



# Tween Bridge Solar Farm

A Nationally Significant Infrastructure Project in the Energy Sector

---

## Preliminary Environmental Information Report

### Chapter 14 – Air Quality and Greenhouse Gases

October 2023



Visit: [www.tweenbridgesolar.co.uk](http://www.tweenbridgesolar.co.uk)  
Email: [info@tweenbridgesolar.co.uk](mailto:info@tweenbridgesolar.co.uk)

## 14. Air Quality and Greenhouse Gases

### 14.1. Introduction

14.1.1. This chapter of the working draft 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 working draft PEIR. The PEIR will be updated as further assessments become available including any update to the baseline in the next iteration of the PEIR which will be presented as part of the statutory pre-application consultation. 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.

14.1.3. 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.

14.1.4. The pollutants of concern for human health from construction equipment and road traffic are nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). During construction, there is also the potential for impacts to occur from dust soiling and elevated PM<sub>10</sub> emissions.

14.1.5. 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**. 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 (CO<sub>2</sub>), however, the assessment includes quantification of GHG emissions that will be released as carbon dioxide equivalent (CO<sub>2</sub>e)<sup>1</sup>, 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 material 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;

---

<sup>1</sup> CO<sub>2</sub>e is the term used for describing different greenhouse gases in a common unit. For any greenhouse gas, CO<sub>2</sub>e is the amount of CO<sub>2</sub> that would have the equivalent global warming effect.

## Air Quality and Greenhouse Gases

---

- 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).
- 14.1.6. 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.
- 14.1.7. 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 200 m of the Exits for Each Construction Compound.
- 14.1.8. 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** – Construction Dust Assessment Procedure;
  - **Appendix 14.4** – Professional Experience; and
  - **Appendix 14.5** – Construction Mitigation.
- 14.1.9. Baseline and assessment work is ongoing; it is anticipated that the following information will be made available for the next iteration of the PEIR:
- Volume of peat to be disturbed, and subsequently the effect on carbon sequestration, as a result of the Scheme;
  - Estimated quantities of all other construction materials for the Scheme<sup>2</sup>, including inverters and switchgear;
  - Details relating to the percentage of the PV modules that will require replacement each year and any ongoing maintenance associated with the Scheme;

---

<sup>2</sup> This version of the PEIR only includes the PV modules and frames, and does not account for materials such as concrete or other fundamental components.

- GHG emissions associated with the operational energy consumption for the Scheme;
- Refined origin and destination information for construction and operational vehicles;
- Clarification on the number of Heavy Duty Vehicles (HDVs)<sup>3</sup> travelling through the Air Quality Management Area (AQMA) on the M18;
- Clarification on the peak number of HDVs leaving the Scheme from any of the five construction compounds;
- Further information relating to the electric vehicle charging hub; and
- Identification of cumulative schemes in the local area.

## 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	<p>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.</p> <p>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</p>	<p>The assessment has followed the same methodology set out in Section 12 of the Scoping Report.</p> <p>Construction traffic will be routed to avoid the centre of Thorne town; this will be secured by DCO Requirement</p>
North Lincolnshire Council Environmental Protection Team Leader	<p>The proposed assessment of air quality impacts during construction is acceptable in principle. This department would request a Construction Environmental Management Plan (CEMP) is submitted with any subsequent planning application.</p>	<p>The assessment has followed the same methodology set out in Section 12 of the Scoping Report.</p>

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

**Air Quality and Greenhouse Gases**

	<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 next iteration of the PEIR.</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 ES chapter.</p>
--	---	---

**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 set as concentrations below which effects are unlikely, even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The ‘objectives’ set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations<sup>4</sup> and the Air Quality (England) (Amendment) Regulations<sup>5</sup>, and provided in Table 14.2.
  
- 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 Guidance<sup>6</sup>. 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 PM<sub>10</sub> 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 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

---

<sup>4</sup> Air Quality (England) Regulations 2000

<sup>5</sup> Air Quality (England) (Amendment) Regulations 2002

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

- 14.3.3. The UK-wide objectives for nitrogen dioxide and PM<sub>10</sub> 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/m<sup>3</sup><sup>6</sup>. Measurements have also shown that the 24-hour mean PM<sub>10</sub> objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m<sup>3</sup>.
- 14.3.4. For PM<sub>2.5</sub>, 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/m<sup>3</sup> and currently set at 20 µg/m<sup>3</sup>.
- 14.3.5. Defra has also recently set two new targets, and two new interim targets, for PM<sub>2.5</sub> concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean PM<sub>2.5</sub> concentration of 10 µg/m<sup>3</sup> by the end of 2040, with the interim target being a value of 12 µg/m<sup>3</sup> by the start of 2028<sup>7</sup>. The second set of targets relate to reducing overall population exposure to PM<sub>2.5</sub>. By the end of 2040, overall population exposure to PM<sub>2.5</sub> should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028.
- 14.3.6. Defra will assess compliance with the population exposure targets by averaging concentrations measured at its own background monitoring stations. This will not consider small changes over time to precisely where people are exposed (such as would relate to exposure introduced by a new development). Furthermore, as explained in paragraph 14.3.71, all four new targets provide metrics against which central Government can assess its own progress. While local authorities have an important role delivering the required improvements, these are expected to relate to controlling emissions and not to directly assessing PM<sub>2.5</sub> concentrations against the targets.
- 14.3.7. In March 2023, the Department for Levelling Up, Housing and Communities<sup>8</sup> explained that the new PM<sub>2.5</sub> targets will:
- “need to be integrated into the planning system, and in setting out planning guidance for local authorities and businesses, we will consider the specific characteristics of PM<sub>2.5</sub>. The guidance will be forthcoming in due course, until then we expect local authorities to continue to assess local air quality impacts in accordance with existing guidance.”*
- 14.3.8. For the time being, therefore, no assessment is required, and indeed no robust assessment is possible, in relation to the new PM<sub>2.5</sub> targets and they are not considered further.
- 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/EC<sup>9</sup> on ambient air quality and cleaner air for Europe sets limit values for nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub>, and is implemented in UK law through the

---

<sup>7</sup> Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m<sup>3</sup> would not exceed the 10 µg/m<sup>3</sup> target.

<sup>8</sup> Department for Levelling Up, Housing and Communities (2023) Planning Newsletter

<sup>9</sup> European Union Directive 2008/50/EC

## Air Quality and Greenhouse Gases

Air Quality Standard Regulations 2010<sup>10</sup>. The limit values for nitrogen dioxide and PM<sub>10</sub> 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).

14.3.11. The relevant air quality criteria for this assessment are provided in Table 14.2

**Table 14.2 Air Quality Criteria for Nitrogen Dioxide, PM<sub>10</sub> and PM<sub>2.5</sub>**

POLLUTANT	TIME PERIOD	VALUE
<b>Nitrogen Dioxide</b>	1-hour Mean	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m <sup>3</sup>
<b>PM<sub>10</sub></b>	24-hour Mean	50 µg/m <sup>3</sup> not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m <sup>3</sup>
<b>PM<sub>2.5</sub></b>	Annual Mean	20 µg/m <sup>3</sup> <sup>a</sup>

<sup>a</sup> There is no numerical PM<sub>2.5</sub> objective for local authorities (see paragraph 14.3.4). Convention is to assess against the UK limit value which is currently 20 µg/m<sup>3</sup>.

### *Screening Criteria for Road Traffic*

14.3.12. EPUK and the IAQM<sup>11</sup> recommend a screening approach<sup>12</sup> to determine whether emissions from road traffic generated by a development have the potential for significant air quality effects.

14.3.13. 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 AQMA are a change in flows of more than 25 HDVs or 100 Light Duty Vehicles (LDVs)<sup>13</sup> 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

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

<sup>11</sup> The IAQM is the professional body for air quality practitioners in the UK.

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

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

guidance<sup>12</sup> 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”.

### *Existing Conditions*

14.3.14. 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 Doncaster<sup>14</sup>. North Lincolnshire Council does not operate any monitoring sites within 5 km<sup>15</sup>;
- background concentrations have been defined using the latest version of Defra’s background pollutant maps<sup>16</sup>. These cover the whole of the UK on a 1 x 1 km grid. The background annual mean nitrogen dioxide maps for 2019 have been calibrated against concurrent measurements from national monitoring sites<sup>17</sup>. Mapped background concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> have not been adjusted; and
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra<sup>18,19</sup>. These maps are used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards to report exceedances of the limit value. The national maps of roadside PM<sub>10</sub> and PM<sub>2.5</sub> concentrations which are available for the years 2009 to 2019<sup>19</sup>, show no exceedances of the limit values anywhere in the UK in 2019.

### Greenhouse Gases

14.3.15. 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 that act as a carbon sink. There are, however, portions of the site that contain peatland, which can 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.

