Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

Preliminary Environmental Information Report

Chapter 9: Air quality

January 2022

This document forms a part of a Preliminary Environmental Information Report (PEIR) for the Hinckley National Rail Freight Interchange project.

A PEIR presents environmental information to assist consultees to form an informed view of the likely significant environmental effects of a proposed development and provide feedback.

This PEIR has been prepared by the project promoter, Tritax Symmetry (Hinckley) Limited. The Proposed Development is described in Chapter 3 of the PEIR and is the subject of a public consultation running from 12 January to 9 March 2022.

Details of how to respond to the public consultation are provided at the end of Chapter 1 of the PEIR and on the project website:

http://www.hinckleynrfi.co.uk/

This feedback will be taken into account by Tritax Symmetry (Hinckley) Limited in the preparation of its application for a Development Consent Order for the project.

Chapter Nine ◆ Air Quality

INTRODUCTION

9.1. This Chapter summarises the assessment work undertaken on the Hinckley National Rail Freight Interchange (HNRFI) scheme with regards to air quality.

9.2. This Chapter describes the methods used to assess the impacts, the baseline conditions currently existing at the Order Limits and study areas identified and the potential direct and indirect impacts of the Proposed Development. Where applicable, it also identifies mitigation measures required to prevent, reduce to offset these impacts and describes the remaining (residual) impacts with such mitigation measures in place.

9.3. This Chapter was completed by members of the BWB Air Quality Team who were responsible for undertaking the studies and assessments reported, contributing to the information described and for compiling this Chapter and the corresponding appendices. The assessment team are members of the Institute of Air Quality Management (IAQM) and Institution of Environmental Sciences (IES).

9.4. This report is necessarily technical in nature, so to assist the reader, a glossary of air quality terminology can be found in Appendix 9.1.

9.5. This Chapter is accompanied by the following appendices:

- Appendix 9.1: Air Quality Glossary of Terms.
- Appendix 9.2: Air Quality National Legislation and Planning Policy.
- Appendix 9.3: Air Quality Construction Phase Dust Assessment.
- Appendix 9.4: Air Quality Road Traffic Emissions Assessment - Existing Human Receptor Locations.
- Appendix 9.5: Air Quality Road Traffic Emissions Assessment - Ecological Transect Locations.
- Appendix 9.6: Wind Rose Utilised in the Air Quality Assessment.
- Appendix 9.7: DEFRA Background Map Concentrations used in the Air Quality Assessment.
- Appendix 9.8: Verification of the Air Quality Model.
- Appendix 9.9: Local Authority Air Quality Monitoring within the Study Area.
- Appendix 9.10: Air Quality Operational Phase Road Traffic Emissions Assessment Full

Results.

- Appendix 9.11: Air Quality Operational Phase Road Traffic Emissions Assessment- DMRB Magnitude.

  Appendix 9.12: Air Quality Operational Phase Road Traffic Emissions Assessment of Ecological Receptors- Full Results.

METHODOLOGY AND DATA SOURCES

The 2020 Scoping Opinion

9.6. An EIA Scoping Report was submitted to the Planning Inspectorate (PINS) in November 2020 which provided an outline approach for the identification and assessment of likely significant effects for air quality.

9.7. In December 2020 PINS, on behalf of the Secretary of State (SoS) and key stakeholders, returned their Scoping Opinion to the Applicant and comments related to air quality are provided in Table 9.1 and Table 9.2.

Table 9.1: Planning Inspectorate's comments from EIA Scoping Opinion in relation to air quality (December 2020)

Secretary of State	Scoping Opinion Response	Response to Comments
Detailed (quantitative assessment of operational energy plant emissions)	The report states that energy production from plant(s) are likely to be installed to the warehousing element of the Proposed Development. A detailed assessment of emissions from this infrastructure is proposed to be scoped out, as the Proposed Development would not be sufficiently progressed to allow for a quantitative assessment of operational emissions. The Scoping Report provides no explanation of the potential nature of the energy facility (fuel types, potential capacity). Given the lack of information the Inspectorate is unable to scope this matter out.	Information regarding the potential nature of the energy facility is provided within the Assessment Methodology section of this Chapter. A detailed assessment of the energy facility emissions was not undertaken as part of the PEIR as detailed information was not available at the time of assessment. Air dispersion modelling of emissions from the energy facility is proposed as part of the ES

Secretary of State	Scoping Opinion Response	Response to Comments
Receptors	The Scoping Report describes potentially sensitive receptors including Air Quality Management Areas (AQMAs). The ES should include the figures to indicate the location of these receptors.	Noted. Human receptor locations (road traffic emissions assessment) are shown on Figures 9.3-9.8 and detailed within Appendix 9.4.
Study Area	The Scoping Report suggests that the study area will be established based on the Affected Road Network. The ES should also justify the extent of consideration of the affected areas of the rail network in the geographic scope of the assessment.	The rail network geographic scope was established in accordance with relevant guidance and details are provided within the Assessment Methodology section of this Chapter.
Sensitive Receptors	The Scoping Report identifies locations where members of the public would spend extended periods of time and experience longer periods of exposure. Burbage Woods and Burbage Common are missing from this list but are identified as popular leisure destinations by Stoney Stanton Parish Council.	Receptor locations, including Burbage Woods and Common, were considered within the assessment for the construction and operational phases. Existing receptor locations are considered within the operational phase road traffic emissions impact assessment on the B4668 Leicester Road in closer proximity to the road network, than Burbage Woods and Common and are therefore considered suitable proxy locations to consider the impact of the Development once operational on local air quality in the area. Details are provided within the Assessment Methodology section of this Chapter and shown in Figures 9.1 and 9.3-9.11.
Consultation	Discussions with Blaby District Council (BDC) and Hinckley and Bosworth District Council (HBBC) over the methodology should be documented in the ES.	Further consultation has been undertaken with BDC and HBBC to discuss the methodology and sensitive receptors. This was agreed and is detailed within Table 9.3 of this Chapter.

Secretary of State	Scoping Opinion Response	Response to Comments
Temporal Scope of the Assessment	The Scoping Report states that assessments will be carried out for the baseline year and a future assessment year but does not explain what the future assessment year would be. The ES should ensure that the choice of future assessment year is based on a worst case scenario.	The opening year of the Proposed Development is confirmed as 2026 for the purposes of the assessment in the ES. A future year of 2036 was chosen early on in the development proposals as 10 years ahead of opening year rather than the end of the Blaby plan period (2038). The transport model does not encompass a 2038 assessment year, only up to 2036 and National Highways (NH) advised that 2036 is a suitable proxy.

Table 9.2: Consultee comments

Consultee	Comments	Response
Blaby District Council (BDC)	The effects of dust generation should be considered in the assessment of the impacts for the construction phase. Air quality and dust levels should be considered not only on site but also off-site, including along access roads, local footpaths and other Public Rights of Way (PRoWs). Any mitigation measures necessary to deal with adverse impacts and identify any residual effects should clearly be defined. Consideration should be given to monitoring dust complaints.	The assessment considers construction phase impacts in accordance with guidance produced by the Institute of Air Quality Management (IAQM) and is contained within this Chapter. Further information on the construction dust assessment is also contained within Appendix 9.3.
Burbage Parish Council	The ES should include a full study of the impact assessment of increased traffic on local air quality. The study should include the impact of traffic congestion upon air quality.	This Chapter considers the impact of operational phase road traffic emissions on local air quality. Consideration of traffic speeds and highways elevations have been considered within the assessment which was undertaken in accordance with relevant guidance.

Consultee	Comments	Response
		A quantitative construction phase road traffic emissions assessment was not undertaken as part of the PEIR as phasing is subject to further detailed considerations and indicative construction traffic numbers for local roads provided by the Project Transport Consultant are below the DMRB criteria for when a detailed assessment is required. Construction phase traffic will be considered further in the ES accompanying the DCO application.
	The ES should not base air quality assumptions upon the reduction of diesel and petrol vehicles which mitigates potential air quality reductions locally from the operation of this development. Local air quality should benefit from the increase in electric vehicles by a [sic] increase in air quality compared to current levels.	The air quality assessment used the latest emission factors from the DEFRA Emissions Factor Toolkit (EFT), version 10.1 and was undertaken in accordance with relevant guidance. The EFT toolkit uses the latest emission factors and is based on real world car sale projections in 2019 from the Department for Transport (DfT). The assessment methodology was agreed with the Environmental Health departments at Blaby District Council (BDC) and Hinckley and Bosworth Borough Council (HBBC).
Elmesthorpe Parish Council	The Parish Council notes that since the original Scoping Report, the NO_2 data from a diffusion tube on Station Road Elmesthorpe is to be taken into account. However the construction dust assessment appears to be proposed for properties within 350m of the site only, and bearing in mind the size of the development this seems inadequate, and we would wish to see the detailed justification for assessment of such a small area, or preferably that the area being assessed should be extended in the ES.	Local authority diffusion tube data contained within the study area is shown within Appendix 9.9. The construction phase dust assessment was undertaken in accordance with guidance produced by the IAQM. This allowed the determination of the sensitivity of the area and dust emission magnitudes based on those receptors which will experience the greatest impacts. The construction phase dust assessment is contained within the Potential Significant Effects of the Proposals section of this Chapter and further information is contained in Appendix 9.3.

Consultee	Comments	Response
	At paragraph 8.76, the Applicant states that a detailed assessment of plant emissions are proposed to be scoped out of the assessment as "they are not considered to be likely to give rise to significant effects". The Parish Council does not agree and would wish to see a detailed assessment in the ES.	Information regarding the potential nature of the energy facility is provided within the Assessment Methodology section of this Chapter. A detailed assessment of the energy facility emissions was not undertaken as part of the PEIR as detailed information was not available at the time of assessment. Air dispersion modelling of emissions from the energy facility is proposed as part of the ES.
National Highways (NH)	Adverse change to noise and air quality should be particularly considered, including in relation to compliance with the European air quality limit values and/or in any local authority designated Air Quality Management Areas (AQMAs).	The impact of the proposals on local air quality was assessed in accordance with relevant guidance. The predicted changes in pollutant concentrations were compared to the relevant air quality objectives and designated AQMAs were considered where necessary.
Hinckley and Bosworth District Council	The Scoping Report identifies relevant policy and legislation relating to air quality. Paragraph 8.12 states there are no relevant policies relating to air quality in the HBBC Core Strategy, however Spatial Objective 12: Climate Change and Resource Efficiency is relevant.	Spatial Objective 12 was considered within the relevant policy and legislation section of this Chapter and further information can be found in Appendix 9.2.
Natural England (NE)	Air quality in the UK has improved over recent decades but air pollution remains a significant issue; for example over 87% of sensitive habitat area in England is[sic] predicted to exceed the critical loads for ecosystem protection from atmospheric nitrogen deposition. A property action in the England Biodiversity Strategy is to reduce air pollution impacts on biodiversity. The planning system plays a key role in determining the location of developments which may give rise to pollution, either directly or from traffic generation, and hence	This Chapter includes an assessment of the impact of the Proposed Development on designated ecological sites identified within the study area. Full results of the ecological assessment can be found in Appendix 9.12 and are discussed within the Potential Significant Effects of the Proposals section of this Chapter.

Consultee	Comments	Response
	planning decisions can have a significant impact on the quality of air, water and land. The assessment should take account of the risks of air pollution and how these can be managed or reduced. Further information on air pollution impacts and the sensitivity of different habitats/designated sites can be found on the Air Pollution Information System (APIS). Further information on air pollution modelling and assessment can be found on the Environment Agency (EA) website.	
Public Health England	When considering baseline conditions and the assessment of future impacts, these should include: • Consideration of impacts on existing areas of poor air quality e.g. existing or proposed local authority AQMAs • Modelling using appropriate meteorological data • Modelling taking into account local topography, congestion and acceleration • Evaluation of the public health benefits of development such as nitrogen dioxide (NO_2) or particulate matter (PM) show no threshold below which health effects do not occur.	This Chapter has considered the baseline conditions and future operational phase road traffic emissions impact upon pollutant concentrations at existing receptors within the study area. The air quality modelling considered receptors within AQMA's in the study area and utilised appropriate meteorological data considered to be representative of the broad study area. The use of the meteorological data was agreed during consultation with BDC and HBBC. Traffic speeds and local topography were also considered within the assessment. The assessment considered the impact of development on sensitive human receptors utilising the most recent guidance and relevant air quality objectives at the time.

