



Fosse Green Energy

Preliminary Environmental Information Report

VOLUME

1

Chapter 14: Other Environmental
Topics

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Prepared for:

Fosse Green Energy Limited

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14. Other Environmental Topics

14.1 Introduction

- 14.1.1 This chapter of the Preliminary Environmental Information Report (PEI Report) presents the findings of a preliminary assessment of the environmental topics that do not warrant individual technical chapters due to the brevity of the assessment or the limited nature of the potential impacts associated with the Proposed Development.
- 14.1.2 This chapter describes and assesses the potential effects of the Proposed Development on:
- Air quality – Section 14.2;
 - Glint and glare – Section 14.3;
 - Ground conditions – Section 14.4;
 - Materials and Waste – Section 14.5;
 - Major Accidents and Disasters – Section 14.6;
 - Telecommunications, Television Reception and Utilities – Section 14.7; and
 - Electromagnetic Fields – Section 14.8.
- 14.1.3 For the topics covered in this chapter, the assessments of potential effects do not strictly follow the approach and methodology outlined in **PEI Report Volume 1, Chapter 5: Environmental Impact Assessment (EIA) Methodology and Consultation**, where doing so is not necessary to reach a conclusion that there are no likely significant effects. For example, a detailed overview of current baseline conditions is not necessarily required if the effects can clearly be considered negligible and similarly, it is unnecessary to determine sensitivity of receptors and magnitude of impacts to define significant of effects if there are clearly no likely significant effects. The purpose of this chapter is to provide a high-level assessment of other environmental topics where a full chapter adhering to the **PEI Report Volume 1, Chapter 5: EIA Methodology** is not considered necessary.
- 14.1.4 **PEI Report Volume 1, Chapter 5: EIA Methodology and Consultation** signposts to the relevant technical chapters that address potential effects to human health. Within this chapter, potential effects to human health are set out in the following sections:
- Section 14.2 Air Quality;
 - Section 14.4 Ground Conditions and **PEI Report Volume 3, Appendix 14-B: Phase 1 Preliminary Risk Assessment**;
 - Section 14.6 Major Accidents and Disasters; and
 - Section 14.8 Electric and Electromagnetic Fields.

Development Parameters Assessed

- 14.1.5 **PEI Report Volume 1, Chapter 3: The Proposed Development** presents a description of the Proposed Development, against which this chapter has been assessed. The assessment has been based on likely worst-case parameters using the Rochdale Envelope approach, therefore the actual impact may be less than anticipated if the Proposed Development is built to a lesser scale or differing design within the worst-case parameters.

14.2 Air Quality

- 14.2.1 This section of the PEI Report presents the preliminary findings of an assessment of the likely significant effects from Air Quality as a result of the Proposed Development. For more details about the Proposed Development, refer to **PEI Report Volume 1, Chapter 1: Introduction, Chapter 2: The Site and Surroundings** and **Chapter 3: The Proposed Development** of this PEI Report.
- 14.2.2 This section identifies and proposes measures to address the potential impacts and effects of the Proposed Development on Air Quality during construction, operation, and decommissioning phases of the Proposed Development.
- 14.2.3 The Air Quality section of this Chapter is supported by PEI Report Volume 2, Figure 14-1: Dust Risk Assessment Zones.

Legislation and Planning Policy

- 14.2.4 Legislation, planning policy, and guidance relating to air quality and pertinent to the Proposed Development comprises of the documents listed below, and in further detail in **PEI Report Volume 3, Appendix 14-A: Other Environmental Topics Legislation and Policy**.

Legislation Framework – Air Quality

- a. The Environmental Protection Act 1990 (Ref 14-1);
- b. Air Quality Standards Regulations (as amended 2016) (Ref 14-2);
- c. The Environment Act (1995) (Ref 14-3);
- d. The Environment Act (2021) (Ref 14-4); and
- e. The Environmental Targets (Fine Particulate Matter) (England) Regulations (2023) (Ref 14-5).

National Policy – Air Quality

- a. The National Air Quality Strategy (2023) (Ref 14-6),
- b. National Policy Statement for Energy (EN-1) (2023) (Ref 14-10);
- c. National Policy Statement for Renewable Energy Infrastructure (EN-3) (2023) (Ref 14-12); and
- d. National Planning Policy Framework (NPPF) (2023) (Ref 14-14).

Guidance – Air Quality

- a. National Planning Policy Guidance (NPPG) (2019) (Ref 14-14);
- b. Institute of Air Quality Management (2017) Land-Use Planning & Development Control: Planning for Air Quality (Ref 14-15);
- c. Institute of Air Quality Management (2024) Guidance on the assessment of dust from demolition and construction (Ref 14-17); and
- d. Local Air Quality Management Technical Guidance 2022 (LAQM TG22) (Ref 14-18).

Consultation

- 14.2.5 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023 as part of the EIA Scoping Process. A Scoping Opinion was received from the Planning Inspectorate on 25 July 2023 (**PEI Report Volume 3: Appendix 1-B: Scoping Opinion**).
- 14.2.6 Responses to comments received in the EIA Scoping Opinion in relation to Air Quality are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses**.
- 14.2.7 No additional consultation has been undertaken with key stakeholders beyond the Scoping Report/Opinion with regard to Air Quality.

Assessment Methodology

- 14.2.8 This section sets out the scope and methodology for the preliminary assessment of the Air Quality impacts of the Proposed Development.

Study Area

- 14.2.9 The study area was defined to include Air Quality features likely to be at risk from possible direct and indirect impacts that might arise from the Proposed Development, termed the Zone of Influence (Zoi). The potential Zoi is considered to be 250m from the Site Boundary (following IAQM guidance (Ref 14-17), as shown on **PEI Report Volume 2, Figure 14-1**, up to 250m from the site access points, and within 50m of the roads expected to be affected by the construction phase traffic. At this stage, indicative locations of site access points are assumed for the purposes of the assessment. These are still to be confirmed following further consultation with the Highway Authority.
- 14.2.10 The Proposed Development is surrounded by numerous ecological sites, which are potential receptors for impacts on air quality. These will be screened as part of the dust risk assessment for sensitivity to construction dust impacts and nitrogen deposition and included as receptors as appropriate.
- 14.2.11 The assessment relates to dust generation, as well as additional road traffic and plant emissions during the construction and decommissioning phases of the Proposed Development. The potential for operational dust impacts is also addressed.

14.2.12 The potential impact of the Proposed Development on local air quality has been determined at the sensitive receptors (human and ecological) identified in the vicinity of the Proposed Development.

Sources of Information

14.2.13 The following sources of information have been used to inform the baseline and preliminary assessment presented within this Section:

- a. North Kesteven District Council Annual Status Report (2023) (Ref 14-19);
- b. Defra's MAGIC Map (Ref 14-20); and
- c. Defra Modelled Background Maps (Ref 14-21).

Scope of the Assessment

14.2.14 This section provides a brief overview of the impacts that have been scoped in and out of the EIA for the Proposed Development.

Construction

14.2.15 The following potential construction impacts have been agreed to be considered as part of the EIA for the Proposed Development, through the EIA Scoping process, for which a preliminary assessment is provided in this Section of the PEI Report:

- a. Dust Soiling;
- b. Impact of dust on human health; and
- c. Impact of dust on sensitive ecological habitats.

14.2.16 Modelled construction traffic data is not available at the time of assessment. However, initial estimates suggest movements per day of 50 HGVs (Solar and Energy Park), 8 HGVs (Cable Corridor), 25 LGVs (Solar and Energy Park), and 12 LGVs (Cable Corridor). These figures are the current assumptions and are subject to further refinement. These numbers fall well within the Institute of Air Quality Management (IAQM) guidance screening criteria (Ref 14-15) for an assessment of a site out with an Air Quality Management Area (AQMA) (a change of annual average daily total (AADT) flows of more than 500 light duty vehicles per day or 100 heavy duty vehicles per day). As such, construction traffic is not considered further within this assessment. When detailed traffic data becomes available it will be reviewed and if necessary, an assessment provided at the Environmental Statement (ES) stage.

14.2.17 This section therefore details the methods used to assess the potential effects on air quality during the construction and decommissioning phases of the Proposed Development.

Operation

14.2.18 Due to the nature of the Proposed Development, a significant change to traffic flows from the baseline is not anticipated to occur once the Proposed Development is operational and there are no other likely significant air quality impacts predicted during operation.

14.2.19 Through the EIA Scoping Process, the Planning Inspectorate has agreed that the potential impacts from operational phase traffic do not need to be considered in detail as part of the EIA for the Proposed Development.

14.2.20 A detailed assessment of emissions from operational road traffic and the subsequent impact upon local air quality is therefore not required, and will not be considered further within this assessment. There are no emissions from operational plant that require detailed assessment.

Impact Assessment Methodology

14.2.21 There is currently no statutory guidance on the methodology for air quality impact assessments. Several non-statutory bodies have published their own guidance relating to air quality and development control, such as that jointly issued by EPUK and IAQM (Ref 14-15). This assessment has been undertaken based on this guidance.

14.2.22 The potential for fugitive emissions of particulate matter from construction and decommissioning phase activities has been qualitatively assessed via a Dust Risk Assessment (DRA) (see **Table 14-5** and Ref 14-17). As construction phase road traffic volumes are not expected to meet thresholds above which detailed modelling is required, an assessment of impacts due to construction phase traffic has not been undertaken. If details of the Proposed Development are subsequently changed, such that a construction phase traffic assessment becomes required, road traffic emissions will be quantitatively assessed via a detailed dispersion modelling exercise as part of the EIA and reported within the ES, but this is considered unlikely.

14.2.23 As set out in **PEI Report Volume 1, Chapter 3: The Proposed Development**, the duration of, and operations required for, decommissioning are similar to those required for construction and consequently the effects of decommissioning are usually similar to, or of a lesser magnitude than, construction effects. Therefore, the preliminary assessment of construction phase effects on air quality also represents the likely significant effects which would be experienced at decommissioning. It should be noted that prior to decommissioning, there will likely be a requirement for a dust risk assessment and dust management plan to be agreed with the planning authority (North Kesteven District Council) prior to any works taking place. However, due to the estimated lifespan of the Proposed Development the process may be different at that point in time.

14.2.24 The DRA presented in this Section follows IAQM guidance, which does not follow the standard EIA methodology set out in **PEI Report Volume 1, Chapter 5: EIA Methodology and Consultation**. Instead, the magnitude of emission is combined with the sensitivity of the area to establish the level of risk that an impact may occur. This risk level is used to apply the appropriate level of mitigation such that there is no significant effect.

Receptor Sensitivity

14.2.25 Receptors of interest for the air quality assessment are those which represent locations where people are likely to be present, as the assessment is most concerned with human health. For the purposes of the DRA,

potentially affected air quality sensitive receptors have been identified through a review of Ordnance Survey (OS) mapping and aerial photography.

14.2.26 Following IAQM guidance (Ref 14-17), the presence of sensitive ecological receptors holding a National or Habitat Site designation within 50m of the Site Boundary has also been established. Ecological sites with the following designations have been explicitly considered within the DRA when identifying sensitive receptors – as stated above or within 50m from a route used by construction vehicles on the public highway (up to 250m from the Site access point):

- a. Sites of Special Scientific Interest (SSSI);
- b. Special Protection Areas (SPA);
- c. Special Areas of Conservation (SAC);
- d. Ramsar Sites;
- e. National Nature Reserves (NNR); and
- f. Local Nature Reserves (LNR).

14.2.27 Ecological sites possessing the following designations have also been reviewed; however, explicit consideration as part of the DRA is not required in accordance with the IAQM guidance (Ref 14-17):

- a. Ancient Woodland (AW); and
- b. Local Wildlife Sites (LWS).

14.2.28 Ammonia-emitting developments, such as intensive livestock and poultry units, in close proximity to AW sites can cause nutrient deposition leading to a greater abundance of nitrogen tolerant plant species which out-compete and impact on many characteristic ancient woodland plants. Ammonia can be released in small quantities from engine exhausts; however, because of the low volume of construction traffic, vehicles movements associated with the Proposed Development will not result in significant emissions of ammonia. There is one ancient woodland adjacent to the Proposed Development. This receptor has been screened into the Dust Risk Assessment.

Significance Criteria

14.2.29 When assessing the significance of dust impacts during the construction phase, IAQM recommends that significance is only assigned to an effect after considering the construction activity with mitigation (Ref 14-17).

14.2.30 Appropriate mitigation measures commensurate with the level of risk identified in the DRA will be defined in and implemented through the detailed Construction Environmental Management Plan (CEMP) as a Requirement of the Development Consent Order (DCO), see **Table 14-3**. Implementation of these measures will prevent significant effects on receptors, thereby resulting in a residual effect that can be considered 'not significant'. Where this is not practicable, it is important to consider the specific characteristics of the Proposed Development and the surrounding area to determine whether construction phase dust effects are likely to be significant in the context of the Proposed Development (Ref 14-17).

Methodology for Assessment of Fugitive Emissions of Particulate Matter during Construction and Decommissioning Phases

- 14.2.31 A qualitative risk-based assessment has been undertaken to assess the significance of any effects on sensitive receptors associated with the construction and decommissioning phase. The assessment is based on IAQM guidance (Ref 14-17) and considers potential sources of emissions from four main activity groupings:
- a. Demolition;
 - b. Earthworks;
 - c. Construction; and
 - d. Track-out.
- 14.2.32 The emphasis within the IAQM guidance (Ref 14-17) is on clarifying the risk of dust impacts from the Proposed Development, which will allow mitigation measures commensurate with that risk to be identified.
- 14.2.33 For each activity group, the following steps are applied with respect to identifying the potential effects, before coming to an overall conclusion about the significance of the effects predicted:
- a. Identify the nature, duration and the location of activities being undertaken;
 - b. Establish the risk of significant effects occurring as a result of these activities;
 - c. Review the proposed or embedded mitigation against good site practice;
 - d. Identify additional mitigation measures, if necessary, to reduce the risk of a significant adverse effect occurring at receptors; and
 - e. Summarise the overall effect of the works with respect to fugitive emissions of particulate matter and report the significance of the effects.
- 14.2.34 A DRA has been undertaken based on the IAQM Guidance (Ref 14-17) and the findings are presented within **Table 14-5** Construction of the Proposed Development will take place sequentially (as described in **PEI Report Volume 1, Chapter 3: The Proposed Development**). As such, potential fugitive emissions may be lower than expected compared to the size of the Site Boundary (when considering the Site in reference to the IAQM Guidance (Ref 14-17)) as construction will not be occurring across the entire Site at one time.

Emissions from Non-Road Mobile Machinery (NRMM)

- 14.2.35 Construction Non-Road Mobile Machinery (NRMM) includes construction machinery such as excavators, loaders, bulldozers. Emissions from construction NRMM will have the potential to increase pollutants such as Nitrogen Dioxide (NO₂) and PM₁₀ (i.e., particulate with diameters of 10 micrometres (µm) or less) concentrations locally when in use during construction. However, IAQM guidance (Ref 14-18) states that “*Experience of assessing the exhaust emissions from on-site plant (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."

- 14.2.36 Emissions from NRMM will be temporary and localised and will be controlled through best-practice mitigation measures (such as the embedded mitigation measures set out in **Table 14-3**). Additionally, exhaust emission from NRMM are controlled through European Directives. The UK is no longer a member of the European Union, since 1 January 2021 the UK has operated a Provisional Great Britain type approval scheme intended to enable vehicles to be placed on the market in Great Britain until a full Great Britain type approval scheme is available. The Provisional scheme follows the EU legislation. For that reason, construction phase NRMM emissions associated with the Proposed Development would not be significant and, therefore, have not been modelled and are not required to be considered any further in this assessment.

Assessment Assumptions and Limitations

- 14.2.37 This assessment is based on baseline and Proposed Development design information available at PEI Report stage. An updated assessment will be undertaken as part of the EIA and reported in the ES, which will be submitted with the DCO application.