14.3.16. 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:

- The embedded carbon from the PV modules and frames has been calculated using International Environmental Performance Declarations (EPD). The assessment of embedded carbon covers “cradle to gate” emissions (i.e. carbon emissions from the extraction of raw materials through to finished PV modules and frames). The calculation of embedded carbon for other components of the Scheme, such as construction

---

<sup>14</sup> Doncaster Council (2022) 2022 Air Quality Annual Status Report (ASR)

<sup>15</sup> North Lincolnshire Council (2022) 2022 Air Quality Annual Status Report (ASR)

<sup>16</sup> Defra (2023) LAQM Support Website, Available at: <https://laqm.defra.gov.uk/>

<sup>17</sup> AQC (2020) Calibrating Defra’s 2018–based Background NO<sub>x</sub> and NO<sub>2</sub> Maps against 2019 Measurements

<sup>18</sup> Defra (2023) 2020 NO<sub>2</sub> projections data (2018 reference year)

<sup>19</sup> Defra (2023) UK Ambient Air Quality Interactive Map



## Air Quality and Greenhouse Gases

---

materials, inverters, batteries and switch gear will be included as part of the next PEIR iteration;

- Emissions from construction site activities have been estimated, based on the approach recommended in guidance on whole life carbon assessment from the Royal Institute of Chartered Surveyors (RICS)<sup>20</sup>;
- CO<sub>2</sub>e emissions from construction road traffic have been calculated using the Department for Energy Security and Net Zero (DESNZ) carbon factors<sup>21</sup> for road vehicles based on the predicted volume of HDV movements generated by the construction works, the loaded weight of the vehicles and travel distances to their origin/destination;
- Emissions associated with the importation (shipping) of the PV modules have been calculated using the DESNZ carbon factors<sup>21</sup> for freighting goods based on an assumed import origin and the mass of products transported by vessel;
- CO<sub>2</sub>e emissions from operational transport have been calculated using DESNZ carbon factors<sup>21</sup> for road vehicles, and applying engine and fuel efficiency factors obtained from the DfT's WebTAG databook<sup>22</sup> based on the number of vehicles generated by the Scheme once operational and estimated travel distances; and
- CO<sub>2</sub>e emissions from the repair and maintenance of the Scheme during its lifetime have been estimated using guidance on whole life carbon assessment from RICS<sup>20</sup>. Emissions related to the replacement of PV modules over the lifetime of the Scheme will be incorporated into the next iteration of the PEIR.

14.3.17. 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 projected to end in 2029. The total emissions arising from construction are based on a works period lasting 30 months.

14.3.18. 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.

14.3.19. 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).

### *Embedded Carbon*

---

<sup>20</sup> Royal Institute of Chartered Surveyors (2023) Whole life carbon assessment for the built environment, 2<sup>nd</sup> edition

<sup>21</sup> Department for Energy Security and Net Zero (2023) UK Government GHG Conversion Factors for Company Reporting

<sup>22</sup> DfT (2022) WebTAG Databook v1.18

- 14.3.20. Embedded GHG emissions will be calculated based on the Inventory of Carbon and Energy (ICE) embodied energy and carbon coefficients~~Error! Bookmark not defined.~~. These factors are available for a range of construction materials, including steelwork, concrete and tarmac/asphalt, and are provided as kilograms of GHGs per kg of material.
- 14.3.21. Estimated quantities of construction material will be available for the next iteration of the PEIR. The ICE factors have been determined for the appropriate material type and are then multiplied by the predicted mass of each construction material. In addition, data from an International EPD for an example PV module including its frame (Jolywood N-type bifacial solar panel) manufactured in China have been used to calculate the embedded GHG emission footprint for PV cells and frames<sup>23</sup>. The CO<sub>2</sub>e factor, which accounts for the supply of raw materials, manufacture and local distribution across China, that has been applied within this assessment is 0.0112 kgCO<sub>2</sub>e/kWh. An estimate of the total annual power output from the Scheme has been estimated using the European Commission's Photovoltaic GIS tool<sup>24</sup>. To align with the EPD, a lifetime of 30 years has been assumed in calculating the embedded carbon. A more robust estimate of lifetime energy production, taking account of degradation of PV cells over time will be used in future iterations of the PEIR.
- 14.3.22. Carbon factors relating to additional construction items, such as inverters, switchgear and Battery Energy Storage System (BESS), will be included in the next iteration of the PEIR.

### *Construction Site Activities*

- 14.3.23. The approach recommended in guidance on whole life carbon assessment from RICS<sup>20</sup> 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 1,612 hectares.
- 14.3.24. For the purposes of this assessment, an emission rate of 25 kgCO<sub>2</sub>e/m<sup>2</sup> has been applied to 1% of the area within the Draft Order Limits (161,200 m<sup>2</sup>), and will be reviewed in the next iteration of the PEIR.

### *Construction Traffic*

- 14.3.25. The number of construction trips to and from the Scheme during the construction period have been based on data provided by the Project Transport Consultants, Pegasus.
- 14.3.26. 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:

---

<sup>23</sup> Jolywood (2020) Environmental Product Declaration: N-Type Bifacial Double Glass Photovoltaic Modules

<sup>24</sup> European Commission (2023) Photovoltaic Geographic Information System:

[https://re.jrc.ec.europa.eu/pvg\\_tools/en/tools.html](https://re.jrc.ec.europa.eu/pvg_tools/en/tools.html)

## **Air Quality and Greenhouse Gases**

- articulated Heavy Goods Vehicles (HGVs) will travel 70 km. This distance is based on the distance by road from the Scheme to the Port of Immingham, from which imported construction materials may be sourced;
- rigid HGVs, such as tippers and JCBs, will travel 60 km, which is the distance to the centre of Leeds where there are likely to be several locations for the construction materials and waste disposal used for the Scheme, such as concrete batching sites and construction waste transfer stations; 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.

14.3.27. GHG emission factors for construction transport were obtained from the DESNZ publication on GHG Conversion Factors for Company Reporting<sup>21</sup> which sets out GHG emissions factors for a range of modes of transport valid for 2023; these are the latest factors available at the time of writing this chapter. The GHG emissions factors are applied to the calculated total construction travel distance to estimate the GHG emissions from construction transport. The use of 2023 factors for construction transport is conservative as emissions from road transport are likely to decarbonise in future years as vehicles become more fuel efficient.

14.3.28. A summary of the 2023 GHG emission factors for selected modes of construction transport used in this GHG assessment is provided in Table 14.3. The assumption was made that one journey to/from the Scheme by an HGV is fully laden, and one journey to/from the Scheme is unladen.

**Table 14.3 Selected Embedded GHG Factors for Construction Traffic<sup>21</sup>**

Vehicle Type	Type	Unit	2023 GHG Factor
LDV	Average Diesel Van (up to 3.5 tonnes)	kgCO <sub>2</sub> e/km	0.92
Rigid HGV	Average Rigid HGV – 0% laden	kgCO <sub>2</sub> e/km	2.58
	Average Rigid HGV – 100% laden	kgCO <sub>2</sub> e/km	4.21
Artic HGV	Average Articulated HGV – 0% laden	kgCO <sub>2</sub> e/km	2.45
	Average Articulated HGV – 100% laden	kgCO <sub>2</sub> e/km	4.07

### *Shipping Emissions*

14.3.29. GHG emission factors for shipping were obtained from the DESNZ publication on GHG Conversion Factors for Company Reporting<sup>21</sup> which sets out GHG emissions factors for a range of modes of transport for freighting goods, including cargo ships, valid for 2023; these are the latest factors available at the time of writing this chapter.

14.3.30. The GHG emissions factors are reported in terms of tonnes of CO<sub>2</sub>e per mass of the goods shipped per distance travelled. For the purposes of the assessment, it has been assumed that the PV modules and their frames will be imported from China, approximately 10,000 km away, and that each unit weighs approximately 35 kg<sup>23</sup>.

14.3.31. A GHG emission factor of 0.016 kgCO<sub>2</sub>e/tonne.km for an average container ship has then been applied.

#### *Operational Transport*

14.3.32. 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 databook<sup>22</sup>.

14.3.33. 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.

14.3.34. The calculated 2029 factor for a typical Light Goods Vehicle is 0.189 kgCO<sub>2</sub>e/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*

14.3.35. Over the lifetime of the Scheme there will be GHG emissions associated with repair, maintenance and refurbishment. These emissions are essentially unregulated.

14.3.36. In the absence of detailed information, the RICS guidance states that "*repair emissions should be assumed as equivalent to... 10% of A1 – A3 emissions*", where A1 – A3 emissions relate to the emissions embedded in construction materials.

14.3.37. Emissions associated with the replacement of the PV modules and the maintenance of the Scheme will be provided in the next iteration of the PEIR.

**Air Quality and Greenhouse Gases**

---

**Assessment of Significance**

Air Quality

*Sensitivity of Receptors*

*Construction Dust*

14.3.38. The IAQM guidance<sup>25</sup> (described in full in Appendix 14.3) 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.

14.3.39. 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*

14.3.40. 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*

14.3.41. There are no formal statutory or regulatory assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM<sup>25</sup> has been used. This follows a sequence of steps:

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

14.3.42. Appendix 14.3 explains the approach to the construction dust risk assessment in more detail.

---

<sup>25</sup> IAQM (2023) Guidance on the Assessment of Dust from Demolition and Construction v2.1

### *Operational Phase*

- 14.3.43. 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*

- 14.3.44. 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*

- 14.3.45. Guidance from the IAQM<sup>25</sup> 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*

- 14.3.46. 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.
- 14.3.47. 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 14.3, whilst the experience of the consultants preparing the Chapter is set out in Appendix 14.4.