9.8. Further to the Scoping Report consultation, consultation was also undertaken with the Environmental Health departments at Blaby District Council (BDC) and Hinckley and Bosworth Borough Council (HBBC) to agree the proposed air quality assessment (AQA) methodology. Table 9.3 provides a summary of the consultation undertaken.

Table 9.3: Consultation responses relevant to this Chapter

Consultee	Date	Comments	Actions
Blaby District Council Environmental Health Department	17/06/2021	Consultation email detailing proposed assessment methodology and receptor locations issued to BDC for review.	None
	17/06/2021	Confirmation of acceptance of methodology received from BDC by email.	None
Hinckley and Bosworth Borough Council Environmental Health Department	17/06/2021	Consultation email detailing proposed assessment methodology and receptor locations issued to HBBC for review.	None
	18/06/2021	Confirmation of acceptance of methodology received from HBBC by email.	None

9.9. A public consultation exercise was also undertaken in 2018/2019 where air quality was discussed with the public. Concerns were raised regarding potential air quality impacts and this chapter considers potential impact of the Proposed Development on local air quality.

Assessment methodology

Construction phase dust assessment

9.10. An assessment of the potential impacts from the construction of the Proposed Development was undertaken in accordance with IAQM guidance[22]. The guidance sets out principles to determine the sensitivity of the area and dust emission magnitudes based on those receptors which will experience the maximum impact. The full assessment methodology is provided in Appendix 9.3 and a summary of the assessment steps are provided below:

- Step 1 - screen the requirement for a more detailed assessment. No assessment is required if there are no receptors within a certain distance of the works;
- Step 2 - assess the risk of dust impacts separately for each of the four activities considered (demolition, earthworks, construction and trackout);
    - Step 2A- determine the potential dust emission magnitude for each of the four activities;
    - Step 2B- determine the sensitivity of the area;
    - Step 2C- determine the risk of dust impacts by combining the findings of steps 2A and 2B.
- Step 3 - determine the site-specific mitigation for each of the four activities; and

- Step 4 - examine the residual and in combination effects and determine significance.

Study area and identification of existing sensitive receptors

9.11. Existing sensitive receptors were identified within the distance bands detailed in the IAQM guidance[22] and considered with regard to dust soiling, human health effects and ecological designated sites. Figure 9.1 details the construction phase dust distance buffers which are measured at 20m, 50m, 100m, 200m and 350m from the Order Limits and represent the extents of the construction phase dust assessment.

9.12. The distance bands provided by the IAQM guidance[22] '*are deliberately chosen to be conservative and take into account the exponential decline in both airborne concentrations and the rate of deposition of dust with distance from the source'*.

9.13. Sensitive receptors for construction dust were identified based on the criteria above.

Construction phase road traffic emissions

9.14. The Design Manual for Roads and Bridges (DMRB) LA105[21] states that emissions from construction vehicles on the local road network should be considered where construction is predicted to last for more than six months. The criteria provided in DMRB LA105 stipulates that further assessment of vehicle emissions is required where a change in flow of 1,000 as a 24 hour annual average daily traffic (AADT) movements or more is expected, or the heavy-duty vehicle (HDV) flow will change by 200 AADT or more.

9.15. A quantitative construction phase road traffic emissions assessment was not undertaken as part of the PEIR as phasing is subject to further detailed considerations and indicative construction traffic numbers for local roads provided by the Project Transport Consultant are below the DMRB criteria for when a detailed assessment is required. Construction phase traffic will be considered further in the ES accompanying the DCO application.

9.16. Further details are provided in Chapter 8: *Transport and Traffic*.

Operational phase road traffic emissions assessment

9.17. A detailed assessment of operational phase road traffic emissions on local air quality was undertaken in accordance with DMRB LA105[21], with reference to DEFRA air quality technical guidance[20], IAQM and EPUK guidance[23] and National Policy Statement (NPS) for National Networks guidance[15].

9.18. Atmospheric Dispersion Modelling System ('ADMS') ADMS-Roads, version 5.0.0.1, was utilised in the assessment to predict concentrations of oxides of nitrogen ('NO_x') and varying sizes of particulate matter ('PM_{10}' and '$PM_{2.5}$') at identified existing human receptor locations and within the designated ecological sites identified within the study area.

Study area and identification of existing receptor locations

9.19. The study area was determined in accordance with the criteria provided by DMRB LA 105

Air Quality guidance[21]. In accordance with DMRB LA105, the screening criteria for the 'affected road network' is:

- a change in alignment of more than 5m or more; or
- a change in daily traffic flows of 1,000 AADT or more; or
- a change in heavy duty vehicles (HDVs) flows of 200 AADT or more; or
- a change in speed band.

9.20. Traffic data provided by the project's Transport Consultants, as set out in Chapter 8: *Transport and Traffic* was screened in accordance with these criteria to identify affected road links and the extent of the study area. Additional traffic data for roads in the vicinity of receptors or monitoring locations was included if required for assessment purposes.

9.21. Existing human receptor locations were identified within the study area and concentrations of nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$ were predicted at these receptors in the operational phase road traffic emissions assessment.

9.22. The extent of the study area for the operational phase road traffic emissions assessment is shown in Figure 9.2, and the receptor locations included within the operational phase road traffic emissions assessment are depicted in Figures 9.3-9.11.

9.23. The existing human sensitive receptor locations considered in the assessment were based on their relative proximity to road links within the study area. Where possible the closest receptors to those road links and junctions were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the Proposed Development. The receptors were located on the facades of the properties closest to the road source.

9.24. The existing human receptor locations are detailed in Appendix 9.4 and Figures 9.3-9.8. Pollutant concentrations were predicted at the height representative of exposure. Ground floor receptors were modelled at a height of 1.5 metres (m). This excludes schools and nurseries, which were modelled at 0.8m to represent a lower than average breathing height for children.

9.25. Receptors relevant to the short term objectives were also identified. These receptors were located where members of the public could be present for a period of time comparable to the short term air quality objectives, but unlikely to be present for extended periods such as those representative of the annual air quality objectives. Such uses include hotels or restaurants.

9.26. Receptors were considered within the following Local Authority areas:

- Blaby District Council (BDC);
- Hinckley and Bosworth Borough Council (HBBC);

- Rugby Borough Council (RBC);
- Harborough District Council (HDC);
- Charnwood Borough Council (CBC);
- Erewash Borough Council (EBC);
- North Warwickshire Borough Council (NWBC);
- North West Leicestershire Council (NWLC);
- Coventry City Council (CCC);
- Tamworth Borough Council (TBC);
- Nuneaton and Bedworth Borough Council (NBBC); and
- West Northamptonshire Council (Daventry District Council (DDC)) (WNC).

Ecological designations

9.27. Ecological designations, including Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Local Nature Reserves (LNR) and Ancient Woodlands (AW), were considered within the assessment where they were located within 200m of the affected road network in accordance with the DMRB LA105 criteria[21]. The locations of the ecological designations are depicted in Figures 9.9-9.11.

Ecological critical load and level assessment

9.28. The dispersion modelling software ADMS-Roads was utilised to predict concentrations of NOx and nitrogen deposition resulting from additional development-generated road traffic emissions within the ecological sites. Transects were modelled at 10m intervals from the boundary of each designated ecological site adjacent to affected roads, up to 200m into the ecological site in accordance with IAQM[24] and DMRB guidance[21].

9.29. Figures 9.9-9.11 detail the ecological designations in which transects were modelled. Further details are also provided in Appendix 9.5.

Rail emissions

9.30. DEFRA guidance[20] provides a screening criterion for both stationary and moving diesel locomotives, which set out when a more detailed assessment of rail emissions may be required. Rail emissions were considered within the assessment in accordance with this guidance.

Identification of existing receptor locations

9.31. The rail emissions were considered using DEFRA guidance[20]. The guidance provides the

following criterion to consider whether an assessment of rail emissions is required:

- where relevant sensitive exposure locations lie within 15m of stationary locomotives; or
- where relevant sensitive exposure locations lie within 30m of identified high diesel usage lines as defined in DEFRA guidance.

Energy centre flue emissions

9.32. It is understood that power for the development will be provided through an enhanced grid supply and the capacity will be augmented with on-site renewable generation from rooftop Photovoltaics (PV). The Proposed Development also includes plans for an energy centre comprising Combined Heat and Power (CHP) generated from gas. At the time of assessment, the energy plant to be installed on the Main HNRFI Site was not sufficiently progressed to enable a quantitative assessment to be undertaken. Therefore, emissions associated with on-site energy generation were not considered further within this assessment at this time. This will be addressed through the ES in time for submission of the application, where sufficient information is available.

Sensitivity of receptors

Construction phase dust emissions

9.33. Existing receptors are located within 350m of the Order Limits. These receptors comprise a variety of sensitivities which are defined using the IAQM guidance[22] and are presented in Table 9.4.

Table 9.4: Receptor sensitivity

Receptor Sensitivity	Rationale	Example Uses
High	Surrounding land where users can reasonably expect to enjoy a high level of amenity or the appearance, aesthetics or value of their property would be diminished by soiling. The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods of time.	Highly sensitive receptors within 350m of the Order Limits include residential dwellings and medium term car parks
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home, or the appearance, aesthetics or value of their property could be diminished by soiling. The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods of time as part of their normal pattern of	Medium sensitive receptors within 350m of the Order Limits include Burbage Common and Woods, Aston Firs SSSI and public rights of way (PRoWs).

Receptor Sensitivity	Rationale	Example Uses
	use.	
Low	The enjoyment of amenity would not be reasonably expected or property would not be reasonably be expected to be diminished in appearance, aesthetics or value by soiling. There is transient exposure where people or property would be reasonably only be expected to be present only for limited periods of time as part of the normal pattern of use of the land.	Low sensitivity receptors within 350m of the Order Limits include roads.

9.34. The construction phase dust assessment was undertaken using the most sensitive receptor classification within the appropriate distance bands to the Order Limits. The closest human receptors are residential dwellings on Smithy Lane, Leicester Road and Station Road (Figures 9.3-9.8**)**. These receptors are considered to be highly sensitive for both dust soiling and human health impacts in accordance with IAQM guidance[22]. Car parking for the Burbage Common and Woods Country Park is considered to be highly sensitive to dust soiling. Initial phases of the Proposed Development will also constitute sensitive receptors to the ongoing construction work.

9.35. The closest ecological receptors identified within 20m of the Order Limits, in accordance with the IAQM guidance[22], are the Burbage Common and Woods and Aston Firs SSSI. These are considered to be medium sensitivity receptors to dust soiling following advice from the appointed ecological consultants, EDP.

Operational phase road traffic emissions

Human receptors

9.36. All receptors identified and considered in the assessment were classified as residential, educational or medical in nature and were therefore considered to be highly sensitive.

Ecological receptors

9.37. International, national or local ecological designated sites are considered sensitive receptors in accordance with DMRB guidance[21].

Assessment scenarios and traffic data

9.38. Traffic data for the assessment scenarios was provided by the appointed transport consultants for the Proposed Development. The data was obtained from the Pan Regional Transport Model 2 (PRTM2.2) which was provided by AECOM. 24-hour AADT and HDV flows and average speeds were provided for the roads shown in Figure 9.2.

9.39. The following scenarios were considered in the air dispersion modelling:

- Scenario 1: Base and Model Verification Year (2019);
- Scenario 2: Opening Year (2026) Without Development;
- Scenario 3: Opening Year (2026) With Development;
- Scenario 4: Future Year (2036) Without Development; and
- Scenario 5: Future Year (2036) With Development.

9.40. The Proposed Development includes the creation of new slip roads at junction 2 of the M69, alongside a new link road through the Main HNRFI Site from junction 2 of the M69 to the B4668 Leicester Road. The assessment therefore considers the new road geometry for the With Development scenarios. Other proposed off-site highway works are minor, do not result in changes in traffic movements and were therefore not explicitly included in the traffic data utilised in air dispersion modelling for the PEIR.

9.41. Committed developments were included in the traffic data provided for the Opening Year and Future Year scenarios to enable consideration of cumulative effects associated with simultaneous operation of all developments. Details of committed developments considered in the assessment are set out in Chapter 8: *Transport and Traffic*.

