leoda solar farm

EIA Scoping Report

Main Report

January 2025

Contents

List of Figures

List of Tables

1 Document Purpose

1.1 Background

1.1.1 Leoda Solar Farm Limited (hereafter referred to as 'the Applicant') has commissioned this Environmental Impact Assessment (EIA) Scoping Report for Leoda Solar Farm (hereafter referred to as the 'Scheme'). The Scheme comprises the installation of solar photovoltaic (PV) generating panels and associated development such as electrical equipment, cabling and on-site battery energy storage system (BESS) facilities across a proposed site that lies to the west of the village of Leadenham (hereafter referred to as the 'Solar PV Site') together with grid connection infrastructure (hereafter referred to as the 'Grid Connection Corridor'), which extends to a proposed National Grid substation east of Navenby. The Scheme would allow for the generation, storage, export and import of electricity with an anticipated capacity greater than 50 megawatts (MW).

1.1.2 The Scheme is defined as a Nationally Significant Infrastructure Project (NSIP) under Sections 14(1)(a) and 15(2) of the Planning Act 2008 (Ref 1-1) as an onshore generating station in England with a capacity exceeding 50 MW. It should be noted that the Scheme remains an NSIP regardless of upcoming legislation, via the Planning and Infrastructure Bill, to change the existing Town and Country Planning Act 1990 (Ref 1-2) threshold for solar projects from 50 MW to 100 MW. The Planning Act 2008 requires the Applicant to apply for a Development Consent Order (DCO) to construct, operate and decommission the NSIP. Figure 1-1 illustrates the Scheme DCO Boundary – for the purposes of this EIA Scoping Report, this is considered the 'Site' or 'Site Boundary', comprising collectively the Solar PV Site and the Grid Connection Corridor.

1.1.3 The Solar PV Site is located on land situated west of Leadenham, Welbourn and Wellingore, east of Brant Broughton and to the north of the A17 road, within the county of Lincolnshire. The Solar PV Site and the Grid Connection Corridor are shown on Figure 1-2 and described in **Chapter 2: The Scheme** of this EIA Scoping Report.

1.1.4 It is important to note that at this stage that Figure 1-2 shows the current expected maximum extent of land that would be included within the application for a DCO, which includes all land being considered for the purposes of the Scheme, and provides a '*plan sufficient to identify the land*' for the purposes of this EIA Scoping Report in line with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 'EIA Regulations') (Ref 1-3). The Site incorporates several options for components that have been, and will be, the subject of consultation and is likely to be refined as the Scheme design progresses, taking into account the findings of the ongoing environmental and technical assessments, and consultation responses.

1.1.5 This EIA Scoping Report forms a formal request for a Scoping Opinion under Regulation 10(1) of the EIA Regulations (Ref 1-3).

Purpose and Structure of an EIA Scoping Report

1.1.6 An EIA Scoping Report is produced by an applicant to formally request an EIA Scoping Opinion. Although the EIA Scoping Opinion is sought from the Secretary of State (SoS), the process is undertaken by the Planning Inspectorate on behalf of the SoS. An EIA Scoping Report provides information to support such a request and can be used to help to inform both the EIA Scoping Opinion and formal consultation with statutory environmental bodies by the Planning Inspectorate.

1.1.7 Regulation 10(3) of the EIA Regulations (Ref 1-3) sets out the requirements for requesting an EIA Scoping Opinion, stating that the request (EIA Scoping Report) must include:

- *"A plan sufficient to identify the land;*
- *A description of the proposed development, including its location and technical capacity;*
- *An explanation of the likely significant effects of the development on the environment; and*
- *Such other information or representations as the person making the request may wish to provide or make."*

1.1.8 The purpose of this EIA Scoping Report is therefore to fulfil these requirements and to:

- Provide a summary of the Scheme;
- Set out the proposed scope of the EIA (i.e. which environmental topics are to be 'scoped in' (included) within the EIA) taking into account what is known about the Site, Scheme and associated commitments;
- Facilitate consultation with statutory consultees and other relevant statutory bodies on the environmental issues to be addressed as part of the EIA and design development process;
- Identify potentially likely significant environmental effects of the Scheme at an early stage of development to ensure they are considered and addressed throughout the design and consenting process and opportunities for mitigation are appropriately explored;
- Provide justification and rationale for 'scoping out' (i.e. not included within the EIA) certain topics from further assessment (for example where no likely significant effects are predicted); and
- Set out what additional information needs to be collected (i.e. through desk-based studies or field survey work) to characterise the baseline environment of the Site;
- Define the assessment methods to be used to determine the likely significant environmental effects of the Scheme; and

- Set out the proposed structure and coverage of the Environmental Statement (ES) to be submitted with the DCO application.

1.1.9 This EIA Scoping Report is set out in accordance with guidance provided by the Planning Inspectorate's Advice Note 7 'Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements' (Ref 1-4).

1.1.10 Table 1-1 lists the suggested requirements identified in Advice Note 7 (Ref 1-4) and details where they are presented in this EIA Scoping Report. The requirements of the EIA Regulations regarding the content of the ES are also covered within the contents tabulated below.

Table 1-1: Contents for the EIA Scoping Report based on the Planning Inspectorate's Advice Note 7

Suggested EIA Scoping Report Contents	Location in this EIA Scoping Report
Transboundary Screening Matrix	Appendix A
The Proposed Development:	
An explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development e.g.: design parameters	Chapter 2 (The Scheme)
Referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development	Figure 1-1 (Site Location) Figure 1-2 (Site Boundary) Figure 2-1 (Environmental Constraints)
EIA Approach and Topic Areas:	
An outline of the reasonable alternatives considered and the reasons for selecting the preferred option	Chapter 3 (Alternatives Considered)
A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues	Chapter 18 (Summary and Conclusions)
A detailed description of the aspects and matters proposed to be scoped out of further assessment with justification provided	Chapters 6 to 16 (Technical Topics)

Suggested EIA Scoping Report Contents	Location in this EIA Scoping Report
Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters	Chapters 6 to 16 (Technical Topics)
Aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect e.g.: criteria for determining sensitivity and magnitude	Chapters 6 to 16 (Technical Topics)
Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects	Chapters 6 to 16 (Technical Topics)
Information Sources:	
References to any guidance and best practice to be relied upon	Chapters 6 to 16 (Technical Topics)
Evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities)	Chapters 6 to 16 (Technical Topics)
An outline of the structure of the proposed ES	Chapter 17 (Structure of the Environmental Statement)

1.1.11 A glossary and abbreviation list are presented in **Chapters 20 and 21** of this EIA Scoping Report respectively.

1.2 Legislative Context and Need for Environmental Impact Assessment

1.2.1 The EIA requirement for NSIPs is transposed into law through the EIA Regulations (Ref 1-3). The EIA Regulations specify which developments are required to undergo EIA, and schemes relevant to the NSIP planning process are listed under either of 'Schedule 1' or 'Schedule 2'. Those developments listed in Schedule 1 must be subject to EIA, while developments listed in 'Schedule 2' must only be subjected to EIA if they are considered 'likely to have significant effects on the environment by virtue of factors such as its nature, size or location'. The Scheme is a Schedule 2 development, listed under Schedule 2, Part 3(a) - industrial installations for the production of electricity, steam and hot water (projects not included in Schedule 1). The criteria on which the judgement on EIA being required must be made are set out in Schedule 3. The Applicant wishes to confirm under Regulation 8(1)(b) of the EIA Regulations that an ES will be provided in respect of the application for a DCO for the Scheme, as it is considered that the Scheme meets the criteria set out in Schedule 3 of the EIA Regulations.

1.2.2 Following the completion of the surveys, assessments, and consultation processes outlined in this EIA Scoping Report, and taking account of the EIA Scoping Opinion, an application for a DCO will be made to the SoS for determination in accordance with the Planning Act 2008 (Ref 1-1). The DCO application will be accompanied by an ES, in accordance with Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 ('APFP Regulations') (Ref 1-5). The ES will set out the methods and findings of a comprehensive EIA undertaken in line with the EIA Regulations (Ref 1-3).

1.2.3 The Localism Act 2011 (Ref 1-6) appointed the Planning Inspectorate as the government agency responsible for operating the DCO process for NSIPs. The SoS will appoint an Examining Authority from the Planning Inspectorate, who will examine the application for the Scheme and then will make a recommendation to the SoS, who will in turn make the decision on whether to grant or to refuse the DCO.

National Policy Statements

1.2.4 In accordance with Section 104(2) of the Planning Act 2008 (Ref 1-1), the SoS is required to have regard to the relevant National Policy Statement (NPS) where it has effect, amongst other matters, when deciding whether or not to grant a DCO.

1.2.5 The SoS must decide any application for the Scheme in accordance with the following NPSs (subject to prescribed and limited exceptions in s104):

- Overarching NPS for Energy (EN-1) (Ref 1-7),
- NPS for Renewable Energy Infrastructure (EN-3) (Ref 1-8), and
- NPS for Electricity Networks Infrastructure (EN-5) (Ref 1-9).

1.2.6 These NPSs were revised in 2023 and came into force on the 17th January 2024.

NPS EN-1

1.2.7 NPS EN-1 is split over five sections. Section one references the role of this NPS and its purpose to set out the government's policy for delivery of major energy infrastructure. EN-1, in conjunction with any relevant technology specific NPS, is the primary policy for Secretary of State decision making on associated development (Ref 1-7).

1.2.8 Section two outlines Government policy on energy and energy infrastructure development. It acknowledges that to produce the energy required for the UK and ensure it can be transported to where it is needed, a significant amount of infrastructure is needed at both local and national scale, and further outlines the government's commitment to reach Net Zero and meet objectives for sustainable development (Ref 1-7).

1.2.9 Section three describes the need for new NSIPs, and the role of solar is discussed in paragraph 3.3.20 onwards, in providing the lowest cost ways of generating electricity, helping reduce costs, and providing a clean and secure source of electricity supply (Ref 1-7).

1.2.10 Section four describes the assessment principles for new energy infrastructure and the requirements to describe likely significant environmental effects, and section five addresses the generic environmental impacts of energy infrastructure (Ref 1-7).

NPS EN-3

1.2.11 NPS EN-3, when taken together with EN-1, provides the primary policy for decisions on applications for renewable energy NSIPs.

1.2.12 EN-3 references Solar PV generation in section 2.10. The following are stated as factors which will influence the applicant assessment for site selection (Ref 1-8):

- Irradiance and site topography;
- Network connection;
- Proximity of a site to dwellings;
- Agricultural Land Classification (ALC) and land type;
- Accessibility;
- Public Rights of Way (PRoW); and
- Security and lighting.

1.2.13 The following are described within the NPS as factors which influence the Secretary of State decision making (Ref 1-8):

- Agriculture land classification and land type;
- Project lifetime and decommissioning;
- Biodiversity, ecological, geological conservation and water management;
- Landscape, visual and residential amenity;
- Cultural Heritage; and
- Construction including traffic and transport noise and vibration.

1.2.14 Within the NPS there are further descriptions of potential impact and mitigation for solar developments.

1.2.15 The NPS describes how solar farms are one of the most established renewable electricity technologies in the UK and the cheapest form of electricity generation and outlines the government's commitment to support solar generation (Ref 1-8).

NPS EN-5

1.2.16 NPS EN-5, when taken together with EN-1, is the primary decision-making guidance document for the Secretary of State when considering development consent applications for NSIPs for electricity networks infrastructure (Ref 1-9).

1.2.17 The following aspects are described within EN-5 as key in determining decision making by the Secretary of State (Ref 1-9):

- Impacts to biodiversity and geological conservation;
- Landscape and visual;
- Noise and vibration;
- Electric and magnetic fields; and
- Sulphur hexafluoride, a potent greenhouse gas associated with electricity networks.

1.2.18 Given the importance of these NPSs, the EIA approach takes account of these documents. A summary of the relevant considerations for each technical assessment is provided for each environmental topic (Chapters 6 to 16 of this EIA Scoping Report).

National Planning Policy Framework

1.2.19 The National Planning Policy Framework (NPPF), updated in December 2024 (Ref 1-10) sets out the Government's national planning policies for England. Paragraph 5 of the NPPF makes it clear that the document does not contain specific policies for NSIPs and that applications in relation to NSIPs are to be determined in accordance with the decision-making framework set out in the Planning Act 2008 and relevant NPSs, as well as any other matters that are considered both important and relevant. However, NPPF paragraph 5 goes on to confirm that the NPPF may be a matter that is both important and relevant for the purposes of assessing DCO applications. As such, the EIA for the Scheme will have regard of the relevant policies of the NPPF as part of the overall framework of national policy.

Local Planning Policy

1.2.20 Policies in Local Plans are frequently considered important and relevant matters and can influence the content of local impact reports (which the host local authorities will produce following submission of the DCO application), and which the SoS must have regard to in its decision making in accordance with the Planning Act 2008 (Ref 1-1). The Scheme lies within the administrative areas of Lincolnshire County Council (LCC) and North Kesteven District Council (NKDC), both of which are members of

the Central Lincolnshire Joint Strategic Planning Committee (CLJSPC). The following documents form the Development Scheme (Ref 1-11) for the land within which the Scheme is located:

- Central Lincolnshire Local Plan, Adopted April 2023 (Ref 1-12);
- Policies map for adopted Central Lincolnshire Local Plan (Ref 1-13); and
- Lincolnshire County Council Minerals and waste local plan - Core strategy and development management policies (Ref 1-14).

1.2.21 Within the administrative areas of LCC and NKDC, the Scheme falls within the Welbourn Neighbourhood Plan which was designated in 2013 (Ref 1-15). Within the southern extent of the Solar PV Site there are a further two potential Neighbourhood Plan areas under discussion – these are the Leadenham Neighbourhood Plan and the Brant Broughton and Stragglethorpe Neighbourhood Plan (Ref 1-16). The Cable Grid Connection Corridor borders the north of the Welbourn Neighbourhood Plan area (Ref 1-17).

Consideration of Planning Policy in EIA

1.2.22 The EIA Scoping Report describes the national and local planning policies relevant to the assessment with a summary provided for each environmental topic. The purpose of the EIA Scoping Report is not to assess the Scheme against planning policy; this will be undertaken and set out in a Planning Statement. The Planning Statement will be a separate document that will be submitted as part of the DCO application.

1.2.23 The purpose of considering the abovementioned planning policy at the Scoping stage of the EIA is twofold:

1. To identify policy that could influence the sensitivity of receptors (and therefore the significance of effects) and any requirements for mitigation; and
2. To identify planning policy that could influence the methodology of the EIA. For example, a planning policy may require the assessment of a particular impact or the use of a particular methodology.

1.2.24 The national and local planning policy relevant to each technical assessment is noted for each environmental topic within **Chapters 6 to 16** of this EIA Scoping Report, and is expanded upon within the respective chapters where further detail is considered pertinent.

1.3 Other relevant policy

1.3.1 Other policies which are likely to be important and relevant matters to the SoS's decision and are considerations for the technical assessments include 'A Green Future: Our 25 Year Plan to Improve the Environment (published in 2018 and

updated in 2023) (Ref 1-18) and the Energy White Paper: Powering our Net Zero Future (2020) (Ref 1-19).

1.3.2 The 25 Year Environment Plan first published in 2018 and last updated in October 2021 sets out the Government's 25 year plan to improve the environment within a generation. It aims to achieve 10 goals which include: achieve clean air; achieve clean and plentiful water; achieve thriving plants and wildlife; reduce risk of harm from environmental hazards like flooding and drought; use resources from nature more sustainably and efficiently; enhance beauty, heritage and engagement with the natural environment; mitigate and adapt to climate change; minimise waste; manage exposure to chemicals; and enhance biosecurity. This plan therefore highlights the Government's support for the reduction in the UK's carbon footprint; protection and enhancement of the natural environment; and ensuring land is managed with environmental gains.

1.3.3 The Energy White Paper published in December 2020 sets out how the UK will reach net zero emissions by 2050. It identifies the Government's aim for a fully decarbonised, reliable and low-cost power system by 2050.

1.3.4 The Paper explains that the Government is not targeting a particular generation mix however commits the Government to maintaining the market conditions which stimulate the cost reductions that have been seen in the renewables energy market over the last five years. It does, however, state that it is possible to determine key characteristics of the future generation mix at this stage identifying that a "*low-cost, net zero consistent system is likely to be composed predominantly of wind and solar*". It highlights that this will need to be complemented by technologies which provide power, or reduce demand, to manage intermittency. Currently this includes "*nuclear, gas with carbon capture and storage and flexibility provided by batteries, demand side response, interconnectors and short-term dispatchable generation providing peaking capacity, which can be flexed as required*".

1.3.5 This Paper therefore highlights the Government's commitment to solar and battery storage to achieve net zero targets and the need to provide this urgently.

1.3.6 In December 2024, the government published the Clean Power 2030 Action Plan (Ref 1-20), which describes the pathway to a clean power system by 2030. The report addresses the challenges of creating an affordable and secure energy source, creation of new energy industries and reducing harmful emissions which contribute to climate change. Page 28 of the report references how a clean power system will require the mass deployment of offshore wind, onshore wind and solar. Page 73 of the report illustrates how the current installed capacity of solar is at 16.6 GW, and the target is 47 GW by 2030.

1.4 The Applicant

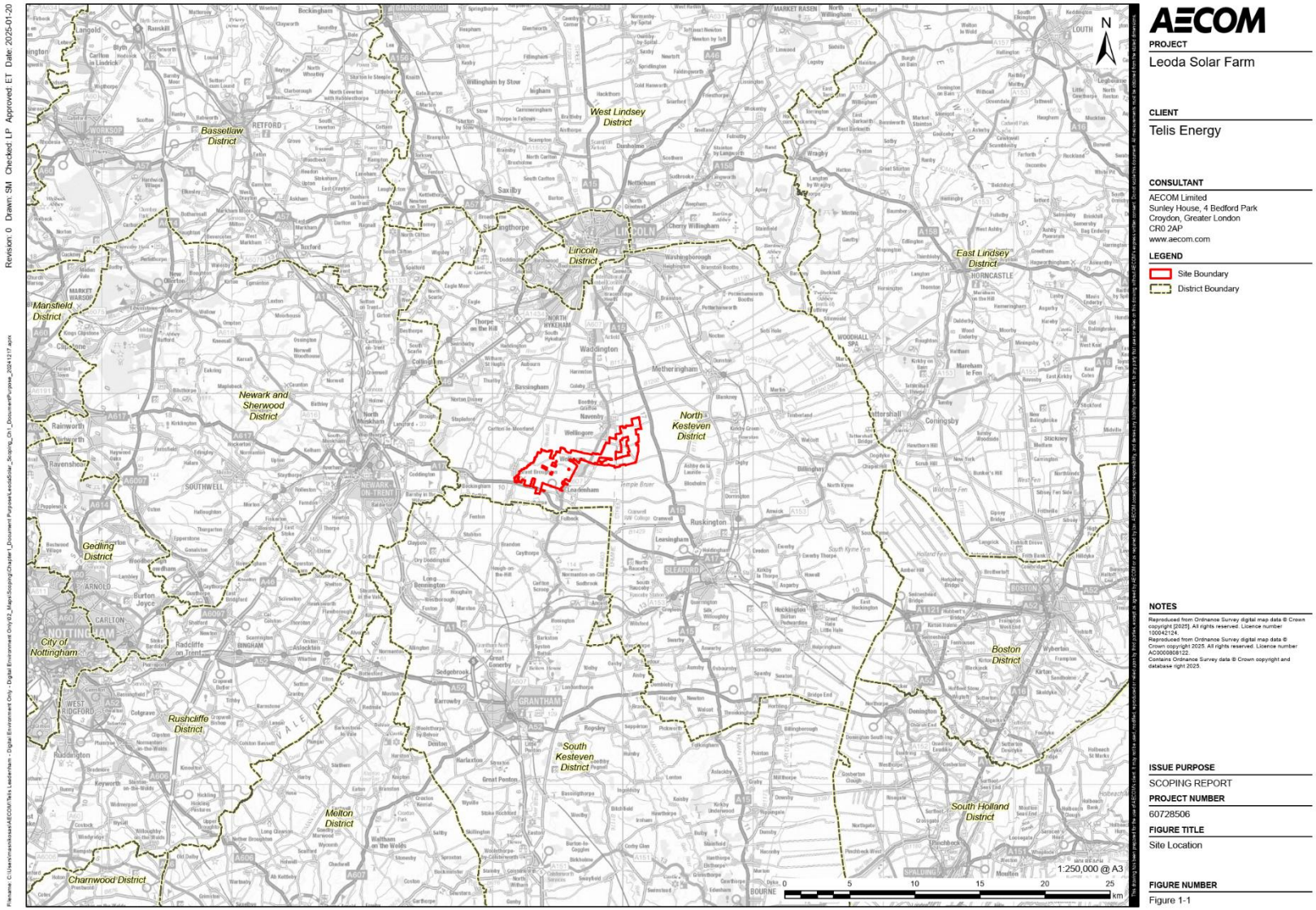
1.4.1 The Applicant, 'Leoda Solar Farm Limited', is part of the Telis Energy Group, a Carlyle portfolio company that specialises in the development of green energy projects. The Carlyle Group is one of the world's largest and most diversified global investment firms, with approximately $425 billion of assets under management. The

Telis Energy Group is a European green energy development platform with a target development pipeline of 10GW across Europe by 2030, delivered by local teams through four subsidiaries across France, the UK, Germany and Italy (Ref 1-21).

1.5 IEMA Quality Mark

1.5.1 Regulation 14 (4) of the EIA Regulations (Ref 1-3) requires that ”in order to ensure the completeness and quality of the environmental statement (a) the applicant must ensure that the environmental statement is prepared by competent experts; and (b) the environmental statement must be accompanied by a statement from the applicant outlining the relevant expertise or qualifications of such experts”. AECOM is an Institute of Environmental Management and Assessment (IEMA) Registered Impact Assessor and holds the IEMA EIA Quality Mark as recognition of the quality of its EIA product and continuous training of its environmental consultants. A Statement of Competence will be included within the ES, outlining the relevant expertise or qualifications of the experts who prepared the ES, in line with Regulation 14(4) of the EIA Regulations.

Figure 1-1: Site Location



AECOM

PROJECT
Leoda Solar Farm

CLIENT
Telis Energy

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LEGEND
Site Boundary
District Boundary

NOTES
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ISSUE PURPOSE
SCOPING REPORT

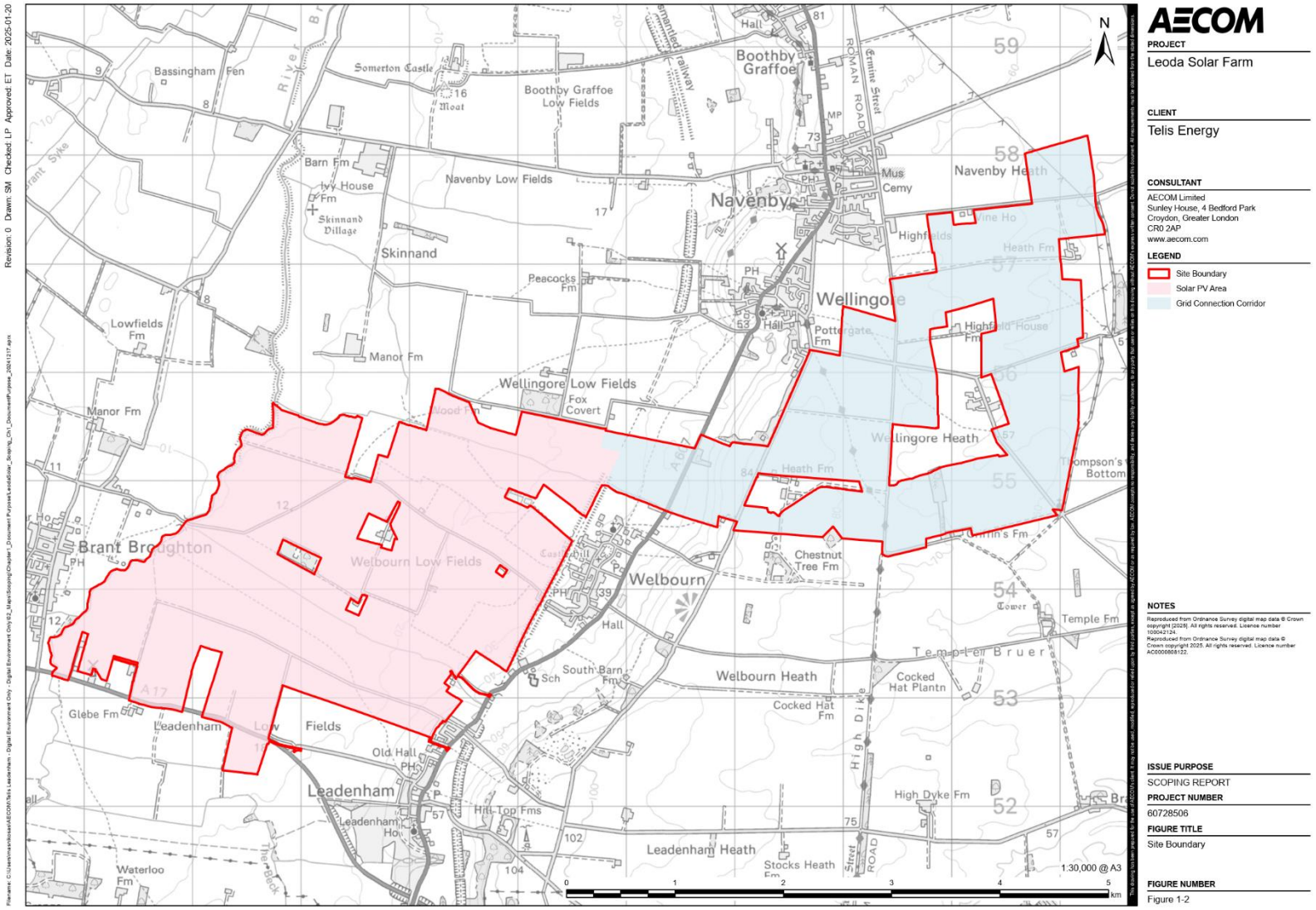
PROJECT NUMBER
60728506

FIGURE TITLE
Site Location

FIGURE NUMBER
Figure 1-1

Revision 0 Drawn: SM Checked: LP Approved: ET Date: 2025-01-20

Figure 1-2: Site Boundary



2 The Scheme

2.1 Introduction

2.1.1 As stated in paragraph 1.1.1, the Scheme comprises the installation of solar PV generating panels, interconnecting cabling and on-site BESS facilities across the proposed Solar PV Site together with grid connection infrastructure located within the Grid Connection Corridor.

2.1.2 This chapter presents a description of the Solar PV Site and the Grid Connection Corridor (Section 2.2) and the Scheme (Sections 2.3 to 2.6) in sufficient detail to inform the approach and scope of the EIA. The Solar PV Site comprises various areas of Solar PV Panels, which are referred to as 'Solar PV Plots'.

2.2 Site Description

Site and Surrounding Area

2.2.1 The Solar PV Site and the Grid Connection Corridor are located within the administrative areas of LCC and NKDC. The rationale for selecting the Solar PV Site and the Grid Connection Corridor is described in **Chapter 3: Alternatives Considered** of this EIA Scoping Report. The maximum extent of land that is expected to be required for the construction, operation and maintenance, and decommissioning of the Scheme is shown on Figure 1-2.

2.2.2 The Solar PV Site boundary represents the current maximum extent of land being considered and will be further refined taking into account environmental and technical factors and consultation responses. Some of this land will also be used for landscaping and habitat creation rather than solar PV infrastructure. At this scoping stage, the expected maximum area of land potentially required for the construction, operation and maintenance, and decommissioning of the Scheme, which includes land required for temporary and permanent purposes, is shown on Figure 1-2.

2.2.3 The Grid Connection Corridor shows a 200 m wide area for the three options of routing being considered at this stage of design and for scoping purposes. The working right of way (or construction area) for the grid connection cable will be typically 20 and up to approximately 40 m wide, located within the Grid Connection Corridor. A typical trench depth of around 2 m and trench width of around 2 m is expected within this construction area. The routing will be further refined prior to statutory consultation based on the findings of the engineering, EIA and other relevant studies, and will be designed to avoid as far as possible sensitive receptors such as habitat designations, residential and commercial properties, and archaeology assets. The Grid Connection Corridor boundary includes the anticipated location of the National Grid's proposed Navenby Substation to allow for future connection. Together with the description of the Scheme components set out in this chapter, Figure 1-2 represents the current maximum land expected to be required for the full range of possible development options which could form part of

the final Scheme. This allows for consideration of the potential environmental effects of the full range of options under consideration, to ensure that the likely significant effects of each of the component options has been scoped into the assessment.

2.2.4 The Solar PV Site comprises multiple land plots within a largely contiguous site as shown on Figure 1-2. The total area of the Solar PV Site is approximately 961 hectares (ha) (excluding the Grid Connection Corridor).

2.2.5 The Solar PV Site is approximately centred on National Grid Reference (NGR) SK9437353368 and is located between the outskirts of the villages of Leadenham, Brant Broughton, and Welbourn. The Grid Connection Corridor runs between the villages of Welbourn and Wellingore towards the outskirts of Navenby.

2.2.6 The landscape features within the Solar PV Site and the Grid Connection Corridor consist predominately of agricultural fields as can be seen on Figure 2-1. According to the Provisional Agricultural Land Classification mapping (Ref 2-1) the land within the Solar PV Site and Grid Connection Corridor is mainly Grade 3 and Grade 2 agricultural land (see **Chapter 15: Soils and Agricultural Land** and Figure 15-1).

2.2.7 The fields within the Solar PV Site are bounded by hedgerows, and there are several small waterbodies located within the Site. To the north-east of Brant Broughton there is a small area of woodland within the Solar PV Site which contains a small waterbody.

2.2.8 The surrounding villages of Brant Broughton, Leadenham, Welbourn and Wellingore and Navenby contain several Listed Buildings including Grade I, II and II*, and are designated as Conservation Areas by NKDC (further details are within **Chapter 7: Cultural Heritage**). Furthermore, there are several non-designated heritage assets located within the Site boundary.

2.2.9 Areas of Flood Zone 2 (land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding) and Flood Zone 3 (land assessed as having a greater than 1 in 100 annual probability of flooding) encroach into the northern and eastern extents of the Solar PV Site. The River Brant adjoins the western extent of the Solar PV Site.

2.2.10 Key environmental constraints within and around the Solar PV Site and the Grid Connection Corridor are shown on Figure 2-1. There are various Public Rights of Way (PRoW) located within the local area and within the Site; these are shown on Figure 2-2.

2.2.11 Further detail on the baseline environmental constraints associated with the Site and the surrounding areas is provided in the technical topic **Chapters 6** to **16**.

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Figure 2-1: Environmental Constraints

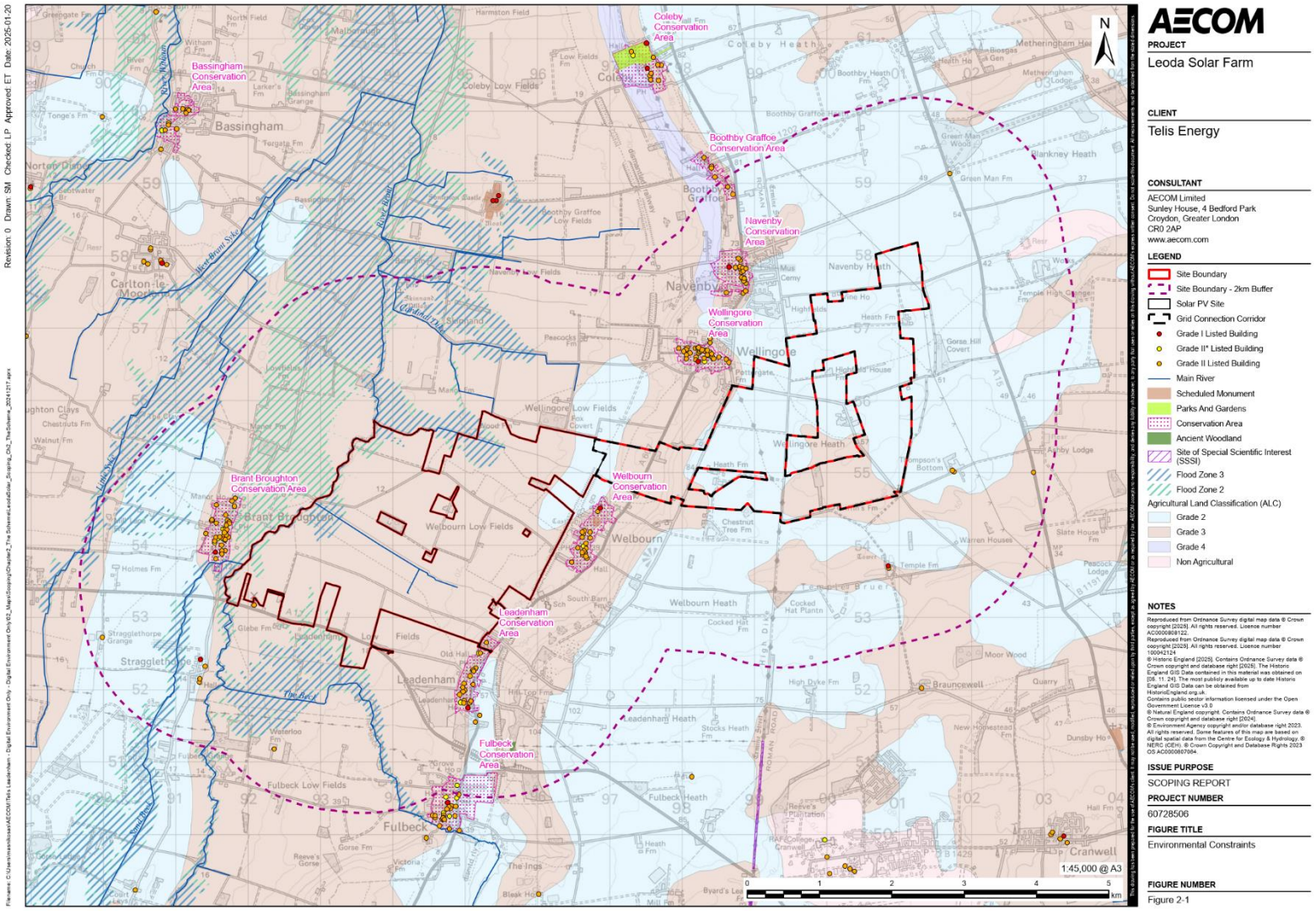
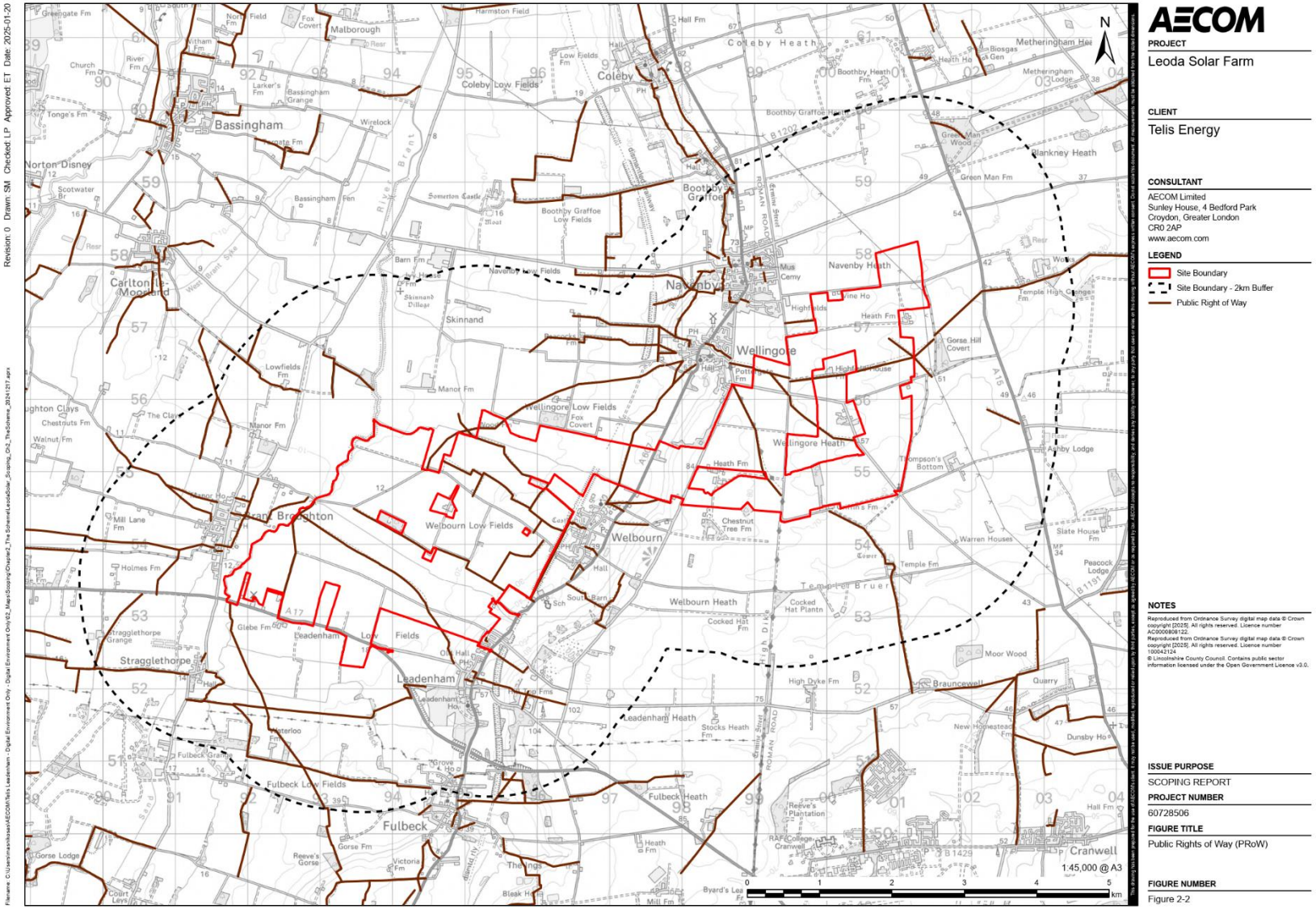


Figure 2-2: Public Rights of Way



2.3 Description of the Scheme

The Rochdale Envelope

2.3.1 The Planning Inspectorate's Advice Note 9: Using the 'Rochdale Envelope' ('Advice Note 9') (Ref 2-2) provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the Planning Act 2008 (Ref 2-3). The advice note acknowledges that there may be aspects of the Scheme design that are not yet fixed, and therefore, it may be necessary for the EIA to assess likely worst-case variations to ensure that all foreseeable significant environmental effects of the Scheme will be assessed.

2.3.2 The amount of flexibility required will depend upon the progress of the design at the stage that the detailed EIA work is undertaken. It is expected that the following aspects of the Scheme will still require design flexibility when the EIA is being carried out:

- The type of PV module mounting structure (panel orientation, fixed or tracker type);
- The arrangement of supporting infrastructure such as inverters, transformers and switchgear (decentralised or centralised options); and
- The inclusion and arrangement of battery energy storage systems (decentralised or centralised options).

2.3.3 It is necessary that there will be some flexibility built into the design of the Scheme when submitting the DCO application, in order that the detailed design of the Scheme can be informed by environmental and technical considerations, post-consent work and take advantage of innovation in technology. Where such flexibility or optionality is required, this is explained in the further paragraphs of Section 2.3.11 below.

2.3.4 It is therefore necessary for the technical assessments to assess an 'envelope' within which the works will take place. As such, the DCO application and EIA will be based on maximum and, if relevant, minimum parameters or limits of deviation. To remain in accordance with the EIA Regulations, it will be essential that the parameters are as 'limited' as possible to ensure that the 'likely significant effects' are identified, rather than unrealistically amplified effects, which could be deemed to be unlikely. These parameters will be considered in detail by technical authors in the ES to ensure the realistic worst-case effects of the Scheme are assessed for each potential receptor. This is of particular importance to maintain flexibility due to the rapid pace of change in solar PV and battery storage technology.

2.3.5 The key elements of Advice Note 9 in relation to the Scheme are set out below:

- The application should acknowledge the need for details of a project to evolve, within clearly defined parameters;

- The EIA should take account of the need for evolution within those parameters, and reflect the likely significance of such a flexible project in the ES;
- Within those defined parameters, the level of detail of the proposals must be such as to enable a proper assessment of the likely significant environmental effects and the identification of mitigation measures, if necessary considering a range of possibilities: *"the assessment may conclude that a particular effect may fall within a fairly wide range. In assessing the 'likely' effects, it is entirely consistent with the objectives of the Directive to adopt a 'worst case' approach. Such an approach will then feed through into the mitigation measures envisaged. It is important that these should be adequate to deal with the worst case, to optimise the effects of the development on the environment"*; and
- It is for the decision maker in granting consent, to impose conditions to ensure that the process of evolution keeps within the parameters applied for the assessed.

2.3.6 The advice outlined above has been followed during the EIA scoping process for this Scheme to identify and refine the scope of environmental topics.

Overview of Solar PV and Battery Storage Infrastructure

2.3.7 The principal infrastructure will be as follows:

- Solar photovoltaic (PV) modules;
- PV module mounting structures;
- Inverters (either string or central type);
- Transformers (Low Voltage (LV)/Medium Voltage (MV) and MV/High Voltage (HV))
- LV, MV and HV switchgear, protection, and control equipment
- Medium voltage (33 kilovolt, kV) substations distributed throughout the Solar PV Plots;
- Onsite underground cabling;
- Interconnecting underground cabling between the Solar PV Plots;
- One or more Battery Energy Storage System (BESS), expected to be formed of lithium-ion batteries storing electrical energy generated by the Scheme;
- Onsite 400/33 kV substation;
- 400 kV Grid Connection Corridor to connect Leoda Solar Farm Limited to National Grid's proposed Navenby Substation, including electrical engineering works to connect to Navenby Substation;

- Operations and maintenance hub with welfare facilities;
- Ancillary infrastructure works, including boundary treatments, security equipment, lighting, landscaping, access tracks, earthworks, surface water management, and any other associated works identified as necessary to enable the development;
- Highway works to facilitate vehicular access to the Site; and
- Landscaping, habitat management, biodiversity enhancement and amenity improvements.

2.3.8 During the construction phase, one or more temporary construction compound(s) will be required as well as temporary roadways to facilitate access to all land within the Solar PV Site as well as the Grid Connection Corridor. Further information on construction activities is provided in Section 2.4.

2.3.9 In areas around the PV arrays and on other land within the Solar PV Site, opportunities for landscaping, biodiversity enhancements and habitat management will be explored.

Solar PV Infrastructure

Solar PV Modules

2.3.10 Solar PV modules convert sunlight into electrical current (as direct current, DC). Individual panels are typically up to 2.4 m long and up to 1.3 m wide and typically consist of a series of photovoltaic cells beneath a layer of toughened glass. Other PV technologies are developing rapidly and may be available at the time of construction. The module frame is typically built from anodised aluminium.

2.3.11 PV panels can be monofacial and bifacial. Monofacial panels generate energy only from the top side facing the sun; this type is the most commonly installed in the UK. Bifacial panels appear very similar but are designed to also generate energy from the light reflected off the ground increasing the energy production compared to the monofacial type. The type of panels for the Scheme will be selected closer to the construction stage; however, this will not affect the maximum parameters that will be assessed in the EIA.

2.3.12 Each module could have a DC generating capacity of between 400 and 900 watts (W), or more depending on advances in technology at the time of construction (the current technology widely available is 750 W). The modules are fixed to a mounting structure in rows known as ‘strings’. Various factors will help to inform the number and arrangement of modules in each string, and it is likely some flexibility will be required to accommodate future technology developments, as referenced in paragraph 2.3.3.

Module Mounting Structures

2.3.13 There are various types of PV module mounting structures. While fixed south facing mounts are the most commonly seen on the solar PV facilities in the UK, the ongoing technological advances and economic considerations make other options increasingly more feasible. The type of the mounting structures to be used for the Scheme is currently being evaluated by the Applicant. The options considered at this scoping stage are:

- Fixed south facing; and
- Single axis tracker.

2.3.14 Each string of modules will be mounted on a steel metal rack, known as a frame. The frames are usually supported by galvanised steel poles typically driven 1 m or up to 3 m into the ground depending on local geology, with tracker systems typically requiring deeper depth of pile between 2 m and 4 m.

2.3.15 Each of the currently considered mounting options is described in the paragraphs below. The dimensions presented below are indicative at this stage as the final elevations of the racks will be influenced by various design factors such as local topography, flood risk, inter-row shading and maintenance considerations. Where relevant, technical topic **Chapters 6–16** consider which option would represent the reasonable worst-case scenario and the potential scoping implications associated with this option.

South Facing Fixed Tilt Option

2.3.16 The configuration where the modules are arranged in rows running from east to west facing to the south at a fixed tilt is commonly seen on existing UK solar farms (see Plate 2-1). The indicative fixed south facing system parameters (subject to detailed design) are as follows:

- Fixed tilt: 10 to 30 degrees from horizontal;
- Height: up to 3.5 m;
- Clearance above ground: 0.8 m (or more if flood modelling requires it); and
- Spacing between rows: from 2 m to 12 m.

Plate 2-1: South-facing fixed tilt modules, finished array

Single Axis East-West Tracker Option

2.3.17 A tracking system involves attaching the PV modules to a motorised table that can move in relation to the sun. This allows for optimal power generation throughout the day. The panels are stored horizontally overnight. There are different types of tracking systems and, if chosen, the Scheme would utilise a single-axis tracking system, which tilts the solar panel around a horizontal north-south axis thus tracking the sun's movement from east to west, as illustrated in Plate 2-2. It is noted that the images show a solar PV scheme in Australia and are indicative as the Scheme may use two panels in landscape orientation as opposed to the one in portrait, as shown. The indicative tracker system parameters (subject to detailed design) are as follows:

- Tracking tilt range: +/-60 degrees from horizontal;
- Height at maximum tilt: up to 3.5 m;
- Clearance above ground at maximum tilt: 1 m; and
- Spacing between rows: from 4 m to 8 m.

Plate 2-2: East-west single axis tracker system, finished array

Supporting Infrastructure: Inverters, Transformers and Switchgear

2.3.18 The supporting infrastructure comprises inverters, transformers, and switchgear.

2.3.19 Inverters are required to convert the DC electricity collected by the PV modules into alternating current (AC), which allows the electricity generated to be exported to the National Grid. Inverters are sized to deal with the level of voltage and current, which is output from the strings of PV modules.

2.3.20 Transformers are required to step up the voltage of the electricity generated across the Solar PV Site ready for transmission to the National Grid Substation.

2.3.21 Switchgears are the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear is used both to protect and isolate/de-energise equipment to allow work to be done and to clear faults downstream.

2.3.22 The Applicant is currently exploring the configuration of these supporting infrastructure which are described in paragraphs below. As the Scheme design develops, the configuration of the supporting infrastructure will be determined based upon environmental and technical factors. A reasonable worst case scenario will be assessed in the ES.

String Inverters Option

2.3.23 String inverters are small enough to be mounted underneath the PV modules, as shown on Plate 2-3. One single string inverter unit could be utilised, for example, for every 10 to 12 strings. String inverters output is low voltage (0.8 kV). In this option,

transformers would step up the voltage of the electricity generated across the Solar PV Site from low voltage (0.8 kV) produced by the PV panels to medium voltage (33 kV) to high voltage (400 kV)

Plate 2-3: Typical string inverter installed under PV modules

Central Inverters Option

2.3.24 Alternatively, central inverters may be used, and these could be sited at regular intervals amongst the PV modules. Centralised inverters are typically housed in containers with an approximate footprint of up to 14 m x 4 m and a height of up to 3.5 m. The precise number of central inverters is subject to detailed design studies; investigations are ongoing to determine this. Plate 2-4 shows a typical outdoor (standalone) central inverter. In this option, 1500V DC voltage is converted directly into 33kV AC by the inverter station, which includes both the inverter and transformer.

Plate 2-4: Typical central inverter

Transformers and Switchgear

2.3.25 For the string inverter option, low voltage electricity from the inverters is fed into of transformers and switchgear. Low voltage electricity passes through 33/0.8 kV transformers and exits through switchgear into 33 kV cables. For the central inverter option, low voltage (LV) DC (max. 1500V DC) electricity from PV String Combiner Boxes (SCBs) will be fed into the inverter transformer station, where central inverters will convert the DC power into AC. The output LV AC power will then be fed to the transformer to step up the power to 33kV and exit through switchgear into 33kV cables.

2.3.26 Transformers and switchgear are typically packaged in containers with an approximate footprint of up to 14 m x 4 m and a height of up to 3.5 m, as illustrated on Plate 2-5. They will normally be mounted on concrete foundations, although other types of foundations may be used depending on the local geology.

2.3.27 Multiple transformers and switchgear will be distributed throughout the Solar PV Site. The exact number of transformers and switchgear is subject to detailed design studies; investigations are ongoing to determine this.

Plate 2-5: Example encloser containing the transformer and switchgear

2.3.28 Transformers and switchgear may also be standalone units, without an enclosure. Standalone transformers will have a footprint of up to 7 x 4 m and with a height of up to 3.5 m. Transformer cabins are typically externally finished in keeping with the prevailing surrounding environment, often with a green painted finish. Standalone switchgears will be housed in a cabin of up to 2.5 m by 6.5 m in plan and up to 3.5 m in height.

Battery Energy Storage Facility

2.3.29 The Scheme will include an associated BESS. The BESS is designed to provide peak generation and grid balancing services to the electricity grid. It will do this primarily by allowing excess electricity generated from the solar PV panels to be stored in batteries and dispatched at strategic times of the day.

2.3.30 There are a few different designs for the BESS that will be explored as part of the iterative design process. Maximum parameters for the compound layouts will be defined in the DCO application in order to present and assess a worst case in the ES.

2.3.31 Batteries will either be in individual enclosures or housed within a larger building or buildings. The precise number of individual battery storage enclosures will depend upon the level of power capacity and duration of energy storage that the Scheme will require; investigations are ongoing to determine this. There needs to be an element of flexibility in this aspect as both the technology and business models are evolving, as is relevant policy such as the provisions on the role of storage in NPS EN-1 (Ref 2-4).

2.3.32 The location of the BESS, transformers, and dedicated switchgear will be determined in part by whether the BESS is AC-coupled or DC-coupled. If the system

is AC-coupled they will be located together in one or more 'centralised' areas, which can be installed, operated, and maintained easily. If the systems are DC-coupled they will be spread around the Solar PV Site and located alongside the centralised inverters.

2.3.33 Each battery energy storage system will likely require a heating, ventilation and cooling (HVAC) system to ensure the efficiency of the batteries, which are integrated into the containers. This may involve a HVAC system that is external to the containerised unit located either on the top of the unit or attached to the side of the unit. If this uses air to heat and cool it will have a fan built into it that is powered by auxiliary power.

2.3.34 The Switchgear/Control Room operates, isolates and controls the exported power from the energy storage system. This would comprise a building of similar dimensions to the containers; either an adapted container or built from glass reinforced plastic (GRP), located within the main battery energy storage system compound.

2.3.35 As the Scheme design develops, the likely configuration of equipment will be determined based upon environmental and technical factors. A reasonable worst-case scenario will be clearly set out and assessed by each of the technical disciplines of the ES.

Onsite and Offsite Cabling

2.3.36 Low and medium voltage onsite electrical cabling is required to connect the PV modules and battery energy storage system(s) to inverters and the inverters to the transformers onsite (typically via 0.6/1 kV cables). The dimension of the trenches will vary depending on the number of cables or ducts they contain but would typically be up to 0.8 m in width and 0.6 m to 0.8 m in depth.

2.3.37 Cabling between PV modules and the inverters will typically be required to be above ground level (along a row of racks), fixed to the mounting structure, and then underground if required (between racks and in the inverter's input). All other on-site cabling will be underground.

2.3.38 Medium voltage cables (normally 33 kV) are then required between the transformers/switchgears and the 400/33 kV substations. These cables will start within, and extend between, the Solar PV Plots connecting them to the 400/33 kV substation as required. These cables will be buried underground. The dimension of the trenches will vary depending on the number of cables or ducts they contain but could be typically up to 1.2 m in width and up to 1.2 m in depth.

2.3.39 Data cables (typically fibre optic) will also be installed, typically alongside electrical cables in order to allow for the monitoring during operation, such as the collection of solar data from pyranometers.

Plate 2-6: Example underground cable installation

Grid Connection Substation

2.3.40 A single 400 kV/33 kV substation will receive the electricity from the 33 kV field substations and step up the voltage to 400 kV ready to be exported to the National Grid Substation via 400 kV cable.

2.3.41 A typical 400 kV/33 kV substation is approximately 50 m by 25 m in plan with equipment 6 m high, securely fenced with a separate control building measuring 4 m by 4 m in plan and 4 m high.

Electricity Export Connection to National Grid

2.3.42 The electricity generated by the Scheme is expected to be imported and exported via interface cables from the on-site sub-station. Planning for the design of the Scheme is ongoing, and potential options for connecting to National Grid are being investigated through the design process. The Applicant is currently investigating the connection from the Scheme to the Navenby Point of Connection (POC).

2.3.43 The Grid Connection Corridor would be directed along highway verges and field margins/boundaries where possible. The Grid Connection Corridor will require crossings over roads, land drains, and potential utilities/statutory undertaker assets.

2.3.44 To connect the Solar PV Site to the Navenby POC, cable circuits would be installed. Each circuit may comprise up to three cables. An earth cable and a fibre optic cable may also be laid alongside the 400 kV cables. Underground cables would be buried below ground at approximately 1.2 m depth and are typically installed using an open trench method requiring 20–40 m working corridor, with trench widths approximately

2 m wide and 2 m deep. At certain locations, such as road crossings, trenchless methods of cable installation may be required. Trenchless methods include horizontal directional drilling (HDD), micro-tunnelling and boring. The total length of the cable run within the Grid Connection Corridor is approximately 7.5 km (approximate distance between the Solar PV Site and the Navenby POC based upon the current longest routing option being considered).

2.3.45 Where the Grid Connection Corridor encounters obstacles such as tree root systems, the width of the cable route (both permanent and temporary) may change locally. Where the Grid Connection Corridor crosses other infrastructure and natural features, the cables will need to be installed deeper, with occasional use of HDD techniques or other similar trenchless techniques to cross these obstacles when open trenching is not practical.

2.3.46 It is likely that jointing pits will be required every 800m to 1,000m to join sections of cable together. The dimensions of these are determined by how many circuits will be in the jointing pit. A link box pit of around 2m in length x 2m in width would also be required. The distance between jointing pits will be determined through the design process and is dependent on existing infrastructure along the Grid Connection Corridor, the cable specification and cable delivery limitations.

2.3.47 The Grid Connection Corridor is subject to an iterative design process. A range of constraints will determine the final optimal cable routing with several options being explored currently. These include physical, ecological, cultural heritage and human interactions, technical engineering, legal and commercial considerations.

Operations and Maintenance Hub

2.3.48 The Scheme will require spare parts for operation and maintenance over time. Storage for spare solar PV modules, trackers, inverters, transformer, switchyard, BESS, closed circuit television (CCTV) and metrological stations spare parts, as well as extra spare cable reels, will require an area equivalent to 32 of 40 feet high cube ISO containers on-site: around 12m in length x 2.5m in width x 3m in height or equivalent shaded open storage area using a 3.2m high shade.

Fencing and Security

2.3.49 A security fence will enclose the operational areas of the Solar PV Site. PRoWs that cross the Solar PV Site will be preserved with the fence installed either side of them. The fence is likely to be a ‘stock deer fence’ or other mesh security fencing, approximately 2.5 to 3 m in height.

2.3.50 Pole mounted internal facing CCTV systems are also likely to be deployed around the perimeter of the operational areas of the Solar PV Site. It is anticipated that these would be up to 5 m high. CCTV cameras would have fixed, inward-facing viewsheds and will be aligned to capture only the Scheme fence and the area inside the fence.

Plate 2-7: Metal CCTV pole and ‘deer fence’

Access Tracks

2.3.51 Access tracks will be constructed across the Solar PV Site. These would typically be 3.5 to 5 m wide compacted stone tracks with 1:2 gradient slopes on either side (where required). An example access track within a solar PV facility is shown on Plate 2-8.

Plate 2-8: Typical crushed stone access track laid on hardcore and geotextile

Surface Water Drainage

2.3.52 The detailed operational drainage design will be carried out pre-construction with the objective of ensuring that drainage of the land to the present level is maintained. It will follow either the design of a new drainage system taking into account the proposed new infrastructure (access tracks, cable trenches, structure foundations) to be constructed, or, if during the construction of any of the infrastructure, there is any interruption to existing schemes of land drainage, then new sections of drainage will be constructed.

2.3.53 The design of new drainage systems will be based on the Flood Risk Assessment (FRA) and hydrological assessment to be undertaken. Infiltration drainage design will be in accordance with Building Research Establishment (BRE) Digest 365: Soakaway Design and Sewers for Adoption (Ref 2-4) and infrastructure will be placed at least 10 m away from watercourses.

Biodiversity and Landscaping

2.3.54 The Scheme will involve field boundary enhancement and planting of seed mixes within the solar PV area. Planting and habitat management will also be used to provide screening (see Plate 2-10 as an example). The enhancements and planting would increase biodiversity throughout the landscape and contribute to the Scheme achieving Biodiversity Net Gain (BNG) in line with the requirements of the Environment Act 2021 (Ref 2-6), the National Planning Policy Framework and local planning policy. There is also a statutory requirement for BNG to apply to NSIPs, which will come into force by November 2025. The Scheme design will achieve BNG

levels greater than the minimum 10% required by the Environment Act 2021 (Ref 2-6).

Plate 2-9: Landscaping within and adjoining solar PV facility

2.4 Construction Programme and Activities

Construction Programme

2.4.1 Subject to the DCO being granted and the Navenby Substation receiving approval to be built by National Grid, the earliest construction would start is anticipated to be in 2028. Construction will require an estimated 24 - 36 months, with operation therefore anticipated to commence in 2030. It is anticipated that the Scheme will be constructed over a continuous period rather than being phased, in a sequential manner with construction teams responsible for specific type of works moving from one Solar PV Plot to the next.

2.4.2 The ES will provide further details of the construction activities, their anticipated duration and indicative programme of each phase of construction work. A reasonable worst-case scenario for the construction programme will be assessed and presented in the ES.

Indicative Construction Activities

2.4.3 The types of construction activities that are likely to be required include (not necessarily in order):

Site preparation to include:

- Import of construction materials, plant and equipment to site;
- The establishment of construction compound(s);
- Upgrading of existing site tracks/access roads and construction of new tracks;
- The upgrade or construction of crossing points (bridges/culverts) over drainage ditches;
- Clearing of vegetation;
- Pre-construction surveys and investigations;
- Establishment of Site fencing; and
- Marking out the location of the infrastructure.

Solar PV facility construction to include:

- Import of components to site;
- Erection of module mounting structures;
- Mounting of modules;
- Installation of electric cabling;
- Installation of transformer cabins;
- Installation of battery storage units; and
- Construction of a substation compound.

