



Tween Bridge Solar Farm

A Nationally Significant Infrastructure Project in the Energy Sector

Preliminary Environmental Information Report

Chapter 14 – Air Quality and Greenhouse Gases

March 2025



Visit: www.tweenbridgesolar.co.uk
Email: info@tweenbridgesolar.co.uk

14. Air Quality and Greenhouse Gases

14.1. Introduction

- 14.1.1. This chapter of the PEIR assesses the likely significant effects of the Scheme on air quality and greenhouse gases (GHGs). The assessment has been carried out by Air Quality Consultants Limited (AQC).
- 14.1.2. This assessment reports on the baseline and Scheme design information available at the time of writing this chapter of the PEIR. Consultation responses received to date from Doncaster Council and North Lincolnshire Council, as well as the scoping opinion issued by the Planning Inspectorate on 13 March 2023 have been taken into account during the preparation of this Chapter and this is discussed in detail below. A working draft of the PEIR was also issued as part of the non-statutory consultation in October 2023. Responses received following the non-statutory consultation are principally the same as those issued during earlier phases of consultation.
- 14.1.3. The Draft Order Limits comprise the main solar generation works area, and an area of search which it is assumed will accommodate the underground export cable corridor and the location of the National Grid Substation (described within Chapter 3: Methodology as the National Grid Substation and RWE Underground Export Cable Route Assessment Area). For the purposes of this chapter of the PEIR, the two areas have been assessed and it has been assumed that construction could occur across both areas, to ensure that the assessment has been carried out on a worse-case approach. In reality, only a portion of land assigned to the export cable corridor will be taken forward for the final design, whilst the rest will not be subject to construction works.
- 14.1.4. The lifetime of the Scheme is anticipated to be 40 years; air quality and GHG emissions associated with the decommissioning phase have been scoped out of the assessment. This approach is adopted since emissions from any sources in 2069 (40 years from the proposed first year of operation) will be net zero, in line with UK Government targets as set out in policies and legislation discussed in Section 14.3.
- 14.1.5. The Scheme has the potential to affect air quality via the following processes:
- emissions from plant and equipment during the construction and operational phases;
 - emissions from road traffic during the construction and operational phases; and
 - dust emissions during the construction phase.
- 14.1.6. The pollutants of concern for human health from construction equipment and road traffic are nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}). During construction, there is also the potential for impacts to occur from dust soiling and elevated PM₁₀ emissions.
- 14.1.7. The air quality assessment set out in this Chapter focuses on the likely significant effects on human health. The potential for air quality impacts on designated ecological habitats has been scoped out of the assessment for the reasons set out in Appendix 14.1.

Air Quality

14.1.8. The Scheme has the potential to directly, and indirectly, affect climate change through the release of GHGs from a number of sources. The key GHG emitted during the construction and operation of the Scheme will be carbon dioxide (CO₂), however, the assessment includes quantification of GHG emissions that will be released as carbon dioxide equivalent (CO₂e)¹, which includes the contribution of all other GHGs (i.e. gases with a Global Warming Potential (GWP)). The assessment considers GHG emissions:

- embodied in the materials and components used in the construction of the Scheme (e.g. the manufacture of PV modules and frames);
- from construction site activities (e.g. fuel use by site machinery, electricity consumed by site offices and waste from welfare facilities);
- from road traffic movements during the construction and operational phases;
- from importation (shipping) of PV modules and other components from overseas; and
- from repair and maintenance throughout the lifetime of the Scheme (for example, associated with the replacement of PV modules and batteries).

14.1.9. This chapter is supported by the following figures:

- **Figure 14.1 – Locations of Nearest Air Quality Management Areas;**
- **Figure 14.2 – Air Quality Monitoring Locations and the Scheme;**
- **Figure 14.3 – 20 m and 50 m Distance Bands Around Construction Area; and**
- **Figure 14.4 – 20 m and 50 m Distance Bands Around Roads Used by Construction Traffic within 250 m of the Exits for Each Construction Compound.**

14.1.10. This chapter is supported by the following appendices:

- **Appendix 14.1 – Air Quality Impacts on Designated Ecological Sites;**
- **Appendix 14.2 – Environmental Protection UK (EPUK) and The Institute for Air Quality Management (IAQM) Planning for Air Quality Guidance;**
- **Appendix 14.3 – GHG Footprint Methodology;**
- **Appendix 14.4 – Construction Dust Assessment Procedure;**
- **Appendix 14.5 – Professional Experience; and**
- **Appendix 14.6 – Construction Mitigation.**

¹ CO₂e is the term used for describing different greenhouse gases in a common unit. For any greenhouse gas, CO₂e is the amount of CO₂ that would have the equivalent global warming effect.

14.1.11. Baseline and assessment work is ongoing; it is currently expected that the following information will be made available for the Air Quality Chapter of the Environmental Statement (ES):

- Volume of peat to be disturbed, and subsequently the effect on carbon sequestration, as a result of the Scheme;
- Final quantities of all construction materials and components for the Scheme²; and
- Clarification on the peak number of Heavy Duty Vehicles (HDVs)³ leaving the Scheme from any of the five construction compounds.

14.2. Consultation

14.2.1. A summary of consultation responses received to date is provided in Table 14.1. The consultation responses relate only to the air quality assessment as at the time of writing no consultation responses in relation to the GHG assessment have been received.

Table 14.1 Summary of Consultation

CONSULTEE	SUMMARY OF CONSULTEE RESPONSE	HOW RESPONSE HAS BEEN ADDRESSED BY APPLICANT
Doncaster Council Senior Pollution Control Officer	Air quality issues are principally covered in Section 12 of the [Scoping] report, and I note the references to standard methodology, information from recognised sources, existing concentrations and appropriate receptors etc. That being the case I have nothing further to request for the EIA other than the Council is keeping a close eye on the nitrogen dioxide concentration at King Street in Thorne and therefore would request that vehicles associated with the proposal are not routed through Thorne Town	The assessment has followed the same methodology set out in Section 12 of the Scoping Report. Construction traffic will be routed to avoid the centre of Thorne town; this is set out in the Outline Construction Traffic Management Plan (CTMP) which will be secured by DCO requirement.
North Lincolnshire Council Environmental	The proposed assessment of air quality impacts during construction is acceptable in principle. This department would request a Construction Environmental Management	The assessment has followed the same methodology set out in Section 12 of the Scoping Report.

² This PEIR includes data on the majority of Scheme materials and components, with some minor exclusions listed in Appendix 14.3.

³ Vehicles with a total weight over 3.5 tonnes, including heavy goods vehicles, buses and coaches.

Air Quality

Protection Team Leader	<p>Plan (CEMP) is submitted with any subsequent planning application.</p> <p>It is anticipated that operational traffic movements will be minimal, with low numbers of movements expected to be associated with the maintenance of the site. This department would expect the number of vehicle movements to be included within any future ES to ensure this can be screened out.</p>	<p>An outline CEMP will be submitted as part of the application and will be available for the ES.</p> <p>The number of operational vehicle movements are set out in Section 14.5 and compared to the relevant screening criteria published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) in their Planning for Air Quality guidance. The comparison with the published screening criteria confirms that the impacts can be screened out of the PEIR.</p>
Non-Statutory Consultation		
Doncaster Council Senior Pollution Control Officer	The Officer commented that as long as traffic movements through Thorne town centre have been addressed, there would be no issues with the air quality assessment.	Construction traffic will be routed to avoid the centre of Thorne town; this is set out in the Outline Construction Traffic Management Plan (CTMP) which will be secured by DCO requirement.
Doncaster Council Head of Sustainability	No comments received to date.	The assessment continues to follow the methodology in the draft PEIR.
North Lincolnshire Council Environmental Protection Team Leader	<p>Colleagues in Planning will be sending out the consultation to our Team in the near future, if I have any questions during this time I will contact you.</p> <p>In relation to Climate Change, we do not have a specialist within the Council.</p>	The assessment continues to follow the methodology in the draft PEIR.

14.3. Assessment Approach

Methodology

Air Quality

Assessment Criteria

14.3.1. The Government has established a set of air quality standards and objectives to protect human health. The ‘standards’ are based on assessment of the effects of each pollutant on human health, including the effects on sensitive sub-groups. The ‘objectives’ set out the extent to which the Government expects the standards to be achieved taking account of practical considerations. The objectives for use by local authorities are prescribed within the Air Quality

(England) Regulations⁴ and the Air Quality (England) (Amendment) Regulations⁵, and provided in Table 14.2.

Table 14.2 Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

POLLUTANT	TIME PERIOD	VALUE
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
PM ₁₀	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³
PM _{2.5}	Annual Mean	20 µg/m ³ ^a

^a There is no numerical PM_{2.5} objective for local authorities (see paragraph 14.3.4). Convention is to assess against the UK limit value which is currently 20 µg/m³.

- 14.3.2. The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. The Department for Environment, Food and Rural Affairs (Defra) explains where these objectives will apply in its Local Air Quality Management (LAQM) Technical Guidance⁶. The annual mean objectives are considered to apply at the facades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objectives, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend one hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 14.3.3. The UK-wide objectives for nitrogen dioxide and PM₁₀ should have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour mean nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m³⁶. Measurements have also shown that the 24-hour mean PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³.
- 14.3.4. For PM_{2.5}, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value (see paragraph 14.3.9), originally set at 25 µg/m³ and currently set at 20 µg/m³.

⁴ Air Quality (England) Regulations 2000.

⁵ Air Quality (England) (Amendment) Regulations 2002.

⁶ Defra (2022) Review and Assessment: Technical Guidance LAQM.TG22, August 2022 Version.

Air Quality

14.3.5. Defra has also set two new targets, and two new interim targets, for PM_{2.5} concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean PM_{2.5} concentration of 10 µg/m³ by the end of 2040, with the interim target being a value of 12 µg/m³ by the start of 2028⁷. The second set of targets relate to reducing overall population exposure to PM_{2.5}. By the end of 2040, overall population exposure to PM_{2.5} should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028. The PM_{2.5} targets are provided in Table 14.3.

Table 14.3 Environment Act PM_{2.5} Targets

METRIC	TARGET	TARGET YEAR
AMCT	Interim target: 12 µg/m ³	2028
	Legally binding target: 10 µg/m ³	2040
PERT	Interim target: 22% reduction in exposure compared to 2018	2028
	Legally binding target: 35% reduction in exposure compared to 2018	2040

14.3.6. In 2024 Defra published Interim Planning Guidance on the PM_{2.5} targets⁸. This states that:

“The purpose of the targets is to improve air quality by reducing levels of PM_{2.5} across the country, therefore improving public health. While achievement of the targets will be assessed at relevant monitoring sites, the targets apply to ambient (outdoor) air throughout England. Applicants and Local Planning Authorities should therefore consider the impact of developments on air quality in all ambient air, whether a monitor is present or not.”

14.3.7. In order to address the new targets, it is not sufficient to assess solely whether a scheme is likely to lead to an exceedance of a legal limit. Instead, developments need to implement appropriate mitigation measures from the design stage, ensuring the minimum amount of pollution is emitted and that exposure is minimised.

14.3.8. Pending publication of the new guidance, Defra advises applicants to provide evidence that they have identified key sources of air pollution within the scheme and taken appropriate action to minimise emissions of PM_{2.5} and its precursors as far as possible. More detailed assessment is expected for development closer to populations and/or having higher emissions. Defra has posed two questions to be used as prompts to support the interim assessment process:

“How has exposure to PM_{2.5} been considered when selecting the development site?; and

⁷ Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m³ would not exceed the 10 µg/m³ target.

⁸ Defra (2024), PM_{2.5} Targets: Interim Planning Guidance, Available: <https://uk-air.defra.gov.uk/pm25targets/planning>.

What actions and/or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM_{2.5} and its precursors?"

- 14.3.9. All European legislation referred to in this Chapter is written into UK Law and remains in place. European Union (EU) Directive 2008/50/EC⁹ on ambient air quality and cleaner air for Europe sets limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}, and is implemented in UK law through the Air Quality Standard Regulations 2010¹⁰. The limit values for nitrogen dioxide and PM₁₀ are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one.
- 14.3.10. In the UK, only monitoring and modelling carried out by the UK Central Government meets the specification required to assess compliance with the limit values. It is understood that the UK Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded unless such studies have been audited and approved by Defra and Department for Transport's (DfT's) Joint Air Quality Unit (JAQU).

Screening Criteria for Road Traffic

- 14.3.11. EPUK and the IAQM¹¹ recommend a screening approach¹² to determine whether emissions from road traffic generated by a development have the potential for significant air quality effects.
- 14.3.12. This approach compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix 14.2) inside an Air Quality Management Area (AQMA) are a change in flows of more than 25 HDVs or 100 Light Duty Vehicles (LDVs)¹³ per day; outside of an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance¹² advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

Study Area

- 14.3.13. The study area for the assessment has been identified using professional judgement, focusing on the areas where impacts from the Scheme are anticipated to be greatest.
- 14.3.14. The construction dust risk assessment considers the potential for impacts within 250 m of the Draft Order Limits and within 50 m of roads used by construction vehicles within 250 m of the Draft Order Limits. In addition, it includes ecological habitats sensitive to fugitive dust within 50 m of the Draft Order Limits.