9.42. A number of roads within the study area are elevated, including railway bridges and motorways, and therefore these sections were elevated in the dispersion model to replicate road geometry. As precise road elevations were not available, elevated road sections were modelled at a height of 5m, which is the minimum height for unmarked road bridges in accordance with Driver & Vehicle Standards Agency (DVSA) guidance[1]. The use of 5m as an elevated road height represents a conservative assessment as it locates the emission source at the closest possible height to the receptors modelled in the assessment.

Assessment inputs and calculations

9.43. The following inputs were utilised in the assessment:

- Emission Factors - emission factors were utilised from the DEFRA Emission Factor Toolkit, version 10.1[2], for the years of assessment (2019, 2026 and 2036). 2030 emissions factors were used for the 2036 scenarios as this is the latest year for which emission factors were derived by DEFRA at the time of assessment.
- Conversion of oxides of nitrogen - concentrations of NOx were predicted using the ADMS-Roads dispersion model. These concentrations were converted to NO_2 using

[1] Driving & Vehicle Standards Agency (DVSA) (2016) The Official DVSA guide to driving buses and coaches
[2] DEFRA (2020) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]

the DEFRA NOx to NO_2 calculator, version 8.1[3].

- Meteorological Data - hourly sequential meteorological data for the base and verification year of assessment (2019) were obtained from the East Midlands Airport recording station as agreed with BDB and HBBC during consultation. This is the closest, most representative recording station to the Proposed Development. The wind rose for 2019 is provided in Appendix 9.6.

- Surface roughness - a surface roughness of 0.75 was utilised in the dispersion model. This is representative of the wider study area, which includes a variety of environments including urban areas such as Hinckley, Narborough and Atherstone, woodland, rural environments and open fields.

- Monin-Obukhov length (MO) - a MO of 30 was utilised in the dispersion model. This is representative of the Main HNRFI Site location and surrounding area which is mix of urban areas, woodland and open fields.

- DEFRA background maps[4] - background concentrations of NOx, NO_2, PM_{10} and $PM_{2.5}$ were obtained for use in the assessments. All were obtained from the pollutant concentration maps provided by DEFRA. The DEFRA pollutant concentration maps are provided as 1 kilometre (km) x1km grids squares of the UK and were obtained for the years of assessment (2019, 2026 and 2036). 2030 data was used for the 2036 scenarios as this is the latest year for which background mapped concentrations were derived by DEFRA at the time of assessment. The background concentrations used within the assessment are detailed in Appendix 9.7.

- Air Pollution Information System (APIS)[5] - APIS provides critical loads for ecological habitats and was utilised to obtain nitrogen deposition values relevant for the ecological sites within the study area. Nitrogen deposition values for ecological habitats not included within APIS were obtained from the appointed ecological consultants for ecological sites within the study area.

- Model verification - model verification was undertaken using 2019 local authority monitoring data for the study area. Full details of the verification procedure are provided in Appendix 9.8. 2020 monitoring data was available at the time of assessment however, due to the influence of COVID-19 pandemic lockdown restrictions on traffic levels in 2020, monitoring undertaken in 2020 would not be considered representative of 'typical' conditions. Model verification was therefore undertaken utilising 2019 monitoring data as the last year of 'typical' monitoring data, in accordance with the IAQM position statement[6].

[3] DEFRA (2020) NOx to NO2 Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]
[4] DEFRA (2020) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018]
[5] Air Pollution Information System (APIS) [http://www.apis.ac.uk/]
[6] IAQM (2021) Use of 2020 and 2021 Monitoring Datasets

- Calculation of short term PM_{10} concentrations - the following calculation, as detailed in DEFRA guidance was utilised to calculate the number of exceedances of the 24-hour mean PM_{10} air quality objective.

  *Number of 24-hour Mean Exceedances = -18.5 + 0.00145*Annual Mean^3 + (206/Annual Mean)*

- Nitrogen deposition conversion - NOx concentrations predicted within each of the ecological sites were converted to deposition values using the relevant deposition conversions as provided in DMRB guidance[21].

Assessment criteria, characterisation of impact and significance criteria

Construction phase dust assessment

9.44. The construction dust assessment was undertaken in accordance with IAQM guidance[22]. The assessment criteria used to undertake the assessment steps is detailed in paragraph 9.9 and provided in Appendix 9.3.

Operational phase road traffic emissions assessment

9.45. Predicted pollutant concentrations at existing human receptor locations were compared to the relevant air quality objectives. The current relevant air quality standards and objectives are detailed in Table 9.5.

Table 9.5: Air quality standards and objectives (England)

Pollutant	Averaging Period	Air Quality Objective ($\mu g.m^{-3}$)	Date to be Achieved by
NO_2	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM_{10}	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
$PM_{2.5}$	Annual mean target (15% cut in annual mean urban background exposure)	25	2010-2020

Critical levels

9.46. The current relevant annual mean Critical Level for NOx for the protection of vegetation

and ecosystems, as transposed into UK law by the Air Quality Standards and Regulations 2010, as amended, are detailed in Table 9.6.

Table 9.6: Annual mean critical level for the protection of vegetation and ecosystems

Pollutant	Averaging Period	Critical Level (µg.m^{-3})
NO_x	Annual Mean	30

Critical loads

9.47. The level of nitrogen deposition calculated across the transect points within the designated ecological sites were compared to the lower critical load value to determine whether changes in nitrogen deposition were greater than 1% of the critical load. The critical loads utilised within the assessment are detailed in Table 9.7.

Table 9.7: Nitrogen deposition critical loads utilised in the assessment

Ecological Site	Critical Load (kg N ha^{-1}yr^{-1})
Alvecote Pools SSSI	20-30
Ashlawn Cutting LNR	10-20
Aston Firs SSSI	15-20
Bramcote Covert AW	10-20
Burbage LNR	10-15
Cave's Inn Pits SSSI	20-30
Daniels Wood AW	10-20
Free Holt Wood AW	10-20
Grendon Wood AW	10-20
Kettle Brook LNR	10-20
Lount Meadows SSSI	20-30
Many Lands Wood AW	10-20
Martinshaw Wood AW	5-15
Martinshaw Wood South AW	10-20
Narborough Bog SSSI	10-20
Oakley Wood SSSI	15-20
Piper Wood AW	10-20
River Mease SAC/SSSI	No data available
Shawell Wood AW	10-20
Sparrowdale Wood AW	10-20
Sparrowdale Wood AW	10-20
Tonge Gorse AW	10-20
Wyken Slough LNR	10-15

9.48. To provide a conservative assessment, the changes in nitrogen deposition were calculated as a percentage of the lower critical load for each site.

9.49. The assessment of likely significant environmental effects as a result of the Proposed Development took into account the construction and operational phases of the Development.

Construction phase dust assessment

9.50. Any impacts associated with the construction of the Proposed Development are likely to be local, medium term and temporary in nature. The significance of any impacts were identified in accordance with IAQM guidance[22].

9.51. Step four of the IAQM guidance examines the residual effects of the Proposed Development and states *'for almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation'.*

9.52. The assessment is used to define appropriate mitigation measures to minimise any potential effect.

Operational phase road traffic emissions assessment

9.53. Any impacts associated with operational phase road traffic emissions are likely to be local, long term and permanent in nature. Impacts will be positive or negative depending on whether an increase or decrease in development-generated vehicle movements is experienced on the local road network. The significance of any impacts were identified in accordance with reference to the criteria provided by IAQM and EPUK guidance[23] and DMRB LA105[21].

Human receptors – IAQM and EPUK guidance

9.54. The impact of the Proposed Development is determined with regard to the percentage change in pollutant concentrations relative to the relevant Air Quality Assessment Level. Predicted pollutant concentrations are compared to the relevant air quality objectives (as detailed in Table 9.5) and the significance of the impact determined with regard to IAQM and EPUK guidance[23]. Guidance is provided by the IAQM and EPUK to determine the significance of the impact of development-generated road traffic emissions on local air quality. The impact descriptors at human receptor locations are detailed in Table 9.8 and were adjusted to the magnitude descriptors used within Environmental Impact Assessments (EIAs). These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the relevant air quality objectives (as detailed in Table 9.5).

Table 9.8: IAQM impact descriptors for individual receptors

Long Term Average Concentrations at Receptor in the Assessment Year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1%	2-5%	6-10%	>10%
<75% of AQAL (<30µg.m^{-3})	Negligible	Negligible	Minor	Moderate
76-94% of AQAL (30-38µg.m^{-3})	Negligible	Minor	Moderate	Moderate
95-102% of AQAL (38-41µg.m^{-3})	Minor	Moderate	Moderate	Major
103-109% of AQAL(41-44µg.m^{-3})	Moderate	Moderate	Major	Major
>110% (>44µg.m^{-3})	Moderate	Major	Major	Major

Note: Figures rounded to the nearest whole number, therefore any values less than 1% after rounding (effectively less than 0.5%) will be described as negligible.

9.55. For each effect, it was concluded whether the effect is 'beneficial' or 'adverse'.

9.56. The following terms were used to define the significance of the effects identified and these can be 'beneficial' or 'adverse':

- Major effect: where the Proposed Development is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity. This effect is considered 'Significant'.

- Moderate effect: where the Proposed Development is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability. This effect is considered more likely to be 'Significant' but will be subject to professional judgement.

- Minor effect: where the Proposed Development is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Development is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change. This effect is considered to be 'Not Significant' but will be subject to professional judgement.

- Negligible: where the Proposed Development is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change. This effect is 'Not Significant'.

9.57. In accordance with IAQM and EPUK guidance, 'Minor' and 'Negligible' level effects were

considered 'Not Significant', whilst 'Moderate' or 'Major' level effects were considered to be potentially 'Significant'. A statement is made as to whether the level of effect is 'Significant' or 'Not Significant'.

Human receptors – DMRB guidance

9.58. DMRB LA105 guidance[21] sets out magnitudes of change in annual concentrations of NO_2, PM_{10} and $PM_{2.5}$ to categorise a significant effect for receptors where the concentration of a pollutant is within 10% of the relevant objective with the Proposed Development. The magnitude of change criteria is presented in Table 9.9.

Table 9.9: Magnitude of change criteria

Magnitude of Change in Concentration ($\mu g.m^{-3}$)	Value of Change in Annual Average NO_2 and PM_{10}
Large (>4)	Greater than 10% of the air quality objective
Medium (>2-4)	Greater than 2$\mu g.m^{-3}$ but less than 10% of the objective (4$\mu g.m^{-3}$)
Small (>0.4 to 2)	Greater than 1% of the objective (0.4$\mu g.m^{-3}$) but less than 5% of the objective (2$\mu g.m^{-3}$)
Imperceptible (≤ 0.4)	Less than equal to 1% of the objective (0.4$\mu g.m^{-3}$)

9.59. Where DMRB LA105[21] is applied, changes in pollutant concentrations greater than imperceptible (0.4$\mu g.m^{-3}$) at each receptor based on the Without Development versus With Development model results, are compared with guideline bands that inform the potential significance of the impact of the Proposed Development. The guideline band ranges are presented in Table 9.10 and provide the upper level of likely non-significance and the lower level of likely significance. Between these two levels are the ranges where likely significance is more uncertain, and greater onus is afforded to professional judgement.

Table 9.10: Guideline to number of properties constituting a significant effect

Magnitude of Change (µg.m^{-3})	Number of Receptors Demonstrating:	
	Worsening of air quality that already exceeds objective, risk of exceeding objective or creation of new exceedance	Improvement of air quality that already exceeds objective, risks of exceeding objective or the removal of existing exceedances
Large (>4)	1 to 10	1 to 10
Medium (>2 to 4)	10 to 30	10 to 30
Small (0.4 to 2)	30 to 60	30 to 60

9.60. Significant air quality effects are only identified for those receptors where air quality thresholds are exceeded or at risk of being exceeded in the without and/or With Development scenarios. Whilst the approach contained within DMRB LA105[21] focuses on receptors already exceeding an annual mean air quality objective, or within 10% of exceeding an objective, guidance for determining the impact of the operational phase of the Proposed Development on each individual local air quality sensitive receptors is provided by the IAQM guidance as detailed in Table 9.8.