### Greenhouse Gases

#### *Sensitivity of Receptors*

- 14.3.48. 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)<sup>26</sup>.
- 14.3.49. 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.

---

<sup>26</sup> The Intergovernmental Panel on Climate Change (2014) AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability

## Air Quality and Greenhouse Gases

---

### *Magnitude of Impacts*

- 14.3.50. There are no impact descriptors for GHG emissions; the approach taken is, therefore, to calculate the net annualised emission rate (in kg CO<sub>2</sub>e) 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*

- 14.3.51. The Institute of Environmental Management and Assessment (IEMA) guidance<sup>27</sup> 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.

- 14.3.52. 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.

- 14.3.53. 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 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.

- 14.3.54. The UK's response to limiting climate change is enshrined in law through the Climate Change Act 2008<sup>28</sup> 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

---

<sup>27</sup> IEMA (2022) EIA Guide to: Assessing greenhouse gas emissions and evaluating their significance. 2nd edition

<sup>28</sup> Committee on Climate Change (2019), Net Zero. The UK's contribution to stopping global warming, Available: <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

to the 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.

14.3.55. 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.

14.3.56. 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.

14.3.57. 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 guidance<sup>27</sup>, 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"> <li>• not mitigated or are only compliant with do–minimum standards set through regulation; and</li> <li>• do not provide further reductions required by existing local and national policy for projects of this type.</li> </ul>
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"> <li>• partially mitigated; and</li> <li>• may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy</li> </ul>



Air Quality and Greenhouse Gases

		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"> <li>• fully consistent with applicable existing and emerging policy requirements; and</li> <li>• in line with good practice design standards for projects of this type.</li> </ul>
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"> <li>• reduced through measures that go well beyond existing and emerging policy; and</li> <li>• better than good practice design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050.</li> </ul>
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"> <li>• below zero; and</li> <li>• it causes a reduction in atmospheric GHG concentrations, whether directly or indirectly, compared to the without-project baseline.</li> </ul>

14.3.58. The IEMA guidance<sup>27</sup> 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."*

*"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."*

14.3.59. 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.

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

*Step 1: Establish Context of GHG Emissions*

14.3.61. 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*

14.3.62. 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.

14.3.63. 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.

## Air Quality and Greenhouse Gases

---

### Legislative and Policy Framework

#### Air Quality

##### *Air Quality Strategy 2007<sup>29</sup>*

- 14.3.64. 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<sup>30</sup>*

- 14.3.65. 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<sup>31</sup>*

- 14.3.66. 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<sup>32</sup>*

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

- 14.3.68. The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of PM<sub>2.5</sub>. These targets are described in paragraph 14.3.5.

---

<sup>29</sup> Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

<sup>30</sup> Defra (2023) Air Quality Strategy: Framework for Local Authority Delivery

<sup>31</sup> Defra (2019) Clean Air Strategy 2019

<sup>32</sup> Her Majesty's Stationary Office (2021), Environment Act 2021

### *Environmental Improvement Plan 2023*<sup>33</sup>

- 14.3.69. Defra published its 25 Year Environment Plan in 2018<sup>34</sup>. The Environment Act (2021)<sup>32</sup> 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.
- 14.3.70. The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of PM<sub>2.5</sub>. These targets, which are described in paragraph 14.3.5, include the long-term targets in the Statutory Instrument described in paragraph 14.3.68, and interim targets to be achieved by 2028.
- 14.3.71. 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*<sup>35</sup>

- 14.3.72. 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 has since announced that the phase-out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030 and that all new cars and vans must be fully zero emission at the tailpipe from 2035. If these ambitions are realised, then road traffic-related NO<sub>x</sub> emissions can be expected to reduce significantly over the coming decades.

### *National Planning Policy*

- 14.3.73. The current National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3)<sup>36</sup>, together with the Overarching National Policy Statement for Energy (EN-1)<sup>37</sup>, provide a policy basis for decisions regarding nationally significant renewable energy infrastructure projects. There is no specific NPS for solar projects. In terms of the assessment of air quality impacts, paragraphs 5.2.6 and 5.2.7 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).*

---

<sup>33</sup> Defra (2023) Environmental Improvement Plan 2023

<sup>34</sup> Defra (2018) A Green Future: Our 25 Year Plan to Improve the Environment

<sup>35</sup> DfT (2018) The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy

<sup>36</sup> Her Majesty's Stationary Office (2011) National Policy Statement for Renewable Energy Infrastructure (EN-3)

<sup>37</sup> Her Majesty's Stationary Office (2011) Overarching National Policy Statement for Energy (EN-1)

**Air Quality and Greenhouse Gases**

---

*The ES should describe:*

- *any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project;*
- *the predicted absolute emission levels of the proposed project, after mitigation methods have been applied;*
- *existing air quality levels and the relative change in air quality from existing levels...”*

14.3.74. In terms of dust emissions, paragraphs 5.6.4 to 5.6.6 state:

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

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

- *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;*
- *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.”*

14.3.75. The draft NPS for Renewable Energy Infrastructure (EN-3)<sup>38</sup> includes a section on the impacts of solar photovoltaic generation, however does not refer to air quality. The draft Overarching NPS for Energy (EN-1)<sup>39</sup> 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 to demonstrate local impacts.*

*Where a proposed development is likely to lead to a breach of the air quality thresholds or affect the ability of a non-compliant area to achieve compliance within the timescales set out in the most recent relevant air quality plan at the time of the decision, the applicant should work*

---

<sup>38</sup> Department for Energy Security & Net Zero (2023) National Policy Statement for Renewable Energy Infrastructure (EN-3)

<sup>39</sup> Department for Energy Security & Net Zero (2023) Overarching National Policy Statement for Energy (EN-1)

*with the relevant authorities to secure appropriate mitigation measures to ensure that those thresholds 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 or any successor to it and should consider relevant advice within Local Air Quality Management guidance."*

- 14.3.76. The National Planning Policy Framework (NPPF)<sup>40</sup> 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".*

- 14.3.77. To prevent unacceptable risks from air pollution, Paragraph 174 of the NPPF states that:

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

- 14.3.78. Paragraph 185 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".*

- 14.3.79. More specifically, on air quality, Paragraph 186 makes clear that:

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

---

<sup>40</sup> Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework

## Air Quality and Greenhouse Gases

---

- 14.3.80. The NPPF is supported by Planning Practice Guidance (PPG)<sup>41</sup>, 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”.*

- 14.3.81. 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”.*

- 14.3.82. 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”.*

- 14.3.83. 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.”*

- 14.3.84. 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 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*

- 14.3.85. The Sheffield City Region, which covers Doncaster, adopted its Transport Strategy 2018 – 2040 in 2019<sup>42</sup>. This includes Policy 4, which aims to *“Improve air quality across our City Region to*

---

<sup>41</sup> Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance

<sup>42</sup> Sheffield City Region (2019) Sheffield City Region Transport Strategy 2018–2040

*meet legal thresholds, supporting improved health and activity for all, especially in designated AQMAs and CAZs."*

### *Local Policies*

- 14.3.86. The Doncaster Local Plan 2015 – 2035<sup>43</sup> 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."*

- 14.3.87. Doncaster Council has also produced an Air Quality Technical Planning Guidance<sup>44</sup> document. This document sets out guidance on air quality requirements for developers, including the required content for air quality assessments.

- 14.3.88. The North Lincolnshire Core Strategy<sup>45</sup> 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."*

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

### *National Air Quality Action Plan*

- 14.3.90. Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK<sup>46</sup> (Defra, 2017); a supplement to the 2017 Plan<sup>47</sup> 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

---

<sup>43</sup> Doncaster Council (2021) Local Plan 2015–2035

<sup>44</sup> Doncaster Council (2022) Air Quality Technical Planning Guidance 2022

<sup>45</sup> North Lincolnshire Council (2011) Core Strategy

<sup>46</sup> Defra (2017) Air quality plan for nitrogen dioxide (NO<sub>2</sub>) in the UK

<sup>47</sup> Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations



**Air Quality and Greenhouse Gases**

---

to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone (CAZ).

14.3.91. 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.

14.3.92. 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<sup>48</sup>*

14.3.93. Doncaster Council has declared eight AQMAs for exceedances of the annual mean nitrogen dioxide objective.

14.3.94. The Council has developed an AQAP which was revised in 2018. 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.

*North Lincolnshire Council Air Quality Action Plan*

14.3.95. North Lincolnshire Council declared an AQMA for exceedances of the 24-hour mean PM<sub>10</sub> objective in 2005 as a result of industrial emissions around Scunthorpe, which was amended in 2018. The Council developed an Air Quality Action Plan<sup>49</sup>, although this is not relevant to this assessment due to the distance between the Draft Order Limits and Scunthorpe (over 10 km).

Greenhouse Gases

*National Policies*

14.3.96. The current NPS documents EN-1<sup>37</sup> and EN-3<sup>36</sup> do not cover the effects of infrastructure developments on greenhouse gas emissions.

14.3.97. Within the draft documents there is no specific NPS for solar projects, and whilst the draft version of EN-3<sup>38</sup> includes a section on the impacts of solar photovoltaic generation, that section does not refer to greenhouse gases.