⁹ European Union Directive 2008/50/EC.

¹⁰ As amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

¹¹ The IAQM is the professional body for air quality practitioners in the UK.

¹² Moorcroft and Barrowcliffe et al. (2017) Land-Use Planning & Development Control: Planning for Air Quality v1.2. Institute of Air Quality Management, London.

¹³ Vehicles with a total weight less than 3.5 tonnes, such as cars, vans and minibuses.

Air Quality

14.3.15. The extent of the road traffic assessment has been determined by the area considered as part of Chapter 12: Transport and Access, prepared by Pegasus, and principally focusses on the roads used to access or egress the five main construction compounds. The road traffic study area also considers the M18 near Bessacar, where Doncaster Council has declared an AQMA.

Existing Conditions

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

- information on existing air quality has been obtained by collating the results of monitoring carried out by Doncaster¹⁴ and North Lincolnshire¹⁵;
- background concentrations have been defined using Defra's 2021-based background pollutant maps¹⁶. These cover the whole of the UK on a 1 x 1 km grid; and
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide, PM₁₀ and PM_{2.5} in the study area has been identified using Defra's Compliance data¹⁷.

Greenhouse Gases

14.3.17. The majority of the area within the Draft Order Limits currently consists of arable land, which will have associated GHG emissions from the use of agricultural machinery; fertilisers; and transportation of goods, as well as hedgerows and scattered trees that act as a carbon sink. There are also portions of the site that contain peatland, which has the potential to sequester and store GHGs, and thus act as a carbon sink. The assessment considers the existing baseline, taking into account the net emitter properties of agricultural land, and the carbon sink properties of peatland.

14.3.18. Total emissions (i.e. covering the full construction phase and lifetime) have been calculated for the following footprint GHG sources using a number of data sources and methodologies.

Embedded Carbon

14.3.19. The embedded carbon from materials and components used to construct the Scheme has been calculated using a number of tools and resources including the Bath University Inventory of Carbon and Energy v3.0¹⁸ and published International Environmental Performance Declarations (EPDs).

14.3.20. The assessment of embedded carbon covers "cradle to gate" emissions (i.e. carbon emissions from the extraction of raw materials through to finished components). Further details of the calculation methodology and resources are provided in Appendix 14.3.

¹⁴ Doncaster Council (2024) 2024 Air Quality Annual Status Report (ASR).

¹⁵ North Lincolnshire Council (2024) 2024 Air Quality Annual Status Report (ASR).

¹⁶ Defra (2025) LAQM Support Website, Available at: <https://laqm.defra.gov.uk/>.

¹⁷ Defra (2025) Air quality compliance data.

¹⁸ Bath University (2019) Inventory of Carbon and Energy v3.0.

Construction Site Activities

- 14.3.21. The approach recommended in guidance on whole life carbon assessment from RICS¹⁹ for calculating emissions arising from on- or off-site construction activities, such as energy consumption for site accommodation, plant use and waste, is based on an emission rate per square meter of Gross Internal Area (GIA). Since GIA relates to the area of a building, and building structures across the Scheme will be limited to Substations and the BESS sites, it is not appropriate to use the full area within the Draft Order Limits, which covers 2,526 hectares.
- 14.3.22. For the purposes of this assessment, an emission rate of 25 kgCO₂e/m² has been applied to 2% of the area within the Draft Order Limits (505,200 m²).

Construction Traffic

- 14.3.23. The number of construction trips to and from the Scheme during the construction period has been based on data provided by the Project Transport Consultants, Pegasus.
- 14.3.24. The precise origin/destination of these trips is not known and will vary throughout the construction period; to ensure a robust estimate of the overall construction transport emissions, the following assumptions relating to average distances have been made:
- articulated Heavy Goods Vehicles (HGVs) will travel 120 km. This distance has been based on the RICS guidance¹⁹;
 - rigid HGVs, such as tippers and JCBs, will travel 80 km. This distance has been based on the RICS guidance¹⁹;
 - external tractors and trailer movements will travel 10 km. These movements are contained within the Draft Order Limits; and
 - vehicles associated with the workforce will travel 20 km, which encompasses Doncaster. It is envisaged that non-local members of the workforce will stay in local accommodation and be transported to the Scheme by minibuses.

- 14.3.25. GHG emission factors for construction transport were obtained from the DESNZ publication on GHG Conversion Factors for Company Reporting²⁰ and applying engine and fuel efficiency factors from the DfT's WebTAG data book²¹. The appropriate GHG factors have been used for the years 2026 to 2028 and take into account decarbonisation of road transport. The GHG emissions factors are applied to the calculated total construction travel distance to estimate the GHG emissions from construction transport. Further details of the volume of construction traffic movements and emissions factors used are available in Appendix 14.3.

Shipping Emissions

¹⁹ RICS (2023) Whole life carbon assessment for the built environment, 2nd edition.

²⁰ Department for Energy Security and Net Zero (2025) UK Government GHG Conversion Factors for Company Reporting.

²¹ DfT (2024) WebTAG Databook v1.24.

Air Quality

14.3.26. GHG emission factors for shipping were obtained from the DESNZ publication on GHG Conversion Factors for Company Reporting²⁰ which sets out GHG emissions factors for a range of modes of transport for freighting goods, including cargo ships, valid for 2024; these are the latest factors available at the time of writing this PEIR.

14.3.27. The GHG emissions factors are reported in terms of tonnes of CO₂e per mass of the goods shipped per distance travelled. For the purposes of the assessment, it has been assumed that many of the Scheme components will be imported from China, approximately 10,000 nautical miles (18,520 km) away. Further details of the assumptions in relation to number, volume and mass of components and shipping emissions factors are provided in Appendix 14.3.

Operational Transport

14.3.28. GHG factors for the earliest year of operation (2029) were determined using the DESNZ carbon factors and applying engine and fuel efficiency factors obtained from the DfT's WebTAG databook²¹.

14.3.29. The calculation of the operational transport GHG emissions is then carried out by multiplying the carbon factor by the distance travelled. It is assumed that operational visits will be carried out by a Light Goods Vehicle, and that each vehicle will travel approximately 20 km, which encompasses Doncaster and the surrounding area.

14.3.30. The calculated 2029 factor for a typical Light Goods Vehicle is 0.1760 kgCO₂e/km. Lifetime emissions from operational transport have been calculated by multiplying the annual emissions by the project lifetime of 40 years. This is conservative as it does not account for decarbonisation of road traffic in this period.

Repair, Maintenance and Refurbishment

14.3.31. CO₂e emissions from the repair and maintenance of the Scheme during its lifetime, which are predominated by embedded carbon in replacement components have been calculated using the same methodology as for construction phase embodied carbon.

14.3.32. Assumptions have been made on the quantity of each key component or material (PV panels, frames and mounting structures, BESS, cable etc.) that will be replaced over the Scheme's 40-year lifetime or the number of times each item will be replaced. These assumptions have been combined with the embedded carbon for each component calculated for the construction phase to estimate lifetime repair, maintenance and replacement emissions. This essentially assumes no decarbonisation of the supply chain, which is very conservative, but consistent with the assumptions in other Whole Life Carbon Assessments for solar developments.

14.3.33. Further details of the assumptions on replacement of components are provided in Appendix 14.3.

Assumptions

14.3.34. Emissions associated with the construction phase of the Scheme are based on the latest available GHG factors for each item considered. This provides a conservative assessment, as emissions associated with the manufacturing of construction materials and transport are projected to reduce with time, with construction works anticipated to end by 2029. The total emissions arising from construction are based on a works period lasting 30 months.

14.3.35. The transport GHG emissions associated with the operation of the Scheme have been calculated for the opening year (assumed to be 2029), taking account of national projections with regards to vehicle fleet etc. These are then assumed to apply each year for the Scheme's lifetime as a worst-case assumption.

14.3.36. The 'net emissions' are the change in GHG emissions between the baseline and the Scheme. The assessment then considers the net emissions in the context of the total energy generated over the lifetime of the Scheme to calculate a carbon intensity factor. This has then been compared to the carbon intensity factors for other non-renewable electricity sources (e.g. natural gas fired power stations). This comparison with non-renewable energy sources enables the Scheme to be contextualised against the forms of energy generation which the Scheme is designed to replace as part of the UK's transition to net zero, and evidence the alignment with Government policies to transition the national grid to renewable and green forms of energy supply.

Assessment of Significance

Air Quality

Sensitivity of Receptors

Construction Dust

14.3.37. The IAQM guidance²² (described in full in Appendix 14.4) followed when carrying out the construction dust assessment requires the number of receptors within certain distance bands (as shown in Section 14.5) to be established in order to determine the sensitivity of the surrounding area, rather than focussing on impacts at individual receptors. It is, therefore, not necessary to set out specific receptors for the assessment of impacts during the earthworks and construction works.

14.3.38. Residential properties, hospitals and schools are classified as high sensitivity receptors, whilst places of work and parks are classified as medium sensitivity receptors for the construction dust risk assessment.

Operational Phase

14.3.39. Within this chapter, all receptors where the air quality objectives (as set out in Table 14.2) apply are considered to be of high sensitivity. Locations where the objectives do not apply must be considered not to be sensitive, therefore there are no medium or low sensitivity receptors within the context of this assessment.

Magnitude of Impacts

Construction Dust

14.3.40. There are no formal statutory or regulatory assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM²² has been used. This follows a sequence of steps:

²² IAQM (2024) Guidance on the Assessment of Dust from Demolition and Construction v2.2.

Air Quality

- Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required;
- Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation; and
- Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant effects.

14.3.41. Appendix 14.4 explains the approach to the construction dust risk assessment in more detail.

Operational Phase

14.3.42. Where the emissions generated by the Scheme can be screened out for the assessment based on comparisons with published criteria, the impact can be considered to be negligible.

Significance Criteria

14.3.43. It is important to differentiate between the terms ‘impact’ and ‘effect’ with respect to the assessment of air quality. The term ‘impact’ is used to describe a change in pollutant concentration at a specific location. The term ‘effect’ is used to describe an environmental response resulting from an impact, or series of impacts. Within this chapter, the air quality assessment has used published guidance and criteria described in the following sections to determine the likely air quality impacts at a number of sensitive locations. The potential significance of effects has then been determined by professional judgement, based on the frequency, duration and magnitude of predicted impacts and their relationship to appropriate air quality objectives.

Construction Dust

14.3.44. Guidance from the IAQM²² is that, with appropriate mitigation in place, the effects of construction dust will be ‘not significant’. This chapter thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be ‘not significant’.

Operational Phase

14.3.45. There is no statutory guidance in the UK on how to assess the significance of operational air quality impacts. The approach developed jointly by EPUK and the IAQM has therefore been used.

14.3.46. The overall significance of the air quality impacts upon human health is determined using professional judgement. Full details of the EPUK/IAQM approach are provided in Appendix 14.2, whilst the experience of the consultants preparing the Chapter is set out in Appendix 14.5.

Greenhouse Gases

Sensitivity of Receptors

14.3.47. The assessment of GHGs does not include identification of sensitive receptors, as GHG emissions do not directly affect specific locations or receptors but lead to indirect effects by

contributing to climate change. Identification of sensitive areas for climate change has been undertaken by the Intergovernmental Panel on Climate Change (IPCC)²³.

- 14.3.48. Impacts on specific areas are not included within this assessment, since the impacts of GHG emissions will affect the global atmosphere, and therefore need to be considered in a total context, rather than on localised areas.

Magnitude of Impacts

- 14.3.49. There are no impact descriptors for GHG emissions; the approach taken is, therefore, to calculate the net annualised emission rate (in kg CO₂e) per unit of energy (in kWh) for the Scheme and compare this to the annualised emission rate per unit of energy for natural gas.

Significance Criteria

- 14.3.50. The Institute of Environmental Management and Assessment (IEMA) guidance²⁴ identifies three underlying principles to inform the assessment of significance, as follows:

- GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect;
- the consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive – e.g., population, fauna, soil, etc.; and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant.

- 14.3.51. Based on these principles, IEMA conclude that:

- when evaluating significance, all new GHG emissions contribute to an adverse environmental impact, however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

- 14.3.52. In advising on the significance of any net change in GHG emission resulting from a development IEMA identify that in order to limit the adverse effects from climate change global temperature

²³ The Intergovernmental Panel on Climate Change (2014) AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability

²⁴ IEMA (2022) EIA Guide to: Assessing greenhouse gas emissions and evaluating their significance. 2nd edition

Air Quality

change needs to be limited to well below 2°C, aiming for 1.5°C. The implication of this objective is that global emissions need to fall to net zero by 2050.

14.3.53. The UK’s response to limiting climate change is enshrined in law through the Climate Change Act 2008 which requires the UK economy to be net zero by 2050 following a trajectory set through five-yearly carbon budgets. The 2050 target (and interim budgets set to date) are, according to the Climate Change Committee (CCC), compatible with the required magnitude and rate of GHG emissions reductions required in the UK to meet the goals of the Paris Agreement, thereby limiting severe adverse effects.

14.3.54. It follows, therefore, that the significance of any net change of GHG resulting from a development is not so much whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions consistent with a trajectory towards net zero by 2050.