Ecological designations

9.61. The NOx concentrations predicted at the transect points within the ecological sites, were compared to the relevant critical level, as detailed in Table 9.6, to determine any exceedances.

9.62. The level of nitrogen deposition calculated across the transect points within the ecological sites were compared to the lower relevant critical load value to determine whether changes in nitrogen deposition were greater than 1% of the critical load. The results were referred to the appointed ecological consultants, to determine any potential impacts. Further details are provided in Chapter 12: *Ecology and Biodiversity*.

Limitations and assumptions

9.63. Information on the precise number of vehicle movements during the construction phase, specific traffic management measures and the exact location of construction site entrances were not available at the time of assessment. The availability of this information will be addressed in the ES, and where applicable, this will be incorporated into the construction phase assessment.

9.64. At the time of assessment, detailed information on the energy plant to be installed at the Main HNRFI Site was not sufficiently progressed to enable a quantitative assessment to be undertaken. Therefore, energy plant were not considered further within this assessment at this time. This will be addressed through the ES in time for submission of the application, where the relevant information is available for consideration.

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

9.66. The air quality assessment level is based on traffic data provided by AECOM for the PRTM2.2 Model. As such any assumptions made within the PTRM2.2 model are included within the AQA.

9.67. In future year scenarios, uncertainty relates to the projection of vehicle emissions and in particular, the rate at which emissions per vehicle will improve over time. This assessment utilised the most recent version of DEFRA's Emission Factors Toolkit to provide the most up to date estimate of current and future emission projections.

9.68. Current projections for vehicle emission factors are only available until 2030, which precedes the 2036 future year scenarios. Therefore, vehicle emission factors adopted for this year were based on 2030 emission factors, which is considered to be conservative.

9.69. To reduce uncertainty associated with predicted concentrations, model verification was carried out following guidance set out in DEFRA guidance. As the models were verified using local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

RELEVANT LAW, POLICY AND GUIDANCE

National Legislation and Planning Policy

9.70. The following national legislation and planning policy is relevant to air quality and was considered in the undertaking of the assessment. A summary of the relevant national legislation and planning policy is provided in Appendix 9.2:

- European Parliament, EU 2008 Ambient Air Quality Directive (2008)[7];
- HMSO, Air Quality (England) Regulations (2000)[8];
- HMSO, Environment Act (1995)[9];
- HMSO, Environment Act (2021)[10];

[7] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[8] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[9] HMSO (1995) The Environment Act 1995, London: TSO
[10] HMSO (2021) The Environment Act 2021, London: TSO

- Department for the Environment, Food and Rural Affairs (DEFRA), Air Quality Strategy (AQS) (2007)[11];
- Ministry of Housing, Communities and Local Government (MHCLG), National Planning Policy Framework (NPPF) (2021)[12];
- National Planning Policy Framework[13]; and
- Planning Practice Guidance[14].
- National Policy Statement (NPS) for National Networks (2014)[15]

Local Planning Policy

Local Plan Policy

9.71. The following local planning policy was considered in the undertaking of the assessment and a summary is provided in Appendix 9.2:

- Blaby District Local Plan Adopted Core Strategy[16];
- Hinckley and Bosworth Local Development Framework (LDF) Core Strategy[17] ;
- Rugby Local Plan[18]; and
- Harborough Local Plan[19].

Air Quality Guidance

9.72. The following guidance was used in the AQA:

- DEFRA, Local Air Quality Management Technical Guidance (LAQM TG(16)) (2021)[20];
- Highways England (HE), Design Manual for Roads and Bridges (DMRB) LA105 Air

[11] Department of the Environment, Food and Rural Affairs (DEFRA) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[12] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework, HMSO London
[13] Ministry of Housing, Communities & Local Government (2019) National Planning Policy Framework, HMSO London
[14] Department for Communities and Local Government (2019) Planning Practice Guidance Air Quality
[15] Department for Transport (DfT) (2014) National Planning Policy Statement for National Networks, HMSO London
[16] Blaby District Council (2013) Adopted Core Strategy
[17] Hinckley and Bosworth Borough Council (2016) Local Development Core Strategy
[18] Rugby Borough Council (2019) Rugby Borough Council Local Plan 2011-2031
[19] Harborough District Council (2019) Harborough Local Plan 2011-2031
[20] DEFRA (2021) Local Air Quality Management Technical Guidance (LAQM TG(16))

Quality guidance (2019)[21];

- Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction (2014)[22];
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)[23]; and
- Institute of Air Quality Management, A Guide to the Assessment of Air quality Impacts on Designated Nature Conservation Sites (2020)[24].

BASELINE CONDITIONS

9.73. This section summarises the characteristics of the existing air quality conditions within the study area. The study area encompasses eleven different local authority areas and details of baseline air quality conditions in these areas are provided. Diffusion tube monitoring data for each local authority for within the study area can be found in Appendix 9.9.

9.74. Principal air pollution sources in the vicinity of the Order Limits are likely to comprise road traffic emissions with the M69, M6 and A5 all within the study area.

Air quality review and assessment

9.75. This section provides a summary of baseline conditions assessment across the Blaby District Council (BDC), Hinckley and Bosworth Borough Council (HBBC) Rugby Borough Council (RBC) and Harborough District Council (HDC) administrative areas.

9.76. The information contained in this section was correct at the time of assessment.

The Site

9.77. The Order Limits are located within the administrative areas of BDC, HBBC, HDC and RBC. The Order Limits are not located within, or in the vicinity of, any Air Quality Management Areas (AQMAs).

Blaby District Council

9.78. BDC declared five AQMAs for the potential exceedance of the annual mean NO_2 objective. AQMA 2 and 3 both fall within the study area as shown in Figure 9.8. AQMA 2 is located along the M1 corridor between Enderby and Narborough and AQMA 3 covers the M1

[21] Highways England, (2019), Design Manual for Roads and Bridges LA 105 Air Quality
[22] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction
[23] Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality
[24] Institute of Air Quality Management, (2019), A guide to the assessment of air quality impacts on designated nature conservation sites

corridor between Thorpe Astley and Kirby Muxloe and extends along the A47 Hinckley Road. Existing sensitive receptors were selected within these AQMAs as part of the assessment.

9.79. Monitored annual mean NO_2 concentrations indicate a downward trend in concentrations within the AQMAs and across the borough. 2019 monitoring results recorded no exceedances of the annual mean NO_2 objective of 40 $\mu g.m^{-3}$.

9.80. No exceedances of the annual mean PM_{10} objective of 40$\mu g.m^{-3}$ or the annual mean $PM_{2.5}$ objectives of 25$\mu g.m^{-3}$ were recorded over the most recent five years of monitoring data available for review.

Hinckley and Bosworth Borough Council

9.81. No AQMAs were declared by HBBC at the time of assessment. Diffusion tube data indicated there were no exceedances of the annual mean NO_2 objective of 40$\mu g.m^{-3}$ in 2019. Between 2015 and 2018 there was one exceedance recorded at monitoring location 14 which is not within the study area. Overall, annual mean NO_2 concentrations show a downward trend over the past five years. No PM_{10} or $PM_{2.5}$ monitoring is undertaken by HBBC within the borough.

Harborough District Council

9.82. HDC declared two AQMAs for the potential exceedance of the annual mean NO_2 objective, however neither of these are located in the vicinity of the study area. 2019 air quality monitoring indicated exceedances of the annual mean NO_2 objectives at a number of monitoring locations, although these locations are not situated in the vicinity of the study area. Annual mean NO_2 concentrations within the borough fluctuated between 2015 and 2019 with no clear trend evident.

9.83. HDC does not undertake any monitoring of PM_{10} or $PM_{2.5}$ within its borough.

Rugby Borough Council

9.84. RBC declared an AQMA for the potential exceedance of the annual mean NO_2 objective. Rugby AQMA (NO_2) illustrated in Figure 9.3 covers the whole urban area of Rugby, including part of the study area. Exceedances of the annual mean NO2 objective were recorded at locations S54a and 54b. S54b is located within the Rugby AQMA and S54a is located outside of the AQMA in Shilton. These monitoring locations are not within the study area. Overall, annual mean NO_2 concentrations recorded between 2015 and 2019 demonstrate a downward trend.

9.85. RBC does not undertake any monitoring of PM_{10} or $PM_{2.5}$ within its borough.

Background concentrations

9.86. No background monitoring is undertaken in the vicinity of the study area and therefore,

background concentrations were obtained from the latest DEFRA background[25] concentrations maps, which are provided for the UK as a 1km by 1km grid network. The latest maps are based on 2018 monitoring and meteorological data. Predicted background concentrations of NO_2, NOx, PM_{10} and $PM_{2.5}$ were obtained for the grid squares covering the study area for the human and ecological receptors for the years of assessment 2019, 2026 and 2030 (for the 2036 scenario).

9.87. The range of background concentrations for each pollutant and each assessment year are detailed in Table 9.11. Full details of background concentrations used for each grid square are detailed in Appendix 9.7.

9.88. Exceedances of the annual mean air quality objectives are shown in bold.

Table 9.11: DEFRA background concentration ranges

Pollutant	Background Concentrations (µg.m^{-3})			
	2019	2026	2030	Air Quality Objective
NO_2	10.8-24.0	8.4-17.7	7.8-15.9	40
PM_{10}	14.0-17.1	13.0-16.1	13.0-16.1	40
$PM_{2.5}$	8.9-10.9	8.1-10.0	8.0-9.9	25
NO_X*	14.2-**35.7**	10.9-25.1	10.1-22.2	30

*NOx – relevant to the protection of vegetation and ecosystems

9.89. The background concentrations are below the annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$ in all scenarios. The annual mean NOx objective set for the protection of vegetation and ecosystems is predicted to be exceeded in the Base Year 2019 through to 2023.

Baseline local air quality operational phase road traffic emissions assessment

9.90. Pollutant concentrations were predicted at the identified existing sensitive human receptor locations using the dispersion model ADMS-Roads. The range of predicted concentrations for Scenario 1, Scenario 2 and Scenario 4 are detailed in Tables 9.12- 9.14. Full details of pollutant concentrations at sensitive human receptor locations are provided in Appendix 9.10. Exceedances of the annual mean air quality objectives are shown in bold.

[25] Defra (2020) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2019]

Table 9.12: NO_2 baseline pollutant concentrations in Scenario 1: 2019 Base year, Scenario 2: 2026 Opening year without development and Scenario 5: 2036 Future year without development

Local Authority	Scenario 1 2019 Base Year (µg.m^{-3})	Scenario 2 2026 Opening Year Without Development (µg.m^{-3})	Scenario 4 2036 Future Year Without Development (µg.m^{-3})
BDC	10.2-36.4	7.9-23.2	7.3-19.1
HBBC	11.5-**41.1**	8.2-23.6	7.5-18.0
CBC	20.0-31.2	14.2-20.0	12.0-15.7
EBC	23.3-27.2	15.9-17.8	13.7-15.0
HDC	11.7-28.8	8.7-17.1	7.9-13.6
NWBC	13.5-23.0	9.9-10.7	8.8-9.3
NWLC	15.4-36.1	10.5-22.3	9.1-18.2
CCC	24.0-**43.4**	16.2-26.2	13.8-20.9
RBC	14.7-**41.4**	9.1-25.1	10.1-18.9
TBC	15.8-22.1	11.8-16.7	10.6-14.4
NBBC	20.9-34.0	13.4-22.1	10.6-12.6
WNC	20.9-26.8	13.0-15.9	10.6-12.6

Table 9.13: PM_{10} baseline pollutant concentrations in Scenario 1: 2019 Base year, Scenario 2: 2026 Opening year without development and Scenario 5: 2036 Future year without development

Local Authority	Scenario 1 2019 Base Year (µg.m^{-3})	Scenario 2 2026 Opening Year Without Development (µg.m^{-3})	Scenario 4 2036 Future Year Without Development (µg.m^{-3})
BDC	13.6-18.3	12.5-17.1	12.4-17.0
HBBC	13.7-20.4	12.7-17.8	12.7-17.8
CBC	16.9-18.6	15.8-17.5	15.8-17.4
EBC	15.7-16.2	14.6-15.1	14.6-15.1