14.3.98. The draft version of EN-1<sup>39</sup> 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:*

---

<sup>48</sup> Doncaster Council (2018) Air Quality Action Plan

<sup>49</sup> North Lincolnshire Council (2008) Action Plan for the Scunthorpe PM<sub>10</sub> AQMA

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

14.3.99. Part 14 of the NPPF<sup>40</sup> 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 154 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.”*

14.3.100. Paragraph 155 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.”*

14.3.101. Paragraph 158 states that, when determining planning applications for renewable and low carbon development, planning authorities should:

## Air Quality and Greenhouse Gases

---

*"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;*

*b) approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas; 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 2008<sup>50</sup>*

14.3.102. 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.

14.3.103. In the 2009 budget, the first three carbon budgets were announced which set out a binding 34% CO<sub>2</sub>e<sup>51</sup> reduction by 2020; and the Government has since adopted the fourth and fifth carbon budgets to reduce CO<sub>2</sub>e by 50% by 2025 and 57% by 2030.

14.3.104. 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 2019<sup>52</sup>*

14.3.105. 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 2021<sup>53</sup>*

14.3.106. 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.

---

<sup>50</sup> Her Majesty's Stationery Office (2008) Climate Change Act 2008

<sup>51</sup> Carbon dioxide equivalent (CO<sub>2</sub>e) is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO<sub>2</sub>e signifies the amount of CO<sub>2</sub> which would have the equivalent global warming impact.

<sup>52</sup> Her Majesty's Stationery Office (2019) The Climate Change Act 2008 (2050 Target Amendment) Order 2019

<sup>53</sup> Her Majesty's Stationery Office (2021) The Carbon Budget Order 2021

### *Energy Act (2013)<sup>54</sup>*

- 14.3.107. 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 Strategy<sup>55</sup>*

- 14.3.108. 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.
- 14.3.109. 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 Transport<sup>56</sup>*

- 14.3.110. 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 Paper<sup>57</sup>*

- 14.3.111. 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"*<sup>58</sup>.

### *Local Policies*

- 14.3.112. Doncaster Council's Local Plan<sup>43</sup> 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:*

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

- 1. community energy schemes that are in full or part community ownership;*

---

<sup>54</sup> Her Majesty's Stationery Office (2013) Energy Act 2013

<sup>55</sup> HM Government (2021) Net Zero Strategy: Build Back Greener

<sup>56</sup> DfT (2021) Decarbonising Transport. A Better, Greener Britain

<sup>57</sup> HM Government (2020) Energy White Paper. Powering our Net Zero Future

<sup>58</sup> See Page 45 of the Energy White Paper.

**Air Quality and Greenhouse Gases**

---

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.”

14.3.113. The North Lincolnshire Core Strategy<sup>45</sup> 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 CO<sub>2</sub> 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.*

*...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 CO<sub>2</sub> emissions.”

**Scoping Criteria**

14.3.114. 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 14.1.7.
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 <sub>2</sub> e emissions arising from road traffic during operation have been included within the GHG assessment, as set out in Paragraphs 14.3.32 to 14.3.34. This approach has been taken since although the operational road traffic

**DRAFT PRELIMINARY ENVIRONMENTAL INFORMATION REPORT**

**Air Quality and Greenhouse Gases**

				emissions are a small component of the total footprint, as the information is available, the calculated operational road traffic CO <sub>2</sub> e emissions have been included as part of the whole lifecycle footprint.
<b>3.13.3</b>	Para 12.66	Detailed assessment of construction traffic impacts on ecological sites	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.	Further discussion, including the traffic volumes generated by the Scheme close to the designated habitats, is provided in Appendix 14.1.
<b>3.13.4</b>	Para 12.57	Impacts from dust	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.	As set out in Appendix 14.3, the IAQM guidance on the assessment of dust from demolition and construction <sup>25</sup> states that:  <i>“An assessment will normally be required where there is: an ‘ecological receptor’ within:</i>  <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>  As set out in Section 14.5, advice from the project ecologist has been sought regarding the sensitivity of ecological sites to dust within

				200 m of the Draft Order Limits, as requested.
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 not anticipated that the nearby AQMAs will be affected. As such, there is no need to propose mitigation measures currently. This will be reviewed as part of the next iteration of the PEIR.</p>

**Limitations to the Assessment**

14.3.115. 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 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.

**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. The site is approximately 10 km to the northeast of Doncaster, and 14 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 close proximity to the site, whilst the towns of Thorne and Crowle are both within 1 km of the Draft Order Limits.



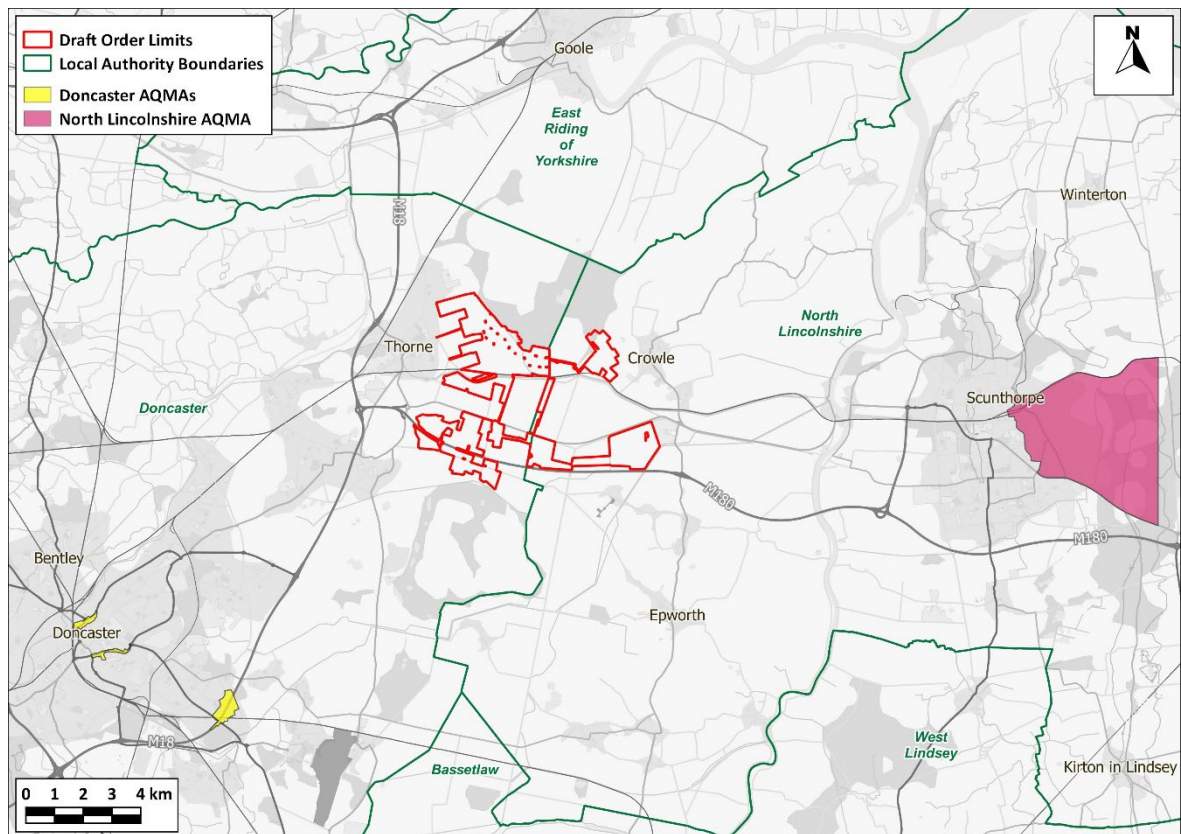
**Air Quality and Greenhouse Gases**

**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 site.
- 14.4.4. North Lincolnshire Council has declared a single AQMA for exceedances of the 24-hour mean PM<sub>10</sub> 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.
- 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**