14.3.55. To establish the significance of the GHG emissions from a development therefore requires judgements on:

- the consistency with policy requirements, since these have been specified to ensure the economy decarbonises in line with the UK’s net zero target; and
- the degree to which the development has sought to mitigate its emissions.

14.3.56. Examining each of these dimensions allows the assessment to make professional judgement on the likely significance of effects based on a set of significance criteria established in the IEMA guidance²⁴, summarised in Table 14.4.

Table 14.4 IEMA GHG Significance Criteria

SIGNIFICANCE RATING	DESCRIPTION	CRITERIA TO DETERMINE SIGNIFICANCE OF NET GHG EMISSIONS
Major Adverse	A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK’s trajectory towards net zero.	The project’s net GHG impacts are: <ul style="list-style-type: none"> • not mitigated or are only compliant with do-minimum standards set through regulation; and • do not provide further reductions required by existing local and national policy for projects of this type.
Moderate Adverse	A project with moderate adverse effects falls short of fully contributing to the UK’s trajectory towards net zero.	The project’s net GHG impacts are: <ul style="list-style-type: none"> • partially mitigated; and

		<ul style="list-style-type: none"> • may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type.
Minor Adverse	A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.	<p>The project's net GHG impacts are:</p> <ul style="list-style-type: none"> • fully consistent with applicable existing and emerging policy requirements; and • in line with good practice design standards for projects of this type.
Negligible	A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.	<p>The project's net GHG impacts are:</p> <ul style="list-style-type: none"> • reduced through measures that go well beyond existing and emerging policy; and • better than good practice design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050.
Beneficial	A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.	<p>The project's net GHG impacts are:</p> <ul style="list-style-type: none"> • below zero; and • it causes a reduction in atmospheric GHG concentrations, whether directly or indirectly, compared to the without-project baseline.

14.3.57. The IEMA guidance²⁴ states:

"A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. It may have residual emissions but is doing enough to align with and contribute to the relevant transition scenario, keeping the UK on track towards net zero by 2050 with at least a 78% reduction by 2035 and thereby potentially avoiding significant adverse effects."

Air Quality

“A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant. This project is playing a part in achieving the rate of transition required by nationally set policy commitments.”

14.3.58. IEMA also advises that:

- Major adverse, moderate adverse and beneficial effects should be considered significant in the context of EIA. Minor adverse and negligible effects are considered to be not significant;
- In the case of large-scale developments, irrespective of the level of mitigation, if net GHG emissions exceed 5% of UK or devolved administrations carbon budget, that this is a level of change that is considered significant;
- Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect, and it is recommended therefore that the assessment also considers emerging policy/standards and the guidance of expert bodies such as the CCC on necessary policy developments, particularly for multi-phased projects with long timescales; and
- To aid decision making it is important to inform the decision maker about the relative severity of environmental effects such that they can be weighed in a planning balance. Therefore, it is essential to provide context for the magnitude of GHG emissions reported in the EIA in a way that aids evaluation of these effects by the decision maker. IEMA advise that context can be provided through comparison of the whole life GHG emissions resulting from the development with national, local and sectoral totals, as well as carbon budgets.

14.3.59. Therefore, the assessment of significance is established over two steps as follows:

Step 1: Establish Context of GHG Emissions

14.3.60. Context for decision making is provided by comparing the net change in the whole life GHG emissions resulting from the development with local and regional GHG emissions totals, and carbon budgets.

Step 2: Determine Significance of Effects

14.3.61. Significance of effects is established through applying the criteria detailed in Table 14.4 based on professional judgement that considers:

- The consistency of the development with national, regional and local policies designed to limit GHG emissions and meet the UK’s net zero target; and
- The robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce and compensate GHG emissions.

14.3.62. In terms of mitigation, IEMA recommends that mitigation should in the first instance seek to avoid GHG emissions. Where GHG emissions cannot be avoided, the development should aim

to reduce the residual significance of a project's emissions at all stages. Where additional GHG emissions remain but cannot be further reduced at source, approaches should be considered that compensate the project's remaining emissions, for example through offsetting (i.e. investing in projects off site which avoid, reduce or remove carbon, for example, reforestation, renewable energy projects or carbon-storing agricultural practices).

Legislative and Policy Framework

Air Quality

*Air Quality Strategy 2007*²⁵

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

*Air Quality Strategy 2023*²⁶

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

*Clean Air Strategy 2019*²⁷

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

*Environment Act*²⁸

- 14.3.66. The UK's new legal framework for protection of the natural environment, the Environment Act 2021 passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental

²⁵ Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

²⁶ Defra (2023) Air Quality Strategy: Framework for Local Authority Delivery.

²⁷ Defra (2019) Clean Air Strategy 2019.

²⁸ His Majesty's Stationary Office (2021), Environment Act 2021.

Air Quality

Protection (OEP), responsible for holding the Government to account and ensuring compliance with these targets.

- 14.3.67. The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of PM_{2.5}. These targets are described in paragraph 14.3.5.

*Environmental Improvement Plan 2023*²⁹

- 14.3.68. Defra published its 25 Year Environment Plan in 2018³⁰. The Environment Act (2021)²⁸ requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023 is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.

- 14.3.69. The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of PM_{2.5}. These targets, which are described in paragraph 14.3.5, include the long-term targets in the Statutory Instrument described in paragraph 14.3.67, and interim targets to be achieved by 2028.

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

*Road To Zero Strategy*³¹

- 14.3.71. The Road to Zero Strategy affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040. It states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. The Government's 'Zero Emission Vehicle' (ZEV) mandate requires that 80% of new cars and 70% of new vans sold in Great Britain must be zero exhaust emission by 2030, increasing to 100% by 2035. If these ambitions are realised, then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades.

National Planning Policy

- 14.3.72. The current National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3)³², together with the Overarching National Policy Statement for Energy (EN-1)³³, provide a policy basis for decisions regarding nationally significant renewable energy infrastructure projects.

²⁹ Defra (2023) Environmental Improvement Plan 2023.

³⁰ Defra (2018) A Green Future: Our 25 Year Plan to Improve the Environment.

³¹ DfT (2018) The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy.

³² Department for Energy Security & Net Zero (2024) National Policy Statement for Renewable Energy Infrastructure (EN-3).

³³ Department for Energy Security & Net Zero (2024) Overarching National Policy Statement for Energy (EN-1).

There is no specific NPS for solar projects; although the NPS for Renewable Energy Infrastructure (EN-3)³² includes a section on the impacts of solar photovoltaic generation, it does not refer to air quality.

14.3.73. In terms of the assessment of air quality impacts, paragraphs 5.2.8 to 5.2.10 in EN-1 state:

“Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement (ES).

The ES should describe:

- existing air quality concentrations and the relative change in air quality from existing levels;*
- any significant air quality effects, mitigation action taken and any residual effects, distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;*

14.3.74. *the predicted absolute emissions, concentration change and absolute concentrations as a result of the proposed project, after mitigation methods have been applied...*

In addition, applicants should consider the Environment Targets (Fine Particulate Matter) (England) Regulations 2022 and associated Defra guidance.”

14.3.75. In terms of dust emissions, paragraphs 5.7.5 to 5.7.7 state:

“The applicant should assess the potential for... emissions of... dust... to have a detrimental impact on amenity, as part of the ES.

In particular, the assessment provided by the applicant should describe:

14.3.76. *the type, quantity and timing of emissions;*

- aspects of the development which may give rise to emissions;*
- premises or locations that may be affected by the emissions;*

14.3.77. *effects of the emission on identified premises or locations; and*

- measures to be employed in preventing or mitigating the emissions.*

The applicant is advised to consult the relevant local planning authority and, where appropriate, the EA about the scope and methodology of the assessment.”

14.3.78. The Overarching NPS for Energy (EN-1)³³ sets out the following additional information and guidance for the assessment:

“Defra publishes future national projections of air quality based on estimates of future levels of emissions, traffic, and vehicle fleet. Projections are updated as the evidence base changes and the applicant should ensure these are current at the point of an application. The applicant’s assessment should be consistent with this but may include more detailed modelling and

Air Quality

evaluation to demonstrate local and national impacts. If an applicant believes they have robust additional supporting evidence, to the extent they could affect the conclusions of the assessment, they should include this in their representations to the Examining Authority along with the source

Where a proposed development is likely to lead to a breach of any relevant statutory air quality limits, objectives or targets, or affect the ability of a noncompliant area to achieve compliance within the timescales set out in the most recent relevant air quality plan/strategy at the time of the decision, the applicant should work with the relevant authorities to secure appropriate mitigation measures to ensure that those statutory limits, objectives or targets are not breached.

The Secretary of State should consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the project application. A construction management plan may help codify mitigation at this stage. In doing so the Secretary of State should have regard to the Air Quality Strategy in England, or the Clean Air Plan for Wales in Wales, or any successors to these and should consider relevant advice within Local Air Quality Management guidance and PM_{2.5} targets guidance.”

14.3.79. The National Planning Policy Framework (NPPF)³⁴ sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

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

14.3.80. To prevent unacceptable risks from air pollution, Paragraph 187 of the NPPF states that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by...preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans”.

14.3.81. Paragraph 198 states:

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

14.3.82. More specifically, on air quality, Paragraph 199 makes clear that:

“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of

³⁴ Ministry of Housing, Communities & Local Government (2024) National Planning Policy Framework.

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

- 14.3.83. The NPPF is supported by Planning Practice Guidance (PPG)³⁵, which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states at paragraph 001 that:

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

- 14.3.84. Regarding plan-making, the PPG states at paragraph 002:

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

- 14.3.85. Regarding the need for an air quality assessment, the PPG states at paragraph 005 that:

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

- 14.3.86. The PPG sets out the information that may be required in an air quality assessment, making clear at paragraph 007 that:

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

- 14.3.87. The PPG also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear at paragraph 008 that:

“Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local

³⁵ Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance.

Air Quality

planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented”.

Local Transport Plan

- 14.3.88. The Sheffield City Region, which covers Doncaster, adopted its Transport Strategy 2018 – 2040 in 2019³⁶. This includes Policy 4, which aims to *“Improve air quality across our City Region to meet legal thresholds, supporting improved health and activity for all, especially in designated AQMAs and CAZs.”*

Local Policies

- 14.3.89. The Doncaster Local Plan 2015 – 2035³⁷ was adopted in September 2021 and includes Policy 54, ‘Pollution’, which states that:

“Development proposals that are likely to cause pollution, or be exposed to pollution, will only be permitted where it can be demonstrated that pollution can be avoided, or where mitigation measures (such as those incorporated into the design and layout of development) will minimise significantly harmful impacts to acceptable levels that protect health, environmental quality and amenity. When determining planning applications, particular consideration will be given to:

A) an assessment of the risks to public health and the impact of cumulative effects and where necessary that the provision for mitigation against the total effects has been provided...

...C) the impact on national air quality; especially but not limited to Air Quality Management Areas, areas potentially close to the EU limit value, other sensitive areas and the aims and objectives of the Air Quality Action Plan. An Air Quality Assessment will be required to enable clear decision making on any relevant planning application.”

- 14.3.90. Doncaster Council has also produced an Air Quality Technical Planning Guidance³⁸ document. This document sets out guidance on air quality requirements for developers, including the required content for air quality assessments.

- 14.3.91. The North Lincolnshire Core Strategy³⁹ was adopted in June 2011, and within this, Spatial Objective 7: ‘Efficient Use and Management of Resources’, aims to

“ensure the efficient use of resources, maximising recycling of minerals and waste products, minimising pollution, maintaining and improving air, soil and water quality, and employing sustainable building practices in new development.”

- 14.3.92. Spatial Objective 7 also states that *“The framework will also support measures to minimise pollution and improve air...quality”.*

³⁶ Sheffield City Region (2019) Sheffield City Region Transport Strategy 2018–2040

³⁷ Doncaster Council (2021) Local Plan 2015–2035

³⁸ Doncaster Council (2022) Air Quality Technical Planning Guidance 2022.

³⁹ North Lincolnshire Council (2011) Core Strategy.

National Air Quality Action Plan

- 14.3.93. Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK⁴⁰; a supplement to the 2017 Plan⁴¹ was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone (CAZ).
- 14.3.94. Since the typical outcome of the 2017 Plan and 2018 Supplement is the creation of a CAZ, the effects of which are not yet incorporated into Defra's modelling tools, there is currently no straightforward way for practitioners to take account of the effects in an air quality assessment. However, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the Scheme.
- 14.3.95. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Doncaster Council Air Quality Action Plan

- 14.3.96. Doncaster Council has declared eight AQMAs for exceedances of the annual mean nitrogen dioxide objective.
- 14.3.97. The Council has developed an AQAP which was revised in 2018⁴². This sets out a range of measures to improve air quality within the borough, aimed at reducing vehicle emissions, reducing traffic volumes, improving public transport, and raising awareness.
- 14.3.98. The Council is currently consulting on a new AQAP, which comprises 10 measures that are largely focused on transport, including promoting alternatives and low emission transport and building the infrastructure to effect change.

North Lincolnshire Council Air Quality Action Plan

- 14.3.99. North Lincolnshire Council declared an AQMA for exceedances of the 24-hour mean PM₁₀ objective in 2005 as a result of industrial emissions around Scunthorpe, which was amended in 2018. The Council updated its Air Quality Action Plan⁴³ in 2024, which is currently waiting Cabinet approval; however, this is not relevant to this assessment due to the distance between the Draft Order Limits and the Scunthorpe AQMA (approximately 7 km).