Baseline Conditions

- 14.2.38 This section describes the baseline environmental characteristics for the Proposed Development and surrounding areas with specific reference to Air Quality.
- 14.2.39 North Kesteven District Council undertake routine ongoing monitoring of ambient air quality as part of their Local Air Quality Management responsibilities under Part IV of the Environment Act (1995) (as amended by the Environment Act 2021) and subsequent Regulations (Ref 14-3 and Ref 14-4). In 2022, North Kesteven District Council undertook passive (diffusion tube) monitoring of nitrogen dioxide (NO₂) at 22 sites located along principal traffic routes in order to quantify roadside NO₂ concentrations in the vicinity of relevant receptors (Ref 14-19).
- 14.2.40 There are no Air Quality Management Areas (AQMAs) within the administrative area of North Kesteven District Council and air quality is generally considered to be good (Ref 14-19). The most recent available monitoring results for 2022 indicate an overall reduction in NO₂ levels between 2018 and 2022.

Background Pollutant Concentrations

- 14.2.41 The total concentration of a pollutant comprises those contributions from explicit local emission sources such as roads, chimney-stacks, etc, and those that are transported into an area from indeterminate sources by wind from further away. If all the explicit local sources were removed, all that would remain is that which comes from indeterminate sources; it is this component that is called 'background'. A good understanding of background concentrations is important when completing air quality assessments as it allows for a better understanding of local pollutant sources.

14.2.42 Background data for the relevant 1km x 1km grid squares (covering the Study Area) was sourced from Defra's 2018-based Background Maps for the assessment year of 2022; these data are presented in **Table 14-1**. These data represent the most current and up to date data source.

Table 14-1: Background Pollutant Concentrations 2023, $\mu\text{g}/\text{m}^3$

	NO₂	PM₁₀	PM_{2.5}
Min	8.5	13.3	7.7
Mean	9.3	15.4	8.3
Max	11.7	16.6	8.8

Future Baseline

14.2.43 The future baseline scenarios are set out in **Chapter 5: EIA Methodology and Consultation**.

14.2.44 In the absence of the Proposed Development, background data for the relevant 1km x 1km grid squares (covering the Study Area) was sourced from Defra's 2018-based Background Maps for 2030; these data are presented in **Table 14-2**. These data represent the most current and up to date data source.

Table 14-2: Background Pollutant Concentrations 2030, $\mu\text{g}/\text{m}^3$

	NO₂	PM₁₀	PM_{2.5}
Min	5.7	14.8	7.9
Mean	6.2	15.1	8.0
Max	7.5	16.2	8.5

Embedded Mitigation Measures

14.2.45 The adoption of good Site practice will be implemented through measures to control dust as outlined within the IAQM guidance. It is proposed that the measures from the IAQM "High Risk Site" category are adopted where relevant, regardless of the level of risk identified in the assessment and the construction phase activities for the Proposed Development (Ref 14-17). As decommissioning operations are predicted to be similar to construction, the same good practice measures are predicted to apply.

14.2.46 Implementation of these measures will be secured through the provision of a detailed CEMP as a DCO Requirement and are included in the **Framework CEMP (PEI Report Volume 3, Appendix 3-A)**, as appropriate. Similarly, a Framework Decommissioning Environmental Management Plan (DEMP) will be submitted with the Environmental Statement (ES), with the detailed DEMP to be prepared prior to the start of decommissioning, again secured via a DCO Requirement.

14.2.47 **Table 14-3** shows good practice measures adopted for the Proposed Development where relevant to the activities being undertaken.

Table 14-3: Embedded Mitigation Measures

Activity	Mitigation Measure
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on Site. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. Display the head or regional office contact information. Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the Site. The DMP may include monitoring of dust deposition, dust flux, real time PM₁₀ continuous monitoring and/or visual inspections.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the local authority when asked. Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book. Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.
Monitoring	Undertake daily on-site and off-site visual inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the Site Boundary. Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions

Activity	Mitigation Measure
	Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences.
Preparing and maintaining the site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period where operations are within 100m of receptors.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
	Avoid site runoff of water or mud.
	Keep site fencing, barriers and scaffolding clean using wet methods.
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping.
	Ensure all vehicles switch off engines when stationary - no idling vehicles
	Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
	Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
Operations	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips.

Activity	Mitigation Measure
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. Avoid bonfires and burning of waste materials.
Waste management	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
Demolition	Avoid explosive blasting, using appropriate manual or mechanical alternatives. Bag and remove any biological debris or damp down such material before demolition. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
Earthworks	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. Only remove the cover in small areas during work and not all at once Avoid scabbling (roughening of concrete surfaces) if possible.
Construction	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
Trackout	Avoid dry sweeping of large areas. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.

Activity	Mitigation Measure
	Record all inspections of haul routes and any subsequent action in a site log book.
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowzers and regularly cleaned.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
	Access gates to be located at least 10m from receptors where possible.

Preliminary Assessment of Effects – Dust Risk Assessment

14.2.48 This DRA considers the potential magnitude of dust emissions at each stage of the Proposed Development in conjunction with the sensitivity of the surrounding area, following IAQM guidance (Ref 14-17). Based on these parameters, the Site will be classified as low, medium or high risk. The DRA is not an impact assessment, but an assessment of the risk of adverse amenity effects being caused by the operation.

14.2.49 The assessment considers the potential dust risk across a set of predefined zones, up to 250m from the Site.

14.2.50 The chosen representative dust risk receptors are shown **Table 14-4**. Dust receptor locations were chosen to represent residential areas in proximity of the Site. All properties are located within 250m of the site boundary. The Dust Risk Assessment is provided in **Table 14-5**.

Table 14-4: Representative Dust Risk Receptors

Receptor ID	X Coordinate	Y Coordinate	Location
R1	490926	364316	7 Old Haddington Lane
R2	490366	365608	Home Farm
R3	490854	365347	18 Fosse Lane
R4	489178	365661	Scotland Farm
R5	488009	364241	Morton Hall Immigration Removal Centre
R6	488571	363756	Morton Lane

Receptor ID	X Coordinate	Y Coordinate	Location
R7	489378	363168	New property off Hollyhock Way
R8	490199	362655	68 Nettleton Drive
R9	490923	360098	5 Water Lane
R10	490664	361420	2 Bassingham Road
R11	491556	360621	April Cottage
R12	498522	359514	Cliff Cottage
R13	491198	363016	Haddington Lane
R14	488865	362941	Halfway Houses Lane

Table 14-5: Dust Risk Assessment

STEP 1 – SCREENING

1a.	Is a human receptor site within:	
	250m of site boundary	Y
	50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s)	Y
1b.	Is an ecological receptor site within:	
	50m of the site boundary	Y
	50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s)	Y

IF ANSWERS TO 1A OR 1B ARE 'YES' COMPLETE 1C AND COMPLETE THE ASSESSMENT

	Provide a description of the proposed demolition and construction activities, their location and duration and any phasing of the development, including: - The proximity and number of receptors; - The specific sensitivity of the receptor(s), e.g. a primary school or hospital; - The duration for which the sources of dust emissions may be close to the sensitive receptors; and - In the case of PM₁₀ the local background concentration.	
1c.	<i>Subject to being granted consent and following a final investment decision, the earliest construction could start is in 2031. Based upon the current construction programme, construction is anticipated to require 24-30 months, with operation therefore anticipated to commence in 2033. Sources of dust emissions are likely to occur during this period. The greatest potential for dust effects is likely to occur during the excavation and earthworks phases, in addition to the substructure construction period.</i> <i>The Site is located in a rural area but close to a number of villages, and consequently there are a large number of receptors within and in proximity to the Site that may be affected by the works. This includes high sensitivity receptors such as residential properties and schools, as well as medium sensitivity receptors such as commercial units and offices. Defra background maps indicate an average background PM₁₀ concentration of 16.6 µg/m³ across the Study Area in 2023. This is well below the annual average objective value of 40 µg/m³.</i>	

STEP 2 – ASSESS THE RISK OF DUST IMPACTS

STEP 2A – Define the Potential Dust Emission Magnitude

DEMOLITION PHASE

2a(i)	Is the volume of demolition:	
	Large Total volume of building to be demolished (>50,000m ²); or	N/A

	Potential dusty construction material (e.g. concrete); or On-site crushing and screening; or Demolition activities >20m above ground level.	
	Medium Total volume of building to be demolished 20,000m ³ – 50,000m ³ ; or Potential dusty construction material; or Demolition activities 10-20m above ground level.	N/A
	Small Total volume of building to be demolished <20,000m ³ ; or Construction material with low potential for dust release (e.g. metal cladding or timber); or Demolition activities <10m above ground level and demolition during wetter months.	N/A
	<i>No demolition is anticipated prior to construction</i>	

EARTHWORKS PHASE

2a(ii)	Is the scale of the earthworks:	
	Large Total site area >10,000m ² ; or Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size); or >10 heavy earth moving vehicles active at any one time on-site; or Formation of stockpile enclosures >8m in height; or Total material moved >100,000 tonnes (where known).	
	Medium Total site area 2,500m ² -10,000m ² ; or Moderately dusty soil type (e.g. silt); or 5-10 heavy earth moving vehicles active at any one time on-site; or Formation of stockpile enclosures 4-8m in height; or Total material moved 20,000-100,000 tonnes (where known).	
	Small Total site area <2,500m ² ; or Soil type with large grain size (e.g. sand); or	Y

	<5 heavy earth moving vehicles active at any one time onsite; Formation of stockpile enclosures <4m in height; or Total material moved <10,000 tonnes (where known), or earthworks during wetter months.	
	<i>Whilst the total site area is large, due to the small area of earthworks and the fact that there will likely be no heavy earth moving vehicles and small stockpile, the Potential Dust Emission Magnitude has been categorised as small.</i>	

CONSTRUCTION PHASE

2a(iii)	Is the scale of the works:	
	Large Total construction volume >100,000m ³ ; or Piling; or On-site concrete batching; or Sandblasting.	
	Medium Total building volume 25,000m ³ -100,000 m ³ ; or Potentially dusty construction material (e.g. concrete); or On-site concrete batching.	
	Small Total building volume <25,000m ³ ; or Construction material with low potential for dust release (e.g. metal cladding or timber).	Y
	<i>Whilst the total site area is large, due to the small area of earthworks and the fact that there will likely be no heavy earth moving vehicles and small stockpile, the Potential Dust Emission Magnitude has been categorised as small.</i>	

TRACKOUT

2a(iii)	Only receptors within 50m of the route(s) used by vehicles on the public highway and up to 500 m from the site entrance(s) are considered to be at risk from the effects of dust. Will the trackout be:	
	Large >50 Heavy Duty Vehicle (HDV; >3,5t) outward movements in one day; Potentially dusty surface material (e.g. high clay/silt content); or Unpaved road length >100m.	

	Medium 10-50 HDV (>3,5t) outward movements in any one day; Moderately dusty surface material (e.g. high clay content); or Unpaved road length 50-100m (high clay content)	Y
	Small <10 HDV (>3.5t) trips in any one day; Surface material with low potential for dust release; or Unpaved road length <50m.	
	<i>At the time of assessment it is expected that there will be peak construction traffic of around 58 HGV per day. It is estimated that a maximum of 50 outward movements of heavy duty vehicles will occur daily during construction. The site access will be through a short section of unpaved road. and as such the Potential Dust Emission Magnitude for the trackout phase is categorised as Medium.</i>	

STEP 2B – Define the Sensitivity of the Area

Define the Receptor Sensitivity

2b(i)	Sensitivity of People to Dust Soiling Effects	
	Is the location a:	
	High sensitivity receptor • Locations where users can reasonably expect enjoyment of a high level of amenity; or • Appearance, aesthetics or value of property would be diminished by soiling; and • People / property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. e.g. residential dwellings, museums, medium/long-term car parks, car showrooms.	Y
	Medium sensitivity receptor • Locations where users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • Appearance, aesthetics or value of property could be diminished by soiling; or • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work.	
	Low sensitivity receptor • Enjoyment of amenity would not reasonably be expected; or	

	- Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or - There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land e.g. playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	
	<i>There are between 40-60 residential dwellings within 20 m of the Site Boundary.</i>	
2b(ii)	Sensitivity of People to Health Effects of PM ₁₀	
	Is the location a:	
	High sensitivity receptor Locations where members of the public are exposed over a time period relevant to the 24-hour objective for PM₁₀ (a relevant location would be where individuals may be exposed for 8 hours or more in a day). e.g. residential dwellings, schools, residential care homes.	Y
	Medium sensitivity receptor Locations where the people exposed are workers, and exposure is over a time period relevant to the 24-hour objective for PM₁₀ (a relevant location would be where individuals may be exposed for 8 hours or more in a day). e.g. office and shop workers, generally excludes workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.	
	Low sensitivity receptor Locations where human exposure is transient, e.g. public footpaths, playing fields, parks and shopping streets.	
	<i>There are between 40-60 residential dwellings within 20 m of the Site Boundary. Although receptors are present very close to the site boundary, they will still be set back from the works themselves. Effects will be temporary and transient</i>	
2b(iii)	Sensitivity of Receptors to Ecological Effects	
	<i>The following designated ecological sites have been identified within 1 km of the Site Boundary: Tunman Wood AW (0m north of the site)</i> <i>Whitby Nature Park LNR (350m north of the site).</i> <i>Due to their presence within 1km of the Site Boundary, the risk of dust effects at Nationally or European designated ecological sites will be considered further in this assessment.</i> <i>There are no internationally designated sites for nature conservation within 10km of the Site boundary.</i> <i>The following sensitive non-designated sites are within 1km of the Site Boundary:</i> A15, Green Man Road to Cuckoo Lane Verge (within the site boundary); Boothby Graffoe Road Verges (within the site boundary); Coleby, Heath Road Verges (within the site boundary); Wellingore Heath Road Verges (within the site boundary);	

Gorse Hill Lane Verges (within the site boundary);
Gorse Lane (within the site boundary);
Green Man Lane (within the site boundary);
High Dike, Coleby Mill to Harmston Verges (within the site boundary);
High Dike, Long Lane to Navenby Verges (within the site boundary);
Navenby Heath Road Verges (within the site boundary);
Navenby, Green Man Road Verges (within the site boundary);
River Witham, Aubourn to Beckingham (29m from site boundary);

There are a number of veteran trees within the designated areas mentioned. However, these would not be sensitive to dust.

Following the sensitivity tables in the IAQM guidance:

Combined Sensitivity of the area for Dust Soiling Effects = HIGH. The presence of high sensitivity receptors (i.e. residential dwellings) within 20 m of the Site boundary results in a combined HIGH sensitivity for Dust Soiling Effects.

Combined Sensitivity of the area to Human Health Impacts = MEDIUM. Annual mean PM₁₀ concentrations of <24 across the study area in conjunction with the presence of sensitive receptors within 20 m of the Site boundary result in a combined MEDIUM sensitivity for Human Health Impacts.

Combined Sensitivity of the area to Ecological Impacts = LOW. Locally designated, potentially sensitive ecosystems are situated within 20 m of the Site boundary, thus a combined LOW sensitivity of the study area to Ecological Impacts has been determined.

14.2.51 A summary of the magnitude of emissions and area sensitivity is provided in Table 14-6 and Table 14-7.

Table 14-6: Summary of Potential Dust Emission Magnitudes for Construction Phase Activities

Activity	Potential Dust Emission Magnitude
Earthworks	Small
Construction	Small
Trackout	Medium

14.2.52

Table 14-7: Summary of Area Sensitivity to Construction Phase Activities

Potential Effect Type	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	High	High	High
Human Health	Medium	Medium	Medium
Ecology	Low	Low	Low

14.2.53 The magnitude of emissions (**Table 14-6**) and area sensitivity (**Table 14-7**) are combined to determine the risk of effects (prior to accounting for the embedded mitigation) as shown in **Table 14-8**. The risk level is used to determine the level of mitigation required. IAQM recommends that significance is only assigned to the effect after considering the construction activity with mitigation.

14.2.54 The overall risk level is Medium Risk for Dust Soiling, Medium Risk for Human Health, and Low Risk for Ecology. Using a conservative approach, the site has been assigned an overall Medium Risk for Dust Effects.

14.2.55 With the implementation of the good practice measures, the impact of the construction phase would be negligible.

Residual Effects and Conclusions

14.2.56 **Table 14-8** provides a summary of the preliminary assessment of effects for air quality with the embedded mitigation, along with a measure of the level of confidence in the prediction of those effects.