Cable installation to include:

- The establishment of mobilisation areas and running tracks;
- Temporary construction compounds (to be located on or near cable route, which are yet to be determined);
- Stripping of topsoil in sections;
- Trenching in sections;
- Appropriate storage and capping of soil;
- Appropriate construction drainage with pumping where necessary;
- Sectionalised approach of duct installation;
- Excavation and installation of jointing pits;
- Cable joint installation;
- Cable pulling;

- Implementation of crossing methodologies for any watercourses, infrastructure (including roads), and sensitive habitats (e.g. HDD, cable bridging, etc.);
- Testing and commissioning; and
- Site reinstatement and habitat creation.

2.4.4 Temporary construction compounds typically comprising lighting, CCTV, fencing, various cabins/welfare facilities, parking for staff and delivery vehicles, laydown and materials storage areas, temporary utilities (water, power, etc.) supplies, temporary drainage, and hardstandings will be located within the Site boundary.

2.4.5 The ES will provide further details of the proposed construction activities, their anticipated duration, along with an indicative programme of each phase of the works.

Construction Staff

2.4.6 Based on experience of other similar sized solar projects, it is currently estimated that up to 400 staff per day will be required to work on the Scheme during the peak construction period, which is likely to include construction of the substation, export cable, and grid connection. This is expected to be a worst case based on the most rapid build out programme, and there will be noticeably fewer workers outside peak activities.

Construction Traffic and Site Access

2.4.7 Based on the preliminary construction material and equipment requirements, it is anticipated that there could be up to a 120 heavy goods vehicle (HGV) movements per day during the peak construction period, based on a “regular” construction programme (i.e. not accelerated relative to a typical programme). This number is indicative, excludes construction staff transportation and ancillary construction traffic, and is subject to refinement. A reasonable worst-case scenario will be assessed in the ES.

2.4.8 Construction Site access is yet to be determined. Access is likely to be taken from the A17, with both the use of local roads and / or an internal haulage road being given consideration. Where possible, existing field accesses will be utilised to minimise the need for vegetation removal. All construction access will be confirmed as the Scheme design progresses and in consultation with the relevant authorities.

2.4.9 It is anticipated that the existing local roads will be utilised, subject to suitability of these roads to carry HGVs. Many of the roads around the Solar PV Site are currently accessible to farm machinery and agriculture-related HGVs. The need for road upgrades, widening and new road construction, for example for abnormal loads or to ensure visibility splays at site access/egress points, will be determined as the Scheme design develops, and will be assessed as appropriate.

2.4.10 All construction and decommissioning access will be confirmed as the Scheme design progresses and in consultation with the County Highways Authorities and National Highways, as appropriate.

2.4.11 A Framework Construction Traffic Management Plan (CTMP) will be developed and submitted with the application.

Construction Environmental Management

2.4.12 A Framework Construction Environmental Management Plan (CEMP) will accompany the DCO application, which will describe the framework of mitigation measures identified in the ES to be followed and to be carried forward to a detailed CEMP prior to construction. The aim of the CEMP is to reduce nuisance impacts and promote best practice such as those listed below:

- Use of land for temporary laydown areas, accommodation, etc.;
- Construction traffic (including parking and access requirements) and changes to access and temporary road or footpath closure (if required);
- Noise and vibration;
- Utilities diversion;
- Dust generation;
- Ecological mitigation;
- Soil removal; and
- Waste generation.

2.4.13 The detailed CEMP will be produced by the appointed construction contractor and agreed with the Local Planning Authorities following grant of the DCO and prior to the start of construction (for example, as part of a requirement attached to the DCO) and will identify the procedures to be adhered to and managed by the Principal Contractor throughout construction.

2.4.14 Contracts with companies involved in the construction works will incorporate environmental control, health and safety regulations, and current guidance and will ensure that construction activities are sustainable and that all contractors involved with the construction stages are committed to agreed best practice and meet all relevant environmental legislation including: Control of Pollution Act 1974 (COPA) (Ref 2-7), Environment Act 1995 (Ref 2-8), Hazardous Waste Regulations 2005 (as amended) (Ref 2-9) and the Waste (England and Wales) Regulations 2011 (Ref 2-10).

2.4.15 Records will be kept and updated regularly, ensuring that all waste transferred or disposed of has been correctly processed with evidence of signed Waste Transfer Notes (WTNs) that will be kept on-site for inspection whenever requested.

Furthermore, all construction works will adhere to the Construction (Design and Management) Regulations 2015 (CDM) (Ref 2-11).

Site Reinstatement and Habitat Creation

2.4.16 Following construction, a programme of site reinstatement and habitat creation will commence. A Framework Landscape and Ecological Management Plan (LEMP) will be submitted as part of the DCO application, and this document will set out the principles for how the land will be managed throughout the operational phase, following the completion of construction. The Framework LEMP will specify mitigation and enhancement measures that would support the BNG. A detailed Biodiversity and Landscape Management Plan will be produced following grant of the DCO and prior to the start of construction (for example, as part of a requirement attached to the DCO).

2.5 Operational and Maintenance Activities

2.5.1 During the operational phase, activity on the Solar PV Site will be minimal and would be restricted principally to vegetation management, equipment maintenance and servicing, replacement of any components that fail, periodic fence inspection, and monitoring to ensure the continued effective operation of the Scheme. The potential for the Site to be used for sheep grazing is also being explored by the Applicant.

2.5.2 Operational Site access will be determined as the Scheme design progresses and in consultation with the relevant authorities.

2.5.3 It is anticipated that there will be one to three permanent staff on-site at any one time during the operational phase. In addition, there will be up to 10 to 20 visitors per week (equating to two to four visitors per day) for deliveries and servicing of equipment.

2.5.4 A Framework Operation Environmental Management Plan (OEMP) will accompany the DCO application, which will describe the framework of operational mitigation measures as identified in the ES to be followed, and carried forward to a detailed OEMP prior to operation.

2.6 Decommissioning

2.6.1 The DCO application will give a definite lifetime for the Scheme, which may, for example, be 40 or 60 years, after which the project would be decommissioned. It is expected that throughout this period faulty or damaged PV modules and other components will require replacement as part of the normal maintenance. The equipment will be reviewed at the end of the design life of the Scheme to determine whether it remains in a viable condition to continue operation after that time.

2.6.2 When the operational phase ends, the Solar PV Site will require decommissioning. All PV modules, mounting poles, cabling, inverters, transformers and switchgear would be removed from the Solar PV Site and recycled or disposed of in accordance

with good practice and market conditions at that time. The Solar PV Site will be returned to its original use after decommissioning. The future of the substation and associated control buildings would be agreed with the Local Planning Authorities and National Grid Electricity Transmission (NGET) prior to commencement of decommissioning.

2.6.3 The mode of cable decommissioning for the Grid Connection Corridor and interconnecting cables will be dependent upon government policy and best practice at that time. Leaving the cables in situ avoids disturbance to overlying land and habitats and to neighbouring communities. Alternatively, the cables can be removed by opening up the ground at regular intervals and pulling the cable through to the extraction point, avoiding the need to open up the entire length of the cable route. The impact assessment will be based on the worst case parameters for each technical topic.

2.6.4 A Framework Decommissioning Environmental Management Plan (Framework DEMP) will be prepared and will set out the general principles to be followed in the decommissioning of the Scheme. A detailed DEMP be prepared and agreed with the relevant authorities at that time of decommissioning, in advance of the commencement of decommissioning works, and would include timescales and transportation methods.

2.6.5 Decommissioning is expected to take between 12 and 24 months and could be undertaken in phases.

2.6.6 The effects of decommissioning are usually similar to, or of a lesser magnitude than, construction effects and will be considered in the relevant sections of the ES. The specific method of decommissioning the Scheme at the end of its operational life is uncertain at present as the engineering approaches to decommissioning will evolve over the operational life of the Scheme. Assumptions will therefore be made where appropriate.

2.6.7 Decommissioning would be undertaken safely and with regard to the environmental legislation at the time of decommissioning, including relevant waste legislation.

3 Alternatives Considered

3.1.1 Schedule 4, paragraph 2 of the EIA Regulations (Ref 3-1) requires that the ES must outline the reasonable alternatives considered by the developer as part of the EIA process. These alternatives may include considerations such as development design, technology, location, size and scale, along with the environmental and social impacts associated with these. The ES must also contain an indication of the main reasons for selecting the chosen option.

3.1.2 For the Scheme, the alternatives analysis is likely to focus on different Scheme layouts, sizing, technologies and design parameters.

3.1.3 A 'no development' alternative would not deliver the additional electricity generation capacity and other benefits associated with the Scheme which include, but are not limited to, a positive climate impact (through exceedance of exceeds net zero requirements) and landscape and habitat enhancement including a net BNG. The 'no-development' scenario is therefore not considered a reasonable alternative and therefore will not be discussed as a 'considered alternative' within the ES. This does not preclude the use of the 'no-development' also referred to as a 'do nothing' scenario in certain technical chapters of the ES where this is required to present future baseline conditions in relation to the impact assessment.

3.1.4 The ES will include a description of the alternatives relevant to the Scheme that have been considered, including their specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects as relevant. This will include alternative Site layouts (Solar PV Site and Grid Connection Corridor), which will be considered during the design process. A full appraisal of the options considered will be presented as part of the ES, discussing the rationale for the final site layout and design selection, as well as explaining the flexibility sought within the consent in this regard.

3.1.5 At this stage in the process, the design of the Solar PV Site or Grid Connection Corridor has not been fully developed or decided. Full details regarding the design process will be included with the ES, including the criteria for selecting the preferred option.

3.1.6 Further refinement will be undertaken as the Scheme design progresses to determine the DCO application boundaries and layout for the Site submitted with the DCO application.

4 Consultation

4.1 Context

4.1.1 Effective stakeholder engagement and consultation is intrinsic to the Planning Act 2008 (Ref 4-1) and fundamental to the success of the Scheme.

4.1.2 The process of consultation is critical to the development of a comprehensive and balanced ES. The views of statutory and non-statutory consultees serve to focus the environmental studies and to identify specific issues that require further investigation. Consultation is an ongoing process, which enables mitigation measures to be incorporated into the project design thereby limiting adverse effects and enhancing environmental benefits.

4.1.3 The Scheme has a wide range of stakeholders (including landowners, statutory consultees, local communities and specialist interest groups) with differing interests that will require varied levels of consultation. Specific communication activities therefore need to be focussed to meet the needs of particular individuals and groups. This requires an understanding of the stakeholders and their interests in the Scheme.

4.1.4 Stakeholder engagement for the Scheme is based on the following principles:

- Early and ongoing engagement to inform and influence the design process;
- Seeking feedback in the iterative design process and taking this feedback into consideration;
- Building of long-term relationships with key stakeholders throughout the different stages of the Scheme to help better understand their views;
- Where possible and practicable ensuring concerns are addressed; and
- Ensuring appropriate statutory consultation is undertaken in compliance with requirements of the Planning Act 2008 (Ref 4-1), EIA Regulations (Ref 4-2) and associated guidance.

4.2 DCO Consultation Requirements

4.2.1 The DCO process has several statutory requirements regarding consultation. These requirements stipulate that certain stakeholder groups and the community must be consulted as part of the pre-application process, as set out in Sections 42, 47 and 48 of the Planning Act 2008 (Ref 4-1) and Regulation 13 of the EIA Regulations (Ref 4-2). Further requirements set out how the Scheme must be publicised, and specific documents produced, including a Statement of Community Consultation (SoCC), Preliminary Environmental Information (PEI) Report and a Consultation Report.

4.2.2 In accordance with Sections 42, 47 and 48 of the Planning Act 2008 (Ref 4-1) the Applicant will be holding a statutory consultation part way through the undertaking of the EIA to inform the community of the Scheme and seek their feedback. Feedback will be recorded and documented in a Consultation Report. There will also be a non-statutory consultation in advance of the statutory consultation. Feedback from both the non-statutory consultation and the EIA process will feed into the statutory consultation.

4.3 Regulatory Engagement to Date

4.3.1 A number of meetings with statutory consultees have already taken place to provide an introduction to the proposals, including:

- North Kesteven District Council; and
- Lincolnshire County Council.

4.3.2 The Applicant has also spoken directly with Members from each of the Local Planning Authorities as a means of introducing the Scheme to them. Regular meetings will be set up with the Local Planning Authorities and other key stakeholders, such as Statutory Environmental Bodies, as the Scheme progresses.

4.4 Scoping Consultation

4.4.1 The Planning Inspectorate (on behalf of the SoS) will consult on this EIA Scoping Report under the EIA Regulations (Ref 4-2). Views from consultees will be considered and used to inform the EIA Scoping Opinion to be issued by the Planning Inspectorate (on behalf of the SoS).

4.4.2 Under Regulation 10(6) of the EIA Regulations (Ref 4-2), the SoS must undertake consultation with statutory consultation bodies, including environmental bodies (such as Natural England, the Environment Agency and Historic England) and relevant planning authorities (LCC, NKDC) before adopting an EIA Scoping Opinion.

4.5 Non-Statutory Consultation

4.5.1 A non-statutory consultation period, including public exhibitions and webinars, will be undertaken in advance of statutory consultation, commencing in January 2025, to introduce stakeholders to the Scheme and give them an opportunity to share their views.

4.6 Statutory Consultation

4.6.1 In accordance with Section 47(1) of the Planning Act 2008 (Ref 4-1) for an NSIP, the Applicant will prepare a SoCC. The Applicant is required to consult the Local Planning Authorities identified pursuant to Section 43(1) of the Planning Act 2008 on the draft SoCC and they will have a period of at least 28 days following receipt

of the request to comment on a draft SoCC prior to its publication for inspection by the public.

4.6.2 In preparing the SoCC, regard will be had to responses received in relation to consultation under Section 47(2) of the Planning Act 2008. The SoCC will then be published and the consultation carried out. The SoCC will outline how the Applicant intends to consult with the local community about the Scheme, including, in accordance with Regulation 12 of the EIA Regulations (Ref 4-2), how the Applicant intends to publicise and consult on the PEI Report.

4.6.3 The format of statutory consultation has not yet been finalised but there are key objectives that will be sought:

- Build on ongoing relationships with communities and stakeholders (established during the non-statutory consultation);
- Formally consult with communities and stakeholders (including statutory consultees) on proposals for the Scheme;
- Update politicians and elected representatives and formally engage with Local Planning Authorities during the SoCC process; and
- Seek views on the preliminary design of the Scheme from consultees.

4.6.4 Methods of engagement associated with statutory consultation will include:

- Preview briefings for MPs, elected members and media;
- A second newsletter to all properties within an agreed radius of the Solar PV Site and Grid Connection Corridor to provide an update on the process and invite people to take part in the statutory consultation;
- Dedicated project website containing updated Scheme proposals, full suite of consultation materials, including details of online and in-person community events, digital feedback form and community relations contact centre;
- Online feedback form (paper copies available on request) seeking views from consultees on the more developed proposals for the Scheme;
- Online community engagement events;
- Face-to-face community engagement events;
- Media engagement with local and regional news outlets; and
- Targeted social media advertising.

4.6.5 During the statutory consultation, consultation will also be undertaken with prescribed consultation bodies as well as affected landowners, in accordance with Sections 42 and 48 of the Planning Act 2008 and Regulation 13 of the EIA Regulations.

4.6.6 Section 42 requires the Applicant to consult with 'prescribed persons', which includes certain consultation bodies such as relevant Local Planning Authorities, Statutory Environmental Bodies, relevant statutory undertakers, those with an interest in the land, as well as those who may be affected by the Scheme.

4.6.7 Section 48 places a duty on the Applicant to publicise the proposed application in the 'prescribed manner' in a national newspaper, The London Gazette and local newspapers circulating within the vicinity of the land.

4.6.8 All responses received during consultation will be carefully considered and regard had to them in the development of the Scheme in accordance with Section 49 of the Planning Act 2008. Details of any responses received during consultation and the account taken of those responses will be included in a Consultation Report.

4.6.9 This Consultation Report will be submitted with the DCO application to the SoS and, if the DCO application is accepted, will be available for public review. The Consultation Report will demonstrate how the Applicant has complied with the consultation requirements of the Planning Act 2008 and EIA Regulations and will be considered by the SoS when determining whether to accept the DCO application.

5 Environmental Impact Assessment Methodology

5.1 Introduction

5.1.1 The ES will be based on several related activities, as follows:

- Establishing existing baseline conditions;
- Consultation with statutory and non-statutory consultees throughout the DCO pre-application process;
- Consideration of relevant local, regional and national planning policies, guidelines and legislation relevant to EIA;
- Consideration of technical standards for the development of significance criteria;
- Review of secondary information, previous environmental studies and publicly available information and databases;
- Desk-top studies;
- Physical surveys and monitoring;
- Computer modelling (where required); and
- Expert opinion.

5.1.2 The ES will set out the process followed during the EIA including the methods used for the collection of data and for the identification and assessment of impacts. Any assumptions made will be clearly identified.

5.1.3 The EIA process is designed to be capable of, and sensitive to, changes that occur as a result of design development, including any mitigation measures that are incorporated during the EIA. This will be particularly important for this EIA as the design and layout of the Scheme is still being refined, and the design is likely to evolve further following submission of this EIA Scoping Report. It is not, however, anticipated that the Scheme that is the subject of the EIA and DCO application will be materially different from the Scheme that is the subject of this EIA Scoping Report, as its location, scale, design and use of technology, etc., will all be within the parameters set out in **Chapter 2: The Scheme**, of this EIA Scoping Report.

5.1.4 Impacts will be considered on the basis of their magnitude, duration, and reversibility. Cumulative and combined effects will also be considered where appropriate. Significance will be evaluated on the basis of the scale of the impact and the importance or sensitivity of the receptors, in accordance with standard

assessment methodologies. More information on the assessment methodology is provided in Section 5.6.

5.1.5 Where potentially significant adverse environmental effects are identified in the assessment process, measures to mitigate these effects will be put forward in the form of recommendations to be undertaken as part of the project development as far as practicable.

5.2 Determining the Baseline Conditions

5.2.1 In order to predict the potential environmental effects of the Scheme, it will be necessary to determine the environmental conditions that currently exist within the Site boundary and surrounding area, in the absence of the Scheme. These are known as 'baseline conditions'.

5.2.2 Detailed, environmental baseline information will be collected and the methodology for the collection process will be detailed within the ES. The baseline information will be gathered from various sources, including:

- Online/digital resources;
- Data searches, for example GroundSure, EnviroCheck, Historic Environment Record, Lincolnshire Environmental Records Centre;
- Baseline site surveys; and
- Environmental information submitted in support of other planning applications for developments in the vicinity of the Scheme.

5.2.3 Consideration will also be given to how the baseline conditions would evolve in the absence of the Scheme, known as the 'future baseline'. As described in **Chapter 3: Alternatives Considered**, this involves the consideration of the 'no development' or 'do nothing' scenario and, where required, allows impact assessments to consider and compare the scale of environmental changes, such as noise levels, with and without the Scheme in place at both the construction and operational phase.

5.3 Mitigation

5.3.1 Regulation 14, Part (2 c) of the EIA Regulations (Ref 5-1) requires the ES to provide 'a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment'. These are commonly referred to as mitigation measures.

5.3.2 The Scheme will adopt a standard hierarchical approach to identifying mitigation requirements:

- Avoid or Prevent: In the first instance, mitigation should seek to avoid or prevent the adverse effect at source, for example by routeing the Grid Connection Corridor or siting PV panels away from a sensitive receptor;
- Reduce: If the effect is unavoidable, mitigation measures should be implemented which seek to reduce the scale/significance of the effect, for example the use of a noise barriers to reduce construction noise at nearby noise sensitive receptors; and
- Offset: If the effect can neither be avoided nor reduced, mitigation should seek to offset the effect through the implementation of compensatory mitigation, for example habitat creation to replace any habitat losses.

5.3.3 Mitigation measures fall into two categories: 'embedded mitigation measures' are built into the design of the Scheme; and 'additional mitigation measures' which are in addition to project design commitments.

5.3.4 Mitigation measures to be committed to as part of the DCO application will be set out in a 'Commitments Register' at both the scoping and ES stage, in accordance with the NSIP guidance (Ref 5-2). The Commitments Register can be found at Appendix E Environmental Mitigation and Commitments Register.

Embedded Mitigation Measures

5.3.5 The Scheme will be developed through an iterative EIA and design process which involves seeking to avoid or reduce and, if possible, offset potential significant adverse environmental effects. Where possible, these measures will be incorporated into the form or design of the Scheme, for example through the appropriate routeing and siting of infrastructure.

5.3.6 Once these measures are incorporated into the design, they are termed 'embedded measures'. Embedded measures relevant to the construction phase will be described within each technical ES chapter. For the operational phase, such embedded measures will be represented primarily in the design. Embedded measures are therefore either incorporated into the design from the outset or identified through the assessment process.

5.3.7 The ES will also incorporate industry standard control measures, which are common practice on construction sites, into the embedded measures. These will be described in each technical chapter and included in a Framework Construction Environmental Management Plan (CEMP), Framework Operational Environmental Management Plan (OEMP) and Framework Decommissioning environmental Management Plan (DEMP) as relevant, which will be prepared as part of the DCO submission. These Plans will provide a framework within which the appointed Contractor(s) (including any sub-contractors or suppliers involved in the works) and operational managers will plan, implement and deliver environmental management, mitigation and monitoring requirements during the construction, operation and decommissioning phases of the Scheme. The Framework CEMP, OEMP and DEMP will be developed into detailed Plans by the appointed Contractor/manager prior to the start of the relevant phase of works to which the Plans apply. It is intended that

the detailed Plans will be 'live' documents and will be updated as and when there are changes to the project team or should additional information become available.

Additional Mitigation Measures

5.3.8 The ES assesses effects with embedded measures in place. Where significant adverse effects are identified after considering these embedded measures, 'additional mitigation measures' are proposed to further avoid or reduce the identified adverse environmental effects. These additional measures are presented within each of the technical chapters, where required, and may include measures beyond industry standard controls such as bespoke/ site specific measures like temporary fencing to prevent glint and glare until the vegetation planting has properly established. These measures will also be discussed within the relevant framework environmental management plan(s).

5.4 Timescales and Assessment Years

Construction Phase Effects

5.4.1 For the construction assessment, these effects will be taken to be those for which the source of environmental effect begins and ends during the construction stage, and the effects do not endure beyond the completion of the construction phase. This covers sources of effects such as construction traffic, noise and vibration from construction activities, dust generation, site runoff, mud on roads, risk of fuel/oil spillage, and the visual intrusion of plant and machinery on-site. Some aspects of construction related effects will last for longer than others, for example impacts related to the establishment of construction compounds are likely to be relatively short in duration in respect of the whole construction period, whereas the construction of energy infrastructure and landscaping activities are likely to persist throughout the entire construction period. By their nature, most construction impacts will be temporary and reversible.

Operational Phase Effects

5.4.2 For the assessment, these are the effects that, although they may start during construction, are either permanent, endure for a substantial period beyond construction, or represent an extended cumulative effect of construction or decommissioning activity. This includes the effects of the physical presence of the energy infrastructure, and its operation, use and maintenance. Timescales associated with these enduring effects are as follows (unless otherwise specified within a technical chapter):

- Short term — endures for up to 12 months after construction or decommissioning;
- Medium term — endures for 1 to 5 years;
- Long term — endures for more than 5 years;

- Reversible long-term effects — long-term effects, which endure throughout the lifetime of the Scheme but which cease once the Scheme has been decommissioned (operational effects will all fall into this category); and

- Permanent effects — effects which cannot be reversed following decommissioning (e.g., where buried archaeology is permanently removed during construction).

5.4.3 Environmental management and mitigation measures for the operational phase of the Scheme will be planned, implemented and delivered through an OEMP to be prepared following grant of the DCO and secured through a requirement in the DCO. A Framework OEMP will be prepared as part of the DCO submission.

Decommissioning Phase Effects

5.4.4 For the assessment, these effects will be taken to be those for which the source begins and ends during the decommissioning stage, and the effects do not endure beyond the completion of the decommissioning phase. This covers sources of effects such as traffic, noise and vibration from decommissioning activities, dust generation, site runoff, mud on roads, risk of fuel/oil spillage, and the visual intrusion of plant and machinery on-site, for example. As with construction phase effects, some aspects of decommissioning will endure for longer than others.

5.4.5 Environmental management and mitigation measures for the decommissioning phase of the Scheme will be planned, implemented and delivered through a DEMP to be prepared following grant of the DCO and secured through a requirement in the DCO. A Framework DEMP will be prepared as part of the DCO submission.

Assessment Years

5.4.6 In order to ensure the EIA is robust in considering the likely significant effects of the Scheme, appropriate assessment scenarios and years have been identified and are discussed below.

5.4.7 The peak construction year for the purpose of the EIA is anticipated to be during 2028. This is based on the assumption that the Scheme is built out rapidly (over approximately 24 - 36 months), which is a worst case from a traffic generation point of view because it compresses the trip numbers into a shorter duration. This would therefore also be the worst case in terms of effects on drivers, pedestrians and cyclists, and traffic-related air quality and noise effects as relevant.

5.4.8 The Scheme may be built in phases over a longer period, which may affect assessment considerations, for example, for landscape and visual amenity and the setting of heritage assets there will be a longer time over which construction activity could affect receptors. However, it should be noted that a longer construction period doesn't necessarily mean that the environmental effects would be greater.

5.4.9 The phasing of the Scheme will be subject to a number of factors. The peak construction assessment year will be reviewed as the anticipated construction

programme is considered in more detail during design development. A full justification for the reasonable worst-case scenario that is assessed will be provided in the ES.

5.4.10 The proposed operational assessment year for the purpose of the EIA is anticipated to be 2030. This is expected to be the earliest that the Scheme will be fully built out and operational.

5.4.11 A future year, anticipated to be 2045, will also be considered for specific topics including landscape and visual amenity, in terms of the maturation of vegetation (i.e. 15 years after the operational assessment year). This is a requirement of the Landscape Institute guidelines, which is discussed further in **Chapter 10: Landscape and Visual Amenity**.

5.4.12 The decommissioning assessment year for the purpose of the EIA is 2070 based on the design life of the Scheme, recognising that the operational life may extend beyond this date if the panels are still operating efficiently at that date.

5.5 Assessment of Impacts and Significance of Effects

5.5.1 The evaluation of the significance of an effect is important; it is the significance that determines the resources that should be deployed in avoiding or mitigating a significant adverse effect, or conversely, the actual value of a beneficial effect. The overall environmental acceptability of the Scheme is a matter for the SoS to determine, having taken into account amongst other matters, the environmental information that is set out in the ES, including all likely beneficial and adverse environmental effects. Where it has not been possible to quantify effects, qualitative assessments will be undertaken, based on available knowledge and professional judgment. Where uncertainty exists, this will be noted in the relevant topic chapter and valid assumptions made/a worst case approach taken as appropriate.

5.5.2 The significance of residual effects will be determined by reference to criteria for each assessment topic. Specific effect significance criteria for each technical discipline will be developed, giving due regard to the following:

- Magnitude of the impact (for example, described as high, medium, low and very low);
- Effect duration (see paragraph 5.4.2), and whether effects are temporary, reversible or permanent;
- Effect nature (whether direct or indirect, reversible or irreversible, beneficial or adverse);
- Whether the effect occurs in isolation, is cumulative or interacts with other effects;
- Performance against any relevant environmental quality standards;
- Sensitivity of the receptor (for example, described as high, medium, low and very low); and

- Compatibility with environmental policies.

5.5.3 The following sections outline the standard EIA methodology, specifically relating to the magnitude of an impact, the sensitivity of a receptor and the significance of any resultant effects, and defines the standardised terminology to be used throughout the ES for a consistent identification of likely significant environmental effects. For those environmental topics scoped into the EIA, details relating to the specific assessment methodology to be used in the ES are provided within the technical sections of this EIA Scoping Report. In summary, each technical chapter of this ES will follow a three-stage approach, as set out below.

Sensitivity of the Receptor / Resource

5.5.4 The technical ES chapters will define the baseline conditions against which the likely significant environmental effects of the Scheme are determined and identify receptors and environmental resources that may be impacted. Each receptor and/ or environmental resource will be assigned a value on the basis of its importance or sensitivity to potential impacts, according to the methodology set out in the relevant technical chapter.

5.5.5 The sensitivity (or value) of a receptor or feature is characterised by the vulnerability to change, recoverability and importance of the receptor or feature (Table 5-1). Characterisation of the receptor is achieved by balancing out these three considerations to determine the receptor's sensitivity.

- Vulnerability – The vulnerability of the receptor relates to its capacity to accommodate change i.e., the tolerance/intolerance of the receptor to change;
- Recoverability – The ability of the receptor to return to the baseline state before the Scheme impact caused the change; and
- Importance – The importance of the receptor or feature is a measure of the value assigned to that receptor based on biodiversity and ecosystem services, social value and economic value. Importance of the receptor is also defined within a geographical context, whether it is important internationally, nationally or locally.

5.5.6 The terminology that will be used to categorise the sensitivity of resources/receptors (as set out in Table 5-1) is as follows:

- High;
- Medium;
- Low; and
- Very Low.

Table 5-1: Sensitivity criteria

Sensitivity	Description
High	Receptor has little or no ability to absorb change without fundamentally altering its character. For example: Receptor has low/no capacity to return to baseline conditions within the Project life, e.g., low tolerance to change and low recoverability such as a physical feature formed over a geological time scale, or loss of access with no alternatives. The receptor is a designated feature of a protected site or is rare or unique. Receptor is economically valuable
Medium	Receptor has moderate capacity to absorb change without significantly altering its character, however some damage to the receptor will occur. For example: Receptor has intermediate tolerance to change. Medium capacity to return to baseline condition, e.g. >5 of up to 10 years. The receptor is valued but not protected.
Low	The receptor is tolerant to change without significant detriment to its character. Some minor damage to the receptor may occur. For example: Receptor has high tolerance to change. High capacity to return to baseline condition, e.g. >5 of up to 10 years. May affect socio-economic behaviour but is not a nuisance to users. The receptor is common and/or widespread.
Very Low	The receptor is tolerant to change with no effect on its character. The activity resulting from the Scheme does not have a detectable effect on survival or viability.

Magnitude of Change

5.5.7 The technical ES chapters will identify the potential impacts of the Scheme from the construction phase, operational phase and on decommissioning. The magnitude of the impact or scale of change in comparison to baseline conditions will be determined in line with the topic specific methodology, while taking into account any embedded mitigation that either forms an inherent part of the Scheme (also defined as 'primary mitigation' by IEMA), is considered as standard practice or is a legislative requirement for managing commonly occurring environmental effects (defined as 'tertiary mitigation' by IEMA (Ref 5-6). Where it has not been possible to quantify impacts, qualitative assessments will be carried out, based on expert opinion and

professional judgement. This will be identified within the relevant ES chapter. Where uncertainty exists, this will be set out in the relevant ES chapter.

5.5.8 General criteria for defining the magnitude of change are set out in Table 5-2. Key factors that influence this include:

- Scale of change – The scale of change refers to the degree of change to or from the baseline environment caused by the impact being described;
- Spatial extent – The extent of an impact is the full area over which the impact occurs; and
- Duration and frequency – The duration is the period within which the impact is expected to last prior to recovery or replacement of the feature. Frequency refers to how often the impact will occur.

5.5.9 The terminology that will be used to categorise the magnitude of change (as set out in Table 5-2) is as follows:

- High;
- Medium;
- Low; and
- Very Low.

Table 5-2: Magnitude of change criteria

Magnitude	Criteria
High	Long term and/or regional level loss; or major alteration to key elements/features of the baseline condition such that post development character/composition of the baseline will be fundamentally changed.
Medium	Medium term loss and/or local level change (greater than the Scheme footprint) or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed.
Low	Short term, site specific and/or a minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation.
Very Low	Very little change from baseline conditions. Change is barely distinguishable, approximating to a “no change” situation.

Evaluating the Significance of Effects

5.5.10 Having established the sensitivity of the receptor and the magnitude of change, the scale and resultant significance of an effect can be assessed. The significance of residual effects will be evaluated with reference to available definitive standards, accepted criteria and legislation. For issues where definitive quality standards do not exist, significance will be based on the:

- Local, district, regional or national scale or value of the resource affected;
- Number of receptors affected;
- Sensitivity of these receptors; and
- Duration of the effect.

5.5.11 In order to provide a consistent approach to expressing the outcomes of the various studies undertaken as part of the EIA, and thereby enable comparison between effects upon different environmental topics, the following terminology will be used in the ES to define residual effects:

- **Adverse** – detrimental or negative effects to an environmental/socio-economic resource or receptor; or
- **Beneficial** – advantageous or positive effect to an environmental/socio-economic resource or receptor.

5.5.12 Where adverse or beneficial effects are identified, these will be assessed against the following scale:

- **Negligible** (also referred to as 'neutral' for some topics) – imperceptible effects to an environmental/socio-economic resource or receptor;
- **Minor** – slight, very short or highly localised effect of no significant consequence;
- **Moderate** – limited effect (by extent, duration or magnitude) which is likely to be considered significant (to be confirmed in the ES technical chapter); and
- **Major** – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards; considered significant.

5.5.13 Each of the technical chapters provides the criteria, including sources and justifications, for quantifying the different categories of effect. Where possible, this will be based upon quantitative and accepted criteria (for example, noise assessment guidelines), together with the use of value judgment and expert interpretation to establish to what extent an effect is environmentally significant. Table 5-3 illustrates an example of the classification of effects matrix (often referred to as a significance matrix).

Table 5-3: Example matrix to classify environmental effects

Sensitivity or value of resource/*receptor*	Magnitude of change			
	High	**Medium**	**Low**	**Very low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very low	Minor	Negligible	Negligible	Negligible

5.5.14 Following the classification of an effect, clear statements will be made within the topic chapters as to whether that effect is significant or not significant. As a general rule, major and moderate effects are considered to be significant (as shown by the shaded cells in Table 5-3 above), whilst minor and negligible effects are considered to be not significant. However, professional judgement will be applied, including taking account of whether the effect is permanent or temporary, its duration/frequency, whether it is reversible, and/or its likelihood of occurrence. A precautionary / worst case approach will be adopted to ensure that the recorded effects are not understated. Generic definitions for the classification of effects are shown in Table 5-4.

Table 5-4: Generic effect descriptions

Effect	Generic description
Major	These effects may represent key factors in the decision making process. Potentially associated with sites and features of national importance or likely to be important considerations at a regional or district scale. Major effects may relate to resources or features which are unique and which, if lost, cannot be replaced or relocated.
Moderate	These effects, if adverse, are likely to be important at a local scale and on their own could have a material influence on decision making.
Minor	These effects may be raised as local issues and may be of relevance in the detailed design of the project but are unlikely to be critical in the decision-making process.
Negligible	Effects which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error, these effects are unlikely to influence decision making, irrespective of other effects.

5.5.15 Where mitigation measures are identified to eliminate, mitigate or reduce adverse impacts, these have either been incorporated into the design of the Scheme;

translated into construction commitments; or operational or managerial standards/procedures. The ES will highlight 'residual' effects, which remain following the implementation of suitable mitigation measures, and classify these in accordance with the effect classification terminology given above.

5.5.16 It should be noted that some technical disciplines may utilise different criteria when undertaking assessments due to differences in industry accepted guidelines and specifications. Where this is the case, the technical topic will discuss how the assessment methodology or classification of effects differs for the general EIA methodology as described in this section and provide justification.

5.6 Cumulative Effects

5.6.1 In accordance with the EIA Regulations (Ref 5-1), 'cumulative effects' will be considered. By definition, these are effects that result from incremental changes caused by other past, present or reasonably foreseeable actions together (i.e., cumulatively) with the Scheme. A range of public sector and industry-led guidance is available on the approach to assessing cumulative effects but at present there is no single, agreed industry standard method. As the Scheme is classified as an NSIP, the approach to the assessment of cumulative effects follows the guidance set out in the Planning Inspectorate's Advice Note 17 (Ref 5-3).

5.6.2 For the cumulative impact assessment, two types of impact will be considered:

- The combined effect of individual impacts from the Scheme, for example where a single receptor if affected by noise and traffic disruption during the construction of the Scheme (these will be referred to as 'effect interactions'); and
- The combined effects of several development schemes which may, on an individual basis be insignificant but, cumulatively with the Scheme, have a new or different likely significant effect.

5.6.3 The assessment will be based on the best available data from other proposed and committed developments and associated information which is currently in the public domain or has been provided to the Scheme. The assessment will assume that publicly available information is accurate; the assessment is also reliant on collaboration with a range of statutory consultees, neighbouring authorities and other developers to identify changes in information which may be pertinent to the assessment.

5.6.4 Where there are specific limitations associated with data, these will be highlighted as the assessment progresses.

Effect Interactions

5.6.5 There is no established EIA methodology for assessing and quantifying effect interactions that lead to combined effects on sensitive receptors, however the European Commission (EC) has produced guidelines for assessing effect

interactions *"which are not intended to be formal or prescriptive, but are designed to assist EIA practitioners in developing an approach which is appropriate to a project*…" (Ref 5-4).

5.6.6 AECOM has reviewed these guidelines and has developed an approach which uses the defined residual effects of the Scheme to determine the potential for effect interactions that lead to combined effects. This approach was followed on previous solar NSIPs that have been consented by the SoS.

5.6.7 The EIA will predict beneficial and adverse effects during construction, operation, and decommissioning of the Scheme, which are classified as minor, moderate or major. Several effects on one receptor or receptor group could theoretically interact or combine to produce a combined significant overall effect.

5.6.8 An exercise which tabulates the effects on receptors or receptor groups will be undertaken to determine the potential for effect interactions and therefore any combined effects. Only adverse or beneficial residual effects classified as minor, moderate, or major will be considered in relation to potential effect interactions. Residual effects, which are classified as negligible will be excluded from the assessment of the effect interactions as, by virtue of their definition (see Table 5-4), they are considered to be imperceptible effects to an environmental / socio-economic resource or receptor.

Cumulative Effects with Other Developments

5.6.9 The Planning Inspectorate's Advice Note 17 on the assessment of cumulative effects (Ref 5-3) identifies a four-stage approach as follows:

Stage 1 – Establish the NSIP's ZoI and identify long list of 'other development'

5.6.10 A review of other developments will be undertaken, initially encompassing a 'Zone of Influence' (ZoI) defined by the environmental topic specialists to prepare a long list of 'other development'. At this stage, it is anticipated that the long list will be based on up to a 5 km area of search which stretches beyond the likely maximum range of any potential significant effects.

5.6.11 The long list of 'other development' to be included in the assessment of cumulative effects will be reviewed and developed in consultation with the Local Planning Authorities, statutory consultees and other relevant organisations.

5.6.12 Development will be included in the initial long-list based on the following criteria:

- Development currently under construction;
- Approved applications which have not yet been implemented (covering the past five years and taking account of those that received planning consent over three years ago and are still valid but have not yet been completed);

- Submitted applications not yet determined;
- Refused applications, subject to appeal procedures not yet determined;
- On the Planning Inspectorate's National Infrastructure Project list;
- Development identified in the relevant Development Plan (and emerging Development Plans); and
- Development identified in other plans and programmes which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

5.6.13 Criteria will be developed and applied to filter development which may be excluded from the initial long list, having regard to the size and spatial influence of each development. These criteria will be documented and set out within the ES.

Stage 2 – Identify shortlist of 'other development' for Cumulative Effects Assessment

5.6.14 At Stage 2, to ensure a proportionate approach to the assessment, a review of the long-list of other developments will be undertaken. Any developments of a nature or scale without the potential to result in cumulative impacts will be excluded, following discussion with the Local Planning Authorities and consideration of the likely ZoI for each environmental topic. This will be modelled on the example given within Matrix 1 (Appendix 1) of the Planning Inspectorate's Advice Note 17 (Ref 5-3).

Stage 3 – Information gathering

5.6.15 Information relating to other developments will be collected from the appropriate source (which may include the Local Planning Authorities, the Planning Inspectorate or directly from the applicant/developer) and will include, but not be limited to:

- Proposed design and location information;
- Proposed programme of demolition, construction, operation and/or decommissioning; and
- Environmental assessments that set out baseline data and effects arising from 'other development'.

Stage 4 – Assessment

5.6.16 The assessment will include a list of those developments considered to have the potential to generate a cumulative effect together with the Scheme, and this will be documented in a matrix, in line with Matrix 2 (Appendix 2) of the Planning Inspectorate's Advice Note 17 (Ref 5-3) which includes the following:

- A brief description of the development;

- An assessment of the cumulative effect with the Scheme;
- Proposed mitigation applicable to the Scheme including any apportionment; and
- The likely residual cumulative effect.

5.6.17 The criteria for determining the significance of any cumulative effect will be based upon:

- The duration of effect, i.e. will it be temporary or permanent;
- The extent of effect, e.g. the geographical area of an effect;
- The type of effect, e.g. whether additive or synergistic;
- The frequency of the effect;
- The 'value' and resilience of the receptor affected; and
- The likely success of mitigation.

5.6.18 In reporting the overall significance of cumulative effects, it is appropriate to also acknowledge the relative contributions different projects make to a cumulative effect, and carefully consider whether the cumulative effect is significant. For example, where a large-scale project is predicted to result in significant effects in its own right and a smaller scheme would not have significant effects, the cumulative assessment should only conclude that there is a significant cumulative effect if the effect of both projects together is of greater significance than the larger project in isolation. Consequently, care will be taken not to simply propagate such effects as being cumulative, but rather to focus on the nature and scale to which genuine cumulative effects might result.

5.7 Proposed Topics to be Included in the ES

5.7.1 The following chapters of this EIA Scoping Report present a discussion of the likely or potential significant environmental effects associated with the Scheme that it is proposed will be considered as part of the EIA. The methodology and assessment criteria that will be used to assess the identified effects are also outlined. These topics comprise:

- Climate Change (Chapter 6);
- Cultural Heritage (Chapter 7);
- Ecology (Chapter 8);
- Water Environment (Chapter 9);
- Landscape and Visual Amenity (Chapter 10);
- Noise and Vibration (Chapter 11);

- Socio-Economics and Land Use (Chapter 12);
- Traffic and Movement (Chapter 13);
- Soils and Agricultural Land (Chapter 14);
- Materials and Waste (Chapter 15); and
- Other Environmental Topics (Chapter 16).

5.7.2 **Chapter 16: Other Environmental Topics** provides a summary of environmental topics which have been considered during the preparation of this EIA Scoping Report, and for which standalone chapters are not anticipated to be required in the ES. For these topics it is considered, from previous experience, that the demonstration of no likely significant effects being expected can be quickly established without the need for detailed information on legislation and policy, methodology and baseline conditions being provided. Therefore, technical appendices will be provided for these topics with a short summary provided in a single chapter within the ES.

5.7.3 This methodology has been used for previous NSIP solar projects and aligns with the PINS guidance on solar scoping, which states:

"The following aspects [Glint and Glare, Electro-Magnetic Fields and Lighting] are not considered to require separate chapter assessments in a solar development Environmental Statement. This is because typically these relate to a source of an impact that could occur to receptors that are considered under a number of different environmental aspects, for example, lighting may be a consideration for both landscape and visual assessment and also for ecology. These technical assessments should therefore be provided as appendices to the Environmental Statement and cross-referred to where relevant within individual aspect assessments."

5.7.4 This approach ensures that a proportionate approach to assessment can be undertaken. For clarity, these topics are not scoped out of the EIA. They are scoped in, and an impact assessment will be undertaken but the format of presentation within the ES will be different to the topics listed above. These topics comprise:

- Air Quality (Section 16.2);
- Glint and Glare (Section 16.4);
- Lighting (Section 16.5);
- Electromagnetic Forces (Section 16.6);
- Ground Conditions (Section 16.7);
- Major Accidents or Disasters (Section 16.8); and
- Telecommunications, Television Reception and Utilities (Section 16.9).

5.7.5 For Human Health specifically, as outlined in Chapter 16, a standalone assessment of Human Health is proposed to be scoped out of the ES. This is because other chapters in the ES will comprehensively assess potential effects of the Scheme which could be relevant to health effects (both physical and mental), and given the nature of the development and its potential impacts this is considered a proportionate approach.

5.7.6 **Chapters 6** to **16** of this EIA Scoping Report provide an outline of the proposed scope of works for the topics identified above, including details of consultations undertaken to date in relation to the definition of the scope for that topic.

5.8 Proposed Topics Scoped Out of the ES

5.8.1 Based upon the work presented in this EIA Scoping Report, each of **Chapters 6 to 16** sets out the elements to be scoped out for that topic.

5.9 Topic Chapter Structure

5.9.1 Each of **Chapters 6 to 16** of this EIA Scoping Report is set out as follows:

- Introduction to the topic;
- Description of the Study Area for the topic;
- Planning Policy Context and Guidance in relation to the topic;
- Consultation;
- Baseline Conditions;
- Potential Effects and Mitigation;
- Assessment Methodology; and
- Assumptions, Limitations and Uncertainties.

5.10 Summary of elements scoped in and scoped out.

5.10.1 For **Chapter 17**, a general discussion of each topic is provided, including elements listed above where relevant, but the text is not confined to the structure above.

6 Climate Change

6.1 Introduction

6.1.1 This chapter outlines the anticipated climate change scope of assessment for the Scheme.

6.1.2 The chapter addresses the potential for likely effects on the climate as a result of the Scheme, and effects on the Scheme as a result of climate change.

6.1.3 In line with Institute for Environmental Management and Assessment (IEMA) Guidance on assessing greenhouse gas emissions (Ref 6-2) and climate change resilience and adaptation (Ref 6-3), consideration has been given to three aspects of the climate change assessment:

- Lifecycle greenhouse gas (GHG) impact assessment – the impact of GHG emissions arising from the Scheme on the climate over its lifetime.
- Climate change risk assessment (CCRA) – the resilience of the Scheme to future climate change impacts.
- In-combination climate change impact (ICCI) assessment – the combined impact of the Scheme and future climate change on the surrounding environment.

6.1.4 This chapter is not accompanied by any figures or appendices.

6.2 Study Area

Lifecycle GHG Impact Assessment

6.2.1 The Study Area for the lifecycle GHG impact assessment covers all direct GHG emissions arising from activities undertaken within the Site Boundary during the construction, operation and maintenance, and decommissioning lifecycle stages. It also includes indirect emissions arising outside the Site Boundary, for example those that are embedded within the construction materials arising as a result of the energy used for their production, as well as emissions arising from the transportation of materials, waste, and construction workers.

6.2.2 The Study Area also includes activities that may be avoided or displaced as a result of the operation of the Scheme, such as other grid electricity generation activities.

Climate Change Risk Assessment

6.2.3 The Study Area for the CCRA is the area within the Site Boundary, i.e. it covers the construction, operation and decommissioning of all assets (e.g. employees, contractors, and visitors) and infrastructure which constitutes the Scheme.

In-combination Climate Change Impact Assessment

6.2.4 The Study Area for the in-combination climate change impact assessment is as defined in each environmental assessment within the Preliminary Environmental Information Report (PEIR) and ES, and includes all environmental receptors identified within the assessments undertaken by the environmental disciplines.

6.3 Legislation, Planning Policy Context and Guidance

Legislation

United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement (United Nations, 2015) (Ref 6-4)

6.3.1 The Paris Agreement is an agreement within the UNFCCC requiring all signatories to strengthen their climate change mitigation efforts to keep global warming below 20°C this century and to pursue efforts to limit global warming to 1.50°C.

UK Nationally Determined Contribution to the UNFCCC (UK Government, 2020) (Ref 6-5)

6.3.2 In 2020, the UK communicated its new Nationally Determined Contribution to the UNFCCC. Within this, the UK has committed to reducing GHG emissions by at least 68% by 2030 compared to 1990 levels.

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (Ref 6-6)

6.3.3 Section 5(2) and Schedule 4, clauses 4 and 5 sets out that an EIA should describe and assess (in an appropriate manner and in light of each individual case) the direct and indirect significant effects of the Scheme on the climate.

The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref 6-7)

6.3.4 The Climate Change Act (2008) and Climate Change Act (2050 Target Amendment Order 2019). The Climate Change Act 2008 set a legally binding target for the UK to reduce its GHG emissions from 1990 levels by at least 80% by 2050. This target is supported by a legally binding five-year 'Carbon budgets' system and an independent body to monitor progress, the Climate Change Committee (CCC). The UK carbon budgets restrict the amount of GHG emissions the UK can legally emit in a defined five-year period. The Act was amended in 2019 to revise the existing 80% reduction target and legislate for Net Zero emissions by 2050 (through the Climate Change Act 2008 (2050 Target Amendment) Order 2019).

The Carbon Budget Order 2021 (Ref 6-8)

- The Carbon Budget Order 2021: This sets the carbon budget total for the Sixth (2033-2037) Carbon Budget period.

6.3.5 The UK is currently developing, alongside the Climate Change Committee, its 7th Carbon Budget, which is expected to be released in early 2025.

National Planning Policy

6.3.6 National Policy Statement NPSs set out the policy framework for NSIPs progressed under the Planning Act 2008. They also include reasons for the policy that has been set out in the Statement and explanations as to how the policy takes account of wider government policy, including that relating to the mitigation of, and adaptation to, climate change. Overarching NPS for Energy (NPS EN-1) (November 2023) (Ref 6-9), includes in respect of climate change:

- Section 2.2 in respect of the UK's goals for net zero emissions and their relevance to energy infrastructure;
- Paragraphs 4.6.13 and 4.10.9 in relation to climate impacts and adaptation;
- Paragraphs 4.1.5 to 4.1.7 in relation to adverse effects and benefits;
- Paragraphs 4.10.3 and 5.8.5 in relation to climate projections, flood risk and the importance of relevant mitigation; and
- Paragraph 5.3.4 requires applicants to undertake a GHG assessment.

6.3.7 National Policy Statement for Renewable Energy Infrastructure (EN-3) (November 2023) (Ref 6-10) with particular reference to:

- Section 2.4 on climate change adaptation and resilience; and
- Paragraph 2.4.11 regarding the specific risks for Solar Photovoltaic Generation from future increased flood risk and high temperatures.

National Guidance

6.3.8 The following guidance is of relevance for climate change:

Planning Practice Guidance, Climate Change (Ref 6-11)

6.3.9 Planning Practice Guidance, Climate Change guidance describes how to identify suitable mitigation and climate adaptation measures to incorporate into the planning process, stating that: *"Effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases… Planning can also help increase resilience to climate change impact through the location, mix and design of development."*

The Greenhouse Gas Protocol (Ref 6-12)

6.3.10 The World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines set out internationally accepted GHG accounting and reporting standards.

PAS 2080:2023 Carbon Management in Infrastructure (Ref 6-13)

6.3.11 Publicly Available Standard (PAS) 2080:2023 is a global standard for managing infrastructure carbon. The framework considers the whole value chain, aiming to reduce carbon and reduce cost through more intelligent design, construction, and use.

Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance Assessment Methodology and Significance Criteria (Ref 6-2)

6.3.12 The IEMA Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance provides a framework for incorporating GHG emissions assessments into EIAs. The guide outlines methodologies for calculating emissions, addressing direct, indirect, and cumulative impacts, and evaluating their significance in the context of climate change. It also provides criteria for determining the acceptability of emissions and encourages mitigation measures to minimise carbon footprints. By linking emissions assessments to climate goals and policies, the guide supports decision-makers in delivering sustainable, low-carbon projects.

IEMA EIA Guide to Climate Change Resilience and Adaptation (Ref 6-3)

6.3.13 The IEMA EIA Guide to Climate Change Resilience and Adaptation provides practical guidance on incorporating climate change considerations into EIAs. Published by the IEMA, the guide emphasises the need to assess both the resilience of projects to climate risks and their contribution to broader adaptation efforts. It outlines methodologies for identifying climate hazards, evaluating vulnerability, and integrating adaptation measures into project design. By aligning with legislative requirements and best practices, the guide helps ensure developments are prepared for future climate conditions and contribute to long-term sustainability goals.

The Inventory of Carbon and Energy (ICE) Database (Version 3) and the Cement, Mortar and Concrete Model (Version 1), Bath University, UK (2019) (Ref 6-14)

6.3.14 ICE is a comprehensive database that provides embodied carbon and energy values for a wide range of construction materials. Developed by the University of Bath, it serves as a critical resource for professionals assessing the environmental impact of building materials throughout their lifecycle.

GHG Emission Factors (Department for Energy Security and Net Zero) (DESNZ) 2024 (Ref 6-15)

6.3.15 The GHG emission factors provided by DESNZ are a standardized set of values used to estimate GHG emissions from various activities across sectors in the UK. These factors cover a range of emissions sources, including energy use, transport,

waste, and industrial processes. Updated annually, they reflect the latest data and methodologies, enabling consistency and accuracy in carbon accounting.

Local Planning Policy

6.3.16 The Scheme falls within the administrative boundaries of the LCC and NKDC. The following local policies are of relevance to climate change:

LCC's Green Masterplan (Ref 6-16)

6.3.17 The Green Masterplan of LCC is built on three guiding principles that drive efforts to reduce carbon emissions and adapt to climate change. These principles emphasise embedding decarbonisation into all council services from the outset and involving everyone in the process. A key focus is transitioning from a linear "take-make-waste" economy to a circular economy that minimises waste at the design stage, maximises resource efficiency, and leverages council assets such as buildings and workforce skills. This shift aims to support the wider economy by providing infrastructure and services that enable circular business models, tackling carbon emissions while conserving time, money, and energy.

Central Lincolnshire Local Plan (Ref 6-17)

6.3.18 The Central Lincolnshire Local Plan focuses on achieving net-zero carbon emissions through renewable energy development, climate change adaptation and sustainable land use. Key objectives include minimising energy usage, reducing dependency on fossil fuels, and improving community resilience to climate change impacts such as flooding.

6.3.19 Some of the key climate change policies are summarised below:

- Policy S9 encourages connection to existing decentralised energy networks, provided they do not increase fossil fuel consumption. New or extended combined heat and power networks must be powered by renewable or low-carbon energy sources.
- Policy S11 prioritises reducing embodied carbon in development by favouring repair and reuse of existing buildings over demolition, with demolition requiring strong justification.
- Policy S14 supports appropriately located renewable energy projects, such as wind and solar, while managing their environmental impacts.
- Finally, Policy S17 emphasises protecting and enhancing carbon sinks, such as peat soils, woodlands, and wetlands. Developments affecting carbon sinks must include impact evaluations and management plans to ensure their preservation and contribution to carbon sequestration.

City of Lincoln Council Climate and Environment Emergency Declaration (Ref 6-18)

6.3.20 On 23rd July 2019, the City of Lincoln Council passed a motion declaring a Climate and Environmental Emergency.

6.3.21 As part of this commitment, the Council has pledged to achieve a net-zero carbon target by 2030.

Lincoln 2030 Climate Action Plan (Ref 6-19)

6.3.22 The Lincoln 2030 Climate Action Plan outlines the city's commitment to achieving net-zero carbon emissions by 2030. It identifies key sources of carbon emissions, including production and consumption, and proposes actions to reduce them. Achieving these reductions will require collaboration among residents, businesses, community groups, and other organizations. The plan emphasizes the importance of engagement with these groups to drive change and facilitate action.

6.3.23 Building on the Lincoln Roadmap to Net Zero Carbon published in 2020, the Climate Action Plan is part of an ongoing consultation process. While it does not outline every step for the next decade, it sets out initial actions and will be updated regularly to reflect changes in national policies and regulations.

6.4 Consultation

6.4.1 Consultation will be undertaken following submission of this EIA Scoping Report with relevant statutory parties, such as NKDC and LCC.

6.5 Baseline Conditions

Lifecycle GHG Impact Assessment

6.5.1 The baseline condition for the lifecycle GHG assessment is a ‘business as usual’ scenario where the Scheme does not go ahead. The current land use within the study area and the local area consists predominately of agricultural fields mainly under arable and fringed by some woodland and peri-urban/urban areas (Figure 2-1). The current land use has relatively low levels of sequestered GHG emissions in the context of the overall emissions in the wider area as it is largely arable land. Baseline agricultural GHG emissions are dependent on types of soil and vegetation present, fuel use for the operation of vehicles and machinery, and other inputs such as fertiliser and pesticide use. Agricultural emissions displaced from the Scheme are not considered, as it is assumed that these agricultural activities would continue in a new location hence no reduction.

6.5.2 The future baseline comprises existing carbon stock and sources of GHG emissions resulting from the existing activities within the study area.

6.5.3 The lifecycle GHG impact assessment will quantify the GHG emissions through a desk-based study, and analysis of data from other relevant technical disciplines, for example, traffic and transport and geology and ground conditions. Where data is available, this will be used to quantify GHG emissions. Where data is unavailable, benchmarks, estimates, or approximations will be used based on professional judgement.

6.5.4 The sources of information used to inform the baseline and assessment methodology include:

- Baseline information on existing carbon stocks will be informed by relevant Scheme data, where available;
- World Business Council for Sustainable Development and World Resources Institute (2001) The GHG Protocol (Ref 6-20);
- GHG Emission Factors (Department for Energy Security and Net Zero) (DESNZ) 2024 (Ref 6-21); and
- Inventory of Carbon and Energy Database (2019) (Ref 6-22).

Climate Change Risk Assessment and In-combination Climate Change Impact Assessment

6.5.5 For the CCRA and ICCI Assessment the existing baseline is the historical (1981-2010) and current climate as defined in terms of temperature, rainfall, extreme weather events and other climatic factors. Existing baseline data has been gathered for the historical climatic factors from the nearest climate station (Waddington), which is approximately 13 km north of the Site. Baseline data sourced from Met Office historical weather station data (Ref 6-23) is displayed below in **Table 6-1**.

Table 6-1: Historic climatic data (1981 - 2010) at the nearest climate station (Waddington)

Climate Variable	Baseline (1981 -2010)
Temperature Change	
Mean annual maximum daily temperature	13.5
Mean summer maximum daily temperature (°C)	20.4
Mean winter minimum daily temperature (°C)	1.4
Number of days of air frost per annum	40.4
Warmest month on average (°C)	21.34 (July)
Coldest month on average (°C)	1.16 (February)
Rainfall	
Mean annual rainfall (mm)	614.6
Mean summer rainfall (mm)	58.9
Mean winter rainfall (mm)	45.7
Wettest month on average (mm)	60.3 (August)
Driest month on average (mm)	36.8 (February)
Other	
Mean monthly wind speed at 10m (knots)	9.01

6.5.6 The future climatic baseline for the Scheme will be determined through the UK Climate Impacts Programme UK Climate Projections 2018 (UKCP18) (Ref 6-23) To provide context, projections highlight the following examples of changes to the climate relative to the 1981 – 2010 baseline, under the Representative Concentration Pathway (RCP) 8.5:

- Mean temperatures are expected to increase in both summer and winter;
- Mean daily maximum and minimum temperatures to increase across the UK in both summer and winter;
- Winter precipitation is expected to increase, and summer precipitation will decrease; and

- Increased frequency of extreme weather events.

6.5.7 The sources of information used to inform the baseline and assessment methodology include:

- UKCP18 in accordance with NPS-EN1 (Ref 6-30); and
- Intergovernmental Panel on Climate Change (IPCC) (2023) (Ref 6-31).

6.6 Assessment Methodology

Lifecycle GHG Impact Assessment

6.6.1 A lifecycle approach will be used to consider emissions from different lifecycle stages of the Scheme as a whole: pre-construction and construction (likely 2-3 years), operation (likely 40 to 60 years), and decommissioning. These lifecycle stages are defined in Table 6-9.