Greenhouse Gases*National Policies*

⁴⁰ Defra (2017) Air quality plan for nitrogen dioxide (NO₂) in the UK.

⁴¹ Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations.

⁴² Doncaster Council (2018) Air Quality Action Plan.

⁴³ North Lincolnshire Council (2024) Action Plan for the Scunthorpe PM₁₀ AQMA

Air Quality

14.3.100. The NPS document EN-1³³ includes Section 5.3 on the assessment of GHG emissions; paragraph 5.3.4 states:

“All proposals for energy infrastructure projects should include a carbon assessment as part of their ES (See Section 4.2). This should include:

14.3.101. *A whole life GHG assessment showing construction, operational and decommissioning GHG impacts*

14.3.102. *An explanation of the steps that have been taken to drive down the climate change impacts at each of those stages*

- *Measurement of embodied GHG impact from the construction stage*
- *How reduction in energy demand and consumption during operation has been prioritised in comparison with other measures*
- *How operational emissions have been reduced as much as possible through the application of best available technology for that type of technology*
- *Calculation of operational energy consumption and associated carbon emissions*
- *Whether and how any residual GHG emissions will be (voluntarily) offset or removed using a recognised framework*

14.3.103. *Where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in combination with other developments at a regional or national level, or sector level, if sectoral targets are developed”.*

14.3.104. NPS EN-3 on renewable energy infrastructure³² includes Section 2.10 on solar development, but does not include any specific policy or guidance on GHG emissions.

14.3.105. Part 14 of the NPPF³⁴ is titled *“Meeting the challenge of climate change, flooding and coastal change”* and sets out the strategy for minimising the climate change effects of new development. Paragraph 164 states that:

“New development should be planned for in ways that [...] can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government’s policy for national technical standards.”

14.3.106. Paragraph 165 states further that:

“To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*
- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*

c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.”

14.3.107. Paragraph 168 states that, when determining planning applications for renewable and low carbon development, planning authorities should:

“a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and give significant weight to the benefits associated with renewable and low carbon energy generation and the proposal’s contribution to a net zero future;

b) recognise that small-scale and community-led projects provide a valuable contribution to cutting greenhouse gas emissions; and

c) in the case of applications for the repowering and life-extension of existing renewable sites, give significant weight to the benefits of utilising an established site, and approve the proposal if its impacts are or can be made acceptable.”

Climate Change Act 2008⁴⁴

14.3.108. The overarching Act in relation to climate is the Climate Change Act 2008. The Act introduces a legally binding target to reduce the UK’s GHG emissions to at least 80% below 1990 levels by 2050. It also provides for a Committee on Climate Change (CCC) with power to set out carbon budgets binding on the Government for five-year periods.

14.3.109. In the 2009 budget, the first three carbon budgets were announced which set out a binding 34% CO₂e⁴⁵ reduction by 2020; and the Government has since adopted the fourth and fifth carbon budgets to reduce CO₂e by 50% by 2025 and 57% by 2030.

14.3.110. The CCC also produces annual reports to monitor the progress in meeting these carbon budgets. Consequent upon the enactment of the Climate Change Act, a raft of policy at national and local level has been developed aimed at reducing carbon emissions.

Climate Change Act 2008 (2050 Target Amendment) Order 2019⁴⁶

14.3.111. In June 2019, the Government passed an order to amend the 2050 carbon emissions target in the Climate Change Act 2008 from 80% below 1990 levels to zero net carbon (i.e. 100% below 1990 levels). This new target will essentially end the UK’s contribution to climate change by 2050.

Carbon Budget Order 2021⁴⁷

⁴⁴ His Majesty’s Stationery Office (2008) Climate Change Act 2008.

⁴⁵ Carbon dioxide equivalent (CO₂e) is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO₂e signifies the amount of CO₂ which would have the equivalent global warming impact.

⁴⁶ His Majesty’s Stationery Office (2019) The Climate Change Act 2008 (2050 Target Amendment) Order 2019.

⁴⁷ His Majesty’s Stationery Office (2021) The Carbon Budget Order 2021.

Air Quality

14.3.112. The Carbon Budget Order 2021 came into force in June 2021. It sets a legal obligation to meet the targets of the Climate Change Act 2008 and subsequent amendment to cut GHG emissions by 78% by 2035.

Energy Act (2013)⁴⁸

14.3.113. The Energy Act makes a provision for the setting of a decarbonisation target range, duties in relation to it and for the reforming of the electricity market for the purposes of encouraging low carbon electricity generation.

Net Zero Strategy⁴⁹

14.3.114. The UK Government’s Net Zero Strategy sets out the strategy for achieving the UK’s binding commitment to net zero carbon emissions by 2050.

14.3.115. The strategy sets out a number of key aims and objectives to decarbonise the UK economy across all sectors. In relation to the power sector the strategy includes commitments to take action so that all of the UK’s electricity supply comes from low carbon sources by 2035 and to accelerate the development of renewable energy generation such as wind and solar.

Decarbonising Transport⁵⁰

14.3.116. The DfT published the Decarbonising Transport plan in 2021, setting out how transport emissions reductions will be delivered in order to reach net zero by 2050. This includes phasing out the sale of all non-zero tailpipe emission vehicles by 2040; for HGVs, sales of all new medium sized vehicles are to be zero tailpipe emission from 2035, with the largest vehicles being zero tailpipe emission by 2040.

Energy White Paper⁵¹

14.3.117. The Government’s energy white paper sets out the plan for growth and decarbonisation of the UK’s energy supply out to 2050, in line with the 2050 net zero target. The white paper provides a framework of policies and incentives to accelerate investment in renewable energy infrastructure and acknowledges that “*onshore wind and solar will be key building blocks of the future generation mix*”⁵².

Local Policies

14.3.118. Doncaster Council’s Local Plan³⁷ contains Strategic Policy 58: Low Carbon and Renewable Energy which states:

“The Council aims to increase the supply of low carbon and renewable energy generated in the Borough, in accordance with the principles set out below:

⁴⁸ His Majesty’s Stationery Office (2013) Energy Act 2013.

⁴⁹ HM Government (2021) Net Zero Strategy: Build Back Greener.

⁵⁰ DfT (2021) Decarbonising Transport. A Better, Greener Britain.

⁵¹ HM Government (2020) Energy White Paper. Powering our Net Zero Future.

⁵² See Page 45 of the Energy White Paper.

A) *Proposals will be supported which give priority to:*

- 1. community energy schemes that are in full or part community ownership;*
- 2. biomass and energy crop schemes especially to the north and south east of the main urban area, for example mixed woodland, single species short rotation forestry and large-scale forestry, outside of areas of high quality arable farmland;*
- 3. heat or power generation from light, water, waste and other low carbon heat sources;*
- 4. landfill and sewage gas energy generation schemes;*
- 5. wind power projects which meet the criteria of Policy 59; and*
- 6. micro-renewable energy technologies and decentralised heat and power systems within new development.*

B) *In all cases, low carbon and renewable energy proposals will be supported where they:*

- 1. have undertaken community engagement and demonstrate how they will deliver environmental, social and economic benefits;*
- 2. have no unacceptable adverse effects on local amenity and air quality, and include appropriate stand-off distances between technologies and sensitive receptors, such as residential areas;*
- 3. allow the continued safe and efficient operation of Doncaster Sheffield Airport;*
- 4. would have no unacceptable adverse effects on highway safety and infrastructure;*
- 5. have no unacceptable adverse impacts, including cumulative impacts, on the built and natural environment (including landscape character, and historic and nature conservation assets, such as Thorne and Hatfield Moors); and*
- 6. reclaim the site to a suitable and safe condition and use (such as agriculture or nature conservation) within a defined and agreed period should the development cease to be operational."*

14.3.119. The North Lincolnshire Core Strategy³⁹ contains Policy CS18: Sustainable Resource Use and Climate Change which states:

"The council will actively promote development that utilises natural resources as efficiently and sustainably as possible. This will include:

...4. Meeting required national reductions of predicted CO₂ emissions by at least 34% in 2020 and 80% in 2050 by applying the following measures on development proposals. Requiring all industrial and commercial premises greater than 1,000 square metres to provide 20% of their expected energy demand from on site renewable energy until the code for such buildings is applied nationally. Where developers consider these Codes and targets cannot be met on the basis of viability they will be required to provide proof through open book discussions with the council at the planning application stage.

Air Quality

...6. Supporting development that minimises the consumption and extraction of minerals by making the greatest possible reuse or recycling of materials in new construction, and by making best use of existing buildings and infrastructure.

...10. Ensuring development and land use helps to protect people and the environment from unsafe, unhealthy and polluted environments, by protecting and improving the quality of the air, land and water.

11. Supporting renewable sources of energy in appropriate locations, where possible, and ensuring that development maximises the use of combined heat and power, particularly at the South Humber Bank employment site and where energy demands for more than 2MW are required for development.

12. Supporting new technology and development for carbon capture and the best available clean and efficient energy technology, particularly in relation to the heavy industrial users in North Lincolnshire, to help reduce CO₂ emissions.”

Scoping Criteria

14.3.120. The following air quality and greenhouse gas comments were provided in the Planning Inspectorate Scoping Opinion dated 13 March 2023.

Table 14.5 Extract of Air Quality and Greenhouse Gas Based Scoping Table from Scoping Opinion for Tween Bridge Solar Farm

ID	REF	MATTER	PLANNING INSPECTORATE COMMENTS	APPLICANT’S RESPONSE
3.13.1	Paras 12.47 and 12.52	Road traffic and GHG emissions – decommissioning	The Scoping Report proposes to scope out an assessment of air quality impacts related to the decommissioning of the Proposed Development on the basis that road traffic and GHG emissions at the time of decommissioning are expected to be zero. The Inspectorate agrees that these matters can be scoped out.	Impacts relating to the decommissioning phase have been scoped out, as set out in Paragraph 14.1.4.
3.13.2	Paras 12.50 and 12.67	Road traffic and GHG emissions – operation	The Scoping Report proposes to scope out these matters on the basis that traffic movements during operation are expected to be minimal. The Inspectorate agrees that these matters can be scoped out.	To ensure a robust consideration of the whole lifecycle associated with the Scheme, the CO ₂ e emissions arising from road traffic during operation have been included within the GHG assessment, as set out in Paragraphs 14.3.28 to 14.3.30.

				<p>This approach has been taken since although the operational road traffic emissions are a small component of the total footprint, as the information is available, the calculated operational road traffic CO₂e emissions have been included as part of the whole lifecycle footprint.</p>
3.13.3	Para 12.66	Detailed assessment of construction traffic impacts on ecological sites	<p>On the basis that the Decision Making Thresholds set out by the Joint Nature Conservation Committee are not exceeded and that the roads affected by the Proposed Development are more than 200 m from any designated site, the Inspectorate agrees that a detailed assessment of construction traffic impacts on ecological sites can be scoped out.</p>	<p>Further discussion, including the traffic volumes generated by the Scheme close to the designated habitats, is provided in Appendix 14.1.</p>
3.13.4	Para 12.57	Impacts from dust	<p>Paragraph 12.57 of the Scoping Report refers to ecological sites within 50m of the site boundary being assessed. The impacts from dust (not limited to construction traffic) on ecological sites within 200 m of the construction area should be assessed.</p>	<p>As set out in Appendix 14.4, the IAQM guidance on the assessment of dust from demolition and construction²² states that:</p> <p><i>“An assessment will normally be required where there is: an ‘ecological receptor’ within:</i></p> <ul style="list-style-type: none"> <i>– 50 m of the boundary of the site; or</i> <i>– 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).”</i> <p>As set out in Section 14.5, the project ecologist has advised on the sensitivity of</p>

Air Quality

				ecological sites to dust within 200 m of the Draft Order Limits.
3.13.5	n/a	Air Quality Management Areas (AQMAs)	Details regarding the locations of any AQMAs relative to the site are not included in the Scoping Report. The ES should provide information to explain the locations of any AQMAs relative to the Proposed Development and assess (where relevant) any potential impacts the Proposed Development may have on them, for example due to construction traffic, and describe any mitigation measures.	<p>The locations of the nearest AQMAs are set out in Figure 14.1 in Section 14.4.</p> <p>Based on the proposed routing of construction vehicles, and the distances from the Draft Order Limits it is judged that there is no need to propose mitigation measures currently within the AQMAs.</p>

Limitations to the Assessment

14.3.121. The following assumptions and limitations are relevant to the assessment:

- The Scheme is complete and operating at full capacity in 2029;
- Construction of the Scheme will take place over a period of 30 months;
- All materials used in construction are new, with no reuse or repurposing of materials (as a worst-case assumption);
- The CEMP and outline CTMP will be in place for the duration of the construction period;
- The lifetime of the Scheme is 40 years; and
- The lifetime GHG emissions make a number of assumptions, led by Government data and strategies about decarbonisation of transport emissions. Relevant details are provided in Appendix 14.3.