Table 14-8: Preliminary Assessment of Effects – Air Quality (construction and decommissioning)

Receptor	Potential Impacts, Details and Evidence	Duration	Mitigation	Likely Significance of Effect	Confidence in Prediction
Human Health	Emissions from construction and decommissioning activities affecting human health	Short-term Temporary (During the construction or decommissioning phase only)	As presented in Table 14-3 (IAQM recommended mitigation for high risk sites).	Not significant	Emissions from road traffic = High - traffic has been assessed in PEI Report Volume 1, Chapter 13: Traffic and Transport and scoped out of further assessment. Predicted traffic volumes could be updated before the ES however an updated screening assessment would be undertaken if there is an increase from current estimates. Emissions from demolition and construction activities = High - A DRA for construction activities has been undertaken on a worst-case scenario of activities happening across the entire site at all times.
Sensitive Ecosystems	Emissions from construction and decommissioning activities affecting sensitive ecosystems	Short-term Temporary (During the construction or decommissioning phase only)	As presented in Table 14-3 (IAQM recommended mitigation for high risk sites).	Not significant	Emissions from road traffic = High - traffic has been assessed in PEI Report Volume 1, Chapter 13: Traffic and Transport and scoped out of further assessment. Predicted traffic volumes could be updated before the ES however an updated screening assessment would be undertaken if there is an increase from current estimates. Emissions from demolition and construction activities = High - Dust risk assessment for construction activities has been undertaken on a worst-case scenario of activities happening across the entire Site at all times.

Additional Mitigation and Enhancement

- 14.2.57 No additional mitigation or enhancement measures beyond the good practice measures described in **Table 14-3** are required with respect to Air Quality effects arising from the Proposed Development, due to no significant adverse effects being identified.

Cumulative Effects

- 14.2.58 This section presents a preliminary assessment of the potential for cumulative effects to arise between the Proposed Development and other proposed and committed plans and projects including other developments (referred to as 'Cumulative Schemes') within the surrounding area.
- 14.2.59 Of the shortlisted developments listed in **Chapter 15: Cumulative and Effect Interactions**, and shown on **PEI Report Volume 2, Figure 15-2**, 14 developments were considered to have the potential for cumulative air quality effects when considered alongside the Proposed Development due to being located within the 250m Zone of Influence for air quality.
- 14.2.60 This preliminary cumulative effect assessment identified for each receptor those areas where the predicted effects of the Proposed Development could interact with effects arising from other plans and, or projects on the same receptor based on a spatial and, or temporal basis.

Construction and Decommissioning

- 14.2.61 There is the potential for cumulative effects during construction from fugitive emissions from construction activities, and from the movement of construction vehicles on the road network.
- 14.2.62 Mitigation measures for managing dust emissions during construction would be documented within the **Framework Construction Environmental Management Plan (Framework CEMP)** presented in **PEI Report Volume 3, Appendix 3-C**, which will ensure that off-site impacts are not significant. It is assumed that nearby construction sites, including the solar Development Consent Order Schemes, will operate to a similar level of good practice in accordance with their own CEMPs. The cumulative effects of dust generation during construction would therefore be neutral (not significant) for all cumulative schemes.
- 14.2.63 As the Proposed Development has an estimated design life of 60 years, it is not possible to predict which developments would be being constructed or decommissioned at the same time as the Proposed Development is decommissioned. Broadly, however, the effects of decommissioning are likely to be similar to those during construction. Mitigation measures for managing dust emissions during decommissioning would be documented within the Framework Decommissioning Environmental Management Plan (DEMP) to be submitted with the DCO application and it is assumed that any nearby construction/decommissioning sites would operate to a similar level of good practice in accordance with their own CEMPs/DEMPs. The

cumulative effects of dust generation during decommissioning would therefore be neutral (not significant).

Operation and Maintenance

14.2.64 Following consideration of the Cumulative Schemes within the Zol for Air Quality, there are two schemes within the Zol that are neighbouring to each other and are both introducing new receptors that are sensitive to dust and another Scheme which is located immediately adjacent to the Proposed Development. These are discussed in **Table 14-9**. All other proposed schemes are considered to be too far away from the Proposed Development, or do not introduce new sources that generate dust that is likely to have an effect beyond their application boundaries and are therefore not considered to have the potential for cumulative effects.

Table 14-9: Preliminary Assessment of Cumulative Effects during Construction and Operation

ID	Application Reference	Distance from Proposed Development (m)	Preliminary Assessment of cumulative effects
5	15/1347/OUT Associated applications: 24/0456/RESM / 22/0174/RESM / 21/0276/RESM	123	Construction: No significant effect is anticipated as it is assumed that impacts will be managed within each scheme. Operation: No contribution from the cumulative scheme
34	20/1736/RESM	257	Construction: No significant effect is anticipated as it is assumed that impacts will be managed within each scheme. Operation: No contribution from the scheme
63	EN010149	0	Construction: No significant effect is anticipated as it is assumed that impacts will be managed within each Scheme. Although the Cable Corridors overlap for both ID63 and the Proposed Development, the Principal Site for the Cumulative Scheme is located approximately 3km away. Operation: No contribution from the scheme

Summary

14.2.65 In summary, with the implementation of the control measures listed in the IAQM guidance (Ref 14-17) the emissions can be minimised at source and managed to prevent significant environmental effects at any receptor beyond

the application boundary. These control measures are industry standard practice with an established track record of effectively managing construction site emissions to air. The distance between schemes ensures that no receptors are closer than 50m to more than one scheme and with each scheme managing the risk of emissions beyond their own scheme boundary cumulative effects will not be significant.

- 14.2.66 At the ES stage, this cumulative effects assessment will be reviewed and updated, and further consideration will be given to cumulative effects from road traffic emissions using updated traffic flows.

14.3 Glint and Glare

Introduction

- 14.3.1 This section of the PEI Report presents the preliminary findings of an assessment of the likely significant effects from Glint and Glare as a result of the Proposed Development.
- 14.3.2 This Section is supported by a preliminary Glint and Glare assessment, presented in **PEI Report Volume 3, Appendix 14-C: Glint and Glare Assessment**. A full Glint and Glare Assessment will be included within the ES to be submitted with the DCO application.
- 14.3.3 The definition of Glint and Glare for the purposes of this assessment is the effect of reflected sunlight causing harm or discomfort to a sensitive receptor. A glint is further defined as the momentary receipt of a bright light and a glare as the receipt of a bright light over an extended or continuous period of time. This widely accepted definition is taken from US Federal Aviation Authority (FAA) guidance (Ref 14-26).
- 14.3.4 This PEI Report assumes the solar PV panels will either be fixed south facing or single axis tracker panels, as described in **PEI Report Volume 1 Chapter 3: The Proposed Development**. The fixed south facing solar PV panels are oriented in a southwards direction at an angle of between 5 and 45 degrees to maximise solar gain and will remain in a fixed position throughout the day and during the year (i.e. they will not rotate to track the movement of the sun). The single axis tracker panels will rotate from east to west (+/-60 degrees from horizontal) to track the movement of the sun throughout the day.
- 14.3.5 Throughout the EIA and following statutory consultation, the design may be altered slightly and the parameters for the solar PV panel arrangement refined to respond to stakeholder comments. Any amendments to the design parameters will be presented in the ES upon finalisation of the Proposed Development for the DCO application and will include the required mitigation measures identified within the final assessment.

Legislation and Planning Policy

- 14.3.6 There is no legislation relevant to Glint and Glare specifically. Planning policy and guidance relating to Glint and Glare which is pertinent to the Proposed Development comprises the documents listed below. More detailed information can be found in **PEI Report Volume 3, Appendix 14-A: Other Environmental Topics Policy and Legislation** and **PEI Report Volume 3 Appendix 14-C: Glint and Glare Assessment**.

National Policy – Glint and Glare

- a. Overarching National Policy Statement for Energy (EN-1) (Ref 14-10); and
- a. National Policy Statement for Renewable Energy Infrastructure (EN-3) (Ref 14-9); and

Local Policy – Glint and Glare

- a. Lincolnshire Local Plan (2023) (Ref 14-44).

Guidance – Glint and Glare

- a. National Planning Practice Guidance (NPPG) – Renewable and Low Carbon Energy (**Ref 14-22**);
- b. BRE (2014) Planning guidance for the development of large scale ground mounted solar PV systems (**Ref 14-23**).
- c. Interim Civil Aviation Authority (CAA) guidance – Solar Photovoltaic Systems (**Ref 14-24**);
- d. CAA – CAP738: Safeguarding Aerodromes 3rd Edition (**Ref 14-25**);
- e. US Federal Aviation Authority (FAA) Administration Policy (**Ref 14-26Ref 14-27**);
- f. FAA Policy: Review of Solar Energy Systems projects on Federally Obligated Airports (**Ref 14-27**); and
- g. Overview of Rail Safety and Standards Board Guidance (RSSB) (**Ref 14-29**).

Consultation

- 14.3.7 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023 as part of the EIA Scoping Process. Consultation responses in relation to Glint and Glare, are presented in **PEI Report Volume 3, Appendix 1-C**. No additional consultation has been undertaken in relation to Glint and Glare to date.

Assessment Methodology

- 14.3.8 This section sets out the scope and methodology for the preliminary assessment of the Glint and Glare impacts of the Proposed Development.

14.3.9 The Glint and Glare assessment methodology is desk-based and has been defined following review of available guidance and studies. The approach has been informed by the legislation and guidance presented in **PEI Report Volume 3, Appendix 14-C: Glint and Glare Assessment**. The approach taken is to determine whether a reflection from the Proposed Development is geometrically possible and then to compare the results against the relevant guidance and studies to determine whether the reflection is significant.

14.3.10 In summary, the assessment methodology is a multi-step process of elimination to determine which receptors have the potential to experience the effects of Glint and Glare, which includes the following:

- a. Identifying receptors in the Study Area defined below surrounding the Proposed Development.
- b. Considering direct solar reflections from the Proposed Development towards the identified receptors by undertaking geometric calculations;
- c. Considering the visibility of the panels from the receptor's location. If the panels are not visible from the receptor, then no reflection can occur;
- d. Based on the results of the geometric calculations, determining whether a reflection can occur, and if so, at what time will it occur;
- e. Considering both the solar reflection from the Proposed Development and the location of the direct sunlight with respect to the receptor's position;
- f. Considering the solar reflection with respect to published studies and guidance – including intensity calculations where appropriate;
- g. Determining whether a significant detrimental effect is expected in line with the significance criteria set out in section 14.3.12.

Study Area

14.3.11 The Study Area was defined to include Glint and Glare features likely to be at risk from possible direct and indirect impacts that might arise from the Proposed Development, termed the Zone of Influence (Zoi). The potential Zoi is considered to vary based on the receptor type, as follows:

- a. Ground-based receptors, including residential receptors, roads, waterways and railways, and PRow within 1km of the Scheme Boundary; and
- b. Aviation receptors within 30km, with detailed assessment for international aerodromes within 20km, military aerodromes within 10km and 5km for small aerodromes.

Magnitude of Impact

Static Receptors

14.3.12 Although there is no specific guidance set out to identify the magnitude of impact from solar reflections, the following criteria has been set out for the purposes of this report:

- a. **High** – Solar reflections impacts of over 30 hours per year or over 30 minutes per day;
- b. **Medium** – Solar reflections impacts above 20 hours but below 30 hours per year or above 20 minutes but below 30 minutes per day;
- c. **Low** – Solar reflections impacts up to and including 20 hours per year or up to 20 minutes per day; and
- d. **None** – Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening.

Moving Receptors

14.3.13 No specific guidance is available to identify the magnitude of impact from solar reflections on moving receptors except in aviation, however, it is thought that a similar approach should be applied to moving receptors as for aviation, based on the ocular impact and the potential for after-image. The following criteria has been set out for the purposes of this assessment:

- a. **High** – Solar reflections impacts consisting of any amount of yellow glare¹;
- b. **Low** – Solar reflections impacts consisting of any amount of only green glare²; and
- c. **None** – Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening.

Baseline Conditions

14.3.14 The agricultural land use within the Study Area is characterised by large scale regular-shaped arable fields across a number of land-holdings. The landscape is interspersed with individual trees, woodlands, hedgerows, linear tree belts, farm access tracks, and local transport roads. These vegetation patterns are varied across the Site and provide some existing screening for surrounding receptors.

14.3.15 Full details of the baseline conditions, and future baseline can be found in **PEI Report Volume 1, Chapter 10: Landscape and Visual Amenity**.

¹ Yellow Glare is defined as "Glare predicted with a potential to cause a temporary after-image".

² Green Glare is defined as "Glare predicted with a low potential for temporary after-image".

Receptors

Residential Receptors

14.3.16 Residential receptors located within 1km of the Proposed Development have been considered in the assessment. Glint was assumed to be possible if the receptor is located within the ground-based receptor zones outlined in **PEI Report Volume 3, Appendix 14-C: Glint and Glare Assessment**.

14.3.17 Where there are a number of residential receptors within close proximity, a representative dwelling or dwellings is/are chosen for detailed analysis as the impacts will not vary to any significant degree. Where small groups of receptors are evident, the receptors on either end of the group have been assessed in detail. A total of 213 dwelling receptors have been assessed.

Road and Rail Receptors

14.3.18 Roads that are within 1km of the Order limits and have potential views of the panels are considered in the assessment. There are 44 roads within the study area that require a detailed assessment and these are defined in **PEI Report Volume 3, Appendix 14-C: Glint and Glare Assessment**. The assessment of these includes 243 receptor points along the 44 assessed roads within the study area, these points are 200m apart to ensure that each road is sufficiently covered within the assessment.

14.3.19 There are some minor roads which serve dwellings that have been screened out as vehicle users of these roads will likely be travelling at low speeds. Therefore, there is a negligible risk of safety impacts resulting from glint and glare of the Proposed Development.

14.3.20 There is one railway line within 1km of the Principal Site which requires assessment, this includes 20 rail receptor points for assessment.

Bridleways

14.3.21 All bridleways within 1km of the Proposed Development have been considered. The assessment included 82 receptor points which are 200m apart.

Aviation Receptors

14.3.22 There are 35 aerodromes within 30km of the Proposed Development, however, only RAF Waddington, Peacocks Farm, South Hykeham Airfield, South Scarle Airfield and Blackmoor Farm required a detailed assessment as the Proposed Development is located within their safeguarding buffer zones.

Embedded Mitigation Measures

14.3.23 The design of the Proposed Development includes embedded design mitigation for Glint and Glare, including landscaping to screen the Proposed Development from view of receptors to Glint and Glare, as well as landscape and visual impacts. This is described in detail in **PEI Report Volume 1, Chapter 10: Landscape and Visual Amenity**.

14.3.24 The embedded mitigation measures include:

- a. Careful siting of the Proposed Development in the landscape with offsets from existing residential areas, vegetation patterns and road networks;
- b. Conserving existing vegetation patterns; and
- c. Creating new Green Infrastructure (i.e., vegetation planting) within the Principal Site with extensive planting proposals.

Assessment of Likely Impacts and Effects

Residential Receptors

14.3.25 Solar reflections are possible at 160 of the 213 residential receptors based on the bare earth model. The initial bald-earth scenario, with no consideration of local vegetation, other obstacles, and cloud cover, identified potential impacts as High at 36 receptors, Medium at 22 receptors, Low at 102 receptors, and None at the remaining 43 receptors. Upon reviewing the actual visibility of receptors, glint and glare impacts remained High for 11 receptors, Medium for two receptors, Low for 47 receptors, and reduced to None for all remaining receptors. Taking into account screening such as field boundary hedgerows, overall impacts would remain Low at 33 receptors, but reduced to None for all remaining receptors. Therefore, overall impacts on residential receptors are considered **Not Significant** and therefore acceptable.

Road Receptors

14.3.26 Solar reflections are possible at all of the 217 road receptor points assessed in the 1km Study Area based on the bare earth model. Upon reviewing the actual visibility of the receptors, glint and glare impacts remain High for 31 receptor points and Low at three receptors to None for the remaining road receptors. Taking into account screening such as field boundary hedgerows, impacts reduced to Low at two receptors to None at all remaining receptors. Therefore, overall impacts are **Not Significant**.

Rail Receptors

14.3.27 Solar reflections are possible at all of the 13 rail receptors assessed within the 1km Study Area. Upon reviewing the actual visibility of the receptors, glint and glare impacts reduce to None for all rail receptors. Therefore, overall impacts on rail receptors are considered to be **None**.

Bridleway Receptors

14.3.28 Solar reflections are possible at all 79 bridleway receptors within the 1km Study Area. Upon reviewing the actual visibility of the receptors, glint and glare impacts remain High at 39 receptors and reduce to Low at 20 receptors and to None at 20 receptors. Taking into account screening such as field boundary hedgerows, impacts reduce to Low at 14 receptors to None at all remaining receptors, therefore overall impacts are **Not Significant**.