6.6.2 Where activity data allows, expected GHG emissions arising from the lifecycle activities associated with the Scheme scoped in above will be quantified using a calculation-based methodology as per the following equation as stated in DESNZ emissions factors guidance (Ref 6-32):

Activity data x GHG emissions factor = GHG emissions values

6.6.3 In line with the GHG Protocol (Ref 6-12), when defining potential impacts (or hot spots), the seven Kyoto Protocol GHGs will be considered, specifically:

- Carbon Dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulphur hexafluoride (SF_6);
- Hydro fluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

6.6.4 These GHGs are broadly referred to in this Chapter under an encompassing definition of ‘GHG emissions’, with the unit of tCO_2e (tonnes CO_2 equivalent) or $MtCO_2e$ (Mega tonnes of CO_2 equivalent).

6.6.5 DESNZ 2024 emissions factors (Ref 6-33) and embodied carbon data from the University of Bath Inventory of Carbon and Energy (ICE) (Ref 6-22) are among those that will be used as the primary data sources for calculating GHG emissions. Where data is not available, a qualitative approach to addressing GHG impacts will be

followed using professional judgement, in line with the IEMA guidance for assessing GHG emissions in EIA (Ref 6-2). The Royal Institution of Chartered Surveyors (RICS) Whole life carbon assessment for the built environment report (Ref 6-34) will inform the assumptions used in the GHG assessment methodology across the whole Scheme lifecycle.

6.6.6 The sensitivity of the receptor (global climate) to increases in GHG emissions is always defined as high as any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore meet their future 5-year carbon budgets. Also, the extreme importance of limiting global warming to below 2°C this century is broadly asserted by the International Paris Agreement (Ref 6-35) and the climate science community.

Magnitude of Impact

6.6.7 For the lifecycle GHG impact assessment, the magnitude of impact considers the output of the GHG quantification process, i.e. the Scheme's GHG lifecycle footprint, in the context of its contribution to the UK carbon budgets and the possible impact of the Scheme on meeting the net zero targets. GHG emissions will also be contextualised against sectoral budgets as defined by the Carbon Budget Delivery Plan published by the UK Government (Ref 6-36).

6.6.8 According to the IEMA guidance on assessing GHG emissions in EIA (Ref 6-2), "GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant".

6.6.9 The UK carbon budgets are in place to restrict the amount of GHG emissions they can legally emit in a five-year period. The UK is currently in the 4th Carbon Budget period, which runs from 2023 to 2027, as detailed in Table 6-2. The 3rd, 4th, and 5th Carbon Budgets reflect the previous 80% reduction target by 2050. The 6th Carbon Budget is the first to align with the legislated 2050 net zero commitment.

6.6.10 In order to illustrate the Scheme's trajectory towards net zero by 2050, it is recommended that the CCC's Balanced Net Zero Pathway is utilised post-2037 in the absence of any nationally legally binding carbon budgets after using the 6th Carbon Budget. The CCC is expected to advise the UK on the level of its 7th Carbon Budget in early 2025. Beyond 2050, it is implied that the UK will remain at net zero.

6.6.11 The CCC Balanced Net-Zero pathway is recommended to be divided into 5-year periods post-2037 to match the previous six legally binding UK national carbon budgets. The proposed carbon budget periods derived from the net-zero pathway encompass the 7th, 8th, and 9th indicative budget periods up to 2050 in line with the UK's 1.5-degree trajectory as detailed in **Table 6-2**.

Table 6-2: UK National and Sectoral Carbon Budgets and Indicative Carbon Budgets Based Upon the CCC's Balanced Net-Zero Pathway

Carbon budget	Power Sector Budget based upon the Carbon Budget Delivery Plan ($MtCO_2e$)	UK Carbon Budget ($MtCO_2e$)	Indicative Carbon Budgets based upon the CCC's balanced net-zero pathway ($MtCO_2e$)
3rd (2018-2022)	-	2,544	-
4th (2023-2027)	143	1,950	-
5th (2028-2032)	63	1,752	-
6th (2033-2037)	42	965	-
7th (2038-2042)	23	-	526
8th (2043-2047)	12.4	-	195
9th (2048-2050)	4	-	17

6.6.12 However, it should be noted that the supplementary carbon budgets beyond 2037 have not been formally adopted by the UK government or ratified by parliament and can only be used as an indicative measure to contextualise the Scheme's progress toward the national net-zero trajectory.

6.6.13 To offer further contextualisation, the GHG assessment will compare the emissions from the Scheme to those of likely alternative sources of electricity generation, such as a combined cycle gas turbine (CCGT). This assessment will illustrate how the generation of electricity via solar power could potentially displace fossil fuels in comparison to other methods like CCGT.

Significance of Effects

6.6.14 When evaluating the significance of the GHG emissions, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace

existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible. The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050.

6.6.15 **Table 6-3** presents the different significance levels as per the latest version of the IEMA guidance, which emphasises that *"…a project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the UK's net zero trajectory, or accepted aligned practice or area-based transition targets, results in a significant adverse effect. It is down to the practitioner to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects"*. Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

Table 6-3: Definition of Levels of Significant for Lifecycle GHG Impact Assessment

Significance level	Effect	Description in the IEMA guidance	Example in the IEMA guidance
Significant adverse	Major adverse	A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the UK's Net Zero trajectory or accepted aligned practice or area-based transition targets, results in a significant adverse effect. It is down to the practitioner to differentiate between the ‘level’ of significant adverse effects; e.g. 'moderate' or 'major' adverse effects.	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards Net Zero.
	Moderate adverse		The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards Net Zero.
Not significant	Minor adverse	A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve a minor adverse effect that is not significant.	The project’s GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK’s trajectory towards net zero.

Significance level	Effect	Description in the IEMA guidance	Example in the IEMA guidance
	Negligible	A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant. This project is playing a part in achieving the rate of transition required by nationally set policy commitments.	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or Net Zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards Net Zero and has minimal residual emissions.
Beneficial	Significant	A project that causes GHG emissions to be avoided or removed from the atmosphere. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds Net Zero requirements with a positive climate impact.

Climate Change Risk Assessment

6.6.16 An assessment of the resilience of the Scheme to climate change will be undertaken to identify potential climate change hazards and to consider their potential consequence and likelihood of impact occurrence, taking account of the measures incorporated into the design of the Scheme.

6.6.17 The types of receptors considered vulnerable to climate change are:

- Construction phase receptors e.g. workforce, plant and machinery; and
- Development assets and their operation, maintenance and refurbishment e.g. electrical equipment including Solar PV panels and BESS, powerhouse pumps/turbines, generators, facility pavements and structures, earthworks, and drainage technology.

6.6.18 The CCRA will provide commentary on how the Scheme will be resilient to the predicted future climate baseline using UKCP18 data (Ref 6-30). UKCP18 projections for the 25km grid cell where the Scheme is located will be used to examine future climate parameters. This climate projection data provides a probabilistic indication of how global climate change is likely to affect the Scheme defined climate variables and time periods.

Magnitude of Impact

6.6.19 The approach outlined below is aligned with existing guidance, such as that of IEMA (Ref 6-2). Climate parameters to be considered in the CCRA across all lifecycle stages include the following:

- Extreme weather events;
- Flood risk;
- Wildfires;
- Droughts;
- Temperature change;
- Wind; and
- Precipitation change.

6.6.20 The following key terms and definitions relating to the CCRA will be used:

- Climate hazard – a weather or climate related event, which has potential to do harm to environmental or community receptors or assets, for example, increased winter precipitation;

- Climate change impact – an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose; and
- Consequence – any effect on the receptor or asset resulting from the climate hazard having an impact.

6.6.21 The likelihood of a climate impact occurring is based on the likelihood of the hazard occurring combined with the vulnerability of the Scheme, using professional judgement and in discussion with the design team. Embedded mitigation measures will also be taken into account and a likelihood rating will be assigned as described in **Table 6-4**.

6.6.22 Following the identification of climate hazards, the likelihood and consequences will be assessed according to **Table 6-4** and **Table 6-5** respectively. The categories and descriptions below are based on the IEMA climate change resilience and adaptation guidance (Ref 6-2).

Table 6-4: Likelihood of an impact occurring criteria for risk assessment

Likelihood term	Qualitative	Quantitative
Rare	Highly unlikely to occur	5%
Unlikely	Unlikely to occur	20%
Moderate	As likely to occur as not	50%
Likely	Likely to occur	80%
Almost certain	Very likely to occur	95%

Table 6-5: Level of Consequence of a Climate Change Impact Occurring

Risk Areas	Magnitude of Consequence				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Asset damage, engineering, operational	Impact can be absorbed through normal activity	Adverse event that can be absorbed by taking business continuity actions	A serious event that requires additional emergency business continuity actions	A critical event that requires extraordinary / emergency business continuity action	Disaster with the potential to lead to shut down or collapse or loss of the asset / network
Health and safety	First aid case	Minor injury, medical treatment	Serious injury or lost work	Major or multiple injuries, permanent injury or disability	Single or multiple fatalities
Environment	No impact on baseline environment. Localised in the source area. No recovery required	Localised within site boundaries. Recovery measurable within one month of impact	Moderate harm with possible wider effect Recovery in one year	Significant harm with local effect Recovery longer than one year. Failure to comply with environmental regulations / consent	Significant harm with widespread effect. Recovery longer than one year. Limited
Social	No negative social impact	Localised, temporary social impacts	Localised, long term social impacts	Failure to protect poor or vulnerable groups (1). National, long term social impacts	Loss of social licence to operate. Community protests
Financial (**)	x % IRR (***) < 2% of turnover	x % IRR (***) 2-10% of turnover	x % IRR (***) 10-25% of turnover	x % IRR (***) 25-50% of turnover	x % IRR (***) > 50% of turnover

Risk Areas	Magnitude of Consequence				
	Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Reputational	Localised, temporary impact on public opinion	Localised, short-term impact on public opinion	Local, long-term impact on public opinion with adverse local media coverage	National, short-term impact on public opinion. negative national media coverage	National, long-term impact with potential to affect the stability of the government
Cultural Heritage and cultural premises	Insignificant impact	Short term impact. Possible recovery or repair.	Serious damage with wider impact to tourism industry	Significant damage with national and international impact	Permanent loss with resulting impact on society

(1) Including groups that depend on natural resources for their income/livelihoods and cultural heritage (even if not considered poor) and groups considered poor and vulnerable (and often that have less capacity to adapt) as well as persons with disabilities and older persons.

(*) The ratings and values suggested here are illustrative. The project promoter and climate-proofing manager may choose to modify them.

(**) Example indicators – other indicators that may be used including costs of immediate / long-term emergency measures; restoration of assets; environmental restoration; indirect costs on the economy, indirect social costs.

(***) Internal Rate of Return (IRR).

6.6.23 Engagement will be undertaken with relevant environmental disciplines and the engineering design team to discuss the CCRA and identify mitigation measures for incorporation into the design of the Scheme.

Significance of Effects

6.6.24 The significance of the CCRA is determined as a function of the likelihood of a climate change impact occurring and the consequence to the receptor if the impact occurs. The significance is detailed in **Table 6-6**. The assessment will take into account confirmed design and mitigation measures (referred to as embedded mitigation).

Table 6-6: Identification of significance ("S" Significant "NS" Not Significant)

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	**Rare**	Low (NS)	Low (NS)	Medium (NS)	High (S)	Extreme (S)
	Unlikely	Low (NS)	Low (NS)	Medium (NS)	High (S)	Extreme (S)
	Moderate	Low (NS)	Medium (NS)	High (S)	Extreme (S)	Extreme (S)
	Likely	Medium (NS)	High (S)	High (S)	Extreme (S)	Extreme (S)
	Almost certain	High (S)	High (S)	Extreme (S)	Extreme (S)	Extreme (S)

In-combination Climate Change Impact Assessment

6.6.25 The ICCI assessment considers the ways in which projected climate change will influence the significance of the impact of the Scheme on receptors in the surrounding environment by taking into account the existing and projected future climate conditions for the geographical location and assessment timeframe. It identifies the extent to which identified receptors in the surrounding environment are potentially vulnerable to and affected by these factors. The impacts will be assessed in liaison with the technical specialists responsible for preparing other technical chapters.

6.6.26 Once the potential ICCIs have been identified in relation to the Scheme through liaison with technical disciplines, criteria used to determine the likelihood of an event occurring, based on its probability and likelihood of occurrence, are detailed below.

Magnitude of Impact

6.6.27 In consideration of the likelihood of the climate risk occurring, and the sensitivity of the receptor, the likelihood of an impact occurring to the receptor is then defined. This includes consideration of any embedded mitigation measures and good practices. These classifications are defined in **Table 6-4**.

6.6.28 The likelihood of a climate hazard occurring is done in alignment with the CCRA as defined in **Table 6-4** and the likelihood of an impact on a receptor is then combined to determine the likelihood of an ICCI occurring (**Table 6-7**).

6.6.29 Once the likelihood of an ICCI has been identified, the assessment will consider how this will affect the significance of the identified effects.

6.6.30 The ICCI consequence criteria are defined in **Table 6-7** and are based on the change to the significance of the impact already identified by the technical discipline. To assess the consequence of an ICCI, each discipline will assign a level of consequence to an impact based on the criteria description and the discipline assessment methodology.

Table 6-7: Consequence Criteria for ICCI Assessment

Level of likelihood of impact occurring	Definition of likelihood
High	Likelihood of climate hazard occurring is high and impact is always/ almost always going to occur.
Medium	Likelihood of climate hazard occurring is high and impact occurs often or the likelihood of climate hazard occurring is moderate and impact is likely to occur always/almost always.
Low	Likelihood of climate hazard occurring is high, but impact rarely occurs or the likelihood of climate hazard occurring is moderate and impact sometimes occurs or the likelihood of climate hazard occurring is low and impact is likely to occur always/almost always.
Very low	All other eventualities – highly unlikely but theoretically possible.
Consequence	Consequence Criteria
High	The climate change parameter in-combination with the effect of the Project causes the significance of the impact of the Project on the resource/receptor, as defined by the discipline, to increase from very low, low, or medium to major.

Medium	The climate change parameter in-combination with the effect of the Scheme causes the effect defined by the discipline to increase from very low or low, to medium.
Low	The climate change parameter in-combination with the effect of the Project causes the significance of effect defined by the topic, to increase from very low to low.
Very low	The climate change parameter in-combination with the effect of the Scheme does not alter the significance of the effect defined by the topic.

Significance of Effects

6.6.31 The significance of the ICCI assessment is determined as a function of the likelihood of a climate impact occurring and the consequence to the receptor if the impact occurs. The significance of potential effects is determined using the matrix in **Table 6-8**. If significant ICCI effects are assessed, then appropriate additional mitigation measures (secondary mitigation) would be identified.

Table 6-8: ICCI Significance Criteria

	Likelihood of climate-related impact occurring			
Level of consequence	**Very low**	**Low**	**Medium**	**High**
Very low	Very low (NS)	Low (NS)	Low (NS)	Low (NS)
Low	Low (NS)	Low (NS)	Low (NS)	Medium (S)
Medium	Low (NS)	Low (NS)	Medium (S)	High (S)
High	Low (NS)	Medium (S)	High (S)	High (S)

Note: S = significant; NS = not significant

6.7 Potential Effects and Mitigation

Lifecycle GHG Impact Assessment

6.7.1 The impact of the Scheme is defined as an increase in GHG emissions in the global atmosphere. Increasing GHG emissions contributes to global warming and climate change. Disruption to the global climate is already having diverse and wide-reaching

impacts on the environment, society, economy, and natural resources. Known effects of climate change include increased frequency and duration of extreme weather events, temperature changes, rainfall and flooding, and sea level rise and ocean acidification. These effects are largely accepted to be negative, profound, global, likely, long-term to permanent, and are transboundary and cumulative from many global actions.

6.7.2 The three stages of the Scheme (construction, operation, and decommissioning) are scoped into the lifecycle GHG impact assessment.

6.7.3 These three stages will be assessed with the following subcategories in line with PAS 2080:2080 as summarised below:

6.7.4 Construction:

- (A0-A5) Pre-construction, Product stage and Construction process stage.

6.7.5 Operation:

- (B1-B8) Operation stage.

6.7.6 Decommissioning:

- (C1-C4) Decommissioning stage

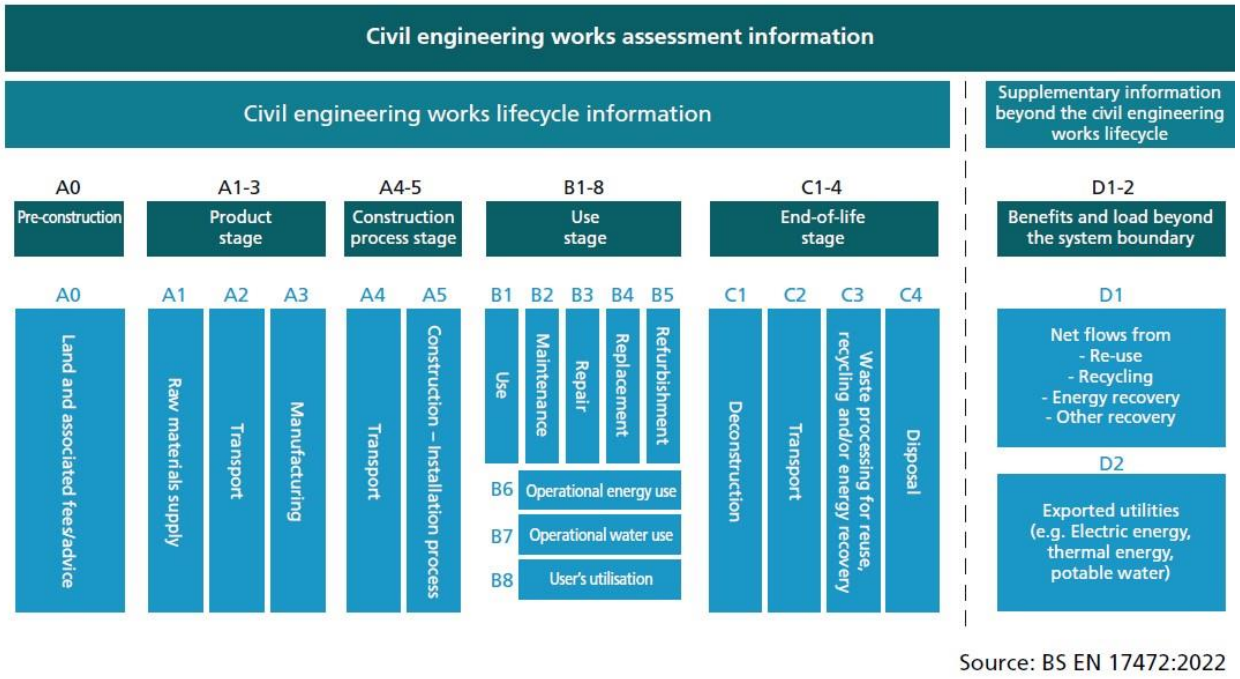
6.7.7 To assess the potential impacts of GHG emissions on the climate arising from the Scheme, likely activities and their associated GHG emissions sources will be estimated. Potential activities related to the Scheme that could cause GHG emission impacts are presented in **Table 6-9**.

Table 6-9: Potential sources of GHG emissions

Lifecycle stage	PAS 2080: 2023 Module	Proposed to be scoped in/out?	Activity	Primary emission sources	**Potential Mitigation Likely Securing Mechanism**
Pre-construction	A0	In	Land and associated fees/advice.	Emissions associated with energy use and transportation demands from preliminary studies and work.	CEMP
Product stage	A1 – A3	In	Raw material extraction and manufacturing of products are required to build the equipment for the Scheme. Transportation of materials for such processes/ manufacturing (where available).	Embodied GHG emissions from energy use in the extraction of materials and manufacture of components and equipment. Emission of potent GHGs during manufacture, such as SF6. GHG emissions from the transportation of products and materials during their processing and manufacture. Due to the nature of the equipment, this could require shipment of certain aspects, over significant distances.	CEMP
Construction process stage	A4	In	Transportation of construction materials to the Site. Due to the nature of the equipment required, this could require shipment of certain aspects over significant distances.	Transport of materials to the Site is included under the construction process stage, where these are not included in embodied GHG emissions.	CEMP

Lifecycle stage	PAS 2080: 2023 Module	Proposed to be scoped in/out?	Activity	Primary emission sources	**Potential Mitigation Likely Securing Mechanism**
	A5	In	On-site construction activity, including emissions from construction compounds. Transportation of construction workers to and from the Site. Disposal of any waste generated by the construction processes. Land use change. Water use.	Energy (e.g., electricity, fuel) consumption from plant and vehicles, generators on-site, and construction worker commuting. GHG emissions from disposal and transportation of waste. GHG emissions are from the net loss of carbon sinks. Provision of potable water, and treatment of wastewater.	CEMP
Operation stage	B1 – B8	In	Operation of the Scheme. Maintenance of the Scheme.	GHG emissions are from energy consumption, the provision of potable water, and the treatment of wastewater. These operational aspects are expected to be negligible in the context of overall GHG emissions of the Scheme's lifecycle. Leakage of potent GHGs during operation, such as SF6.	OEMP

Lifecycle stage	PAS 2080: 2023 Module	Proposed to be scoped in/out?	Activity	Primary emission sources	**Potential Mitigation Likely Securing Mechanism**
				GHG emissions from energy consumption, material use and waste generation as a result of Site maintenance.	
Decommissioning stage	C1 – C4	In	On-site decommissioning activity. Transportation and disposal of waste materials. Transportation of workers.	Energy (e.g., electricity, fuel) consumption from plant, vehicles, and generators within the Site. GHG emissions from disposal and transportation of waste. GHG emissions from the transportation of workers to the Site.	DEMP



Source: BS EN 17472:2022

Plate 6-1: Lifecycle stages of civil engineering works assessment (PAS 2080:2023) (Ref 6-13)

6.7.8 As shown in **Plate 6-1**, Module D is reported as two separate sub-modules:

- D1 - Potential benefits and loads from reuse, recycling and energy recovery from the net output flows of materials exiting the system boundary and/or from other recovery.
- D2 - Potential benefits and loads from exported utilities exiting the system boundary.

6.7.9 Module D covers potential benefits and loads beyond the system boundary. Module D is estimated separately to ensure that impacts, particularly for recovery and use of recovered material, are not double counted.

6.7.10 Module D is a supplementary figure that indicates the future potential for recovery, however it has limitations being used as a metric for quantifying circularity and assessing future resource efficiency.

6.7.11 However, as an example, as mentioned in Section 6.6, the GHG assessment will compare the emissions from the Scheme to those of likely alternative source of electricity generation, such as CCGT. This will provide insight into the potential benefits and loads of the Scheme in alignment with Module D.

6.7.12 It's important to acknowledge that the calculation methodologies for Module D are currently limited within the industry as of the writing of this report. Therefore, where reasonably practicable, estimates will be provided for Module D to demonstrate the

potential impact of the Scheme. However, these estimates will not be incorporated into the total GHG assessment results and will be solely indicative.

Climate Change Risk Assessment

6.7.13 The CCRA will consider the three phases of the Scheme (construction, operation, and decommissioning). The potential climate change impact will be determined based on the UKCP18 projections for the parameters described in **Table 6-10**.

Table 6-10: Climatic Parameters for the CCRA

Climate Parameter	Proposed to be Scoped In or Out	Rationale
Extreme weather events	In	The Scheme may be vulnerable to extreme weather events such as storm damage, coastal erosion and storm surge impacts to structures and assets.
Precipitation changes	In	The Scheme may be vulnerable to changes in precipitation, for example, pressure on water supply during periods of reduced rainfall, and damage to structures and drainage systems during periods of heavy precipitation.
Temperature change	In	Increased temperatures may increase cooling requirements, alter the power efficiency of the Scheme, and could impact on the structural integrity of buildings and materials.
Sea level rise	In	Rising sea levels could potentially affect local waterways and floodplains, posing a risk to the Scheme.
Sea temperature rise	In	Rising Sea temperatures could potentially affect local waterways and floodplains, posing a risk to the Scheme.
Wind	In	Currently, there is no evidence of compelling trends when considering maximum gust speed in the UK wind network over the last five decades (Ref 6-39). However, the effects of increased wind strength will be considered qualitatively in the CCRA.

In-combination Climate Change Impact Assessment

6.7.14 The ICCI assessment will consider how the resilience of various receptors in the surrounding environment is affected by the Scheme in combination with future

climatic conditions. The impacts are considered for the construction, operation, and decommissioning stages. UKCP18 projections for the geographical location and lifetime of the Scheme and the receptors that will be identified by technical disciplines will be considered in this assessment.

6.7.15 A separate ICCI assessment is proposed to be scoped into the climate change assessment based on climate parameters relevant to the development as detailed in **Table 6-11**.

Table 6-11: Climatic Parameters for the ICCI Assessment

Climate Parameter	Proposed to be Scoped In or Out	Rationale
Extreme weather events	In	An increase in the likelihood and severity of extreme weather events could lead to damage to ecosystem stability. The likelihood and severity of acute environmental impacts from extreme weather such as erosion, loss of habitats, destabilisation, and damage to infrastructure may be exacerbated by the Scheme.
Precipitation change	In	Climate change may lead to both an increase in substantial precipitation and drought events. For various receptors in the surrounding environment potentially affected by the Scheme the combination of the Scheme and climate change may cause increased risk of impacts.
Temperature change	In	Fluctuating temperatures may lead to: Increase in likelihood and severity of heat waves which might have a negative impact on biodiversity and health; and Increase in likelihood and severity of freezes which might have a negative impact on biodiversity and health.
Sea level rise	In	Rising sea levels could potentially affect local waterways and floodplains, posing a risk to the Scheme.
Sea temperature rise	In	Rising sea temperatures could potentially affect local waterways and floodplains, posing a risk to the Scheme.
Wind	In	Currently, there is no evidence of compelling trends when considering maximum gust speed in the UK wind network over the last five decades (Kendon, M et al, 2021). However, the effects of increased wind strength

Climate Parameter	Proposed to be Scoped In or Out	Rationale
		in combination with the Scheme will be considered qualitatively in ICCI assessment by technical disciplines.

6.8 Limitations and Assumptions

6.8.1 When quantitative data is unavailable, reasonable assumptions will be developed and agreed upon with the design team in accordance with the specifications of the Scheme.

6.8.2 If it is not feasible to quantify the required data or make reasonable assumptions, a qualitative assessment of the environmental impact will be provided, informed by professional experience and expertise.

6.9 Summary of Elements Scoped In and Scoped Out

Lifecycle GHG Impact Assessment

6.9.1 The GHG Impact Assessment is scoped in and will cover all aspects of the Scheme set out in **Table 6-9**, covering the pre-construction, construction, operation and decommissioning lifecycle stages.

Climate Change Risk Assessment

6.9.2 As set out in **Table 6-10** the CCRA assessment is scoped in and will consider the vulnerability of the Scheme to extreme weather events, precipitation change, temperature change, sea level rise, sea temperature rise and through to construction, operation and maintenance, and decommissioning.

In-combination Climate Change Impact Assessment

6.9.3 As set out in **Table 6-11** the ICCI assessment is scoped in and will assess how the resilience of various receptors in the surrounding environment is affected by the Scheme in combination with future climatic conditions. The future climatic conditions considered as part of the assessment includes extreme weather events, precipitation change, temperature change, sea level rise, sea temperature rise and through to construction, operation and maintenance, and decommissioning.

7 Cultural Heritage

7.1 Introduction

7.1.1 This chapter outlines the anticipated cultural heritage scope of assessment for the Scheme.

7.1.2 This chapter sets out the approach to the assessment of the Scheme's impacts on cultural heritage (comprising built heritage, archaeology, and the historic landscape). The purpose of the assessment will be to identify and characterise any relevant cultural heritage resources, and to consider the nature and scale of potential impacts and effects arising from the Scheme, and to assess the significance of any likely effects.

7.1.3 This chapter is supported by the following figures:

- **Figure 7-1: Location of Designated Heritage Assets within 3km;**
- **Figure 7-2: Designated Assets within 5km;**
- **Figure 7-3: Location of Non-designated Heritage Assets; and**
- **Figure 7-4: Historic Landscape Character within Study Area.**

7.1.4 A full list of designated and non-designated assets considered in this chapter is provided in **Appendix C Gazetteer of Heritage Assets**.

7.2 Study Area

7.2.1 The assessment of likely significant effects to the historic environment within this chapter includes the Solar PV Site and relevant surrounding Study Areas.

7.2.2 The Study Area for buried components of the Scheme, comprising the onsite and interconnecting underground cabling, will be up to 1 km from the Site Boundary. Once operational, these components of the Scheme would not be visible and would not change the setting of heritage assets. As such, a 1 km Study Area is considered to be proportionate to the level of likely impact. The Study Area will provide data relating to heritage assets in proximity to the Scheme, whose setting may change temporarily during construction as a result of the installation of buried components of the Scheme, but would not experience any long-term effects as a result of the Scheme. An assessment of the buried components of the Scheme will be considered in the ES, although the final extent of the Study Area will be determined once the Grid Connection Corridor has been refined.

7.2.3 A Wider Study Area is proposed around those parts of the Site that would house above-ground components of the Scheme. This is because these components have the potential to result in long-term change to the settings of heritage assets, some of which may be located at distance from the Scheme. As such, the wider Study

Area will allow consideration of those heritage assets whose setting may extend into the Site Boundary; it is influenced by the heritage value of the asset, the prevailing topography, and the predicted visibility of the Scheme.

7.2.4 The wider Study Area will extend to a distance of 1 km from the Site Boundary for non-designated assets, and to 3 km from the boundary of the Solar PV Site for designated assets. This will allow for cultural heritage assets to be set within their wider context and allow for the assessment of archaeological potential within the Site Boundary, and assessment of the setting of heritage assets within the Site and the surrounding landscape.

7.2.5 A flexible approach will be taken to the identification of assets of the highest value (i.e., World Heritage Sites, scheduled monuments, Grade I and II* listed buildings and Registered Parks and Gardens and Conservation Areas containing a number of assets of the highest value), where there may be an impact through change to setting up to 5 km beyond the Site Boundary. High value assets up to this distance may be considered, where identified as necessary by the EIA technical discipline team or through consultation. This will be guided by the Scheme's Zone of Theoretical Visibility (ZTV) (to be prepared as part of the Landscape and Visual Amenity assessment) but will also consider physical and historical connectivity and relationships with other monuments and the wider landscape. The Preliminary ZTV is shown in **Figure 10-1: Zones of Theoretical Visibility** and will be updated for the ES.

7.3 Legislation, Planning Policy Context and Guidance

7.3.1 Legislation, planning policy and guidance relating to cultural heritage, and pertinent to the Scheme, comprises:

Legislation

- Infrastructure Planning (Decisions) Regulations 2010 (Ref 7-1);
- Planning (Listed Buildings and Conservation Areas) Act 1990 (Ref 7-2); and
- Ancient Monuments and Archaeological Areas Act 1979 (Ref 7-3)

National Planning Policy

- NPS EN-1 (Ref 7-6) with particular reference to Section 5.9 in relation to the significance, impact and recording of the historic environment;
- NPS EN-3 (Ref 7-7) with particular reference to paragraphs 2.10.107 – 2.10.119 in relation to the impacts of solar PV developments on the historic environment;
- NPS EN-5 (Ref 7-8) with particular reference to Paragraph 2.9.25 in relation to the archaeological consequences of electricity line installation;

- NPS EN-5 (Ref 7-8) with reference to Paragraph 2.2.10 and the desirability of preserving sites, buildings and objects of architectural, historic or archaeological interest, and also Paragraph 2.9.25 which highlights the potential impacts to archaeological sites from underground cables; and
- NPPF (Ref 7-9) with particular reference to Section 16: Conserving and Enhancing the Historic Environment.

National Guidance

7.3.2 The following guidance is of relevance for cultural heritage:

- Planning Practice Guidance, Section 16: Conserving and enhancing the historic environment (Ref 7-10Ref 7-10);
- Historic Environment Good Practice Advice in Planning Note 2. Managing Significance in Decision Taking in the Historic Environment (Ref 7-11Ref 7-11);
- Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets (2nd edition, 2017) (Ref 7-12Ref 7-12);
- Historic Environment Statement of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12 (Ref 7-13Ref 7-13);
- Commercial Renewable Energy Development and the Historic Environment. Historic England Advice Note 15 (Ref 7-14Ref 7-14);
- Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (Ref 7-15Ref 7-15);
- CIfA Code of Conduct (Ref 7-16Ref 7-16); and
- IEMA, the Institute of Historic Building Conservation (IHBC) and the Chartered Institute for Archaeologists (CIfA), Principles of Cultural Heritage Impact Assessment in the UK (Ref 7-17Ref 7-17).

Local Planning Policy

7.3.3 The Scheme falls within the administrative boundaries of the LCC and NKDC. The following local policies are of relevance to the historic environment:

- Central Lincolnshire Local Plan 2023 (Ref 7-18Ref 7-18); and
- Welbourn Neighbourhood Development Plan 2015-2030 (Ref 7-19Ref 7-19).

7.3.4 Policy S57 of the Central Lincolnshire Local Plan (Ref 7-18) requires developers to consider impacts on the Historical Environment, including conservation areas, and aim to promote and enhance assets through consideration of design and layout. Development should seek to avoid harm to heritage assets, however consideration

will be given to those projects that achieve substantial public benefits that may outweigh any harm or loss caused.

7.3.5 Policy S58 of the Central Lincolnshire Local Plan (Ref 7-18) requires that development proposals should seek not to detract from the historical setting and character within the areas in and surrounding Lincoln, Gainsborough and Sleaford.

7.3.6 Policy DES1 of the Welbourn Neighbourhood Plan (Ref 7-19) requests that where possible, development proposals should preserve or enhance the village of Welbourn through consideration of design choices, views and effects on heritage assets, including conservation areas.

7.3.7 Policy EN2 of the Welbourn Neighbourhood Plan (Ref 7-19) states that alternative sources of energy generation will be supported provided that they will not have an 'unacceptable impact of the local character of Welbourn'.

7.4 Consultation

7.4.1 Consultation will be carried out with the Historic Environment Officer and Conservation Officer for LCC to ensure, as far as practicable, that cultural heritage issues are identified and potential impacts to cultural heritage assets are included in the assessment. Consultation will also be carried out with Historic England if potential impacts to designated heritage assets, or non-designated assets of high value, are anticipated.

7.5 Baseline Conditions

7.5.1 To assist with the Scoping assessment, data has been considered from the National Heritage List (Ref 7-20Ref 7-20), the Lincolnshire Historic Environment Record (HER) to gain an understanding of the designated and non-designated heritage assets within the Study Areas of the Solar PV Site. All heritage assets identified within the Study Areas are illustrated on **Figure 7-1: Location of Designated Heritage Assets within 3km**, **Figure 7-2: Designated Assets within 5km**, and **Figure 7-3: Location of Non-designated Heritage Assets**. They are referred to in the text by a unique identity code in brackets (e.g., MLI121065 or 1009214).

7.5.2 Several of the non-designated assets are recorded within the HERs as findspots. A 'findspot' is a chance find of archaeological evidence which is no longer within the context it was found in. Findspots inform the potential for associated archaeological remains, although because they are no longer in-situ, they are not considered extant assets and as such are scoped out of assessment.

Designated Assets

7.5.3 There are no designated heritage assets within the Solar PV Site.

7.5.4 Within the 3 km Study Area from the Solar PV Site there are 166 designated heritage assets comprising four scheduled monuments, five conservation areas and 157 listed buildings.

7.5.5 The scheduled monuments within 3 km comprise:

- Wellingore village cross (NHLE: 1009214);
- Fulbeck village cross (NHLE:1009223);
- Castle Hill Ringwork (NHLE:1020436); and
- Somerton Castle (NHLE 1061974/ 1005015) (also Grade I listed).

7.5.6 The five conservation areas within the 3 km Study Area comprise Leadenham Conservation Area, Welbourn Conservation Area, Wellingore Conservation Area, Brant Broughton Conservation Area and Navenby Conservation Area.

7.5.7 The majority of the 157 listed buildings are listed at Grade II. These are concentrated within the villages surrounding the Solar PV Site and mostly consist of post-medieval houses and farm buildings. A full list of these assets is provided in the Gazetteer in Appendix C. However, there are nine Grade I listed buildings, and 12 Grade II* listed buildings, as described within the following paragraphs.

7.5.8 The Grade I listed buildings within the 3 km Study Area are:

- Church of St Chad, Welbourn (NHLE 1061852), approximately 280 m east of the Site;
- Church of St Helen, Brant Broughton (NHLE 1147497), approximately 380 m west of the Site;
- Church of St Michael, Stragglethorpe (NHLE 1061900), approximately 880 m south-west of the Site;
- Church of St Swithin, Leadenham (NHLE 1147388), approximately 900 m south-east of the Site;
- Church of All Saints, Wellingore (NHLE 1308424) approximately 1.7 km north-east of the Site;
- Church of St Nicholas, Fulbeck (NHLE 1166164), approximately 2.1 km south of the Site;
- Somerton Castle and outbuilding to the north-west (NHLE 1061974) approximately 2.9 km north of the Site;
- South-west outbuilding at Somerton Castle (NHLE 1061975) approximately 2.9 km north of the Site; and

- Orchard outbuilding at Somerton Castle (NHLE 1360511) approximately 2.99 km north of the Site.

7.5.9 There are 12 Grade II* listed buildings within the 3 km Study Area, which are:

- The Old Hall, Leadenham (NHLE 1061869; Grade II*) approximately 130 m south-east of the Site;
- Welbourn Manor (NHLE 1360567), approximately 320 m east of the Site;
- Brant Broughton Quaker Meeting House and attached stable (NHLE 1061898) approximately 470 m west of the Site;
- The Priory, gates and gate piers, Brant Broughton (NHLE 1360527), approximately 480 m west of the Site;
- Lister Place, gates and gate piers, Brant Broughton (NHLE 1061928) approximately 500 m west of the Site;
- Leadenham House (NHLE 1061877) approximately 850 m east of the Site;
- Wellingore Hall and attached Church of St Augustine (NHLE 1147748) approximately 1.8 km north-east of the Site;
- Fulbeck House (NHLE 1309048) approximately 1.98 km south-east of the Site;
- Fulbeck Hall (NHLE 1270291) approximately 2.1 km south-east of the Site;
- Gates of Fulbeck Hall (NHLE 1360292) approximately 2.1 km south-east of the Site;
- Ermine House, Fulbeck (NHLE 1062408) approximately 2.3 km south-east of the Site; and
- Fulbeck Manor (NHLE 1166259), approximately 2.3 km south-east of the Site.

7.5.10 Within the wider 5 km Study Area for assets of the highest value there are 15 assets comprising four scheduled monuments, six Grade I listed buildings, and five Grade II* listed buildings.

7.5.11 The four scheduled monuments within the 5 km Study Area comprise:

- Remains of preceptory church, Temple Bruer (NHLE: 1007686); approximately 4.6 km east of the Site.
- Churchyard cross, All Saints' churchyard (NHLE: 1009215); approximately 5 km north-west of the Site.
- Churchyard cross, All Saints' churchyard (NHLE: 1009216); approximately 4.1 km south-west of the Site, and

- Churchyard cross, St Vincent's churchyard (NHLE: 1009225); approximately 3.8 km south of the Site.

7.5.12 The six Grade I listed buildings within the 5 km Study Area are:

- Church of St Peter, Navenby (NHLE 1147458) approximately 3.02 km north-east of the Site;
- Church of St Mary, Carlton-le-Moorland (NHLE 1360553) approximately 3.6 km north-west of the Site;
- Parish Church of St Vincent, Caythorpe (NHLE 1317320) approximately 3.7 km south of the Site;
- Church of All Saints, Beckingham (NHLE 1360525) approximately 4.1 km west of the Site;
- Church Tower to the North of Temple Farmhouse (NHLE 1254328), Temple Bruer, approximately 4.2 km east of the Site; and
- Church of All Saints, Fenton (NHLE 1062914) approximately 4.6 km south-west of the Site.

7.5.13 The five Grade II* listed buildings within the 5 km Study Area are:

- Caythorpe Hall (NHLE 1165323), approximately 3.4 km south of the Site;
- Pickworth House, Caythorpe (NHLE 1062396), approximately 4 km south of the Site;
- Caythorpe Court (NHLE 1062429), approximately 4.4 km south-east of the Site;
- Brandon Old Hall (NHLE 1166332), approximately 4.9 km south-west of the Site; and
- Church of St Michael and All the Angels (NHLE 1061923) approximately 4.97 km north-west of the Site.

7.5.14 There are no World Heritage Sites, Registered Battlefields, Registered Parks and Gardens, or Protected Wrecks within the Site or any of the Study Areas.

Figure 7-1: Location of Designated Heritage Assets within 3km

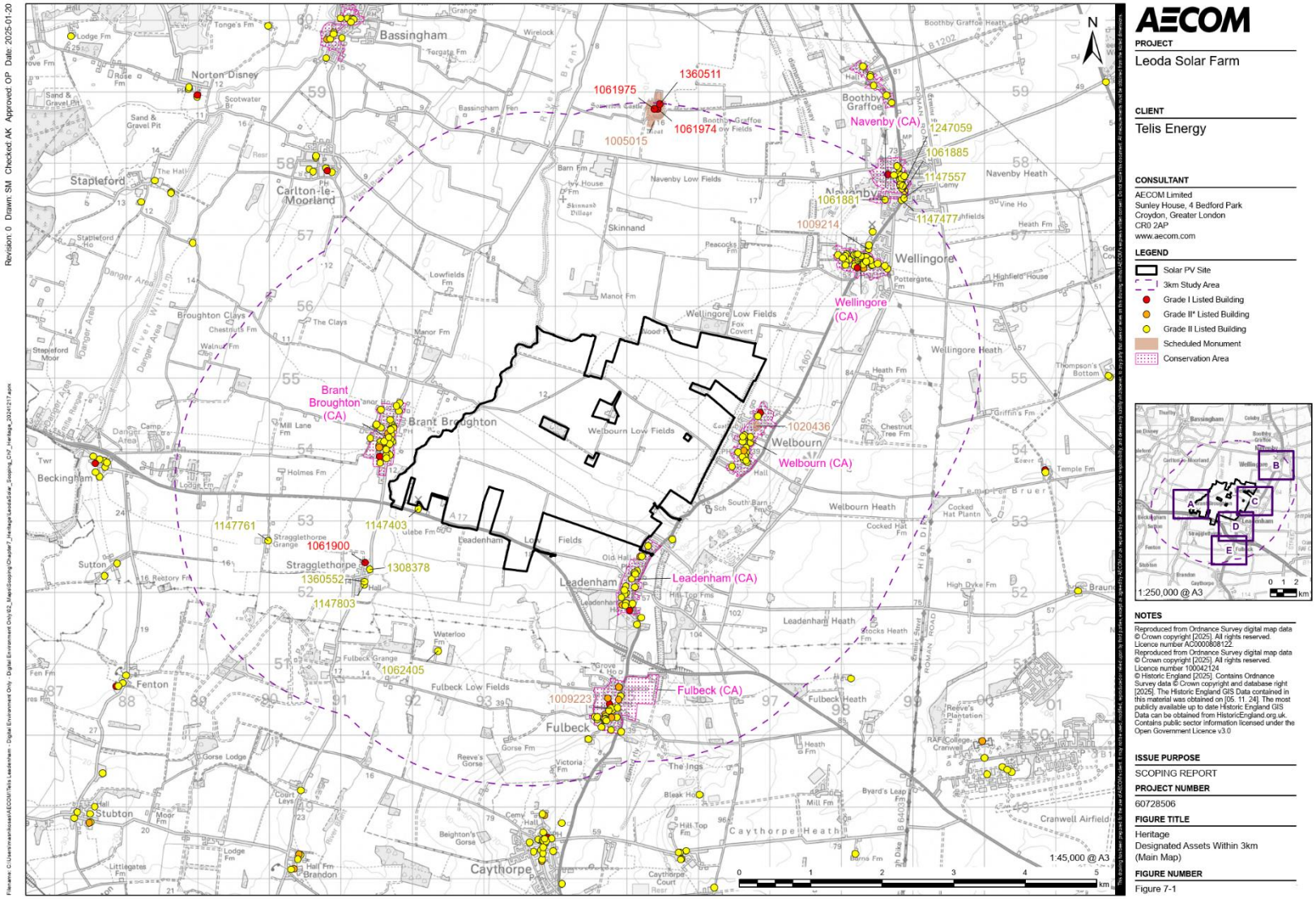
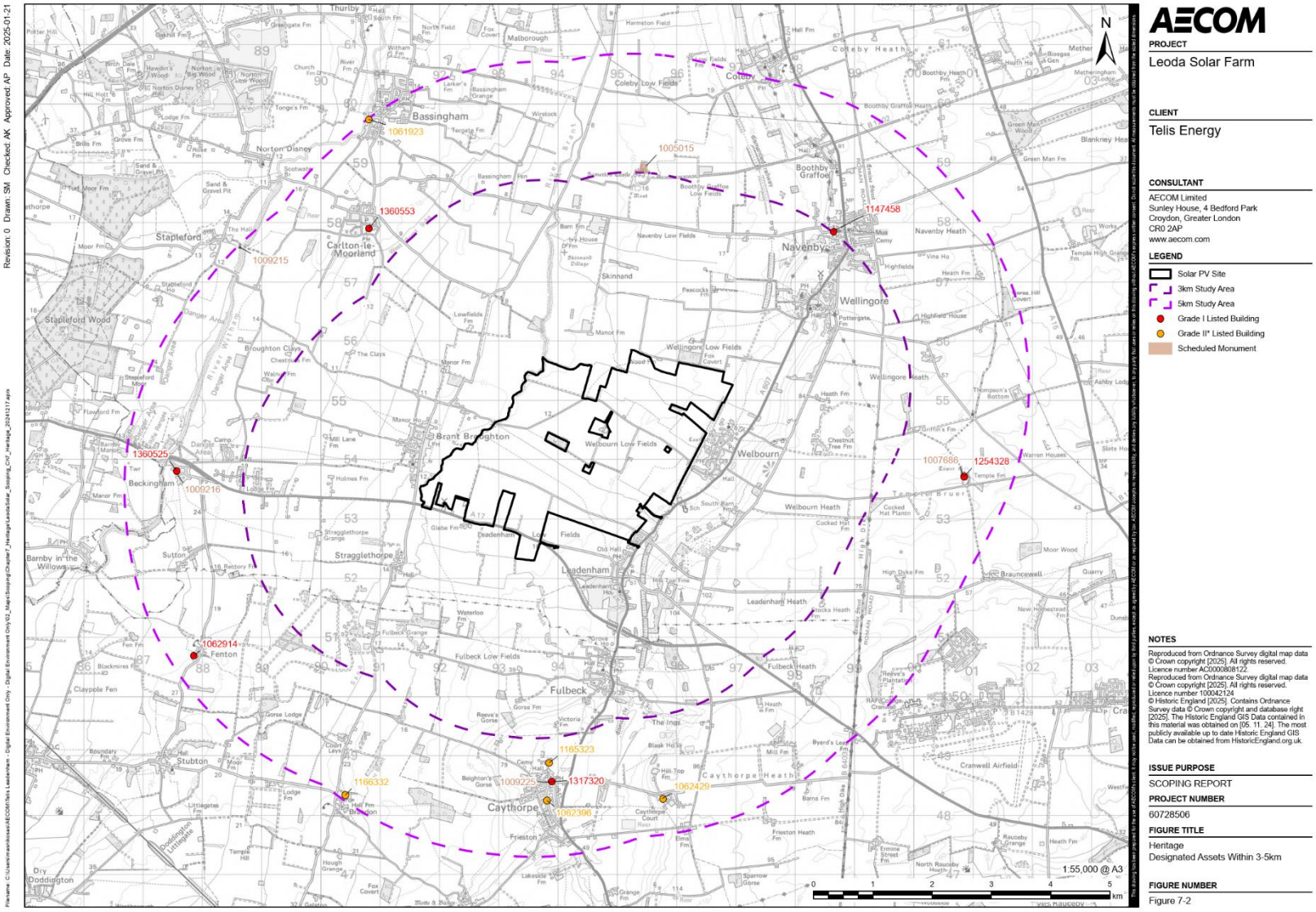


Figure 7-2: Designated Assets within 5km



Non-designated Assets

7.5.15 Non-designated heritage assets are identified by their Lincolnshire HER unique identification number and are illustrated on **Figure 7-3: Location of Non-designated Heritage Assets**.

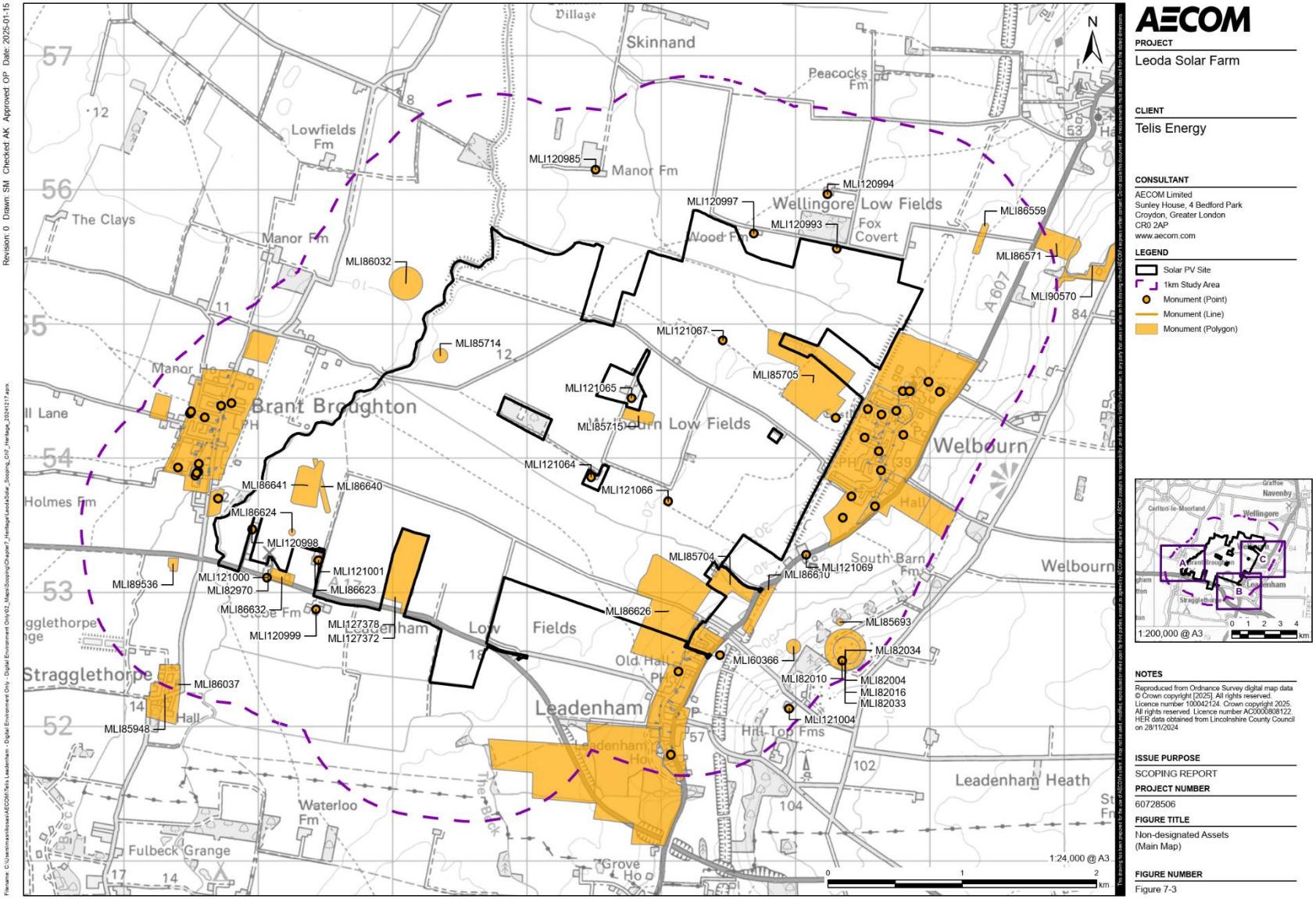
7.5.16 There are 100 non-designated heritage assets recorded in the 1 km Study Area. These include eight prehistoric, 17 Romano-British, six early medieval, 18 Medieval, 42 post-medieval, three modern and six undated assets. Of these, 18 are located wholly or partially within the Site.

7.5.17 The non-designated assets recorded within the Site Boundary comprise:

- Lowfields Farm, Welbourn (HER: MLI121065);
- Fox Covert Cottages, Welbourn (HER: MLI121064);
- Settlement of Welbourn (HER: MLI85689);
- Late medieval earthwork ridge and furrow, Welbourn (HER: MLI85704);
- Romano-British pottery scatter, near the River Brant, Welbourn (HER: MLI85714);
- Earthwork ridge and furrow, Welbourn (HER: MLI85715);
- Romano-British pottery scatter, Leadenham Low Fields (HER: MLI86624);
- Probably late medieval earthwork ridge and furrow, west of Leadenham (HER: MLI86626);
- Possible prehistoric cropmark pit alignment, north of Field House, Leadenham Low Fields (HER: MLI86640);
- Romano-British settlement, north of Field House, Leadenham Low Fields (HER: MLI86641);
- Late medieval earthwork ridge and furrow, Welbourn (HER: MLI85705);
- Pre-medieval Linear Features at Land off the A17, Leadenham (HER: MLI127372);
- Below Ground Ridge and Furrow Remains, Leadenham Low Fields (HER: MLI127378);
- Coin of Edward I, and other metal object, Welbourn. (HER: MLI60503);
- Unnamed farmstead, Wellingore (HER: MLI120993);
- Unnamed farmstead, Welbourn (HER: MLI121066);

- Unnamed farmstead, Welbourn (HER: MLI121067); and
- Settlement of Leadenham (MLI80739).

Figure 7-3: Location of Non-designated Heritage Assets



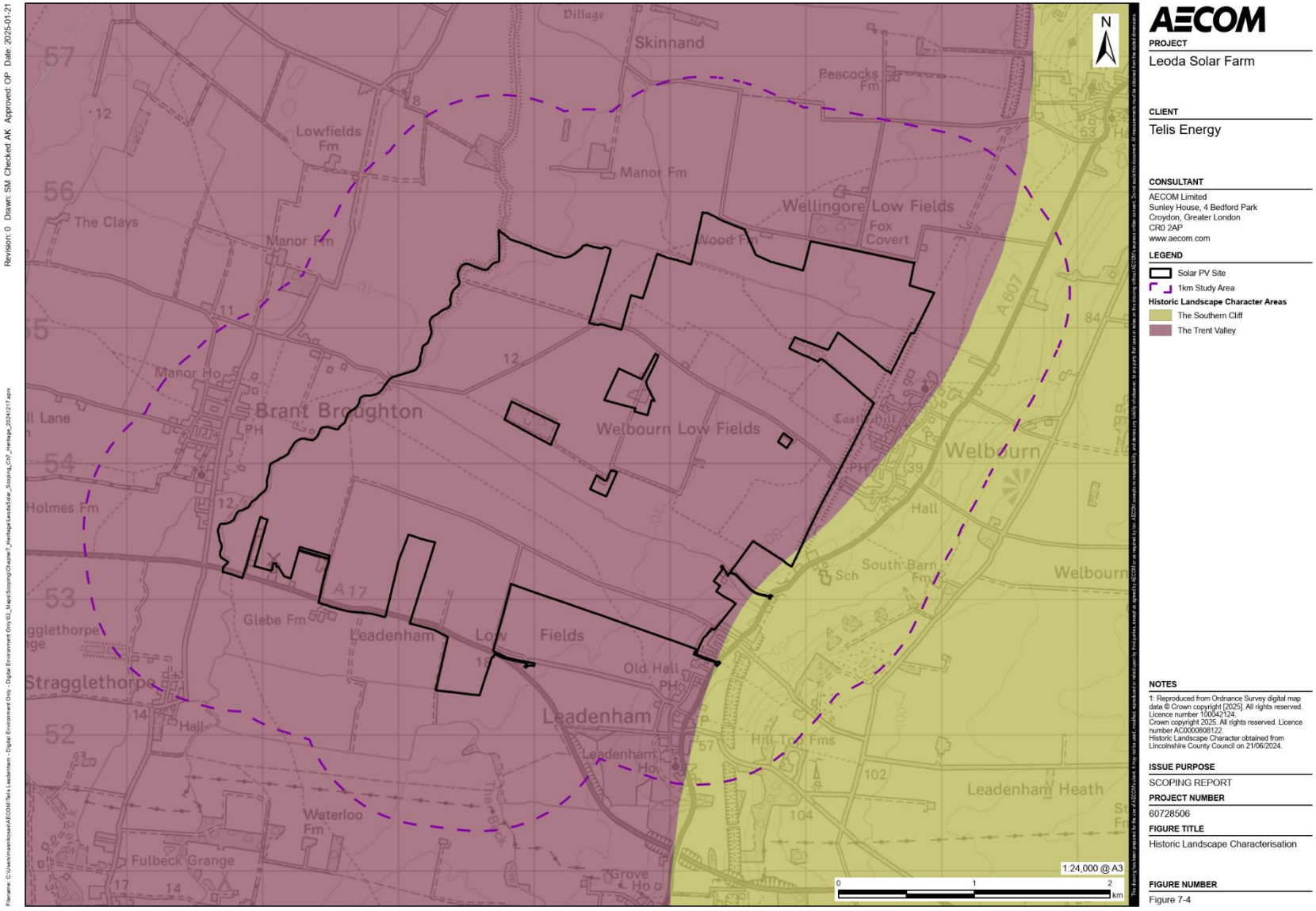
Historic Landscape Characterisation

7.5.18 Natural England has divided the UK landscape into 159 National Character Areas (NCA), which form broad and cohesive landscape divisions, the character and features of which provide useful context and understanding of the development of the historic landscape. The Study Areas extend across two of these NCA; Area 45: Northern Lincolnshire Edge with Coversands extends north-south along the eastern limits of the 1km Study Area and Site, while the remainder of the Scheme falls within Area 48: Trent and Belvoir Vales.

7.5.19 The Historic Landscape Characterisation (HLC) is a project supported by Historic England, Lincolnshire Wolds Countryside service and individual councils to investigate how landscape has been shaped by natural and human activities. To illustrate this the project split Lincolnshire into areas and zones. Historic Landscape Character Zones (HLCSZ's) are depicted on **Figure 7-4: Historic Landscape Character within Study Area.** The Study Area lies within two HLCSZ's, the Valley of Fens Historic Landscape Character Zone (TVL3), which is within the wider The Trent Valley Historic Landscape Character Area, and The Southern Cliff Heath Historic Landscape Character Zone (SCL1), which is within the wider The Southern Cliff Historic Landscape Character Area.

7.5.20 The HLCSZ's were not provided within the HER data, instead they are accessible on the Lincolnshire County Council website (Ref 7-21).

Figure 7-4: Historic Landscape Character within Study Area.



7.6 Potential Effects and Mitigation

7.6.1 There is potential for previously unrecorded archaeological finds, features and deposits to survive within the Site Boundary. These remains could potentially be affected during excavation works required during construction including, but not limited to, power control infrastructure and on-site cabling, the laying of the required connector cables and the establishment of a construction compounds and access tracks. The construction of the PV module mounting structures are direct piled into the ground and therefore do not require excavation, but they still have the potential to impact archaeological remains.