14.4. Baseline Conditions

Site Description and Context

14.4.1. The majority of the site is currently used as agricultural land, with portions of the site containing peatland. At its closest points, the site is approximately 12 km to the northeast of Doncaster, and 7 km west of Scunthorpe. The M180 and A18 pass through the site, as does the Stainforth and Keadby Canal.

14.4.2. There are several isolated residential properties in proximity to the Scheme, whilst the towns of Thorne and Crowle are both within 1 km of the Draft Order Limits.

Baseline Survey Information

Air Quality

Air Quality Management Areas

14.4.3. Doncaster Council has declared eight AQMAs for exceedances of the annual mean nitrogen dioxide objective, the nearest of which, covering a section of the M18 near Bessacarr, is over 10 km from the western boundary of the Draft Order Limits.

14.4.4. North Lincolnshire Council has declared a single AQMA for exceedances of the 24-hour mean PM₁₀ objective as a result of industrial emissions. The AQMA covers part of the town of Scunthorpe and an area to the east which covers the steelworks, and which is approximately 7 km from the eastern boundary of the Draft Order Limits.

14.4.5. The locations of the AQMAs relative to the site are shown in Figure 14.1.

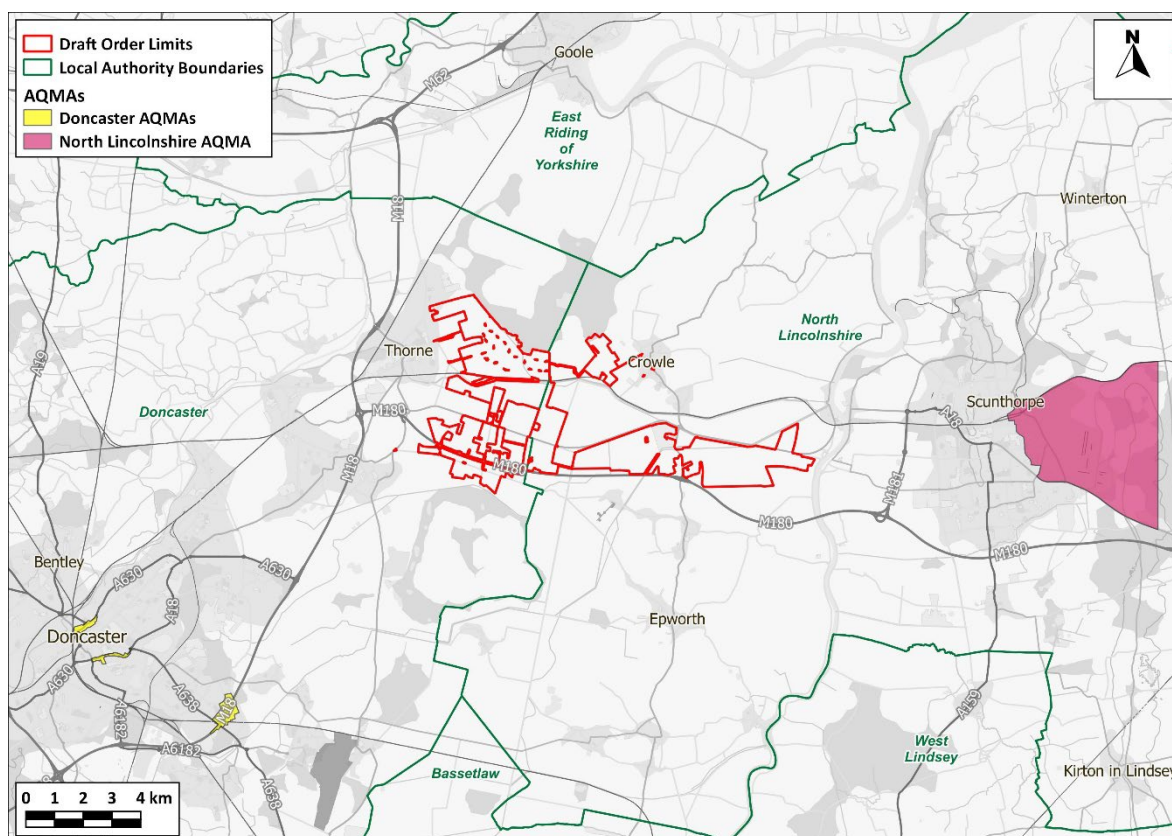


Figure 14.1 Locations of Nearest Air Quality Management Areas

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

Local Nitrogen Dioxide Monitoring

SITE ID	SITE TYPE	LOCATION	2019	2020	2021	2022	2023
Doncaster							
DT33	Rural	Hatfield Moors, off A614 Thorne Road	8.7	7.9	7.2	9.3	6.3
DT34	Roadside	A614 Bawtry Road, Hatfield Woodhouse	18.5	14.4	13.7	16.3	13.1
DT35	Rural	Hatfield Moors, Hollinbridge Lane	9.9	-	8.3	10.4	8.1
DT38	Urban Background	Church Road, Stainforth	15.6	13.8	14.1	13.5	12.1
DT50	Roadside	A614 King Street, Thorne	38.0	28.5	30.4	30.6	27.9
North Lincolnshire							
2	Roadside	Scotter Road	24.0	21.5	24.6	24.3	23.5
3	Roadside	B&Q	18.0	17.5	17.2	19.8	16.5
4	Roadside	Hilton Avenue	20.0	19.0	21.0	20.7	18.6
24	Roadside	Burringham Road / Woodside Drive	-	-	17.3	15.9	14.3
OBJECTIVE			40				

Local Particulate Matter Monitoring

- 14.4.9. Doncaster Council measures PM₁₀ and PM_{2.5} concentrations at four automatic monitors within its area, whilst North Lincolnshire monitors PM₁₀ at all six of its automatic monitors and concentrations of PM_{2.5} at two of the monitors.
- 14.4.10. Although the monitors are all located more than 5 km from the Draft Order Limits, there have been no exceedances of either the PM₁₀ or PM_{2.5} annual mean objectives at any monitor across Doncaster or North Lincolnshire in recent years^{14,15}, whilst concentrations of PM_{2.5} also met the AMCT at both monitor locations in Doncaster. An exceedance of the 24-hour mean PM₁₀ objective was recorded in 2022 at one of the monitors located in an industrial setting in Scunthorpe.
- 14.4.11. Concentrations of PM₁₀ and PM_{2.5} in 2023 in North Lincolnshire have reduced compared to 2019, whilst in Doncaster none of the automatic monitors have measured five consecutive years of data since 2019 to conclude any trends in concentrations.

Exceedances of the EU Limit Values

Air Quality

14.4.12. Defra’s Compliance data¹⁷ do not identify any exceedances of the annual mean or 1-hour mean objectives across either Doncaster or North Lincolnshire. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the Scheme by the time that it is operational.

14.4.13. As discussed in Paragraph 14.3.93, Defra has produced an Air Quality Plan⁴⁰ to tackle roadside nitrogen dioxide concentrations in the UK. Within this Plan, whilst North Lincolnshire is not identified, Doncaster Council is identified as having limit value exceedances in or beyond 2017, but not beyond 2020, thus the Plan does not require the authority to undertake any further action. A High Court judgement⁵⁴ declared the Plan unlawful with regard to its application to the 45 local authority areas in which exceedances were projected beyond 2017, but not beyond 2020. The judgement required the 33 local authorities where exceedances were projected beyond 2018 to “develop and implement a plan designed to deliver compliance in the shortest time possible”; Doncaster Council is not one of these authorities, having no projected exceedances beyond 2018, thus it was not required to produce a plan.

Background Concentrations

14.4.14. Estimated background concentrations in the study area are set out in Table 14.7 and are all well below the objectives. A range of values is presented as the Draft Order Limits cover multiple 1 x 1 km grid squares.

Table 14.7 Estimated Annual Mean Background Pollutant Concentrations in 2023 (µg/m³)

YEAR	NO ₂	PM ₁₀	PM _{2.5}
2023	5.8 – 8.0	11.3 – 16.3	5.7 – 6.5
OBJECTIVE / AMCT^a	40	40	20^b / 10^a

^a To be met by 2040.

^b The 20 µg/m³ PM_{2.5} objective is not in Regulations and there is no requirement for local authorities to meet it.

Greenhouse Gases

14.4.15. A report by Natural England on UK carbon sequestration⁵⁵ estimates average net GHG emissions from land used for arable agriculture to be 0.29 tCO_{2e}/ha/yr. Based on a total Draft Order Limits area of 2,526 hectares, this would result in baseline annual GHG emissions of approximately 733 tCO_{2e}, which is a very small amount.

14.4.16. There are, however, areas within the Draft Order Limits that contain peatland, which has the potential to sequester and store GHGs, and thus it acts as a carbon sink, leading to a reduction in the existing baseline emissions associated with the Scheme in its current use. This may not be the case as poor condition, degraded and dried out peat can be a net emitter of carbon. As such it is unlikely the existence of peat at the Scheme will have a large impact on the baseline

⁵⁴ Royal Courts of Justice (2018) Judgement on Case No. CO/4922/2017.

⁵⁵ Natural England (2021) Carbon storage and sequestration by habitat: a review of the evidence (second edition).

carbon emissions. The volume and condition of peat at the Scheme, and subsequently GHG emissions sequestered or released, will be available for the final ES.

14.4.17. Overall, baseline GHG emissions associated with the Scheme are very small.

14.5. Assessment of Likely Significant Effects

Air Quality

Construction

Construction Traffic

- 14.5.1. The construction of the Scheme will generate a total of 39,644 construction vehicle movements (allowing for contingency)⁵⁶; these will comprise articulated lorries, tipper trucks and low loaders. In addition to the HDV movements, there will also be 103,371 LDV movements associated with construction workers, sub-contractors and skip collections. Assuming that construction is completed within 30 months, this equates to an approximate Annual Average Daily Traffic (AADT) flow of 170 two-way movements, of which 47 will be HDV movements⁵⁶.
- 14.5.2. This total trip generation (47 HDVs and 123 LDVs) is well below the screening criteria of 500 LDVs and 100 HDVs set out in the EPUK/IAQM guidance¹².
- 14.5.3. There will be five primary construction compounds used during the construction phase. Vehicles will access and egress the southern areas of the scheme⁵⁷ via the A18, Low Levels Bank and an unnamed road parallel to the A18⁵⁸; parcels of land to the north of the Stainforth and Keadby Canal⁵⁷ will be accessed via Marsh Road (Crowle) and Coulman Street / Moor Edges Road⁵⁸, thus avoiding the centre of Thorne. Vehicles will distribute in both directions on the strategic road network, including the M180 and M18, such that fewer than 47 HDVs will use any single road.
- 14.5.4. As set out in paragraph 14.4.3, Doncaster Council has declared an AQMA along a section of the M18 to the south of the Scheme; however, it is understood that HDVs will likely travel via Goole or Immingham ports, which are located to the north of the Scheme, and will not therefore pass through the AQMA. With respect to LDVs, if the entire workforce is based in Doncaster, then the number of LDV trips (123 movements) could exceed the screening criteria in the AQMA¹², however this is judged unlikely, since in reality, workers will be based across Doncaster, North Lincolnshire or the East Riding of Yorkshire⁵⁹, such that the trips are unlikely to exclusively originate from the south.
- 14.5.5. Based on the traffic generation, the impacts from construction traffic on local air quality will be negligible and occur for a transient period of time. It is, therefore, reasonable to conclude that the overall effect on local air quality will be 'not significant'.

⁵⁶ As set out in Section 12.5 of Chapter 12: Transport and Access.

⁵⁷ See Appendix 4.1 for the locations of each land parcel.

⁵⁸ As set out in Section 2.18 of Chapter 2: Project Description and Appendix 12.2: Construction Traffic Management Plan.

⁵⁹ As set out in Section 11.5 of Chapter 11: Socio Economics.

Air Quality

On-Site Exhaust Emissions

14.5.6. The IAQM guidance²² states:

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

14.5.7. The site is very large and covers 2,526 hectares, , including the National Grid Substation and RWE Underground Export Cable Route Assessment Area, the majority of which is more than 50 m from any sensitive receptors. As such, whilst the exact siting and numbers of NRMM to be used onsite during the construction phase is unknown, the distance between any areas of operation and sensitive receptors will be maximised, as far as possible. Further, all vehicles and plant will be switched off when not in use; this will be specified as part of the CEMP.

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

Construction Dust and Particulate Matter Emissions

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

14.5.10. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix 14.4), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

14.5.11. The site is used for agricultural land, thus there will be no demolition on site.

Earthworks

14.5.12. The characteristics of the soil at the site have been defined using the British Geological Survey’s UK Soil Observatory website⁶⁰, as set out in Table 14.8. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 14.8 Summary of Soil Characteristics

CATEGORY	RECORD
Soil Layer Thickness	Deep

⁶⁰ British Geological Survey (2025) UK Soil Observatory Map Viewer.

Soil Parent Material Grain Size	Mixed (Primarily Argillaceous ^a to Arenaceous ^b and Peat)
European Soil Bureau Description	Mixed (Primarily Riverine Clay and Floodplain Sands and Gravel, Eolian Sand, Peat, Glaciolacustrine and Eolian Sand)
Soil Group	Mixed (Primarily Light (Sandy), Light (Silty), Medium and Heavy)
Soil Texture	Mixed (Clay to Clayey Loam ^c to Silty Loam, Sand and Peat)

^a grain size < 0.06 mm.

