10.4	9.5	9.6	0.1	1	Negligible
ER28	Residential Receptor on Nut Slip	10.0	9.0	9.1	0.1	1	Negligible
ER29	Residential Receptor on Snells Mead	10.1	9.2	9.3	0.1	1	Negligible
ER30	Residential Receptor on London Road	10.7	9.8	9.8	0.0	0	Negligible
ER31	Residential Receptor on London Road	10.4	9.5	9.6	0.1	1	Negligible
ER32	Residential Receptor on Layston Meadow	10.6	9.7	9.7	0.0	0	Negligible
ER33	Residential Receptor on Hare Street	10.2	9.3	9.4	0.1	1	Negligible

Receptor ID	Receptor Location	Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)					
		2019 Baseline	2029 without Dev.	2029 With Dev.	Change (µg/m^3)	% Change Relative to Objective	Impact
ER34	Residential Receptor on Hare Street	10.3	9.5	9.6	0.1	1	Negligible
ER35	Residential Receptor on Crouch Gardens	10.3	9.4	9.4	0.0	0	Negligible
ER36	Residential Receptor on London Road	10.2	9.3	9.4	0.1	1	Negligible
ER37	Residential Receptor on Olvega Drive	10.3	9.4	9.4	0.0	0	Negligible
ER38	Residential Receptor on Stearn Way	10.2	9.3	9.4	0.1	1	Negligible
ER39	Residential Receptor off Stearn Way	10.5	9.6	9.6	0.0	0	Negligible
ER40	Residential Receptor off Parker Drive	10.4	9.5	9.5	0.0	0	Negligible
ER41	Residential Receptor on Luynes Rise	9.6	8.7	8.8	0.1	1	Negligible
DR1	Proposed Development (1)	N/A		9.4	N/A		
DR2	Proposed Development (2)			9.2			
DR3	Proposed Development (3)			9.3			

Results rounded to 1 decimal place

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