Local Authority	Scenario 1 2019 Base Year ($\mu g.m^{-3}$)	Scenario 2 2026 Opening Year Without Development ($\mu g.m^{-3}$)	Scenario 4 2036 Future Year Without Development ($\mu g.m^{-3}$)
HDC	13.9-18.3	13.0-17.1	13.1-17.1
NWBC	12.9-16.9	11.9-13.4	11.9-13.3
NWLC	14.6-19.0	13.6-17.8	13.6-17.7
CCC	16.9-19.6	15.8-18.3	15.7-18.4
RBC	14.6-18.9	13.2-17.5	13.2-18.5
TBC	14.9-15.7	13.9-15.2	13.9-15.2
NBBC	15.7-18.3	14.1-16.9	14.1-16.9
WNC	16.4-16.8	15.3-15.6	15.3-15.5

Table 9.14: $PM_{2.5}$ Baseline pollutant concentrations in Scenario 1: 2019 Base year, Scenario 2: 2026 Opening year without development and Scenario 5: 2036 Future year without development

Local Authority	Scenario 1 2019 Base Year ($\mu g.m^{-3}$)	Scenario 2 2026 Opening Year Without Development ($\mu g.m^{-3}$)	Scenario 4 2036 Future Year Without Development ($\mu g.m^{-3}$)
BDC	8.7-11.5	7.9-10.5	7.8-10.4
HBBC	8.6-12.7	7.8-10.6	7.8-10.5
CBC	10.4-11.1	9.6-10.2	9.6-10.2
EBC	10.0-10.4	9.2-9.5	9.2-9.5
HDC	8.8-11.1	8.1-10.1	8.1-10.0
NWBC	8.5-10.2	7.7-8.2	7.7-8.2
NWLC	9.2-11.1	8.3-10.1	8.3-10.0
CCC	11.0-12.8	10.1-11.7	10.1-11.8
RBC	9.3-11.5	8.2-10.5	8.2-11.0

Local Authority	Scenario 1 2019 Base Year ($\mu g.m^{-3}$)	Scenario 2 2026 Opening Year Without Development ($\mu g.m^{-3}$)	Scenario 4 2036 Future Year Without Development ($\mu g.m^{-3}$)
TBC	9.7-10.2	8.9-9.6	8.9-9.5
NBBC	10.0-11.8	8.9-10.7	8.8-10.7
WNC	10.3-10.6	9.3-9.5	9.3-9.5

9.91. There are three exceedances of the annual mean air quality objective for NO_2 in the 2019 Base Year at human receptors in the study area. These exceedances are located adjacent to the M1 motorway in HBBC, M6 motorway in CCC and M69 motorway in RBC which carry large volumes of traffic and therefore exceedances are anticipated. The exceedance in CCC is within the city wide AQMA. However, the maximum annual mean predicted baseline concentrations are expected to decrease across the study area in the 2026 Opening Year and 2036 Future Year Without Development scenarios. No exceedances of the annual mean NO_2 objective are predicted in the Opening Year or Future Year baseline scenarios.

9.92. There are no exceedances of the annual mean air quality objectives for PM_{10} and $PM_{2.5}$ at any of the human receptor locations considered in the assessment.

9.93. Predicted concentrations at short term human receptors were compared to the short term air quality objectives for NO_2 and PM_{10}. The predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with DEFRA guidance it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 9.40 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

POTENTIAL SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE PROPOSALS

Construction phase dust assessment

9.94. The construction phase of the Proposed Development will involve a number of activities which have the potential to impact on local air quality. These include emissions of dust generated through demolition, excavation, construction and trackout activities, exhaust pollutant emissions from construction traffic on the local highway network, and exhaust emissions from non-road mobile machinery (NRMM) within the construction site itself.

9.95. The location of sensitive receptors in relation to construction activities will affect the potential for such construction activities to cause dust soiling, nuisance and local air quality impacts. Meteorological conditions and the use of control measures will also contribute to the effects experienced.

9.96. Steps 1 to 4 of the IAQM guidance[22] were followed in undertaking the construction phase dust assessment. Full details of the assessment undertaken are provided in Appendix 9.3 with a summary of the findings of Steps 2a, 2b and 2c of the assessment provided below.

9.97. To enable a conservative assessment, the construction phase dust assessment was undertaken utilising the boundaries of the Order Limits where construction activities were proposed. Where off-site improvement works do not involve construction activities, e.g. replacement of signage, these works were not considered in the construction phase dust assessment.

Step 2: Assess the risk of dust impacts

Step 2A: Define the potential dust emission magnitude

9.98. The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance[22] and detailed in Appendix 9.3. The dust emission magnitudes for the construction phase of the Proposed Development are summarised in Table 9.15.

Table 9.15: Dust emissions magnitudes definition

Activity	Project Defined Dust Emission Magnitude	Justification
Demolition	Large	Total building volume significantly greater than 50,000m^3 with potentially dusty construction materials to be used.
Earthworks	Large	Total site area is significantly greater than 10,000m^2.
Construction	Large	Total building volume significantly greater than 100,000m^3
Trackout	Large	>50 HDV movements in any one day over the duration of the development

Step 2B: Define the sensitivity of the area

9.99. The sensitivity of the study area takes into account specific receptors in the vicinity of the DCO Site, the proximity and number of those receptors, the local background concentration of PM_{10} and Site-specific factors. The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling, human health and ecological impacts and these are presented in Table 9.16**.**

Table 9.16: Determination of the sensitivity of the study area

Activity	Project Defined Dust Emission Magnitude	Justification			
		Demolition	Earthworks	Construction	Trackout
Dust Soiling	There are more than 100 highly sensitive receptors within 20m of the DCO Site. The sensitive receptors identified are residential dwellings, car parks and footpaths within 20m of the Proposed	High	High	High	High

Activity	Project Defined Dust Emission Magnitude	Justification			
		Demolition	Earthworks	Construction	Trackout
	Development where dust soiling may affect the amenity of the users there for extended periods. Residential dwellings and long term car parks would be considered highly sensitive in accordance with guidance. Footpaths would be considered low sensitivity receptors.				
Human Health	There are more than 100 highly sensitive receptors within 20m of the DCO Site. The highly sensitive receptors are residential dwellings. The background PM_{10} concentrations detailed within Table 9.10 are less than 24µg.m^{-3}	Medium	Medium	Medium	Medium
Ecological Receptors	The Burbage Common and Woods and Aston Firs SSSI are located within 20m of the DCO Site. The appointed ecological consultants advised the habitats have a medium sensitivity to dust. Due to the close proximity of these sites to the Proposed Development and to provide a conservative assessment, the sensitivity of the sites to dust was uplifted to high.	High	High	High	High

Step 2C: Define the risk of impacts

9.100. The dust emission magnitude in Step 2A is then combined with the sensitivity of the area determined in Step 2B to define the risk of dust impacts with no mitigation applied. The results of this assessment are detailed in Table 9.17.

Table 9.17: Summary of dust risk table to define site specific risk

Activity	Step 2A: Dust Emission Magnitude	Step 2B: Sensitivity of the Area	Step 2C: Risk of Dust Impacts
Dust Soiling Effects on People and Property			
Demolition	Large	High	High Risk
Earthworks	Large	High	High Risk
Construction	Large	High	High Risk
Trackout	Large	High	High Risk
Human Health Impacts			
Demolition	Large	Medium	High Risk
Earthworks	Large	Medium	Medium Risk
Construction	Large	Medium	Medium Risk
Trackout	Large	Medium	Medium Risk
Ecological Receptors			
Demolition	Large	High	High Risk
Earthworks	Large	High	High Risk
Construction	Large	High	High Risk
Trackout	Large	High	High Risk

Operational phase road traffic emissions assessment- human receptors

9.101. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations across the study area for Scenario 2 to Scenario 5 to consider the impact of development-generated vehicles on local air quality with the Proposed Development in place.

2026 Opening year and 2036 Future year

9.102. The ranges of predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are detailed in Tables 9.18 – 9.20 for Scenario 2 to Scenario 5. The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are illustrated in Figures 9.12 – 9.14 for 2026 and Figures 9.18 – 9.20 for 2036. The operational effects reported are local, long-term and permanent. Full details of pollutant concentrations at sensitive receptor locations are detailed in Appendix 9.10.

Table 9.18: Predicted annual mean NO_2 concentration ranges and Proposed Development impact at existing human receptor locations in Scenario 2:2026 Opening year without development, Scenario 3:2026 Opening year with development, Scenario 4:2036 Future year without development and Scenario 5:2036 Future year with development

Local Authority	Scenario 2: 2026 Without Development (NO_2 µg.m^{-3})	Scenario 3: 2026 With Development (NO_2 µg.m^{-3})	Change (µg.m^{-3})	Effect	Scenario 4: 2036 Without Development (NO_2 µg.m^{-3})	Scenario 5: 2036 With Development (NO_2 µg.m^{-3})	Change (µg.m^{-3})	Effect
BDC	8.2-23.2	8.2-23.2	-0.2-+0.3	Negligible	7.5-19.1	7.5-19.0	-0.1-+0.3	Negligible
HBBC	8.2-23.6	8.2-23.5	-0.7-+1.6	Negligible	7.5-18.0	7.4-17.9	-0.5-+1.7	Negligible
CBC	14.2-20.0	14.2-20.0	-0.2-0.0	Negligible	12.0-15.7	12.0-15.7	0.0-+0.2	Negligible
EBC	15.9-17.8	15.8-17.6	-0.2- -0.1	Negligible	13.7-15.0	13.7-15.0	0.0	Negligible
HDC	8.7-17.1	8.5-17.2	-0.4-+0.3	Negligible	7.9-13.6	8.0-13.6	-0.3-+0.1	Negligible
NWBC	9.9-10.7	9.9-10.7	-0.1-0.0	Negligible	8.8-9.3	8.8-9.3	0.0	Negligible
NWLC	10.5-22.3	10.5-22.0	-0.3-+0.8	Negligible	9.1-18.2	9.1-18.2	0.0-+0.1	Negligible
CCC	16.2-26.2	16.3-26.4	-0.1-+0.2	Negligible	13.8-20.9	13.9-21.1	0.0-+0.2	Negligible
RBC	9.1-25.1	9.1-25.9	-0.6-+0.8	Negligible	10.1-18.9	10.3-20.0	-0.4-+1.1	Negligible
TBC	11.8-16.7	11.8-16.6	-0.1-0.0	Negligible	10.6-14.4	10.6-14.3	-0.1-0.0	Negligible
NBBC	13.4-22.1	13.3-21.8	-0.3-+0.2	Negligible	12.1-19.0	12.1-19.0	0.0	Negligible
WNC	13.0-15.9	13.0-15.9	0.0	Negligible	10.6-12.6	10.6-12.6	0.0	Negligible
Air Quality Objective 40µg.m^{-3}								

**Discrepancies due to rounding*

Table 9.19: Predicted annual mean PM_{10} concentration ranges and Proposed Development impact at existing human receptor locations in Scenario 2: 2026 Opening year without development, and Scenario 3: 2026 Opening year with development, Scenario 4:2036 Future year without development and Scenario 5:2036 Future year with development

Local Authority	Scenario 2: 2026 Without Development (PM_{10} µg.m^{-3})	Scenario 3: 2026 With Development (PM_{10} µg.m^{-3})	Change (µg.m$^{-3)}$	Effect	Scenario 4: 2036 Without Development (PM_{10} µg.m^{-3})	Scenario 5: 2036 With Development (PM_{10} µg.m^{-3})	Change (µg.m$^{-3)}$	Effect
BDC	12.5-17.1	12.5-17.1	-0.1-+0.3	Negligible	12.4-17.0	12.4-17.0	-0.1-+0.2	Negligible
HBBC	12.7-17.8	12.7-17.9	-0.3-+1.8	Negligible	12.7-17.8	12.6-17.8	-0.3-+0.2	Negligible
CBC	15.8-17.5	15.8-17.5	-0.1-0.0	Negligible	15.8-17.4	15.8-17.5	0.0-+0.2	Negligible
EBC	14.6-15.1	14.6-15.1	0.0	Negligible	14.6-15.1	14.6-15.1	0.0	Negligible
HDC	13.0-17.1	12.9-17.1	-0.1-+0.3	Negligible	13.1-17.1	12.9-17.1	-0.2-+0.2	Negligible
NWBC	11.9-13.4	11.9-13.4	0.0	Negligible	11.9-13.3	11.9-13.4	0.0	Negligible
NWLC	13.6-17.8	13.6-17.7	-0.1-+0.3	Negligible	13.6-17.7	13.6-17.8	-0.1-+0.2	Negligible
CCC	15.8-18.3	15.8-18.3	0.0-+0.1	Negligible	15.7-18.4	15.8-18.5	-0.2-+0.1	Negligible
RBC	13.2-17.5	13.3-17.6	-0.2-+0.3	Negligible	13.2-18.5	13.3-16.5	-0.7-+0.2	Negligible
TBC	13.9-15.2	13.9-15.2	0.0	Negligible	13.9-15.2	13.9-15.2	0.0-+0.3	Negligible
NBBC	14.1-16.9	14.1-16.7	-0.1-0.0	Negligible	14.1-16.9	14.2-16.9	0.0	Negligible
WNC	15.3-15.6	15.4-15.6	0.0	Negligible	15.3-15.5	15.3-15.5	0.0	Negligible
Air Quality Objective 40µg.m^{-3}								