^b grain size 0.06 – 2.0 mm.

^c a loam is composed mostly of sand and silt.

14.5.13. The site covers 2,526 hectares and most of this will be subject to earthworks, including the excavation of trenches for cabling, directional drilling and ground preparation for the five substations and BESS. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil).

14.5.14. Based on the example definitions set out in Table 14.4.1 in Appendix 14.4, the dust emission class for earthworks is considered to be *large*.

Construction

14.5.15. The Scheme requires the construction of a single main substation building and compound and the installation of the solar panel arrays along with the erection of a perimeter fence. In addition, smaller temporary construction compounds will be located across the site as the Scheme is built out. Dust will arise from vehicles travelling over unpaved ground, the handling of soil during the installation of the electric cabling, the handling of concrete and stone chippings for the substation and piling to support the solar panel frames.

14.5.16. Based on the example definitions set out in Table 14.4.1 in Appendix 14.4, the dust emission class for construction is considered to be *large*.

Trackout

14.5.17. On average, there will be approximately 28 HDVs leaving the Scheme; these trips will, however, be distributed across the five construction compounds. Chapter 12: Transport and Access estimates that on average, a maximum of seven HDVs would leave the largest land parcel (Parcel D)⁵⁷. Whilst there will be periods during peak construction when there are more than seven HDVs leaving any parcel, it is judged unlikely that there would be more than 50 HDVs, which may track out dust and dirt, exiting any one of the construction compounds per day. The peak number of vehicles exiting any one of the construction compounds will be confirmed for the ES.

14.5.18. Taking a conservative approach to the example definitions set out in Table 14.4.1 in Appendix 14.4, and to allow for some variability in the peak traffic volumes, the dust emission class for trackout is considered to be *medium*.

14.5.19. Table 14.9 summarises the dust emission magnitude for the Scheme.

Air Quality

Table 14.9 Summary of Dust Emission Magnitude

SOURCE	DUST EMISSION MAGNITUDE
Demolition	None
Earthworks	Large
Construction	Large
Trackout	Medium

Sensitivity of the Area

- 14.5.20. This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM₁₀ concentrations.
- 14.5.21. The IAQM guidance explains that residential properties are ‘high’ sensitivity receptors to dust soiling (Table 14.4.2 in Appendix 14.4). Residential properties are also classified as being of ‘high’ sensitivity to human health effects. The majority of the area within 100 m of the Draft Order Limits is agricultural land, however, there are approximately 80 residential properties within 20 m of the Draft Order Limits (see Figure 14.3), and over 100 within 50 m. These are largely located next Land Parcels A, B and D.

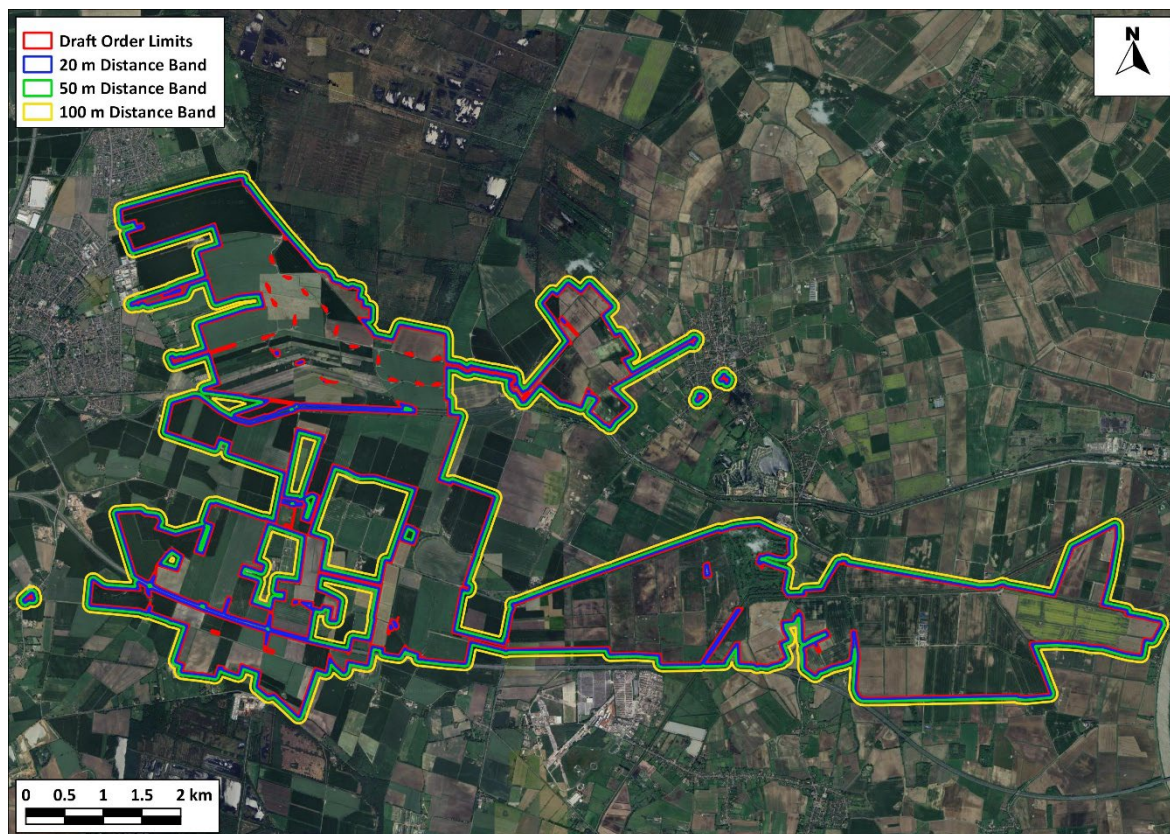


Figure 14.3 20 m, 50 m and 100 m Distance Bands Around Draft Order Limits

Imagery ©2025 TerraMetrics.

- 14.5.22. Table 14.9 shows that the dust emission magnitude for trackout is *Medium*, and Table 14.4.3 in Appendix 14.4 thus explains that there is a risk of material being tracked 250 m from the five construction compounds.
- 14.5.23. There are approximately 15 residential dwellings within 20 m of the routes used by vehicles exiting the individual construction compounds, the majority of which are adjacent to compound 2, whilst there are additional properties within 50 m of compounds 1 and 2, and The Lincolnshire Golf Course is adjacent to the exit point for construction compound 5 (see Figure 14.4).

Air Quality

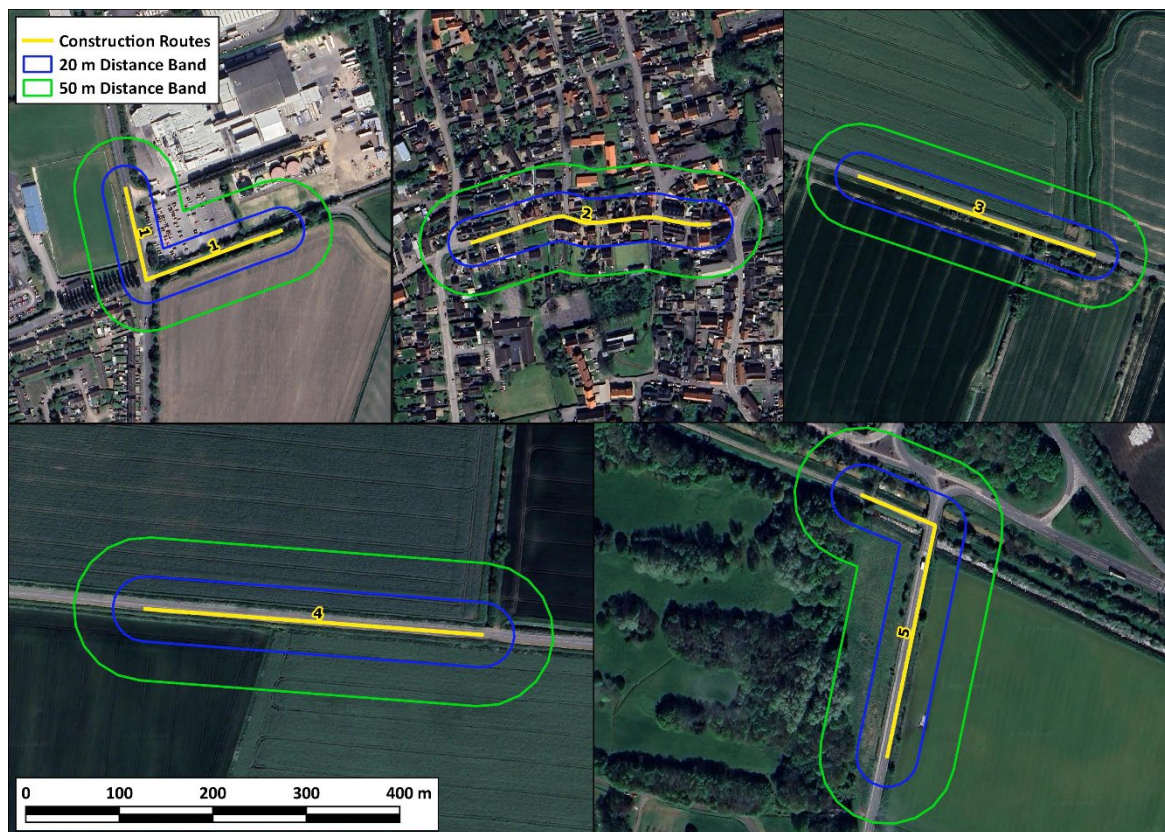


Figure 14.4 20 m and 50 m Distance Bands Around Roads Used by Construction Traffic within 250 m of the Exits for Each Construction Compound

Imagery ©2025 TerraMetrics.

Sensitivity of the Area to Effects from Dust Soiling

- 14.5.24. Using the information set out in Paragraph 14.5.21 and Figure 14.3, alongside the matrix set out in Table 14.4.3 in Appendix 14.4, the area surrounding the onsite works is of 'high' sensitivity to dust soiling.
- 14.5.25. Using the information set out in Paragraph 14.5.23 and Figure 14.4 alongside the same matrix, the area is of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

- 14.5.26. The matrix in Table 14.4.4 in Appendix 14.4 requires information on the baseline annual mean PM₁₀ concentration in the area. With the exception of one monitor downwind of an asphalt plant, PM₁₀ concentrations measured across Doncaster and North Lincolnshire over the last five years have been below 24 µg/m³ (the threshold concentration in Table 14.4.4 in Appendix 14.4).
- 14.5.27. Using the information set out in Paragraph 14.5.21 and Figure 14.3, alongside the matrix set out in Table 14.4.4 in Appendix 14.4, the area surrounding the onsite works is of 'low' sensitivity to human health effects.

14.5.28. Using the information set out in Paragraph 14.5.23 and Figure 14.4 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of ‘low’ sensitivity.

Sensitivity of the Area to any Ecological Effects

14.5.29. The guidance considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. Thorne Moor Special Area of Conservation (SAC), Thorne, Crowle and Goole Moors Site of Special Scientific Interest (SSSI) and Hatfield Chase Ditches SSSI are all within 20 m of the Draft Order Limits; Hatfield Moors SAC and SSSI is within 100 m of the southern Draft Order Limits.

14.5.30. The guidance considers SACs and SSSIs with dust-sensitive features to be of ‘high’ and ‘medium’ sensitivity, respectively; Tyler Grange, the project ecologists confirmed that the designated habitats (for example, moorland, bogs and heathland) may be affected by dust soiling, whilst species such as invertebrates and nightjars could also be sensitive to dust.

14.5.31. Table 14.4.5 in Appendix 14.4 shows that the areas around the construction works are of ‘high’ sensitivity to ecological effects. Only Hatfield Chase Ditches SSSI is within 20 m of the route used by construction vehicles exiting compound 5, therefore the area surrounding roads along which material may be tracked from the site is of ‘medium’ sensitivity. There would be no change to this conclusion if the 200 m distance buffer, as set out in the Planning Inspectorate’s Scoping Opinion in Table 14.5 (Comment ID 3.13.4) was applied.

Summary of the Area Sensitivity

14.5.32. Table 14.10 summarises the sensitivity of the area around the proposed construction works.

Table 14.10 Summary of the Area Sensitivity

EFFECTS ASSOCIATED WITH:	SENSITIVITY OF THE SURROUNDING AREA	
	ON-SITE WORKS	TRACKOUT
Dust Soiling	High	High
Human Health	Low	Low
Ecological	High	Medium

Risk and Significance

14.5.33. The dust emission magnitudes in Table 14.9 have been combined with the sensitivities of the area in Table 14.10 using the matrix in Table 14.4.6 in Appendix 14.4, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 14.11. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 14.6 (Step 3 of the assessment procedure).