Aviation Receptors

14.3.29 Twelve runway approach paths and two Air Traffic Control Towers (ATCT) were assessed in detail at RAF Waddington, Peacocks Farm, South Hykeham Airfield, South Scarle Airfield and Blackmoor Farm. Only green glare impacts were predicted for the Runway 20 approach path and ATCT at RAF Waddington and the Runway 24 approach path at Blackmoor Farm based on bare earth model. This is considered to be an acceptable impact upon runways, according to Federal Aviation Authority (FAA) guidance. Upon reviewing the actual visibility of the receptors, including ground elevation, the glare impacts are reduced to None and Not Significant. Overall impacts on Aviation receptors are acceptable and **Not Significant**.

Mitigation Measures

14.3.30 The preliminary Glint and Glare assessment requires mitigation measures to be implemented due to the High and Medium impacts found during the visibility analysis at 36 residential receptors, 39 bridleway receptors and 31 road receptors and the Low impacts at 47 residential receptors, 20 bridleway receptors and three road receptors. These are preliminarily defined within **PEI Report Volume 3, Appendix 14-C** and these mitigation requirements are based on the desktop analysis and do not take into account the actual condition of existing hedgerows and the proposed hedgerows already embedded into the design (as shown on **PEI Report Volume 2 Figure 3-2A and Figure 3-2B**).

14.3.31 Where mitigation has been identified as required in the preliminary Glint and Glare assessment, this will be reviewed and incorporated within the Framework Landscape and Ecology Management Plan (LEMP) to be submitted with the DCO application. This will take into account the final design of the Proposed Development and will be based on the final Glint and Glare Assessment model. The Framework LEMP will specify, if and where required, that hedgerows will be infilled and maintained to a sufficient height to effectively screen views of the Proposed Development where Glint and Glare is possible at the identified receptors.

Residual Effects and Conclusions

14.3.32 With the proposed embedded design mitigation, no significant residual effects are anticipated as a result of the Proposed Development.

14.3.33 The effects of Glint and Glare and their impact on local receptors is predicted to be Low at 33 residential receptors, Low at two road receptors and Low at 14 bridleway receptors, whilst the remaining ground-based receptors are expected to have no impacts once mitigation measures have been considered. Impacts upon aviation receptors are predicted to be Acceptable. Therefore, overall impacts are **Not Significant**.

Cumulative Assessment

- 14.3.34 The short-list of cumulative schemes is presented in **PEI Report Volume 1, Chapter 15: Cumulative Effects and Interactions**. The assessment summarised above identified that with the introduction of the additional mitigation, receptors will not be likely to experience significant effects as a result of the Proposed Development, which are judged to be **Not Significant**.
- 14.3.35 In addition, it is anticipated that the other solar developments listed within **PEI Report Volume 1, Chapter 15: Cumulative Effects and Interactions** will be designed to ensure that there will be effective screening to prevent Glint and Glare effects from other individually planned solar farms. Therefore, cumulative effects would be unlikely and are not considered to arise for Glint and Glare. Most of the other solar developments listed within **PEI Report Volume 1, Chapter 15: Cumulative Effects and Interactions** are also located further than the Glint and Glare Zol of 1km. The overall impact of the Proposed Development is considered **Not Significant**.

14.4 Ground Conditions

Introduction

- 14.4.1 Regarding the preliminary assessment of the impact of the Proposed Development on Ground Conditions, a Phase 1 Preliminary Risk Assessment (PRA) Report has been prepared for the Proposed Development and is provided in **PEI Report Volume 3, Appendix 14-B**, the findings of which are summarised in this section.
- 14.4.2 A Phase 1 PRA is equivalent to a Stage 1 Tier 1 level of assessment, as defined by the Environment Agency's Land Contamination Risk Management (LCRM) (2023) guidance (Ref 14-30). The objective of the PRA is to identify and evaluate potential land quality risks and development constraints associated with the Proposed Development and to prepare an initial conceptual site model that can be used to inform future decision making and the design of future ground investigation which may be required. The Phase 1 PRA Report covers the land within the Site.
- 14.4.3 The Phase 1 PRA includes the following:
- A description of the geology, hydrogeology and shallow mining potential;
 - A description of the environmental setting/sensitivity and current/historical land use of the Site and surrounding area;
 - A description of the findings of a site reconnaissance visit;
 - An initial Conceptual Site Model (CSM) for the prevailing ground conditions; and
 - A preliminary qualitative risk assessment of potential land contamination risks to human (chronic), environmental and controlled water receptors

from contamination sources on or in the vicinity of the Site using the source-pathway-receptor model.

Legislation and Planning Policy

- 14.4.4 Legislation, planning policy, and guidance relating to Ground Conditions and pertinent to the Proposed Development comprises the documents listed below. More detailed information can be found in **PEI Report Volume 3, Appendix 14-A: Other Environmental Topics Policy and Legislation**.

Legislative Framework – Ground Conditions

- 14.4.5 There are six key legislative drivers for dealing with risks to human health and the environment from ground conditions, namely:
- Part 2A of the Environmental Protection Act (EPA) 1990 (the Contaminated Land Regime) (Ref 14-31);
 - The Water Resources Act 1991 (Ref. Ref 14-32);
 - Water Act 2003 (Ref. Ref 14-33);
 - Building Act 1984 (Ref. Ref 14-34);
 - The Building Regulations 2010 (Ref 14-35); and
 - Planning Act 2008 (Ref 14-36).
- 14.4.6 Other legislation of relevance to this topic includes:
- Environmental Permitting (England and Wales) Regulations 2016 (Ref 14-37) (as amended);
 - Hazardous Waste (England and Wales) Regulations 2005 (Ref 14-38);
 - Contaminated Land (England) Regulations 2006 (Ref 14-39);
 - Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 14-40); and
 - Anti-Pollution Works Regulations 1999 (Ref 14-41).

National Policy – Ground Conditions

- Overarching National Policy Statement (NPS) for Energy (EN-1) (2023) (Ref 14-10);
- National Planning Policy Framework (2023) (Ref 14-14).

Local Policy – Ground Conditions

- Central Lincolnshire Adopted Local Plan 2023 (Ref 14-44).

Consultation

- 14.4.7 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023 as part of the EIA Scoping Process. A Scoping Opinion was received from the Planning Inspectorate on 25 July 2023 (**PEI Report Volume 3: Appendix 1-B: Scoping Opinion**).

- 14.4.8 Responses to comments received in the EIA Scoping Opinion in relation to Ground Conditions are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses**.

Baseline Conditions

- 14.4.9 A summary of the baseline conditions is described within PEI Report Volume 1, Appendix 14-B: Preliminary Phase 1 Risk Assessment.

Embedded Mitigation Measures

- 14.4.10 A number of environmental design and management measures will be employed as standard best practice to minimise impacts to human health, controlled waters, sensitive ecological receptors, buildings/infrastructures and property during the construction and decommissioning phases of the Proposed Development. These are outlined in the Framework CEMP (**PEI Report Volume 3, Appendix 3-A: Framework CEMP**) which will be further refined within the ES. Similarly, a Framework Decommissioning Environmental Management Plan (DEMP) will be provided with the ES. Delivery of a detailed version of these plans prior to construction/decommissioning and implementation of the measures they contain will be secured through DCO Requirements.
- 14.4.11 During construction, the Proposed Development works will be undertaken in compliance with Construction Design and Management (CDM) 2015 Regulations. Mitigation to prevent surface runoff, discharge into watercourses and dust generation will form part of the construction phase obligations and requirements. These measures will be outlined within the Framework CEMP (**PEI Report Volume 3, Appendix 3-A**). On-site activities when the Proposed Development is complete and operational will be limited to the maintenance of the infrastructure. During maintenance activities, there may be the need to use oils, grease, fuels, lubricants and cleaning agents on-site. There is a limited risk of chemical pollution arising from accidental spillages during these operations. An Operational Environmental Management Plan (OEMP) will be prepared following grant of DCO to address all operational related issues. A Framework OEMP will be provided with the ES. This will include the provision of a spillage Emergency Response Plan (ERP), which maintenance staff will be required to have read and understood. On-site provisions will be made to contain a serious spill or leak through the use of booms, bunding and absorbent material. Operational activities are proposed to be scoped out of the assessment.

Preliminary Assessment of Effects

- 14.4.12 The principle of risk assessment for land contamination is outlined in the Environmental Protection Act 1990 (Part 2A) (Ref 14-1) and LCRM (Ref 14-30). The risk assessment process for environmental contaminants is based on a source-pathway-receptor analysis. These terms can be defined as follows:

- a. Source: hazardous substance that has the potential to cause adverse impacts;
- b. Pathway: route whereby a hazardous substance may come into contact with the receptor. Examples include ingestion of contaminated soil and leaching of contaminants from soil into watercourses; and
- c. Receptor: target that may be affected by contamination. Examples include human occupants/ users of site, water resources (surface waters or groundwater), or structures.

14.4.13 For a risk to be present, there must be a relevant/viable contaminant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway.

14.4.14 The following sources, pathways and receptors in **Table 14-10** have been identified for the Proposed Development.

Table 14-10: Sources, Pathways and Receptors (Ground Conditions)

Sources	Pathways	Receptors
1: On Site, current farm buildings and yards where fuel and agricultural materials were/are stored. Made Ground (infilled pits/quarries/former ponds). Former corn mill. Current digestate holding lagoon (slurry tanks). (relevant to the Principal Site)	1: Direct Pathway: direct contact, dermal absorption or ingestion of soil. 2: Indirect Pathway: inhalation of soil particulates or vapour derived from soils. 3: Indirect Pathway: migration of hazardous gases/vapours via permeable strata into confined spaces (asphyxiation/explosion).	1: Current Site Users: farmers/site visitors/general public on the Site using the Public Rights of Way (PRoW) network and permissive paths. 2: Future Site Users: farmers/site visitors/trespassers/general public on the Site using the PRoW network and permissive paths.
2: On Site, former Swinderby Airfield. (relevant to the Principal Site)	4: Indirect Pathway: leaching of chemicals and vertical migration via permeable unsaturated strata to shallow groundwater.	3: Secondary A aquifers of the Alluvium, River terrace Deposits and Trent Valley Formation; Secondary B aquifers of the Scunthorpe Mudstone Formation and Charmouth Mudstone Formation; and Principal aquifer of the Lincolnshire Limestone Formation.
3: Off Site; current and former farm buildings and yards where fuel and agricultural materials were/are stored. (relevant to the Principal Site)	5: Indirect Pathway: lateral migration in groundwater and baseflow into surface waters.	4: River Witham, River Brant, drains and ponds.
4: Off Site waste management facility. (relevant to the Principal Site)		

Sources	Pathways	Receptors
5: Off Site former and current sewage works. Former pump house. Current pumping station. (relevant to the Principal Site)	6: Indirect Pathway: uptake via root system and ingestion.	5: Tunman/Housham Woods designated ancient woodland.
6: Made Ground (infilled pits/infilled land/quarries) (relevant to the Grid Connection Route)	7: Direct Pathway: direct contact of buried concrete with contaminated soils (i.e., hydrocarbons) and aggressive ground conditions (pH and sulphate).	6: Future proposed infrastructures (PV Mounting Structure and cables).
	8: Direct Pathway: direct contact of services and supply pipes with contaminated soils.	7: Proposed structures.
	9: Indirect Pathway: Migration of hazardous gases/vapours via permeable strata into enclosed spaces and service/utility trenches.	8: Potable water supply pipes and other services
		9: Property: crops and livestock.

14.4.15 Using criteria broadly based³ on those presented in the section 6.3 of the CIRIA Report “Contaminated Land Risk Assessment: A Guide to Good Practice” (CIRIA Report C552) (Ref 14-45), the magnitude of the risk associated with potential contamination at the Site has been assessed. To do this, an estimate was made of:

- a. The magnitude of the potential consequence (i.e. severity); and
- b. The magnitude of probability (i.e. likelihood).

14.4.16 The classifications of severity and likelihood, and the risk rating based on the comparison of severity and likelihood, are presented in the Phase 1 PRA report (**PEI Report Volume 3, Appendix 14-B**).

14.4.17 The key findings of the risk assessment are detailed below. Full details outlining all the source-pathway-receptor linkages for all of the sources, pathways and receptors detailed above are provided in the Phase 1 PRA report (**PEI Report Volume 3, Appendix 14-B**).

14.4.18 The potential risks that have been identified from potential contaminated land have been assessed by the PRA as being very low to moderate / low for human health, controlled waters and other sensitive receptors. The highest risks have been identified in the areas formerly occupied by the Swinderby Airfield.

³ CIRIA Report C552 was used to create the assessment criteria, however the terminology has been altered slightly for example through the use of likelihood rather than probability.

- 14.4.19 Provided that the embedded mitigation (termed in the PRA as Construction Embedded/Standard Environmental Mitigation Measures) and recommended additional mitigation measures are implemented as indicated in Sections 11, 12, 14 and 15 of the Phase 1 PRA (**PEI Report Volume 3, Appendix 14-B**); and as summarised in the Framework CEMP (**PEI Report Volume 3, Appendix 3-A**), no likely significant effects are anticipated.
- 14.4.20 It is anticipated that the findings and recommendations of the Phase 1 PRA, once incorporated into the Framework CEMP, along with the environmental design and management measures, for the construction, operation and decommissioning phases, will negate the need for a specific ground conditions chapter in the ES. Therefore, there is no requirement for a specific ground conditions chapter in the ES. However the topic will be included in the Other Environmental Topics chapter of the ES.

Cumulative Effects

- 14.4.21 This section presents a preliminary assessment of cumulative effects between the Proposed Development and other proposed and committed plans and projects including other developments.
- 14.4.22 This assessment has been made with reference to the methodology and guidance set out in **PEI Report Volume 1, Chapter 5: EIA Methodology and Consultation** and shortlist of cumulative schemes identified in **Chapter 15: Cumulative Effects and Interactions**.
- 14.4.23 This preliminary cumulative effects assessment identified, for each receptor, those areas where the predicted effects of the Proposed Development could interact with effects arising from other plans and, or projects on the same receptor based on a spatial and, or temporal basis.
- 14.4.24 The shortlisted cumulative schemes identified in **Chapter 15: Cumulative Effects and Interactions** have been screened for spatial and temporal overlaps with the Proposed Development.
- 14.4.25 There are 11 cumulative schemes within the Zone of Influence for Ground Conditions (within 500m) of the Proposed Development. The majority of these are developments for mixed residential, care/retirement units, business park and installation of solar panels.
- 14.4.26 Provided that the requirements of relevant policy and legislation relating to land contamination and remediation are adopted in design and that appropriate mitigation measures are applied during the demolition and construction phases of each development, it is considered that the residual cumulative effects of the identified developments on ground conditions will be of negligible significance (not significant).
- 14.4.27 Other schemes are not likely to contribute to the effects on Ground Conditions receptors identified, and therefore the effects are not significant.
- 14.4.28 This cumulative effects assessment will be reviewed and updated at the ES stage.