7.6.2 The following assets within the Site Boundary may be physically impacted by the Scheme:

- Lowfields Farm, Welbourn (HER: MLI121065);
- Fox Covert Cottages, Welbourn (HER: MLI121064);
- Settlement of Welbourn (HER: MLI85689);
- Late medieval earthwork ridge and furrow, Welbourn (HER: MLI85704);
- Earthwork ridge and furrow, Welbourn (HER: MLI85715);
- Probably late medieval earthwork ridge and furrow, west of Leadenham (HER: MLI86626);
- Possible prehistoric cropmark pit alignment, north of Field House, Leadenham Low Fields (HER: MLI86640);
- Romano-British settlement, north of Field House, Leadenham Low Fields (HER: MLI86641);
- Late medieval earthwork ridge and furrow, Welbourn (HER: MLI85705);
- Pre-medieval Linear Features at Land off the A17, Leadenham (HER: MLI127372);
- Below Ground Ridge and Furrow Remains, Leadenham Low Fields (HER: MLI127378);
- Unnamed farmstead, Wellingore (HER: MLI120993);
- Unnamed farmstead, Welbourn (HER: MLI121066);
- Unnamed farmstead, Welbourn (HER: MLI121067); and
- Settlement of Leadenham (HER: MLI80739).

7.6.3 As detailed earlier within this chapter, the non-designated assets recorded within the Solar PV Site Boundary included findspots, which are not considered extant

assets and as such are scoped out of assessment. Three such records, comprising the findspot of a coin and two pottery scatters, have been scoped out of the assessment.

7.6.4 There is also the potential for effects on designated and non-designated heritage assets within the Site and Study Areas through change to their setting during construction, operation and/or decommissioning of the Scheme. An initial list of such assets, based on their proximity to the Scheme, includes but is not limited to:

- Leadenham Conservation Area and listed buildings within;
- Welbourn Conservation Area and listed buildings within;
- Leadenham Mill (NHLE 1147403) Grade II listed building;
- Fox Covert Cottages, Welbourn (HER: MLI121064);
- Lowfields Farm, Welbourn (HER: MLI121065);
- Old Brickworks, Leadenham Low Fields (HER:MLI86632);
- Oak Trees, Leadenham (HER: MLI120998);
- The Millhouse (Leadenham Mills), Leadenham (HER: MLI121000);
- Wood Farm, Wellingore (HER: MLI120997);
- Leadenham railway station, Main Road (HER: MLI86610);
- Glebe Farm, Leadenham (HER: MLI120999);
- Medieval ridge and furrow located to the southeast of Brant Broughton (HER: MLI86026); and
- Multiple-ditched boundary lying to the west of the River Brant, north of Brant Broughton (HER: MLI86032).

7.6.5 The historic landscape character may also be subject to change as a result of the construction, operation and/or decommissioning of the Scheme.

7.6.6 The Scheme will be designed to avoid or minimise potential changes to the setting of designated heritage assets, including Grade I, Grade II* and Grade II listed buildings, with a minimum 100m offset from any designated heritage asset implemented as part of the Scheme design.

7.6.7 The external finish of infrastructure within Field Stations will be typically in keeping with the prevailing surrounding environment, to minimise the visual impact. External finish varies between manufacturers and colour would be confirmed during detailed design but is most often a grey or green painted finish.

7.6.8 Given the potential for effects on the historic environment, all aspects of cultural heritage, comprising archaeology, built heritage and historic landscape, are scoped into the EIA and no matters are scoped out (**Table 7-3**).

7.7 Assessment Methodology

7.7.1 The assessment of potential effects as a result of the Scheme on cultural heritage will be undertaken using the methodology set out below. A consideration of any combined and cumulative effects will also be included.

7.7.2 The value of a heritage asset (its heritage significance) is guided by its designated status but is derived also from its heritage interest which may be archaeological, architectural, artistic or historic (NPPF Annex 2, Glossary) (Ref 7-9). Each identified heritage asset can be assigned a value in accordance with the criteria set out in **Table 7-1**. Using professional judgement and the results of consultation to be carried out as part of the assessment, heritage assets will be assessed on an individual basis and regional variations and individual qualities will be taken into account, where applicable, to assign the value.

Table 7-1: Criteria for assessing the value of heritage assets

Asset value	Description
High	World Heritage Sites Scheduled Monuments Grade I and II* listed buildings Registered battlefields Grade I and II* registered parks and gardens Conservation areas of demonstrable high value Non-designated heritage assets (archaeological sites, historic buildings, monuments, parks, gardens or landscapes) that can be shown to have demonstrable national or international importance Well preserved historic landscape character areas, exhibiting considerable coherence, time-depth or other critical factor(s)
Medium	Grade II listed buildings Conservation areas Grade II registered parks and gardens Conservation areas Non-designated heritage assets (archaeological sites, historic buildings, monuments, park, gardens or landscapes) that can be shown to have demonstrable regional importance Averagely preserved historic landscape character areas, exhibiting reasonable coherence, time-depth or other critical factor(s) Historic townscapes with historic integrity in that the assets that constitute their make-up are clearly legible
Low	Locally listed buildings Non-designated heritage assets (archaeological sites, historic buildings, monuments, park, gardens or landscapes) that can be shown to have demonstrable local importance Assets whose values are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade Historic landscape character areas whose value is limited by poor preservation and/ or poor survival of contextual associations
Very Low	Assets identified on national or regional databases, but which have no archaeological, architectural, artistic or historic value Assets whose values are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade Landscape with no or little significant historical merit

7.7.3 Having identified the value of the heritage asset, the next stage in the assessment will be to identify the level and degree of impact to an asset arising from the Scheme. Impacts may arise during construction, operation and/or operation decommissioning and can be temporary, reversible, or permanent. Impacts can occur to the physical fabric of the asset or affect its setting. The contribution of the setting to the significance of any affected assets will be subject to assessment.

7.7.4 The level and degree of impact (impact rating) will be assigned with reference to a four-point scale as set out in **Table 7-2**. The assessment of the level and degree of impact will be made in consideration of any scheme design mitigation (embedded mitigation). If no impact is identified, no impact rating will be given, and no resulting effect reported.

Table 7-2: Factors influencing the assessment of magnitude of impacts

Magnitude of Impact	Description of impact
High	Changes such that the significance of the asset is totally altered or destroyed Comprehensive change to, or total loss of, elements of setting that would result in harm to the asset and our ability to understand and appreciate its significance
Medium	Change such that the significance of the asset is significantly altered or modified Changes such that the setting of the asset is noticeably different, affecting significance and resulting in changes in our ability to understand and appreciate the significance of the asset
Low	Changes such that the significance of the asset is slightly affected Changes to the setting that have a slight impact on significance resulting in changes in our ability to understand and appreciate the significance of the asset
Very Low	Changes to the asset that hardly affect significance. Changes to the setting of an asset that have little effect on significance and no real change in our ability to understand and appreciate the significance of the asset

7.7.5 An assessment to classify the effect, having taken into consideration any embedded mitigation, is determined using the matrix in **Chapter 5: Environmental Impact Assessment Methodology**.

7.7.6 Major and moderate effects will be considered significant. Within the NPS EN-1 (Ref 7-6) (and NPPF Section 16 (Ref 7-9)) , impacts affecting the value of heritage assets are considered in terms of harm, and there is a requirement to determine whether the level of harm amounts to ‘substantial harm’ or ‘less than substantial harm’. There

is no direct correlation between the classification of effect as reported in the ES and the level of harm caused to heritage significance in accordance with the NPS. A harm statement will be provided in the DCO documentation assessing the degree of harm to impacted designated heritage assets (and non-designated archaeological assets of equivalent value to a scheduled monument), irrespective of the degree of significance of effect reported in the ES.

7.7.7 Pursuant to NPS EN-1, Paragraph 5.9.13 (Ref 7-6), any harmful impact to the significance of a designated heritage asset should be weighed against the public benefit of the Scheme, whilst Regulation 3 of the Infrastructure Planning (Decisions) Regulations 2010 (Ref 7-1) requires the Secretary of State to have regard to the desirability of preserving a listed building or its setting. In all cases, the determination of the level of harm to the significance of the asset arising from development impact is one of professional judgement and will be undertaken adopting a precautionary approach.

7.7.8 This baseline assessment will be undertaken in accordance with guidance set out by the CIfA and Historic England, in particular the Standard and Guidance for Historic Environment Desk-Based Assessment (Ref 7-15) and the Code of Conduct (Ref 7-16).

7.7.9 Principles of Cultural Heritage Impact Assessment in the UK (Ref 7-17) is a guide to good practice in cultural heritage impact assessment published jointly by the IEMA, the IHBC and the CIfA. The document provides guidance on understanding cultural heritage assets and evaluating the consequences of change and will be considered when undertaking the assessment.

Walkover Survey

7.7.10 A walkover survey will be undertaken including a survey of known archaeological and built heritage assets within the Site Boundary and the immediate vicinity to record their survival, extent, condition, setting and significance.

7.7.11 A site visit will also be undertaken to the Study Areas to assess the setting of assets which could potentially be affected by the Scheme. This setting assessment will be undertaken from publicly accessible areas with the aim of establishing the key features of the asset's setting, alongside any intervisibility or other setting relationship with the Site.

Desk-based Assessment

7.7.12 A cultural heritage Desk-Based Assessment (DBA) will be prepared in accordance with industry standards and best practice guidelines (Ref 7-15), and with reference to any statutory consultation responses received as part of the EIA Scoping Opinion. The DBA will inform the cultural heritage chapter of the ES and will form an appendix to the ES. The DBA, alongside the results of agreed evaluation surveys (see section 7.7.14 below), will confirm whether additional surveys are required to better determine the nature, extent and origin of archaeological remains within the construction footprint of the Scheme.

Desk-based sources

7.7.13 Sources of information that will be consulted include:

- National Heritage List for England (NHLE) database (Ref 7-20);
- Formal searches of the Lincolnshire Historic Environment Record (HER) including the Historic Landscape Characterisation (HLC) data if available;
- North Kesteven's local list of non-designated heritage assets;
- Various online resources including the British Geological Survey (BGS) Geology of Britain Viewer (Ref 7-21) and the local planning portal for the Local Plan and other planning information;
- Published and unpublished literature (including a detailed review of reports for previous fieldwork carried out within the proximity to the Site Boundary);
- Existing geotechnical data;
- Available 1 m and 2 m spatial resolution LiDAR data published by the Environment Agency;
- Documentary, cartographic and other resources as deposited within the local Archives and Local Studies Library and the National Archives at Kew; and
- Local Planning Authority Plans, Guidance and Lists.

Additional Surveys

7.7.14 The desk-based assessment will be augmented by the undertaking of LiDAR and air photo analysis, interpretation and assessment of the Site, using all available oblique and vertical air photos from local and national archival sources. The desk-based research will also be supported by a programme of archaeological investigation. A geophysical survey of the Site will be undertaken to establish the potential for the presence of below-ground archaeological remains within the Site Boundary. The scope of geophysical survey will be agreed with the Historic Environment Officers for LCC and will be undertaken within areas of the Site Boundary that are suitable for survey and where land access can be obtained by way of landowner agreement.

7.7.15 Further archaeological evaluation may be undertaken as part of the assessment process, the scope of which will be informed by the DBA, the outcomes of the geophysical survey, aerial photograph and LiDAR analysis and through consultation with the Historic Environment Officers for LCC. These additional surveys (if required) may include, but are not limited to:

- Monitoring of geotechnical ground investigations to establish the geoarchaeological baseline conditions and to assess the potential for deposits containing palaeoenvironmental data to be present; and

- Archaeological trial trench evaluation to confirm the results of the geophysical survey, characterise the nature, extent and preservation level of archaeological remains in order to understand their heritage value, and to inform a suitable mitigation response.

7.8 Limitations and Assumptions

7.8.1 It is assumed that there will be access to all required land to undertake the walkover survey and any additional surveys that may be required to support the ES. In the event that access is not available a professional judgement and a precautionary principle approach will be adopted, based on available research and data, to assess the archaeological potential of the area.

7.8.2 It is assumed that the data provided by external sources is accurate.

7.9 Summary of Elements Scoped In and Scoped Out

7.9.1 A summary of the elements scoped into and out of the cultural heritage assessment are presented in **Table 7-3**.

Table 7-3: Elements scoped in and out of the assessment of cultural heritage

Element	Scoped in / Scoped Out
Built heritage	Scoped in. An assessment of impact on built heritage assets including impacts arising from changes to their setting.
Archaeology	Scoped in. An assessment of impact on archaeological assets including impacts arising from changes to their setting.
Historic landscape	Scoped in. An assessment of impact on the historic landscape.
Non-designated findspots recorded within the Site	The non-designated findspots (comprising the findspot of a coin and two pottery scatters) recorded within the Site Boundary are not considered extant assets and as such are scoped out of assessment.

8 Ecology and Nature Conservation

8.1 Introduction

8.1.1 This chapter of the EIA Scoping Report presents an initial overview of the baseline conditions for ecology and nature conservation (collectively referred to as biodiversity) that are relevant to the Scheme. It identifies the scope of the assessment and requirement for additional surveys to accurately characterise the baseline. In addition, this chapter provides an overview of the potential impacts of the Scheme on biodiversity and the proposed assessment method for the ecological impact assessment (EcIA) that will be included in the Environmental Statement (ES).

8.1.2 A Preliminary Ecological Appraisal (PEA) has been undertaken which consisted of three components:

- A desktop study data review, including a request for data from Greater Lincolnshire Nature Partnership (GLNP) / Lincolnshire Environmental Records Centre (LERC);
- A walkover survey of accessible areas of the Site, to record the broad habitats (using UKHab methods (Ref 8-1)); and
- A protected species scoping survey, to inform on the likelihood of the habitats on Site supporting protected species and other species of conservation concern.

8.1.3 The PEA report (information from which is included in this chapter) confirmed the need for ecological surveys and these commenced on the Solar PV Site (where access permitted) in March 2024 (with surveys for breeding birds) and will continue through 2025 and into 2026 (where necessary), to gather detailed baseline ecological information relevant to the Scheme.

8.1.4 The ecology and nature conservation chapter of the ES will fully identify and characterise any relevant important ecological features (IEFs) (including designated sites, priority habitats and protected or notable species) and will consider the effects that the Scheme is likely to have on their conservation status and contribution to local, regional and (if appropriate) national biodiversity targets.

8.1.5 The assessment will identify prevention, avoidance, reduction, mitigation and, if necessary, compensation measures that may be required to enable the Scheme to proceed, in compliance with relevant legislation and planning policies. The works for the Scheme will be planned accordingly, to demonstrate that due consideration has been given to IEFs, including provisions for biodiversity enhancements, where appropriate.

8.1.6 This chapter is accompanied by the following figures:

- **Figure 8-1: Location of Statutory Sites**
- **Figure 8-2: Location of Non-Statutory Sites;** and
- **Figure 8-3: Ancient Woodland and Priority Habitats identified within 2km of the Site.**

8.1.7 There are no appendices to accompany this chapter.

8.2 Study Area

8.2.1 Within this EIA Scoping Report, the following terminology is used when referring to the geographic areas within which assessments will be made:

- Study Area – the Scheme area and an appropriate radius (as defined in paragraph 8.2.4) which has and will be subject to collection of background information, e.g., the location of non-statutory designated sites within 2 km of the Site;
- Zone of Influence (ZoI) – the area over which biodiversity features may be affected by biophysical changes as a result of the Scheme and associated activities (Ref 8-2) and based on:
- The nature of the Scheme (a solar farm, and associated infrastructure), associated Scheme activities, and the potential for effects at all development stages (construction, operation (including maintenance) and decommissioning);
- The nature of the current land use and habitats in the vicinity (majority being arable), their connectivity (e.g. through hedgerows, ditches or grassland margins), and how they may be used by different species;
- The presence and assemblages of species which may be in the area based on the location of the Scheme and desk study data; and
- The different habits, behaviours and preferences of different species that could be affected, and how these vary both spatially and seasonally.

8.2.2 Using the criteria above and proportionate to the Scheme's potential to impact on each feature. Through review of likely impacts of the Scheme and results of the desk study, the scope of field surveys was then defined; and

- Survey Area – the area within which field survey work was, or will be, undertaken.

8.2.3 The Site includes the Solar PV Site (to include solar arrays, battery storage and associated infrastructure) and the Grid Connection Corridor (as defined in Chapter 1 of this EIA Scoping Report). The Site is within the administrative county of Lincolnshire, however this chapter of the EIA Scoping Report recognises that key aspects of biodiversity are coordinated and managed within the geography of

Greater Lincolnshire, for example the Nature Strategy for the Greater Lincolnshire Nature Partnership. This will be considered when undertaking the assessment.

8.2.4 The Study Area captures all designated sites, sensitive habitats, and species of importance that occur within the relevant Zol of the Scheme. The boundaries and zones for the Study Area reflect standard good practice and are informed by published guidance (Ref 8-2) and professional judgement.

8.2.5 In defining individual Study Areas, consideration was given to the geographic location, nature, and scale of the Scheme. The Study Area, within which data were searched and collated through a desk study, is within the Site and up to:

- 10 km for European sites, extended to 20 km where birds with extensive foraging ranges (e.g. Pink-footed Goose *Anser brachyrhynchus* or Golden Plover *Pluvialis apricaria*) are noted as a qualifying feature and 30 km from the Site for any Special Area for Conservation (SAC) where bats are noted as the, or one of, the qualifying features. In addition, a search beyond these distances was undertaken to determine whether the Site is hydrologically connected to any European sites;
- 5 km for sites statutory designated for their biodiversity value at a National level, e.g. Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs). In addition, for the purposes of potential air quality impacts on biodiversity, consideration beyond this distance will be given where a designated site is identified as being within 200 m of the Affected Road Network, if appropriate;
- 2 km for sites non-statutory designated for their biodiversity value, e.g. Local Wildlife Sites (LWSs), Sites of Importance for Nature Conservation (SINC) In addition, for the purposes of air quality, consideration beyond this distance will be given where a designated site is identified as being within 200 m of the Affected Road Network, if appropriate;
- 2 km for Ancient Woodland, veteran trees and Priority Habitats;
- 2 km for records (from the preceding ten years) of protected and notable species;
- 2 km for aquatic species records. However, where relevant records of notable aquatic species were available from connected water bodies, a wider search area was utilised to consider connectivity for migratory species (e.g., fish);
- 2 km for any applications for European Protected Species Licences and agri-environment schemes, e.g. Countryside Management Schemes; and
- 2 km for the status of water bodies subject to the Water Framework Directive (WFD) (Ref 8-3). As impacts may propagate downstream in hydrologically linked surface water bodies, the Study Area was extended beyond 2 km where data was not available within 2 km.

8.3 Legislation, Planning Policy Context and Guidance

8.3.1 Legislation, planning policy and guidance relating to biodiversity (including designated sites, priority habitats and protected or notable species) pertinent to the Scheme is outlined below.

Legislation

8.3.2 Legislation applicable to the Scheme and biodiversity is:

- Habitats Directive – Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Ref 8-4);
- Birds Directive - Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Ref 8-5);
- Regulation (EU) 1143/2014 of the European Parliament and of the Council on the prevention and management of the introduction and spread of invasive alien species (Ref 8-6);
- Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ref 8-7);
- Wildlife and Countryside Act 1981 (as amended) (Ref 8-8);
- Environment Act 2021 (Ref 8-9);
- Countryside and Rights of Way (CRoW) Act 2000 (Ref 8-10);
- The Conservation of Habitats & Species Regulations 2017 (as amended) (Ref 8-11);
- The Natural Environment and Rural Communities (NERC) Act 2006 (Ref 8-13);
- Protection of Badgers Act 1992 (Ref 8-14);
- The Hedgerows Regulations 1997 (Ref 8-15);
- Wild Mammals (Protection) Act 2006 (Ref 8-16);
- Salmon and Freshwater Fisheries Act 1975 (Ref 8-17);
- The Eels (England and Wales) Regulations 2009 (Ref 8-18);
- The Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 8-19); and
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 8-3).

8.3.3 The above legislation will be referenced when identifying potential constraints to the Scheme, design options and mitigation. Compliance with the above legislation may require obtaining relevant protected species licences prior to the implementation of the Scheme.

Habitats Regulations Assessment

8.3.4 As part of the assessment of a development, it is necessary to consider whether the Scheme is likely to have a significant effect on areas that have been internationally designated for nature conservation purposes (i.e. European sites (previously the 'Natura 2000 network')). European Union (EU) legislation as it applied to the UK on 31st December 2020 is now a part of UK domestic legislation as 'retained EU legislation'. European sites are protected under the Conservation of Habitats and Species Regulations 2017 (Ref 8-11) which effectively continues the legislation which implemented the EU Habitats and Species Directive (Ref 8-5) and parts of the Wild Birds Directive (Ref 8-6) through the provisions of the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ref 8-12). The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ref 8-12) make it clear that the need for Habitats Regulations Assessment (HRA) continues to apply.

8.3.5 The HRA will be undertaken with reference to the general EU guidance on HRA (Ref 8-20), general guidance on HRA published by the UK government in July 2019 (Ref 8-21) and Planning Inspectorate (PINS) Guidance on Nationally Significant Infrastructure Projects: Advice on Habitats Regulations Assessments (Ref 8-22). Although the UK has departed the EU, the HRA will nonetheless take account of relevant EU case law (for instance, the Holohan (Ref 8-23) and People over Wind (Ref 8-24) cases) as a precaution and where relevant.

8.3.6 Whilst the HRA decisions must be taken by the competent authority (the Secretary of State, informed by the recommendations of the appointed Examining Authority), the information needed to undertake the necessary assessments must be provided by the Applicant. The information needed for the competent authority to establish whether there are any Likely Significant Effects (LSEs) from the Scheme and to assist in carrying out its Appropriate Assessment, will be provided in the HRA Report.

8.3.7 Stage 1 of the HRA process (Screening) will consider the potential impact pathways between the Scheme and European sites within 10 km of the Site (on the basis that it is unlikely that a Scheme such as this will affect sites further afield), and whether there is potential to have a significant adverse effect on the integrity of European sites, either alone or in combination with other plans or projects. The Study Area for HRA will be extended to 20 km from the Site where birds with extensive foraging ranges (e.g. Pink-footed Goose or Golden Plover) are noted as a qualifying feature and 30 km for any European site for which bats are a qualifying feature. In addition, a search beyond these distances was undertaken to determine whether the Site is hydrologically connected to any European site or sites.

8.3.8 Stage 1 will result in the preparation of a HRA Screening Report which will be submitted at the PEIR stage, and this will be updated as necessary for DCO application, including a report to inform Appropriate Assessment (Stage 2), if required.

National Planning Policy

8.3.9 The Ecology and Nature Conservation chapter of the ES will consider relevant NPS for energy, including relevant sections for solar and biodiversity. These NPS set out national policy for energy infrastructure and provide guidance and the legal framework for planning decisions. They comprise the United Kingdom (UK) government's objectives for the development of nationally significant infrastructure and take account of government policy relating to the mitigation of, and adaptation to, climate change. Therefore, the following NPS, which were released in November 2023 and which came into force on 17 January 2024, have been reviewed and are relevant to the Scheme and biodiversity:

- Overarching NPS for Energy (NPS EN-1) (Ref 8-25);
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Ref 8-26); and
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Ref 8-27).

8.3.10 The National Planning Policy Framework (NPPF) (Ref 8-28) sets out the UK Government's planning policies for England and how these are expected to be applied. While the NPPF does not contain specific policies for NSIPs like those in the above NPS, it remains a relevant matter for consideration as to the Government's general directions in respect of planning. The NPPF with particular reference to Section 15 (conserving and enhancing the natural environment) states that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity.

8.3.11 The NPPF (Ref 8-28) is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieving net gains for nature, and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution.

8.3.12 The NPPF (Ref 8-28) also specifies the obligations that the Local Authorities and the UK Government have regarding sites statutory designated for their biodiversity value and otherwise protected or notable habitats and protected species under UK and international legislation and how this is to be delivered in the planning system.

8.3.13 Priority habitats and protected or notable species are of material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted and significant harm to biodiversity cannot be avoided, then adequate mitigation measures (or as a last resort, compensation) will be required to avoid or minimise impacts on certain habitats and species.

Local Planning Policy

8.3.14 The Central Lincolnshire Local Plan (Ref 8-29), specifically Policy S60: Protecting Biodiversity and Geodiversity, Policy S61: Biodiversity Opportunity and Delivering Measurable Net Gains and Policy S66: Trees, Woodland and Hedgerows are relevant to biodiversity and the Scheme.

8.3.15 Policy S60: Protecting Biodiversity and Geodiversity sets out the level of protection afforded to International, National and Local Sites as well as Irreplaceable Habitats. It states that development should:

- "protect, manage, enhance and extend the ecological network of habitats, species and sites of international, national and local importance (statutory and non-statutory), including sites that meet the criteria for selection as a Local Site;
- minimise impacts on biodiversity and features of geodiversity value;
- deliver measurable and proportionate net gains in biodiversity in accordance with Policy S61; and
- protect and enhance the aquatic environment within or adjoining the site, including water quality and habitat".

8.3.16 Policy S61: Biodiversity Opportunity and Delivering Measurable Net Gains states that:

- "all development proposals, unless specifically exempted by the Government, must provide clear and robust evidence for biodiversity net gains and losses in the form of a biodiversity gain plan, which should be submitted with the application form".

8.3.17 Policy S66: Trees, Woodland and Hedgerows states that:

- "development proposals should be prepared based on the overrising principal that the existing tree and woodland cover is maintained, improved and expanded; and
- opportunities for expanding woodland are actively considered and implemented where practical and appropriate to do so."

Other Guidance

8.3.18 Other guidance documents relevant to the assessment of the impacts of the Scheme on biodiversity, are:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Costal and Marine (Ref 8-2);
- Environmental Improvement Plan 2023 (Ref 8-30);

- Biodiversity 2020: A strategy for England's Wildlife and Ecosystem Services (Ref 8-31);
- Biodiversity Guidance for Solar Developments (Ref 8-32);
- Natural England (NE) and Department for Environment, Food and Rural Affairs (DEFRA) Standing Advice (protected species) (Ref 8-33);
- The UK Biodiversity Action Plan (BAP) list of priority habitats and species (Ref 8-34Ref 8-29), succeeded by the UK Biodiversity Framework (Ref 8-35);
- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Ref 8-36);
- Mitigating biodiversity impacts associated with solar and wind energy development: Guidelines for project developers (Ref 8-37);
- NE's evidence review of the impacts of solar farms on birds, bats and general ecology (Ref 8-38);
- NE's Technical Information Note TIN101 Solar parks: Maximising Environmental Benefits (Ref 8-39);
- Greater Lincolnshire Biodiversity Opportunity Mapping (Ref 8-40);
- Central Lincolnshire Green Infrastructure Strategy (Ref 8-41);
- Lincolnshire Biodiversity Action Plan (LBAP) (3rd edition) (Ref 8-42), succeeded by the Greater Lincolnshire Local Nature Recovery Strategy (Ref 8-43);
- The Guidelines for the Selection of Biological SSSI (Ref 8-44);
- Local Wildlife Site Guidelines for Greater Lincolnshire (Ref 8-45); and
- State of Nature 2023 report (Ref 8-46).

8.3.19 Technical guidance that has been used to define the survey methods for habitats and species is included in Table 8-3 and will be included in the methods section of the relevant technical appendices, submitted with the ES chapter.

8.4 Consultation

8.4.1 Consultation will be carried out as necessary with statutory consultees, including Natural England, local council biodiversity officers and the Environment Agency, as well as other interested parties such as Lincolnshire Wildlife Trust. Engagement on the scope and methodology of surveys necessary to inform the assessment, potential ZoIs as defined by the CIEEM Guidance (Ref 8-2), and the IEFs to be considered as part of the assessment will be sought.

8.5 Baseline Conditions

8.5.1 The known or predicted ecological baseline conditions are summarised in the following sections. These will be fully defined as the Applicant continues to undertake detailed ecological surveys and assessment.

Statutory designated sites

8.5.2 Statutory sites that are designated for their biodiversity value were identified through a review of the Multi-Agency Geographic Information for the Countryside (MAGIC) (Ref 8-47) website.

8.5.3 There are no sites statutory designated for their biodiversity value at an international or European level within 10 km of the Site and no European sites within 20 km and 30 km of the Site for which birds or bats, respectively, are a qualifying feature. The closest European site is Birklands and Bilhaugh SAC, which is approximately 33 km west of the Site and is designated for its old acidophilous oak woods.

8.5.4 Beyond the 30 km Study Area, the River Brant, which is along the western boundary of the Site, does connect downstream to the River Witham which eventually flows in to the Wash SPA/Ramsar and The Wash and North Norfolk Coast SAC. These statutory designated sites are >70 km downstream of the Scheme. At this distance, it is considered that there are no potential impacts arising as a result of the Scheme and as such the Scheme will not have a likely significant effect upon these sites.

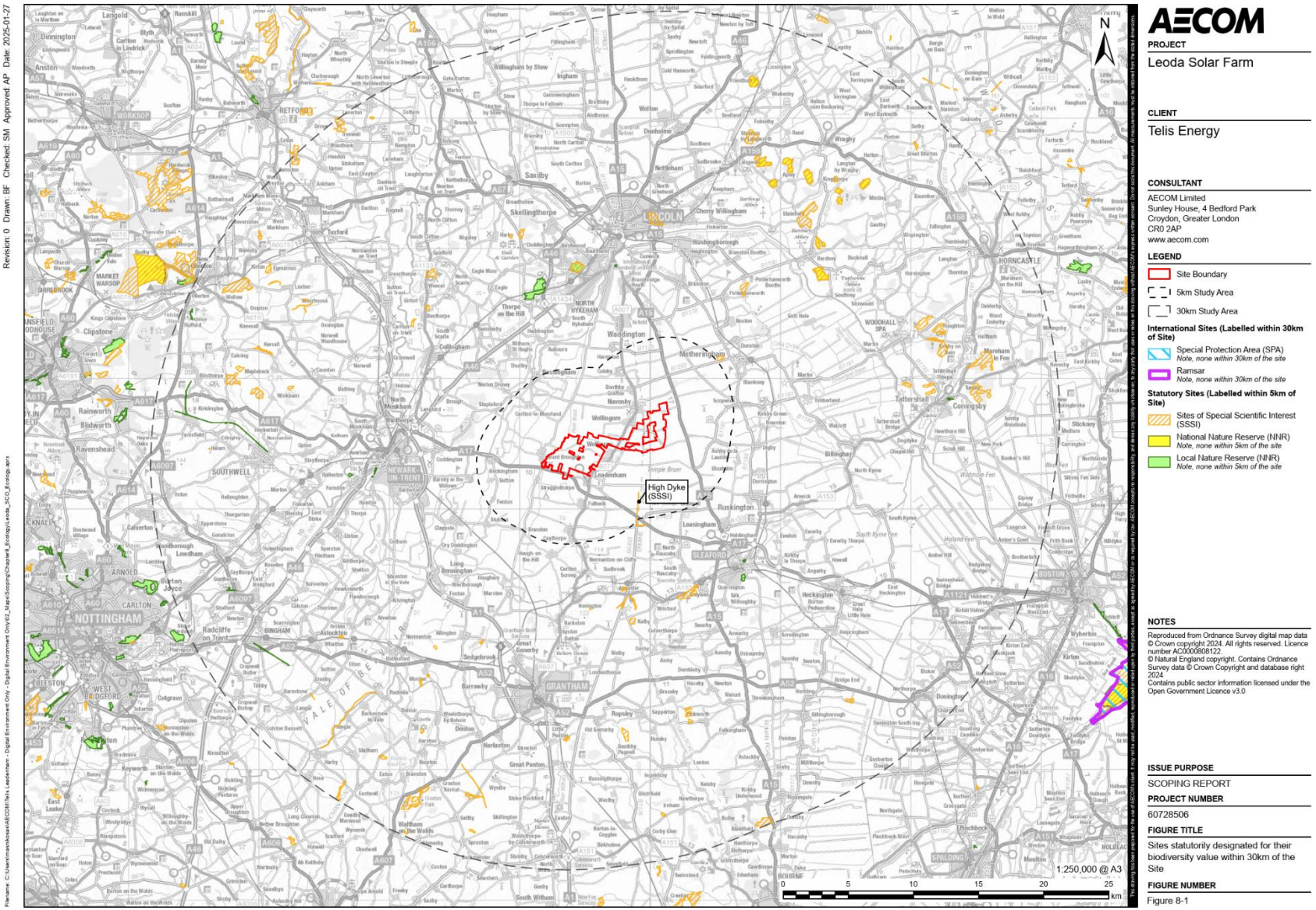
8.5.5 Within the 5 km Study Area, there is one nationally designated site, High Dyke SSSI, which is located approximately 3.0 km south of the Site. A description of the designated site is presented in **Table 8-1**. Designation details are taken from citation documents, published online by the Joint Nature Conservation Committee (JNCC). The locations of statutory sites are presented in **Figure 8-1: Location of Statutory Sites.**

8.5.6 Natural England's SSSI Impact Risk Zone (England) website (Ref 8-48) indicates that the Scheme (a solar farm) is unlikely to have an effect on High Dyke SSSI and does not trigger the impact risk zones for this, or any other SSSI.

Table 8-1: Sites statutory designated for their biodiversity value within 5 km (national) of the Site

Statutory site name, designation and area (hectares (ha))	Statutory Site Description
High Dyke SSSI (6.5 ha)	Wide road verges comprise a substantial area of Eastern Jurassic Limestone grassland in south Lincolnshire and is the site of two nationally rate plants. The habitat consists of permanent species-rich calcareous grassland, managed by mowing. Species include Upright Brome *Bromus erectus*, False Oat-grass *Arrhenatherum elatius*, Tor-grass *Brachypodium pinnatum* and Red Fescue *Festuca rubra* tend to dominate, with characteristic herbs including Dropwort *Filipendula vulgaris*, Common Rock-rose *Helianthemum nummularium*, Small Scabious *Scabiosa columbaria*, Field Scabious *Knautia arvensis*, Salad Burnet *Sanguisorba minor* and the locally uncommon Saw-wort *Serratula tinctoria* and Purple Milk-vetch *Astragalus danicus*. On the roadside verges to the south, Dyer's Greenweed *Genista tinctoria* occurs. Scattered scrub occurs along the boundary with adjacent arable fields. Areas of bare ground in the centre provide habitat for arable weeds such as Night-flowering Catchfly *Silene noctiflora* and Venus's Looking-glass *Legousia hybrida*.

Figure 8-1: Location of Statutory Sites



Non-statutory designated sites

8.5.7 There are 14 sites that are non-statutory designated for their biodiversity value within 2 km of the Site (as per the Study Area defined earlier in this chapter) and these are presented in **Table 8-2** and listed in ascending order, with those closest to the Site listed first. These sites have been designated for their biodiversity value at a county level and are known to have supporting value to a wide variety of protected and ecologically important species and/ or habitats.

8.5.8 Site information descriptions are summarised in **Table 8-2** and are taken from non-statutory site descriptions received as part of the desk study through LERC. The locations of these non-statutory designated sites, relevant to the Scheme, are presented in **Figure 8-2: Location of Non-Statutory Sites.**

Figure 8-2: Location of Non-Statutory Sites

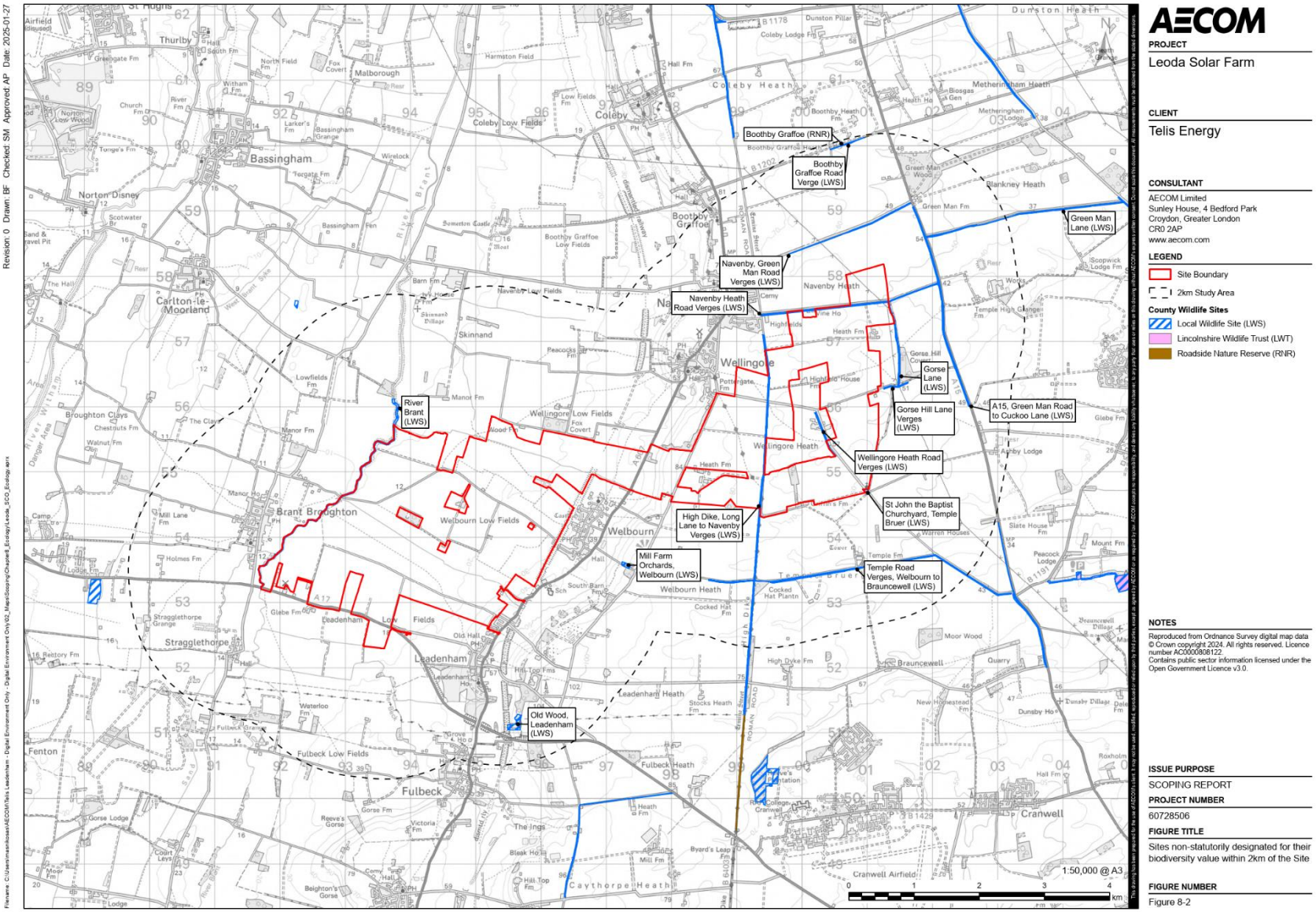


Table 8-2: Sites Non-statutory designated for their biodiversity value within 2 km of the Site

Non-statutory site name and designation	Non-statutory Site Description	Approximate distance (m / km) and direction from closest point of the Site
High Dike, Long Lane to Navenby Verges Local Wildlife Site (LWS)	Verge made up of calcareous grassland.	Within the Grid Connection Corridor
Navenby Heath Road Verges LWS	Verge made up of calcareous grassland.	Within the Grid Connection Corridor
River Brant LWS	This site comprises a 4 km section of the northward-flowing River Brant and steep banks on both sides. Water quality in the meandering 2m to 6m wide channel is rather poor, with prominent growth of algae in places and some in-flowing cloudy water from the east. Aquatic flora is quite good, including Common Duckweed *Lemna minor*, Water-starwort *Callitriche stagnalis*, Fennel *Foeniculum vulgare*, Curled Pondweed *Potamogeton crispus*, Horned Pondweed *Zannichellia palustris*, Spiked Water-milfoil *Myriophyllum spicatum* and Unbranched Bur-reed *Sparganium emersum*. Waterside plants of many species occur in small numbers, such as Brooklime *Veronica beccabunga*, Water-cress *Nasturtium officinale*, Fool's-water-cress *Helosciadium nodiflorum*, Water-plantain *Alisma plantago-aquatica*, Pink Water-speedwell *Veronica catenata*, Creeping-Jenny *Lysimachia nummularia*, Meadowsweet *Filipendula ulmaria*, Branched Bur-reed *Sparganium erectum*, Amphibious Bistort *Persicaria amphibia*, False Fox-sedge *Carex otrubae* and Reed Canary-grass *Phalaris arundinacea*. To the south of Welbourn Road, the west bank is largely un-managed and dominated by scrub and coarse grassland, while the east bank supports much less scrub in short or longer grassland that is mown occasionally; north of Welbourn Road the situation is reversed. Woody plants and	Adjacent to the Solar PV Site

Non-statutory site name and designation	Non-statutory Site Description	Approximate distance (m / km) and direction from closest point of the Site
	associated species include Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Ash *Fraxinus excelsior*, Elm *Ulmus minor*, Sycamore *Acer pseudoplatanus*, Field Maple *Acer campestre*, Elder *Sambucus nigra*, Grey Sallow *Salix cinerea*, Crack Willow *Salix fragilis*, Dog-rose *Rosa canina*, Nipplewort Lapsana *communis*, Hedge Garlic *Alliaria petiolata*, Herb-Robert *Geranium robertianum*, upright hedge-parsley *Torilis arvensis*, Red Campion *Silene dioica* and Wood Avens *Geum urbanum*. Coarse vegetation is characterised by dock *Rumex* sp., Thistle *Cirsium* sp., Ragwort *Jacobaea vulgaris*, Common Nettle *Urtica dioica*, Hemlock *Conium maculatum*, Bindweed *Convolvulus* sp., Bramble *Rubus fruticosus*, Cow Parsley *Anthriscus sylvestris*, Bristly Oxtongue *Helminthotheca echioides*, Couch *Elymus repens*, Cock's-foot *Dactylis glomerata* and False Oat-grass. Managed grassland is not botanically-rich, but some of the more interesting species are Meadow Vetchling *Lathyrus pratensis*, Perforate St John's-wort *Hypericum perforatum*, Cat's-ear *Hypochaeris radicata*, Common Knapweed *Centaurea nigra*, Oxeye Daisy *Leucanthemum vulgare*, Lesser Trefoil *Trifolium dubium* and the locally scarce Stone Parsley *Sison amomum*. Birds associated with water and scrub are a major feature and amongst the invertebrates recorded were Meadow Brown *Maniola jurtina*, Ringlet *Aphantopus hyperantus*, Large Skipper *Ochlodes sylvanus*, Cinnabar *Tyria jacobaeae* and Banded Demoiselle *Calopteryx splendens*.	
St John the Baptist Churchyard, Temple Bruer LWS	Mature Yews, probably planted around the time the cemetery was established cast dense shade on the open grassland west and south of the church, but this is very species-rich. The open area on the north east side of the church is not as rich and at least part has been disturbed (evidence of work on septic tank or some such). However plants such as Hoary Plantain *Plantago media* persist. The richest areas of grassland appear to be mown regularly and the arisings removed (little evidence of mulching) producing a	Adjacent to the Grid Connection Corridor

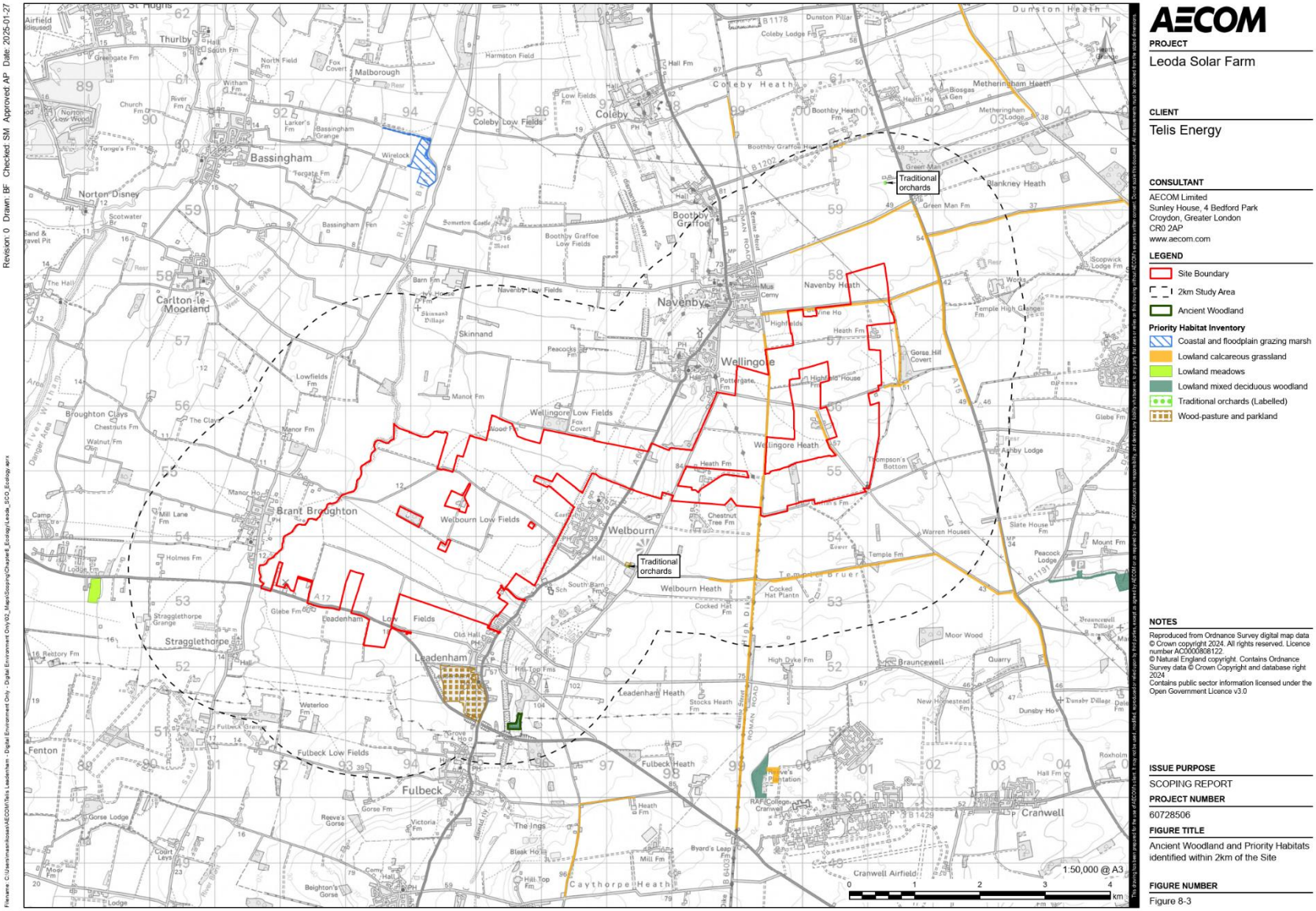
Non-statutory site name and designation	Non-statutory Site Description	Approximate distance (m / km) and direction from closest point of the Site
	very tight low sward with abundant Thyme *Thymus vulgaris*. However, taller plants were flowering including Small Scabious *Scabiosa columbaria* and Burnet Saxifrage *Pimpinella saxifraga*. Bat droppings were present in the church porch and it appeared that bats were roosting behind boarding which covered the stonework.	
Wellingore Heath Road Verges LWS	Verge made up of calcareous grassland.	Adjacent to the Grid Connection Corridor
Gorse Lane LWS	A narrow lane, running north from Gorse Hill Lane (TF014563), east of Wellingore, to a minor road (TF013576) connecting Navenby to the A15. It is separated from arable fields on the west side by a thick, unmanaged hedge. On the east side, the southern half merges into Gorse Hill Covert, a small mainly deciduous wood, and the northern half is separated from arable fields by a hedge along most of its length.	Adjacent to the Grid Connection Corridor
Gorse Hill Lane Verges LWS	Verge made up of calcareous grassland.	50 m east of the Grid Connection Corridor
Navenby, Green Man Road Verges LWS	Verge made up of calcareous grassland.	600 m north of the Grid Connection Corridor
A15, Green Man Road to Cuckoo Lane LWS	Strip of calcareous grassland.	730 m east of the Grid Connection Corridor
Green Man Lane LWS	Verge made up of calcareous grassland. Calcareous grassland indicator species are numerous in this verge, but their distribution is patchy. The grassland is interspersed by coarse, dense vegetation such as Bramble.	760 m east of the Grid Connection Corridor

Non-statutory site name and designation	Non-statutory Site Description	Approximate distance (m / km) and direction from closest point of the Site
Temple Road Verges, Welbourn to Brauncewell LWS	Verge made up of calcareous grassland.	970 m south of the Grid Connection Corridor
Mill Farm Orchards, Welbourn LWS	A small old orchard with some impressive mature Apple *Malus domestica* trees as well as more recent plantings of various fruit and nut bearing species. The grassland underneath supports a forb-rich sward comprised of an odd mix of woodland, calcareous grassland and damp grassland species including Agrimony *Agrimonia eupatoria*, Lords and ladies *Arum maculatum*, Cuckooflower *Cardamine pratensis*, Common Knapweed, Water Avens *Geum rivale*, Yellow Archangel *Lamiastrum galeobdolon* ssp *montanum*, Primrose *Primula vulgaris*, Cowslip *Primula veris* and Sweet Violet *Viola odorata*. Incidental records of notable fauna from the site include Common Toad *Bufo bufo* and the landowner reports records of Hedgehog and Badger.	1.03 km south of the Grid Connection Corridor
Old Wood, Leadenham LWS	Small patches of older woodland and single mature trees (Pedunculate Oak *Quercus robur*, Ash and Small-leaved Elm) are linked by recent replanting. Dead pines remain standing and replanting is of an appropriate mix of native hardwood species including Field Maple, Alder *Alnus glutinosa*, Hazel *Corylus avellana*, Hawthorn, Spindle *Euonymus europaeus*, Ash, Holly *Ilex aquifolium*, Pedunculate Oak, Bird Cherry *Prunus padus*, Small-leaved Lime *Tilia cordata* and Common Lime *Tilia* × *europaea*. However, there is also a significant amount of Sycamore. The field layer is dominated by Bramble and Nettle. Occasional woodland ground flora species of interest include Enchanter's Nightshade *Circaea lutetiana*, Scaly Male-fern *Dryopteris affinis*, Dog's Mercury *Mercurialis*	1.26 km south of the Solar PV Site

Non-statutory site name and designation	Non-statutory Site Description	Approximate distance (m / km) and direction from closest point of the Site
	perennis, Hairy Violet *Viola hirta* and Sweet Violet *Viola odorata*. A small patch of Himalayan Balsam *Impatiens glandulifera* is present.	
Boothby Graffoe Roadside Nature Reserve (RNR) / LWS	Calcareous grassland and plants include Small Scabious, Common Bird's-foot-trefoil *Lotus corniculatus*, Burnet Saxifrage, Salad Burnet, Greater Knapweed *Centaurea scabiosa*, Lady's Bedstraw *Galium verum* and Upright Brome. Plants of dry soils include Thyme-leaved sandwort *Arenaria serpyllifolia*, Mouse-ear-hawkweed *Pilosella officinarum* and Small-flowered Crane's-bill *Geranium pusillum* .	1.91 km north of the Grid Connection Corridor

8.5.9 In addition, one area of Ancient Woodland was identified within 2 km of the Site (Ref 8-49). This was Old Wood, an area of ancient and semi-natural woodland, approximately 1.26 km south of the Solar PV Site. The location of Old Wood is presented in **Figure 8-3: Ancient Woodland and Priority Habitats identified within 2 km of the Site.**

Figure 8-3: Ancient Woodland and Priority Habitats identified within 2km of the Site.



Habitats

8.5.10 A walkover survey of accessible areas of the Solar PV Site, undertaken in May and November 2024 as part of the PEA, identified that the majority of habitat within this area is arable farmland, used for the production of crops (e.g. wheat). A review of aerial imagery of the proposed Grid Connection Corridor identified that the habitat within this area is also predominantly arable farmland.

8.5.11 Potential Habitats of Principal Importance (HaPI) under Section 41 of the NERC Act 2006 (Ref 8-13) present (where determination by further survey is required) on land within the Solar PV Site (and likely within the Grid Connection Corridor) include hedgerows, rivers, standing water / ponds, arable field margins and deciduous woodland. These habitats have potential to support a large range of protected and notable species. Detailed surveys will be undertaken throughout the Site to confirm these HaPI.

8.5.12 Outside of the Site, but within the 2 km Study Area, the MAGIC website (Ref 8-47) identified the presence of the following HaPI:

- traditional orchards;
- wood pasture and parkland BAP priority habitat; and
- good quality semi-improved grassland.

8.5.13 A review of the Ancient Tree Inventory (Ref 8-50) indicates that there are no notable or veteran trees within the Site, but there are notable or veteran trees outside of the Site and within the 2 km Study Area. Further survey will be undertaken to determine the location of any veteran or notable trees not recorded in the Inventory (Ref 8-50), within the Site.

Species

Desk study

8.5.14 The desk study, including a data request through LERC (undertaken in November 2024), identified records of the following species that are present within the 2 km Study Area of the Site:

- Two butterfly species (Small Heath *Coenonympha pamphilus* and Purple Emperor *Apatura iris*) and 18 moth species (the majority of which were returned from a single moth-trapping location near Navenby);
- One bony fish (European Eel *Anguilla anguilla*);
- Four amphibian species (Great Crested Newt *Triturus cristatus*, Smooth Newt *Lissotriton vulgaris*, Common Frog *Rana temporaria* and Common Toad *Bufo bufo*);

- Over 60 species of bird, including specially protected bird species such as Peregrine *Falco peregrinus*, Hobby *Falco subbuteo* and Barn Owl *Tyto alba*;
- Two reptile species (Common Lizard *Zootoca vivipara* and Grass Snake *Natrix helvetica*);
- At least seven bat species: Brown Long-eared Bat *Plecotus auritus*, Common Pipistrelle *Pipistrellus pipistrellus*, Natterer's Bat *Myotis nattereri*, Noctule *Nyctalus noctula*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Western Barbastelle *Barbastella barbastellus* and Whiskered Bat / Brandt's Bat (*Myotis mystacinus/brandtii*);
- Five Species of Principal Importance (SPI) mammal species (Badger *Meles meles*, Otter *Lutra lutra* and Water Vole *Arvicola amphibius*, Brown Hare *Lepus europaeus* and Hedgehog *Erinaceus europaeus*); and
- Four invasive non-native plant species: Variegated Yellow Archangel *Lamium galeobdolon subsp. argenatum*, Giant Hogweed *Heracleum mantegazzianum*, Russian Vine *Fallopia baldschuanica* and Buddleia *Buddleja davidii*; two non-native mammal species: Chinese Muntjac *Muntiacus reevesi* and Grey Squirrel *Sciurus carolinensis*; and one Schedule 9 (Ref 8-8) non-native macroinvertebrate (*Crangonyx pseudogracilis* / *Crangonyx pseudogracilis* / *floridanus*).

8.5.15 A single report of Feral Ferret *Mustela furo* was also made, but there were no records of Polecat *Mustela putorius*.

8.5.16 Several of the species recorded during the desk study are offered full or part protection under the Wildlife and Countryside Act 1981 (Ref 8-8) and, or, are listed as SPI under Section 41 of the NERC Act (Ref 8-13). Full details of these species and their legal status and conservation value will be provided in the Ecology and Nature Conservation chapter of the ES.

8.5.17 Non-native plant species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (Ref 8-8) are those that continue to pose a conservation threat to native biodiversity and habitats, as such it is illegal to plant or to otherwise encourage or cause these plants to grow in the wild.

Field Surveys

8.5.18 Review of ecological data within the Study Areas enabled the identification of specific areas requiring ecological survey (Survey Areas) (see **Table 8-3**), which are specific to a given species, group of species or habitat. The Study Areas (see Section 8.2 of this EIA Scoping Report) and Survey Areas defined are the maximum distances that statutory consultees would typically expect to be considered.

8.5.19 **Table 8-3** presents details of the identified surveys, methods and survey periods that have commenced or will be undertaken within the relevant Survey Areas. The extent of the Survey Areas varies according to the ecological feature in question and with regards to the precautionary principle, i.e. if there is doubt as to whether or not

an area should be surveyed it is included within the Survey Area. Accordingly, the Survey Areas that will be used in the assessment will ensure sufficient data is gathered to meet any design iterations which may change the likely ZoI used to undertake the impact assessment.

8.5.20 The data gathered from these surveys will be used to inform the final assessment presented in the ES. These surveys will also inform any European Protected Species (EPS) mitigation licences (where required). As part of the DCO application for the Scheme these will be prepared in draft for advisory comment from Natural England.

Table 8-3: Ecological surveys that have been, or will be, undertaken to characterise the baseline conditions within the Site

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
UKHab Survey, including Habitat Condition Assessment for Biodiversity Net Gain	Walkover survey recording habitat types and boundary features, following the standard UKHab method (Ref 8-1). In addition, where appropriate, a habitat condition assessment, modular river surveys and hedgerows condition assessments will be undertaken for the purpose of BNG assessment.	The land within the Site and a zone of up to 50 m (where visible from within the Site or accessible).	In progress. Habitat conditions will be undertaken between April to October.	Using professional judgement, 50 m from the Site is an appropriate Survey Area within which to record habitats, acknowledging that those that are likely to be directly impacted by the Scheme are within the Site itself and surveying up to 50 m from the Site is appropriate in evaluating adjacent habitats and informing on the potential presence, or otherwise, of protected species (e.g. Badger) within the vicinity of the Scheme. The information from surveys undertaken within the Site to support the BNG assessment will form the basis of the calculation of potential permanent and temporary habitat effects within the EcIA.
Terrestrial Habitat and Flora: Arable Flora Survey Phase 2 botanical / NVC Survey	Surveys for important arable flora species involve walking arable field boundaries to record notable species as listed in Great Britain	The Site.	In progress. May to September.	Using professional judgement, areas of terrestrial habitat to be surveyed in further detail are those within the Site that have the potential to be impacted by the Scheme, informed by the desk study and as identified from the initial UKHab survey. The surveys

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
	(Ref 8-52, Ref 8-53) and England (Ref 8-54). Grassland surveys (including roadside verges) involve surveying such areas in more detail (i.e.: species lists with abundance ratings) for notable species and species composition with the rarity of higher plants given based on 'New Flora of the British Isles' (Ref 8-55).			will identify any areas of notable habitats or important for flora and inform any required avoidance, mitigation or enhancement.
Hedgerows	Hedgerows will be surveyed in accordance with the methodology as outlined in DEFRA's Hedgerow Survey Handbook (Ref 8-56), to assess their 'importance' against the Wildlife and Landscape Criteria, detailed in the Hedgerows Regulations (Ref 8-15) and to determine whether a hedgerow is species-poor or species-rich.	The Site.	Not yet commenced. May to September.	Using professional judgement, surveying all hedgerows within the Site is appropriate, acknowledging that those hedgerows that are likely to be impacted by the Scheme are within the Site itself. Hedgerows outside of the Site will remain intact and unaffected by Scheme.