Air Quality

Table 14.11 Summary of Risk of Impacts without Mitigation

SOURCE	DUST SOILING	HUMAN HEALTH	ECOLOGY
Demolition	None	None	None
Earthworks	High Risk	Low Risk	High Risk
Construction	High Risk	Low Risk	High Risk
Trackout	Medium Risk	Low Risk	Medium Risk

14.5.34. The IAQM guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be ‘not significant’²².

Operation

14.5.35. During operation, activities onsite would amount to servicing and maintenance of plant and equipment associated with the Scheme. During operation, the Scheme will generate approximately one visit to the Scheme per land area⁵⁷ per day on average, as well as one visit per day to each land parcel associated with a Shepherd tending to sheep grazing on site; it is likely that the vehicles would be either a 4x4 or 7.5 tonne van. As set out in Chapter 12: Transport and Access, this equates to approximately 20 vehicles per day. This trip generation is well below the screening criteria of 500 LDVs and 100 HDVs set out in the EPUK/IAQM guidance¹².

14.5.36. Based on the traffic generation, the impacts from operational traffic on local air quality will be negligible. It is, therefore, reasonable to conclude that the overall effect will be ‘not significant’.

Greenhouse Gases

Embedded Carbon

14.5.37. As described in Paragraph 14.3.19, the embedded GHGs in construction materials and components have been calculated using a range of resources (see Appendix 14.3). A summary of the embedded carbon emissions is provided in Table 14.12.

Table 14.12 Embedded Carbon Emissions

Scheme Component	Embedded Carbon (TCO ₂ e)	% of Embedded Carbon
PV Panels	229,819	46.3%
PV Framework	26,708	5.4%

Cables	39,861	8.0%
HV Infrastructure (Inverters, Transformers, Switchgear)	31,260	6.3%
BESS (Batteries, Containers, HVAC)	166,783	33.6%
CCTV	1,542	0.3%
Total	495,973	100%

14.5.38. The total CO₂e emissions associated with the embedded carbon in construction materials and components is 495,973 tonnes.

Construction Site Activities

14.5.39. As described in Paragraph 14.3.22, emissions associated with construction site activities can be estimated based on multiplying 2% of the area within the Draft Order Limits by the emission rate of 25 kgCO₂e.

14.5.40. The total CO₂e emissions associated with construction site activities is 12,630 tonnes.

Construction Transport

14.5.41. The calculation of construction transport related GHG emissions for the Scheme have been calculated for construction site staff, materials transport by road and shipping separately as shown in Table 14.13.

Table 14.13 Construction Transport Emissions

Construction Transport Category	Carbon Emissions (TCO ₂ e)
Materials Transport – Road	1,576
Materials Transport – Shipping	35,374
Construction Staff Travel	401
Total	37,351

14.5.42. The total CO₂e emissions from construction transport for the Scheme is 37,351 tonnes.

Air Quality

Operational Traffic

- 14.5.43. The calculation of operational transport related GHG emissions for the Scheme multiplies the calculated GHG emission factors for an average Light Goods Vehicle by the average distance travelled. Total vehicle numbers were provided by the Project’s Transport Consultant, Pegasus.
- 14.5.44. The total operational transport GHG emissions are calculated as 1,013 tonnes CO₂e over the 40-year lifetime of the Scheme.

Repair, Maintenance and Refurbishment

- 14.5.45. GHG emissions relating to the repair, maintenance and refurbishment of the Scheme over its lifetime are calculated to be 623,197 tonnes. The largest contributions to these emissions are batteries (assuming three replacements in 40 years) and PV panels (assuming one full replacement in 40 years). Further details are provided in Appendix 14.3.

Total GHG Emissions Footprint

- 14.5.46. Table 14.14 summarises the GHG emissions for the Scheme in the lifetime for each footprint element; where possible, the calculation includes the illustrative underground export cable corridor. This will be further developed and refined in the final ES based on final Scheme data.
- 14.5.47. As shown in Table 14.14, the Scheme will result in total GHG emissions over its lifetime of 1,170,163 tonnes CO₂e.

Table 14.14 Lifetime GHG Footprint for the Scheme

Phase	Footprint Element	Tonnes of CO ₂ e Emissions	% of Lifetime Emissions
Construction	Embedded Carbon	495,973	42%
	Site Activities	12,630	1%
	Transport	37,351	3%
	Construction Total	545,954	47%
Operation	Transport	1,013	0%
	Repair, Maintenance and Refurbishment	623,197	53%
	Operation Total	623,602	53%
Total	-	1,170,163	100%

Carbon Intensity Factor

14.5.48. The Scheme has the potential to generate approximately 1,000,000 MWh of electricity each year. Over the lifetime of the Scheme this is estimated to equate to 37,925,500 MWh which assumes a 0.45% annual degradation rate in energy production, reset after 20 years to account for replacement of the PV panels. This is a basic estimate and a more detailed and robust estimate, accounting for the design of the Scheme and degradation of PV cells over its 40-year lifetime will be provided in the final ES. Based on a lifetime GHG footprint of 1,170,163 tCO₂e, this equates to a carbon intensity factor of 0.030 kgCO₂e per kWh. Table 14.15 sets out the carbon intensity factors for electricity generation from a range of commonly used fuels taken from the latest DESNZ fuel mix disclosure data⁶¹.

Table 14.15 Carbon Intensity Factors for Common Fuels⁶¹

Fuel	Unit	Carbon Intensity Factor
Coal	kgCO ₂ e/kWh	1.046
Natural Gas	kgCO ₂ e/kWh	0.375
Grid Average	kgCO ₂ e/kWh	0.171
Scheme	kgCO ₂ e/kWh	0.030

14.5.49. The carbon intensity factor associated with the Scheme is significantly lower than other fuel types set out in Table 14.15, and the UK grid average for 2023/24. Since the carbon intensity factor is lower, the transition to electricity generated by the Scheme will lead to national reductions in GHGs.

14.5.50. It should be noted that this comparison compares the lifecycle emissions of construction and operation of the Scheme to operational emissions of other power generation only. The final ES will provide further contextualisation of the GHG benefits of the Scheme in relation to conventional power generation and lifecycle emissions of other renewable developments.

Consistency with Policy

14.5.51. The second step in determining the likely significant effects is to demonstrate the Scheme's consistency with national and local policy, which is described in the following sections.

National Policies

14.5.52. In terms of national policy, the key national policies are contained within the NPS and NPPF.

⁶¹ DESNZ (2024) Fuel Mix Disclosure Data Table 01/04/2023 – 31/03/2024.

Air Quality

NPS

14.5.53. Section 5.3 of EN-1 outlines the requirements for the GHG assessment; the assessment has demonstrated that the Scheme is consistent with the requirements in the following ways:

- A whole life GHG assessment has been completed which includes the emissions associated with each stage of the Scheme and components associated with each stage (such as embodied carbon during construction); since the decommissioning phase will take place after 2050, emissions associated with the decommissioning have been scoped out (as agreed with PINS – see Table 14.5);
- Mitigation, secured by design and through DCO requirement, have been identified to minimise the overall impacts of the Scheme; and
- The assessment has demonstrated that the Scheme will generate energy with a lower carbon intensity factor than many other fuels, thus, the transition to energy generated by the Scheme will result in a net reduction in carbon emissions. Overall, there will be no residual GHG emissions associated with the Scheme.

14.5.54. There are no relevant sections within EN-3.

NPPF

14.5.55. Paragraphs 164 b), 165 and 168 are of particular relevance to the GHG assessment, which are all within Part 14 of the NPPF.

14.5.56. Paragraph 164 b) requires that: *“New development should be planned in ways that can help reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government’s policy for national technical standards.”*

14.5.57. The Scheme will provide an alternative electricity supply to fossil fuels and non-zero emission sources; in this respect, it will directly reduce GHG emissions. The Scheme therefore complies with Paragraph 164 b) of the NPPF.

14.5.58. Paragraph 165 requires that: *“To help increase the use and supply of renewable and low carbon energy and heat, plans should: a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts); b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for colocating potential heat customers and suppliers.”*

14.5.59. Whilst this paragraph strictly applies to development plans, the Scheme will provide an extensive source of renewable energy which will subsequently enable future developments to connect to a renewable energy supply. The Scheme therefore does not conflict with the intentions of Paragraph 165 of the NPPF.

14.5.60. Paragraph 168 requires that: *“In determining planning applications, local planning authorities should a) not require applicants to demonstrate the overall need for renewable or low carbon*

energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions and b) recognise that small-scale and community-led projects provide a valuable contribution to cutting greenhouse gas emission”.

- 14.5.61. The assessment has demonstrated that the Scheme will result in electricity generation with a lower carbon intensity than fuels that are currently widely used (and the National Grid average) and has presented the impacts associated with the construction and operation phases of the Scheme.

Commitments to Net Zero

- 14.5.62. In addition to the NPS and NPPF, it is appropriate to review how the Scheme aligns with national commitments to net zero by 2050. The CCC has established a "balanced net zero pathway" which considers feasible and cost-effective policy and technology interventions to ensure the UK can meet its new net zero target.

- 14.5.63. For power generation under this scenario, the CCC considers that 100% of power generation by 2050 will be low carbon, and for ground transport it forecasts that all ground transportation (apart from small number of HGVs) will be electrically powered. The CCC therefore, forecasts that power and ground transportation sectors are largely decarbonised by 2050 with any residual emissions removed through technical and/or natural means.

- 14.5.64. In providing renewable, low carbon energy, the Scheme therefore supports the Government in the transition to net zero, by providing energy which will allow the progressive removal of higher carbon electricity generation such as coal and natural gas.

- 14.5.65. The Scheme does not, therefore, conflict with efforts to meet the national net zero target and will actively contribute to the transition to net zero.

Summary

- 14.5.66. Overall, it is demonstrated that the Scheme complies with the requirements of national planning policy relevant to GHG emissions.

Local Policies

- 14.5.67. Overall, the Scheme aligns with Strategic Policy 58 of Doncaster Council's Local Plan since:
- it presents a scheme that will generate power from light (Section A); and
 - it has demonstrated that it will deliver an environmental benefit insofar as the Scheme results in energy with a lower carbon intensity factor than other fuels (Section B).
- 14.5.68. Overall, the Scheme aligns with Policy CS18 of the North Lincolnshire Core Strategy since:
- it presents a scheme that utilises natural resources efficiently and sustainably;
 - Contributes to reducing national CO₂ emissions (Paragraph 4);
 - Where possible, the construction phase will reuse and recycle materials (Paragraph 6); and

Air Quality

- Will contribute to improving the quality of the air, since the use of solar-generated energy will reduce the need for combustion processes (Paragraph 10).

14.5.69. In relation to the local policies, the Scheme may also incorporate an electric vehicle charging hub and vehicle parking; further details will be available for the ES, however, it is anticipated that the hub would be available to members of the local community.

14.6. Achieving Compliance with the PM_{2.5} Targets

14.6.1. The monitoring data described in Section 14.4 demonstrate that annual mean PM_{2.5} concentrations are currently below the AMCT, which is to be met by 2040, at both monitors in Doncaster.

14.6.2. Defra have set out in their Interim Planning Guidance⁸ two questions designed to consider whether a development supports the AMCT and PERT PM_{2.5} targets. The first question is “*How has exposure to PM_{2.5} been considered when selecting the development site?*”, whilst the second question is “*What actions and/or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM_{2.5} and its precursors?*”.

14.6.3. Whilst the Scheme itself is not classed as relevant exposure, as explained later in Section 14.7, ways to minimise PM_{2.5} emissions have been considered in the following ways:

- emissions during the construction phase will be managed through the use of appropriate mitigation measures and set out within a CEMP and Outline CTMP secured by DCO requirement;
- A Delivery Management System will be in place to coordinate and control deliveries, and vehicles will not be allowed to idle on the public highway;
- construction vehicles will be diverted away from populated areas (such as Thorne), thus minimising the population exposed to vehicle emissions;
- the planting and landscaping strategy will include new hedgerow planting, hedgerow trees, blocks of woodland planting and small copses to act as a buffer between the Scheme and sensitive receptors;
- during construction, contractors will be housed in accommodation close to the Scheme, so that vehicle miles are reduced;
- contractors will be transported to the Site using minibuses, to minimise the number of private vehicles accessing the site;
- construction traffic movements through Crowle will be managed and timed to avoid the peak hours on the highway network and the busiest times of the school day to reduce exposure to vehicle emissions;
- the Scheme includes two Electric Vehicle charging points, which will be available to the community; and

- once operational, the Scheme will provide energy to meet the needs of over 240,000 homes, thus facilitating a transition away from combustion sources.

14.6.4. It is considered that the development complies with the requirements to deliver achievement of the AMCT and PERT by 2040 as appropriate action has been taken to minimise emissions of PM_{2.5} and its precursors as far as is reasonably practicable.

14.7. Mitigation, Enhancement and Residual Effects

Mitigation by Design

Air Quality

14.7.1. The EPUK/IAQM guidance¹² advises that good design and best practice measures should be considered, whether or not more specific mitigation is required.

14.7.2. The Scheme incorporates the following best practice measures:

- Adoption of a CEMP and Outline Construction Traffic Management Plan (CTMP) to minimise the environmental impacts of the construction works; and
- Routing arrangements during the construction period to ensure that they do not travel through the village of Thorne, which will be secured by DCO requirement as part of the CEMP and CTMP.

Greenhouse Gases

14.7.3. Reducing GHG emissions during construction would include consideration of:

- Minimising the use of construction materials through recycling and reuse of materials where possible, and ensuring that surplus materials are not ordered;
- The procurement of sustainable materials, with consideration of the embedded carbon footprint of the material, from the extraction of the raw materials to the production of the final construction products; and
- The transport of products between the factory and the Scheme.