**Discrepancies due to rounding*

Table 9.20: Predicted annual mean $PM_{2.5}$ concentration ranges and Proposed Development impact at existing human receptor locations in Scenario 2: 2026 Opening year without development, and Scenario 3: 2026 Opening year with development, Scenario 4:2036 Future year without development and Scenario 5:2036 Future year with development

Local Authority	Scenario 2: 2026 Without Development ($PM_{2.5}$ µg.m^{-3}	Scenario 3: 2026 With Development ($PM_{2.5}$ µg.m^{-3}	Change (µg.m^{-3})	Effect	Scenario 4: 2036 Without Development ($PM_{2.5}$ µg.m^{-3}	Scenario 5: 2036 With Development ($PM_{2.5}$ µg.m^{-3}	Change (µg.m^{-3})	Effect
BDC	7.9-10.5	7.8-10.5	-0.2-+0.3	Negligible	7.8-10.4	7.8-10.4	-0.1-+0.2	Negligible
HBBC	7.8-10.6	7.8-10.6	-0.1-+0.9	Negligible	7.8-10.5	7.8-10.5	-0.3-+0.2	Negligible
CBC	9.6-10.2	9.6-10.2	0.0	Negligible	9.6-10.2	9.6-10.2	0.0-+0.1	Negligible
EBC	9.2-9.5	9.2-9.5	0.0	Negligible	9.2-9.5	9.2-9.5	0.0	Negligible
HDC	8.1-10.1	8.0-10.1	-0.1-+0.1	Negligible	8.1-10.0	8.10-10.0	-0.1-+0.1	Negligible
NWBC	7.7-8.2	7.7-8.2	0.0	Negligible	7.7-8.2	7.7-8.2	0.0	Negligible
NWLC	8.3-10.1	8.3-10.0	0.0-+0.2	Negligible	8.3-10.0	8.3-10.1	0.0-+0.1	Negligible
CCC	10.1-11.7	10.2-11.7	0.0	Negligible	10.1-11.8	10.1-11.8	-0.1-0.0	Negligible
RBC	13.2-17.5	13.3-17.6	-0.1-+0.2	Negligible	8.2-11.0	8.2-10.7	-0.3-+0.1	Negligible
TBC	8.9-9.6	8.9-9.6	0.0	Negligible	8.9-9.5	8.9-9.6	0.0-+0.1	Negligible
NBBC	8.9-10.7	8.9-10.6	-0.1-0.0	Negligible	8.8-10.7	8.8-10.7	0.0	Negligible
WNC	9.3-9.5	9.3-9.5	0.0	Negligible	9.3-9.5	9.3-9.5	0.0	Negligible
Air Quality Objective 25µg.m^{-3}								

**Discrepancies due to rounding*

9.103. The predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ in Scenarios 2 to Scenario 5 are below the annual mean air quality objectives at all receptors considered in the assessment. The Proposed Development is not predicted to lead to any exceedances of the relevant air quality objectives.

9.104. Predicted changes in concentrations at all receptors in both the '2026 Opening Year' and '2036 Future Year' With and Without Development scenarios are 4% or less of the relevant air quality objective and the total pollutant concentrations is less than 75% of the relevant air quality objective.

9.105. With regard to short term air quality objectives, the predicted annual mean NO_2 concentrations are less than $60\mu g.m^{-3}$ and therefore in accordance with DEFRA guidance[20] it may be assumed that exceedances of the 1-hour mean objective are unlikely.

9.106. With regard to short term air quality objectives for PM_{10} at the existing receptor locations, the calculation detailed in paragraph 9.40 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

9.107. The effect of the Proposed Development is therefore considered to be 'negligible' in accordance with IAQM and EPUK guidance[23] which is 'not significant'.

9.108. Consideration was given to the predicted magnitude of change at receptor locations in accordance with DMRB LA105[21]. As no receptor locations with the Proposed Development in the 2026 Opening Year or 2036 Future Year scenarios are predicted to be within 10% of the relevant air quality objective for an assessed pollutant, the significance criteria within DMRB LA105[21] does not apply. Further details can be found in Appendix 9.11.

9.109. Tables 9.21 and 9.22 and figures 9.15 – 9.17 and 9.21 – 9.23 provides a summary across the study area of the total number of considered receptors which are predicted to have an improvement, deterioration or no change as a result of the Proposed Development in the 2026 Opening Year and 2036 Future Year Without and With Development scenarios respectively.

Table 9.21: Summary of total number of considered receptors with an improvement, no change or deterioration in pollutant concentrations in 2026 Opening year with the Proposed Development

Local Authority Area	Total Number of Considered Receptors								
	Improvement in Concentrations (+ve) (2026)			No Change in Concentrations (2026)			Deterioration in Concentrations (-ve) (2026)		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
BDC	26	20	20	0	0	0	29	35	34
HBBC	72	54	56	2	0	0	33	53	51
CBC	2	1	1	0	0	0	1	2	2
EBC	3	3	3	0	0	0	0	0	0
HDC	8	7	7	0	0	0	6	7	7
NWBC	4	3	4	1	0	0	2	4	3
NWLC	3	2	2	3	0	0	5	9	9
CCC	2	1	1	0	0	0	3	4	4
RBC	3	3	3	0	0	0	9	9	9
TBC	6	1	1	0	0	0	0	5	5
NBBC	4	4	4	0	0	0	1	1	1
WNC	0	0	0	0	0	0	3	3	3
TOTALS	**133**	**99**	**102**	**6**	**0**	**0**	**92**	**132**	**128**

Table 9.22: Summary of total number of considered receptors with an improvement, no change or deterioration in pollutant concentrations in 2036 Future year with the Proposed Development

Local Authority Area	Total Number of Considered Receptors								
	Improvement in Concentrations (+ve) (2036)			No Change in Concentrations (2036)			Deterioration in Concentrations (-ve) (2036)		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
BDC	23	20	20	4	0	0	28	35	35

Local Authority Area	Total Number of Considered Receptors								
	Improvement in Concentrations (+ve) (2036)			No Change in Concentrations (2036)			Deterioration in Concentrations (-ve) (2036)		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
HBBC	70	75	75	4	0	0	33	32	32
CBC	2	0	0	0	0	0	1	3	3
EBC	0	0	0	3	0	0	0	3	3
HDC	7	7	7	1	0	0	6	7	7
NWBC	4	1	1	1	0	0	2	6	6
NWLC	6	1	1	0	0	0	6	11	11
CCC	0	2	2	0	0	0	5	3	3
RBC	4	6	6	0	0	0	6	4	4
TBC	5	1	1	0	0	0	0	4	4
NBBC	0	1	1	0	0	0	5	4	4
WNC	0	0	0	1	0	0	2	3	3
TOTALS	**121**	**114**	**114**	**14**	**0**	**0**	**94**	**115**	**115**

9.110. In the 2026 Opening Year With Development scenario, there are predicted to be 133 improvements in NO_2 concentrations and 99 and 102 improvements in PM_{10} and $PM_{2.5}$ concentrations respectively at considered existing receptor locations across the study area as a result of the operation of the Proposed Development. Conversely, there are predicted to be 92 deteriorations of NO_2 concentrations and 133 and 128 deteriorations in PM_{10} and $PM_{2.5}$ concentrations respectively.

9.111. In the 2036 Future Year With Development scenario, there are predicted to be 121 improvements in NO_2 concentrations and 114 improvements in PM_{10} and $PM_{2.5}$ concentrations at considered existing receptor locations within the study area as a result of the operation of the Proposed Development. Conversely, there are predicted to be 94 deteriorations of NO_2 concentrations and 115 deteriorations of PM_{10} and $PM_{2.5}$ concentrations.

9.112. The improvements in pollutant concentrations at some identified existing receptors in the 2026 Opening Year and 2036 Future Year scenarios are due to a redistribution of traffic across the network.

9.113. The overall effect of the Proposed Development on air quality is considered to be 'negligible' and 'not significant':

- Consideration was given to national and planning policy and the Proposed Development is considered to be in accordance with these polices with regard to air quality.
- Existing concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the study area are predicted to be below the relevant air quality objectives at all receptors and the impact of the development on existing sensitive receptors is negligible in accordance with the IAQM and EPUK guidance and the Proposed Development does not lead to any new exceedances of the air quality objective.
- The AQA undertaken utilised robust model inputs including appropriate meteorological data and surface roughness and cumulative traffic flows.
- The impact of development-generated road traffic on local air quality is defined as negligible at all receptors in the assessment in accordance with IAQM and EPUK guidance.

9.114. The sensitivity of all of the assessed receptors is considered to be high. The magnitude of change and absolute concentrations were considered simultaneously with regard to Table 9.10 and IAQM and EPUK guidance[23]. Taking into consideration the results of the assessment, there is likely to be a local, permanent, negligible effect at all receptors.

Operational phase road traffic emissions assessment-ecological receptors

Critical level

9.115. Concentrations of NOx were predicted along transects through each of the designated

sites. Predicted concentrations were compared to the critical level of 30µg.m^{-3} for the protection of vegetation and ecosystems. The range of concentrations predicted are detailed in Table 9.23 for Scenario 2 to 5. Further details of the results are available in Appendix 9.12.

Table 9.23: Predicted NOx concentration ranges at the designated ecological sites within the study area in Scenario 2: 2026 Opening year without development, Scenario 3: 2026 Opening year with development, Scenario 4: 2036 Future year without development and Scenario 5: 2036 Future year with development

Receptor	Scenario 2: 2026 Opening Year Without Development (NOx µg.m^{-3})	Scenario 3: 2026 Opening Year With Development (NOx µg.m^{-3})	Change (µg.m^{-3})	Scenario 4: 2036 Future Year Without Development (NOx µg.m^{-3})	Scenario 5: 2036 Future Year With Development (NOx µg.m^{-3})	Change (µg.m^{-3})
Burbage LNR	11.6-12.0	11.7-12.2	-0.1- -0.4	10.6-10.9	10.6-11.2	-0.1-+0.3
Freeholt Wood AW	14.6-14.7	14.9-15.0	+0.2-+04	12.7	12.9-13.0	+0.2-+0.3
Aston Firs SSSI	12.6-14.9	12.7-14.7	-0.3-+0.1	11.3-12.7	11.3-12.7	0.0-+0.1
Narborough Bogs SSSI	19.3-20.4	19.3-20.4	0.0	16.3-17.1	16.3-17.1	0.0
Wyken Slough LNR	24.4-25.2	24.0-24.7	-0.5- -0.4	20.4-21.0	20.5-21.1	+0.1
Cave's Inn Pitts SSSI	15.3-15.8	15.4-15.8	0.0	13.0-13.3	13.0-13.4	+0.1
Shawell Wood AW	18.1-**41.7**	18.2-**41.9**	0.0 -+0.2	14.7-**31.4**	14.7-**31.5**	0.0-+0.1
Martinshaw Wood AW	18.5-**82.8**	18.5-**82.2**	-0.6 -0.0	15.3-**57.6**	15.2-**57.0**	-0.6 -0.0
Oakley Wood SSSI	20.7 - 28.4	20.6 - 28.4	0.0	16.7 - 21.8	16.7 - 21.8	0.0 - +0.1
Piper Wood AW	15.7 - **30.7**	15.7 - **30.6**	0.0	13.3 - 23.5	13.3 - 23.4	0.0 - +0.1
Tonge Gorse AW	14.1 - 29.0	14.1 - 29.1	0.0 - +0.1	12.2 - 22.4	12.2 - 22.4	0.0 - +0.1
Lount Meadows SSSI	13.4 - 23.0	13.4 - 23.0	0.0 - +0.1	11.5 - 18.1	11.6 - 18.2	0.0 - +0.1
River Mease SAC	12.3 - 27.4	12.3 - 27.2	-0.1 - 0.0	10.6 - 20.7	10.6 - 20.8	0.0 - +0.1
Bramcote Covert AW	14.9 - 16.3	14.8 - 16.3	0.0	12.5 - 13.5	12.6 - 13.6	+0.1
Alvecote Pools SSSI	15.5-17.9	15.5 - 17.9	0.0	13.2 - 14.8	13.2 - 14.8	0.0
Grendon Wood AW	11.3 - 11.7	11.3 - 11.7	0.0	10.2 - 10.4	10.2 - 10.4	0.0
Sparrowdale Wood AW	11.7 - 11.8	11.7 - 11.8	0.0	10.7	10.7	0.0
Daniels Wood AW	21.3 - 29.9	21.3 - 29.9	0 - +0.1	17.4 - 23.3	17.5 - 23.7	+0.1 - +0.4
Many Lands Woods AW	16.9 - 18.0	17.2 - 18.4	+0.3 - +0.4	14.5 - 15.4	14.6 - 15.4	0.0
Ashlawn Cutting LNR	17.4 - 27.8	17.4 - 27.9	0.0 - +0.2	14.2 - 21.2	14.2 - 21.2	0.0