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
Aquatic habitat and species surveys including for any invasive non-native species (potentially including River Habitat Surveys (RHS), pond Predictive System for Multimetrics (PSYM), macrophytes, macroinvertebrates and fish surveys)	An aquatic scoping survey comprising a desk-based assessment of available aquatic ecology data and a walkover survey will inform site selection for further surveys. Selected waterbodies (ponds, ditches, rivers) likely to be impacted will be surveyed and assessed using relative standard methodologies for aquatic macrophytes (Ref 8-57), aquatic macroinvertebrates (Ref 8-58, Ref 8-59), River Habitat Surveys (Ref 8-60), Fish (Ref 8-61) and PSYM specifically for ponds (Ref 8-62).	Up to 2 km from the Site for the desk study and up to 250 m for field survey.	Not yet commenced. RHS – May and June (not restrictive) Macroinvertebrates - 2 seasons Spring (March - May) and Autumn (September – November) PSYM – June to August Macrophytes – June to September Fish – June to September	Up to 250 m from the Site is an appropriate Survey Area to determine any potential impacts arising from the Scheme both upstream and downstream (the desk study will assess a wider 2 km area).
Terrestrial invertebrates scoping survey	Desk-based study and walkover survey by a specialist entomologist to identify areas of likely greater importance to terrestrial invertebrates, followed by sample-	The Site.	Not yet commenced. April to September.	Professional judgement was used to determine that habitat within the Site is an appropriate Survey Area, acknowledging that habitats that have the potential to be permanently impacted (i.e. lost) by the Scheme and potentially

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
	surveying to appraise the broad level of terrestrial invertebrate interest within such areas.			supporting notable terrestrial invertebrates or assemblages are within this area. A scoping survey will identify any areas likely to be important for terrestrial invertebrates and inform avoidance, mitigation and enhancement.
Amphibians, including Great Crested Newt	Water bodies within 500 m of the Site were identified during the desk study. Habitat Suitability Index (HSI) surveys to evaluate the suitability of ponds and their potential to support Great Crested Newt (Ref 8-63). Further to the HSI assessment, suitable (as defined by the results of the HSI survey) and accessible water bodies identified within the Survey Area will then be scoped in for Environmental DNA (eDNA) survey (Ref 8-64) to determine	HSI surveys will, or have been, undertaken on water bodies within 250 m of the Site and, where further survey was identified as being required (based on the HSI score), using eDNA methods.	In progress. HSI and eDNA surveys to be undertaken between mid-April and 30 June.	With reference to published guidance, habitats within and up to 250 m of the Site could constitute significant foraging areas, hibernation or resting sites for Great Crested Newt, which typically utilise terrestrial habitat up to 500 m from their breeding ponds (Ref 8-65). However, 250 m is an appropriate Survey Area from the Site for determining Great Crested Newt populations within the ZoI of the Scheme through HSI and eDNA surveys, acknowledging that there is a notable decrease in abundance of Great Crested Newt beyond a distance of 250 m from a breeding pond (Ref 8-66).

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
	presence or absence of Great Crested Newt.			
Reptiles	A Habitat Suitability Assessment will determine the suitability of the Site for reptiles. If required, surveys of terrestrial habitats for reptiles to record species presence (or absence) using artificial refugia and observations of species in accordance with standard guidance for survey (Ref 8-67, Ref 8-68).	Suitable habitat for reptiles (such as grassland) within the Site that is potentially directly impacted by the Scheme.	Not yet commenced. If required, May to June and August to September.	With reference to published guidance, any surveys that are required within the Survey Area will provide sufficient information on reptile presence within the Site, acknowledging that good quality habitats, potentially supporting populations of reptiles and where these may be permanently impacted (i.e. lost) by the Scheme are within this area.
Non-breeding birds (including farmland birds)	Non-breeding bird surveys, using an adapted walkover survey method, including frequent stopping points to view and observe bird behaviour (Ref 8-69, Ref 8-70).	For the general non-breeding bird assemblage, the land within the Site and up to 50 m from the Site will be surveyed. For species of greater conservation value and/ or higher sensitivity to potential noise or	In progress. October to March.	Whilst standardised survey zones for assessing the impacts of development on bird populations do not exist, the Survey Area provides information on the non-breeding bird population within the area immediately surrounding and contiguous with the Site, where birds may potentially be adversely affected, either directly or indirectly. Therefore, the Survey Area is sufficient to determine the

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
		visual disturbance (e.g. Golden Plover *Pluvialis apricaria)*, where any such species are recorded, the Survey Area will be extended up to 200 m from the Site.		likely impacts of the Scheme on non-breeding bird species occurring or likely to occur in the area.
Breeding birds (including farmland birds)	Surveys for breeding birds are based on a standard territory mapping method for surveying breeding birds (Ref 8-69, Ref 8-70) and were adapted where necessary to include species-specific methods (as detailed in 'Bird Monitoring Methods' (Ref 8-69)) for other species, as required.	For the general breeding bird assemblage, the Survey Area is the land within the Site and up to 50 m from the Site. For species of greater conservation value and/ or higher sensitivity to potential noise or visual disturbance, where any such species are recorded, the Survey Area will be extended up to 200 m from the Site.	In progress. March to mid-June for the general breeding bird assemblage, with additional survey effort as necessary in August and September to record any late-breeding species (e.g. Hobby *Falco subbuteo*)	Standardised survey zones for assessing the impacts of development on bird populations do not exist, however, the Survey Areas provide information on the breeding birds within the area immediately surrounding and contiguous with the Site, where birds may potentially be adversely affected. Published guidance (Ref 8-71) on disturbance distances for specially protected species e.g. those listed on Schedule 1 of the WCA (Ref 8-8) was used to define the Survey Area for any such species likely to be present.

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
Bats – Daytime Bat Walkover (DBW) Survey	Trees (and structures, if present) will be subject to a DBW survey in accordance with The Bat Conservation Trust guidance (Ref 8-72).	Relevant features within the Site and up to 15 m from the Site, where accessible and likely to be impacted by the Scheme.	In progress. Any time of year, but winter months are best when there is little foliage on the trees.	Information collated on the location of trees and structures that are suitable for roosting bats will inform design and offset buffers to avoid direct effects upon potential roost sites. Furthermore, the information will form the basis of the scope for roost surveys (as detailed below).
Bats – Roost Surveys including Ground Level Tree Assessment (GLTA) and aerial survey	Where any works to trees potentially supporting bat roosts (as recorded during the DBW survey) has been confirmed prior to ES submission, a GLTA and aerial survey and/ or bat emergence surveys will be undertaken in accordance with standard survey guidance (Ref 8-72).	Features with bat roost suitability within the Site that will be impacted by the Scheme (i.e. if the design cannot avoid the loss of trees).	If required, May to September.	Based on the Scheme design, it is anticipated that impacts to potential roosts are likely to be avoided and that any further survey work, if required, is likely to be minor (i.e. possibly a few individual trees) and undertaken on a precautionary basis.
Bats – Night-time Bat Walkover (NBW)	Walked transect routes, to cover representative habitats within the Site, with each transect surveyed once in spring, summer and autumn.	Solar PV Site only.	In progress. May to September.	Using professional judgement and with reference to published guidance, the Survey Area will provide sufficient information on bat activity (commuting and foraging) of the Site and where

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
	The survey method is based upon published guidance (Ref 8-72) and supplemented by the deployment of static bat detectors, (at least one per transect).			impacts are predicted, assessing commuting and foraging habitat and nearby roosts, and enabling determination of impacts on bat populations occurring within, or adjacent to, the Site acknowledging that any impacts within the Grid Connection Corridor will be temporary and loss of important features (such as hedgerows) minimised/ avoided.
Riparian mammals (Water Vole *Arvicola amphibius*, Otter *Lutra lutra* and the INNS, Mink *Mustela vison*)	A Habitat Suitability Assessment will determine the suitability of each watercourse or water body for riparian mammals. Watercourses and water bodies, deemed suitable for riparian mammals (as identified during the Habitat Suitability Assessment) will then be surveyed for evidence of riparian mammals, following standard guidance for surveying Water Vole (Ref 8-73, Ref 8-74) and for Otter	All water bodies and watercourses within the Site (and to a maximum of 10 m from the Site where access is permitted), identified as being potentially suitable for Water Vole. Note that where suitable habitat for Otter is present then the survey will extend 200 m upstream and downstream (where accessible). Additional surveys	Not yet commenced. May to September.	With reference to published guidance and using professional judgement, surveying riparian habitats up to 10 m (Water Vole) and 200 m (Otter) from the Site is sufficient to determine presence or absence of riparian mammals within, or adjacent to, the Site as it covers the appropriate avoidance buffers around Water Vole burrows or Otter holts (which may be present outside of the Site).

Survey	Survey method	Survey Area	Status of survey and survey timing - months	Justification for Survey Areas
	(Ref 8-75, Ref 8-76, Ref 8-77). Any evidence of Mink will also be recorded, using these survey methods.	of woodland in the vicinity of water courses will also be checked for Otter holts.		
Badger	A walkover survey, searching for signs of Badger activity (such as setts and latrines), and following standard survey guidance (Ref 8-78, Ref 8-79).	Within the Site and to a maximum of 50 m from the Site, where viewable from within the Site or where access is permitted.	In progress. Any time of year, ideally when vegetation not in leaf (November to February).	With reference to published guidance and applying professional judgement, 50 m beyond the Site is an appropriate Survey Area as it covers the 30 m distance of avoidance around setts at which direct or indirect effects on Badger setts could occur.
Invasive non-native species (INNS)	INNS species observations will be recorded when noted during other ecological surveys. Plants will include notes on precise location and stand size. Aquatic and riparian INNS will be surveyed for as part of the aquatic ecology baseline.	The land within the Site and a zone of 50 m (where visible from within the Site or accessible).	In progress. Any time of year, but April to September is the optimal period for recording INNS plants.	Using professional judgement, INNS will be recorded within the Site and to a maximum of 50 m to avoid and reduce the spread of any INNS species before, during and after construction.

8.5.21 Ecological surveys undertaken to date have noted the presence of Brown Hare *Lepus europaeus* within the Site and it is likely that other mammal species listed in accordance with Section 41 of the NERC Act (Ref 8-13), e.g. Hedgehog, Polecat and Harvest Mouse *Micromys minutus* may also be present within the Site. Ongoing ecological surveys will continue to note the presence of these species, if observed. Where the Site is within the known geographical range for these species and if there are desk study records of any such species occurring within 2 km of the Site and there is suitable habitat on site to support them, then they will be assumed to be present on Site and assessed as such within the ES. No species-specific surveys are proposed and the precautionary approach of assuming presence (if desk top data and habitat suitability suggest this is likely), is considered proportionate. Consideration for any embedded mitigation required for relevant SPI will be described and included in the ES, submitted as part of the DCO Application. It is anticipated that the proposed landscape design for the Scheme will be largely beneficial for any such mammal species present as the Scheme will retain habitats and ensure that connectivity is maintained across the Site.

8.5.22 Water bodies and ditches located within and close to the Site may support common and widespread amphibian species (e.g. Common Frog and Smooth Newt) and the Site also offers suitable terrestrial habitats for these species in the form of hedgerows, scrub, semi-improved grassland and woodland. Surveys are not required for such species as they receive limited legislative protection and, as such, surveys will not be specifically undertaken for these species, but observations of these species will be recorded during ecological surveys. Embedded mitigation described and included in the ES, submitted as part of the DCO Application, will seek to avoid injury or killing of such species (if present) during construction of the Scheme.

8.6 Potential Effects and Mitigation

Potential Effects

8.6.1 Prior to the implementation of any mitigation, the Scheme has the potential to affect biodiversity (positively or negatively) during construction, operation and decommissioning in the following ways:

Construction (assumed to be 2028-2030)

8.6.2 Impacts on biodiversity features during construction of the Scheme potentially include:

- Habitat loss or gain – direct impacts associated with changes in land use resulting from the construction of Scheme, for example temporary works associated with site clearance, and permanent land-take (mainly arable land) associated with the installation of the Scheme;
- Fragmentation of populations or habitats – indirect impacts due to the Scheme potentially dividing a habitat, group of related habitats, site or ecological

network, or the creation of partial or complete barriers (e.g. culverts) to the movement of species, with a consequent impairment of ecological function;

- Disturbance – indirect impacts resulting from a change in normal conditions (e.g., light, noise, vibration and human activity) that result in individuals or populations of species changing behaviour or range;
- Habitat degradation – direct or indirect impacts resulting in the reduction in the condition of a habitat and its suitability for some or all of the species it supports, for example changes in chemical water quality, increased sedimentation and dust deposition, or changes in surface flow or groundwater;
- Species mortality – direct impacts on species populations associated with mortalities due to construction activities, for example site clearance; and
- Introduction and, or, spread of invasive species, due to the movement of personnel, equipment and plant machinery, potentially facilitating the introduction of invasive species.

Operation and Maintenance (assumed to be 2030-2070)

8.6.3 Impacts on biodiversity features during operation and maintenance of the Scheme are likely to include:

- Potential avoidance by species using the Site, such as bats and birds, due to indirect impacts through, for example, operational lighting;
- Disturbance or displacement of sensitive species during operational maintenance activities; and
- Fragmentation of habitats causing a barrier effect, e.g., due to fencing.

Decommissioning (assumed to be from 2070)

8.6.4 Impacts on ecological features during decommissioning of the Scheme are likely to be the same as those during the construction phase. Field surveys would be required in advance of decommissioning to define the ecological baseline at the time of decommissioning and to ensure that impacts on ecological features are identified, avoided and, or, mitigated. Upon decommissioning, the above-ground physical infrastructure will be removed and the Site returned to landowners in the condition as at the end of operation, including the established habitats.

Biodiversity Net Gain (BNG)

8.6.5 When the relevant provisions come into force, the Environment Act 2021 (Ref 8-9) will include a mandate for at least 10% biodiversity net gain (BNG) for projects, including for NSIPs. The Scheme will achieve at least this level of net gain in all habitat units within the baseline (i.e., area, linear and watercourse habitats where applicable (as set out in the incoming legislation)).

8.6.6 The CIEEM's Biodiversity Net Gain: Good Practice Principles for Development (Ref 8-80) defines BNG as "*development that leaves biodiversity in a better state than before*" and involves an approach where developers work with local governments, wildlife groups, landowners and other stakeholders in order to support their priorities for nature conservation. BNG is achieved when measurable improvements for biodiversity are delivered in association with a development, through the creation of new habitats or enhancement and management of existing habitats. Although BNG allows for these measures to be provided on-site, off-site or in combination, the Scheme will deliver BNG on-site through the implementation of measures such as field boundary enhancements and planting seed mixes within the Solar PV Site.

8.6.7 NPS EN-1 (Ref 8-25) also sets out how BNG should be addressed for Energy NSIPs stating that "*proposals should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity, where possible"*; and that "*biodiversity net gain should be applied after compliance with the mitigation hierarchy* [as presented in paragraph 4.6.10] *and does not change or replace existing environmental obligations*".

8.6.8 A BNG assessment will be undertaken (using Defra's Statutory Biodiversity Metric Tool or the most up to date metric) to identify on-site opportunities to deliver BNG. These opportunities will be identified and set out within the ES, in line with the requirements of the Environment Act (Ref 8-9), the NPPF (Ref 8-28) and local planning policy, including the Central Lincolnshire Local Plan (Ref 8-29).

8.6.9 A Framework LEMP will be submitted with the DCO application and will specify mitigation and enhancement measures that would deliver BNG.

8.6.10 Compliance with planning policy in the NPS (Ref 8-25) requires that the Scheme considers and engages a mitigation hierarchy, requiring the highest level to be applied, where practicable. The mitigation hierarchy is also fundamental to BNG and there are four sequential steps that must be taken throughout the lifecycle of a project, where there is potential for impacts on relevant ecological features:

- Avoidance – actions taken to avoid causing impacts to the environment prior to beginning development (e.g. moving part of the development to a different location).
- Minimisation – measures taken to reduce the duration, intensity, extent and/ or likelihood of the unavoidable environmental impacts caused by development (e.g. adapting the development design to minimise impacts).
- Restoration or rehabilitation – actions taken to repair environmental degradation or damage following unavoidable impacts caused by development.
- Offsets – measures taken to compensate for any adverse environmental impacts caused by development which cannot be avoided, minimised and/ or restored (e.g. including habitat creation to offset losses).

Design, Avoidance and Mitigation

8.6.11 The design for the Scheme will include consideration of IEFs and will incorporate, where reasonably practical, measures to avoid or reduce the potential for adverse effects on these, in accordance with the mitigation hierarchy (as presented in paragraph 8.6.10) and relevant planning policy. The measures that will be identified and adopted include those that are inherent to the design of the Scheme, and those that can realistically be expected to be applied as part of environmental best practice, or as a result of legislative requirements.

8.6.12 Standard best practice construction measures will be set out within a Framework CEMP, secured through the DCO, to avoid any potential harmful impacts on IEFs and ensure compliance with environmental legislation. The CEMP will detail and formalise measures that will be implemented prior to and during construction of the Scheme to mitigate construction-related effects on IEFs.

8.6.13 The Scheme will occur mostly on lower value habitats (i.e. arable). Use of these lower valued habitats substantially reduces the potential for the Scheme to result in significant adverse effects on ecological features.

8.6.14 The Scheme will be designed so that impacts upon important habitats (e.g. woodland, hedgerows and arable margins) are avoided or reduced, where reasonably practicable and compensated for where not, through the creation of replacement habitat.

8.6.15 The Scheme will aim to avoid, protect and retain notable habitats where practicable, all of which will be included in the design. This will include offsets of:

- at least 10 m from watercourses and water bodies;
- at least 15 m from existing woodland features;
- at least 5 m from hedgerows without trees; and
- offsets applicable to each tree's root protection area (RPA) (Ref 8-81) for individual trees and trees occurring within hedgerows.

8.6.16 Where practicable, retained trees will be protected as per British Standard BS: 5837 Trees in relation to design, demolition and construction – Recommendations (Ref 8-81). Fencing, as appropriate, will be included around working areas to protect above-ground vegetation and below-ground root systems.

8.6.17 The Scheme will also aim to avoid, protect and retain protected or notable species where practicable, all of which will be included in the design. This will include offsets of:

- retaining Badger setts, with an undeveloped zone of at least 30 m from the sett (dependent on the activity); and

- retaining trees with the potential to support roosting bats, with an undeveloped zone of at least 15 m around the tree.

8.6.18 There are likely to be beneficial effects following completion of the Scheme that will ensure no net loss of habitats and will provide an overall net gain in biodiversity, ensuring compliance with planning policy relating to this. These beneficial effects are likely to include:

- Increases in permanent grassland habitat of greater floristic diversity than arable farmland, increasing invertebrate assemblages and abundance;
- Increased connectivity across the Site and into the wider area, through planting of trees and hedgerows;
- Potential contribution to nature recovery in Lincolnshire;
- Areas of habitat creation, such as undeveloped fields and margins that provide permanent (and undisturbed) nesting and foraging habitats for farmland birds, small mammals and reptiles;
- Potential attraction and increases in species foraging around the Site, such as bats and birds, from increases in prey items (i.e., flying insects);
- Potential increases in abundance and distribution of species, due to lack of human disturbance and changes in habitat (such as agricultural practices) within the Site; and
- Indirect beneficial impacts through a possible reduction of agricultural chemical inputs to watercourses / reduction in pesticide use on crops within the local area resulting in an increase in invertebrate abundance and diversity.

8.7 Assessment Methodology

Assessment Criteria

8.7.1 The approach used for the EcIA will be undertaken in accordance with best practice guidance, issued by the CIEEM (the CIEEM guidelines) (Ref 8-2). The aims of the assessment will be to:

- identify IEFs which may be impacted by the Scheme;
- undertake a scientifically rigorous and transparent approach to the assessment of the likely ecological impacts and resultant effects of the Scheme, where the level of detail provided is proportionate to the scale of the development and the complexity of its potential impacts. Impacts and effects may be positive or negative; and
- set out what steps will be taken to adhere to policy (in terms of national, regional and local policies) and legal requirements relating to the relevant IEFs concerned.

8.7.2 The principal steps involved in the CIEEM approach can be summarised as determining:

- ecological features that are both present and might be affected by the Scheme are identified (both those likely to be present at the time works begin and those predicted to be present at a set time in the future) through a combination of targeted desk-based study and field survey work to determine the relevant baseline conditions;
- the importance of the identified ecological features is evaluated, placing their relative nature conservation importance into geographic context, which is then used to define the relevant biodiversity features that need to be considered further;
- the changes or perturbations predicted to result as a consequence of the Scheme (i.e., the potential impacts) and which could potentially affect relevant ecological features are identified and their nature described. Established best-practice, legislative requirements or other incorporated design measures to minimise or avoid impacts are also described and are taken into account;
- the likely effects (positive or negative) on relevant ecological features are then assessed, and where possible quantified;
- measures to avoid or reduce any predicted significant effects, if practicable, are then developed in conjunction with other elements of the design (including mitigation for other environmental disciplines) and if necessary, measures to compensate for effects on features of nature conservation importance are also included; and
- any residual effects of the Scheme are reported; and scope for ecological enhancement is considered.

8.7.3 It is not necessary in the assessment to address all habitats and species with potential to occur in the relevant Study Areas and instead the focus is on those that are “relevant”, i.e., ecological features that are considered to be important (IEFs) and potentially affected by the Scheme. This does not mean that efforts should not be made to safeguard wider biodiversity and requirements for this have been considered, where appropriate.

8.7.4 A consideration of any combined and cumulative effects will also be included.

Determining Importance

8.7.5 To support a focussed assessment, there is a need to determine the scale at which the relevant ecological features identified through the desk studies and field surveys undertaken for the Scheme are of value. The value of each relevant ecological feature has been defined with reference to the geographical level at which it matters, informed through relevant planning policy and legislation which is important in demonstrating how the Scheme will comply with statutory requirements and policy

objectives for biodiversity, in accordance with Section 4.3 of the CIEEM guidelines (Ref 8-2).

8.7.6 Species populations are valued on the basis of their size, recognised status (such as through published lists of species of conservation concern and designation of BAP status) and legal protection. For example, bird populations exceeding 1% of published data for national populations are considered to be of national importance, and so on.

8.7.7 In assigning values to species populations, it is important to take into account the status of the species in terms of any legal protection. However, it is also important to consider other factors such as its distribution, rarity, population trends and the size of the population which would be affected. For example, whilst the Great Crested Newt is protected as a European protected species under the relevant legislation and therefore conservation of the species is of significance at an international level, this does not mean that every population of Great Crested Newt is internationally important. It is important to consider the particular population in its context. Therefore, in assigning values to species, the geographic scale at which they are important has been considered. The assessments of value rely on the professional opinion and judgment of experienced ecologists and will be set out clearly in the PEIR and ES.

8.7.8 Plant communities are assessed both in terms of their intrinsic value and as habitat for protected species whose habitat is also specifically protected and for species of nature conservation concern which are particularly associated with them.

8.7.9 Due regard will also be paid to the legal protection afforded to species during the development of mitigation and compensation measures to be implemented for the Scheme. For European protected species there is a requirement that the Scheme should not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

8.7.10 For the purposes of the assessment within this chapter, only ecological features of at least Local importance are considered as IEFs that require assessment for potential significant effects. Whilst consideration of impacts at all geographic scales is important, features of less than Local importance (i.e. of Site importance) are common and widespread (therefore of no local value) and are not legally protected or included within local planning policy. The CIEEM guidelines (Ref 8-2) make it clear that there is no need to "*carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable*".

8.7.11 Assessing the value of features requires consideration of both existing and future predicted baseline conditions. Therefore, the description and valuation of ecological features takes account of any likely changes, such as trends in the population size or distribution of species which may arise either naturally through habitat changes or as a result of increased conservation effort, likely changes to the extent of habitats and the effects of other developments or land use changes.

8.7.12 A summary of the value (importance) of ecological features and the geographical frames of reference used for this assessment, based on Section 4.7 in the CIEEM guidelines (Ref 8-2), is presented in **Table 8-4**.

Table 8-4: Summary of sensitivity of ecological features, according to geographic context

Sensitivity	Geographic Frame of Reference	Examples
Very High	International (or European)	European sites, such as SACs (including candidate SACs), SPAs (including potential SPAs), normally within the geographic area of Europe. Ramsar sites (including proposed sites), which are designated under international convention) are also included. Areas of habitat that would meet the selection criteria for designation as a European Ramsar site. Species occurring in numbers approaching that of international importance (i.e., >1% of a biogeographic population) that would meet the selection criteria for designation as a European or Ramsar site. Qualifying species connected to an SAC (such as bats).
High	UK or National (Great Britain), but considering the potential for certain ecological features to be more notable (of higher value) in England, with context relative to Great Britain as a whole)	Statutory designated site, such as a SSSI or NNR. HaPI (Ref 8-13), considering factors such as its size, distribution and the size of the habitat which would be affected. This would include Ancient Woodland and ancient or veteran trees. Species occurring in numbers approaching that of national importance (i.e., >1% of the UK population) that would meet the relevant SSSI selection criteria (Ref 8-44).
Medium / High	Regional (East Midlands)	Species, including SPI (Ref 8-13), occurring in numbers of greater geographical importance than within the county of Lincolnshire but does not reach the threshold to be of National importance.

Sensitivity	Geographic Frame of Reference	Examples
Medium	County (Lincolnshire) and/or District (North Kesteven)	Non-statutory designated sites, such as LWSs. HaPI (Ref 8-13) not representing a nationally important habitat but recognised as a habitat which would or may fulfil the criteria for selection as a LWS (Ref 8-45). Species occurring in numbers approaching that of county or district importance (i.e., >1% of the county or district (if known) population).
Low	Local	Areas of habitat that do not meet criteria for selection as LWS in Lincolnshire (Ref 8-45) but are considered to enrich the local area. Species of conservation interest (e.g. SPI (Ref 8-13), red-listed or legally protected species) that are common and widespread but contribute to the local biodiversity.
Negligible	Site	Species that are common and widespread and are not legally protected or included within local planning policy (e.g. Field Vole *Microtus agrestis*). Areas of habitat that are widespread and of no local value (such as a fence-line or hard-standing).

Characterising Ecological Features

8.7.13 In accordance with Section 1.21 in the CIEEM guidelines (Ref 8-2), the terminology used within the assessment will draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EcIA these terms are defined as follows:

- Impact – actions resulting in changes to an ecological feature. For example, construction activities of a development removing a hedgerow; and
- Effect – outcome resulting from an impact acting upon the conservation status or structure and function of an ecological feature, e.g., the effects on a population of bats as a result of the loss of a bat roost.

8.7.14 When describing potential impacts (and where relevant the resultant effects) consideration is given to the following characteristics likely to influence this:

- Positive or negative - i.e., is the change likely to be in accordance with nature conservation objectives and policy and is that change:

- Positive - a change that improves the quality of the environment, or halts or slows an existing decline in quality e.g., increasing the extent of a habitat of conservation value; or
- Negative - a change that reduces the quality of the environment e.g., destruction of habitat.
- Spatial extent - the spatial or geographical area or distance over which the impact or effect may occur under a suitably representative range of conditions;
- Magnitude - the 'size', 'amount' or 'intensity' and 'volume' of an impact - this is described on a quantitative basis where possible;
- Duration - the time over which an impact is expected to last prior to recovery or replacement of the resource or feature. Consideration has been given to how this duration relates to relevant ecological characteristics such as a species' lifecycle. However, it is not always appropriate to report the duration of impacts in these terms. The duration of an effect may be longer than the duration of an activity or impact;
- Timing and frequency - i.e., consideration of the point at which the impact occurs in relation to critical life-stages or seasons; and
- Reversibility - i.e., is the impact temporary or permanent. A temporary impact is one from which recovery is possible or for which effective mitigation is both possible and enforceable. A permanent effect is one from which recovery is either not possible or cannot be achieved within a reasonable timescale i.e., the 60-year lifespan of the Scheme (in the context of the feature being assessed).

8.7.15 Combined, these characteristics form the magnitude criteria for effects of the Scheme on IEFs as summarised in **Table 8-5.**

Table 8-5: Magnitude criteria for impacts and effects

Magnitude	Magnitude Criteria
High	Changes to the ecological feature pre-development (baseline) condition that almost always have an effect (positively or negatively) on its integrity or conservation status. Such changes may be long-term, permanent and/or irreversible.
Medium	Changes to the ecological feature baseline condition that in some circumstance may affect (positively or negatively) its integrity or conservation status. Although such changes may be long-term, they are potentially reversible.
Low	Changes to the ecological feature baseline condition that do not usually affect the baseline condition and are often short-term and/or reversible.

Magnitude	Magnitude Criteria
Very low	There is no noticeable change to the ecological feature baseline condition

Significance Criteria

8.7.16 For each ecological feature, only those characteristics relevant to understanding the ecological effect of the Scheme and determining the significance are described. The determination of the significance of effects has been made based on the predicted effect on the structure and function, or conservation status, of relevant ecological features, as follows:

- Not significant - no effect on structure and function, or conservation status; and
- Significant - structure and function, or conservation status is affected.

8.7.17 Sections 5.24 to 5.28 in the CIEEM guidelines (Ref 8-2) state that effects should be determined as being significant (a 'significant effect') when "*an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g., for a designated site) or broad (e.g., national / local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local. A significant effect is an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)".*

8.7.18 Using this information and professional judgement, it is determined whether the effects will be 'significant' or 'not significant' on the structure and integrity of site or ecosystems or conservation status of habitats and, or species of each ecological feature and the impact significance is determined at the appropriate geographical scale, as presented in **Table 8-4**.

8.7.19 There are a number of approaches for determining the significance of effects on ecological features. Whilst the CIEEM guidelines (Ref 8-2) recommend the avoidance of the use of the matrix approach for categorisation (major, moderate and minor), in order to provide consistency of terminology within the EIA, the terminology used in the CIEEM guidelines for impact assessment have been translated into the classification of effects scale, as outlined in **Table 8-6**, but still remain consistent with the CIEEM guidelines.

8.7.20 As a rule, major and moderate effects are considered to be significant, whilst minor and neutral/negligible effects are considered to be not significant. However, professional judgement will be applied, including taking account of whether the

effect is permanent or temporary, its duration and frequency, whether it is reversible, and/ or its likelihood of occurrence.

8.7.21 Beneficial effects, as described in **Table 8-6**, are assessed as those where there has, or will be, a change from the ecological baseline that improves (e.g. an increase in habitat or species population). Adverse effects are assessed as those where there will be a change from the ecological baseline that worsens (e.g. a reduction in habitat or decline in species population).

Table 8-6: Significance criteria for effects

Effect Classification Terminology	Equivalent CIEEM terminology
Major beneficial (Positive)	1) Beneficial effect on structure / function or conservation status at a regional, national or international level; and 2) The extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Moderate beneficial (Positive)	1) Beneficial effect on structure/ function or conservation status at a county level; and 2) The extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Minor beneficial (Positive)	1) Beneficial effect on structure / function or conservation status at a local level; and 2) The extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible	No effect on structure / function or conservation status.
Minor adverse (Negative)	1) Adverse effect on structure / function or conservation status at a local level; and 2) The extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Moderate adverse (Negative)	1) Adverse effect on structure / function or conservation status at a county level; and 2) The extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
Major adverse (Negative)	1) Adverse effect on structure / function or conservation status at a regional, national or international level; and 2) The extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.

8.8 Limitations and Assumptions

8.8.1 An assumption has been made that the following habitats will be retained as part of the Scheme: woodlands, water bodies (including ponds), watercourses (assuming watercourses are not lost as a whole and small crossings of minor watercourses could be required but any main rivers would be crossed using trenchless techniques) and the majority of hedgerows (assuming hedgerows are not lost as a whole, but could require either a temporary or permanent gap through occasionally, which would be minimised to smallest necessary).

8.8.2 It is currently assumed that should there be the requirement for the potential mitigation of ecological features and recommended enhancement measures, suitable on-site areas will be made available to deliver the required outcomes.

8.8.3 An assumption has been made that any compound and material storage areas will be contained within the Site.

8.8.4 Baseline ecological surveys commenced in 2024 (within accessible areas of the Site) and will continue through 2025 to determine the baseline ecological conditions. The surveys may highlight new IEFs with potential to be significantly affected which have not been identified to date (or considered not to be significant) at this stage of the assessment.

8.8.5 Arboricultural surveys will be undertaken to inform the design of the Scheme.

8.9 Summary of Elements Scoped In and Scoped Out

8.9.1 The surveys to inform the baseline characterisation and support the biodiversity assessment, along with justification as to their scope, are set out in **Table 8-3**. A summary of the scope of the biodiversity assessment, including any matters that are scoped out, are presented in **Table 8-7**.

Table 8-7: IEFs scoped in and out of the biodiversity assessment

IEF	Matters scoped in / out
Statutory designated sites (European sites)	Scoped Out – No European sites within 10 km of the Site or up to 30 km from the Site with mobile species as qualifying criteria. Whilst no European sites have been identified within the respective Study Areas, if the Site changes and where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES, to determine whether there are any pathways to effects on any such sites.
	Scoped out – European sites beyond 10 km from the Site (without mobile species as qualifying criteria). Beyond 10 km there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
Statutory designated sites of National importance	Scoped In – High Dyke SSSI A single site (High Dyke SSSI) is present within the 5 km Study Area and as such, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
	Scoped out – sites beyond 5 km from the Site (without mobile species as qualifying criteria). Beyond 5 km there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
Non-statutory designated sites	Scoped In – non-statutory designated sites within 2 km of the Site Fourteen non-statutory designated sites are present within the 2 km Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.

IEF	Matters scoped in / out
	Scoped Out – non-statutory designated sites beyond 2 km of the Site. Beyond 2 km there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
Habitats	Scoped In - Habitats of Principal Importance (HaPI) within the ZoI of the Site Habitats of Principal Importance (HaPI) have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
	Scoped Out – common and widespread habitats of no conservation value and habitats outside of the Site. There will be no direct impact to habitats outside of the Site and good practice construction methods will ensure that there are no indirect impacts to habitats outside of the Site. Therefore, there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
Biodiversity Net Gain	Scoped In.
Terrestrial invertebrates	Scoped In – notable terrestrial invertebrate species and assemblages. Notable terrestrial invertebrate species have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
	Scoped Out – common and widespread species of no conservation value and species outside of the Site. Retention of the majority of habitats (e.g. woodland, hedgerows and ditches) within the Site, avoidance of off-Site habitats and good practice construction methods will ensure that there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.

IEF	Matters scoped in / out
Aquatic Macroinvertebrates	Scoped In – notable aquatic macroinvertebrate species and assemblages. There are potential impact pathways for direct and indirect impacts to aquatic invertebrates as per Section 8.6 of this chapter , and where necessary an assessment of these will be provided in the ES.
	Scoped Out – attraction of aquatic invertebrates to solar PV panels during operation. The Scheme is not located adjacent to water bodies, or near designated sites that are designated for supporting populations of notable aquatic invertebrates. Artificial horizontally polarising surfaces (such as solar panels), the reflection-polarisation characteristics of which are similar to those of water, have the potential to attract water-leaving polarotactic insects, posing a potential threat to these species. Aquatic macroinvertebrates in their terrestrial or airborne phase may be attracted to these surfaces, which may then disrupt their life cycle. Some aquatic insects are attracted to solar panels although this is an unusual event dependent on the coincidence of several suitable conditions to trigger such behaviour, e.g. wind direction and cloud cover. The likelihood of aquatic insects being attracted to large open areas of shiny surfaces is considered low given that such species will preferentially use smaller shiny surfaces. Most of the aquatic insect species identified during the desk study are of low conservation value, and do not use open water areas for any of their behaviours (i.e. few Odonata (dragonflies) were recorded for example). The impact of solar panels on aquatic insects would therefore be negligible. Scoped out – common and widespread species of no conservation value and species outside of the Site. Retention of the majority of habitats (e.g. watercourses and water bodies) within the Site, avoidance of off-Site habitats and good practice construction methods will ensure that there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
Aquatic Macrophytes	Scoped In. There are potential impact pathways for direct and indirect impacts to aquatic macrophytes as per Section 8.6 of this chapter, and where necessary an assessment of these will be provided in the ES.
Fish	Scoped In.

IEF	Matters scoped in / out
	There are potential impact pathways for direct and indirect impacts to fish as per Section 8.6 of this chapter, and where necessary an assessment of these will be provided in the ES.
Amphibians including Great Crested Newt	Scoped In. Protected and notable amphibians have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
Reptiles	Scoped In. Reptiles have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
Breeding and non-breeding birds	Scoped In. Protected and notable bird species have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
	Scoped Out – potential collision / attraction to solar PV panels from breeding or non-breeding birds during operation. The Scheme is not located adjacent to water bodies or on a migratory flyway / flightpath used by congregations of birds, e.g. between sites known to support large congregations of birds. Surveys of breeding and non-breeding birds will confirm the usage of the Site by birds, including of birds flying over the Site. There is no evidence in the UK that solar panels increase the risk of mortality or displacement of bird populations. Risk of collision with solar panels is therefore proposed to be scoped out of the assessment. Scoped Out – the requirement for two years worth of data for surveys of non-breeding birds The Scheme is not within 20 km of any European Site or Ramsar site that is designated for birds and the land within the Site is therefore not functionally linked habitat or connected to any European Site. Therefore, a

IEF	Matters scoped in / out
	survey of non-breeding birds within a single winter period (between October and March) will be representative of the non-breeding bird population using the Site to allow the potential impacts of the Scheme on non-breeding birds to be assessed.
Bats	Scoped In. Roosting and foraging/commuting bats have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
Riparian mammals	Scoped In. Water Vole and Otter have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
Badger	Scoped In. Badger have been identified within the Study Area. Therefore, where appropriate, the potential impact pathways identified in Section 8.6 of this chapter will be considered in the assessment provided in the ES.
Surveys for Brown Hare, Hedgehog, Polecat and Harvest Mouse	Scoped Out. Polecat is a rare species outside of its known distribution range (Ref 8-82) and historical records of Polecat show a widespread but scarce distribution in the northern half of Lincolnshire (Ref 8-82). Therefore, given the paucity of records of this species within the Study Area and this species' rarity within Lincolnshire, Polecat is likely to be absent from the Site. Brown Hare and Hedgehog are likely to be present within the Site and Harvest Mouse has the potential to be present, based on the habitat within the Site. Incidental records of these species will be recorded during other ecological surveys and any embedded mitigation measures (which will be formalised in the Framework CEMP secured as part of the DCO requirements) will ensure the integrity of retained habitats are not adversely affected and that there is no fragmentation of habitats, or of populations of species and that no species mortality occurs.

IEF	Matters scoped in / out
	Therefore, there are no impact pathways, either directly or indirectly, that would negatively impact upon Brown Hare (known to be present), Hedgehog or Harvest Mouse (if present) and mitigation will be adopted on a precautionary principle.
Other mammals, e.g. common and widespread species of no conservation value (such as Deer)	Scoped Out. The design of the perimeter fence will include gaps to allow mammals, including small deer to pass underneath at strategic locations to maintain ecological connectivity.

9 Water Environment

9.1 Introduction

9.1.1 This chapter outlines the anticipated water environment scope of assessment for the Scheme.

9.1.2 This chapter relates to the potential effects of the Scheme on the water environment, which includes surface water features (e.g., rivers, streams, ditches, and canals) and groundwater features. Impacts considered cover water quality, water resources, physical changes to hydromorphology and the function of water environment systems, flood risk and drainage. Isolated ponds as receptors are included within **Chapter 8: Ecology** as they are considered as a specific habitat type and to avoid duplication of assessment.

9.1.3 Where designated ecological sites are sensitive to changes in hydrology or water quality (i.e., they are 'water dependent') an assessment of the risks to them is considered in this chapter. However, potential impacts from contaminated land on any controlled water (surface or groundwater) is not considered in this chapter. For this, please refer to **Chapter 16: Other Environmental Topics**.

9.1.4 This chapter also considers the scope for mitigation, and how it is proposed to assess the significant of any identified potential effects.

9.1.5 This chapter is supported by the following figures:

- **Figure 9-1: Surface Water Environment;**
- **Figure 9-2: Groundwater Environment;**
- **Figure 9-3: Environment Agency Flood Zones;** and
- **Figure 9-4: Surface Water Flood Risk.**

9.1.6 This chapter is supported by Appendix D Water Framework Screening.

9.2 Study Area

9.2.1 A Study Area of approximately 1 km from the Site Boundary has been considered in order to identify water features that could potentially be affected directly by the Scheme. However, the baseline assessment has also considered a wider Study Area downstream of the Site Boundary along watercourses as water quality and flood risk impacts may propagate downstream, and thus it is important to consider all attributes of the water body that may be impacted. This distance will be decided during further assessment and informed by professional judgement.

9.3 Legislation, Planning Policy Context and Guidance

9.3.1 A summary of the legislation, planning policy and guidance relevant to the assessment of impacts of the Scheme on the water environment is presented in this section.

Legislation

- Environment Act 2021 (Ref 9-1);
- Water Act 2014 (Ref 9-2);
- Flood and Water Management Act 2010 (Ref 9-3);
- Marine and Coastal Access Act 2009 (Ref 9-4);
- Land Drainage Act 1991 (as amended) (Ref 9-5);
- Water Resources Act 1991 (as amended) (Ref 9-6)
- Salmon and Freshwater Fisheries Act 1975 (as amended) (Ref 9-7);
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 9-8);
- Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 9-9);
- Environmental Permitting (England and Wales) Regulations 2016 (Ref 9-10);
- Building Regulations 2010 (Ref 9-11);
- Flood Risk Regulations 2009 (Ref 9-12);
- Eels (England and Wales) Regulation 2009 (Ref 9-13); and
- Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 9-14).

National Planning Policy

9.3.2 The following planning policies have been taken into account as part of identifying the assessment methodology, receptor selection, importance and sensitivity, potential significant environmental effects, and scope for mitigation either embedded in the design or additional:

- National Policy Statement (NPS) EN-1 (Ref 9-15) with particular reference to section 5.16 Water Quality and Resources, paragraph 5.16.7 which describes what the ES should include. The Secretary of State (SoS) needs to be satisfied that a proposal has regard to the River Basin Management Plans and meets the requirement of the Water Framework Directive (including Article 4.7

[of the Directive as transposed in England]). Also, particular reference to Section 5.8 Flood Risk, paragraphs 5.8.6 to 5.8.23.

- Additionally, paragraphs 4.10.8 to 4.10.12 states that applicants for new energy infrastructure must take into account the potential impacts of climate change, and adopt appropriate mitigation or adaption measures for the lifetime of the proposed infrastructure.

- NPS EN-3 (Ref 9-16) notes, in paragraph 2.10.84 that "where a Flood Risk Assessment has been carried out this must be submitted alongside the applicant's ES. This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not, in general, be significant".

- NPS EN-5 (Ref 9-17), with particular reference to Section 2.3: Climate Change Adaptation and Resilience; and

- National Planning Policy Framework (NPPF) (Ref 9-18). Whilst the NPPF does not contain specific policies for nationally significant infrastructure projects, national policy statements form part of the overall framework of national planning policy. Within the NPPF, particular reference is given to paragraphs 161-182 in relation to flood risk and paragraphs 182 regarding water quality.

9.3.3 Consideration will also be given to UK Government's 25 Year Environment Plan (Ref 9-19), the Government's Environmental Improvement Plan 2023 (Ref 9-20), the UK Government's Future Water Strategy (2011) (Ref 9-21), Non-statutory technical standards for SuDS (Ref 9-22), Building Regulations 2010 Approved Document H: Drainage and Waste Disposal (Ref 9-23), BRE Digest 365: Soakaway Design and Water UK Design and Construction Guidance (DCG, 2021) (Ref 9-24).

9.3.4 At a regional level, water management is coordinated through 10 River Basin Management Plans (RBMPs). Each RBMP is prepared by the Environment Agency for six-year cycles and set out how organisations, stakeholders and communities will work together to improve the water environment. The most recent plans were published in 2022 (the third cycle). The water features within the Study Area fall under the Anglian RBMP (Ref 9-25).

National Guidance

9.3.5 The National Planning Policy Guidance (NPPG) (Ref 9-26) provides guidance for local planning authorities on assessing the significance of water environment effects of Schemes.

9.3.6 The NPPF (Ref 9-27) and the Flood Risk and Coastal Change NPPG (Ref 9-26) recommends that Local Plans should be supported by a Strategic Flood Risk Assessment and should develop policies to manage flood risk from all sources taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as Lead Local Flood Authorities (LLFAs) and Internal Drainage Boards.

9.3.7 An advice note on the Water Framework Directive by the Planning Inspectorate was updated in September 2024. The advice summarises the requirements of The Water Environment Regulations 2017 (the WFD Regulations) in relation to NSIP applications.

Local Planning Policy

9.3.8 The Scheme falls within the administrative boundaries of the LCC and NKDC. The following local policies are of relevance to the water environment:

- Policy LP14 of the adopted Central Lincolnshire Local Plan (2017) sets out policy considerations with respect to managing water resources and flood risk (Ref 9-28).
- Joint Lincolnshire Flood Risk and Water Management Strategy 2019-2050 (Ref 9-30).
- Central Lincolnshire Local Plan (2023) (Ref 9-31).
- Upper Witham Internal Drainage Board Flood Risk Management Policy Statement, 2018 (Ref 9-32).

9.3.9 Finally, the following Strategic Flood Risk Assessments (SFRAs) are available for the development sites and will be reviewed in full as part of the EIA:

- Central Lincolnshire Level 1 Strategic Flood Risk Assessment (SFRA), 2015 (Ref 9-33);
- Central Lincolnshire Level 2 Strategic Flood Risk Assessment (SFRA), 2016 (Ref 9-34); and
- North Kesteven Council Strategic Flood Risk Assessment (SFRA), 2009 (Ref 9-35).

9.4 Consultation

9.4.1 It is proposed that relevant statutory and non-statutory consultees will be consulted as the Scheme is developed, including: Natural England, local council biodiversity officers, the Environment Agency, Upper Witham IDB etc. This is to make sure a robust approach is adopted to scope and methodology of surveys and assessments, and to ensure sufficient mitigation is determined for any predicted significant impacts.

9.5 Baseline Conditions

9.5.1 Baseline information has been reviewed in the context of the Scheme, in order to identify the potential for significant effects based on a source-pathway-receptor model and where relevant, consideration has been given to the scope for mitigation.

9.5.2 The water environment baseline conditions have been determined by a desk study of available information, and various other online data sources including:

- Online Ordnance Survey (OS) maps viewed to identify any surface water features within 1 km of the Scheme (Ref 9-36);
- Online aerial photography (Ref 9-37);
- Part 1: Anglian river basin district river basin management plan (Ref 9-38);
- Environment Agency Catchment Data Explorer website (Ref 9-39)
- National Soil Resources Institute Soilscapes website (Ref 9-40)
- Multi Agency Geographical Information for the Countryside (MAGIC) map website; (Ref 9-41)
- British Geological Society (BGS) Geoindex website (Ref 9-42)
- Meteorological Office website (Ref 9-43)
- BGS Borehole and Geology Mapping (Ref 9-44); and
- Environment Agency Online Interactive Maps (Ref 9-45):
- Flood map for planning (rivers and sea);
- Risk of flooding from surface water;
- Risk of flooding from reservoirs; and
- Flood warning areas and risk.

9.5.3 Where relevant, water features and their attributes have been presented in a series of figures that support this chapter. **Figure 9-1: Surface Water Environment** presents the surface water environment**, Figure 9-2: Groundwater Environment** the groundwater environment**, Figure 9-3: Environment Agency Flood Zones** shows the Environment Agency Flood Zones (including the location of flood defences and areas benefitting from flood) and **Figure 9-4: Surface Water Flood Risk** shows the Surface Water Flood Risk.

9.5.4 Further review of existing geological plans, hydrogeological data and any existing site investigation data will be carried out at the PEIR stage to provide a preliminary assessment of local ground and groundwater conditions. Summarised data will be recorded and provided within the FRA and will be used to inform the Surface Water Drainage Strategy. The FRA will form a technical appendix to the ES.

9.5.5 In addition, further information and data will be obtained from the Environment Agency and local district councils and will be presented in the next stages of the assessment (i.e. the PEIR). This will include water quality, resources (pollution incidents, licenced and unlicenced (private) water abstractions, and water activity

permits (i.e. consented discharges), hydrogeology (e.g. groundwater levels), Water Framework Directive (WFD) data and flooding data.

9.5.6 It is also proposed to undertake to general walkover and hydromorphological surveys of the Site at PEIR stage.

Topography, land use, climate and geology

Solar PV Site

9.5.7 The topography of the area of the Solar PV Site, and surrounding Study Area is summarised as lower level land rising towards the east and an escarpment rising to the east of Leadenham village. The western area of the Solar PV Site, near the River Brant is approximately 13 m AOD, rising to 48 m AOD west of the A607, which runs north-south through the village of Leadenham. Eastwards within the Study Area, the land rises to approximately 97 to 100 m AOD. This area of higher ground is a north-south trending scarp slope.

9.5.8 The area is currently used mainly for agriculture, with a mosaic of agricultural fields. The village of Leadenham is located within the Study Area, to the east of the Solar PV Site.

9.5.9 Based on the Meteorological Office website (Ref 9-46), the nearest weather station is Waddington in Lincolnshire (SD728438), approximately 16 km north of Leadenham village. Using data from this weather station, for the period 1991-2020, it is estimated that the Study Area experiences approximately 615 mm of rainfall per year, with it raining more than 1 mm on approximately 116 days per year, which are both low in the UK context. This is relevant to the whole Study Area.

9.5.10 The bedrock and superficial geology for the area is identified by the BGS Geoindex online mapping (Ref 9-47). The Solar PV Site is located on bedrock of the Charmouth Mudstone Formation, which is described in the BGS GeoIndex as dark grey laminated shales, and dark, pale and bluish grey mudstones, with ironstone nodules present in some layers. At the eastern extent of the Solar PV Site, the geology changes to a thin band of Marlstone Rock Formation - Ferruginous Sandstone and Ironstone, then the Whitby Mudstone Formation. As the topography of the land rises further east, the geology changes through a thin layer of Grantham Formation – sandstone, siltstone and mudstone, to the Lower Lincolnshire Limestone.

9.5.11 In terms of superficial deposits there is patchy coverage of Head – clay, silt, sand and gravel, with alluvial deposits with sand and gravel within the area of the River Brant to the western boundary of the Solar PV Site.

Grid Connection Corridor

9.5.12 From west to east within the area of the potential Grid Connection Corridor, the topography lies at approximately 40 m AOD as in the area of the A607, and rises to 85 m AOD in the area of the north-south Pottergate Road, a distance of

approximately 600 m. The elevation of 85 m AOD is close to the high point of the scarp, the land then slopes eastwards down towards the eastern edge of the Grid Connection Corridor area, where the height is in the area of 50-52 m AOD.

9.5.13 The area is currently mainly used for agricultural usage, with a mosaic of agricultural fields. There are a few farms, and more isolated dwellings located within the potential area.

9.5.14 The climate will be similar to that stated above for the Solar PV Site, due to their proximity.

9.5.15 The bedrock and superficial geology for the area is identified by the BGS Geoindex online mapping (Ref 9-47). From west to east the Grid Connection Corridor is initially located on the Charmouth Mudstone Formation, changing to the Whitby Mudstone Formation in the area of the A607 and eastwards up the slope to Pottergate Road.

9.5.16 Prior to reaching Pottergate Road, the bedrock geology transitions through a narrow band of Grantham Formation (sandstone, siltstone and mudstone), to the Lower Lincolnshire Limestone Member (Lime – Wackestone). In the area of Heath Farm the bedrock geology changes to the Upper Lincolnshire Limestone Member (Ooidal Limestone).

9.5.17 There is very little superficial coverage of the bedrock geology, with a small area of Blown Sand located on the southern edge of the area for the potential Grid Connection Route.

Surface Water Features

Solar PV Site

9.5.18 The minor watercourses within the Solar PV Site itself are draining to the north-west, to confluence with the River Brant. The River Brant flows from south to north along the western boundary of the Site. Most of the area of the Solar PV Site is contained within the catchment area of one WFD surface waterbody, the Brant Lower Water Body. There are two others within the Study Area.

9.5.19 The Scheme is located within the Anglian River Basin District. It extends across three WFD water body catchments: Brant – Lower, Brant – Upper and Fulbeck Beck. These are listed below:

- Brant – Lower Water Body (GB105030056110);
- Brant – Upper Water Body (GB105030056770); and
- Fulbeck Beck Water Body (GB105030056120).

9.5.20 These catchments and named WFD surface water features are shown on **Figure 9-1: Surface Water Environment**.

9.5.21 The three water bodies are part of the Witham Upper Operational WFD Catchment. This drains an area which is narrow east to west, draining the area northwards from south of Nottingham to the Gainsborough area. These are shown on **Figure 9-1: Surface Water Environment**.

9.5.22 The Brant – Lower Water Body (GB105030056770) is currently at Moderate Ecological Potential (Cycle 3 2022 WFD classifications) and is designated as heavily modified. Biological quality elements are currently at Moderate status, with fish and macrophytes and phytobenthos combined being Moderate, although the macrophytes sub element is at Bad status. Invertebrates, meanwhile, are at High status. Hydromorphological supporting elements support Good status, while mitigation measures assessment is at Moderate or less. Physico-chemical quality elements are at Moderate due to Phosphate which is Poor. All other physico-chemical elements are High apart from dissolved oxygen which is Good. Specific pollutants are currently at High status. The whole of the Solar PV Site Boundary is located within this water body catchment area.

9.5.23 The Brant – Upper Water Body (GB105030056110) is currently at Moderate Ecological Potential (Cycle 3 2022 WFD classifications) and is designated as heavily modified. Biological quality elements are at Good status. Physico-chemical quality elements are at Moderate status due to phosphate which is Moderate, although all other physico-chemical quality elements are at High status. Hydromorphological supporting elements support Good status, while mitigation measures assessment is Good. Specific pollutants are at High status.

9.5.24 The Fulbeck Beck Water Body (GB105030056120) is currently at Poor Ecological Status (Cycle 3 2022 WFD classifications) and is not designated as artificial or heavily modified. Biological quality elements are currently at Poor status due to macrophytes and phytobenthos combines which are Poor. Physico-chemical quality elements are at Moderate status due to phosphate which is Poor, although other physico-chemical elements are High. Hydromorphological supporting elements support Good status, with morphology supporting Good status, although hydrological regime does not support Good status.

9.5.25 The nearest gauging station on the River Brant is located at the northwestern extent of the Solar PV site, where Skinnand Beck (within the Brant – Lower Catchment) confluences with the River Brant. (Station 3033, Brant at Brant Broughton, Ref 9-48). The location is shown on **Figure 9-1: Surface Water Environment**. This drains a catchment of 66 km^2. The annual mean flow is 0.256 m^3/sec, with a flow that is exceeded 95% of the time (Q95) of 0.007 m^3/sec. This gauging station is located adjacent to the site, and therefore, is a good representation of flow within the River Brant on the western edge of the Solar PV Site within the Brant – Lower Water Body designated channel.

Grid Connection Corridor

9.5.26 The Grid Connection Corridor extends eastwards from the Solar PV Site, as shown in **Figure 1-2**. The topography of the area rises up a limestone scarp slope. As such, with the high permeability of the bedrock, there are very few water features within

this area. Some minor surface water channels rise to the east of the A607, Cliff Road, and flow westwards into the Solar PV site.

9.5.27 The area of the potential Grid Connection Corridor is located within the Brant Lower water body, summarised in the section above. As the topography rises over the scarp, the catchment changes to the Dorrington Dike Water Body (GB105030056175).

Hydromorphology

9.5.28 The Brant – Lower Water Body (GB105030056770) is 12 km in length and is classified as heavily modified. It flows through a rural landscape, and is likely resectioned and realigned around agricultural fields. Whilst historic maps (Ref 9-49) show little change from the 1888-1915 map, they do show the path of a previous channel, in a currently straight section of the lower Brant directly West of Coleby. LiDAR maps (Ref 9-50) also show a line of depression in the land parallel to the current channel, indicating a previous path of the channel. A review of Google Street View (Ref 9-51) indicates that, where visible, the channel is significantly over deep and disconnected from the surrounding floodplain. In some places, set-back embankments further contribute to the disconnection of the channel and floodplain. Uniform banks indicate previous re-sectioning and possibly over-deepening of the channel.

9.5.29 The Brant – Upper Water Body (GB105030056110) is 11.2 km in length and is classified as heavily modified. It flows through a rural landscape, and is likely resectioned and realigned around agricultural fields. Geology mapping (Ref 9-52) shows mudstone is the main underlying bedrock, with superficial deposits of sand and gravel, indicative of areas the river may have previously meandered across the floodplain. Historic maps (Ref 9-49) show little change from the 1888-1915 map. A review of Google Street View indicates that, where visible, the channel is narrow and significantly over deep, disconnected from the surrounding floodplain, and flows around the edges of agricultural fields.

9.5.30 The Fulbeck Beck Water Body (GB105030056120), is 2.8 km in length and not classified as heavily modified. It flows through a rural landscape, and is likely re-sectioned and realigned around agricultural fields, joining the Brant at Stragglethorpe. Geology mapping (Ref 9-52) shows mudstone is the main underlying bedrock. Historic maps (Ref 9-49) show a 400 m length of channel has been engineered, from the 1888-1915 map. A previously sinuous path is shown at a reach that is currently straightened, demonstrating the physical modification to this reach.

9.5.31 The area considered for the grid connection corridorto the east of Welbourn, has few immediate channels that would be impacted by a grid connection corridor. The Metheringham Beck and Dunston Beck water body catchments fall to the east of the Lower Brant catchment, however channels are further east, through Metheringham and Dunston.

Water quality

9.5.32 Water quality data for the River Brant has been obtained from the Environment Agency's Water Quality Archive website (Ref 9-55). The nearest site is located at the Brant Broughton Gauging Station, at the northwest of the Solar PV Site (Ref 9-55). The location of this is shown on **Figure 9-1: Surface Water Environment**.

9.5.33 According to samples from January – October 2024, water quality within the Brant at Brant Broughton is consistently slightly alkaline with an average pH of 7.99. This falls within the WFD high classification based on the data from 2023 to 2024. A 10th percentile dissolved oxygen saturation of 77.3% is within the good WFD classification, with above 80% being where a high classification would start.

9.5.34 Biochemical Oxygen Demand (BOD) 90th percentile for the 2023-2024 data is 1.92, which is within the high WFD classification. The 90th percentile for ammonia as Nitrogen is 0.214 mg/l, which is within the good WFD classification.

9.5.35 Data is also available for Fulbeck Beck. This data will be summarised within the PEIR stage of the assessment.

Water resources

9.5.36 The Study Area is not located within a Drinking Water Protected Area. Drinking Water Protected Areas (Surface Water) are where raw water is abstracted from rivers and reservoirs and additional measures are required to protect the raw water supply to reduce the need for additional purification treatment (Ref 9-56). The Study Area is also not located within a Drinking Water Safeguard Zone for groundwater.

9.5.37 The Study Area is not located within a Drinking Water Safeguard Zone for surface water.

9.5.38 The Study Area is contained within a Nitrate Vulnerable Zone (NVZ) (Number S375). This is the Lower Witham NVZ for surface water, these are areas where there is a risk from agricultural nitrate pollution, and thus will not be considered further.