14.7.4. A CEMP will be available for the ES, setting out mitigation measures and environmental management controls for the construction works. The CEMP will define, amongst other things, the hours of operation, dust control measures, vehicle emissions control, and a schedule of all plant, non-road and road mobile vehicles. In addition to the environmental management measures and procedures (such as noise control, protection of trees and ecology and water usage), consideration shall also be given to construction materials quantities and best practice environmental standards for construction sites. The Site will also be registered with the UK's Considerate Constructors Scheme.

14.7.5. During construction, construction materials with low embedded carbon and from sustainable sources will be used where possible, and good practice measures will be employed on site to minimise energy use from construction activities. If possible, materials will be reused or recycled to minimise waste to landfill.

Air Quality

- 14.7.6. In terms of construction transport, the outline CTMP will reduce the environmental impact from the construction stage and optimise the efficient delivery and collection of goods and materials to the Scheme.
- 14.7.7. Further, the Scheme will coordinate minibuses to shuttle the majority of general operatives to each of the construction compounds to minimise the number of vehicle movements generated during the construction phase.

Additional Mitigation

Air Quality

Construction

- 14.7.8. Measures to mitigate dust emissions will be required during the construction phase of the Scheme in order to minimise effects upon nearby sensitive receptors.
- 14.7.9. The site has been identified as a *High Risk* site during earthworks and construction and *Medium Risk* for trackout, as set out in Table 14.11. Comprehensive guidance has been published by the IAQM⁶² that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction⁶². This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix 14.6.
- 14.7.10. The mitigation measures should be integrated into the CEMP and may require monitoring.
- 14.7.11. Where mitigation measures rely on water, only sufficient water will be applied to damp down the material and unnecessary usage will be avoided. There should not be any excess to potentially contaminate local watercourses.

Operation

- 14.7.12. The assessment has demonstrated that the Scheme would not cause any exceedances of the air quality objectives, and that the overall effect of the Scheme is 'not significant'. It is, therefore, not considered appropriate to propose mitigation measures beyond those included by design.
- 14.7.13. Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law).

Greenhouse Gases

- 14.7.14. No additional mitigation measures are required for the Scheme.

Mitigation Measures

⁶² IAQM (2018) Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites v1.1

14.7.15. A summary of the mitigation measures proposed for air quality and greenhouse gas emissions are set out in Table 14.16.

Table 14.16 Mitigation

Ref	Measure to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects	How measure would be secured		
		By Design	By S.106	By DCO Requirements
1	Adoption of CEMP			X
2	Production of a Draft CTMP			X
3	Routing restrictions through Thorne			X
4	Construction dust mitigation measures outlined in Appendix 14.6.			X

Enhancements

Air Quality

14.7.16. In terms of air quality, it is unlikely that the Scheme will generate any enhancements during the construction phase. During operation, the Scheme will enhance air quality beyond the Draft Order Limits since it will reduce the need for combustion to generate electricity.

Greenhouse Gases

14.7.17. It has been demonstrated that the Scheme leads to a source of electricity with a lower carbon intensity factor than many other fuel types; the transition from non-renewable sources to energy generated by the Scheme will, therefore, lead to reductions in CO₂e emissions over the lifetime of the Scheme.

Residual Effects

Air Quality

Construction

14.7.18. The IAQM guidance²² is clear that, with appropriate mitigation in place, the residual effects will normally be ‘not significant’. The mitigation measures set out in this section and Appendix 14.6 are based on the IAQM guidance. With these measures in place and effectively implemented, the residual effects are judged to be ‘not significant’.

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

Operation

Air Quality

14.7.20. The residual effects will be the same as those identified in Section 14.5. The overall effects of the Scheme will be ‘not significant’.

Greenhouse Gases

14.7.21. Table 14.17 summarises the residual significance of effects of the Scheme’s GHG emissions, following the IEMA approach summarised in Table 14.4.

14.7.22. The assessment considers the context of the Scheme’s GHG emissions, as well as the compliance of the Scheme with relevant national and local policies and the robustness, timeliness, and efficacy of the mitigation to avoid and reduce GHG emissions.

Table 14.17 Assessment of Effects in Accordance with IEMA Guidance²⁴

HEMA STEP	DESCRIPTION	ASSESSMENT	ALIGNMENT WITH IEMA ²⁴
Step 1	Context	The Scheme will result in GHG emissions, primarily during the construction phase; operational emissions are a small proportion of the total footprint. The Scheme will provide developments access to electricity with a lower carbon intensity factor than other fuels. Emissions arising from road transport during operation can decarbonise in line with national trajectories.	Beneficial: The Scheme’s lifetime net GHG emissions are below zero and it causes a reduction in atmospheric GHG concentrations, compared to the without-Scheme baseline.
Step 2	Consistency with Policy	The Scheme has been demonstrated to meet the requirements of national and local policies relating to GHG emissions and climate change.	
	Robustness, timeliness and efficacy of mitigation	The Scheme will adopt good practice measures to avoid and reduce GHG emissions during the construction phase and over its lifetime. The majority of the measures to avoid and reduce GHG emissions are designed in and will therefore be delivered from the operation of the Scheme onwards.	

14.7.23. Although construction of the Scheme contributes to local and national GHG emissions, its lifetime carbon intensity factor is lower than operational carbon intensity factors for other electricity generation methods, and the Scheme will therefore lead to a net reduction in GHG emissions compared to conventional UK electricity generation methods it is designed to replace.

14.7.24. The Scheme therefore provides support towards the UK’s target for net zero carbon emissions by 2050. The Scheme has also been demonstrated to meet all relevant policies related to GHG emissions and climate change.

- 14.7.25. Based on the significance criteria set out in Table 14.4, it is therefore judged that the Scheme will have an overall beneficial impact in terms of GHG emissions, and thus the effect is 'significant'.

14.8. Cumulative and In-Combination Effects

Air Quality

Construction

- 14.8.1. As stated in Paragraph 14.5.2, the traffic generated by the Scheme during construction is below screening criteria set out in the EPUK/IAQM guidance¹². These screening criteria are designed to provide a threshold, below which the effects will be 'not significant', regardless of baseline conditions. As such, it is judged that the cumulative effects of construction traffic emissions will be 'not significant'.
- 14.8.2. The IAQM guidance²² is clear that, with appropriate mitigation measures in place, any residual construction dust effects from an individual site will be 'not significant'. The guidance also suggests that cumulative construction dust impacts are only likely where sites are within 250 m of each other. Work would also have to be taking place concurrently in areas of both sites that are close to a receptor in order for cumulative effects to occur.
- 14.8.3. In accordance with the mitigation measures set out in Appendix 14.6, if there is concurrent construction work on sites within 250 m of each other, the construction contractors should *"hold regular liaison meetings with other high risk construction sites within 250 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised"*.
- 14.8.4. It is anticipated that any construction sites within 250 m would adopt appropriate mitigation measures to limit emissions of dust, would hold the liaison meetings recommended above and would ensure that plans are co-ordinated to minimise impacts upon the most sensitive receptors. With these measures in place, the cumulative effect of construction activities should be 'not significant'.

Operation

- 14.8.5. As stated in Paragraph 14.5.37, once operational, traffic generated by the Scheme is well below screening criteria set out in the EPUK/IAQM guidance¹². These screening criteria are designed to provide a threshold, below which the effects will be 'not significant', regardless of baseline conditions.
- 14.8.6. As such, it is judged that the cumulative effects of Scheme-generated road traffic emissions will be 'not significant'.

Greenhouse Gases

- 14.8.7. GHG emissions from all projects will contribute to climate change; globally, not just locally. As set out in the IEMA guidance²⁴:

"Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other".

Air Quality

- 14.8.8. This statement relates to ‘cumulative’ on a global scale. The definition of ‘cumulative effects’ in the context of GHGs and climate change therefore goes far beyond the typical definition of cumulative effects for EIA, which tends to focus on other proposed projects in the vicinity of the Scheme. The IEMA guidance recognises that any individual project in isolation would unlikely significantly affect global warming and climate change except within the context of global anthropogenic emissions. As such, the assessment in following the IEMA approach is intrinsically cumulative and the cumulative GHG effects are judged to be not significant.

14.9. Summary

Introduction

- 14.9.1. This chapter of the PEIR identifies the potential effects of the Scheme on air quality and greenhouse gases. The assessment has considered the potential for effects to occur during the construction and operational phases of the Scheme; effects from decommissioning have been scoped out since emissions beyond 2050 should be approaching zero.

Baseline Conditions

- 14.9.2. The assessment has demonstrated that air quality conditions in the local area are generally good, with pollutant concentrations below the relevant air quality objectives.
- 14.9.3. The Scheme is currently used for agricultural purposes which are a small source of GHGs emissions; there is, however, peatland throughout the Scheme which is able to sequester CO₂, and therefore acts as a carbon sink. The volume of peat that will be disturbed as part of the construction of the Scheme will be determined for the ES. For the purposes of the assessment, baseline GHG emissions have been assumed to be zero.

Likely Significant Effects

- 14.9.4. The assessment has demonstrated that, with mitigation, the effect of construction dust on sensitive receptors will be ‘not significant’. Traffic generated by the Scheme during both the construction and operational phases will be below published screening thresholds, and thus will be ‘not significant’.
- 14.9.5. As described in Chapter 12: Transport and Access, consideration of the underground export cable corridor does not lead to any changes in traffic flows associated with the Scheme. The construction dust risk assessment has included all land associated with both the illustrative underground export cable corridor and the Scheme. In this respect, the construction dust risk assessment is worst-case, since only a portion of land assigned to the cable corridor will be taken forward for the final design, whilst the rest will not be subject to construction works. Overall, when considering both the National Grid Substation and RWE Underground Export Cable Route and the Scheme, with mitigation the effect of construction dust will remain ‘not significant’.
- 14.9.6. The assessment has demonstrated that the Scheme will lead to residual GHG emissions across its lifetime; these mainly arise during the construction phase. However, once operational, the Scheme will generate electricity with a lower carbon factor than other non-zero fuels, such that its operation will lead to net reductions in GHG emissions, and facilitate a transition to net-zero. The overall GHG effects are judged to be beneficial and therefore significant.

Mitigation and Enhancement

TWEEN BRIDGE SOLAR FARM

VOLUME 1 MAIN REPORT – CHAPTER 14 AIR QUALITY

MARCH 2025

14.9.7. A suite of mitigation measures will be in place throughout the duration of the construction phase to ensure that the residual air quality effects are 'not significant'.

14.9.8. The Scheme incorporates a number of best practice measures to minimise its GHG footprint; no additional mitigation is required beyond these measures.

Conclusion

14.9.9. The Scheme will not lead to significant effects on air quality and will have a significant beneficial effect in relation to reducing GHG emissions from the UK's energy supply.

14.9.10. Table 14.18 provides a summary of effects, mitigation and residual effects.

PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Air Quality

Table 14.18 Summary of Effects, Mitigation and Residual Effects

Receptor / Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect**	Geographical Importance	Significance of Effects	Mitigation / Enhancement Measures	Residual Effects
Construction								
Human Health Receptors	Effects from dust soiling	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable significance to be determined before mitigation	Suite of construction mitigation measures set out in Appendix 14.6	Not Significant
Human Health Receptors	Effects from emissions of PM ₁₀ and dust on human health	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable significance to be determined before mitigation	Suite of construction mitigation measures set out in Appendix 14.6	Not Significant

PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Air Quality

Human Health Receptors	Effects on concentrations of NO ₂ , PM ₁₀ and PM _{2.5} from construction traffic	Temporary / Direct	High	Not Applicable	Local	Negligible	Mitigation is not required	Not Significant
Ecological Receptors	Effects from dust soiling and PM ₁₀ /dust emissions on sensitive ecological features	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable significance to be determined before mitigation	Suite of construction mitigation measures set out in Appendix 14.6	Not Significant
Operation								
Human Health Receptors	Effects on concentrations of NO ₂ , PM ₁₀ and PM _{2.5} from road traffic	Permanent / Direct	High	Not Applicable	Local	Negligible	Mitigation is not required	Not Significant
All	Lifecycle Emissions of GHGs (incl. construction)	Permanent / Direct	High	Not Applicable	International	Beneficial	Additional measures not required beyond best practice	Significant

PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Air Quality

							measures designed into Scheme	
Cumulative and In-Combination								
Human Health Receptors	Effects from dust soiling	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable significance to be determined before mitigation	Suite of construction mitigation measures set out in Appendix 14.6	Not Significant
Human Health Receptors	Effects from emissions of PM ₁₀ and dust on human health	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable significance to be determined before mitigation	Suite of construction mitigation measures set out in Appendix 14.6	Not Significant

PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Air Quality

Ecological Receptors	Effects from dust soiling and PM ₁₀ /dust emissions on sensitive ecological features	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable significance to be determined before mitigation	Suite of construction mitigation measures set out in Appendix 14.6	Not Significant
Human Health Receptors	Effects on concentrations of NO ₂ , PM ₁₀ and PM _{2.5} from road traffic (construction and operation)	Permanent / Direct	High	Not Applicable	Local	Negligible	Mitigation is not required	Not Significant