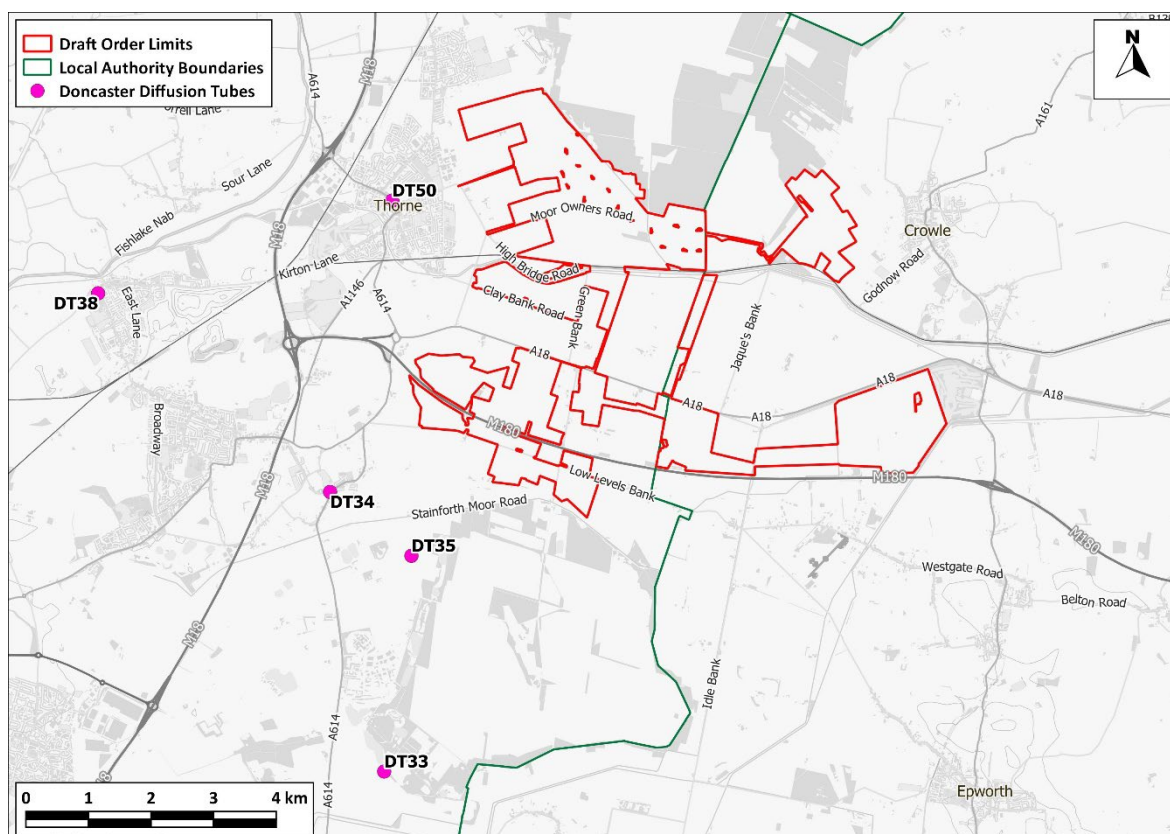
Contains Ordnance Survey data © Crown copyright and database right 2023. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

*Local Nitrogen Dioxide Monitoring*

- 14.4.6. Doncaster Council monitored air quality throughout its area in 2021 using four automatic monitoring stations, none of which are within 10 km of the Scheme. The Council also measures concentrations of nitrogen dioxide at a number of locations using diffusion tubes; the locations of monitors within 5 km of the Scheme are shown in Figure 14.2. Table 14.6 shows the diffusion

tube monitoring data for the years 2017 to 2021<sup>59</sup> for; data have been taken from Doncaster Council’s 2022 ASR<sup>14</sup>. North Lincolnshire Council also monitors air quality in its administrative area; however, its nearest monitoring locations are in Scunthorpe, over 10 km from the Scheme.

14.4.7. The results presented in Table 14.6 show an exceedance of the objective was recorded in 2018 at DT50, located in Thorne. In all other years, and at all other sites, no exceedances of the annual mean objective were measured within 5km of the Scheme. Furthermore, concentrations were well below 60 µg/m<sup>3</sup> at all monitoring sites, indicating an exceedance of the 1-hour mean objective is unlikely across the study area<sup>6</sup>.



**Figure 14.2 Air Quality Monitoring Locations and the Scheme**

Contains Ordnance Survey data © Crown copyright and database right 2023. Ordnance Survey licence number 100046099. Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v1.0.

**Table 14.6 Summary of Annual Mean Nitrogen Dioxide Monitoring (µg/m<sup>3</sup>)<sup>a</sup>**

SITE ID	SITE TYPE	LOCATION	2017	2018	2019	2020	2021
DT33	Rural	Hatfield Moors, off A614 Thorne Road	12.0	11.0	8.7	7.9	7.2

<sup>59</sup> While 2020 and 2021 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of ‘typical’ air quality conditions due to the considerable impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations. Data for 2022 are not yet available.

**Air Quality and Greenhouse Gases**

DT34	Roadside	A614 Bawtry Road, Hatfield Woodhouse	23.0	21.0	18.5	14.4	13.7
DT35	Rural	Hatfield Moors, Hollinbridge Lane	12.0	13.0	9.9	-	8.3
DT38	Urban Background	Church Road, Stainforth	18.0	19.0	15.6	13.8	14.1
DT50	Roadside	A614 King Street, Thorne	40.0	<b>41.0</b>	38.0	28.5	30.4
<b>OBJECTIVE</b>			<b>40</b>				

<sup>a</sup> Exceedances of the objective are shown in bold.

*Local Particulate Matter Monitoring*

14.4.8. Doncaster Council measures PM<sub>10</sub> concentrations at three automatic monitors within its area, one of which also measures PM<sub>2.5</sub> concentrations.

14.4.9. The monitors are all located more than 10 km from the site, however, there have been no exceedances of either the PM<sub>10</sub> or PM<sub>2.5</sub> objectives at any monitor in recent years<sup>14</sup>.

*Exceedances of the EU Limit Values*

14.4.10. There are no AURN<sup>60</sup> monitoring sites within 1 km of the Draft Order Limits with which to identify exceedances of the annual mean nitrogen dioxide limit value.

14.4.11. Defra’s roadside annual mean nitrogen dioxide concentrations<sup>19</sup>, which are used to identify and report exceedances of the limit value, do not identify any exceedances within the study area in either 2019 or 2029. 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.

14.4.12. As discussed in Paragraph 14.3.90, Defra has produced an Air Quality Plan<sup>46</sup> 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 judgement<sup>61</sup> 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 is not required to produce a plan.

*Background Concentrations*

<sup>60</sup> Defra (2023) Defra AURN Archive

<sup>61</sup> Royal Courts of Justice (2018) Judgement on Case No. CO/4922/2017

14.4.13. 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 2019 (µg/m<sup>3</sup>)**

YEAR	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2019	8.0 – 12.3	12.7 – 17.9	7.7 – 9.7
OBJECTIVE	40	40	20 <sup>a</sup>

<sup>a</sup> The 20 µg/m<sup>3</sup> PM<sub>2.5</sub> objective is not in Regulations and there is no requirement for local authorities to meet it.

Greenhouse Gases

14.4.14. A report by Natural England on UK carbon sequestration<sup>62</sup> estimates average net GHG emissions from land under arable agricultural to be 0.29 tCO<sub>2</sub>e/ha/yr. Based on a total Draft Order Limits area of 1,612 hectares, this would result in baseline annual GHG emissions of approximately 467 tCO<sub>2</sub>, which is a very small amount.

14.4.15. 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. The volume of peat at the Scheme, and subsequently GHG emissions sequestered, will be available for the next iteration of the PEIR.

14.4.16. Overall, baseline GHG emissions associated with the Scheme are considered to be very low; for this iteration of the PEIR, the baseline GHG emissions are assumed to be zero.

**14.5. Assessment of Likely Significant Effects**

**Air Quality**

Construction

*Construction Traffic*

14.5.1. The construction of the energy park part of the Scheme will generate a total of 27,289 construction vehicle movements (allowing for contingency)<sup>63</sup>; these will comprise articulated lorries, tipper trucks and low loaders. In addition to the HDV movements, there will also be vehicle 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 281 two-way movements, of which 33 will be HDV movements<sup>63</sup>.

<sup>62</sup> Natural England (2021) Carbon storage and sequestration by habitat: a review of the evidence (second edition)

<sup>63</sup> As set out in Section 12.5 of Chapter 12: Transport and Access

## Air Quality and Greenhouse Gases

---

- 14.5.2. The construction of the cable route will also generate additional traffic, including excavators, dumpers and tractors; it is anticipated that a maximum AADT flow of 10 two-way movements would be associated with the cable route<sup>63</sup>.
- 14.5.3. This total trip generation (43 HDVs and 248 LDVs) is below the screening criteria of 500 LDVs and 100 HDVs set out in the EPUK/IAQM guidance<sup>12</sup>.
- 14.5.4. There will be five primary construction compounds used during the construction phase. Vehicles will access and egress the southern areas of the scheme<sup>64</sup> via the A18, Low Levels Bank and an unnamed road parallel to the A18<sup>65</sup>; parcels of land to the north of the Stainforth and Keadby Canal<sup>64</sup> will be accessed via Marsh Road (Crowle) and Coulman Street / Moor Edges Road<sup>65</sup>, 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 43 HDVs will use any single road.
- 14.5.5. 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; based on the total trip generation during the construction phase and the likely distribution of vehicles across the network, it is unlikely that more than 25 HDVs, the screening threshold for within an AQMA<sup>12</sup>, will travel through the AQMA. The precise number of HDVs will be available for the next iteration of the PEIR.
- 14.5.6. 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'.

### *On-Site Exhaust Emissions*

- 14.5.7. The IAQM guidance<sup>25</sup> 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".*

- 14.5.8. The site is very large and covers 1,612 hectares, 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 on-site 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.
- 14.5.9. It is judged that there no risk of significant effects at existing receptors as a result of on-site machinery emissions.

### *Construction Dust and Particulate Matter Emissions*

---

<sup>64</sup> See Appendix 4.1 for the locations of each land parcel.

<sup>65</sup> As set out in Section 2.18 of Chapter 2: Project Description and Appendix 12.2: Construction Traffic Management Plan.