Internal Drainage Boards

9.5.39 The Study Area contains an area associated with the Upper Witham IDB. This is shown on **Figure 9-1: Surface Water Environment**. The catchment area of the Upper Witham IDB corresponds to the areas at risk of flooding, and not the whole Solar PV Site.

Aquatic ecology and nature conservation sites

9.5.40 Multi-Agency Geographic Information for the Countryside (MAGIC) (Ref 9-41) has been used to identify designated sites for nature conservation. As noted in **Chapter 8: Ecology and Nature Conservation**, there are no statutory sites located within the Study Area.

Groundwater

9.5.41 The aquifer status of the ground underlying Solar PV Site itself Secondary (undifferentiated). A north south strip of unproductive aquifer divides this from the Lincolnshire Limestone outcrop, which is designated as Principal Aquifer.

9.5.42 The small areas of head deposits overlying the mudstones of the Solar PV Site are designated as Secondary (undifferentiated). The Sands and gravels and alluvial deposits within the area of the River Brant area are designated as a Secondary A aquifer. Large areas of the Site have no superficial deposits covering the bedrock geology.

9.5.43 Principal aquifers comprise layers that have high permeability, meaning they usually provide a high level of water storage and transmission. They may support water supply and/or river baseflow on a strategic scale.

9.5.44 Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of baseflow to rivers.

9.5.45 Secondary B aquifers comprise predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

9.5.46 Secondary undifferentiated aquifer has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

9.5.47 The bedrock aquifers underlying the Site are contained within the Anglian (WFD groundwater) Management Catchment (Ref 9-39). The Study Area is underlain by two groundwater bodies (see also **Figure 9-2: Groundwater Environment**):

- Witham Lias Groundwater body (GB40502G401400); and
- Witham Limestone Unit A Groundwater body (GB40501G444800).

9.5.48 Witham Lias U Operation Groundwater body (GB40502G401400) covers a north-south strip from near Melton Mowbray in the south towards the Gainsborough area in the north. This has an overall classification of Good, with both quantitative and chemical elements being classified as Good. It had an objective for Good by 2015, and has met this objective.

9.5.49 Witham Limestone Unit A Groundwater body (GB40501G444800) covers a north-south strip from near Melton Mowbray in the south northwards to north of Lincoln. This has an overall classification of Poor. The quantitative element is designated as Poor on the basis of Quantitative Dependent Surface Water Body Status. The Chemical Status element is designated as Poor on the basis of the General Chemical Test. This is stated as being due to poor nutrient management of the

agriculture and rural land management industry. The overall objective for the water body is for Poor by 2015.

9.5.50 There are several boreholes in the area on Geoindex (Ref 9-47). Borehole reference SK95SW7, Broach Road, Boughton, is a record of a 907 m deep borehole formed in 1974 (Ref 9-57). This is located on the western edge of the Solar PV Site, next to the River Brant. This borehole was formed to examine the extent of coal measures at depth. The upper 151 ft (or 46 m) is noted to be Lias Marl deposits, with no superficial deposits present. No water strikes are noted in this upper layer.

9.5.51 A series of boreholes were formed to investigate for the 'Leadenham Bypass' in 1971. Some of these are located within the Solar PV site at the eastern edge of the Site, near to Leadenham village. Borehole SK95SE18 (Ref 9-58) was formed to 9 m. This notes a 0.2 m covering of topsoil over sandy silty Clay, becoming stiffer with depth. This is the Charmouth Mudstone Formation. Groundwater was encountered at 3 m below ground level (bgl). The other boreholes for this bypass investigation were to 2-3 m bgl with no groundwater encountered.

9.5.52 On the western edge of the village of Welbourn, a site investigation took place in 2004. These are mainly trial pits excavated to 1.5 to 2 m bgl, with no water strikes except for one trial pit which notes a water strike within a laminated clay layer at 1.80 m bgl. (SK95SE113 Ref 9-59).

9.5.53 Therefore, from these records there is a likelihood of encountering groundwater for excavations which are in the region of 2-3 m bgl.

9.5.54 There are two Zone III Source Protection Zones (SPZ) located 620m east of the A607 and another which sits north of Navenby. Neither the Solar PV Site or Grid Connection Corridor sit directly within either SPZ, with the Solar PV Site southeastern edge positioned 758m northwest of the nearest SPZ and the Grid Connection Corridor northern edge positioned 940m south of the nearest SPZ.

9.5.55 There are no drinking water safeguard zones (groundwater) in the Study Area (Ref 9-56).

Flood Risk

9.5.56 The flood risk from all sources for the Solar PV Site is summarised below in **Table 9-1** and for the Grid Connection Corridor in **Table 9-2** below.

Table 9-1: Solar PV Site Flood Risk from all sources

Flood Risk Source	Comments
Tidal / Fluvial	Within the Study Area there are Flood Zone 3 (in any year the land has a 1% or more chance of flooding from rivers) and Flood Zone 2 (in any year the land has between a 1% and 0.1% chance of flooding from rivers) areas associated with the River Brant and its tributaries, the

Flood Risk Source	Comments
	Fulbeck to the south and Skinnand Beck on the northern boundary of the Solar PV Site. The western Study Area contains areas at risk of flooding from the River Brant. Areas of Flood Zone 2 and3 extend into the Solar PV Site along the western extent. The northern area of the Solar PV Site has Flood Zond 2 and 3 areas associated with Skinnand Beck extending into the area. These are shown on **Figure 9-3: Fluvial Flood Risk**. There is very low risk of tidal flooding in this area, with the River Brant located upstream of the tidal limit of the Upper Witham catchment, and with the tidal barrier protection scheme in Boston providing protection; therefore, this is scoped out of further consideration. With ground levels at the proposed development location being approximately 14m AOD or higher, it is considered future sea level rise will not impact the as well; however, the H++ scenario will be assessed to ensure infrastructure will remain operational in times of flood.
Surface Water	There are many ephemeral drainage channels within the site draining from west to east, which are areas shown as low (0.1 to 1% chance per year) medium (1 – 3.3% chance per year) and high (more than 3.3% chance per year) risk of surface water flooding.
Groundwater	Gov.uk flood map for planning (https://check-long-term-flood-risk.service.gov.uk/ground-water) states that flooding from groundwater is unlikely in this area.
Sewers	The area of the Solar PV Site is located in a predominantly rural location, however where the Site is close to, a highway or in proximity to a settlement such as Leadenham, there is potential for flooding from sewer sources.
Reservoirs	Gov.uk flood map for planning (https://check-long-term-flood-risk.service.gov.uk/ground-water) states that flooding from reservoirs is unlikely in this area.

Table 9-2: Grid Connection Corridor Flood Risk from all sources

Flood Risk Source	Comments
Tidal / Fluvial	Within the Study Area for the Grid Connection Corridor there is a very low flood risk from tidal / fluvial flooding as the Grid Connection Corridor route is within Flood Zone 1. In addition, there will be no permanent above ground infrastructure within the Grid Connection Corridor; therefore, no change to long term flood risk associated with it.
Surface Water	Within the area of the Grid Connection Corridor, there are small areas at risk of surface water flooding in the western section from Pottergate Road westwards, associated with the surface water channels which lead to watercourses further west into the Solar PV Site. These areas are of medium risk (between 1% and 3.3% chance of occurring each year) and low risk (between 0.1% and 1% chance of occurring each year). Additionally, there are infrequent narrow areas at risk of surface water flooding, which drain to the east. These are from low to high risk (more than 3.3% chance of occurring each year). However, as the cable route will be buried with no permanent above ground infrastructure, there is no long term flood surface water flood risk associated with the grid connection corridor.
Groundwater	Gov.uk flood map for planning (https://check-long-term-flood-risk.service.gov.uk/ground-water) states that flooding from groundwater is unlikely in this area.
Sewers	The are of the Grid Connection Corridor is located in a predominantly rural location. The route crosses Cliff Road and Pottergate Road, and contains some isolated farms. Where the route is close to, a highway or in proximity to farming settlements, there is potential for flooding from sewer sources.
Reservoirs	Gov.uk flood map for planning (https://check-long-term-flood-risk.service.gov.uk/ground-water) states that flooding from reservoirs is unlikely in this area.

Figure 9-1: Surface Water Environment

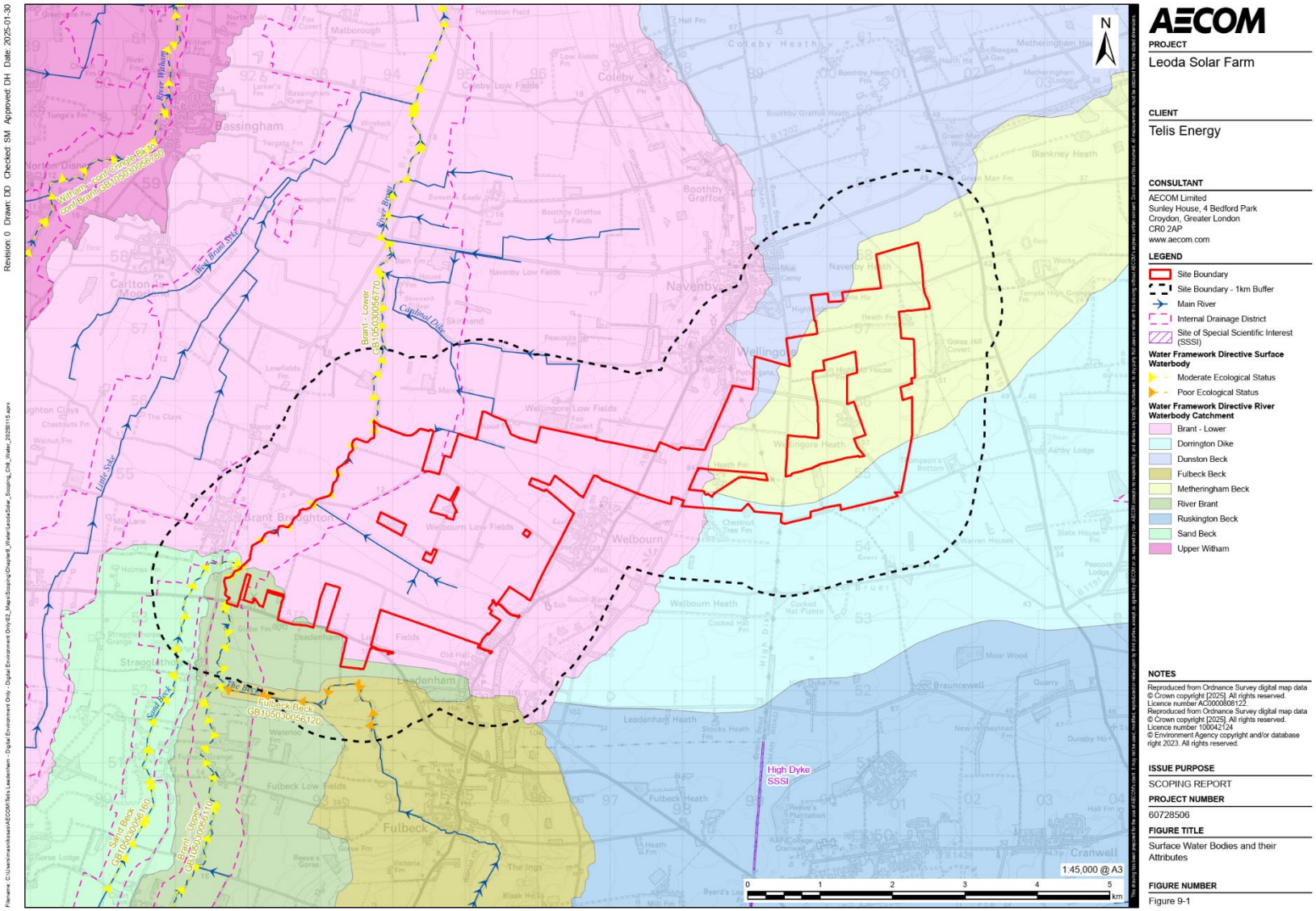


Figure 9-2: Groundwater Environment

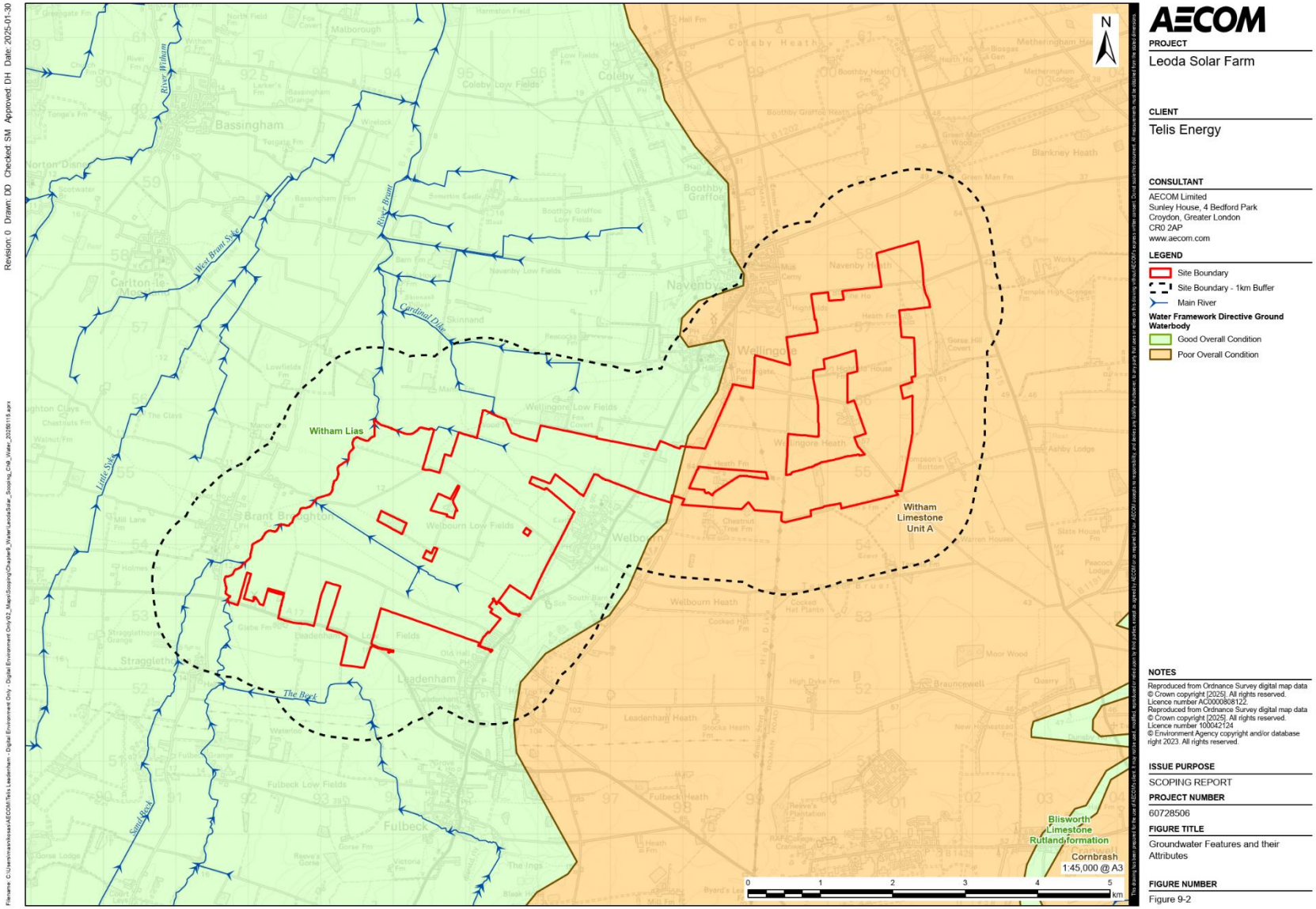


Figure 9-3: Environment Agency Flood Zones

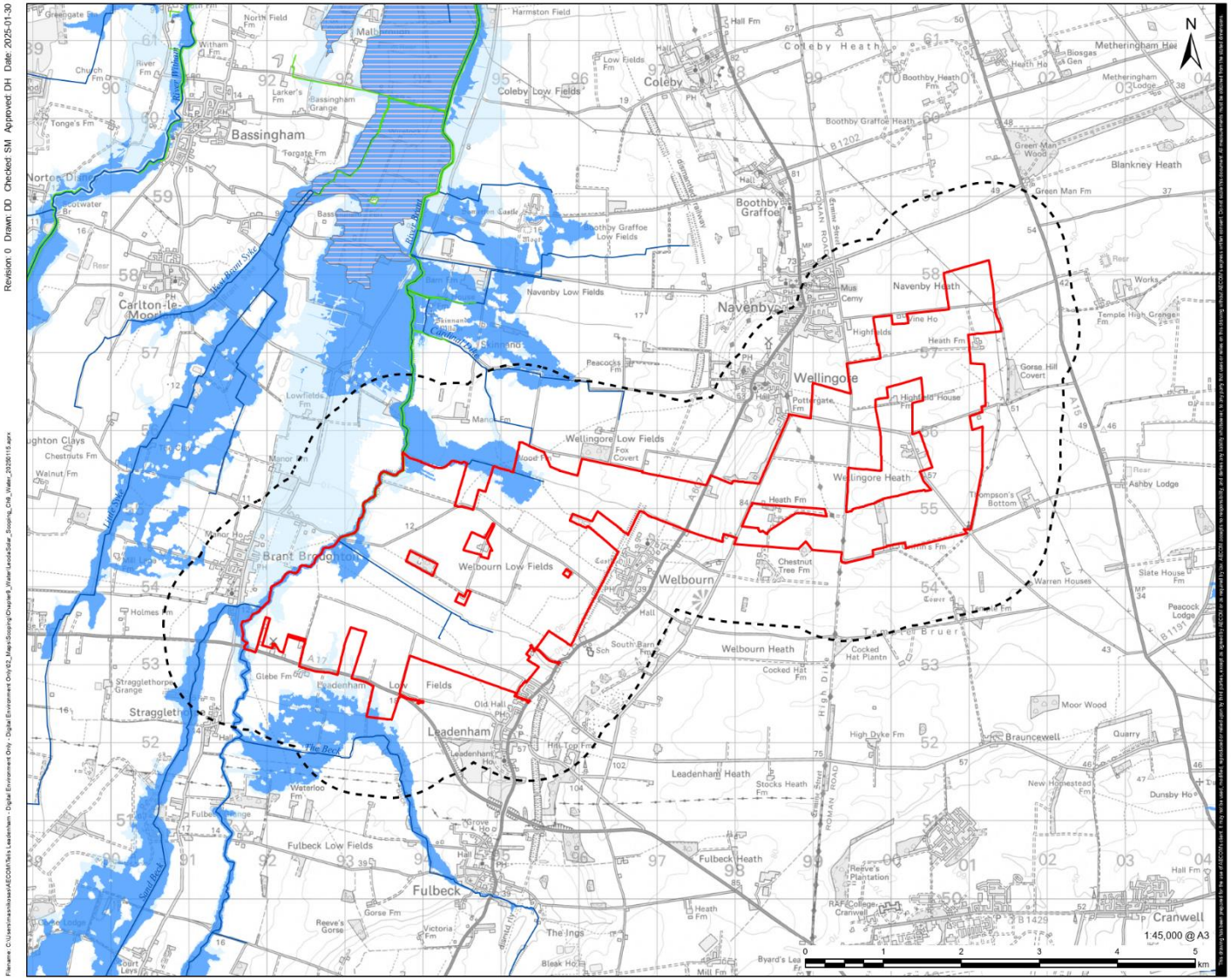
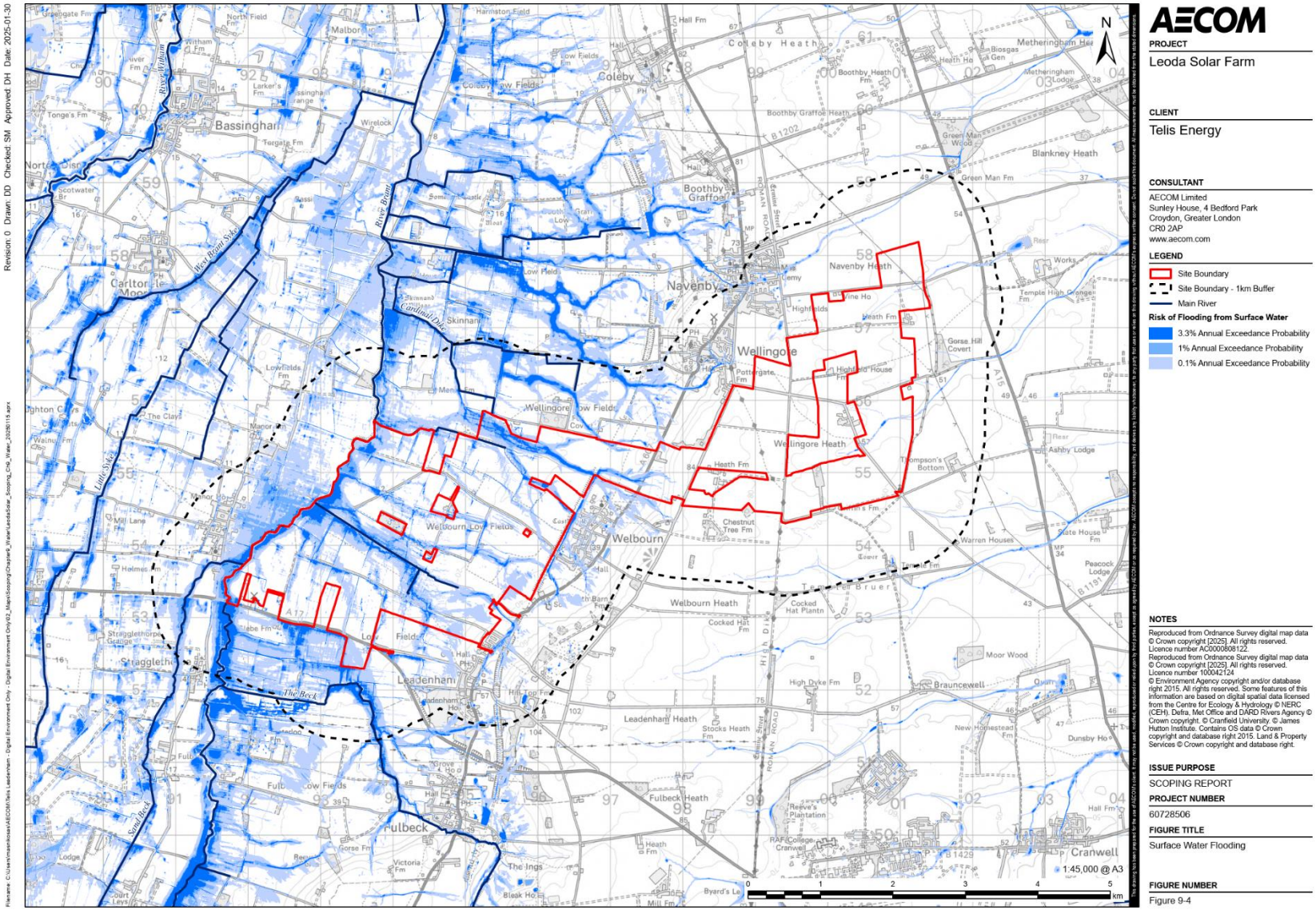


Figure 9-4: Surface Water Flood Risk



AECOM

PROJECT
Leoda Solar Farm

CLIENT
Telis Energy

CONSULTANT
AECOM Limited
Sunley House, 4 Bedford Park
Croydon, Greater London
CR0 2AP
www.aecom.com

LEGEND
- Site Boundary
- Site Boundary - 1km Buffer
- Main River

Risk of Flooding from Surface Water
- 3.3% Annual Exceedance Probability
- 1% Annual Exceedance Probability
- 0.1% Annual Exceedance Probability

NOTES
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ISSUE PURPOSE
SCOPING REPORT

PROJECT NUMBER
60728506

FIGURE TITLE
Surface Water Flooding

FIGURE NUMBER
Figure 9-4

9.6 Potential Effects and Mitigation

9.6.1 A qualitative assessment of potential effects on surface water quality from construction, operation and decommissioning of the Scheme will be undertaken. This will consider the risk to surface water features resulting from construction, decommissioning works or future operation activity using a source-pathway-receptor approach. Where there is a risk of pollution, mitigation measures will be described with reference to best practice guidance (e.g., Guidance on Pollution Prevention Notes and Construction Industry Research and Information Association guidance). Mitigation will be included within the CEMP for construction, and within the DEMP for decommissioning.

Construction and Decommissioning

9.6.2 A number of activities which will be undertaken at both during construction and decommissioning phases are likely to generate impacts which have the potential to affect the water environment, if unmitigated.

9.6.3 The greatest risk of adverse impacts during construction and decommissioning phases are on the River Brant, as the Solar PV Site is located within this catchment. This is located approximately 16 km northwards and is considered to be sufficiently far downstream to avoid impacts, due to dilution and distance of potential propagation of impacts and effects.

9.6.4 During construction the following adverse impacts may occur:

- Pollution of surface water or groundwater (and any designated ecology sites that are water dependent) due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through uncontrolled site run-off including dewatering of excavations or piling;
- Temporary impacts on the hydromorphology of watercourses from open-cut watercourse crossings or temporary vehicle access crossings as may be required;
- Temporary changes in flood risk from changes in surface water runoff (e.g., disruption of stream flows during any potential culvert construction works), and exacerbation of localised flooding, due to deposition of silt, sediment in drains, ditches; and changes; and
- Potential impacts on groundwater resources and local water supplies (licenced and unlicenced abstractions) and potentially the baseflow to watercourses from temporary dewatering of excavations or changes in hydrology.

9.6.5 The Scheme includes the construction of a Grid Connection Corridor from the Solar PV Site eastwards towards Metheringham. The route climbs up onto the Limestone escarpment with the southern edge of the Grid Connection Corridor terminating at Temple Bruer and the northern edge terminating just east of Navenby.

9.6.6 Within the area of the Grid Connection Corridor, which is an area of limestone, there are no drainage channel and ditches over the majority of the route. From the Ordnance Survey mapping a few small watercourses rise east of the A607 and flow westwards towards the River Brant. Therefore, where the crossing of watercourses and drainage ditches for internal site cabling is likely to be required is more in the area of the Solar PV Site as opposed to the Grid Connection Corridor. The construction of any cable routes crossing watercourses has the potential to result in modifications to watercourse which drain to the River Brant WFD water body. Some of these may be temporary such as to provide field access across watercourses or for an open-cut excavation of the channel for the installation of the new cables.

9.6.7 Details on construction methodologies are not yet available, however the Applicant has confirmed that Solar PV panels will be off set from watercourses by a minimum of 10 m measured from the centre line of the channel (as bank top is a variable feature). The purpose of this buffer reduces the risk of any pollutants entering the watercourse directly during construction or direct physical impacts, whilst also providing space for mitigation measures (e.g., fabric silt fences) should they be required as identified at the PEIR and ES stages.

9.6.8 To protect watercourses from fine sediment runoff, topsoil/subsoil will be stored a minimum of 20 m from watercourses on flat lying land. Where this is not practicable, and it is to be stockpiled for longer than a two-week period, the material will either be covered with geotextile mats, seeded to promote vegetation growth, or runoff prevented from draining to a watercourse without prior treatment.

9.6.9 During decommissioning, potential impacts would be similar to the construction phase although it is anticipated that underground cabling in both the Solar PV Site and Grid Connection Corridor may be left in situ beneath watercourses and there would be less excavation works required close to watercourses. There may also be some additional wastewater in pipework of above ground installations that would need to be removed, tested, and potentially treated as waste rather than discharged to a watercourse or to ground.

Operation and Maintenance

9.6.10 During the operational phase, the following impacts may occur:

- Impacts on water quality in watercourses and groundwater from run-off and the potential for accidental spillages from new permanent hardstanding and maintenance activities, assuming surface water run-off does ultimately drain to a surface watercourse rather than simply to ground;
- Potential for impact on groundwater or surface water from firewater runoff in the event of a fire in the battery storage areas;
- Potential impacts on hydrology as a result of the Scheme. This may also have a subsequent effect on aquatic habitats and water-dependent nature conservation sites;

- Potential for permanent physical impacts to watercourses if crossings are required for access and depending on the design of the structure used – more impact from the potential use of culverts;
- Potential impacts on the rate and volumes of surface water run-off entering local watercourses and increasing the risk of flooding;
- The current arable fields are treated with fertiliser and pesticides. During the life of the project the use of such chemicals will be ceased which will lead to beneficial impacts on the water environment;
- Potential impacts on groundwater resources and local water supplies (if confirmed a risk); and
- The conversion of the land from intensive farmland to solar PV grassland has the potential to enhance infiltration rates onsite.

9.6.11 Due to the potential for impacts and effects on water receptors and resources by the Scheme, a full Water Environment Impact Assessment will be included in the ES. This will also be supported by a Surface Water Drainage Strategy, an FRA and a Water Framework Directive Assessment (WFD). The scope for these assessments and how the significance of effects will be determined is described in the following section.

9.6.12 The Surface Water Drainage Strategy will include information on the outline design of drainage systems to ensure that there will be no increases in flood risk downstream, during storms up to and including the 1 in 100 (1%) annual probability design flood, with an allowance for climate change.

9.6.13 In accordance with planning policies of LCC and NKDC (Ref 9-30, Ref 9-31) and general good practice, mitigation will be provided by restricting surface water discharge rates and providing on-site attenuation, primarily via SuDS, such as Rural SuDS (RSuDS) techniques or other appropriate solutions, to ensure there will be no increase in flood risk elsewhere.

9.6.14 Mitigation for any risks from future Panel cleaning during operation will be presented, and may include, for example, the use of clean water with no added chemical products.

9.6.15 The potential or impact of foul drainage / water supply in the area from the offices / maintenance facilities has been scoped out of further assessment.

9.7 Assessment Methodology

Water Quality and Resource Assessment

9.7.1 Relevant data will be requested and obtained from the Environment Agency. A Site Walkover Survey will be undertaken during the PEIR stage of the assessment, which would be undertaken by a hydromorphologist and a water resources specialist. This

will be to observe surface water features in the Study Area and to make observations about their current condition and character, the presence of existing risks and any potential pathways for construction, operation and decommissioning impacts as a result of the Scheme. Further site surveys may be required as the Scheme design develops. However, no water quality sampling is proposed – water quality of the more significant watercourses near the Site Boundary, and just beyond, will be determined with reference to background water quality data from routine Environment Agency monitoring where available. The importance of water bodies will be determined from a holistic review of water body features and their attributes and will not rely on water quality alone due to the principle that no controlled water may be polluted (i.e. just because water quality may be poorer at a point in time does not mean a greater impact can be allowed). In keeping with standard practice and reflecting the level of risk from the Scheme, water quality impacts will be based on a qualitative risk assessment that does not require input of raw background water quality data.

9.7.2 The appropriateness of the surface water drainage measures in terms of providing adequate treatment of diffuse pollutants will be assessed with reference to the Simple Index Assessment method described in the SuDS Manual (Ref 9-60). The Simple Index Approach follows three steps:

- Step 1 – Determine suitable pollution hazard indices for the land use(s);
- Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index (for three key types of pollutants - total suspended solids, heavy metals and hydrocarbons); and
- Step 3 – If the discharge is to a water body protected for drinking water, consider a more precautionary approach.

9.7.3 The SuDS Manual (Ref 9-60) only provides a limited number of land use types and so those selected will be the most suitable for the components of the Scheme, based on professional judgement. Where more than one pollution hazard category applies to a component of the Scheme, the worst pollution hazard will be selected.

9.7.4 As part of the groundwater assessment a groundwater risk analysis would be undertaken of each location where there may be a watercourse crossing. This would compare the likely depth of excavation with available estimates of groundwater level at each site.

9.7.5 A consideration of any combined and cumulative effects will also be included.

Hydromorphology and Water Framework Directive Assessment

9.7.6 Due to the potential impacts upon WFD water bodies, initially a Screening and Scoping WFD Assessment will be undertaken in keeping with Planning Inspectorate (PINS) Advice Note 18: The Water Framework Directive released in 2024 (Ref 9-61). The assessment would determine the potential for any non-compliance of the Scheme with WFD objectives for affected water bodies, using readily available information. This will include a qualitative examination of the potential construction,

operation and decommissioning phase impacts of the Scheme on relevant WFD hydromorphological, biological and physio-chemical parameters. Depending on the outcomes of the preliminary assessment, more detailed investigations may be required, which will be determined in consultation with the Environment Agency.

Surface Water Drainage Strategy

9.7.7 A Surface Water Drainage Strategy will be prepared to ensure the risk of surface water flooding is not increased as a result of the Scheme, and any increased land take for foundations and any access roads.

9.7.8 Careful consideration of the SuDS features, in-keeping with local planning policy and through liaison with the LLFA, the Upper Witham IDBs and Environment Agency, will be undertaken to ensure that the Surface Water Drainage Strategy adequately attenuates and treats runoff from the Scheme, whilst minimising flood risk to the site and surrounding areas.

9.7.9 A water quality risk assessment of all solar infrastructure will be undertaken using the Simple Index Approach described in The SuDS Manual (Version 6) (CIRIA C753) (Ref 9-60). This will inform what, if any, treatment measures are required to manage the risk from diffuse urban runoff to watercourses or ground.

Nutrient Neutrality

9.7.10 The Scheme is not located within an area listed as being contained within a Nutrient Neutrality Catchment (Natural England, 2024). Therefore, this is not considered further and is scoped out of the assessment.

Flood Risk Assessment

9.7.11 A Flood Risk Assessment (FRA) will be prepared for the Scheme, and will be a technical appendix to the ES, to review the current and future flood risk to the Study Area from all sources (including surface water, sewer, groundwater, tidal and fluvial and other artificial sources), in-keeping with the NPS and also NPPF requirements, to inform the Scheme design and set out any proposed mitigation requirements that are to be addressed within the Surface Water Drainage Strategy.

9.7.12 The NPPF includes solar farms as ‘essential infrastructure’, as categorised in Annex 3: flood risk vulnerability classification.

9.7.13 Cable routes are not generally considered in long term flood risk terms, other than temporary works during installation. However, the approach to the Sequential and Exception Tests for the Grid Construction Corridor will be clarified with the Environment Agency and the LLFA as required.

9.7.14 The majority of the Solar PV Site is located in Flood Zone 1 and development in this Zone is considered acceptable without the need for additional flood risk mitigation. Where development is to take place within areas at risk of flooding (Flood Zones 2 and 3 close to the River Brant), there may be a requirement for the construction of

flood compensation or mitigation measures to ensure no detrimental effect to flooding potential within or from the affected watercourse in the catchment once the Scheme is operational. The conclusions of this will be referred to within the flood risk, drainage and surface water assessment presented in the ES. As the Scheme is classified as essential infrastructure and parts of the Solar PV Site are located in Flood Zone 3, the Exception Test may be required to be undertaken as part of the FRA if the Sequential Test cannot be satisfied in terms of the internal site layout and positioning of infrastructure within areas of the lowest risk of flooding, from all sources. For the Exception Test to be passed allowing development in Flood Zone 3, the FRA will be required to demonstrate that the development will be safe for its lifetime, this requirement may influence positioning of infrastructure within the Solar PV Site and heights of panels. Paragraph 5.8.41 of NPS EN-1 (Ref 9-15) notes development within Flood Zone 3b should not be consented unless appropriate compensation can be provided, if the infrastructure has to be located within it. Flood Zone 3b is designated as functional floodplain; land with a 3.33% chance of flooding in any given year.

Assessment of Effect Significance

9.7.15 The impact assessment will be based on a source-pathway-receptor model. For an impact on the water environment to exist the following is required:

- An impact source (such as the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a water body);
- A receptor that is sensitive to that impact (i.e., water features and the services they support); and
- A pathway by which the two are linked.

9.7.16 Once an impact has been identified and assessed, the effect category will be determined with reference to the criteria set out within the Design Manual for Roads and Bridges LA113 (Ref 9-62).

9.7.17 This can be applied to all development types and represents the most robust and nationally accepted criteria for the determination of potential effects on the water environment.

9.7.18 The criteria will be adapted where required to take account of hydromorphological impacts and the full range of flood risks. Impacts and effects will be categorised as adverse / beneficial, direct / indirect, temporary / permanent and short term or long term, as per the methodology described in **Chapter 5** of this EIA Scoping Report. After embedded mitigation measures, any additional mitigation measures are taken into account, and residual effects are those effects which are still predicted to potentially take place. Effects that are moderate or greater in scale will be considered significant.

9.8 Limitations and Assumptions

9.8.1 The assessment of potential effects is currently based on the description of the Scheme set out in **Chapter 2: The Scheme** of this EIA Scoping Report.

9.8.2 The final routes for Grid Connection Corridor, and the cable route construction methodologies and mitigation, have not yet been determined. This is of particular importance when considering impacts associated with any potential watercourse crossings, the quality of surface water runoff, impacts to hydromorphology and channel hydraulics. The protection of water environment receptors will be taken into consideration within the iterative design process, including the choice of crossing methodology and use of best practice methodologies for construction.

9.8.3 Receptors considered in this assessment will include existing infrastructure assets, residential buildings, commercial buildings, agricultural land, and property potentially affected by the Scheme.

9.8.4 The locations of private water supplies and abstractions have not yet been obtained, and so these are not included as receptors at this time. Water activity permits (i.e., permitted discharges) are also not yet known and have not been considered in the current baseline. These receptors will be considered at the PEIR stage.

9.8.5 Requirements for hydraulic modelling of watercourses will be discussed with the Environment Agency / LLFA; any modelling required will be undertaken as part of the ES to inform the FRA and Surface Water Drainage Strategy. The IDB will be consulted on the FRA and Surface Water Drainage Strategy.

9.8.6 Visual surveys will be undertaken of accessible water/drainage features to inform the Surface Water Drainage Strategy. However, it may not be possible to survey all significant locations (such as crossing locations) or structures due to access constraints. Where this is the case, we will attempt to survey close to the area of interest and use data from that as a proxy. In addition, some watercourses may be small, ephemeral and flow only intermittently, and these may not be identified in the field. It is not proposed to carry out any water quality sampling and testing, but EA data will be used to ascertain baseline water quality in the Study Area.

9.8.7 Other than the site walkover survey, the FRA and Surface Water Drainage Strategy will be based on desktop surveys and best available site layout proposals in line with best practice. LiDAR data will be used to inform the FRA and the Surface Water Drainage Strategy.

9.8.8 Temporary works will not be assessed unless they are of a potentially significant scale and have the potential to adversely affect flood risk or impact the quality or form of water features. The temporary works where such risks are considered significant (for example, excavations for the cable routes), will be identified and assessed within the FRA, Screening and Scoping WFD Assessment and ES.

9.8.9 As part of the full environmental impact assessment, the risk from surface water drainage to surface or groundwater bodies will be assessed according to the Simple

Index Approach presented in the C753 The SuDS Manual (Ref 9-60). Given the very low risk the need for treatment measures is expected to be minimal. Given the availability of space it is not anticipated that there would be any issues providing any treatment of diffuse pollutants, should the Simple Index Approach assessment identify such a need.

9.8.10 At the time of writing, it is not assumed that wastewater generated from the Scheme will be managed by either connection to an available public sewer, if close enough, or a self-contained independent non-mains domestic storage. This would be a self-contained foul drainage system to a sealed cesspit or similar sealed system. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor. Therefore, impact on foul drainage or water supply has been scoped out of further assessment.

9.9 Summary of Elements Scoped In and Scoped Out

9.9.1 A summary of the elements scoped into and out of the Water Environment assessment are presented in **Table 9-3**.

Table 9-3: Elements scoped in and out of the assessment of the water environment.

Element	Scoped in / Scoped Out
Surface water drainage	Scoped in: potential for impacts due to construction and operation of the Scheme
Foul water drainage / water supply	Scoped out: potential for impacts from foul drainage and for potential for impact on water supply
Groundwater	Scoped in: potential for impacts due to construction and operation of the Scheme
Hydromorphology	Scoped in: potential for impacts due to infrastructure in the area the River Brant, and watercourse crossings by access bridges within its catchment area
Flood Risk	Scoped in: potential for impacts on the flood risk potential within the Scheme area, and downstream on watercourses surface runoff waters.
Nutrient Neutrality Assessment	Scoped out: no hydrologic continuity between the Site and the designated sites identified by Natural England as requiring assessment.

10 Landscape and Visual Amenity

10.1 Introduction

10.1.1 This chapter sets out the relevant landscape and visual matters, including the landscape and visual impact assessment (LVIA) methodology, which will be addressed within the ES.

10.1.2 Landscape effects relate to changes to the landscape as a resource, including physical changes to the fabric or individual elements of the landscape, its aesthetic or perceptual qualities, and landscape character.

10.1.3 Visual effects relate to changes to existing views of identified visual receptors ('people'), from the loss or addition of features within their view due to the Scheme. For example, this may be residents or users of Public Rights of Way (PRoW).

10.1.4 The LVIA will be undertaken in accordance with the Guidelines for Landscape and Visual Impact Assessment, Third Edition, 2013 (GLVIA3) (Ref 10-1) and with reference to other environmental topics, including Ecology and Nature Conservation, Cultural Heritage, and Glint and Glare.

10.1.5 This chapter is accompanied by the following figures:

- **Figure 10-1: Zones of Theoretical Visibility; and**
- **Figure 10-2: Viewpoint Locations.**

10.1.6 There are no appendices to accompany this chapter.

10.2 Study Area

10.2.1 In accordance with GLVIA3 (Ref 10-1), the purpose of the landscape Study Area is to identify the area which the Scheme may influence in a significant manner. The visual Study Area is concerned with the area across which the Scheme may be visible and is focused on the individuals or groups of people who may be significantly affected by changes in the composition of their views.

10.2.2 The LVIA Study Area will be informed by desk-based review of landform, landcover context surrounding the Scheme and supported by computer generated Zones of Theoretical Visibility (ZTV) (as shown in **Figure 10-1: Zones of Theoretical Visibility**). These will be verified in the field.

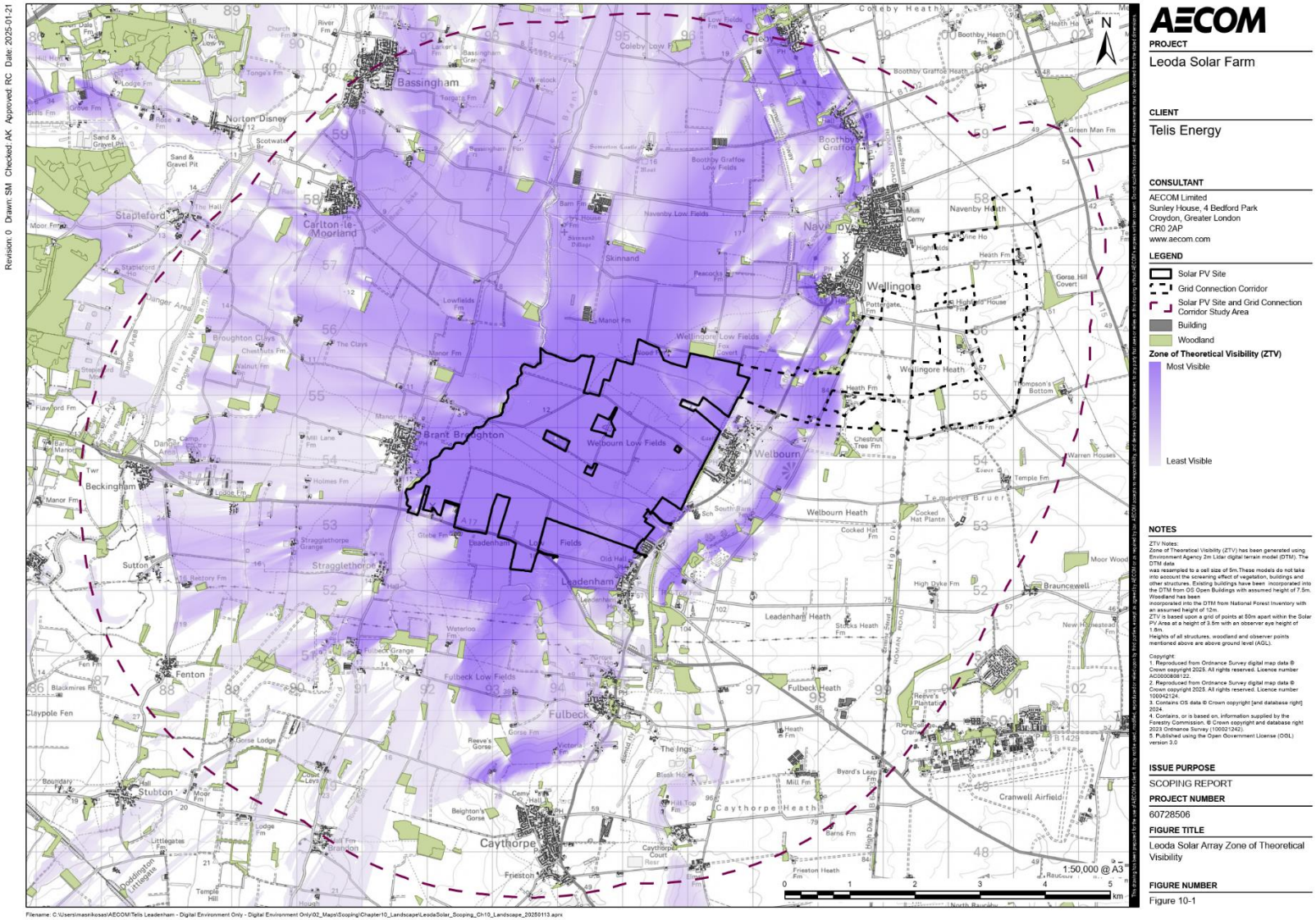
10.2.3 As the design of the Scheme evolves, the Study Area to be used for the LVIA may need to be refined to ensure all works, including temporary areas required for construction and permanent infrastructure are included. The maximum parameters of these, in terms of height and location, will be determined as the Scheme design

develops, taking into account environmental and technical factors. A reasonable worst case will be assessed and presented in the ES.

10.2.4 Based on the desk-based review, ZTV and professional judgement, a preliminary LVIA Study Area extends up to 5 km from the Solar PV Site Boundary and 1 km from the Grid Connection Corridor.

10.2.5 The extent of the LVIA Study Area will be reviewed throughout the iterative design process and via fieldwork in winter when the deciduous vegetation is not in leaf and will be refined to the extent of potential significant effects or extent of visibility. The extent of LVIA Study Area will also be consulted upon with the Local Planning Authorities and the justification for its final extent will be set out in the ES.

Figure 10-1: Zones of Theoretical Visibility



10.3 Legislation, Planning Policy Context and Guidance

10.3.1 The following planning policies are relevant to the landscape and visual matters.

Legislation

10.3.2 There is no applicable legislation specific to the assessment.

National Planning Policy

10.3.3 Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 10-2), with particular reference to section 4.7 in relation to good design for energy infrastructure and Section 5.10 in relation to landscape and visual considerations, including National Landscapes, when assessing energy projects.

10.3.4 NPS for Renewable Energy Infrastructure (EN-3) (Ref 10-3), with particular reference to section 2.10, specifically paragraphs 2.10.93 to 2.10.101, in relation to landscape, visual and residential amenity considerations for solar photovoltaic generation.

10.3.5 NPS for Electricity Networks Infrastructure (EN-5) (Ref 10-4), with particular reference to 2.9, specifically paragraphs 2.89.7 to 2.9.19, in relation to landscape and visual impacts from electricity network infrastructure.

10.3.6 National Planning Policy Framework (NPPF) (Ref 10-5), with particular reference to paragraph 135 in relation to achieving well designed developments; paragraph 187 in relation to contributing to and enhancing the natural and local environment; paragraph 189 in relation to National Landscapes and their setting; and paragraph 198 in relation to siting development that is appropriate for its location, taking into account likely effects and mitigation.

National Guidance

10.3.7 The following guidance is of relevance for landscape and visual amenity:

- Planning Practice Guidance (PPG) for ‘Natural Environment’ (Ref 10-6);
- PPG for ‘Light Pollution’ (Ref 10-7); and
- PPG for ‘Renewable and Low Carbon Energy’ (Ref 10-8).

Local Planning Policy

10.3.8 The Scheme falls within the administrative boundaries of the LCC and NKDC. The following local policies are of relevance to the landscape and visual assessment (Ref 10-9):

- Policy S5: Development in the Countryside;

- P53: Design and Amenity;
- P59: Green and Blue Infrastructure;
- P62: Areas of Outstanding Natural Beauty and Areas of Great Landscape Value;
- P64: Local Green Space;
- P65: Important Open Spaces; and
- P66: Trees, Woodland and Hedgerows.

10.3.9 This policy context provides a framework to ensure that schemes have regard to landscape character and distinctiveness through the use of design tools to ensure that key views and settings are respected and that schemes are assimilated into the landscape through having regard to existing character and amenity considerations.

10.4 Consultation

10.4.1 No consultation has been undertaken to date with respect to landscape and visual matters. This EIA Scoping Report will form the basis of consultation with stakeholders, including methodology, LVIA Study Area extent, scope, proposed mitigation and representative viewpoints.

10.5 Baseline Conditions

10.5.1 This section provides a review of the landscape and visual baseline, alongside key local guidance documents. It also identifies those landscape and visual receptors which will merit detailed consideration in the LVIA. In accordance with paragraph 3.19 of GLVIA3 (Ref 10-10), it also identifies those which are 'scoped out' from further assessment as effects 'have been judged unlikely to occur or so insignificant that it is not essential to consider them further'.

Landscape Context

10.5.2 The Study Area consists of arable and pastural farmland. The extensive landscape is generally low lying and flat, enclosed by a limestone escarpment, the Lincoln Edge, known locally as the Lincoln Cliff. The landform runs in a north to south formation and is made up of scarp and dip slopes.

10.5.3 The agricultural land use generally comprises of small to medium irregular sized fields within the central and western areas. The field sizes to the east of the Lincoln Cliff are generally larger. Tree cover is generally limited across the Study Area. Landscape features consist of hedgerows, individual trees and small sized woodland blocks. As a result of the generally level terrain across the central and western sections of the Study Area, where present, hedgerows have a strong influence by foreshortening views. Tree cover is denser along the Lincoln Cliff where

there are numerous small woodlands and copses located at the edge of settlements and the landscape in between.

10.5.4 The topography is generally flat across much of the Study Area ranging from between 6 m Above Ordnance Datum (AOD) to 12 m AOD. The topography in the east of the Study Area, around the Lincoln Cliff, the land rises to approximately 100 m AOD around Leadenham.

10.5.5 A number of small settlements are present in the Study Area. These include the villages of Leadenham, Welbourn, Wellingore and Navenby in the east of the Study Area and Brant Broughton in the west that are located close to the Site. Other villages located further from the Site are present in the Study Area. Other settlement includes hamlets, isolated properties and farmsteads.

10.5.6 Public Rights of Way (PRoW) cross parts of the Study Area, linking settlements (refer to Figure 2-2). The Long Distance Route (LDR) Viking Way follows the line of the Lincoln Cliff in the east of the Study Area.

10.5.7 The A17 lies to the south of the Site Boundary, dissecting a small part of the Solar PV Site.

Landscape Character and Relevant Designations

10.5.8 There are no statutory landscape designations, i.e. National Parks or National Landscapes, located within the Study Area.

10.5.9 A locally designated Area of Great Landscape Value (AGLV), as identified in the Lincolnshire Local Plan (Policy S62), lies within the east of the Study Area. The AGLV extends from Leadenham to Brace Bridge, which is located further north outside the Study Area.

Published Landscape Character Assessments and Related Studies

10.5.10 The Study Area and Site Boundary are covered by several published character assessments and related studies, which form part of the evidence base for LCC and NKDC. These documents will be reviewed as part of the iterative design process.

10.5.11 The following section provides an overview of these publications.

National Landscape Character Assessments

10.5.12 At a national level, the Site Boundary is covered by Natural England's National Character Area Profiles for National Character Area 47: Southern Lincolnshire Edge (NCA 47) (Ref 10-11) and NCA 48 – Trent and Belvoir Vales (NCA 48) (Ref 10-12).

10.5.13 Within National Character Area Profile, NCA 47 is described as:

"The Southern Lincolnshire Edge is an area of clear character defined by the dramatic limestone cliff to the west and the dip slope that drops gently away to the edge of the fens in the east".

10.5.14 Statements of Environmental Opportunity for NCA 47 include enhancing the management of soil, water, habitats, and landscape features on agricultural land to improve the provision of vital ecosystem services. Also, the safeguarding archaeological sites, historic buildings, and traditional villages for preserving a sense of place and history.

10.5.15 Within National Character Area Profile, NCA 48 is described as:

"The Trent and Belvoir Vales NCA is characterised by undulating, strongly rural and predominantly arable farmland, centred on the River Trent."

10.5.16 Statements of Environmental Opportunity for NCA 48 include promoting sustainable agricultural practices to enhance ecological networks, and ensuring long-term farming viability while supporting biodiversity, carbon storage, and water quality. Expanding the woodland and hedgerow network improve habitat connectivity and regulate soil erosion and water flow. Restore rivers and floodplains and add recreational value while preserving their historical significance. Maintain the rural character of the gently undulating landscape, managing distinctive features to sustain the unique sense of place and history of the Trent and Belvoir Vales.

Regional and District Assessments and Studies

10.5.17 Regional and District Assessments and Studies include:

- The North Kesteven Landscape Character Assessment (Ref 10-13); and
- Green Infrastructure Study for Central Lincolnshire - Volumes 1-6 (Ref 10-14).

Extent of Visibility

10.5.18 As a result of the relatively flat land cover across the Solar PV Site and the western and central section of the Study Area, theoretical visibility is likely to be widespread. In practice, the presence of hedges along a number of field boundaries and the scattered small sized woodland blocks and linear tree planting that are present within the Study Area is likley to prevent medium to long distance views and in general restrict longer distance views from local roads.

10.5.19 The elevated nature of the Lincoln Cliff allows for medium to long distance views across the Study Area, where these are available at village edges. The Lincoln Cliff landform prevents views of the Solar PV Site from further east. Although views of the Grid Connection Corridor will be available from east of the Lincoln Cliff.

10.5.20 From the desk-based review and initial site visit (undertaken in June 2024) the visibility of the land within the Site Boundary varies, due to the landform, woodland, field boundaries and roadside vegetation across the surrounding landscape.

Key Visual Receptors

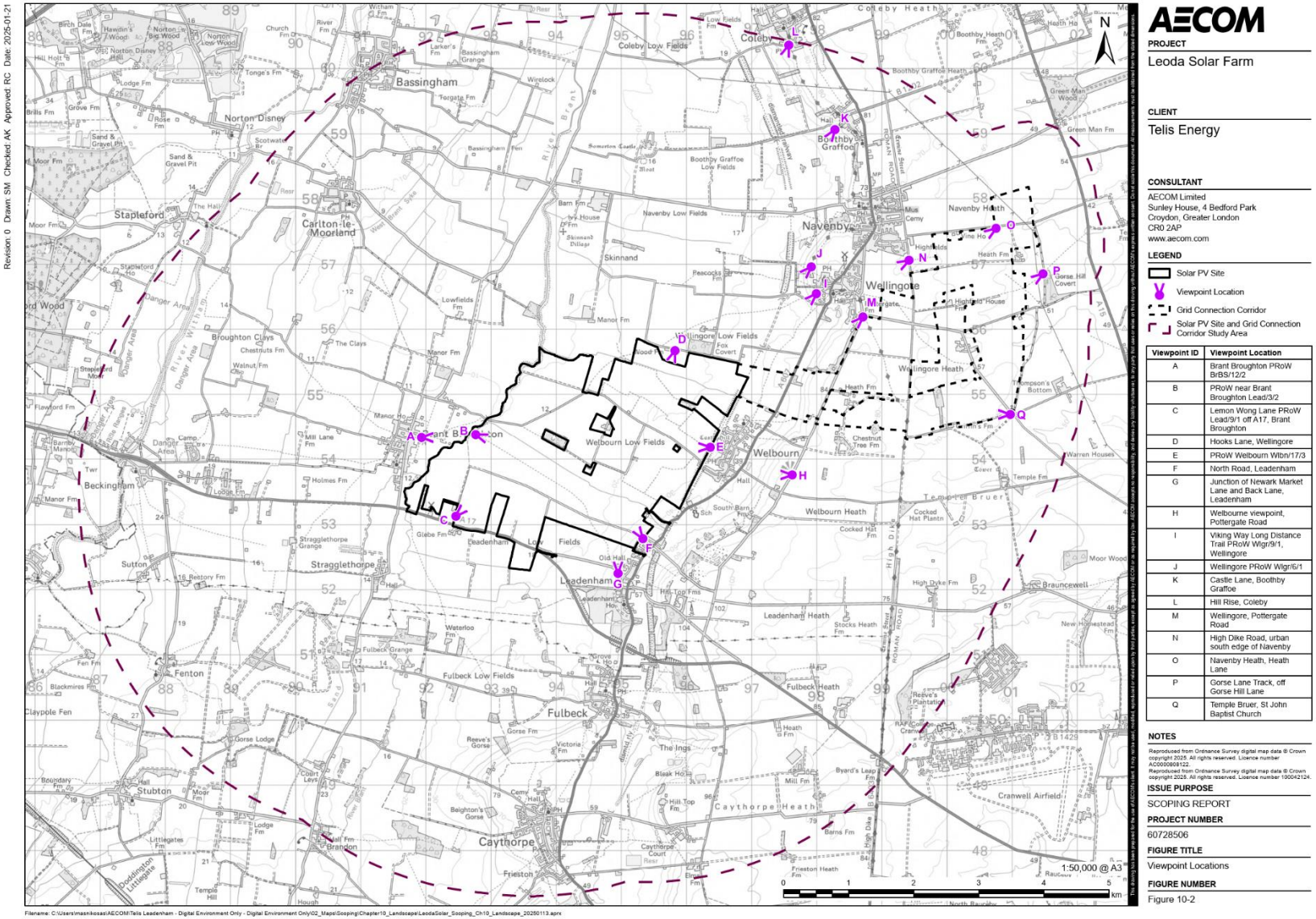
10.5.21 An initial selection of representative viewpoint locations have been informed by desktop analysis and a high-level site survey. They are intended to form the basis for consultation with stakeholders including the relevant LPAs and Natural England. Further iteration and amendment may follow changes in the arrangement of the Scheme. These initial locations are listed in **Table 10-1**: and illustrated on **Figure 10-2: Viewpoint Locations**. The representative viewpoints will be taken forward as the basis for the visual assessment, which will be undertaken for the construction (winter), year 1 (winter), year 15 (summer) and decommissioning (winter) phases of the Scheme. Visualisations will be provided in the ES for a select number of viewpoints, locations to be agreed with relevant LPAs, to illustrate the effects of the Scheme in year 1 (winter) and year 15 (summer).