14.5 Materials and Waste

Introduction

- 14.5.1 This section of the PEI Report provides a baseline report and presents the findings of an assessment of the likely significant effects on materials and waste from the Proposed Development. For more details about the Proposed Development, refer to **PEI Report Volume 1, Chapter 3: The Proposed Development**.
- 14.5.2 This section follows the methodology set out in the Institute of Environmental Management and Assessment (IEMA) guide to: Materials and Waste in Environmental Impact Assessment, Guidance for a Proportionate Approach (referred from herein as the 'IEMA Guidance') (Ref 14-46). The methodology followed in this Section is presented in **PEI Report Volume 3, Appendix 14-D: Materials and Waste Impact Assessment Methodology**.
- 14.5.3 This section discusses the expected waste streams from the Proposed Development and how they will be managed. Design life, replacement frequency and recycling of key components of the Proposed Development are also considered. A qualitative high level preliminary assessment has been undertaken in accordance with the IEMA Guidance.
- 14.5.4 This section identifies and proposes measures to address the potential impacts and effects of the Proposed Development on materials and waste during construction, operation and decommissioning phases of the Proposed Development.
- 14.5.5 For the purpose of this assessment, materials and waste comprise:
- a. The consumption of materials (key construction materials only); and
 - b. The generation and management of waste.
- 14.5.6 Materials are defined in the IEMA Guidance as “physical resources that are used across the lifecycle of a development. Examples include key construction materials such as concrete, aggregate, asphalt, and steel”.
- 14.5.7 Other material assets considered include built assets such as landfill void capacity and allocated/safeguarded mineral and waste sites.
- 14.5.8 Impacts on Mineral Safeguarding Areas (MSAs) are not assessed as part of this materials and waste assessment in accordance with the IEMA Guidance; **PEI Report Volume 1, Chapter 12: Socio-Economics and Land Use** of the PEI Report covers this aspect. A Minerals Assessment Report is presented in **PEI Report Volume 3, Appendix 12-C: Minerals Assessment Report**.
- 14.5.9 The Site Boundary is located partly within a Sand and Gravel MSA. It is also located partly within an existing sewage treatment works which borders the central western section of the Site Boundary. The Site Boundary also partly encroaches upon a Specific MSA and Existing Minerals Site located at the south western extent (further information on these mineral and waste sites

can be found within **PEI Report Volume 3, Appendix 12-C: Minerals Assessment Report**). There are no historic landfills (Ref 14-49), authorised landfills (Ref 14-50), currently permitted waste sites, or waste site applications (Ref 14-51) within the Site Boundary. There is one waste site listed in the permitted waste sites list at South Farm, Moor Lane operated by H & S Roe and Sons Farm Limited within the Site Boundary, but the status is surrendered. Therefore, direct impacts on mineral and waste sites are not considered further in the assessment.

14.5.10 Waste is defined as per the Waste Framework Directive (Ref 14-52) as “*any substance or object which the holder discards or intends or is required to discard*”.

14.5.11 The legal definition of waste covers substances or objects which fall outside of the commercial cycle or out of the chain facility. Most items that are sold or taken off site for recycling are wastes, as they require treatment before they are reused or resold.

14.5.12 In practical terms, wastes include surplus spoil, scrap, recovered spills, unwanted surplus materials, packaging, office waste, wastewater, broken, worn-out, contaminated or otherwise spoiled plant, equipment, and materials.

Legislation and Planning Policy

14.5.13 Legislation, planning policy, and guidance relating to Materials and Waste and pertinent to the Proposed Development comprises the documents listed below. More detailed information can be found in **PEI Report Volume 3, Appendix 14-A: Other Environmental Topics Policy and Legislation**.

Legislative Framework – Materials and Waste

- a. The Waste Framework Directive (Ref 14-52);
- b. The Waste (England and Wales) Regulations 2011 (Ref 14-53);
- c. Environmental Protection Act 1990 (Ref 14-1);
- d. The Environmental Permitting (England and Wales) Regulations 2016 (Ref 14-54);
- e. The Hazardous Waste (England and Wales) Regulations 2005 (amended in 2016) (Ref 14-55); and
- f. The Environment Act 2021 (Ref 14-56).

National Planning Policy – Materials and Waste

- a. National Planning Policy for Waste (Ref 14-57);
- b. The Waste Management Plan for England 2021 (Ref 14-58);
- c. A Green Future: Our 25 Year Plan to Improve the Environment 2018 (Ref 14-59);
- d. Environmental Improvement Plan 2023 (Ref 14-60);

- e. Our Waste, Our Resources, A Strategy for England 2018 (Ref 14-61);
- f. Overarching National Policy Statement for Energy (EN-1) (Ref 14-62); and
- g. National Planning Policy Framework (NPPF) (Ref 14-13).

Guidance – Materials and Waste

- a. National Planning Policy Guidance (NPPG) for Minerals and Waste (Ref 14-63);
- b. IEMA Guide to: Materials and Waste in Environmental Impact Assessment, Guidance for a Proportionate Approach (Ref 14-46);
- c. Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice (Ref 14-64);
- d. Waste and Resources Action Programme (WRAP) Designing Out Waste: A Design Team Guide for Civil Engineering (Ref 14-65);
- e. Waste Duty of Care Code of Practice (Ref 14-66); and
- f. Applying the Waste Hierarchy (Ref 14-67).

Local Planning Policy – Materials and Waste

- a. Central Lincolnshire Local Plan (Adopted April 2023) (Ref 14-68); and
- b. Lincolnshire Minerals and Waste Local Plan (adopted June 2016) (Ref 14-48).

Consultation

14.5.14 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023 as part of the EIA Scoping Process. A Scoping Opinion was received from the Planning Inspectorate on 25 July 2023 (**PEI Report Volume 3: Appendix 1-B: Scoping Opinion**). Responses to comments received in the EIA Scoping Opinion in relation to Materials and Waste are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses**.

14.5.15 No additional consultation has been undertaken to date in relation to Materials and Waste.

Assessment Methodology

14.5.16 This section sets out the scope and methodology for the preliminary assessment of the materials and waste impacts of the Proposed Development.

Study Area

14.5.17 The Study Areas for Materials and Waste are defined in line with the IEMA Guidance. Two types of Study Areas are defined:

- a. A Proposed Development Study Area – for construction and operational waste generation, use of construction and operational materials and

consideration of impacts on allocated/safeguarded mineral and waste sites. This Study Area is deemed to include the footprint of the proposed works, together with any temporary land requirements during the construction, i.e. the Site.

- b. An expansive Study Area – within which waste is managed and materials are sourced:
 - i. For non-hazardous and inert waste management this is the East Midlands region as defined by the Environment Agency (Ref 14-69) (Lincolnshire, Derbyshire, Leicestershire, Northamptonshire and Nottinghamshire);
 - ii. For hazardous waste management this is England;
 - iii. For the availability of key construction materials (crushed rock, sand and gravel, ready-mixed concrete and asphalt) this is the East Midlands and Great Britain; and
 - iv. For availability of key construction materials (steel) this is the UK.

Sources of Information

14.5.18 The following sources of information have been used to inform the baseline and preliminary assessment presented within this chapter:

- a. The Environment Agency's 2022 Waste Summary Tables for England - Version 2 (Ref 14-69);
- b. The Environment Agency's Permitted Waste Sites - Authorised Landfill Site Boundaries (Ref 14-50);
- c. The Environment Agency's Historic Landfill Sites (Ref 14-49);
- d. The Environment Agency's Environmental Permitting Regulations - Waste Sites (Ref 14-51);
- e. Make UK's A New Deal for Steel: Laying the Foundations for a Vibrant UK steel industry, 2018 data (Ref 14-70);
- f. Mineral Products Association's Minerals and mineral products sales in Great Britain, 2021 data (Ref 14-71);
- g. Local, regional and National policy; and
- h. Legislation.

Scope of the Assessment

14.5.19 At EIA Scoping (**PEI Report Volume 1, Appendix 1-A**) it was concluded that significant adverse materials and waste impacts are not expected during either construction, operation, or decommissioning, hence the need for a separate materials and waste chapter was scoped out of the EIA. However, the impacts associated with materials and waste are assessed at a high level and presented within this PEI Report chapter.

14.5.20 **Table 14-11** provides the outline scope of the material and waste assessment.

14.5.21 Effects on the availability (inferred from consumption/sales) of materials during operation and decommissioning are not included in the assessment since forecast effects are (using professional judgement) considered negligible in relation to the scale and nature of the Proposed Development, since only very small quantities of materials would be required on an intermittent basis.

Table 14-11: Scope of the Materials and Waste Assessment

Proposed Development phase	Effects	Scoped in/out
Construction	Changes in availability of key construction materials	Scoped in
	Changes in available landfill void capacity	Scoped in
	Changes to allocated/safeguarded mineral sites	Scoped out (there are no sites within the Site Boundary)
	Changes to allocated/safeguarded waste sites	Scoped out (there are no sites within the Site Boundary)
Operation	Changes in availability of materials	Scoped in
	Changes in available landfill void capacity	Scoped in
Decommissioning	Changes in availability of materials	Scoped in
	Changes in available landfill void capacity	Scoped in

Impact Assessment Methodology

14.5.22 The IEMA Guidance methodology for assessing the magnitude of impact from materials comprises a percentage-based approach that determines the influence of the Proposed Development consumption of construction materials on the national/regional availability. In a worst case, where material sensitivity is very high, a significant effect would occur at a magnitude of minor, which is where construction materials are more than 1% by volume of the baseline availability.

14.5.23 The IEMA Guidance offers two methods to assess waste effects:

- a. W1 – Void Capacity, a detailed methodology where the magnitude of impact from waste is assessed by determining the percentage of the remaining landfill void capacity that will be depleted by waste produced during the construction and/or operation of a proposed development. In a worst case, where landfill sensitivity is very high, a significant effect would occur at a magnitude of minor, which for proposed development

non-hazardous and inert waste is more than 1% of landfill capacity and for hazardous waste is more than 0.1% of landfill capacity.

- b. W2 – Landfill Diversion, a simpler approach where developments are compared to a good practice landfill diversion rate of 90%. The IEMA Guidance does not provide guidance on how to allocate sensitivity in method W2 therefore a medium sensitivity is used in the assessment. A significant effect would occur at a magnitude of moderate which is a landfill diversion of less than 60%.

14.5.24 The IEMA Guidance states “Due to uncertainties relating to future technologies and infrastructure, this first edition of the guidance does not incorporate a proposed methodology to assess impacts and effects during decommissioning or end of first life”. However, methods W1 and W2 have also been considered for decommissioning of the Proposed Development.

14.5.25 Details on the assessment methodology specific to materials and waste, including sensitivity, magnitude and effect significance criteria, are provided in **PEI Report Volume 3 Appendix 14-D: Materials and Waste Impact Assessment Methodology**.

Assessment Assumptions and Limitations

14.5.26 Waste arising from extraction, processing and manufacture of construction components and products are not included in the assessment. This is based on the assumption that these products and materials are being developed in a manufacturing environment with their own waste management plans, facilities, and supply chain, which are potentially in different regions of the UK or the world and therefore outside of the geographical scope of this study. Such matters cannot be accurately predicted and assessed as they relate to procurement decisions that cannot be assured.

14.5.27 Other environmental impacts associated with the management of waste from the Proposed Development e.g. on water resources, air quality, noise or traffic resulting from the generation, handling, on-site temporary storage or off-site transport of materials and waste are addressed separately in other relevant chapters of this PEI Report.

Baseline Conditions

Existing Baseline

14.5.28 Baseline information for materials and waste has been reviewed and consists of:

- a. National and regional availability for key construction materials:
 - i. UK steel, 17 million tonnes (Ref 14-70);
 - ii. regional aggregates (30.6 million tonnes crushed rock and 6.1 million tonnes of sand and gravel) (Ref 14-71);
 - iii. regional asphalt (3.3 million tonnes) (Ref 14-71); and

- iv. regional concrete (1.3 million m³, 3.1 million tonnes based on a density of 2.4 tonnes/m³) (Ref 14-71).
- b. Non-hazardous and inert landfill void capacity in the East Midlands (31.8 million m³ and 18.7 million m³ respectively) (Ref 14-69).
- c. Hazardous merchant landfill void capacity England (9.9 million m³) (Ref 14-69).
- d. A good practice landfill diversion target of 90% has been achieved and exceeded by major UK developments as outlined in the IEMA Guidance (Ref 14-46). In 2020, the UK generated 59.1 million tonnes of non-hazardous construction and demolition waste, of which 54.8 million tonnes was recovered. This represents a recovery rate of 92.6 % (Ref 14-72).
- e. Standard, good and best practice recovery rates by material are provided by WRAP (Ref 14-73). Recovery rates for key construction materials and other construction wastes relevant to the Proposed Development are provided in **Table 14-12**.

Table 14-12: Standard, Good and Best Practice Recovery Rates by Materials

Material	Standard Practice Recovery (%)	Good Practice Recovery (%)	Best Practice Recovery (%)
Metals	95	100	100
Packaging	60	85	95
Concrete	75	95	100
Inert	75	95	100
Plastics	60	80	95
Miscellaneous	12	50	75
Electrical equipment	Limited information	70	95
Cement	Limited information	75	95
Liquids and oils	100	100	100
Hazardous	50	Limited information, cannot be 100% since some hazardous waste e.g. asbestos must be landfilled.	

Future Baseline

14.5.29 The future baseline scenarios are set out in PEI Report Volume 1, Chapter 5: EIA Methodology and Consultation.

14.5.30 There is no publicly available information on any potential changes to national or regional construction material availability by the time of the construction of the Proposed Development. Construction material demand such as ready mixed concrete is closely aligned to both the quantity of construction taking place and the general economy. It is deemed

inappropriate to forecast future demand as the demand is unlikely to be linear and it is not possible to set a future baseline for construction materials. As such, future availability is assumed to remain the same as the current baseline as outlined in paragraph 14.5.28.

- 14.5.31 There is no publicly available information regarding any potential changes to landfill capacity by the time of Proposed Development construction, operation or decommissioning.
- 14.5.32 Due to the cyclic nature of inert and hazardous landfill capacity (e.g. landfill capacity decreasing, and then new sites or landfill cells being opened with landfill capacity increasing), it is not realistic to forecast future landfill capacity. Therefore, inert and hazardous landfill capacity is assumed to remain the same as the existing baseline as outlined in paragraph 14.5.28.
- 14.5.33 For non-hazardous waste, using the current rate of decline of landfill capacity and forecasting into the future would lead to the inevitable conclusion that there would be no void space remaining. However, this is not a credible scenario, as if there is still a need for landfill then the Waste Planning Authority (WPA) will need to consent new landfill capacity to replace that which has been used up. Therefore, non-hazardous landfill capacity is assumed to remain the same as the existing baseline as outlined in paragraph 14.5.28.

Embedded Mitigation

- 14.5.34 The following embedded mitigation measures have been incorporated into the Proposed Development design, with detailed proposals to be submitted with the DCO application.
- 14.5.35 The Proposed Development will aim to prioritise waste prevention, followed by preparing for reuse, recycling and recovery and lastly disposal to landfill as per the waste hierarchy, illustrated in **Plate 14-1**.

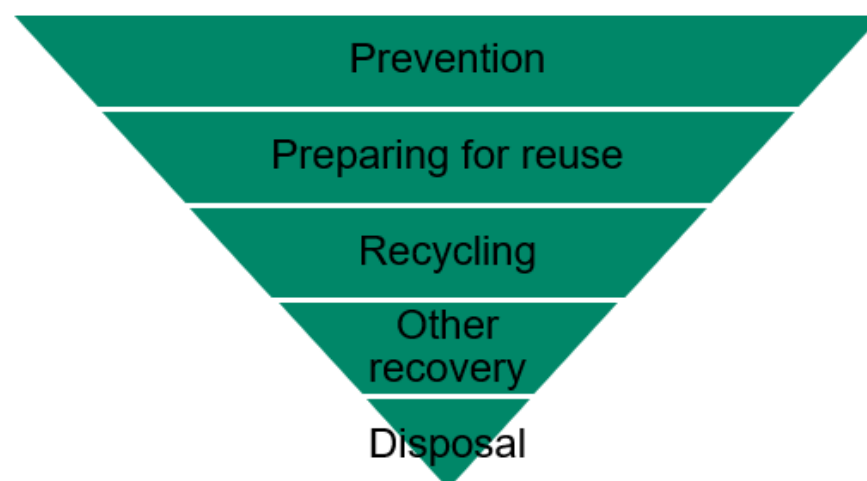


Plate 14-1: The Waste Hierarchy, from Defra's Guidance on Applying the Waste Hierarchy

(recreated by AECOM) (Ref 14-67)

- 14.5.36 All management of waste will be in accordance with the relevant regulations and waste will be transported by licensed waste carriers to waste management sites which hold the necessary regulatory authorisation and/or permits for those wastes consigned to them.
- 14.5.37 The construction of the Proposed Development will be subject to measures and procedures defined within a detailed Construction Environmental Management Plan (CEMP). The detailed CEMP will include the implementation of industry standard practice and control measures for environmental impacts arising during construction, such as the control of dust and the approach to material and waste management on site. A **Framework CEMP (PEI Report Volume 3 Appendix 3-A)** will accompany the DCO application, which will set out:
- a. The waste streams that will be generated;
 - b. How the waste hierarchy will be applied to these wastes;
 - c. Good practice measures for managing waste; and
 - d. Roles and responsibilities for waste management.
- 14.5.38 The construction contractor will use these documents to produce their detailed CEMP and a detailed Site Waste Management Plan (SWMP), which would be produced prior to works commencing on site.
- 14.5.39 If required, a Materials Management Plan (MMP) would be developed under the CL:AIRE Definition of Waste: Development Industry Code of Practice (Ref 14-64) by the appointed construction Contractor to support the reuse of excavated materials, minimise off-site disposal; and to demonstrate the necessary lines of evidence to support the proper reuse/offsite disposal of materials and ensure compliance with regulatory guidance.
- 14.5.40 A Framework Operational Environmental Management Plan (OEMP) will accompany the DCO application and will set out the general principles to be followed during operation of the Proposed Development. A detailed OEMP, based on the Framework OEMP, will be prepared and agreed with the relevant authorities at that time of operation, in advance of the commencement of operations. This will be secured through a DCO requirement.
- 14.5.41 A Framework Decommissioning Environmental Management Plan (DEMP) will accompany the DCO application and will set out the general principles to be followed in the decommissioning of the Proposed Development. A detailed DEMP based on the Framework DEMP will be prepared and agreed with the relevant authorities at that time of decommissioning, in advance of the commencement of decommissioning works. This will be secured through a DCO requirement.