Receptor	Scenario 2: 2026 Opening Year Without Development (NOx µg.m^{-3})	Scenario 3: 2026 Opening Year With Development (NOx µg.m^{-3})	Change (µg.m^{-3})	Scenario 4: 2036 Future Year Without Development (NOx µg.m^{-3})	Scenario 5: 2036 Future Year With Development (NOx µg.m^{-3})	Change (µg.m^{-3})
Kettle Brook LNR	15.7-**40.8**	15.7-**40.8**	-0.4 - 0.0	13.9 - **31.1**	13.8 - **30.9**	-0.7 - 0.0

9.116. Concentrations of NOx at the ecological transects were predicted to be below the critical level of 30µg.m^{-3} in all scenarios considered, with the following exceptions:

- Shawell Wood AW - exceedances of the NOx critical level were predicted adjacent to the M1 at the transect points closest to the road (26-46m) in the 2026 Opening Year and Without and With Development scenarios and at 26m in the Future Year With and Without Development scenarios;

- Martinshaw Wood AW - exceedances of the NOx critical level were predicted adjacent to the M1 at the transect points closest to the road (5-135m) in the 2026 Opening Year Without and With Development scenarios and at 5-65m in the 2036 Future Year With and Without Development scenarios;

- Piper Wood AW - exceedances of the NOx critical level were predicted adjacent to the M1 at the transect point closest to the road (29m) in the 2026 Opening Year Without and With Development scenarios. There are no exceedances in the Without and With Development Future Year scenarios; and

- Kettlebrook LNR - exceedances of the NOx critical level were predicted on the boundary of the Kettlebrook LNR in transect 1 and within the Kettlebrook LNR up to 10m into the designation on transect 6, in the 2026 Opening Year Without and With Development scenarios. Additionally, exceedances of the critical level were predicted on the boundary of the designation on transect 6 in the 2036 Completion year Without and With Development scenarios.

9.117. The results were provided to the appointed ecological consultants for analysis and are discussed in Chapter 12: *Ecology and Biodiversity*.

Critical load

9.118. Transects were modelled at 10m intervals, up to 200m into each of the designated sites, to consider the impact of nitrogen deposition (N) on each of the ecological sites. The percentage change in deposition was compared to the lower critical load for each habitat. The range of concentrations predicted at each site are detailed in Tables 9.24 and 9.25 for 2026 Opening Year Without and With Development Scenarios and 2036 Future Year Without and With Development Scenarios. The full results are presented in Appendix 9.12.

Table 9.24: Predicted nitrogen deposition ranges at the designated ecological sites in 2026 Opening year scenarios

Receptor	Critical Load (kg N $ha^{-1}yr^{-1}$)	2026 Opening Year Without Development N Deposition (kg N $ha^{-1}yr^{-1}$)	2026 Opening Year With Development N Deposition (kg N $ha^{-1}yr^{-1}$)	Change in Nitrogen Deposition (kg N $ha^{-1}yr^{-1}$)	Percentage Change of Lower Critical Load (kg N $ha^{-1}yr^{-1}$)
Burbage Wood LNR	10-15	**27.2 - 27.4**	**27.2 - 27.4**	-0.1 – 0.0	-0.6 - +0.2
Freeholt Wood AW	10-20	**50.7**	**50.7**	0.0	-0.3 - 0.0
Aston Firs SSSI	15-20	**49.6 - 50.0**	**49.6 - 50.0**	-0.3 - 0.0	-1.8 - -0.3
Narborough Bogs SSSI	10-20	**53.5 - 53.6**	**53.3 - 53.4**	-0.2	-2.1 - -1.6
Wyken Slough LNR	10-15	**25.4 - 25.5**	**25.4**	0.0	-0.4 - -0.3
Cave's Inn Pits SSSI	20-30	**27.3 - 27.4**	**27.3 - 27.4**	0.0	0.0
Shawell Wood AW	10-20	**49.0 - 52.0**	**49.0 - 52.0**	0.0	+0.1 - +0.3
Martinshaw Wood AW	5-15	**44.9 - 53.5**	**44.9 - 53.5**	0.0	-1.2 - 0.0
Oakley Wood SSSI	15-20	**44.3 - 45.5**	**44.3 - 45.5**	0.0	0.0
Piper Wood AW	10-20	**43.5 - 45.7**	**43.5 - 45.7**	0.0	-0.1 - 0.0
Tonge Gorse AW	10-20	**43.5 - 45.7**	**43.5 - 45.7**	0.0	0.0 - +0.2
Lount Meadows SSSI	20-30	**30.8 - 32.2**	**30.8 - 32.2**	0.0	0.0 - +0.1
River Mease SAC*	No data available	12.8 -13.9	12.8 -13.9	0.0	No critical load
Bramcote Covert AW	10-20	**41.8 - 42.0**	**41.8 - 42.0**	0.0	-0.1 - 0.0
Alvecote Pools SSSI	20-30	12.0 - 12.1	12.0 - 12.1	0.0	0.0
Grendon Wood AW	10-20	**39.4 – 39.4**	**39.4 - 39.5**	0.0	0.0
Sparrowdale Wood AW	10-20	**37.6 – 37.6**	**37.6 – 37.6**	0.0	0.0
Daniels Wood AW	10-20	**43.4 - 44.7**	**43.4 - 44.7**	0.0	+0.1
Many Lands Woods AW	10-20	**43.6 - 43.7**	**43.6 - 43.8**	0.0 - +0.1	+0.5 - +0.7
Ashlawn Cutting LNR	10-20	**44.3 - 45.8**	**44.3 - 45.8**	0.0	0.0 - +0.2
Kettle Brook LNR	10-20	**38.2 - 39.9**	**38.2 - 39.8**	0.0	-0.3 - 0.0

**Project Ecologist confirmed that River Mease SAC is not sensitive to nitrogen deposition.*

Table 9.25: Predicted nitrogen deposition ranges at the designated ecological sites in 2036 Future year scenarios

Receptor	Critical Load (kg N $ha^{-1}yr^{-1}$)	2026 Opening Year Without Development N Deposition (kg N $ha^{-1}yr^{-1}$)	2026 Opening Year With Development N Deposition (kg N $ha^{-1}yr^{-1}$)	Change in Nitrogen Deposition (kg N $ha^{-1}yr^{-1}$)	Percentage Change of Lower Critical Load (kg N $ha^{-1}yr^{-1}$)
Burbage Wood LNR	10-15	**25.7 - 25.8**	**25.7 - 25.8**	0.0 - +0.1	+0.1 - +0.6
Freeholt Wood AW	10-20	**49.1 – 49.1**	**49.1 - 49.2**	0.0 - +0.1	+0.3 - +0.5
Aston Firs SSSI	15-20	**48.2 - 48.4**	**48.2 - 48.4**	0.0	0.0 - +0.1
Narborough Bogs SSSI	10-20	**51.9 - 52.0**	**51.9 - 52.1**	0.0	0.0
Wyken Slough LNR	10-15	**25.0**	**25.0**	0.0	0.0 - +0.1
Cave's Inn Pits SSSI	20-30	**25.4**	**25.4**	0.0	0.0 -+0.1
Shawell Wood	10-20	**46.7 - 49.3**	**46.7 - 49.3**	0.0	0.0 - +0.1
Martinshaw Wood AW	5-15	**43.1 - 49.0**	**43.1 - 49.0**	0.0	-1.5 - -0.1
Oakley Wood SSSI	15-20	**42.2 - 43.0**	**42.2 - 43.0**	0.0	0.0
Piper Wood AW	10-20	**41.6 - 43.3**	**41.6 - 43.3**	0.0	-0.1 - 0.0
Tonge Gorse AW	10-20	**41.4 - 43.0**	**41.4 - 43.0**	0.0	0.0 - +0.1
Lount Meadows SSSI	20-30	**28.9 - 29.9**	**28.9 - 29.9**	0.0	0.0
River Mease SAC	No data available	11.8 - 12.6	11.8 - 12.6	0.0	No critical load
Bramcote Covert AW	10-20	**39.9 - 40.1**	**40.0 - 40.1**	0.0	+0.1 - +0.2
Alvecote Pools SSSI	20-30	11.1 - 11.2	11.1 - 11.2	0.0	0.0
Grendon Wood AW	10-20	**38.1**	**38.1**	0.0	0.0
Sparrowdale Wood AW	10-20	**37.0**	**37.0**	0.0	0.0
Daniels Wood AW	10-20	**42.3 - 43.2**	**42.3 - 43.2**	0.0 -+0.1	+0.2 - +0.7
Many Lands Woods LNR	10-20	**42.1 - 42.2**	**42.1 - 42.2**	0.0	0.0 - +0.1
Ashlawn Cutting LNR	10-20	**42.3 - 43.4**	**42.3 - 43.4**	0.0	0.0
Kettle Brook LNR	10-20	**37.7 - 39.0**	**37.7 - 39.0**	-0.1 - 0.0	-0.5 - 0.0

9.119. All modelled transect points experiencing a change in nitrogen deposition of less than 1% of the lower critical load as detailed in Tables 9.24 and 9.25 are predicted to experience a 'not significant' impact in accordance with DMRB guidance[21].

9.120. Within Martinshaw Wood AW, Ashton Firs SSSI and Narborough Bog SSSI, there is predicted to be change in nitrogen deposition concentrations greater than 1% of the lower relevant critical load along some of the transect points. The results were therefore referred to the appointed ecological consultants, to determine any potential impact. Further details are available in Chapter 12: *Ecology and Biodiversity*.

Rail emissions

9.121. The operational development would lead to an increase in the number of trains using the Felixstowe to Nuneaton freight line to access the Proposed Development.

9.122. DEFRA guidance[20] sets out a list of railway lines which are currently considered to experience heavy traffic of diesel locomotives. The Felixstowe to Nuneaton line is not one of these lines.

9.123. It is recognised that Covid 19 is likely to have affected movements on the line. In the absence of information on known movements post March 2020, Realtimetrains[26] was used to provide the baseline for the existing movements at the current time on a weekday.

9.124. Typical existing train movements were considered for the baseline and these are detailed below in Table 9.26**.**

Table 9.26: Existing train movements

Train Type	No. daytime movements based on known movements (two-way)	No. of night-time movements based on known movements (two-way)
Turbostar Class 170	64	5
Class 66 freight engines	41	21

9.125. It is understood that there will be a maximum of 16 intermodal train movements per day as a result of the Proposed Development, which will result in an additional 32-two way movements. Unloading times at the HNRFI will be a 24 hour operation and a DCO requirement could be provided to ensure that engines are to be switched off within 30 minutes of a shunt or a move.