Table 10-1: Initial Viewpoint Locations

Viewpoint ID	Viewpoint Location	Description	Grid Reference
A	Brant Broughton PRoW BrBS/12/2	View across farmland from edge of village.	491932, 354335
B	PRoW near Brant Broughton Lead/3/2	View across farmland along route of historic PRoW.	492764, 354378
C	Lemon Wong Lane PRoW Lead/9/1 off A17, Brant Broughton	Partial view across farmland.	492460, 353126
D	Hooks Lane, Wellingore	Open view across farmland	495824, 355668
E	PRoW Welbourn Wlbn/17/3	View from edge of Welbourn	496366, 354184
F	North Road, Leadenham	View from edge of Ledenham. View across farmland, partially obscured by boundary vegetation.	495331, 352782
G	Junction of Newark Market Lane and Back Lane, Leadenham	Slightly elevated view from the western edge of Leadenham over farmland.	494950, 352247
H	Welbourne viewpoint, Pottergate Road	Glimpsed, panoramic view for road users along Pottergate Road.	497624, 353760

Viewpoint ID	Viewpoint Location	Description	Grid Reference
I	Viking Way Long Distance Trail PRoW Wlgr/9/1, Wellingore	Elevated view from PRoW on edge of Wellingore.	497995, 356542
J	Wellingore PRoW Wlgr/6/1	Elevated view from the edge of Wellingore	497995, 356542
K	Castle Lane, Boothby Graffoe	Partially elevated view across farmland from edge of Boothby Graffoe.	498280, 359061
L	Hill Rise, Coleby	On PRoW Cole/3/1	497571, 360358
M	Wellingore, Pottergate Road	On PRoW Wlgr/1/1 junction of Pottergate Lane and Gorsehill Lane	498710, 356185
N	High Dike Road, Navenby	On PRoW Nave/14/1 off High Dike Road	499418, 357055
O	Navenby Heath, Heath Lane	On Heath Lane in between High Dikes Road and the A15	500754, 357546
P	Gorse Lane Track, off Gorse Hill Lane	On PRoW Wlgr/2/4 on the edge of Gorse Hill Covert	501475, 356847
Q	Temple Bruer, St John Baptist Church	On New England Lane, St Johns Church	500973, 354688

Figure 10-2: Viewpoint Locations



Future Baseline

10.5.22 The LVIA will take into consideration the 'future baseline': how the current baseline conditions may change going forward to the point of construction. This will be considered in descriptive terms highlighting where significant effects are likely to arise as far as can be reasonably predicted. This is anticipated to include developments in construction and consented developments; changes arising from climate change; implications of tree diseases; and changes to land use and settlement patterns where relevant.

10.6 Potential Effects and Mitigation

10.6.1 The Scheme has the potential to result in temporary significant adverse landscape effects during the construction phase, due to alterations to surface landform and vegetation, the presence of construction machinery and associated reductions in tranquillity. These aspects of the construction phase also have the potential to result in significant adverse visual effects, due to changes to the composition of views, in comparison to views of fields and general farming activity.

10.6.2 The Scheme has the potential to result in significant adverse landscape effects during operation (assessed at year 1 and year 15) due to the change in land use resulting from the presence and massing of the solar panels and associated structures, although the Scheme is reversible given the eventual decommissioning of the Scheme. The Scheme has the potential to result in beneficial landscape and visual effects in the longer term from changes to land cover and new planting across the Site Boundary. The proposed structures also have the potential to result in significant adverse visual effects due to the changes in the composition of views, in comparison to fields and general farming activity.

10.6.3 The decommissioning phase has the potential to result in significant adverse landscape and visual effects, like the construction phase, due to the presence of machinery and general activity to remove the panels and associated structures.

10.6.4 Cumulative landscape and visual effects may also arise. These may include cumulative visual effects, such as intervisibility with other solar schemes, both in combination or sequentially; or cumulative landscape effects, due to greater extent of similar development within a defined landscape character area.

10.6.5 The effects on landscape and visual receptors will be mitigated as far as practicable to avoid, prevent, reduce, or offset effects through the integrated design and mitigation strategy for the Scheme. This will comprise primary and secondary measures. Primary measures are those developed through the iterative design process that will become integrated or embedded into the project design along with standard construction and operational management practices for avoiding and reducing environmental effects. Secondary measures are those, as noted in GLVI3, that are "*designed to address any residual adverse effects remaining after primary measures and standard construction practices have been incorporated into the scheme".*

10.6.6 The LVIA will inform the iterative design process of the Scheme and the mitigation measures, specifically with regards to the siting, layout of the solar panels and associated structures; and choice of and colour tones for the associated structures to reduce their visibility and perceived scale and mass within the landscape.

10.6.7 The LVIA will also inform the iterative design process via identifying opportunities for new Green Infrastructure (e.g., planting and improvements to recreational routes).

10.6.8 The relevant landscape and visual mitigation will be set out in the LVIA within the ES. The LVIA will inform the iterative design process of the Scheme and the mitigation measures, specifically with regards to the siting, layout of the solar panels and associated structures to reduce their visibility and perceived scale and mass within the landscape. At this stage, the following mitigation is currently relevant to this chapter:

- During the construction phase no lighting is proposed between the hours of 19:00 and 07:00; and
- Any lighting will be directional and designed to minimise potential for light spillage beyond the Site, particularly towards houses, live traffic and ecological habitats in so far as it is reasonably practicable.

10.7 Assessment Methodology

10.7.1 The methodology for the LVIA will be based upon guidance within GLVIA3. This is the standard reference for undertaking landscape character and visual assessments/appraisals in the UK.

10.7.2 A detailed methodology will be included in the PEIR and ES. Reference will also be made to the following:

- Notes and Clarifications on Aspects of Guidelines for Landscape and Visual Impact Assessment (Third edition). Landscape Institute Technical Guidance Note LITGN-2024-01 (Ref 10-15);
- Visual Representation of Development Proposals. Landscape Institute Technical Guidance Note 06/19 (Ref 10-16);
- An Approach to Landscape Character Assessment. Natural England. (Ref 10-17);
- Assessing landscape value outside national designations. Landscape Institute Technical Guidance Note 02/21 (Ref 10-18);
- Infrastructure guidance. Landscape Institute Technical Guidance Note 04/2020: (Ref 10-19);
- Tranquillity. Landscape Institute Technical Guidance Note 01/17 (Ref 10-20); and

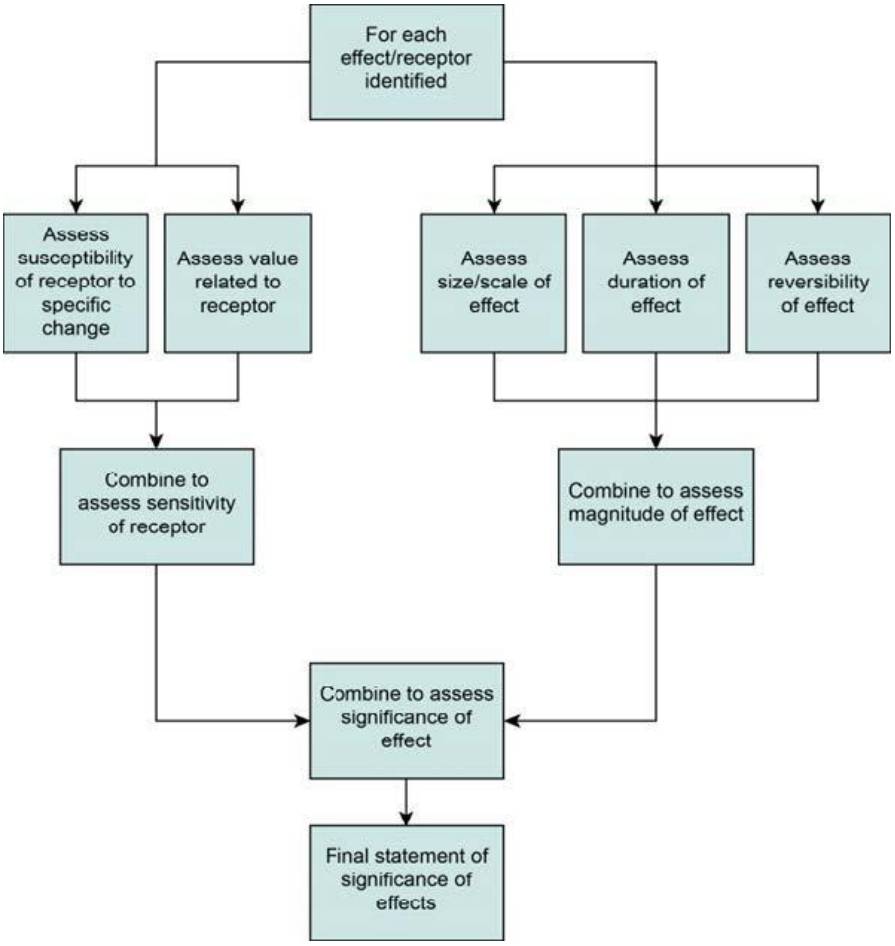
- Residential Visual Amenity Assessment. Landscape Institute Technical Guidance Note 02/19: (Ref 10-21).

10.7.3 The following section summarises the methodology for the LVIA; a detailed methodology will be included in the PEIR and ES. For clarity and in accordance with good practice, the assessments of potential effects on landscape character and visual amenity, although closely related, will be undertaken separately.

10.7.4 GLVIA3 places a strong emphasis on the importance of professional judgement in LVIA. Much of the assessment will rely on qualitative judgements, particularly with reference to the significance of effects; and whether effects are adverse or positive.

10.7.5 The broad LVIA methodology will reflect the process set out in Figure 3.5 of GLVIA3 as shown below in **Plate 10-1**.

Plate 10-1: GLVIA3, Assessing the significance of effects



10.7.6 In accordance with the GLVIA3 process, the LVIA will include the following key stages:

- A baseline review of published landscape assessments, studies, relevant supporting evidence base documents, aerial photography, mapping and

fieldwork to identify the landscape and visual baseline and the landscape and visual receptors;

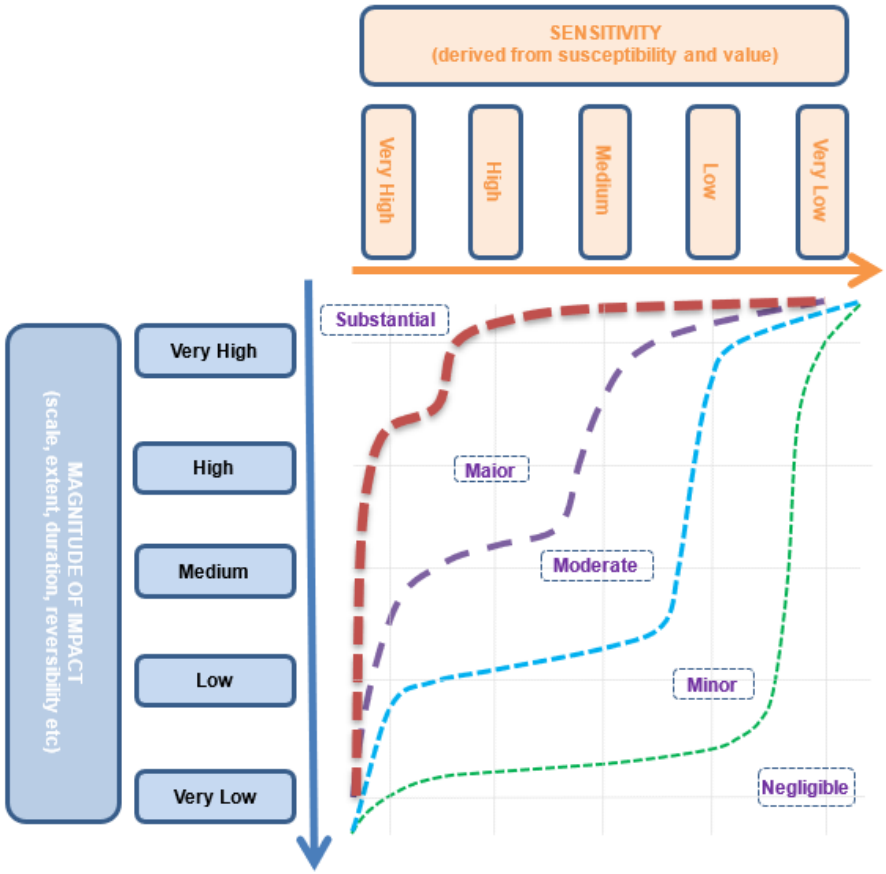
- An assessment of the sensitivity (nature of the receptor) of landscape and visual receptors, via an assessment of their value and susceptibility to change;
- An assessment of the magnitude of impact (nature of effect) of the Scheme. The magnitude of impact will be assessed in relation to the size, scale, duration and reversibility of the effect; and
- An assessment of the significance of the effect on the landscape and visual receptors for the phases of the Scheme (as defined in section 10.7.7)

10.7.7 The assessment of the Scheme will be undertaken for the:

- Construction activity, covering all elements of the Scheme and including any effects arising from access along highways, in winter as a worst-case scenario;
- Year 1 of operation, which will assume the season is winter (as a worst-case scenario); the Solar PV Site is fully built out; works within the Grid Connection Corridor will be complete; and any replacement planting or seeding is not yet established;
- Year 15 of operation during summer when any replacement or proposed planting is fully in leaf and considered to be sufficiently established and providing functional mitigation; and
- Decommissioning, in winter as a worst-case scenario.

10.7.8 Indicative linkages between the sensitivity of the receptor and the magnitude or nature of effect in order to determine significance are set out below in **Plate 10-2**. GLVIA3 dictates that this is not a prescriptive process and is provided as a guide to how combinations of sensitivity and magnitude are typically combined. In the PEIR and ES LVIA, reasoned explanation of judgements on significance will be based on consideration of the factors set within the detailed LVIA methodology.

Plate 10-2: Classification of Landscape and Visual Effects



10.7.9 Effects predicted to be minor or negligible will generally be considered to be 'not Significant'. Effects considered as moderate may be important with reasoned justification. Substantial or major effects are generally considered to be 'Significant'.

10.7.10 When assessing the degree of individual effects, these may fall across several different categories and professional judgement is therefore used to determine which level best fits the overall effect on a landscape or visual receptor. GLVIA 3 dictates that this is not a prescriptive process and is provided as a guide to how combination of sensitivity and magnitude are typically combined.

Relationship to Residential Visual Amenity

10.7.11 The LVIA will assess the potential visual effects to different types of visual receptor, including residential receptors, i.e. private views.

10.7.12 With reference to the Landscape Institute's Technical Guidance Note 2/19: 'Residential Visual Amenity Assessment' (Ref 10-21), the Residential Visual Amenity Threshold is considered as to whether:

"the effect of the development on Residential Visual Amenity of such nature and / or magnitude that it potentially affects 'living conditions' or Residential Amenity."

10.7.13 The guidance is based upon a 'four' stage approach. Stages 1 to 3 accord with the above LVIA methodology whereby—in line with GLVIA3— visual receptors are identified, along with the magnitude of impact and the significance of effect.

10.7.14 The fourth step is a more detailed examination of residential properties, where appropriate, when the highest 'significance of effect' levels are identified via Stages 1 to 3. Although, as stated by the guidance, there are no 'hard and fast rules' as to making a judgement on the Residential Visual Amenity Threshold (RVAT).

10.7.15 It is not anticipated that any assessment will be made from private residential properties, both inside residential buildings and from within the curtilage. It is not intended to undertake a residential amenity assessment, in line with Landscape Institute Technical Guidance Note 02/19 (Ref 10-21), unless requested during consultation and agreement with respect to access is made. It is the intention of the Scheme design, including the use of mitigation, to ensure that whilst even where significant effects may arise for representative views that reflect the outlook for residential receptors, these will not reach a threshold where residential visual amenity is a consideration.

10.8 Limitations and Assumptions

10.8.1 All fieldwork will be undertaken from publicly accessible locations. Professional judgement will be used to assess residents' views, aided by aerial photography and fieldwork observations.

10.8.2 Short term durations are considered to be under one year; medium term durations are considered to be between one and five years, and long-term durations are considered to be more than five years.

10.8.3 For the construction phase assessment, the assumptions are that, as a worst case, construction activity will be undertaken across the Site at the same time; although as discussed in **Chapter 2: The Scheme**, works will likely be undertaken sequentially, and construction in some Solar PV Plots is likely to be complete whilst others are on-going. PRoW which cross the Site Boundary will be kept open or temporarily closed for short periods of time only, and therefore recreational receptors along these routes will not be assessed for the construction phase.

10.8.4 For the year 1 and year 15 operation assessments, the assumptions are the Scheme will be operational across all of the Site as a worst case (although in reality a sequential build-out may mean that at year 1 some plots are still under construction while others are operational).

10.8.5 For the decommissioning assessment, the assumptions are the Scheme is no longer operational, and the solar panels and associated structures and equipment are being removed in a manner similar to the construction phase, requiring machinery and localised excavation. It is currently expected that the proposed Green Infrastructure would remain (although the Applicant cannot control what the landowners do to the Green Infrastructure after completion of the decommissioning

and once the land is handed back; any changes at this point would not be part of the Scheme).

10.8.6 Uncertainties at this stage include the final layout, siting and heights of the solar panels, sub-stations and associated structures. The extent of the LVIA Study Area and potential landscape and visual receptors will be reviewed accordingly in relation to the heights of these features, informed by ZTVs and professional judgement.

10.8.7 A lighting assessment is scoped out of the assessment, as during the construction phase no lighting is proposed between the hours of 19:00 and 07:00. During operation the only visible lighting would be motion detection lighting at the substation when nighttime maintenance is required. Any lighting will be directional and designed to minimise potential for light spillage beyond the Site, particularly towards houses, live traffic and ecological habitats in so far as it is reasonably practicable. This will be noted within the relevant sections of the LVIA at the PEIR and ES stages and captured in the CEMP and OEMP, where appropriate. However, no significant effects are expecting to arise from lighting with respect to landscape and visual matters, therefore a specific lighting assessment will be scoped out of this chapter.

10.9 Summary of Elements Scoped In and Scoped Out

10.9.1 A summary of the elements scoped into and out of the landscape and visual amenity assessment are presented in **Table 10-2**.

Table 10-2: Elements scoped in and out of the assessment of landscape and visual amenity

Element	Scoped in / Scoped Out
Assessment of landscape and visual effects for all assessment phases	Scoped in.
Lighting Assessment	Scoped out. Lighting during the construction phase would be temporary and directed away from homes, live traffic and habitats as far as is reasonably practicable. Lighting during operation will also be on temporarily (triggered by motion detection and directed at the Scheme infrastructure).

11 Noise and Vibration

11.1 Introduction

11.1.1 This chapter outlines the anticipated noise and vibration scope of assessment for the Scheme.

11.1.2 Note that the scope of this chapter considers noise and vibration effects on human receptors and excludes assessment of noise and vibration on ecological or heritage receptors. In-combination effects on local ecological or heritage receptors due to the introduction of the Scheme will be considered in **Chapter 7: Cultural Heritage** and **Chapter 8: Ecology and Nature Conservation**.

11.1.3 This chapter is supported by Figure 11-1: Noise and Vibration Study Area and Noise Monitoring Locations.

11.1.4 There are no appendices accompanying this chapter.

11.2 Study Area

11.2.1 The Study Area was defined to include construction and operational noise and vibration features likely to be at risk from possible direct and indirect impacts that might arise from the Scheme.

11.2.2 For decommissioning and construction noise effects from the Solar PV Site the area for which potential impacts are expected is considered to be 300 m, based on guidance in BS 5228-1 (Ref 11-1), which states construction noise predictions are generally reliable up to 300 m. However, for operational noise effects from the Solar PV Site, a Study Area of up to 500 m is considered appropriate based on previous experience of solar farm projects showing that adverse effects are unlikely to occur outside this area.

11.2.3 The wider 500 m operational Study Area has therefore been used for both the decommissioning, construction and operational noise and vibration assessment as receptors further than 500 m will experience considerably lower levels of noise and vibration emissions as these will attenuate over distance, resulting in negligible noise and vibration effects from the Scheme. The Study Area for the Solar PV Site is illustrated in **Figure 11-1: Noise and Vibration Study Area and Noise Monitoring Locations.**

11.2.4 As there are no operational noise sources along the Grid Connection Corridor, the Study Area for construction noise effects along the Grid Connection Corridor will include receptors within 300 m, as per guidance in BS 5228-1 (Ref 11-1). These receptors will be identified once a grid corridor option has been selected. Additionally, a Study Area of 50 m either side of construction traffic routes has been defined based on guidance in the Design Manual for Roads and Bridges LA111 (DMRB) (Ref 11-2).

11.2.5 The nearest sensitive receptors within the Study Area will be identified using Addressbase Plus data. Examples of noise and vibration sensitive receptors that will be considered when identifying likely significant effects are presented in **Table 11-1**:.

Table 11-1: Sensitive Receptor Types

Receptor Group	Receptors in Group
Residential	Individual dwellings and private open spaces (e.g. gardens)
Non-residential	Non-residential community facilities such as schools, hospitals, places of worship, and noise sensitive commercial properties

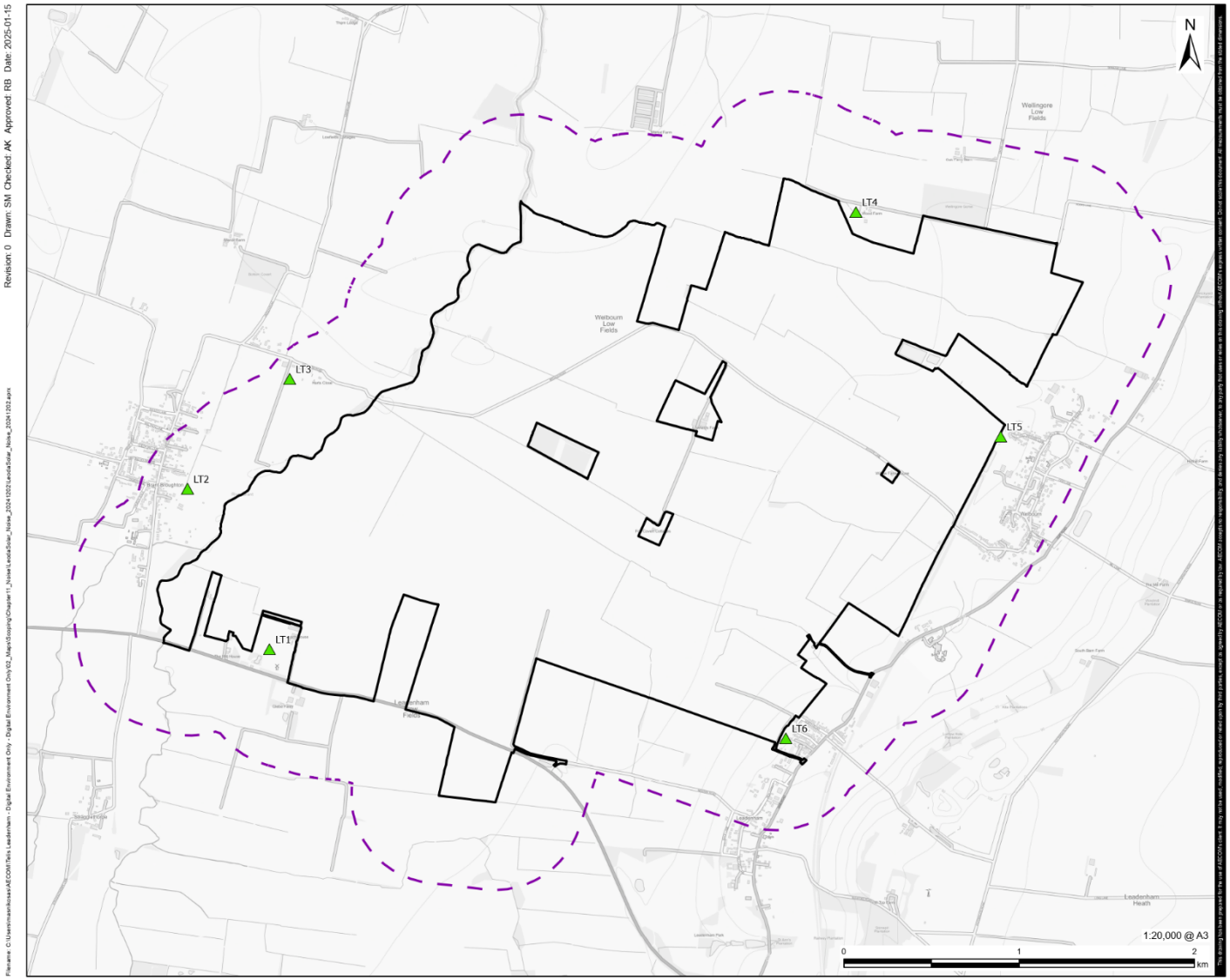
11.2.6 Additionally, the finalised list of assessment receptors will be selected through the EIA Scoping process and consultation with key stakeholders including Environmental Health Officers of LCC and NKDC.

11.2.7 Noise is assessed based on the effect on health and quality of life. Noise generated by the construction, operational, and decommissioning phases of the Scheme will only affect Public Rights of Way (PRoW) users for limited periods of time when they are in close proximity to a noise source.

11.2.8 It is acknowledged that short-term exposure to noise can cause disturbance to PRoW users and result in adverse noise effects. Planning Practice Guidance Noise (Ref 11-10) identifies an adverse noise effect as "*Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life*." This is considered to describe the level of noise effect that may be perceived by PRoW users.

11.2.9 Given the linear nature of PRoWs, the range of noise impacts along them that forms the ambient noise environment, and the transient usage of a PRoW, a material change in the experience of using the PRoW as a whole as a result of noise emissions from the Scheme, which could affect PRoW users' health or quality of life, is not anticipated. As such, an assessment of noise effects on PRoW users as a result of the Scheme has been scoped out. However, all reasonable steps to minimise the effects of noise on PRoW users will be taken during the construction, operational and decommissioning phases of the Scheme.

Figure 11-1: Noise and Vibration Study Area and Noise Monitoring Locations.



11.3 Legislation, Planning Policy Context and Guidance

Legislation

- Control of Pollution Act 1974 (Ref 11-3); and
- Environmental Protection Act 1990 (Ref 11-4).

National Planning Policy

- The Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 11-5) sets out national policy for energy and will be an 'important and relevant consideration' in the Secretary of State's ('SoS') determination of consent in respect of the Scheme. Reference will be made to Section 5.12 in relation to the assessment of noise.
- The NPS for Renewable Energy Infrastructure (EN-3) (Ref 11-6), in particular section 2.10, specifically paragraphs 2.10.120 – 3.10.126, relating to noise and vibration generated by construction traffic and transport.
- The NPS for Electricity Networks Infrastructure (EN-5) (Ref 11-7) along with NPS EN-1 provides the primary basis for decisions taken by the SoS on applications it receives for the categories of nationally significant electricity networks infrastructure included within it. Reference will be made to Section 2.9 (Noise and Vibration) and paragraph 2.9.38 relating to noise from substation equipment.
- The National Planning Policy Framework (NPPF) (Ref 11-8) contains the government's planning policies for England relating to noise.
- The Noise Policy Statement for England (NPSE) (Ref 11-9) sets out the long-term vision of the government's noise policy. The NPSE sets definitions for 'significant adverse effects' and 'adverse effects' using the concepts:
    - Lowest Observed Adverse Effect Level (LOAEL) – the level above which, as an average response, adverse effects on health and quality of life can be detected; and
    - Significant Observed Adverse Effect Level (SOAEL) – the average response level above which, as an average response, significant adverse effects on health and quality of life occur.

National Guidance

11.3.1 The following guidance is of relevance for noise:

- Planning Practice Guidance Noise provides guidelines that are designed to assist with the implementation of the noise requirements set out in the NPPF (Ref 11-10);

- British Standards Institute (2003) BS 7445 – Description and environment of environmental noise – Part 1: Guide to quantities and procedures. London: BSI (Ref 11-11).
- British Standards Institute (2014) BS 4142 – Methods for rating and assessing industrial and commercial sound. London: BSI (Ref 11-12).
- British Standards Institute (2003) BS 5228:2009+A1:2014 – Description and environment of environmental noise – Part 2: Vibration. London: BSI (Ref 11-13).
- Institute of Environmental Management and Assessment (2014) Guidelines for environmental noise impact assessment (Ref 11-14).

Local Planning Policy

11.3.2 The Scheme falls within the administrative boundaries of the LCC and NKDC. The Central Lincolnshire Local Plan adopted April 2023 (Ref 11-11) contains the following local policies that are of relevance to noise and vibration:

- Policy S14 (Renewable Energy) states that proposals for the development of the energy sector (…) will be supported where noise impacts are acceptable on the amenity of sensitive neighbouring uses (including local residents).
- Policy S53 (Design and Amenity) states all new development should not result in adverse noise and vibration taking into account surrounding uses.

11.4 Consultation

11.4.1 Consultation with the Environmental Health Officers at LCC and NKDC will be carried out to agree the scope and methodology of baseline sound surveys.

11.5 Baseline Conditions

11.5.1 The existing land use of the Site is primarily agricultural. Nearby recreational and residential receptors include (but are not limited to) isolated farms and rural properties, the villages of Leadenham, Welbourn, Fulbeck, Straglethorpe, Brant Broughton, the PRoW (Public Right of Way) network, and quiet rural lanes.

11.5.2 The main sources of sound in the area are considered to be:

- Traffic on the local road network, the A607 and the A17 which are the main roads in the area located to the east and south of the Solar PV Site;
- Light aircraft associated with the Foston Airfield/ Manor House Farm Airstrip;
- Non-commercial or recreational aircraft associated with the Royal Air Force Cranwell Airbase; and

- Agricultural activities associated with farms and fields in the vicinity of the Solar PV Site.

11.5.3 Baseline sound monitoring will be undertaken at selected locations to define representative baseline data at noise-sensitive receptors around the Solar PV Site. Six unattended monitoring locations have been selected with approximate locations illustrated in **Figure 11-1: Noise and Vibration Study Area and Noise Monitoring Locations**. Additionally, attended monitoring will be undertaken to define ambient sound conditions at receptors along the Grid Connection Corridor. These locations will be confirmed once the Grid Connection Corridor has been defined. As such, attended monitoring at receptors along the Grid Connection Corridor will be used to inform the ES assessment of construction noise effects.

11.5.4 The monitoring procedures will follow guidance from BS 7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedures' (Ref 11-12) and BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (Ref 11-13).

11.5.5 A weather station will be installed for the duration of the sound surveys so any periods of adverse weather conditions could be identified and omitted from measured sound data.

11.6 Potential Effects and Mitigation

Construction and decommissioning noise and vibration (temporary effects)

11.6.1 Potential noise and vibration effects during construction and decommissioning phases are likely to include works activities associated with site preparation, plant installation, substation construction, cable laying and construction-related vehicle movements within the Solar PV Site and along access routes.

11.6.2 Construction traffic can cause vibration; however, DMRB LA 111 states: "operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects". This implies that a well-maintained road surface would not result in adverse levels of traffic induced vibration at sensitive receptors. As the condition of road surfaces is outside the scope of the project, traffic induced vibration is not considered to generate likely significant effects and is therefore scoped out.

11.6.3 Measures to control noise as defined in Annex B of British Standard (BS) 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (Ref 11-14) and measures to control vibration as defined in Section 8 of BS 5228:2009+A1:2014 'Part 2: Vibration' (Ref 11-14) will be adopted where reasonably practicable.

11.6.4 These measures represent 'Best Practicable Means' (BPM) (as defined by section 72 of the Control of Pollution Act 1974) to manage noise and vibration emission from

construction activities. Examples of BPM that may be implemented during construction works are presented below:

- Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use;
- Appropriate routing of construction traffic on public roads and along access tracks;
- Drop heights of materials will be minimised;
- Plant and vehicles will be sequentially started up rather than all together;
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas; and
- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications.

11.6.5 Embedded measures relevant to the construction and decommissioning phases will be described within a Framework CEMP or DEMP (as relevant), to be submitted with the DCO application. The CEMP will be developed into a detailed (or construction issue) CEMP prior to the start of construction, and implemented.

Operational Noise and Vibration (reversible long-term effects)

11.6.6 The potential noise effects during operation of the Scheme are likely to include noise from solar farm plant (e.g. inverters, transformers, switchgears and the motors for the tracking panels, should this option be taken forward) and associated battery storage plant (e.g. cooling units, transformers), the on-site substations (e.g. transformers), and any associated vehicle movements.

11.6.7 Plant items such as solar PV modules, PV module mounting structures, and cabling (both on-site and via the cable route) will not produce any operational noise emissions.

11.6.8 No plant that would generate perceptible levels of vibration outside the Solar PV Site Boundary are part of the Scheme and, as such, there will be no associated operational vibration effects. It is proposed that operational vibration is scoped out of any further assessment.

11.6.9 Embedded mitigation measures that will be applied for the operational phase of the Scheme are summarised as follows:

- Selection of plant with consideration to noise emission level; and
- Design, location and orientation of plant to minimise noise at receptors.

11.7 Assessment Methodology

Impact Assessment Methodology

11.7.1 All noise effects are local, only affecting nearby sensitive receptors, and are direct in nature; however, defining a likely effect and whether it is significant or not depends on the nature of a noise source. Likely effects have been defined based on guidance set out in national policy. The criteria presented in **Chapter 5: EIA Methodology** of this EIA Scoping Report will be followed in assigning categories to construction and operational phase noise and vibration impacts and determining if the effects are significant.

11.7.2 A new source of noise is assessed through the absolute noise level it generates at sensitive receptors. Where an exceedance of the defined SOAEL for each noise source occurs, it is an indication of a likely significant effect. However, where an existing noise source is changed (i.e. construction traffic changing road traffic noise levels), the assessment of the effect level due to the change in noise refers to guidance within IEMA Guidelines for environmental noise impact assessment (Ref 11-15).

11.7.3 Government policy for noise is based on community exposure response relationships and noise insulation of a typical dwelling. Consequently, an assessment based on LOAELs and SOAELs cannot be applied to non-residential sensitive receptors. As such, the approach to the assessment of non-residential receptors differs from that adopted for residential receptors. Non-residential receptors are considered on a case-by-case basis by considering the applicable design criteria for good internal noise levels.

11.7.4 A consideration of any combined and cumulative effects will also be included.

Construction and Decommissioning Noise and Vibration

11.7.5 Noise and vibration levels associated with construction and decommissioning works will be assessed (at chosen sensitive receptors. Annex E of BS 5228-1 (Ref 11-14) provides example methods for the assessment of the significance of construction noise effects. With reference to the NPSE, the LOAEL and SOAEL thresholds have been set in **Table 11-2**: below.

Table 11-2: Thresholds of Potential Effects of Construction and Decommissioning Noise at Residential Buildings

Time Period	Threshold Value ($L_{Aeq,T}$ dB)	
	LOAEL	SOAEL
Day (07:00 – 19:00) Saturday (07:00 – 13:00)	65	75
Evening (19.00 – 23.00)	55	65

Weekends (13.00–23.00 Saturdays and 07.00–23.00 Sundays)		
Night (23.00 – 07.00)	45	55

11.7.6 **Table 11-3**: details Peak Particle Velocity (PPV) levels (a standard measure of vibration effects) and their potential effect on humans based on guidance from BS 5228-2 (Ref 11-14).

Table 11-3: Thresholds of Potential Effects of Construction and Decommissioning Vibration (human response)

Effect Level	PPV Vibration Level	BS 5228-2 Description of Impact
LOAEL	0.3 mm/s	Vibration might be just perceptible in residential environments.
SOAEL	1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but it can be tolerated if prior warning and explanation has been given to residents.

11.7.7 The temporary changes in road traffic noise levels along the local road network due to construction traffic will be assessed based on guidance from the IEMA Guidelines for environmental noise impact assessment (Ref 11-15). Assessment criteria are presented in **Table 11-4**:.

Table 11-4: Construction Traffic Noise Assessment Criteria

Effect Level	Magnitude Criteria
Negligible	≥ 0 dB and < 1 dB
Minor	≥ 1 dB and < 3 dB
Moderate	≥ 3 dB and < 5 dB
Major	≥ 5 dB

Operational Noise

11.7.8 The impact of the proposed operational plant, such as noise from the inverters, tracker panels (if this option is taken through to the ES) and battery energy storage system, will be assessed following guidance from BS 4142:2014 (Ref 11-13). Reference is also made to BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. (Ref 11-16) and the World Health Organization (WHO) 'Guidelines for Community Noise' (1999) (Ref 11-17).

11.7.9 The assessment criteria for noise from fixed plant installations are summarised in **Table 11-5**:. The assessment will be based on available information on the operating conditions and the levels of noise generated by the plant.

Table 11-5: Operational Noise Assessment Criteria

Effect Level	Rating Level (External) at Receptor, $L_{Ar,Tr}$	
	Daytime (07:00-19:00) and Evening (19:00-23:00)	Night-time (23:00-07:00)
LOAEL	Less than or equal to the typical background level ($L_{A90,T}$) – minimum of 35 dB $L_{Ar,Tr}$	Less than or equal to the typical background level ($L_{A90,T}$) – minimum of 30 dB $L_{Ar,Tr}$
SOAEL	Greater than 10 dB above the background noise level – minimum of 45 dB $L_{Ar,Tr}$	Greater than 10 dB above the background noise level – minimum of 40 dB $L_{Ar,Tr}$

11.8 Limitations and Assumptions

11.8.1 Noise and vibration effects during the decommissioning phase of the Scheme will be similar to or less than noise and vibration effects during the construction phase. The noise assessment presented for the construction phase will therefore be considered representative (or an overestimate) of the decommissioning phase. As such a separate assessment for noise from the decommissioning phase is not proposed.

11.8.2 Predictions of sound levels have an associated degree of uncertainty. Modelling and measurement processes have been carried out in such a way to reduce such uncertainty; however, it is unavoidable that some degree of prediction uncertainty remains so a precautionary approach will be adopted in sound predictions.

11.8.3 Construction works noise levels will be predicted following guidance from BS 5228-1:2009+A1:2014 (Ref 11-14) which provides a realistic estimate of sound propagation from construction plant. The predictions will use representative noise levels, sourced from industry standard guidance documents such as BS 5228-1:2009+A1:2014, for typical items of plant that are used in such developments.

11.8.4 Construction phase vibration will be assessed based on historic vibration measurement data from relevant guidance documents including BS 5228-2:2009+A1:2014 (Ref 11-14) and Transport Research Laboratory (TRL) Report 429 (Ref 11-18). No predictions of ground-borne vibration propagation are proposed.

11.8.5 Predictions of operational plant and activities sound pressure levels will be undertaken following guidance from International Organisation for Standardisation (ISO) 9613 ‘Attenuation of sound during propagation outdoors’ (Ref 11-19), which are based on an assumption of moderate downwind propagation, and hence could

be considered as a worst-case calculation. However, the standard also indicates an estimated accuracy of ±3 dB(A) in predicted levels.

11.8.6 Any measurement of existing ambient or background sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels and a small degree of uncertainty will always remain in the values taken from such a measurement survey.

11.8.7 Every effort will be made to ensure that measurements are undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions, and school holiday periods (which are often considered to result in atypical sound levels). Consequently, the level of uncertainty in measurements has been reduced as far as reasonably practicable.

11.9 Summary of Elements Scoped In and Scoped Out

11.9.1 A summary of the elements scoped into and out of the noise and vibration assessment are presented in **Table 11-6.**

Table 11-6: Elements scoped in and out of the assessment of noise and vibration

Element	Scoped in / Scoped Out
Noise and vibration levels associated with construction and decommissioning works	Scoped in – temporary noise and vibration emissions from construction and decommissioning works may adversely impact on sensitive receptors.
Construction traffic noise	Scoped in – temporary noise from construction traffic movements may adversely affect receptors near public roads that are part of construction traffic routes.
Operational noise	Scoped in – permanent noise emissions from solar farm infrastructure may adversely affect nearby sensitive receptors.
Construction traffic vibration	Scoped out – road traffic can cause vibration; however, DMRB LA 111 states: "*operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects.*" Consequently, traffic induced vibration is not considered to generate likely significant effects and is therefore scoped out.

Element	Scoped in / Scoped Out
Operational traffic noise	Scoped out – operational traffic flows would be minimal (e.g. a few vehicles per week) and not sufficient to result in a 1 dB increase in noise, which would require a 25% increase in traffic.
Vibration from the operation of the Scheme	Scoped out – no plant that would generate perceptible levels of vibration are part of the Scheme and, as such, there will be no associated operational vibration effects. It is proposed that operational ground-borne vibration is scoped out of any further assessment.
Noise and vibration effects on PRoW users	Scoped out – short-term exposure to noise and vibration for PRoW users would not constitute a significant effect on health and quality of life. All reasonable steps to minimise the effects of noise on PRoW users will be taken during the construction, operational and decommissioning phases of the Scheme.

12 Socio-Economics and Land Use

12.1 Introduction

12.1.1 This chapter outlines the anticipated socio-economics and land use scope of assessment for the Scheme.

12.1.2 There are no figures or appendices accompanying this chapter.

12.2 Study Area

12.2.1 The potential temporary and permanent economic and employment impacts arising from the Scheme will be considered relative to a principal economic area, defined based on consideration of Local Planning Authority boundaries, a typical travel time from the Site and drawing on demographic and economic data/indicators for the combined statistical area that aligns with the radius deemed most appropriate.

12.2.2 The Study Area for land use receptors (including residential properties, local businesses, visitor attractions, community facilities, open space, recreational assets and development land) reflects receptors that could be directly or indirectly affected by the Scheme. The receptors that could be impacted are therefore those within the Site, including the Solar PV Site and the Grid Connection Corridor, and those within 500 m of the Site Boundary, noting that a 2 km radius is used for community facilities.

12.3 Legislation, Planning Policy Context and Guidance

12.3.1 There is no applicable legislation specific to the assessment of socio-economics and land use. Planning policy and guidance relating to socio-economics and land use and pertinent to the Scheme are set out below.

National Planning Policy, Other Policy, and Guidance

Relevant national planning and other policy and guidance includes:

- NPS EN-1 (Ref 12-1) with particular reference to paragraphs 4.1.5 to 4.1.7 in relation to adverse effects and benefits, paragraphs 4.3.1 and 4.3.2 in relation to requirements for the content of an Environmental Statement, and paragraph 5.13.2 in relation to socio-economics;
- NPS EN-3 (Ref 12-2), where applicable includes the additional consideration of socio-economic impacts associated specifically with solar photovoltaic generation schemes and highlights the need to consider effects on PRoW. Paragraph 2.10.69 references the socio-economic benefits of retaining site infrastructure after the operational life of a solar farm, such as retaining pathways through the site;

- NPPF (Ref 12-3) with particular reference to Section 6: Building a strong, competitive economy (paragraphs 85-87),) and Section 17 (Facilitating the sustainable use of minerals);

- National Economic Development Policy with particular reference to the Government's Industrial Strategy White Paper ambitions (Ref 12-4) to increase productivity and drive growth, one way that is highlighted is through Clean Growth to lead the world in the development, manufacture and use of low carbon technologies; and

- PPG (Ref 12-5) with particular reference to guidance on planning and the economy and the potential future needs of the population in terms of economic development, jobs and employment opportunities.

Regional Planning Policy, Other Policy, and Guidance

- Greater Lincolnshire Local Enterprise Partnership (LEP) Local Industrial Strategy (2021) (Ref 12-6) with reference to aspirations to pioneer the industrial decarbonisation sector, building upon local industrial specialisms. Reference is also made to employment and skills ambitions.

- Greater Lincolnshire LEP Strategic Economic Plan (2016) (Ref 12-7) with reference to its strategic priority to invest in the low carbon economy, with a particular focus on renewable energy. Reference is also made to skills and employment and creating a stronger link between priority industries and training.

- Greater Lincolnshire LEP Local Skills Report (2022) (Ref 12-8) with reference to matching the skills of the local labour market to the labour demand of growing industries, including renewable energies. Reference is also made to increasing awareness of local career opportunities to young people and adults within Greater Lincolnshire.

- Lincolnshire County Council Corporate Plan (2023) (Ref 12-9) with reference to enhancing the skills of local communities to meet the needs of the local economy, as well as attracting and retaining highly-skilled talent within Lincolnshire.

Local Planning Policy, Other Policy, and Guidance

12.3.2 The Scheme falls within the administrative boundaries of LCC and NKDC. The following local policies are of relevance to the socio-economics and land use:

- Central Lincolnshire Local Plan (2023) (Ref 12-10) with particular reference to Policy S2 (Growth Levels and Distribution), Policy S43 (Sustainable Rural Tourism), Policy S48 (Walking and Cycling Infrastructure), and Policy S50 (Community Facilities).

- The North Kesteven Community Strategy 2030 (2021) (Ref 12-11) with reference to promoting inclusive and sustainable industrialisation, including the development of green infrastructure and knowledge economy.
- The North Kesteven Plan 2023-2026 (2023) (Ref 12-12) with particular reference to the economic priority to support local economic growth and resilience and build on opportunities from the 'green economy'.
- City of Lincoln Vision 2025 (2020) (Ref 12-13) with reference to the aspirations to drive 'inclusive economic growth' and 'address the challenge of climate change'.
- Lincolnshire Mineral and Waste Local Plan Site Locations (2017) (Ref 12-14). According to the site location policies map, there are no allocated sites within the Solar PV Site boundary.

12.4 Consultation

12.4.1 Consultation will be undertaken with LCC's PRoW team to find out about current usage of PRoW which interact with the site. No other consultation will be undertaken specifically to inform the assessment of socio-economic and land use impacts, however, the information gathered during the non-statutory and statutory consultation events, which will include feedback from the local authorities and other key stakeholders, will be used as appropriate to help inform the scope of the assessment.

12.5 Baseline Conditions

12.5.1 The potential impact of arising from the Scheme are assessed relative to the baseline conditions and benchmarked against regional and national standards where appropriate. Key indicators and measures for the Study Areas will be established for:

- Population and deprivation;
- The local economy;
- The local labour markets; and
- Land use.

12.5.2 A high-level summary of baseline conditions has been presented in the following paragraphs, based upon review of the following documents:

- Office for National Statistics (ONS), 2011 Census data (Ref 12-15);
- ONS, 2021 Census data (Ref 12-16);
- Ministry of Housing, Communities and Local Government, (2019); English indices of deprivation (Ref 12-17);

- ONS, (2024); Gross Value Added (Income Approach) (Ref 12-18); and
- ONS, (2024); Business Register and Employment Survey 2023 (Ref 12-19).

12.5.3 The Scheme is located within the area administered by NKDC at a District level, and LCC at a County level. This section therefore establishes the baseline conditions relative to this area in comparison to the wider East Midlands region, and England and Wales.

Population and Deprivation

12.5.4 The usual resident population of North Kesteven has grown from 107,766 in 2011 to 118,075 in 2021 representing an increase of 9.6% which is greater than that exhibited in the East Midlands (+7.7%) and England and Wales as a whole (6.3%) (Ref 12-15, Ref 12-16).

12.5.5 In terms of deprivation, North Kesteven is ranked 268th out of 317 local authority areas, where 1st is most deprived (Ref 12-17). None of the Lower Super Output Areas (LSOAs) in North Kesteven are ranked amongst the 20% most deprived LSOAs nationally. Accordingly, 61% of LSOAs are ranked amongst the 30% least deprived nationally.

Local Economy and Labour Market

12.5.6 Gross Value Added (GVA) per head is slightly lower in Lincolnshire (£23,379 per head of population at current basic prices in 2022) than the wider East Midlands region (£26,099) (Ref 12-18).

12.5.7 In 2021, Census data showed that 29.9% of usual residents aged 16 and over hold degree-level qualifications (National Vocational Qualification 4+), which is broadly in line with the equivalent rate for the East Midlands region (29.1%), although slightly lower than recorded across England and Wales (33.8%) (Ref 12-16). Conversely, a lower proportion of usual residents aged 16 and over hold no qualifications in North Kesteven (16.2%) compared to the East Midlands region (19.5%) and England and Wales (18.2%).

Employment

12.5.8 The broad industrial groups that employ the most people are the manufacturing (14.1%) and health (14.1%) sectors. The mining, quarrying and utilities broad industrial group (which includes employment from the generation of energy) represents 1.1% of employment by number of jobs (approximately 450 jobs) (Ref 12-19).

12.5.9 The economic activity rate (defined as the proportion of all usual residents aged 16 to 64 who are economically active, excluding full-time students) in North Kesteven at the time of the 2021 Census was 58.6%, which is marginally greater than recorded in the East Midlands region (57.5%) and across England and Wales (58.3%) (Ref 12-16).

Land Use Receptors

12.5.10 The Site is mostly used for agricultural purposes, being characterised by large scale regular-shaped arable fields across a number of land-holdings.

12.5.11 In respect of recreational routes, there is a network of PRoW which traverse the Site and provide pedestrian connectivity between adjacent settlements. There are also PRoWs which could be impacted by the Grid Connection Corridor. More information on each of these PRoW routes is provided in **Chapter 13: Traffic and Transport**, and in **Figure 2-2: Public Rights of Way**.

Residential Properties

12.5.12 Lowfields Farm, Willow Farm House and Fox Covert Cottages are surrounded by, though not located within, the Solar PV Site Boundary.

12.5.13 Three villages containing residential properties and farm buildings lie close to the boundary (within 500 m) of the Solar PV Site. These comprise of Brant Broughton approximately 300 m to the west of the Solar PV Site, Leadenham approximately 300 m to the south-east, Welbourn approximately 150 m to the east, and a few individual farm properties approximately 50 m to the south.

12.5.14 The Grid Connection Corridor avoid the major settlements in the area, but various isolated farms are located within the area.

Community Facilities

12.5.15 There are no built community facilities within the Site Boundary, although one of the fields north of Dycote Lane is used by the Kesteven Model Flyers, a model aircraft enthusiasts club.

12.5.16 The following community facilities are located within the 2 km Study Area for the Solar PV Site:

- The closest Fire Station to the Study Area is the Brant Broughton Community Fire Station located approximately 130 m west of the Site on High Street;
- The closest secondary school to the Study Area is the Sir William Robertson Academy located approximately 150 m east of the Site on Main road;
- The closest primary school to the Study Area is The Welbourn CofE Primary School located approximately 200 m east of the Site on High Street;
- The closest village hall to the Study Area is the Welbourn Village Hall located approximately 420 m east of the Site on Beck Street;

12.5.17 The community facilities located within the 2 km Study Area for the Grid Connection Search Area include:

- The closest pre-school to the Study Area is the First Timers Pre-School Nursery located approximately 300 m east of the Grid Connection Search Area on Four Winds Farm, The Heath.
- The closest community sports facility to the Study Area is the Navenby Bowls Club located approximately 750 m north-east of the Grid Connection Search Area on Grantham Road.
- The closest village hall to the Study Area is The Venue Community Centre located approximately 900 m north-east of the Grid Connection Search Area on Grantham Road.
- The closest medical practice to the Study Area is the Cliff Villages Medical Practice located approximately 1.0 m north-east of the Grid Connection Search Area on Grantham Road.
- The closest primary schools to the Study Area is the Navenby CofE Primary School located approximately 1.2 km north-east of the Grid Connection Search Area on East Road.

Business Premises and Development Land

12.5.18 The Solar PV boundary takes in a number of farm holdings. Lowfields Farm is surrounded by, though not located within, the Solar PV Site Boundary. Wood Farm is directly adjacent to the Site Boundary to the north-east. There are a number of other farms within 500 m of the Solar PV Site.

12.5.19 While there are no other businesses located within the Solar PV Site Boundary, there are business premises located in Brant Broughton comprising a caravan and campsite, village shop, a public house, a care home, and several farms. Business premises located between Leadenham and Welbourn comprise car dealers, private nursing homes, catering food and drinks supplier, Pilates studio, village shop, petrol station, car dealer, car garage, pet car service, e-bike shop, care homes, a public house, landscaping business, and door supplier.

12.5.20 Within the Grid Connection Corridor and the surrounding 500 m Study Area, there are a number of farms including Heath Farm, Chestnut Tree Farm, Griffin's Farm, Highfield House Farm, and Pottergate Farm.

12.5.21 Business premises within the Grid Connection Corridor and the surrounding 500 m Study Area include storage facilities, retreat centre, holiday retreat, agricultural services, and suppliers.

12.5.22 There are two sites allocated for housing which are within 500 m of the Site Boundary: NK/LEAD/01 (Station Yard, Leadenham) and NK/LEAD/02 (Land Off Main Road, Leadenham) (Ref 12-20).

Mineral Safeguarding Areas

12.5.23 The Grid Connection Corridor passes through a Mineral Safeguarding Area for Limestone. This Mineral Safeguarding Area sits outside of, albeit within 500 m of, the Solar PV Site (Ref 12-20).

12.6 Potential Effects and Mitigation

12.6.1 The Scheme may generate a range of socio-economic and land use effects, some of which would be temporary, whilst others would be permanent. For the purposes of the ES, due consideration will be given to the following:

- Temporary employment during the construction and decommissioning phases;
- Gross Value Added during the construction and decommissioning phases;
- Creation of long-term employment opportunities once the Scheme is operational including consideration of any existing employment uses on-site;
- Creation of training and apprenticeship opportunities during construction, operation and decommissioning of the Scheme;
- Any indirect impacts for the region hosting the Scheme, in particular in relation to the use of local support services and supply chains, and contribution of the Scheme to low-carbon industries at the local, regional and national level;
- Impacts on local services and facilities, including local accommodation facilities that support tourism;
- Potential temporary and/or permanent adverse land take impacts on residential properties, local businesses, visitor attractions, community facilities, open space, PRoW or recreational routes, or development land; and
- Potential temporary and/or permanent adverse changes to accessibility including severance of access to residential properties, local businesses, visitor attractions, community facilities, open space, PRoW or recreational routes, or development land.

12.6.2 Where appropriate, evaluation of job creation associated with the Scheme will include information related to the sustainability of the jobs creates including the extent to which they will help develop the skills needed for the UK's transition to New Zero.

12.6.3 Although the Grid Connection Corridor runs through an MSA for limestone, effects on the MSA are scoped out. This is because the land take required from the MSA for the installation of the grid connection would be very limited relative to the overall size of the MSA and the design will aim to minimise impacts on the MSA. The depth of the buried cables and the temporary lifespan of the proposed development mean that the affected area of the MSA is not expected to be sterilised permanently.

12.6.4 Several PRoWs will require management to ensure user safety and accessibility. Management measures include, but are not limited to:

- Maximising visibility between construction and decommissioning vehicles and other users (i.e., pedestrians, cyclists, equestrian);
- Implementing traffic management (e.g., advanced signage to advise other users of the works); and
- Use of manned controls where the Scheme crosses PRoW (i.e., marshals or banksmen), with a default priority that decommissioning traffic will give-way to other users.

12.6.5 Embedded mitigation measures will be included in the design where practicable to help avoid, prevent or reduce effects on socio-economics.

12.7 Assessment Methodology

Baseline

12.7.1 Relevant policy will be reviewed at the local, regional and national levels to identify the key issues of relevance to the Scheme. This will include Local Plans, any relevant Supplementary Planning Guidance, the relevant NPS and the NPPF.

12.7.2 A baseline assessment will be undertaken using a range of sources to provide a description of the socio-economic conditions within the local area and at local authority level, including employment and the economy. This will be done using established statistical sources as presented in Section 12.5 above.

Assessment of effects (including significance)

12.7.3 An assessment will be undertaken to assess the effects of the Scheme on the baseline socio-economic conditions. The methodology for assessing socio-economic effects will follow standard EIA guidance and will entail:

- Assessment of the likely scale, permanence and significance of effects associated with socio-economic receptors; and
- An assessment of the potential cumulative effects with other schemes within the surrounding area.

12.7.4 The assessment of potential socio-economic effects will use policy thresholds and expert judgment to assess the scale and nature of the effects of the Scheme against baseline conditions. For socio-economics there is no accepted definition of what constitutes a significant (or not significant) socio-economic effect. It is however recognised that effects are categorised based on the relationship between the scale (or magnitude) of effect and the sensitivity (or value) of the affected resource or receptor.

12.7.5 As such, the socio-economic effects will be assessed on the basis of:

- The sensitivity of receptors: specific values in terms of sensitivity are not attributed to socio-economic resources/receptors due to their diverse nature and scale, however the assessment takes account of the qualitative (rather than quantitative) sensitivity of each receptor and, in particular, their ability to respond to change; and
- The magnitude of impact: this entails consideration of the scale or size of the impact on people or business in the context of the area in which impacts will be experienced.

12.7.6 The assessment aims to be objective and quantifies effects as far as possible. However, some effects can only be evaluated on a qualitative basis. Effects are defined as follows:

- Beneficial classifications of effect indicate an advantageous effect on an area, which may be minor, moderate, or major;
- Negligible classifications of effect indicate imperceptible effects on an area;
- Adverse classifications of effect indicate a disadvantageous effect on an area, which may be minor, moderate or major; and
- No effect classifications indicate that there are no effects on an area.

12.7.7 Based on consideration of the above, where an effect is assessed as being beneficial or adverse, the scale of the effect has been assigned using the below criteria:

- Minor: a small number of receptors are beneficially or adversely affected. The effect will make a small measurable positive or negative difference on receptors at the relevant area(s) of effect;
- Moderate: a noticeable number of receptors are beneficially or adversely affected. The effect will make a measurable positive or negative difference on receptors at the relevant area(s) of effect; and
- Major: all or a large number of receptors are beneficially or adversely affected. The effect will make a measurable positive or negative difference on receptors at the relevant area(s) of effect.

12.7.8 Socio-economic and land use effects reflect the relationship between the sensitivity of the affected receptor and the magnitude of the impact, as set out in **Table 12-1**.

Table 12-1: Impact Assessment and Effect Significance

Sensitivity or value of resource/*receptor*	Magnitude of change			
	High	Medium	Low	Very low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very low	Minor	Negligible	Negligible	Negligible

12.7.9 Those effects which are found to be moderate or major are considered to be 'significant' and those which are minor or negligible are 'not significant'.

12.7.10 Duration of effect is also considered, so as to identify whether changes are temporary or permanent and to distinguish between short, medium and long term changes.

12.7.11 The assessment of employment and GVA effects will consider the temporary and permanent impact on a principal economic area defined based on consideration of local authority area boundaries and a typical travel time from the Site. Homes and Communities guidance on additionality will be applied to assess direct, indirect and induced impacts (Ref 12-21).

12.7.12 The assessment of effects on PRoW will consider direct impacts arising from any closures and/or diversions. Effects on development land will consider direct (land-take) and indirect (access) impacts on the delivery of development proposals or allocations both within and adjacent to the Site.

12.8 Limitations and Assumptions

12.8.1 Information on current land use from landowners on the Site may be required to determine existing employment generated within the existing Site. In the absence of this information, good practice guidance and professional judgment will be applied.

12.9 Summary of Elements Scope In and Scoped Out

12.9.1 A summary of the elements scoped into and out of the socio-economics and land use assessment are presented in **Table 12-2**.

Table 12-2: Elements scoped in and out of the assessment of socio-economics and land use

Element	Scoped in / Scoped Out
Employment, economic growth and training (construction, operation and decommissioning)	Scoped in – there is potential for the creation of jobs as well as training and apprenticeship opportunities, including for local residents.
Local accommodation sector	Scoped in – temporary workers may require accommodation within the local area during the construction phase.
Community land and assets (construction, operation and decommissioning)	Scoped in – there may be direct effects (land take) within the Site Boundary or indirect effects (severance) beyond the Site Boundary on receptors including PRoW and other recreational resources, open space and community facilities.
Private land and assets (construction, operation and decommissioning)	Scoped in – there is potential for direct effects (land take) within the Site Boundary or indirect effects (severance) beyond the Site Boundary on receptors including businesses, residential properties, visitor attractions and development land.
Minerals, Safeguarding (construction, operation, and decommissioning)	Scoped out – the Grid Connection Corridor run through a MSA for limestone. However, the land take required from the MSA for the installation of the grid connection would be very limited and the design will aim to minimise impacts on the MSA.