Preliminary Assessment of Effects

- 14.5.42 Taking into account the embedded mitigation measures as detailed in paragraphs 14.5.34 and 14.5.38 above, the potential impacts and effects of

the Proposed Development have been assessed using the methodology as detailed in paragraphs 14.5.16 and 14.5.23 of this chapter.

14.5.43 A qualitative high level preliminary assessment has been undertaken in accordance with the IEMA Guidance.

14.5.44 The Proposed Development has the potential to affect materials and waste (negatively), during construction, operation and during decommissioning, in the following ways:

- a. Changes in availability of materials; and
- b. Changes in available landfill void capacity.

Construction

14.5.45 Construction materials required to construct the Proposed Development are unlikely to be required in large quantities. In archaeologically sensitive areas solar PV modules may be mounted on concrete blocks, subject to further archaeological investigation and agreement with the relevant stakeholders. Material quantities are not anticipated to be more than 1% of regional or national construction material availability. 1% of national steel availability is 170,000 tonnes, 1% of regional availability of aggregates, asphalt and concrete are 367,000 tonnes and 33,000 tonnes and 31,000 tonnes respectively. Therefore, no significant effects are anticipated.

14.5.46 The type of waste generated during construction is likely to comprise:

- a. General waste from site offices and welfare facilities;
- b. Small quantities of waste from the maintenance of construction vehicles;
- c. Packaging waste from incoming materials; and
- d. Other waste from construction of fencing, access roads and other supporting infrastructure.

14.5.47 The solar panels, batteries, inverters, transformers and other supporting equipment will be manufactured off-site to the specified sizes, and therefore wastage during installation is expected to be minimal.

14.5.48 No demolition works are anticipated.

14.5.49 With the embedded mitigation measures in place, the overall quantities of construction waste disposed to landfill are anticipated to be below 1% of regional inert and non-hazardous landfill capacity (187,000 m³ and 318,000 m³) and less than 0.1% of national hazardous landfill capacity (9,900 m³). Therefore, the sensitivity is very high, the magnitude of impact is negligible, and the effect is slight adverse, which is considered to be **not significant**.

14.5.50 As set out in **Table 14-12**, good and best practice waste recovery (landfill diversion) for the Proposed Development is likely to be above 90% for the majority of construction wastes (excluding excavated material). Therefore, the sensitivity is medium, the magnitude of impact is negligible, and the effect is slight adverse, which is considered to be **not significant**.

- 14.5.51 Excavated material is not included in a construction waste estimate, or when calculating the overall waste recovery rate, since where possible the material would be reused on-site and hence will not be categorised as a waste. Waste recovery targets do not include excavated material (uncontaminated excavated soil and stones, European Waste Catalogue (EWC) code 17 05 04). This approach is consistent with the waste hierarchy and the objectives of minimising waste generation and reusing materials.
- 14.5.52 As the Site is relatively flat, large-scale earthworks are not expected to be required and therefore there is not expected to be either a large surplus or shortfall of fill material requiring either export from or import to the Site. It is expected that all materials removed by cable trenching operations or in the creation of working or laydown/compound areas will be reinstated again with no import or export of materials being required. At this stage the potential for generation of some surplus excavated material cannot be ruled out. However, the quantities involved would be not significant in the context of regional landfill capacity and would only be disposed of to landfill as a last resort, with reuse or deposit for recovery being the preferred options.
- 14.5.53 All management of materials and waste will be in accordance with the relevant regulations and waste will be transported by licensed waste carriers to waste management sites which hold the necessary regulatory authorisation and/or permits for those wastes consigned to them.
- 14.5.54 Considering the above, it is concluded that significant waste effects are not expected during construction of the Proposed Development.

Operation (and Maintenance)

- 14.5.55 Construction materials required to operate the Proposed Development are unlikely to be required in large quantities e.g. more than 1% of regional or national construction material availability. Therefore, no significant effects are anticipated.
- 14.5.56 During the operational phase, the Site will be manned by a small number of staff across the Site (up to four permanent staff per day), predominantly undertaking day-to-day maintenance tasks. Waste arising from this day-to-day operation would include:
- a. Welfare facility waste; and
 - b. General waste (such as paper, cardboard, wood).
- 14.5.57 All management of materials and waste will be in accordance with the relevant regulations and waste will be transported by licensed waste carriers to waste management sites which hold the necessary regulatory authorisation and/or permits for those wastes consigned to them.
- 14.5.58 During operation, including maintenance activities, waste generation is expected to be minimal, since solar panels do not generate any waste as part of the energy production process.

14.5.59 Given the 60-year operational life of the Proposed Development, there will be a requirement for periodic replacement of some or all of the Principal Site elements.

14.5.60 Waste arisings associated with maintenance activities, such as component replacement during the operational life of the Proposed Development, will be managed in the same way as waste from the final decommissioning of the Proposed Development. Component replacement during operation will be covered within the Framework OEMP to be provided as part of the DCO application.

Table 14-13: Indicative Design Life and Replacement Frequency for Key Components

Component	Design Life / Replacement Frequency	Recyclable
Solar PV panels	25–40 years	Yes
Solar panel mounting structure	25–40 years	Yes
Batteries	5–15 years	Yes
Inverters	10–20 years	Yes
Transformers	25–30 years	Yes
Onsite Substation equipment	25–30 years	Yes

14.5.61 Recycling routes are generally available for materials at present, and it is likely that there will be even greater opportunities for recycling in the future, not least because the market will have expanded to meet demand as solar PV installations increase.

14.5.62 The company Recycle Solar, based nearby in North Lincolnshire, reports that 90% of the glass and 95% of the semi-conductor materials in end-of-life solar panels can be extracted for use in new solar panels (Ref 14-74).

14.5.63 The UK market for Li-ion battery recycling is under development, as the fleet of electric vehicles and other Li-ion battery users rapidly increases. A number of new investments have been announced (Ref 14-75) and an 80% recovery rate is reported.

14.5.64 The overall recovery rate is therefore expected to be greater than 60% (and potentially greater than 90%). Therefore, the sensitivity is medium, the magnitude of impact is minor adverse (60-89% recovery) or negligible (90-99% recovery), and the effect is slight adverse, which is considered to be **not significant**.

14.5.65 With the embedded mitigation measures in place, the overall quantities of operational waste disposed of to landfill are anticipated to be below 1% of regional inert and non-hazardous landfill capacity (187,000 m³ and 318,000 m³) and less than 0.1% of national hazardous landfill capacity (9,900 m³).

Therefore, the sensitivity is very high, the magnitude of impact is negligible, and the effect is slight adverse, which is considered to be **not significant**.

Decommissioning

14.5.66 Construction materials required to decommission the Proposed Development are unlikely to be required in large quantities e.g. more than 1% of regional or national construction material availability. Therefore, no significant effects are anticipated.

14.5.67 The design life of the Proposed Development is expected to be 60 years.

14.5.68 At the end of the Proposed Development's operational life, it will be decommissioned. As this is expected to be 60 years into the future, it is not possible to identify at this stage either the waste management routes or specific facilities that would be used, as these are liable to change over such a timescale.

14.5.69 As outlined in paragraphs 14.5.61 - 14.5.63 the overall recovery rate is therefore expected to be greater than 60% (and potentially greater than 90%). Therefore, the sensitivity is medium, the magnitude of impact is minor adverse (60-89% recovery) or negligible (90-99% recovery), and the effect is slight adverse, which is considered to be **not significant**.

14.5.70 With the embedded mitigation measures in place, the overall quantities of decommissioning waste disposed of to landfill are anticipated to be below 1% of regional inert and non-hazardous landfill capacity (187,000 m³ and 318,000 m³) and less than 0.1% of national hazardous landfill capacity (9,900 m³). Therefore, the magnitude of impact is negligible, and the effect is slight adverse, which is considered to be **not significant**.

Additional Mitigation and Enhancement

14.5.71 As no likely significant effects have been identified for materials and waste impacts, no further or additional mitigation or monitoring of likely significant effects are proposed.

Residual Effects and Conclusion

14.5.72 As no likely significant effects were identified in the preliminary assessment, and no further or additional mitigation or monitoring is proposed, the residual effects remain as assessed in the preliminary assessment.

Cumulative Effects

14.5.73 This section presents an assessment of cumulative effects between the Proposed Development and other proposed and committed plans and projects including other developments.

14.5.74 This assessment has been made with reference to the methodology and guidance set out in PEI Report Volume 1, Chapter 5: EIA Methodology and Consultation and shortlist of cumulative developments identified within PEI Report Volume 1, Chapter 15: Cumulative Effects and Interactions.

- 14.5.75 At this stage of the PEI Report, other developments that may give rise to cumulative materials and waste effects when considered along with the Proposed Development have not been fully assessed. A list of relevant developments is presented in PEI Report Volume 1 Chapter 15: Cumulative Effects and Interactions, and full details of cumulative developments will be provided within the ES.
- 14.5.76 A Zone of Influence (Zol) for materials and waste is not set in the cumulative assessment since a detailed cumulative assessment is not conducted for all materials and waste. The cumulative effects of decommissioning of solar farm specific elements, e.g. solar panels, is considered separately and the Zol for cumulative effects associated with these solar farm specific wastes is Lincolnshire.
- 14.5.77 With regards to materials and waste, a detailed cumulative effects assessment for non-solar farm specific wastes has not been undertaken since:
- As part of their planning function, WPAs are required to ensure that enough land is available to accommodate facilities for the treatment of all waste arising in the area, either within the WPA area, or through export to suitable facilities in other areas;
 - Minerals Planning Authorities (MPAs) are similarly required to ensure an adequate supply of minerals, sufficient to meet the needs of national and regional supply policies, and local development needs;
 - In preparing their waste management strategies, the WPAs already take into account waste generation at the regional and sub-regional scale, since these are the figures which are then used for determining the need for waste facilities. The landfill void capacity remaining (which is used to evaluate the effects of the Proposed Development) already takes into account the cumulative effects of waste generated by other developments, and hence a separate cumulative impact assessment is not required for waste. It is therefore not necessary or feasible for each development within the region to, in effect, duplicate the function of the WPA as part of the EIA process; and
 - It is assumed that each of the cumulative developments will also be considering and implementing the waste hierarchy as per requirements set out in The Waste (England and Wales) Regulations 2011.
- 14.5.78 It is likely that the solar panel waste generated by the Proposed Development during operation and decommissioning would be managed by specialist regional or national facilities, and that such facilities would be developed over the operational period in response to demand generated by the UK-wide solar panel industry. The capacity of such facilities is not expected to be influenced by other non-solar farm projects in the surrounding area because the facilities will only be managing solar panel waste.

- 14.5.79 Private sector waste companies will develop these facilities to respond to market demands. Current solar panel waste generation is low, so there is little demand for facilities, hence the limited available capacity presently. Therefore, it is expected that facilities which reuse, recycle, or recover end-of-life solar panels will be developed as the quantities of this waste stream increase. The Waste Electrical and Electronic Equipment (WEEE) regulations (Ref 14-77) place obligations on those who place solar panels on the market to finance the costs of collection, treatment, recovery and environmentally sound disposal; and the landfill tax strongly incentivise reuse, recycling and recovery.
- 14.5.80 As stated by the government, the 'Proximity Principle', indicates that it is neither necessary or realistic to require that capacity be available within Lincolnshire, either now or in the future, to recycle all the solar panel waste that may be generated by solar farms in the county.
- 14.5.81 It is assumed that specialist regional or national facilities would be in place at the time of decommissioning, and these would be developed in response to demand generated by the UK-wide solar panel industry and waste solar panels would be reused, recycled, or recovered and not disposed of to landfill. This is considered a realistic worst-case assumption.
- 14.5.82 The Framework OEMP and the Framework DEMP will set out that the Proposed Development is committed to maximise recycling and reuse of the components of the Proposed Development at the end of their life. There are already organisations around the UK and Europe specialising in solar recycling, such as PV Cycle and the European Recycling Platform. They are working with solar developers to minimise electrical waste and recycling old panels in line with the WEEE Regulations. In addition, companies like SECONDSOL offer a marketplace service for the purchase and selling of second-hand PV panels and equipment, where there is still a good level of life in the equipment remaining. Panels that have developed faults or damage can also be refurbished and repowered by specialist companies and the manufacturers and resold or reinstalled.
- 14.5.83 The Proposed Development will adhere with the industry best practice outlined in Solar Power Europe's Lifecycle Quality Best Practice Guidance (Ref 14-78). Since waste solar panels are unlikely to be disposed of to landfill, the effects are anticipated to be not significant. Therefore, no significant cumulative materials and waste effects have been identified for the Proposed Development.

14.6 Major Accidents and Disasters

Introduction

- 14.6.1 This section of the PEI Report provides a description of the potential effects of the Proposed Development on the risk of major accidents and disasters occurring.
- 14.6.2 'Accidents' are defined as an occurrence resulting from uncontrolled developments in the course of construction, operation and decommissioning (e.g. major emission, fire or explosion).
- 14.6.3 'Disasters' are defined as naturally occurring extreme weather events or ground related hazard events (e.g. subsidence, landslide, earthquake).

Legislation, Planning Policy and Guidance

- 14.6.4 Key legislation, planning policy and guidance relating to the assessment of Major Accidents and Disasters and pertinent to the Proposed Development comprises the documents listed below. More detail regarding these policies can be found in **PEI Report Volume 3, Appendix 14-A: Other Environmental Topics Policy and Legislation**.
- 14.6.5 The EIA Regulations (Ref 14-79) require consideration to be given to the risks of major accidents and disasters that are relevant to the proposed development.
- 14.6.6 Section 4.13.3 of NPS EN-1 (Ref 14-9) provides the following commentary in relation to the assessment of Major Accidents and Disasters: "*Some energy infrastructure will be subject to the Control of Major Accident Hazards (COMAH) Regulations 1999.*" However, the Proposed Development is not subject to the Control of Major Accident Hazards (COMAH) Regulations 1999.
- 14.6.7 There is no national or local guidance relating to the assessment of major accidents and disasters.
- 14.6.8 This preliminary assessment was carried out with reference to the IEMA guidance document 'Major Accidents and Disasters in EIA: A Primer' (Ref 14-85).

Consultation

- 14.6.9 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023 as part of the EIA Scoping Process. A Scoping Opinion was received from the Planning Inspectorate on 25 July 2023 (**PEI Report Volume 3: Appendix 1-B: Scoping Opinion**). Responses to comments received in the EIA Scoping Opinion in relation to Major Accidents and Disasters are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses**.

14.6.10 The HSE have been formally consulted by the Planning Inspectorate as part of the preparation of the Scoping Opinion (**PEI Report Volume 3, Appendix 1-B**). As a prescribed consultation body, the HSE will also be consulted during statutory consultation.

Assessment Methodology

14.6.11 The following methodology has been adopted to assess major accidents or disasters. In general, major accidents or disasters, as they relate to the Proposed Development, fall into three categories:

- a. Events that could not realistically occur, due to the nature of the Proposed Development or its location;
- b. Events that could realistically occur, but for which the Proposed Development, and associated receptors, are no more vulnerable than any other development; and
- c. Events that could occur, and to which the Proposed Development is particularly vulnerable, or which the Proposed Development has a particular capacity to exacerbate.