14.5.10. 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.

14.5.11. 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 14.3), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

*Potential Dust Emission Magnitude*

*Demolition*

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

*Earthworks*

14.5.13. The characteristics of the soil at the site have been defined using the British Geological Survey’s UK Soil Observatory website<sup>66</sup>, 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
<b>Soil Layer Thickness</b>	Deep
<b>Soil Parent Material Grain Size</b>	Mixed (Argillaceous <sup>a</sup> to Arenaceous <sup>b</sup> and Peat)
<b>European Soil Bureau Description</b>	Mixed (Riverine Clay and Floodplain Sands and Gravel, Eolian Sand, Peat, Glaciolacustrine)
<b>Soil Group</b>	Light (Sandy) to Heavy
<b>Soil Texture</b>	Mixed (Clayey Loam <sup>c</sup> to Silty Loam and Sand)

<sup>a</sup> grain size < 0.06 mm.

<sup>b</sup> grain size 0.06 – 2.0 mm.

<sup>c</sup> a loam is composed mostly of sand and silt.

14.5.14. The site covers 1,612 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).

14.5.15. Based on the example definitions set out in Table 14.3.1 in Appendix 14.3, the dust emission class for earthworks is considered to be *large*.

<sup>66</sup> British Geological Survey (2023) UK Soil Observatory Map Viewer

## **Air Quality and Greenhouse Gases**

---

### *Construction*

- 14.5.16. 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.
- 14.5.17. Based on the example definitions set out in Table 14.3.1 in Appendix 14.3, the dust emission class for construction is considered to be *large*.

### *Trackout*

- 14.5.18. On average, there will be approximately 33 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 14 HDVs would leave the largest land parcel (Parcel A)<sup>64</sup>. Whilst there will be periods during peak construction when there are more than 14 HDVs leaving the site, 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 reviewed for the next iteration of the PEIR.
- 14.5.19. Based on the example definitions set out in Table 14.3.1 in Appendix 14.3, and to ensure a conservative approach, the dust emission class for trackout is considered to be *medium*.
- 14.5.20. Table 14.9 summarises the dust emission magnitude for the Scheme.

**Table 14.9 Summary of Dust Emission Magnitude**

SOURCE	DUST EMISSION MAGNITUDE
<b>Demolition</b>	None
<b>Earthworks</b>	Large
<b>Construction</b>	Large
<b>Trackout</b>	Medium

### *Sensitivity of the Area*

- 14.5.21. This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM<sub>10</sub> concentrations.
- 14.5.22. The IAQM guidance explains that residential properties are ‘high’ sensitivity receptors to dust soiling (Table 14.3.2 in Appendix 14.3). 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 16 residential properties within 20 m of the Draft Order Limits (see Figure 14.3), and a small number more (no more than 30) within 100 m.

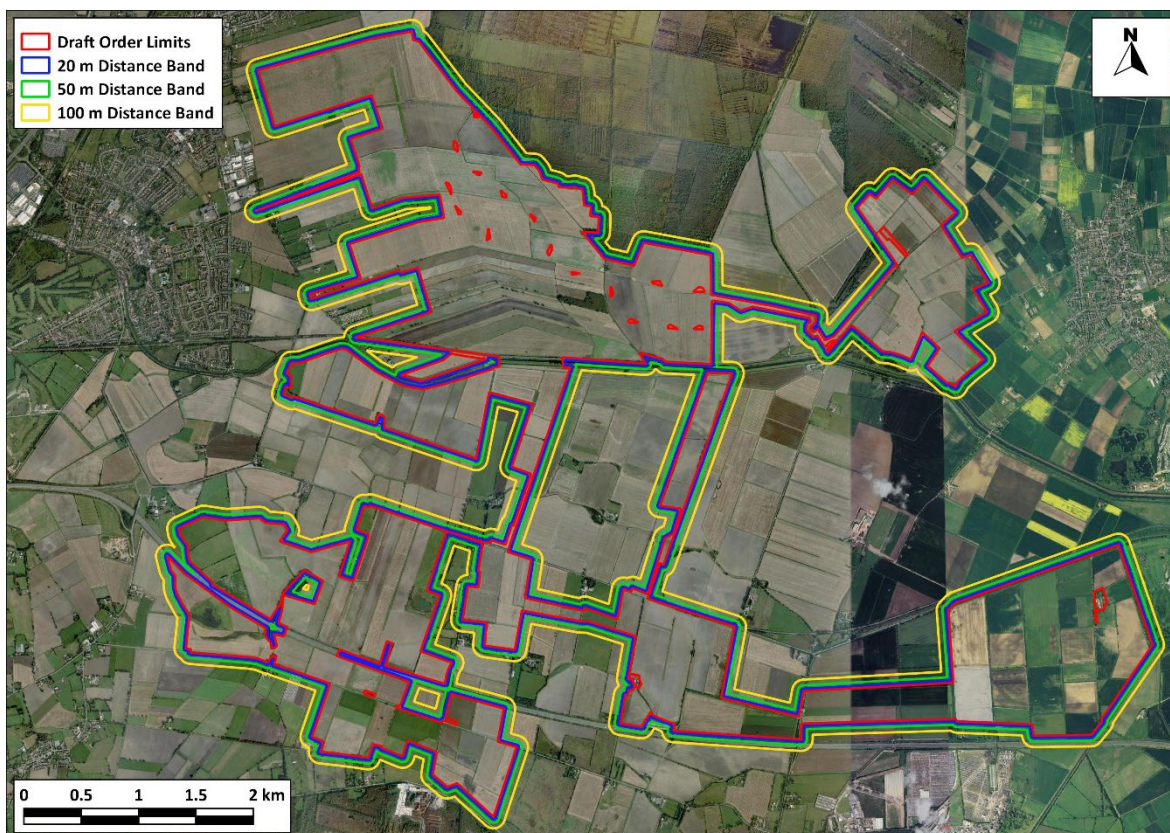


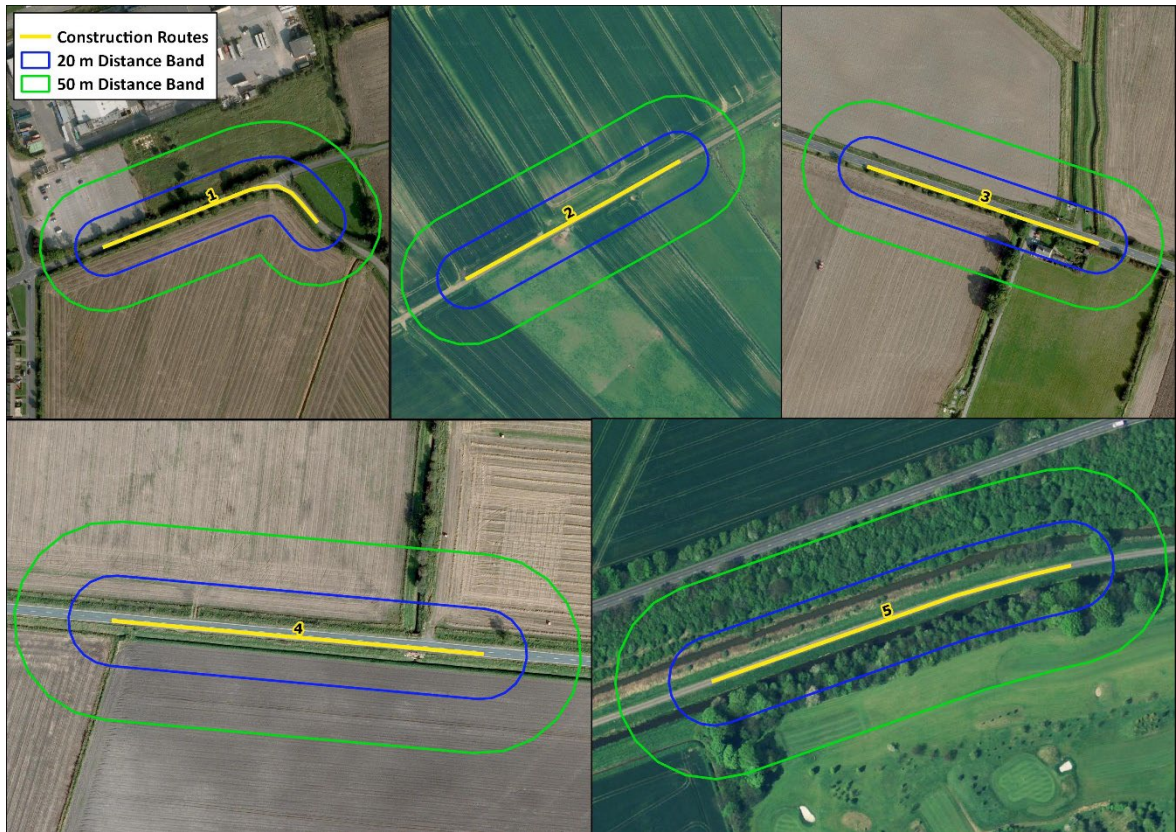
Figure 14.3 20 m, 50 m and 100 m Distance Bands Around Construction Area

Imagery ©2023 TerraMetrics.