9.126. DEFRA guidance[20] provides a screening criterion for both stationary and moving diesel locomotives, above which more detailed assessment may be required. Table 9.27

[26] *https://www.realtimetrains.co.uk/*

compares the DEFRA screening criteria to the Proposed Development.

Table 9.27: Rail screening of the Proposed Development

DEFRA Criteria	DEFRA Screening Criteria	Proposed Development	Criteria Exceeded
Stationary locomotives	Locations where diesel locomotives are regularly (at least 3 times a day stationary for more than 15 minutes or more); and	16 trains per day. Planning condition could be provided to ensure that engines will be switched off within 30 minutes of a shunt/move.	No
	Presence of relevant exposure within 15m of the locomotives	It is not anticipated that there will be any sensitive receptors within 15m of locomotives being loaded. Please see Figure 9.24 for an illustration.	
Moving locomotives	Background annual mean NO_2 concentration about 25µg.m^{-3}	Background concentrations are well below this threshold as indicated in Table 9.11.	No
	Relevant exposure within 30m of the relevant railway tracks	Railway line is not a 'Rail Line with Heavy Traffic' as defined by DEFRA	No

9.127. It was determined that the Proposed Development would not exceed any of the screening criteria detailed in Table 9.27 for rail locomotives. Furthermore, it is anticipated that the Proposed Development would only generate an additional 16 train movements (32 two way movements) per day, less than 1 per hour over a 24-hour period.

9.128. Based on the number of trains already on the rail network, the additional train movements generated by the Proposed Development will be so small as to be considered not significant. Therefore the impacts on local air quality from rail emissions as a result of the operational development are deemed to be negligible and 'not significant'.

PROPOSED MITIGATION

Construction phase

Step 3: Site-specific mitigation

9.129. The risk of dust impacts, defined in Step 2C of the assessment, are used to determine the mitigation measures required to minimise the emission of dust during construction phase activities. The IAQM guidance[22] provides details of the highly recommended and desirable

mitigation measures which are commensurate with the risk of dust impacts defined in Step 2C for demolition, earthworks, construction and trackout activities. Where the mitigation measures are general in nature, the highest risk category was applied in accordance with the guidance. The highest risk category identified was 'High Risk'. The mitigation measures detailed in Table 9.28 and 9.29 will be included within the Construction Environmental Management Plan (CEMP), a framework CEMP will be submitted as part of the ES of the DCO application.

Table 9.28: Construction phase mitigation measures for a 'High Risk' site

Category	Mitigation Measures	
	Highly Recommended	Desirable
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	None
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager.	
	Display the head or regional office contact information.	
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.	
	Make the complaints log available to the local authority when asked.	None
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	None
	Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make	None

Category	Mitigation Measures	
	Highly Recommended	Desirable
	the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary.	
	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	None
	Erect solid screens or barriers around dusty activities that are at least as high as any stockpiles on site.	
	Fully enclose specific operations where there is a high potential for dust production and the site is active for an extended period.	
	Avoid site runoff of water or mud.	
	Keep site fencing, barriers and scaffolding clean using wet methods.	
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	
	Cover, seed or fence stockpiles to prevent wind whipping.	
Operating vehicle	Ensure all vehicles switch off engines when stationary – no idling vehicles.	None

Category	Mitigation Measures	
	Highly Recommended	Desirable
machinery and sustainable travel	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	
	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker with the agreement of the local authority, where appropriate).	
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	None
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	
	Used enclose 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 and dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	
Waste Management	Avoid bonfires and burning of waste materials.	None

Table 9.29: Mitigation measures specific for demolition, earthworks, construction and trackout

Category	Mitigation Measures	
	Highly Recommended	Desirable
Demolition (High Risk Site)	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	None
	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	
	Avoid explosive blasting, using appropriate manual or mechanical alternatives.	
	Bag remove any biological debris or damp down such material before demolition.	
Earthworks (High Risk Site)	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	None
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	
	Only remove the cover in small areas during work and not all at once.	
Construction (High Risk Site)	Avoid scabbling (roughening of concrete surfaces) if possible.	For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
	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.	
Trackout (High Risk Site)	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials tracked out of the site. This may require the sweeper being continuously in use.	None
	Avoid dry sweeping of large areas.	

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

Operational phase

9.130. A Sustainable Transport Strategy (STS) and Travel Plan (TP) will be submitted with the application and a comprehensive package of on and off-site transport improvements are proposed as part of the Proposed Development. The STS and TP will promote the use of sustainable transport methods such as public transport, walking and cycling to the HNRFI Site to reduce emissions associated with the Proposed Development. The TP is submitted with the PEIR. The following measures will further reduce road traffic emissions associated with the Proposed Development. These measures were not included within the air quality assessment and are therefore additional measures proposed.

- A TP Co-ordinator will be appointed to implement and monitor measures across the Proposed Development;
- Car parking provision will be supplied with charging facilities for Electric Vehicles with ductwork provision for future car charging points on all remaining car parking spaces. This will encourage the use of EV for staff commuting to work;
- The yard areas will be future proofed for the future installation of Heavy Goods Vehicle (HGV) charging points;
- Provision of covered cycle parking facilities;

- New and improved walking and cycling routes are proposed both on and off-site:
- Shared pedestrian and cycleway on the new A47 link road through the HNRFI Site;
- Potential enhancements to B4669 east of the M69 to Sapcote; andThe Proposed Development also seeks to improve bus accessibility to the HNRFI Site by enhancing local bus services.

9.131. The measures above aim to reduce emissions associated with the Proposed Development and encourages the use of sustainable methods of transport. Any reduction in emissions will be beneficial to both human and ecological receptors.

RESIDUAL ENVIRONMENTAL EFFECTS

Construction phase dust assessment

Step 4: Determine significant effects

9.132. In accordance with IAQM guidance[22], with the implementation of the mitigation measures detailed in Tables 9.28 and 9.29, the residual impacts from the construction phase are considered local, medium term, temporary and 'not significant'.

Operational phase road traffic emissions assessment

Human receptors

9.133. A negligible impact is predicted at receptors as a result of the development-generated road traffic emissions. The residual impacts are predicted to be local, permanent and 'not significant'.

Ecological receptors

Critical level

9.134. Within the ecological designations exceedances of NOx were predicted in the 2026 Opening Year scenarios and 2036 Future Year scenarios adjacent to the M1 for three sites. The results of the assessment were referred to the appointed ecological consultants for analysis.

Critical load

9.135. The predicted changes in nitrogen deposition for three sites were referred to the appointed ecological consultants to determine the significance. The results are discussed in Chapter 12: *Ecology and Biodiversity.*

CUMULATIVE AND IN-COMBINATION EFFECTS

9.136. There are two types of cumulative effects, intra-project effects, combined effects from the Proposed Development on sensitive receptors such as dust, noise and visual effects and inter-project effects, the combined effects of the Proposed Development with other development site(s) which may be insignificant individually but combined can create a significant effect.

Construction phase

9.137. The construction phase dust assessment, was undertaken for the Proposed Development in accordance with IAQM guidance[22] and considers potential dust impacts arising during construction for human and ecological receptors within 350m of the Order Limits. Construction phase activities associated at other sites within 700m of the Proposed Development have the potential to occur simultaneously with construction phase activities associated with the Proposed Development, cumulative dust impacts could occur.

9.138. No committed developments were located within 700m of the Order Limits and are outside the area of consideration for the construction phase dust assessment. It is therefore considered that the cumulative impacts associated with the construction phase are 'not significant' and no further mitigation measures are required. The location of committed developments will be reviewed during the preparation of the ES and the assessment revisited where applicable.

Operational phase

9.139. The traffic data provided for use in the AQA includes cumulative traffic flows for the study area including those detailed within Chapter 8: *Transport and Traffic*. Therefore, no additional cumulative road traffic emissions impact assessment was undertaken, as cumulative impacts were considered within the operational phase road traffic assessment. This provides a conservative assessment for both human and ecological receptors.

CLIMATE CHANGE

9.140. Climate change is caused by the emissions of greenhouse gases changing the general weather conditions prevailing over a long period of time. The impacts of climate change can therefore be considered in terms of volume of greenhouse gas emitted by the Proposed Development.

9.141. The Proposed Development will provide a major shift from road transport to rail. A report by the Strategic Rail Business Case Advisors, Baker Rose Ltd reviewed the HGV mileage saved per annum. Chapter 18 of this PEIR report sets-out the effects of the Proposed Development on Climate Change.

SUMMARY AND CONCLUSIONS

Construction phase

9.142. A qualitative construction phase dust assessment was undertaken and measures were recommended for inclusion in a CEMP to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance[22].

Construction phase road traffic

9.143. Details of the construction phase road traffic associated with the Proposed Development were not known at the time of assessment. A detailed construction phase traffic emissions assessment was therefore not undertaken at this stage. This will be revisited through the ES in time for submission of the DCO application.

Operational phase

Operational phase road traffic emissions assessment- human receptors

9.144. A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing human receptor locations within the study area. This included cumulative traffic flows for the study area as detailed within Chapter 8: *Traffic and Transport*. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified sensitive receptor locations within the study area. The modelling assessment was undertaken in accordance with DEFRA guidance. Changes in pollutant concentrations were determined and the impact of the development on local air quality at identified human receptors was predicted to be negligible and 'not significant' in accordance with IAQM and EPUK guidance[23].

9.145. Table 9.30 contains a summary of the likely significant effects of the Proposed Development.

Operational phase road traffic emissions assessment- ecological receptors

Critical level

9.146. A critical level assessment was undertaken to consider the impact of the Proposed Development on ecological designations within the study area. In accordance with DMRB guidance[21], transect points were modelled within each of the designations. Concentrations of NOx were predicted and compared to the NOx critical level for ecosystems. Exceedances of the critical level were predicted at Shawell Wood, Martinshaw Wood and Piper Wood AWs and the results were referred to the appointed ecological consultants.

Critical loads

9.147. A critical load assessment for nitrogen deposition was also undertaken to consider the impact of the Proposed Development on the designated sites within the study area. Transects were modelled within each designation, in accordance with DMRB guidance[21]. The percentage change in nitrogen critical loads, as a result of the development was calculated for 2026 Opening Year and for 2036 Future Year Without and With Development scenarios. The results of the assessment were referred to the appointed ecological consultants to determine any potential impact.

Rail emissions

9.148. An assessment of the potential effects of rail emissions was undertaken in accordance with DEFRA guidance[20]. It was determined that the Proposed Development would not exceed any of the screening criteria detailed for rail locomotives and therefore the impacts on local air quality from rail emissions as a result of the operational development are deemed to be negligible and 'not significant'.

Table 9.30: Summary of environmental effects (air quality)

Potential Effect	Receptor*	Nature of Effect**	Sensitivity of Effect***	Magnitude of Effect****	Significance of Effect^	Mitigation	Residual Effect
Construction							
Dust Soiling from Construction Phase	Local	Short term and Temporary	High	Major	Not defined in accordance with IAQM guidance	Dust Mitigation Measures within CEMP	Not Significant
Dust impact from Construction Phase on Human Health	Local	Short term and Temporary	Medium	Major	Not defined in accordance with IAQM guidance	Dust Mitigation Measures within CEMP	Not Significant
Dust Impacts on Ecological Receptors	Local	Short term and Temporary	High	Major	Not defined in accordance with IAQM guidance	Dust Mitigation Measures within CEMP	Not Significant
Operation							
Emissions from Development Traffic on Human Health	Local	Long term and Permanent	High	Not Defined	Negligible	Comprehensive package of on and off-site transport improvements; Sustainable Transport Strategy, Travel Plan and EV charging	Not significant
Emissions from Development	Local	Long Term and Permanent	Please see Chapter 12: *Ecology and Biodiversity* for the assessment of ecological receptors				

Potential Effect	Receptor*	Nature of Effect**	Sensitivity of Effect***	Magnitude of Effect****	Significance of Effect^	Mitigation	Residual Effect
Traffic on Ecological Receptors							

** International; United Kingdom; England; Regional; County; Borough; Local*

*** Permanent or Temporary/Direct or Indirect*

**** High, Moderate or Low*

*****Major, Moderate, Minor or Negligible*

^ Major, Moderate, Minor or Negligible/Adverse or Beneficial