14.6.12 An exercise was undertaken to identify all possible major accidents or disasters that could be relevant to the Proposed Development. This list was drawn from several sources, including the UK Government's Risk Register of Civil Emergencies (Ref 14-83) and Lincolnshire Community Risk Management Plan (Ref 14-80). Major accidents or disasters with little relevance in the UK were not included, such as volcanic eruptions for example.

14.6.13 The IEMA guidance note on the assessment of MA&D in EIA (Ref 14-85) states "Not all potential events will fall into the scope of a major accidents and/or disasters assessment" and suggests that "the assessment will typically focus on low likelihood but potentially high consequence events". This is supported by the fact that events with a high likelihood and high consequence would be unacceptable for any development and would therefore be managed or designed out and low risk and low consequence events would not have the potential to result in a major accident. On this basis the assessment focusses on low likelihood but potentially high consequence events.

Table 14-14: Major Accidents or Disasters Shortlisted for Further Consideration

Major Accident or Disaster	Potential Receptor	Comments	Relevant Chapter or Appendix of the PEI Report
Malicious activity, criminal damage	The Proposed Development and employees	If the Proposed Development were to be damaged through pre-planned criminal activity, the risk of a major accident	Section 14.6 of this Chapter (this section) and PEI Report Volume

Major Accident or Disaster	Potential Receptor	Comments	Relevant Chapter or Appendix of the PEI Report
		occurring on-site may increase. Security measures will be implemented on Site to minimise the potential for damage to occur through criminal activity.	1, Chapter 3: Proposed Development
Floods	Property and people in areas of increased flood risk, including the Proposed Development	Both the vulnerability of the Proposed Development to flooding and its potential to exacerbate flooding, will be addressed in the Preliminary Flood Risk Assessment, and also reported in the ES, both in terms of the risk to the Proposed Development and increased risk caused by the Proposed Development.	PEI Report Volume 1, Chapter 9: Water Environment PEI Report Volume 3, Appendix 9-C: Preliminary Flood Risk Assessment
Fire	Local residents, habitats, and species	There may be some potential for fire as a result of the battery storage element of the Proposed Development. However, the battery energy storage system will include cooling systems, which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. The layout of the Proposed Development will be designed in consultation with the local fire and rescue service and will be compliant with National Fire Chiefs Council (NFCC) guidance. A Framework Battery Safety Management Plan (BSMP) will be included as part of the DCO application.	Section 14.6 of this Chapter (this section)
Road accidents	Aquatic environment Road users	The risk posed by spillage from hazardous loads as a result of a road traffic accident during construction or decommissioning will be considered in the Water Environment Chapter of the ES. The potential for glint and	PEI Report Volume 1, Chapter 9: Water Environment PEI Report Volume 1,

Major Accident or Disaster	Potential Receptor	Comments	Relevant Chapter or Appendix of the PEI Report
		glare to affect road users will be considered within a technical appendix to the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Proposed Development Design.	Chapter 13: Traffic and Transport PEI Report Volume 3, Appendix 14-C: Glint and Glare Assessment
Rail accidents	Rail users	No rail lines pass through the Site Boundary, with the nearest railway line being 500m to the north west. Given the distance, adverse effects on rail users are not expected.	Section 14.6 of this Chapter (this section)
Aircraft disasters	Pilots and aircraft	The glint and glare assessment demonstrated there is no potential for glint and glare to pose a significant risk to aircraft.	PEI Report Volume 3, Appendix 14-C: Glint and Glare Assessment
Flood defence failure	Employees	This will be covered in the Preliminary Flood Risk Assessment and will also be reported in the ES, both in terms of the risk to the Proposed Development and increased risk caused by the Proposed Development.	PEI Report Volume 1, Chapter 9: Water Environment PEI Report Volume 3, Appendix 9-C: Preliminary Flood Risk Assessment
Utilities failure (gas, electricity, water, sewage, oil, communications)	Employees and local residents.	The Proposed Development has the potential to affect existing utility infrastructure below ground. To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken and this will be presented within the ES.	Section 14.7 Telecommunications, Television Reception and Utilities of this Chapter
Mining / extractive industry	Employees	There is the potential for current or past quarrying activity in the vicinity to lead to unstable ground conditions. However, the risk will be considered as part of the	Section 14.4 Ground Conditions of this Chapter

Major Accident or Disaster	Potential Receptor	Comments	Relevant Chapter or Appendix of the PEI Report
		geotechnical design ensuring that the risk is designed out.	
Plant disease	Habitats and species	New planting may be susceptible to biosecurity issues such as the increased prevalence of pests and diseases. The planting design will take account of biosecurity risks through a wider mix of species including some non-natives.	PEI Report Volume 1, Chapter 9: Ecology

14.6.14 An effect is considered significant if there is a significantly increased risk of an accident or a disaster occurring as a result of the Proposed Development. Details on appropriate prevention measures and mitigation for significant effects on the environment from such events are either provided in the sections below or within the referenced topic chapters.

Study Area

14.6.15 The Study Area for the assessment of major accidents and disasters is 10km from the Site Boundary which is based on the largest Zone of Influence shown in **PEI Report Volume 2, Figure 15-1**.

Baseline Conditions

14.6.16 A number of receptors are present in the vicinity of the Proposed Development which could be vulnerable to major accidents or disasters, either because of their proximity to the Proposed Development or their importance to the surrounding area. These include:

- Towns, villages, farms and residential homes;
- Commercial sites and buildings;
- Roads;
- Railways;
- Airports and runways;
- Designated ecological sites, woodland, farmland and waterbodies; and
- Overhead and underground infrastructure services including electricity, water, communications and gas.

14.6.17 Details of the specific receptors that fall into the above categories are provided in **PEI Report Volume 1, Chapter 3: The Proposed Development**. These receptors have been considered in this assessment.

Assessment of Effects

14.6.18 Risks of major accidents and disasters occurring during construction and decommissioning are assessed in this section and the relevant chapters outlined in **Table 14-14**. All works will be subject to risk assessments as required by the Framework CEMP (presented in **PEI Report Volume 3, Appendix 3-A**). Mitigation measures will be listed within the detailed CEMP, which will be secured in the DCO.

Construction and Decommissioning Phase

Malicious Activity

14.6.19 The Site Boundary would be managed by the contractor during construction and decommissioning to mitigate the risk of criminal and malicious activity. The design will include fencing, CCTV cameras and lighting in critical areas to prevent/deter criminal activity. Therefore, the Proposed Development is not expected to have an effect on the environment or employees due to the risk of a major accident occurring as a result of criminal damage from malicious activity during construction and decommissioning.

Flooding

14.6.20 Both the vulnerability of the Proposed Development to flooding, and its potential to exacerbate flooding will be addressed in **PEI Report Volume 3, Appendix 9-C: Preliminary Flood Risk Assessment** and also reported in the ES, both in terms of the risk to the Proposed Development and increased risk caused by it.

14.6.21 The Flood Risk Assessment will include recommendations for mitigation required during construction which will be captured within the **Framework CEMP (PEI Report Volume 3, Appendix 3-A)**.

14.6.22 The Framework CEMP includes a requirement for contractors to monitor weather forecasts and receive the Environment Agency's flood alerts and plan works accordingly with internal methodologies to manage workers and resources in extreme weather conditions such as storms, flooding. Health and safety plans are to be in place in accordance with policy and legislative requirements.

14.6.23 Consideration has also been given to the presence of flood defences along western bank of the River Witham, both banks of the River Brant, and the northern side of Fen Lane within the Principal Site. The Proposed Development also crosses a significant flood storage area associated with the Lincoln Flood Alleviation Scheme (Witham Washlands Flood Storage Area). Construction methods will be developed to ensure that there are no effects to the structural integrity of these defences and the flood storage area.

Fire

14.6.24 Measures relating to the suppression of fires on site during construction will be included within the Framework CEMP (presented in **PEI Report Volume 3, Appendix 3-A**).

14.6.25 Measures relating to the management of Unexploded Ordnance (UXO) during construction are presented in Section 14.4 of this Chapter.

Road Accidents

14.6.26 The risk posed by spillage from hazardous loads as a result of a road traffic accident during construction or decommissioning has been considered in **PEI Report Volume 1, Chapter 9: Water Environment**.

14.6.27 The potential for glint and glare to affect road users has been considered within a preliminary assessment which is presented in Section 14.3 of this chapter and **PEI Report Volume 3, Appendix 14-C**.

Rail Accidents

14.6.28 No operational rail lines pass through the Site Boundary, with the nearest operational rail line located 500m to the north west. The preliminary glint and glare assessment (**PEI Report Volume 3, Appendix 14-B**) concludes that there is no potential for glint and glare impacts on rail receptors.

Aircraft Disasters

14.6.29 Principal Site There are four aerodromes located within 5km of the Principal Site, these are as follows:

- a. Peacocks Farm airfield, which is located approximately 0.23km east of the Principal Site;
- b. South Hykeham Airfield, which is located approximately 1.79km east of the Principal Site;
- c. South Scarle Airfield, which is located approximately 2.76km west of the Principal Site; and
- d. Blackmoor Farm, which is located approximately 3.47km east of the Principal Site.

14.6.30 Royal Air Force (RAF) Waddington Station is located approximately 5.93km north west of the Principal Site.

14.6.31 The potential for glint and glare to affect aircraft has been considered within a preliminary assessment (**PEI Report Volume 3, Appendix 14-C**).

14.6.32 Mitigation has been considered, and where necessary, incorporated into the Proposed Development design.

Utilities Failure (gas, electricity, water, sewage, oil, communications)

14.6.33 The Proposed Development has the potential to affect existing utility infrastructure due to the location of overhead lines and buried water and waste water pipes within the Site Boundary. Impacts to or failure of this

infrastructure could potentially lead to a major accident. To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken prior to construction so that appropriate mitigation such as buffers can be incorporated into the design. Cable Avoidance Tool (CAT) scans will also be used by Contractors to check for buried utilities prior to earth breaking site activities. The Applicant will endeavour to engage with utilities providers as appropriate.

14.6.34 Further information on Utilities, including embedded mitigation measures, is provided in Section 14.7 of this Chapter.

Mining / Extractive Industry

14.6.35 There is the potential for current or past quarrying activity in the vicinity to lead to unstable ground conditions due to nearby active quarries. The risk will be considered as part of geotechnical design following post consent geotechnical investigations, ensuring that the risk is designed out.

Plant Disease

14.6.36 There is the potential for disease and pathogen transfer (including undesirable weed species) between different areas of land during construction. The loss of soil resource is considered as the main cause of disease and pathogen transfer, due to the transfer of soil (and incorporated seed/spore bank) from infected to uninfected areas. The Soil Management Plan (SMP) to be prepared prior to construction (and secured through the DCO) will set out appropriate measures to minimise soil loss and hence biosecurity risk. A Framework SMP will be provided with the ES.

14.6.37 A Biosecurity Plan will be prepared prior to construction, secured through the CEMP. This may include measures such as appropriate cleaning and/or disinfection of machinery and equipment in areas considered to be at high risk.

14.6.38 The UK Government's website advertising current occurrences and imposed restrictions with regards to animal and plant diseases would be checked both pre-construction and at regular intervals throughout construction.

Operational Phase

Criminal Damage

14.6.39 If the Proposed Development were to be damaged through pre-planned criminal activity, the risk of a major accident occurring on-site may increase. However, the Proposed Development design will ensure that the compounds (including BESS), and solar equipment are secure to minimise the potential for damage to occur through criminal activity. Embedded mitigation will include fencing, CCTV cameras, and lighting in critical areas. These are described in further detail in **PEI Report Volume 1, Chapter 3: The Proposed Development**.

14.6.40 Furthermore, the Proposed Development does not process or include large quantities of chemicals, and criminal damage to the infrastructure is unlikely

to lead to a large-scale leak, explosion, or other major event. Therefore, the Proposed Development is not expected to have an effect on the risk of a major accident occurring as a result of criminal activity during operation.

Flooding

14.6.41 Both the vulnerability of the Proposed Development to flooding, and its potential to exacerbate flooding will be addressed in **PEI Report Volume 3, Appendix 9-C: Preliminary Flood Risk Assessment**, and also reported in the ES, both in terms of the risk to the Proposed Development and increased risk caused by the it.

14.6.42 Mitigation will be considered, and where necessary, incorporated in the Proposed Development's design through the preparation of the drainage strategy.

Fire

14.6.43 The potential for fire as a result of the battery energy storage system (BESS) has been considered. The BESS will include automatic cooling and fire suppression systems, which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. The BESS layout will be developed in consultation with the local fire and rescue service and will be compliant with National Fire Chiefs Council (NFCC) guidance. A Framework BSMP will be submitted with the DCO application. The provision of a detailed BSMP will be secured via a requirement in the DCO.

14.6.44 The development of the BSMP will be considered in the iterative design of the Proposed Development ensuring that design requirements to ensure fire safety (such as ensuring adequate provision of land for water storage, and the location of BESS away from trees and hedgerows to minimise risk of fire spreading) and management of any firewater runoff are captured. The development of the Framework BSMP will be discussed with Lincolnshire Fire and Rescue Service.

Road Accidents

14.6.45 The risk posed by spillage from hazardous loads as a result of a road traffic accidents during operation and maintenance of the Proposed Development is considered minimal due to limited road traffic movements being required during operation.

14.6.46 The potential for glint and glare to affect road users during operation has been considered within a preliminary assessment which is presented in Section 14.3 of this chapter and **PEI Report Volume 3, Appendix 14-C**.

Rail Accidents

14.6.47 No rail lines pass through the Site Boundary, with the nearest railway line being 500m to the north west. The preliminary glint and glare assessment (**PEI Report Volume 3, Appendix 14-B**) concludes that there is no potential for glint and glare impacts on rail receptors.

Aircraft Disasters

14.6.48 Waddington RAF Station is located approximately 4.6km north west of the Principal Site. There are no other active runways within 5km of the Principal Site.

14.6.49 The potential for glint and glare to affect aircraft during operation has been considered within a preliminary assessment (**PEI Report Volume 3, Appendix 14-C**). It has concluded that there is no potential for glint and glare to pose a risk to aircraft.

Plant Disease

14.6.50 New planting may be susceptible to biosecurity issues, such as the increased prevalence of pests and diseases, due to climate change. New planting would be managed in accordance with the Framework Landscape and Ecology Management Plan (LEMP) to be submitted as part of the DCO application which would include measures to minimise such risks.

14.6.51 The Biosecurity Plan prepared for the construction phase will be revised for the operational phase, in advance of start of operation (secured through the OEMP).

Conclusion

14.6.52 By their very nature, major accidents and disasters have the potential to lead to moderate or major adverse effects, irrespective of the Proposed Development. Therefore, the focus is on prevention and response planning to reduce any additional risk or effect of this happening which may arise as a result of the Proposed Development. This exercise is underway and on-going through design development and consultation with relevant statutory consultees. However, at this stage, it is not expected that there is a significant risk of major accidents and disasters occurring during construction, operation and maintenance, or decommissioning as a result of the Proposed Development. This will be reviewed and confirmed in the ES.

Mitigation Measures

14.6.53 Minimising the risk of major accidents during construction and decommissioning will be addressed through appropriate risk assessments, as required in the detailed CEMP.

Cumulative Effects

14.6.54 The shortlisted cumulative schemes (**PEI Report Volume 1, Chapter 15: Cumulative Effects and Interactions**) located in close proximity to the Proposed Development comprise predominantly residential developments and ground mounted solar and battery storage schemes.

14.6.55 Increased traffic during construction and decommissioning phases of the Proposed Development in combination with other developments could result in a greater risk of road accidents. This is assessed in **PEI Report Volume**

1, Chapter 13: Traffic and Transport, with appropriate mitigation presented where applicable.

- 14.6.56 The possibility of a major accident or disaster from the Proposed Development is low, and any such disaster (in the unlikely event that one did occur) would be short term and infrequent. As such, the likelihood for concurrent events on other cumulative schemes is very low. For these reasons, it is concluded that no significant cumulative effects would arise from the Proposed Development in terms of increased risk of a major accident or disaster occurring.

14.7 Telecommunications, Television Reception and Utilities

Introduction

- 14.7.1 This section evaluates the effects of the Proposed Development on telecommunication infrastructure, television reception and existing utilities.