- 14.5.23. Table 14.9 shows that the dust emission magnitude for trackout is *Medium*, and Table 14.3.2 in Appendix 14.3 thus explains that there is a risk of material being tracked 200 m from the five construction compounds.
- 14.5.24. There is one residential property within 20 m of the route used by vehicles exiting construction compound 3, whilst The Lincolnshire Golf Course is within 50 m of the route used by vehicles exiting construction compound 5 (see Figure 14.4).



Air Quality and Greenhouse Gases



**Figure 14.4 20 m and 50 m Distance Bands Around Roads Used by Construction Traffic within 200 m of the Exits for Each Construction Compound**

Imagery ©2023 TerraMetrics.

*Sensitivity of the Area to Effects from Dust Soiling*

- 14.5.25. Using the information set out in Paragraph 14.5.22 and Figure 14.3, alongside the matrix set out in Table 14.3.3 in Appendix 14.3, the area surrounding the onsite works is of 'high' sensitivity to dust soiling.
- 14.5.26. Using the information set out in Paragraph 14.5.23 and Figure 14.4 alongside the same matrix, the area is of 'medium' sensitivity to dust soiling due to trackout.

*Sensitivity of the Area to any Human Health Effects*

- 14.5.27. The matrix in Table 14.3.4 in Appendix 14.3 requires information on the baseline annual mean PM<sub>10</sub> concentration in the area. The maximum PM<sub>10</sub> concentration measured at any location across Doncaster over the last five years was 22.1 µg/m<sup>3</sup> (CM2 in 2021)<sup>14</sup>.
- 14.5.28. Using the information set out in Paragraph 14.5.22 and Figure 14.3, alongside the matrix set out in Table 14.3.4 in Appendix 14.3, the area surrounding the onsite works is of 'low' sensitivity to human health effects.
- 14.5.29. 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*

- 14.5.30. 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 50 m of the Draft Order Limits; Hatfield Moors SAC and SSSI is within 100 m of the southern Draft Order Limits.
- 14.5.31. The guidance considers SACs and SSSIs with dust-sensitive features to be of ‘high’ and ‘medium’ sensitivity, respectively; Avian Ecology, the project ecologists, have also 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.
- 14.5.32. Table 14.3.5 in Appendix 14.3 shows that the areas around the construction works are of ‘medium’ 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*

- 14.5.33. 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
<b>Dust Soiling</b>	High	Medium
<b>Human Health</b>	Low	Low
<b>Ecological</b>	Medium	Medium

*Risk and Significance*

- 14.5.34. 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 14.3.6 in Appendix 14.3, 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 and Greenhouse Gases**

**Table 14.11 Summary of Risk of Impacts without Mitigation**

SOURCE	DUST SOILING	HUMAN HEALTH	ECOLOGY
<b>Demolition</b>	None	None	None
<b>Earthworks</b>	High Risk	Low Risk	Medium Risk
<b>Construction</b>	High Risk	Low Risk	Medium Risk
<b>Trackout</b>	Medium Risk	Low Risk	Medium Risk

14.5.35. 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’<sup>25</sup>.

Operation

14.5.36. 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 parcel<sup>64</sup> per day on average; 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 eight vehicles per day. This trip generation is well below the screening criteria of 500 LDVs and 100 HDVs set out in the EPUK/IAQM guidance<sup>12</sup>.

14.5.37. 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

14.5.38. As described in Paragraph 14.3.20, to calculate the embedded GHGs in construction, the mass of each construction material is multiplied by the corresponding ICE carbon coefficient obtained from the inventory. The calculation of the embedded GHGs in the Scheme is therefore:

$$\text{Sum of each mass of material (kg)} \times \text{Relevant Embodied Carbon Coefficient (kgCO}_2\text{e/kg)} / 1,000 = \text{Embedded GHG (tonnes CO}_2\text{e)}$$

14.5.39. The embedded CO<sub>2</sub>e emissions for materials associated with the construction of the Scheme will be provided in the next iteration of the PEIR.

14.5.40. As set out in Paragraph 14.3.21, embedded carbon associated with the manufacture of the PV modules and frames can be determined from International EPDs based on multiplying the electrical output by the emission factor. The Scheme has the potential to generate a maximum of 606 MW of AC capacity per annum, estimated to generate 593,344 MWh per year<sup>24</sup>. This equates to 17,800,321 MWh over 30 years (equivalent to the Reference Service Life in the EPD<sup>23</sup>).

14.5.41. The total CO<sub>2</sub>e emissions associated with the manufacture of the PV modules and frames is 198,642 tonnes.

Construction Site Activities

14.5.42. As described in Paragraph 14.3.24, emissions associated with construction site activities can be estimated based on multiplying 1% of the area within the Draft Order Limits by the emission rate of 25 kgCO<sub>2</sub>e.

14.5.43. The total CO<sub>2</sub>e emissions associated with construction site activities is 4,030 tonnes.

Construction Road Traffic

14.5.44. The calculation of construction transport related GHG emissions for the Scheme are presented in Table 14.12. The assessment multiplies the calculated 2023 GHG emission factors for each mode of travel (see Table 14.3) by the average distance travelled. Total vehicle numbers were provided by the Project’s Transport Consultant, Pegasus, and may be refined for the next iteration of the PEIR.

**Table 14.12 Calculation of GHG Emissions for Construction Traffic<sup>21</sup>**

Vehicle Type	Direction to / from Scheme	Trips During Construction	Distance (km) Travelled During Construction <sup>a</sup>	CO <sub>2</sub> e Tonnes <sup>b</sup>
LDV	-	135,780	2,715,600	2,498
Rigid HGV	Inbound <sup>c</sup>	4,514	270,858	699
	Outbound <sup>c</sup>	4,514	270,858	1,140
Artic HGV	Inbound <sup>c</sup>	11,867	830,655	2,035
	Outbound <sup>c</sup>	11,867	830,655	3,381
<b>Total</b>	-	<b>168,542</b>	<b>4,918,626</b>	<b>9,753</b>

<sup>a</sup> Total distances travelled are calculated by multiplying the number of trips by the average distances travelled by each vehicle type.

<sup>b</sup> CO<sub>2</sub>e emissions are calculated by multiplying distance travelled by CO<sub>2</sub>e factors by mode from Table 14.3.

<sup>c</sup> Assuming rigid and articulated HGVs are 100% laden in one direction and 0% laden in the opposite direction.

14.5.45. The total CO<sub>2</sub>e emissions from construction traffic for the Scheme are 9,753 tonnes.

Shipping Emissions

14.5.46. The calculation of shipping related GHG emissions associated with the import of the PV modules from overseas for the Scheme multiplies the 2023 GHG emission factor for an average container ship originating from China, and carrying 1,436,662 PV modules.

**Air Quality and Greenhouse Gases**

14.5.47. The total CO<sub>2</sub>e emissions from importing PV modules from overseas are 8,106 tonnes.

Operational Traffic

14.5.48. The calculation of operational transport related GHG emissions for the Scheme multiplies the calculated 2029 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, and may be refined for the next iteration of the PEIR.

14.5.49. The annual operational transport GHG emissions are calculated as 22 tonnes CO<sub>2</sub>e and over the 40-year lifetime is estimated to be 883 tonnes CO<sub>2</sub>e.

Repair, Maintenance and Refurbishment

14.5.50. GHG emissions relating to the repair, maintenance and refurbishment of the Scheme over its lifetime will be provided for the next iteration of the PEIR.

Total GHG Emissions Footprint

14.5.51. Table 14.13 summarises the GHG emissions for the Scheme in the lifetime for each footprint element; this will be updated for the next iteration of the PEIR when additional information is available.

14.5.52. As shown in Table 14.13, the Scheme will result in a net increase in GHG emissions over its lifetime of 221,414 tonnes CO<sub>2</sub>e. The GHG footprint will be updated in the next iteration of the PEIR.

**Table 14.13 GHG Footprint for the Scheme in 2029 <sup>a</sup>**

Phase	Footprint Element	Tonnes of CO <sub>2</sub> e per Annum		
		Baseline	Lifetime	Net Emissions
<b>Construction</b>	Embedded	0	198,642	+198,642
	Site Activities	0	4,030	+4,030
	Transport	0	9,753	+9,753
	Shipping	0	8,106	+8,106
<b>Operation</b>	Transport	0	883	+883
<b>Total</b>	-	<b>0</b>	<b>221,414</b>	<b>+221,414</b>

<sup>a</sup> All numbers have been rounded.

Carbon Intensity Factor

14.5.53. The Scheme has the potential to generate approximately 593,344 MWh of electricity each year<sup>24</sup>. Over the lifetime of the Scheme this is conservatively estimated to equate to 17,800,321 MWh. 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 next iteration of the PEIR. Based on a lifetime GHG footprint of 221,414 tCO<sub>2</sub>e, this equates to a carbon intensity factor of 0.012 kgCO<sub>2</sub>e per kWh. Table 14.14 sets out the carbon intensity factors for electricity generation from a range of commonly used fuels taken from the latest DESNZ fuel mix disclosure data<sup>67</sup>.