Legislation and Policy

- 14.7.2 Effects relating to existing infrastructure are not environmental effects and there is no requirement to include an assessment of these effects under the EIA Regulations (Ref 14-79). However, given the nature of solar farm developments, they have the potential to affect existing utility infrastructure above and below ground.
- 14.7.3 There is no other legislation, policy or guidance specifically related to Telecommunications, Television Reception, and Utilities.

Consultation

- 14.7.4 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023 as part of the EIA Scoping Process. A Scoping Opinion was received from the Planning Inspectorate on 25 July 2023 (**PEI Report Volume 3: Appendix 1-B: Scoping Opinion**). Responses to comments received in the EIA Scoping Opinion in relation to Telecommunications, Television Reception and Utilities are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses**. No additional consultation has been undertaken to date in relation to this topic.

Assessment Methodology

- 14.7.5 To identify any existing infrastructure constraints, both consultation and a desk-based study have been undertaken. Consultation with relevant telecommunication and utilities providers is a routine part of solar development and will continue over the course of the DCO application preparation and examination process.

- 14.7.6 Consultees include water, gas and electricity providers, and telecommunications providers. Telecommunications and television providers are unlikely to be affected by Electromagnetic Interference (EMI) unless transmitters are near electrical infrastructure associated with the Principal Site (see also Section 14.8 Electric and Electromagnetic Fields below).
- 14.7.7 At the ES stage, a desk-based search will be undertaken for the presence of telecommunications, television reception and utilities infrastructure within the Proposed Development Site and within the vicinity. A qualitative approach undertaken by competent experts will be used to assess the likelihood of significant effects on telecommunications, television reception and utilities within the ES. Further consultation will be undertaken with utilities providers.

Study Area

- 14.7.8 The Study Area for telecommunications and utilities comprises the Site Boundary (see **PEI Report Volume 2, Figure 1-2**), as potential interactions with existing infrastructure are limited to the location of Proposed Development activities only.

Baseline Conditions

- 14.7.9 Existing infrastructure constraints are in the process of being defined and will be identified and confirmed in the ES. Existing infrastructure constraints identified during a desk study within and adjacent to the Proposed Development include the following:
- a. Overhead lines:
 - i. 4ZM ROUTE TWR (448 - 630) 400kV Overhead Transmission Line route Bicker Fen - Spalding North - West Burton (Circuit 1) and Bicker Fen - Walpole - West Burton (Circuit 2) running to the north of the Principal Site and passing within the south eastern Section of the Cable Corridor;
 - ii. Overhead line towers are located within the central section of the Site between Thurlby and Witham St Hughes, running parallel to Moor Lane, within the north eastern section of the Site, south of Thorpe on the Hill and located within the south western section of the Site, between Bassingham and the Norton Disney Fishing Lakes.
 - b. The Bassingham Sewage Treatment Works, operated by Anglian Water is located west of Bassingham, immediately adjacent to the Principal Site, off Clay Lane;
 - c. The Swinderby Sewage Treatment Works, operated by Anglian Water is located east of Witham St Hughes, immediately adjacent to the west of the Principal Site.
 - d. The Sand Syke Pumping Station, operated by the Upper Witham internal Drainage Board is located immediately adjacent to the south of the Cable Corridor;

- e. A disused Ministry of Defence (MoD) pipeline is located east of Witham St Hughes, assumed to be associated with the Swinderby Sewage Treatment Works and may extend east within the Principal Site;
- f. The Lincoln to Grantham Pipeline, operated by Anglian Water is located within the eastern extent of the Cable Corridor, between Coleby and Boothby Graffoe; and
- g. The Finaline Killingholme to Buncefield underground fuel pipeline, operated by TotalEnergies, is located within the eastern extent of the Cable Corridor.

Assessment of Effects

Telecommunications

- 14.7.10 The Proposed Development is unlikely to interfere with telecommunications infrastructure due to the relatively low height (under 5m from the ground level) of the solar PV panels, BESS, and supporting infrastructure, which will not provide an obstacle for telecommunication waves. Therefore, no such effects are anticipated in the construction, operation and decommissioning phases.

Television Reception

- 14.7.11 The Proposed Development consists of fixed low-lying infrastructure and is therefore unlikely to interfere with digital television signals, and therefore no effects are anticipated in the construction, operation and decommissioning phases.

Utilities

- 14.7.12 The potential exists for utilities to be affected during the construction and decommissioning of the Proposed Development through inadvertent damage caused as a result of excavation and engineering operations. Without any precautionary measures to avoid damage to utilities, this could lead to a short-term adverse effect. However, with embedded mitigation in place to identify, avoid and manage utilities interactions, it is not expected that there would be any adverse effects.
- 14.7.13 Precautionary measures will be included as part of embedded mitigation for the Proposed Development to prevent such damage from occurring, including:
- a. Locating the Proposed Development outside of utilities protected zones;
 - b. The use of ground penetrating radar before excavation to identify any unknown utilities; and
 - c. Consultation and agreement with relevant utility operators regarding construction/demobilising methods prior to works commencing.
- 14.7.14 These measures, along with those listed within the **Framework CEMP (PEI Report Volume 3 Appendix 3-A)**, will reduce the likelihood of effects on

utilities during construction and decommissioning. Therefore, no adverse effects are expected during construction and decommissioning.

- 14.7.15 No effects on utilities are predicted as a result of the operational phase of the Proposed Development because no below-ground works are required during operation and maintenance. Embedded mitigation measures in relation to safe working beneath overhead lines would be in place (as they would during all phases of the Proposed Development). This includes, for example, ensuring adequate clearances are in place when plant and equipment are being moved beneath overhead lines and limiting any planting beneath overhead lines to low growing species.

Mitigation Measures

- 14.7.16 The risk of damage to utilities during construction would be minimised through embedded mitigation, which would involve the implementation of the measures listed within Paragraph 14.7.13 and the mapping of infrastructure that crosses the Proposed Development, and therefore avoiding it through the design. No further mitigation would be required for telecommunications, television reception and utilities.

Cumulative Effects

- 14.7.17 The Proposed Development has been preliminarily assessed to have no effect on telecommunication, television, or utilities. It is expected that the other developments included within the cumulative schemes shortlist within **PEI Report Volume 1, Chapter 15: Cumulative and Effect Interactions** would also have no effect on telecommunications and television reception and would adhere to the same mitigation as set out above to reduce the risk of damaging utilities. It is assumed that all other developments will conform to good practice measures and their environmental impacts will be managed through a CEMP (or similar) and would include mitigation measures to reduce the risk of damaging utilities during construction. Therefore, no cumulative effects are expected on telecommunications, television reception, or utilities.

14.8 Electric and Electromagnetic Fields

Introduction

- 14.8.1 This section presents the preliminary findings of an assessment of the likely effects of the Proposed Development on Electric and Electromagnetic Fields (EMF) as a result of the Proposed Development.
- 14.8.2 Electric fields are the result of voltages applied to electrical conductors and equipment. Fences, shrubs, and buildings easily block electric fields. Electromagnetic fields are produced by the flow of electric current; however, unlike electric fields, most materials do not readily block electromagnetic fields. The intensity of both electric fields and electromagnetic fields diminishes with increasing distance from the source.
- 14.8.3 With the exception of relatively short lengths of cables connecting solar PV panels to string inverters, all cables associated with the Proposed Development would be buried underground. The dimension of the trenches will vary depending on the number of cables or ducts they contain as is further described in **PEI Report Volume 1, Chapter 3: The Proposed Development**. EMF associated with the Proposed Development is considered a minor risk and this preliminary assessment has been included on a precautionary basis.

Legislation and Policy

- 14.8.4 Key legislation, planning policy and guidance relating to the assessment of Electric and Electromagnetic Fields and pertinent to the Proposed Development comprises the documents listed below. More detail regarding these policies can be found in **PEI Report Volume 3, Appendix 14-A: Other Environmental Topics Policy and Legislation**.
- 14.8.5 Whilst there are no statutory regulations in the UK that limit the exposure of the general public to power-frequency EMFs, responsibility for implementing appropriate measures for the protection of the public lies with the UK Government, which has a clear policy incorporated in the NPS EN-5 (November 2023) with specific attention to Paragraphs 2.11.8 to 2.11.15 (Ref 14-9).
- 14.8.6 The relevant legislation is the Control of Electromagnetic Fields at Work Regulations 2016 (Ref 14-86).
- 14.8.7 The relevant policy is NPS for Electricity Networks Infrastructure (EN-5) (November 2023) (Ref 14-9).
- 14.8.8 There are no relevant local policy provision in relation to EMFs.
- 14.8.9 Guidance relevant to electric and electromagnetic fields includes:
- a. National Grid (2015). Undergrounding high voltage electricity transmission lines (Ref 14-87);

- b. DECC (2012). Power Lines: Demonstrating Compliance with EMF public exposure guidelines (Ref 14-88);
- c. Energy Networks Association (2012). Electric and Magnetic Fields: The Facts (Ref 14-89);
- d. Energy Networks Association (2017). Electric and Magnetic Fields (Ref 14-90);
- e. International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1998). Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz) (Ref 14-91);
- f. ICNIRP (2020). Guidelines for limiting exposure to Electromagnetic Fields (100 kHz to 300 GHz) (Ref 14-92); and
- g. Department of Transport (2002) The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction (updated 2016) (Ref 14-93).

Consultation

14.8.10 A request for an EIA Scoping Opinion was sought from the Secretary of State through the Planning Inspectorate in June 2023 as part of the EIA Scoping Process. A Scoping Opinion was received from the Planning Inspectorate on 25 July 2023 (**PEI Report Volume 3: Appendix 1-B: Scoping Opinion**). Responses to comments received in the EIA Scoping Opinion in relation to Electric and Electromagnetic Fields are presented in **PEI Report Volume 3, Appendix 1-C: Scoping Opinion Responses**.

14.8.11 The assessment of Electric and Electromagnetic Fields was initially requested for inclusion by the Planning Inspectorate within the Scoping Opinion (**PEI Report Volume 3, Appendix 1-C**) due to the option of an overhead line being used to export the electricity generated by the Proposed Development. This option is no longer being taken forward and electricity will instead be exported via an underground cable. However, an assessment of electric and electromagnetic fields has been included as this topic is a common concern for the public. No additional consultation has been undertaken to date in relation to this topic.

Assessment Methodology

14.8.12 This section sets out the scope of methodology for the preliminary assessment of the impacts of the Proposed Development on EMF.

14.8.13 Underground cables eliminate the electric field altogether as it is screened out by the sheath around the cable, but they still produce electromagnetic fields. In accordance with National Grid guidance (Ref 14-87), EMF effects from underground cables would not exceed the International Commission on Non-Ionizing Radiation Protection (ICNIRP) reference levels and have therefore been scoped out of this assessment.

- 14.8.14 The On-Site Cables are not considered in the assessment as they would have a very low voltage of less than 1kV and therefore would not significantly contribute to any increase in electromagnetic fields should they overlap with other infrastructure.
- 14.8.15 The ICNIRP 'reference levels' for the public are 100 microteslas for magnetic fields and 5,000 volts per metre for electric fields (Ref 14-92). These are the levels above which more investigation is needed if this level of exposure is likely to occur; the permitted levels of exposure are somewhat higher, 360 microteslas and 9,000 volts per metre. They apply where the time of exposure is significant, for instance in a residence. As a worst-case the lower 'reference level' of 100 microteslas and 5,000 volts per metre is used in the assessment as the threshold at which potentially significant effects could occur.

Study Area

- 14.8.16 The EMFs produced by the electrical assets of the Proposed Development would have a given magnitude at a given distance from the asset. Therefore, the Study Area of the assessment includes all areas around the assets where the EMFs could potentially be. The Study Area for the assessment is therefore the Site, as shown in **PEI Report Volume 2, Figure 1-2: Site Boundary Plan**.

Baseline Conditions

- 14.8.17 The Site is located within a mixture of primarily rural and semi-rural areas, which accommodate existing electrical assets. Electric and magnetic fields both occur naturally. The Earth's magnetic field, which is caused mainly by currents circulating in the outer layer of the Earth's core, is roughly 50 microteslas in the UK. This field may be distorted locally by ferrous minerals or by steelwork such as in buildings.
- 14.8.18 The Earth's natural fields are static, and the power system produces alternating fields. In homes in the UK that are not close to high-voltage overhead lines or underground cables, the average 'background' power frequency magnetic field (the field existing over the whole volume of the house) ranges typically from 0.01 microteslas to 0.2 microteslas with an average of approximately 0.05 microteslas, normally arising from currents in the low voltage distribution circuits that supply electricity to homes. The highest magnetic fields to which most people are exposed arise close to domestic appliances that incorporate motors and transformers. For example, close to the surface, fields can be 2,000 microteslas for electric razors and hair dryers, 800 microteslas for vacuum cleaners, and 50 microteslas for washing machines. The electric field in most homes is in the range 1-20 volts per metre (V/m), rising to a few hundred V/m close to appliances.

Assessment of Effects

- 14.8.19 DECC guidance (Ref 14-88) states that underground cables at voltages up to and including 132kV are considered not capable of exceeding the ICNIRP exposure guidelines for electromagnetic fields (Ref 14-92) and that

compliance with exposure guidelines for such equipment can be assumed unless evidence is brought to the contrary in specific cases. However, there is potential for exceedances of 132kV where infrastructure overlaps.

- 14.8.20 The National Grid document 'Undergrounding high voltage electricity transmission lines' (Ref 14-87) states that for a 400kV cable buried at 0.9 m depth, the typical magnetic field is 24 microteslas when on top of the cable and 3 microteslas at 5m from the centreline, with the maximum level known by National Grid being 96 microteslas on top of the cable at 0.9 m depth, and 13 microteslas at 5m. Taking into account this guidance and the UK limits set for safety of members of the public, the maximum reported electromagnetic field for HV cables buried at a minimum depth of 1.4m would comply with the ICNIRP limits even if the cabling were directly under a human receptor. Therefore, no significant impacts are expected to arise from electromagnetic fields as result of the underground cables that form part of the Proposed Development.
- 14.8.21 Cables between solar PV panels and the inverters would typically be required to be above ground level (along a row of racks fixed to the solar PV mounting structure or fixed to other parts of nearby components) and then underground if required (between racks and in the inverter's input). All other on-site cabling would be underground.
- 14.8.22 As stated in Paragraph 14.8.14, the Onsite Cables would have a voltage of less than 1kV and therefore would not significantly contribute to any increase in electromagnetic fields should they overlap with other infrastructure.
- 14.8.23 There are no permanent receptors within 10m of the Site Boundary. The electricity export cable will be located at least 10m from permanent receptors due to the need for construction vehicles to manoeuvre both sides of the trench within the working width. Therefore, no significant effects to receptors are predicted to occur.
- 14.8.24 Some PRow and permissive paths do cross over the Cable Corridor and may also pass over the Interconnecting and Cable Corridor where they are routed within the Solar Energy Storage Park. PRows are shown on **PEI Report Volume 2, Figure 2-2**. The presence of the public either directly above or adjacent to underground cables associated with the Proposed Development would be transient, with the individuals using the PRow exposed to electro-magnetic fields from the cables for only very short periods of time. It is considered that the level of exposure to users of PRow would be lower than that associated with general household appliances. Therefore, no significant effects to users of PRow are predicted to occur.
- 14.8.25 Where the cables associated with the Proposed Development are proposed to cross watercourses, the cables will be installed a minimum of 1.5m beneath any minor watercourses and 5m beneath main rivers, which will provide sufficient distance to attenuate EMF and avoid impacts on river species such as fish. EMF levels at this distance would be almost imperceptible (around 3 microteslas, or lower if the cables are installed in bedrock), with any fish also being directly above the buried cables for only a

very short duration. The effect on river fauna is therefore considered to be negligible.

14.8.26 The assets associated with the Proposed Development would be fully compliant with the relevant Government policy. Specifically, all the EMFs produced would be below the relevant exposure limits. Therefore, no significant EMF effects are anticipated as a result of the Proposed Development.

14.8.27 The EMF assessment will be revisited and confirmed within the ES and incorporate feedback from any further consultation undertaken with the relevant stakeholders.

Cumulative Effects

14.8.28 EMF associated with the Proposed Development has been assessed to have no significant effect on receptors. It is expected that the EMF associated with other developments included within the cumulative developments shortlist would also have no significant effect on receptors and would adhere to the same relevant Government policy as set out above to ensure all EMF is below the relevant exposure limits. Therefore, no cumulative effects are expected due to EMFs.

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