**Table 14.14 Carbon Intensity Factors for Common Fuels<sup>67</sup>**

Fuel	Unit	Carbon Intensity Factor
Coal	kgCO <sub>2</sub> e/kWh	0.945
Natural Gas	kgCO <sub>2</sub> e/kWh	0.371
Grid Average	kgCO <sub>2</sub> e/kWh	0.186
Scheme	kgCO <sub>2</sub> e/kWh	0.012

14.5.54. The carbon intensity factor associated with the Scheme is significantly lower than other fuel types set out in Table 14.14, and the UK grid average. Since the carbon intensity factor is lower, the transition to electricity generated by the Scheme will lead to national reductions in GHGs.

**Consistency with Policy**

14.5.55. 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

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

*NPS*

14.5.57. As set out in Section 14.3 there is no relevant policy in the current versions of EN-1 or EN-3. However, Section 5.3 of draft EN-1 outlines the requirements for the carbon 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

<sup>67</sup> DESNZ (2023) Fuel Mix Disclosure Data Table 01/04/2022 – 31/03/2023

Air Quality and Greenhouse Gases

---

(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 obligations, 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.

14.5.58. Emissions associated with the operational energy consumption for the Scheme will be included as part of the next iteration of the PEIR.

14.5.59. There are no relevant sections within the draft version of EN-3.

*NPPF*

14.5.60. Paragraphs 154 b), 155 and 158 are of particular relevance to the GHG assessment, which are all within Part 14 of the NPPF.

14.5.61. Paragraph 154 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.”*

14.5.62. 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 154 b) of the NPPF.

14.5.63. Paragraph 155 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.”*

14.5.64. 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 155 of the NPPF.

14.5.65. Paragraph 158 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) approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale*

*projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.”*

- 14.5.66. 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*

- 14.5.67. 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<sup>28</sup> 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.
- 14.5.68. 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.
- 14.5.69. 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.
- 14.5.70. 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*

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

### *Local Policies*

- 14.5.72. 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).
- 14.5.73. 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 CO<sub>2</sub> emissions (Paragraph 4);
  - Where possible, the construction phase will reuse and recycle materials (Paragraph 6); and



## Air Quality and Greenhouse Gases

---

- 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).

14.5.74. 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 next iteration of the PEIR, however, it is anticipated that the hub would be available to members of the local community.

### 14.6. Mitigation, Enhancement and Residual Effects

#### Mitigation by Design

##### Air Quality

14.6.1. The EPUK/IAQM guidance<sup>12</sup> advises that good design and best practice measures should be considered, whether or not more specific mitigation is required.

14.6.2. 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

14.6.3. 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.

14.6.4. A CEMP will be available for the next iteration of the PEIR, 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.

14.6.5. 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.

14.6.6. 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.

14.6.7. 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*

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

14.6.9. 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 IAQM<sup>25</sup> that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction<sup>68</sup>. 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 14.5.

14.6.10. The mitigation measures should be integrated into the CEMP and may require monitoring.

14.6.11. 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*

14.6.12. 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.

14.6.13. 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

14.6.14. No additional mitigation measures are required for the Scheme.

#### Mitigation Measures

---

<sup>68</sup> IAQM (2018) Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites v1.1

**Air Quality and Greenhouse Gases**

---

14.6.15. A summary of the mitigation measures proposed for air quality and greenhouse gas emissions are set out in Table 14.15.

**Table 14.15 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 14.5.			X

**Enhancements**

Air Quality

14.6.16. 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

14.6.17. 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 CO<sub>2</sub>e emissions over the lifetime of the Scheme.

**Residual Effects**

Air Quality

*Construction*

14.6.18. The IAQM guidance<sup>25</sup> 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 14.5 are based on the IAQM guidance. With these measures in place and effectively implemented, the residual effects are judged to be ‘not significant’.

14.6.19. 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*

# DRAFT PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

## Air Quality and Greenhouse Gases

14.6.20. 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

14.6.21. Table 14.16 summarises the residual significance of effects of the Scheme’s GHG emissions, following the IEMA approach summarised in Table 14.4.

14.6.22. 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 14.16 Assessment of Effects in Accordance with IEMA Guidance<sup>27</sup>**

HEMA STEP	DESCRIPTION	ASSESSMENT	ALIGNMENT WITH IEMA <sup>27</sup>
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.	

14.6.23. Although construction of the Scheme contributes to local and national GHG emissions, its lifetime carbon intensity factor is substantially (~90%) lower than carbon intensity factors for other electricity generation methods, and the Scheme will therefore lead to a net reduction in GHG emissions compared to current UK electricity generation.

14.6.24. 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.

## Air Quality and Greenhouse Gases

---

- 14.6.25. 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'.
- 14.6.26. The assessment of significance will be reviewed in light of additional information available for the next iteration of the PEIR.

### 14.7. Cumulative and In-Combination Effects

#### Air Quality

##### Construction

- 14.7.1. As stated in Paragraph 14.5.3, the traffic generated by the Scheme during construction is below screening criteria set out in the EPUK/IAQM guidance<sup>12</sup>. 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'.
- 14.7.2. The IAQM guidance<sup>25</sup> 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 500 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.
- 14.7.3. In accordance with the mitigation measures set out in Appendix 14.5, if there is concurrent construction work on sites within 500 m of each other, the construction contractors should *"hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised"*.
- 14.7.4. It is anticipated that any construction sites within 500 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

- 14.7.5. 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 guidance<sup>12</sup>. These screening criteria are designed to provide a threshold, below which the effects will be 'not significant', regardless of baseline conditions.
- 14.7.6. As such, it is judged that the cumulative effects of Scheme-generated road traffic emissions will be 'not significant'.

#### Greenhouse Gases

- 14.7.7. GHG emissions from all projects will contribute to climate change; globally, not just locally. As set out in the IEMA guidance<sup>27</sup>:

*“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”.*

- 14.7.8. 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.
- 14.7.9. Cumulative Schemes in the locality will be available for the next iteration of the PEIR. Regardless, it is difficult to quantify the GHG emissions from Cumulative Schemes and as discussed above, cumulative contributions to climate change from GHGs will extend well beyond these schemes. It is expected that mitigation will be provided, principally for embodied carbon during construction and operational energy and transport, which are policy compliant and work to minimise the on-site GHG emissions and reduce the lifetime GHG emissions of each Cumulative Scheme.
- 14.7.10. The residual cumulative GHG emissions from the Cumulative Schemes and the Scheme will be assessed as part of the next iteration of the PEIR.

## 14.8. Summary

### Introduction

- 14.8.1. This chapter of the PEIR identifies that 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

- 14.8.2. The assessment has demonstrated that air quality conditions in the local area are generally good, with pollutant concentrations below the relevant air quality objectives.
- 14.8.3. 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 CO<sub>2</sub>, 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 next iteration of the PEIR. For the purposes of the assessment, baseline GHG emissions have been assumed to be zero.

### Likely Significant Effects

- 14.8.4. 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’.
- 14.8.5. 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

## Air Quality and Greenhouse Gases

---

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**

- 14.8.6. 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'.
- 14.8.7. The Scheme incorporates a number of best practice measures to minimise its GHG footprint; no additional mitigation is required beyond these measures.

### **Conclusion**

- 14.8.8. The Scheme will not lead to significant effects on either air quality or GHG emissions; the conclusions of this chapter will be reviewed for the next iteration of the PEIR.
- 14.8.9. Table 14.17 provides a summary of effects, mitigation and residual effects.

Table 14.17 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
<b>Construction</b>								
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 14.5	Not Significant
Human Health Receptors	Effects from emissions of PM <sub>10</sub> and dust on human health	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable significance to be determined	Suite of construction mitigation measures set out in Appendix 14.5	Not Significant



DRAFT PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Air Quality and Greenhouse Gases

						before mitigation		
Human Health Receptors	Effects on concentrations of NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> from construction traffic	Temporary / Direct	High	Not Applicable	Local	Negligible	Mitigation is not required	Not Significant
Ecological Receptors	Effects from dust soiling and PM <sub>10</sub> /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 14.5	Not Significant
<b>Operation</b>								
Human Health Receptors	Effects on concentrations of NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> from road traffic	Permanent / Direct	High	Not Applicable	Local	Negligible	Mitigation is not required	Not Significant

DRAFT PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Air Quality and Greenhouse Gases

All	Lifecycle Emissions of GHGs (incl. construction)	Permanent / Direct	High	Not Applicable	International	Beneficial	Additional measures not required beyond best practice measures designed into Scheme	Significant
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 14.5	Not Significant
Human Health Receptors	Effects from emissions of PM <sub>10</sub> and dust	Temporary / Direct	High	Not Applicable	Local	Not Applicable – the guidance does not enable	Suite of construction mitigation measures set	Not Significant

TWEEN BRIDGE SOLAR FARM

PEIR VOLUME 1 MAIN REPORT – CHAPTER 14 AIR QUALITY

OCTOBER 2023

DRAFT PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Air Quality and Greenhouse Gases

	on human health					significance to be determined before mitigation	out in Appendix 14.5	
Ecological Receptors	Effects from dust soiling and PM <sub>10</sub> /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 14.5	Not Significant
Human Health Receptors	Effects on concentrations of NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> from road traffic (construction and operation)	Permanent / Direct	High	Not Applicable	Local	Negligible	Mitigation is not required	Not Significant