13 Traffic and Movement

13.1 Introduction

13.1.1 This chapter outlines the anticipated traffic and movement scope of assessment for the Scheme.

13.1.2 The objectives of the chapter are to:

- Describe the baseline environment in relation to traffic and movement;
- Outline the methods and assessments to be undertaken for inclusion within the ES; and
- Identify any potential effects on users of the local transport network that may arise as a result of the Scheme and any potential mitigation measures.

13.1.3 This chapter should be read in conjunction with the remainder of the EIA Scoping Report and with particular focus on the following chapters:

- **Chapter 11: Noise and Vibration;**
- **Chapter 12: Socio-economics and Land Use;** and
- **Chapter 16: Other Environmental Topics** (Air Quality).

13.1.4 This chapter is accompanied by Figure 13-1: Roads Affected by the Scheme.

13.2 Study Area

13.2.1 Due to the nature and size of the Scheme, consideration will need to be given to a number of locations within the surrounding highway network which could potentially be impacted. Key roads likely to require consideration are listed in **Table 13-1**, **Table 13-2** and **Table 13-5**.

13.2.2 The extent of the Study Area for assessment in terms of highway impact will be subject to discussion, and agreement will be sought with National Highways, LCC as highway authorities for the Strategic Road Network (SRN) and Local Road Network (LRN) respectively. At this stage, whilst it is considered unlikely that junction capacity analysis will be required due to the likely volume of construction/operational traffic during the typical network peak hours, it cannot be entirely discounted yet.

13.2.3 It is anticipated that both Heavy Goods Vehicle (HGV) and Abnormal Indivisible Load (AIL) traffic during the construction phase is likely to route to/from the site via the A17 which borders the southern extent of the site. Further afield, the A17 links with the A1 and the A46 via the Brownhills Roundabout and Winthorpe Interchange.

13.3 Legislation, Planning Policy Context and Guidance

Legislation

13.3.1 There is no applicable legislation specific to the assessment of transport and access. The following planning policy and guidance relating to transport and pertinent to the Scheme have been reviewed instead:

National Planning Policy

- NPS EN-1 (Ref 13-1) with reference to section 5.14, which reiterates the measures that potential disruption to services and infrastructure (such as road, rail and airports) should be considered.

- NPS EN-3 (Ref 13-2) sets out specific considerations for controls on vehicle movement associated with the development which apply to the construction traffic for a solar farm. These consider the fact the Secretary of State may impose controls on the number of vehicles movements to and from the solar farm for a specific period during construction and possible on the routing of such movements. Furthermore, it may be appropriate for non-permanent highway improvements carried out for the development (such as temporary road widening) to be made available for use by other subsequent solar farm developments.

- NPPF (Ref 13-3) paragraph 110 says that an application should promote sustainable transport modes where possible. The development should consider safe and suitable site access, reflect current guidance in terms of the design on parking and other transport elements, and ensure that any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree. Paragraph 116 states development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe. Paragraph 118 states a development that generates a significant amount of movement should be supported by a Transport Statement (TS) or Transport Assessment (TA) and should provide a Travel Plan.

- Planning Practice Guidance ‘Travel Plans, Transport Assessments and Statements in Decision-Taking’ (2014) (Ref 13-4). Paragraph 002 outlines that Travel Plans (TP), TA and Transport Statements (TS), “…are all ways of assessing and mitigating the negative transport impacts of development in order to promote sustainable development. They are required for all developments which generate significant amounts of movements”. Paragraphs 004 and 005 outlines that TA should evaluate the potential transport impacts of a development proposal and may propose mitigation measures to promote sustainable development to avoid unacceptable or “severe” impacts where necessary. Paragraph 006 outlines that TA support National Planning Policy and can positively contribute to encouraging sustainable travel, reducing traffic generation and detrimental impacts, reducing carbon emissions and climate

impacts, creating accessible, connected, and inclusive communities, improving health outcomes and quality of life, improving road safety and reducing the need for new development to increase existing road capacity of provide new roads. Paragraph 007 outlines that TA should be established at an early stage and be tailored to local circumstances and proportionate to the size and scope of the proposed development. In addition, they should be brought forward through collaborative ongoing working between the local planning authority/ transport authority, transport operators, rail network operators, as well as National Highways where there may be implications for the strategic road network and other relevant bodies. Paragraph 13 outlines when a TA and TS will be required. Paragraph 014 states "…the need for, scale, scope and level of detail required of a Transport Assessment or Statement should be established as early in the development management process as possible". Paragraph 015 outlines the requirements of what information should be included within a TA and TS.

National Guidance

- Overarching principles of Travel Plans, Transport Assessments and Statements (Ref 13-5).

Regional and Local Planning Policy

13.3.2 The Scheme falls within the administrative boundaries of the LCC and NKDC. The following local policies are of relevance to Traffic and Movement.

Lincoln Transport Strategy 2020 to 2036 (2020)

13.3.3 The new Lincoln Transport Strategy (Ref 13-6) has been developed by LCC, City of Lincoln Council, NKDC and West Lindsey District Council. It aims to provide a clear vision for the future of transport across the Lincoln area up to 2036, the strategy includes:

- Enhancing connectivity across the network for all modes;
- Increasing the capacity of the network and supporting the reduction in traffic in the urban area; and
- Rebalancing movement towards walking and cycling.

Central Lincolnshire Local Plan (April 2023)

13.3.4 The Central Lincolnshire Local Plan 2020-2040 (Ref 13-7) has been prepared by the Central Lincolnshire Joint Strategic Planning Committee (hereby referred to as the 'Joint Committee') and was adopted in April 2023, superseding the previously adopted version (April 2017).

13.3.5 Policy S14: Renewable Energy, states that "Joint Committee is committed to supporting the transition to a net zero future and will seek to maximise appropriately

located renewable energy generated in Central Lincolnshire. Proposals for renewable energy schemes, including ancillary development, will be supported where the direct, indirect, individual and cumulative impacts on the following considerations are, or will be made, acceptable. To determine whether it is acceptable, the following tests will have to be met:

- The impacts are acceptable having considered the scale, siting and design, and the consequent impacts on landscape character; visual amenity; biodiversity; geodiversity; flood risk; townscape; heritage assets, their settings and the historic landscape; as well as highway safety and rail safety;
- The impacts are acceptable on aviation and defence navigation system/communications; and
- The impacts are acceptable on the amenity of sensitive neighbouring uses (including local residents) by virtue of matters such as noise, dust, odour, shadow flicker, air quality and traffic."

13.3.6 Policy S45: Strategic Infrastructure Requirements states that "new developments should be supported by, and have good access to infrastructure:

- Planning permission will only be granted if it can be demonstrated that there is, or will be, sufficient infrastructure capacity to support and meet all the necessary requirements arising from the Scheme. Development proposals must consider all of the infrastructure implications of a scheme; not just those on the site or in its immediate vicinity. Conditions or planning obligations, as part of a package or combination of infrastructure delivery measures, are likely to be required for many proposals to ensure that new development meets this principle; and
- Consideration must be given to the likely timing of infrastructure provision. As such, development may need to be phased. Conditions or a planning obligation may be used to secure this phasing arrangement."

13.3.7 Policy S46: Safeguarded Land for Future Key Infrastructure states that "development proposals on, or near to, the preferred route of the North Hykeham Relief Road, as indicated on the Policies Map, which will prejudice the efficient and effective delivery of the project will be refused."

13.3.8 Policy S47: Accessibility and Transport states that "development proposals which contribute towards an efficient and safe transport network that offer a range of transport choices for the movement of people and goods will be supported. Similarly, all development should demonstrate, where appropriate, that they have a regard to the following criteria:

- Located where travel can be minimised, and the use of sustainable transport modes are maximised;

- Minimise additional travel demand through the use of measures such as travel planning, safe and convenient public transport, car clubs, walking and cycling links and integration with existing infrastructure; and
- Making Allowance for low and ultra-low emission vehicles refuelling infrastructure."

13.3.9 Policy S48: Walking and Cycling Infrastructure states that "development proposals should facilitate active travel by incorporating appropriate measures from the design stage. Plans and evidence accompanying applications should demonstrate how the ability to travel by foot or cycle will be actively encouraged by the delivery of well designed, safe and convenient access for all both into and through the site. Priority should be given to the needs of pedestrians, cyclists, people with impaired mobility and users of public transport by providing a network of high-quality pedestrian and cycle routes and green corridors, linking to existing routes and public rights of way where opportunities exist, that provide easy access and permeability to adjacent areas. Proposals will:

- Protect, maintain and improve existing infrastructure, including closing gaps or deficiencies in the network and connecting communities and facilities;
- Provide high quality attractive routes that are safe, direct, legible and pleasant and are integrated into the wider network;
- Ensure the provision of appropriate information, including signposting and way-finding to encourage the safe use of the network;
- Encourage the use of supporting facilities, especially along principle cycle routes;
- Make provision for secure cycle parking facilities in new developments and in areas with high visitor numbers across Central Lincolnshire; and
- Consider the needs of all users through inclusive design."

Fifth Lincolnshire Local Transport Plan

13.3.10 LCC's Fifth Local Transport Plan (Ref 13-7) is a statutory duty for Local Highway Authorities and is designed to cover the short-term (2022-2026), medium-term (to 2034) and long-term (to 2050) horizons for transport and highways for the whole county. Chapter 2 discusses the proposed themes related to the integrated transport strategy which include:

- Theme 1: Supporting economic growth;
- Theme 2: Future ready, green transport;
- Theme 3: Promoting thriving environments;
- Theme 4: Supporting safety, security and a healthy lifestyle;

- Theme 5: Promoting high aspirations; and
- Theme 6: Improve quality of life.

13.3.11 Theme 2 focuses on introducing low-carbon technologies which reduce the reliance on fossil fuels as well as delivering sustainable development by ensuring new developments are designed in a way such that reduce the need to travel, minimise car use and support the use of more sustainable modes.

13.3.12 Policy Green 2 states that the Local Transport Plan supports the commitments of the Green Master Plan to achieve net-zero alongside a thriving natural environment.

13.3.13 Policy Green 4 states "We will use the local and strategic development management processes to ensure that development is planned, delivered and managed to reduce the need to travel and support the delivery of sustainable transport modes. We will support the provision of improved walking, cycling and public transport services and facilities as part of new developments and actively encourage innovative solutions such as car clubs, mobility hubs, active travel plans and other sustainable solutions as opposed to single occupancy car use".

Lincolnshire Road Safety Strategy 2015-2025 (2020)

13.3.14 The core objectives of the Lincolnshire Road Safety Strategy (Ref 13-9) are to achieve a 20% of reduction in the number of killed or seriously injured road casualties from an annual average number of 457 (in 2010-2012) to no more than 367. The second core objective is to achieve a 20% reduction in the number of children killed or seriously injured road casualties from an average number of 27 (in 2010-2012) to no more than 22.

13.3.15 These objectives will be achieved through engineering, enforcement, evaluation and a programmed of education, training and publicity (ETP).

Lincolnshire Walking Strategy 2015-2025 (2020)

13.3.16 The aim of the Lincolnshire Walking Strategy (Ref 13-10) is to make Lincolnshire a place where walking is a natural choice for everyday journeys for leisure and for enjoyment and where walking is seen as accessible, inclusive and attractive for all. The aims of Walking Strategy will be achieved through policies that are arranged into the following themes.

- Theme 1: Infrastructure – providing the appropriate infrastructure to enable walking journeys
- Theme 2: Networks and connectivity – enhancing walking's role in connecting people to the places they want to reach.
- Theme 3: New developments – Opportunities to create sustainable communities with active travel at the centre.

- Theme 4: Leisure and Tourism – As a popular leisure and tourism activity, walking improves physical and mental health, can boost community spirit and supports a key part of the economy.

- Theme 5: Encouraging and enabling – Influencing behaviour and removing barriers.

Industry Guidance

13.3.17 The IEMA Guidelines for the Environmental Assessment of Traffic and Movement (Ref 13-11) provides guidance on examining the environmental impacts of developments in terms of traffic and movement. This guidance has been used to outline the scope of the assessment.

13.4 Consultation

13.4.1 LCC, NKDC and National Highways (NH) will be consulted with regard to traffic and movement to determine, and seek agreement on, the scope, Study Area and methodological approach.

13.5 Baseline Conditions

13.5.1 The Solar PV Site and Grid Connection Corridor are located within the administrative boundary of LCC and NKDC. The traffic and movement Study Area will include the construction routes serving the Scheme. As a minimum, it is anticipated that the links mentioned in paragraph 13.2.3 will likely be used by construction vehicles to access the Scheme.

13.5.2 Baseline conditions for the land associated with the Scheme will be described in detail in the ES.

Sources of Baseline Information and Consultation

13.5.3 To inform the assessment of the Scheme, information from a number of sources will be collected. The sources which will be used are set out below:

- Automatic Traffic Counts (ATCs) will be undertaken at a number of locations in the vicinity of the Scheme to determine the baseline traffic conditions of the surrounding highway network. Average Annual Daily Traffic (AADT) flows will be derived from the ATC data to enable the baseline traffic flows to be established at the required design years. The extent of the traffic data and scope for any traffic surveys that may be required will be agreed with LCC and NH, as relevant.

- Personal Injury Accident (PIA) data for the most recent five-year period will be obtained from the highway authorities, which will provide information on each collision including severity, as well as factors which attributed to the collision. The extent of the PIA Study Area will be detailed within the ES.

- Local travel information will be gathered from various sources including local bus operators as well as LCC and NKDC.
- OS / Architectural Base Mapping will be used to ascertain an accurate geographical representation of the areas in the vicinity of the Scheme; and
- Travel mode share data from the 2011 Census.

13.5.4 To determine the potential impact of the Scheme, a number of scenarios will be assessed using the information collated above. The scenarios considered appropriate for assessment are as follows and will be assessed using 24-hour AADT flows, AM and PM combined network peak hour flows and the development peak hour flows to ensure a robust assessment:

- Baseline (2025);
- Peak Construction Year without the Scheme; and
- Year of opening.

13.5.5 The peak construction year will be ascertained from the construction programme once available and will consider both HGV and all other traffic associated with the construction of the Scheme.

13.5.6 The future baseline will be established by extrapolating the 2025 traffic count data to future years using appropriate factors (based on the local MSOA) derived from the industry standard software TEMPro. This will provide a robust estimate of the future baseline traffic levels during the three phases of construction.

13.5.7 A consideration of any committed and cumulative developments within the area will also be included.

Planned Surveys

13.5.8 ATCs will be undertaken during a neutral month and will provide two-way traffic flows, classified by vehicle type, including HGVs. The ATCs will also collect speed data. In line with Transport Assessment Guidance (TAG) Unit M1.2 (Ref 13-12) neutral periods are defined as Monday to Thursday from March through to November (excluding August) and avoiding the weeks before / after Easter. Surveys may be carried out outside these months if the conditions being surveyed are representative. Where practical ATC data collection will avoid roadworks.

13.5.9 As discussed in section 13.3, the locations and timings of the ATC surveys, will be agreed with LCC and NH.

13.5.10 The ATC locations that have been selected, subject to agreement, will provide a basis for the analysis and incorporate local routes within the Study Area close to potential sensitive receptors, and routes along local strategic links, to provide a robust baseline for assessment. These locations will be surveyed for one continuous full week, 24 hours a day.

13.5.11 The Solar PV Site and Grid Connection Corridor are currently being refined. Once these have been confirmed, a plan showing the proposed location of the traffic surveys will be submitted to the Local Planning Authority for approval for review and approval.

Existing Local Highway Network

13.5.12 This section provides a summary of the baseline conditions in respect of the roads and PRoWs (Public Rights of Way) which are located within, or in proximity to the Scheme. In the event that the refinement to the redline boundary or grid connection corridor alters the roads and PRoWs to be impacted, the baseline conditions for roads and PRoWs will be updated.

13.5.13 An overview of the existing baseline for the roads which are likely impacted by the Scheme are presented in the **Table 13-1** and **Figure 13-1: Roads Affected by the Scheme.**

Figure 13-1: Roads Affected by the Scheme

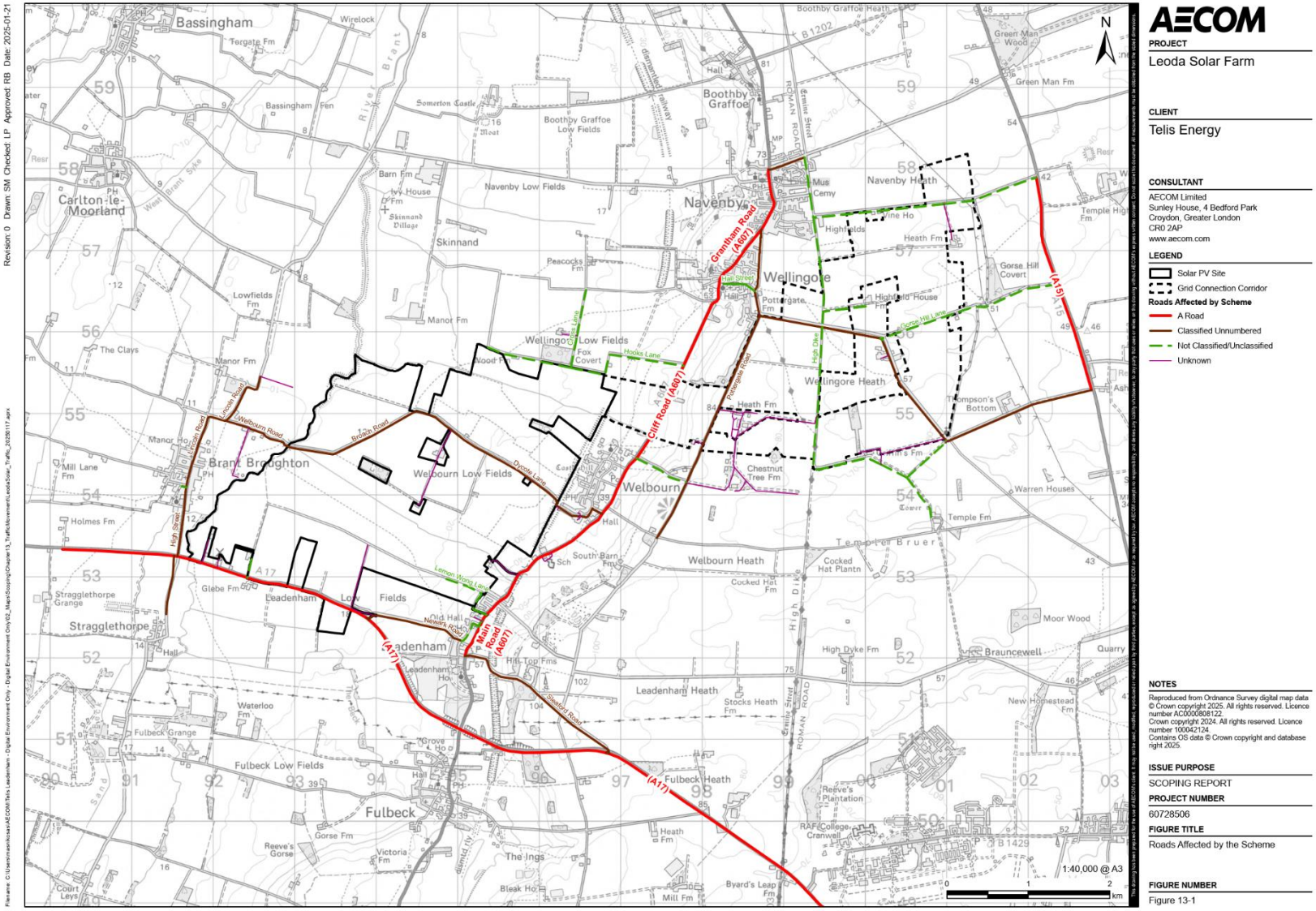


Table 13-1: Roads likely to be Impacted by the Development Area

Road name	Description	Interaction
A17	A single carriageway road, subject to the national speed limit. There is no streetlighting or footways on either side of the carriageway.	Located to the south of the development area. Potential for direct access to the site to be provided via the A17.
A607 Main Road	A single carriageway road, subject to a 40mph speed limit, which decreases to 30mph outside the Sir William Robertson Academy. The northern side of the carriageway benefits from intermittent sections of footway, with associated streetlighting. The southern side of the carriageway does not benefit from footways aside from in proximity to the Sir William Robertson Academy.	Located in proximity to the eastern border of the development area.
Crow Lane / Lemon Wong Lane	A narrow (approximately 3 m wide) single carriageway country road, subject to a 40mph speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the development area.
Dycote Lane	A narrow (approximately 3 m wide) single carriageway country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the development area.

Road name	Description	Interaction
Broach Road	A narrow (approximately 3 m wide) single carriageway country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the development area.
Welbourn Road	A narrow (approximately 3 m wide) single carriageway country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the development area.
Hooks Lane	A narrow (approximately 3.5 m wide) single carriageway country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the development area.
Cross Lane	A narrow (approximately 4 m wide) country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the development area.

13.5.14 An overview of the existing baseline for the roads which may be impacted by the area considered for cable easement are presented in **Table 13-2**.

Table 13-2: Roads Impacted by Area considered for cable easement

Road Name	Description	Interaction
A607 Cliff Road	A single carriageway road, subject to the national speed limit. There is an approximately 2 m wide footway on the western side of the carriage, but with no streetlighting.	Routes through the Area considered for cable easement.
Pottergate Road	A single carriageway country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the Area considered for cable easement.
High Dike	A narrow (approximately 3 m wide) country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the Area considered for cable easement.
Heath Lane	A narrow (approximately 4 m wide) country road, subject to the national speed limit. There is no streetlight or footway on either side of the carriageway.	Routes through the Area considered for cable easement.
Highfield House Farm access road	A narrow (approximately 3 m wide) farm access road.	Routes through the Area considered for cable easement.
Gorse Hill Lane	A narrow (approximately 3.5 m wide) country road, subject to the National Speed Limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the Area considered for cable easement.
The Heath	A single carriageway country road, subject to the National Speed Limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the Area considered for cable easement.
Hooks Lane	A single carriageway country road, subject to the national speed limit. There is no streetlighting or footway on either side of the carriageway.	Routes through the Area considered for cable easement.

Existing Public Rights of Way

13.5.15 An overview of the existing baseline PRoW which may be impacted by the Scheme and area considered for cable easement are presented in **Table 13-3** and **Table 13-4** respectively.

Table 13-3: PRoWs Impacted by the Scheme

PROW Name	Description	Interaction
Footpath Lead/3/1	Routes Northwest-Southeast between Lemon Wong Lane and Newark Road. Comprises of a natural surface and is approximately 900 m long.	Routes through the development area.
Footpath Lead/3/2	Routes Northwest-Southeast between Lemon Wong Lane and Bridleway Lead/9/2. Comprises of a natural surface and is approximately 2.25 km long.	Routes through the development area.
Bridleway Lead/9/1	Routes North-South between the A17 and Bridleway Lead/9/2. Comprises of a paved surface and is approximately 500 m long.	Routes through the development area.
Bridleway Lead/9/2	Routes North-South between Bridleway Lead/9/1 and Welbourn Road/Broach Road. Comprises of a natural surface and is approximately 1.15 km long	Routes through the development area.
Footpath Wlbn/19/2	Routes Northwest-Southeast from Broach Road to Footpaths Wlbn/847/2 and Wlbn/19/1. Comprises of a natural surface and is approximately 2.35 km long.	Routes through the development area.
Footpath Wlbn/19/1	Routes North-South from Footpaths Wlbn/19/2 and Wlbn/847/2 to Dycote Lane. Comprises of a natural surface and is approximately 1 km long.	Routes through the development area.
Footpath Wlbn/847/2	Routes Northwest-Southeast from Footpaths Wlbn/19/2 and Wlbn/19/1 to Footpaths Wlbn/848/2 and Wlbn/847/1. Comprises of a natural surface and is approximately 660 m long.	Routes through the development area.
Footpath Wlbn/848/2	Routes Northeast-Southwest from Footpaths Wlbn/847/2 and Wlbn847/1 to Drycote Lane (Footpath Wlbn/848/1). Comprises of a natural surface and is approximately 680 m long.	Routes through the development area

PROW Name	Description	Interaction
Footpath Wlbn/847/1	Routes Northwest-Southeast from the A607 Cliff Road to Footpaths Wlbn/848/2 and Wlbn/847/2. Comprises of a gravel surface and is approximately 65 m long.	Routes through the development area.
Footpath Wlbn/1/1	Routes Northeast-Southwest from Broach Road to Footpaths Wlgr/10/5 and Wlgr/856/1. Comprises of a natural surface and is approximately 720 m long.	Routes through the development area.
Footpath Wlbn/16/1	Routes Northwest-Southeast from Broach Road to Footpaths Wlbn/850/1 and Wlbn/16/2. Comprises of a natural surface and is approximately 820 m long.	Routes through the development area.
Footpath Wlbn/850/1	Routes North-South from Dycote Lane to Footpaths Wlbn/16/1 and Wlbn/16/2. Comprises of a natural surface and is approximately 330 m long.	Routes through the development area.
Footpath Wlbn/16/2	Routes Northwest-Southeast from Footpaths Wlbn/16/1 and Wlbn/850/1 to Footpaths Wlbn/16/3 and Wlbn/849/1. Comprises of a natural surface and is approximately 890 m long.	Routes through the development area.
Footpath Wlbn/16/3	Routes East-West from Footpath Wlbn/16/2 to Footpaths Wlbn/17/1 and Wlbn/17/2. Comprises of a natural surface and is approximately 225 m long.	Routes through the development area.
Footpath Wlbn/849/1	Routes North-South from Footpaths Wlbn/16/2 and Wlbn/16/3 to Footpaths Wlbn/15/1 and Wlbn/15/2. Comprises of a natural surface and is approximately 335 m long.	Routes through the development area.

PROW Name	Description	Interaction
Footpath Wlbn/17/1	Routes North-South from Dycote Lane to Footpaths Wlbn/16/3 and Wlbn/17/2. Comprises of a natural surface and is approximately 220 m long.	Routes through the development area.
Footpath Wlbn/17/2	Routes East-West from Footpaths Wlbn/17/1 and Wlbn/849/1 to Footpaths Wlbn/848/1 and Wlbn/16/4. Comprises of a natural surface and is approximately 385 m long.	Routes through the development area.
Footpath Wlbn/848/1	Routes North to South from Footpaths Wlbn/17/2 and Wlbn/16/4 to Dycote Lane (Footpath Wlbn/848/2). Comprises of a natural surface and is approximately 350 m long.	Routes through the development area
Footpath Wlbn/16/4	Routes North-South from Footpaths Wlbn/848/1 and Wlbn/17/2 to Footpaths Wlbn/15/1 and Wlbn/17/3. Comprises of a natural surface and is approximately 140 m long.	Routes through the development area.
Footpath Wlbn/15/1	Routes Northwest-Southeast from Footpath Wlbn/16/4 to Footpaths Wlbn/849/1 and Wlbn/15/2. Comprises of a natural surface and is approximately 655 m long.	Routes through the development area.
Footpath Wlbn/15/2	Routes Northwest-Southeast from Footpaths Wlbn/15/1 and Wlbn/849/1 to Footpaths Wigr/10/4 and Wigr/856/1. Comprises of a natural surface and is approximately 1.4 km long.	Routes through the development area.
Footpath Wlgr/856/1	Routes East-West from Footpath Wlbn/15/2 to Footpath Wlbn/1/1. Comprises of a natural surface and is approximately 570 m long.	Routes through the development area.

Table 13-4: PRoWs Impacted by the area considered for cable easement

PROW Name	Description	Interaction
Footpath Nave/14/1	Routes East from High Dike. Comprises of a natural surface and is approximately 420 m long.	Routes through area considered for cable easement.
Footpath Wlgr/2/3	Routes Northeast-Southwest from High Dike to Footpaths Wlgr/3/2, Wlgr/3/1 and Wlgr/2/4. Comprises of a paved surface and is approximately 1.75 km long.	Routes through area considered for cable easement.
Footpath Wlgr/3/2	Routes Northwest-Southeast from the intersection of Footpaths Wlgr/2/3, Wlgr/3/1 and Wlgr/2/4. Comprises of a natural surface and is approximately 270 m long.	Routes through area considered for cable easement.
Footpath Wlgr/3/1	Routes Northwest-Southeast from the intersection of Footpaths Wlgr/2/3, Wlgr/3/2 and Wlgr/2/4. Comprises of a natural surface and is approximately 360 m long.	Routes through area considered for cable easement.
Footpath Wlgr/2/4	Routes Northeast-Southwest between the intersection of Footpaths Wlgr/2/3, Wlgr/3/1 and Wlgr/3/2 and Footpath Temp/2/1 (Gorse Hill Covert). Comprises of a natural surface and is approximately 355 m long.	Routes through area considered for cable easement.
Footpath Wlgr/2/1	Routes East-West from Pottergate Road to Footpaths Wlgr/2/2 and Wlgr/4/1. Comprises of a natural surface and is approximately 690 m long.	Routes through area considered for cable easement.
Footpath Wlgr/2/2	Routes East-West from Footpaths Wlgr/2/1 and Wlgr/4/1 to High Dike. Comprises of a natural surface and is approximately 165 m long.	Routes through area considered for cable easement.
Footpath Wlgr/4/1	Routes Northwest-Southeast from Footpaths Wlgr/2/1 and Wlgr/2/2 to the High Dike/Gorse Hill Lane junction. Comprises of a natural surface and is approximately 275 m long.	Routes through area considered for cable easement.

PROW Name	Description	Interaction
Footpath Wlgr/4/2	Routes Northwest-Southeast from the High Dike/Gorse Hill Lane junction to The Heath. Comprises of a natural surface and is approximately 1.2 km long.	Routes through area considered for cable easement.
Footpath Wlgr/1/1	Routes Northwest-Southeast from Pottergate Lane/ Gorse Hill Lane junction to High Dike. Comprises of a natural surface and is approximately 1.65 km long.	Routes through area considered for cable easement.
Restricted Byway Temp/4/1	Routes North-South from Griffin's Farm to Temple Road. Comprises of a natural surface and is approximately 1.3 km long.	Routes through area considered for cable easement.
Footpath Wlgr/8/4	Routes North-South from Footpaths Wlgr/8/1 and Wlgr/9/2 to Footpaths Wlbn/11/1 and Wlbn/10/1.Comprises of a natural surface and is approximately 1.9 km long.	Routes through area considered for cable easement.
Footpath Wlgr/11/1	Routes Northeast-Southwest from Footpaths Wlgr/8/4 and Wlgr/10/1 to the A607 Cliff Road. Comprises of a natural surface and is approximately 285 m long.	Routes through area considered for cable easement.
Footpath Wlbn/8/1	Routes to the east from the A607 Cliff Road. Comprises of a natural surface and is approximately 540 m long.	Routes through area considered for cable easement.
Footpath Wlbn/7/1	Routes East-West from the A607 Cliff Road to the unnamed road between the A607 Cliff Road and Pottergate Lane. Comprises of a natural surface and is approximately 490 m long.	Routes through area considered for cable easement.

Construction Traffic Routing

13.5.16 An overview of the existing baseline for the roads identified as likely construction traffic routes for the Scheme area are presented in **Table 13-5**.

Table 13-5: Roads likely to be impacted by construction traffic routing

PROW Name	Description	Interaction
A17	A single carriageway road, subject to the national speed limit. There is no streetlighting or footways on either side of the carriageway.	Located to the south of the development area. Potential for access to the site to be provided via the A17.
A46	A dual carriageway road, subject to the national speed limit. There are no footways on either side of the carriageway, but there is regular streetlighting.	Likely route for construction traffic.
A1	A dual carriageway road, subject to the national speed limit. There are no footways on either side of the carriageway, but there is regular streetlighting.	Likely route for construction traffic.

13.6 Potential Effects and Mitigation

13.6.1 The nature of the Scheme is such that the greatest impact is likely to occur during the construction and decommissioning phases and this will be the focus of the assessment of potential transport effects presented in the ES.

Construction

13.6.2 During the construction phase, there will be a temporary increase in traffic flow on the road network surrounding the site due to the construction vehicles accessing the site, which is discussed in Chapter 2. Currently, the level of construction traffic is not defined. However, based on experience of other similar sized solar projects, it is currently estimated that up to 400 staff per day will be required to work on the Scheme during the peak construction period, which is likely to include construction of the substation, export cable, and grid connection. This is expected to be a worst case based on the most rapid build out programme, and there will be noticeably fewer workers outside peak activities. The level of trips associated with the construction phase will be confirmed as the project progresses.

13.6.3 A key change from the baseline condition is the number and percentage of HGVs using local roads during the construction phase. Vehicle trip generation for the peak construction phase will be utilised to inform the future baseline.

13.6.4 Other aspects of the construction phase which could lead to a significant effect are as follows:

- Severance to communities caused by a large increase in traffic for a longer period;
- Temporary increase in abnormal loads / AILs;
- Increased risk of road traffic accidents caused by a large increase in traffic for a longer period;
- Temporary road closures, diversions, realignment and widening;
- Construction traffic using temporary bell mouths and site entrances for access to construction areas; and
- Temporary closures or diversions of PRoW and other public access routes.

13.6.5 Traffic associated with the different aspects of the Scheme and phases (split by vehicles/HGVs) will then be added to the network to generate the anticipated future traffic levels. This will then be used to form the basis for assessment.

13.6.6 Further detail on proposed access to the Scheme will be included within the ES chapter and the Transport Assessment, which will be submitted with the DCO application.

13.6.7 Potential mitigation measures that could be implemented during the construction phase may include:

- Development of a Framework Construction Traffic Management Plan (CTMP), to include details such as restrictions of HGV movements to certain routes, days of the week and times of the day;
- Development of a Framework Construction Worker Travel Plan (CWTP), which may include details of methods to be used to encourage sustainable travel to / from sites for workers. This information could also potentially be incorporated into the Framework CTMP; and
- Development of a Framework Public Rights of Way (PRoW) Management Plan to include details of how the PRoWs will be maintained/ managed through the lifespan of the development.

Operation

13.6.8 It is anticipated that there will be up to a maximum of three permanent staff on-site at any one time during the operational phase, predominantly undertaking maintenance tasks. In addition, as a worst case assumption at this stage, it is assumed there will be 10 to 20 visitors per week (equating to 2 to 4 visitors per day) for deliveries and servicing of equipment. Staff vehicles and those used for maintenance will primarily be four wheeled drive vehicles and vans, with HGVs

rarely accessing the Solar PV Site during Scheme operation (only required for exceptional maintenance and repair activities).

13.6.9 Due to the low level of trips likely to be generated within the network peak hours (with up to seven arrivals and seven departures expected daily), it is proposed to scope operational phase transport effects out of the EIA. Further detail of the operational stage transport arrangements will be set out in the ES and TA technical note to support this approach.

Decommissioning

13.6.10 At this stage, the number of vehicle movements required to decommission the Scheme is not known, as such the level of predicted impact cannot be identified. However, typically the decommissioning traffic is similar or less than the construction phase traffic and, as such, the impact of the decommissioning process is considered to be adequately assessed through the construction phase assessment.

13.6.11 Decommissioning traffic mitigation will be secured as part of the DTMP, which will sit within the DEMP.

Mitigation

13.6.12 Based on the potential for significant effects generated by the Scheme on traffic and movement, it is likely that mitigation will be required to reduce the potential impacts.

13.6.13 Additional (Scheme Specific) Mitigation Measures including travel planning and HGV management will sit alongside the Framework CTMP to be submitted with the DCO application.

13.6.14 Programming of HGV / AIL movements may be subject to restricted periods of the day and the working week on some, or all, of the access routes. For example, on routes close to schools, HGV movements may be restricted during drop off and pick up times to improve traffic flow and safety.

13.6.15 Other minor highway improvements could potentially be carried out in sensitive locations to reduce the impact of the construction traffic.

13.6.16 The assessment of routes from the strategic road network to the sites will determine the feasibility of routes and where mitigation works are required. In the event that local roads are impacted then these will also fall within the assessment.

13.6.17 It is anticipated that all mitigation required will be set out within the outline designs where required for route improvements between the strategic road network and the Site. Swept path analysis will be presented to support these designs where required. Temporary diversion or other mitigation measures for foot/cycle paths and PRoWs will be proposed where necessary.

13.7 Assessment Methodology

Transport Assessment

13.7.1 To inform this assessment a Transport Assessment will be produced.

13.7.2 The ability of the highway network to accommodate the development construction traffic will be assessed and reported in a Transport Assessment Technical Note which will form a technical annex to the ES Chapter. The TA Technical Note will include information on:

- A review of relevant national, regional and local policies;
- Description of the existing baseline conditions – a thorough description of the roads, railway lines, footpaths, bridleways and cycle paths and PRoWs. Traffic flows on these routes and levels of use on bridleways, footpaths and cycle paths will be measured through site observations and agreed with the relevant planning authority;
- A review of the road safety data for the most recent five-year period within the identified search area;
- Description of the Scheme, setting out timescales for construction, compound locations, access routes to compounds, construction methods;
- Traffic generation of compounds and any other relevant sites for construction staff with a profile of arrivals and departures for the day and HGV traffic with a profile of arrivals and departures for the day;
- Distribution and assignment of trips on the road network with construction traffic distributed based on a gravity model of worker catchment area and HGVs assigned from the A road network;
- Analysis of abnormal load requirements and routing;
- Swept path analysis to assess construction vehicle movements (Cable Drum/ Transformer deliveries) and access suitability;
- Junction capacity assessment of Site access arrangements.
- Mitigation measures; and
- Summary and conclusions.

Impact Assessment Methodology

13.7.3 In accordance with paragraph 3.3 of the IEMA guidelines for the ‘Environmental Assessment of Traffic and Movement’ (Ref 13-11) the assessment of the construction phase will consider the following criteria.

- Severance, including PRoW;
- Driver delay;
- Pedestrian delay (incorporating delay to all non-motorised users);
- Non-motorised user amenity;
- Fear and Intimidation;
- Road Safety; and
- Hazardous loads/large loads.

13.7.4 The receptors which may be impacted will be identified based on the likely locations in which development traffic may route during the construction of the Scheme.

13.7.5 The following user groups are to be considered:

- Non-motorised users;
- Public right of way users;
- Motorists and freight vehicles;
- Public transport; and
- Emergency services.

13.7.6 When assessing the impacts of traffic effects, there are a range of particular groups and locations which may be sensitive to changes in traffic conditions compliant with the criteria previously outlined. These are outlined in the IEMA guidance as 'Affected Parties', as follows:

- People at home;
- People at work;
- Sensitive and/or vulnerable groups (including young age, older age, income, health status, social disadvantage and access and geographic factors);
- Locations with concentrations of vulnerable users (e.g., hospitals, places of worship and schools);
- Retail areas;
- Recreational areas;
- Tourist attractions;
- Collisions clusters and routes with road safety concerns; and

- Junctions and highway links at (or over) capacity.

13.7.7 The methodology for assessing the impact of development-generated traffic will be based on that outlined in the IEMA guidelines for the 'Environmental Assessment of Traffic and Movement' (Ref 13-11). The IEMA guidelines state that a link on the highway network should be included within the study if one of the following criteria is met:

- Rule 1 – Include highway links where traffic flows will increase by more than 30% (or the number of HGVs increase by more than 30%); or
- Rule 2 – Include highway links of high sensitivity where traffic flows have increase by 10% or more.

13.7.8 Under Rule 1, the guidance indicates that: "the day-to-day variation of traffic on a road is frequently at least + or -10%. At a basic level, it should therefore be assumed that projected changes in traffic of less than 10% create no discernible environmental impact."

13.7.9 Furthermore, a negligible magnitude of change will be assigned where traffic flow (or HGV) increase is less than 30% per hour during each of the development peak hours due to the construction of the Scheme in line with Rule 1.

13.7.10 A negligible magnitude of change will be assigned where there is expected to be fewer than 30 additional vehicle trips per hour, irrelevant of background traffic levels, as a result of the construction of the Scheme (except for the assessment of hazardous/large loads), irrespective of the proportional increase in traffic flows. This is designed to avoid over-reporting impacts in areas where baseline traffic flows are very low and is in line with the IEMA guidance which states that caution should be observed when applying thresholds to very low baseline flows given that these are unlikely to experience impacts even with high percentage changes in traffic.

13.7.11 The vehicle routeing and movements associated with the construction of the Scheme will be identified within the Transport Assessment.

13.7.12 As a general rule, the forecast changes to baseline (magnitude of change), the relative value/sensitivity/importance of the affected receptor and the scale, nature and significance of the effect (consequence) should be considered. In addition, the anticipated effect should be classified as short-term, medium-term or long-term, as well as permanent or temporary.

13.7.13 Assessments will be undertaken at the anticipated peak construction period as this will be the worst-case scenario. The traffic associated with the construction of the Scheme will be distributed onto the surrounding highway network or where the Scheme crosses the highway network, footways/cycleways and PRoW.

13.7.14 Baseline traffic flows will be factored up to the future year scenario by adopting growth factors derived from TEMPro utilising the latest National Trip End Model

(NTEM) datasets for the relevant areas potentially impacted by the construction of the Scheme.

Receptor Sensitivity

13.7.15 As stated above, the methodology for assessing the impact of the Scheme generated traffic will be based on that outlined in the IEMA guidelines. The general criteria for defining the importance or sensitivity of receptors are set out in **Table 13-6**, which applies to the assessment of Severance, Pedestrian Delay, Non-Motorised User Amenity, and Fear and Intimidation. Key factors influencing this include:

- The value of the receptor or resource based upon empirical and/or intrinsic factors, for example considering any legal or policy protection afforded which is indicative of the receptor or resources' value internationally, nationally or locally; and
- The sensitivity of the receptor or resource to change, for example is the receptor likely to acclimatise to the change. This will consider legal and policy thresholds which are indicative of the ability of the resources to absorb change.

Table 13-6: Sensitivity Criteria of Affected Parties / Receptors (Severance, Pedestrian Delay (incorporating delay to all non-motorised users), Non-motorised User Amenity, and Fear and Intimidation)

Sensitivity	Receptors
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident blackspots, retirement homes, urban/residential roads without footways that are used by pedestrians.
Medium	Traffic flow sensitive receptors including congested junctions, doctor's surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, un-segregated cycleways, community centres, parks, recreation facilities.
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision.
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distanced from affected roads and junctions.

13.7.16 The general criteria for defining the imparts or sensitivity of receptors for the assessment of Driver Delay are set out in **Table 13-7**.

Table 13-7: Sensitivity Criteria of Affected Parties / Receptors (Driver Delay)

Sensitivity	Receptors
High	Road Links: Key local route which forms part of a public transport corridor within a built-up area.

Sensitivity	Receptors
	Road Junctions: Roundabout or signalised junction (at least four arms) within a built-up area or a junction with high queuing expected.
Medium	Road Links: Key local route within a built-up area Road Junctions: Roundabout or signalised junction (at least four arms) within a built-up area or a junction with moderate/high queuing expected.
Low	Road Links: Strategic route within a built-up area OR a local route outside of a built-up area Road Junctions: Roundabout or signalised junction (fewer than four arms) outside of a built-up area OR a priority junction within a built-up area with low/moderate queuing expected.
Negligible	Road Links: Strategic route outside of a built-up area OR a minor/ local no-through route Road Junctions: Priority junction outside of a built-up area with no/low queuing expected.

13.7.17 The preliminary criteria for defining the importance or sensitivity of receptors for the assessment of Road Safety and Hazardous/Large Loads are set out in **Table 13-8**. The collision rate for road links has also been calculated and compared with national road safety statistics provided within Road Casualties for Great Britain to determine an appropriate receptor sensitivity level.

Table 13-8: Sensitivity Criteria of Affected Parties / Receptors (Road Safety and Hazardous/Large Loads)

Sensitivity	Road Safety	Hazardous/Large Loads
High	10+ collisions in five years, or more than three serious collisions and/ or one fatal collision in five years	5+ serious/fatal collisions (or more than one fatal collision) involving a goods vehicle (>3.5 tonnes) in five years
Medium	5-9 collisions (with up to three serious collisions and/ or one fatal collision) in five years	3-4 serious/fatal collisions (with up to one fatal collision) involving a goods vehicle (>3.5 tonnes) in five years
Low	3-4 collisions in five years (with up to one serious collision and no fatal collisions) in five years	1-2 serious collisions (with no fatal collisions) involving a good vehicle (>3.5 tonnes) in five years
Negligible	Fewer than three collisions (with no serious or fatal collisions) in five years	No serious or fatal collisions involving a goods vehicle (>3.5 tonnes) in five years

13.7.18 The link sensitivity will be based upon an average sensitivity of the whole link with a separate assessment of high / very high receptors. Some links will be broken down

into sensible sections where appropriate i.e., between two main junctions or villages etc.

Magnitude

13.7.19 As identified within the IEMA guidance, the magnitude of each impact represents the level of change from the baseline conditions.

13.7.20 This assessment will consider the potential effects that could be experienced during construction. The operational phase of the development will result in negligible to zero traffic and as such is scoped out of the assessment. This section identifies how magnitude will be considered for each type of effect.

13.7.21 **Severance** is defined in the IEMA guidance as the "perceived division that can occur within a community when it becomes separated by major traffic infrastructure. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by infrastructure". The guidance states that changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance respectively. However, caution should be observed when applying these thresholds to very low baseline flows which are unlikely to experience severance impacts even with high percentage changes in traffic.

13.7.22 **Driver Delay** relates to incremental increases in traffic (as outlined in Table 13-10). However, traffic delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system.

13.7.23 **Pedestrian Delay (incorporating delay to all non-motorised users)** is considered to be affected by the changes in volume, composition or speed of traffic, in terms of their respective impacts on the ability of pedestrians to crossroads. The assessment of pedestrian delay serves as a proxy for the delay that other modes of non-motorised users may experience when crossing roads. In general, increases in traffic levels and/or traffic speeds are likely to lead to greater increases in pedestrian delay.

13.7.24 **Non-Motorised User Amenity** is broadly defined as "the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic". The guidance suggests that a tentative threshold for judging the significance of changes in non-motorised user amenity would be where the traffic flow (or HGV component) is halved or doubled.

13.7.25 **Fear and Intimidation** occurs through a combination of traffic flow, heavy vehicle composition, speed, and the proximity of traffic to people. These indicators are often heightened by a perceived lack of protection or buffers from the highway or through narrow or non-existent footways. The assessment considers each road on a case-by-case basis, however there are thresholds provided in the IEMA guidance which are presented in **Table 13-10**.

13.7.26 Details relating to Fear and Intimidation, in terms of calculating magnitude of impact based on the IEMA guidance, are provided in **Table 13-9**.

Table 13-9: Magnitude of Effect of Affected Parties / Receptors for Fear and Intimidation

Criteria	Degree of Hazard Level			
	Small	Moderate	Great	Extreme
a) Average Traffic Flow over 18-hour day – all vehicles / hour 2-way	<600	600 – 1200	1201 – 1800	>1800
Degree of hazard score	0	10	20	30
b) Total 18-hour heavy vehicle flow	<1000	1000 – 2000	2001 – 3000	>3000
Degree of hazard score	0	10	20	30
c) Average vehicle speed (mph)	<20 mph	20 – 30 mph	31 – 40 mph	>40 mph
Degree of hazard score	0	10	20	30

13.7.27 The combined score for each criteria are then assigned a level of fear and intimidation based on the following scoring system:

1. Small - Total hazard score of 0- 20;
2. Moderate - Total hazard score of 21- 40;
3. Great - Total hazard score of 41- 70; and
4. Extreme - Total hazard score of 71+.

13.7.28 **Table 13-10** sets out the proposed magnitude thresholds for the respective environmental effects, contextualising the impact to the base scenario.

13.7.29 **Road Safety** considers Personal Injury Accident (PIA) data obtained for the most recent five-year period available at junctions and links along the proposed construction traffic routes. The sensitivity of discrete areas of the highway network can then be determined following a detailed review of the baseline characteristics including the collision rate and any collision clusters.

13.7.30 With regard to **Hazardous/Large Loads**, the IEMA guidance states that the transportation of dangerous or hazardous loads by road should be recognised including specialist loads that might be involved during the construction and operation of the Scheme. Where the number of movements is considered to be

significant, risk or catastrophe analysis should be carried out to illustrate the potential for an accident and the likely effect of such an effect. The construction process is likely to trigger the need to move a Battery Energy Storage System (BESS) and a transformer to site. The frequency of these movements is low, as once on site they will remain for the duration of the development. The number of movements are not considered to be significant and will be addressed as part of the outline and full CTMP as AIL movements. It is therefore not envisaged that Hazardous Loads will be required to be assessed outside of the CTMP assessment as the number of movements proposed is low and the risk will be captured through the CTMP process. All other movements associated with the construction process are expected to use non-hazardous materials and equipment used in the construction process. As such, Hazardous Loads have been scoped out of the assessment. Appropriate routes for abnormal/large load movements should be considered, with mitigation strategies to secure safe passage.

13.7.31 **Table 13-9** and **Table 13-10** summarise the criteria that will be used to assess the magnitude of effect (based on increases i.e., 'adverse' effects), along with the thresholds that will be used to determine whether effects are considered high, medium, low or negligible. Depending on the baseline information available, the various thresholds identified for the proportional increases in traffic flow relate to peak hour flows and daily flows (whichever is highest). Within these tables, neither the sensitivity of receptors, nor the duration of effects, is taken into consideration.

Table 13-10: Magnitude of Effect of Affected Parties / Receptors

Impact	Negligible	Low	Medium	High
Severance	Increase in total traffic flows of below 30% (or increase in HGV flows of below 10%).	Increase in total traffic flows of 30-59% (or increase in HGV flows of 10-39%).	Increase in total traffic flows of 60-89% (or increase in HGV flows of 40-89%).	Increase in total traffic flows or HGV flows of 90% and above.
Pedestrian Delay	Increase in total traffic flows of below 30% (or increase in HGV flows of below 10%).	Increase in total traffic flows of 30-59% (or increase in HGV flows of 10-39%).	Increase in total traffic flows of 60-89% (or increase in HGV flows of 40-89%).	Increase in total traffic flows or HGV flows of 90% and above.
Non-Motorised User Amenity	Increase in total traffic flows of below 50%.	Increase in total traffic flows of 50-69%.	Increase in total traffic flows of 70-99%.	Increase in total traffic flows of 100% or above.
Fear and Intimidation	No change in degree of hazard level for daily traffic flows, HGV flows and vehicle speeds	One step change in degree of hazard level (see **Table 13-9**), but with <400 daily vehicle increases	One step change in degree of hazard level (see **Table 13-9**), but with >400 daily vehicle increases	Two step changes in degree of hazard level based on the degree of hazard scores for daily traffic

Impact	Negligible	Low	Medium	High
	(see **Table 13-9**).	or <500 daily HGV increase.	or >500 daily HGV increase.	flows, HGV flows and vehicle speeds (see **Table 13-9**).
Driver Delay	Increase in total traffic flows of below 30%.	Increase in total traffic flows of 30-59%.	Increase in total traffic flows of 60-89%.	Increase in total traffic flows of 90% and above.
Road Safety	Increase in total traffic flows of below 30% (or increase in HGV flows of below10%).		All links estimated to experience increases in total traffic flows of at least 30% or increases in HGV flows of at least 10% are analysed further on a case-by-case basis.	
Hazardous/ Large Loads	Based on the probability of a personal injury accident, categorised as fatal or serious, involving a hazardous/large load, occurring.			

Effect Significance

13.7.32 The classification of effects is determined through the consideration of two elements; the magnitude of the impact and the sensitivity of the receptor as outlined above. **Table 13-11** shows the matrix that will be used to determine the effect category. Effects which are classified as Major or Moderate are considered to be significant (shown in bold) whilst effects classified as Minor or Negligible are considered to be not significant.

Table 13-11: Classification of effects

Magnitude	Value and sensitivity of receptor			
	High	Medium	Low	Very Low
High	**Major**	**Major**	**Moderate**	Minor
Medium	**Major**	**Moderate**	Minor	Minor
Low	**Moderate**	Minor	Minor	Negligible
Very low	Minor	Minor	Negligible	Negligible

13.7.33 Table 13-12: provides a definition of the classification of effects.

Table 13-12: Definition of effects

Effect	Description
Major	Effects, both adverse and beneficial, which are likely to be important considerations at a national to regional level because they contribute to

Effect	Description
	achieving national/regional objectives, or which are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Effects that are likely to be important considerations at a regional and local level.
Minor	Effects that could be important considerations at a local level.
Negligible	An effect that is likely to have a negligible or neutral influence, irrespective of other effects.

13.8 Limitations and Assumptions

13.8.1 At this stage the exact extent of the Study Area cannot be confirmed in terms of traffic and movement as detailed discussions have not yet taken place with NH, LCC and NKDC. As set out in Section 13.3, such discussions are due to take place and will be carried out in advance of assessment.

13.8.2 The Site is located within a rural area where access is likely to be constrained in terms access to public transport.

13.8.3 Where practical, traffic surveys will be carried out during a neutral month in accordance with the methodology detailed in paragraph 13.4.8. Base traffic surveys will be representative of normal traffic conditions. Construction traffic flows will represent the peak construction period. The construction traffic flows will be based upon a best estimate of likely requirements adopting a precautionary approach so that numbers are not underestimated.

13.9 Summary of Elements Scoped In and Out

13.9.1 A summary of the elements scoped out of the assessment of transport and movement are presented in **Table 13-13**.

Table 13-13: Elements scoped in and out of the assessment of transport and access.

Element	Scoped In / Scoped Out
Construction Phase – Additional Severance to pedestrians and cyclists	Scoped in – There is potential for the scheme to create additional severance to pedestrians and cyclists.
Construction – Additional delay to drivers and passengers	Scoped in – There is potential for the scheme to create additional delay to drivers and passengers.

Element	Scoped In / Scoped Out
Construction – Additional delay to pedestrians and cyclists	Scoped in – There is potential for the construction of the scheme to create additional delay to pedestrians and cyclists.
Construction – Decline in pedestrian and cyclist amenity	Scoped in – There is potential for the construction of the scheme to result in a decline in pedestrian and cyclist amenity.
Construction – Additional fear and intimidation to pedestrians and cyclists	Scoped in – There is potential for the construction of the scheme to result in additional fear and intimidation to pedestrians and cyclists.
Construction – Decline in pedestrian safety	Scoped in – There is potential for the construction of the scheme to create a decline of pedestrian safety.
Construction – Impacts on PRoWs diversions and/or closures.	Scoped in – There is potential for the construction of the scheme cause PRoW diversions and closures.
Construction – Decline in road safety	Scoped in – There is potential for the construction of the scheme to result in a decline in road safety.
Hazardous loads (construction)	No hazardous loads are expected as part of the construction process. There are no nearby road features which suggest that the transfer of materials poses a risk beyond that which would be expected on the general highway network.
Assessments for the operational phase	. No significant effects predicted due to low vehicle numbers.

Element	Scoped In / Scoped Out
Assessments for the decommissioning phase	The decommissioning phase will be accounted for by the assessment of the construction phase, which represents a worst-case. Any decommissioning traffic would follow the construction phase and therefore benefit from any access junction upgrades/measures delivers as part of the construction phase. As such, consideration of the construction phase is considered robust in concluding the potential effects associated with the decommissioning phase.

14 Soils and Agricultural Land

14.1 Introduction

14.1.1 This chapter outlines the anticipated soils and agricultural land scope of assessment for the Scheme.

14.1.2 This chapter presents an initial baseline for Soils and Agricultural Land relevant to the Scheme, identifies the need for additional surveys to ensure there is appropriate information to accurately characterise the baseline, and sets out the Study Area. In addition, the chapter provides an overview of the assessment methodology to be followed for the environmental assessment and identifies the potential effects provisionally identified.

14.1.3 This chapter should be read alongside the following:

- **Chapter 8: Ecology and Nature Conservation** in relation to the assessment of potential impacts to the habitats supported by the land and soils within the Site;
- **Chapter 9: Water Environment** in relation to the assessment of potential impacts to the water environment from soil erosion; and
- **Chapter 12: Socio-Economics** in relation to the assessment of the socio-economic impacts due to the change in land use.

14.1.4 There are no figures or appendices to accompany this chapter.

14.2 Study Area

14.2.1 The Study Area for the Soils and Agricultural Land assessment is the boundary of the Site. No buffer is applied when describing the Study Area as the impacts to soils and agricultural land only occur on the land that is directly impacted by the Scheme.

14.2.2 The Study Area includes the Grid Connection Corridor but will be assessed using secondary data only without carrying out surveys. This is because any works within this area would represent a temporary impact only and would not change the agricultural land classification or prevent farming once the cable is installed. The cable would be buried below ground at approximately 1.2 m depth, therefore allowing existing agricultural activity including cultivations to enable return of the land to arable. Survey of soils and agricultural land classification would be done pre-construction to feed into the Soil Management Plan and determine appropriate storage methods for the soil.

14.3 Legislation, Planning Policy Context and Guidance

Legislation

14.3.1 Schedule 4, Part (y) of the Town and Country Planning (Development Management Procedure) (England) Order 2015 (Ref 14-1) requires that Natural England be consulted if the area of a proposed permanent development exceeds 20 ha of BMV land[1].

National Planning Policy

14.3.2 NPS EN-1 is the primary planning policy for NSIPs, along with NPS EN-3. Within NPS EN-1, section 5.11 'Land use, including open space, green infrastructure and green belt' is relevant to the Scheme. Within NPS EN-3, paragraphs 2.10.28 – 2.10.34 'Agriculture land classification and land type' are relevant for the Scheme.

National Guidance

14.3.3 The following guidance is of relevance for soils and agricultural land.

14.3.4 The PPG which accompanies the NPPF is split into a number of guidance notes. Guidance on soils and agricultural land is found in the Planning Practice Guidance for the Natural Environment 2019 (PPGNE) (Ref 14-3) under the heading Agricultural Land, Soil and Brownfield Land of Environmental Value. This describes the ALC and advises that it be used to assess the quality of farmland to enable informed choices to be made about its future use within the planning system. The PPGNE states that *"Planning policies and decisions should take account of the economic and other benefits of the best and most versatile agricultural land".*

14.3.5 The PPGNE goes on to state that "In the circumstances set out in Schedule 4 paragraph (y) of the Development Management Procedure Order 2015, Natural England is a statutory consultee: a local planning authority must consult Natural England before granting planning permission for large-scale non-agricultural development on best and most versatile land that is not in accord with the development plan" and refers to Natural England guidance to assessing development proposals on agricultural land (Ref 14-5).

14.3.6 Therefore, knowledge of the ALC grading of land affected by the Scheme is necessary to be able to determine whether the requirements of planning policy are being met.

14.3.7 The PPGNE also recognises soil as an essential natural capital asset that provides important ecosystem services, for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution. It also recommends Defra's Code of Practice for the

[1] Best and most versatile (BMV) agricultural land is defined as land of excellent (ALC Grade 1), very good (Grade 2) and good (Subgrade 3a) agricultural quality. Moderate (Subgrade 3b), poor (Grade 4) and very poor (Grade 5) quality land is restricted to a narrower range of agricultural uses and is collectively termed 'non-BMV' agricultural land.

Sustainable Use of Soils on Construction Sites (Ref 14-4) as a useful tool when setting planning conditions for development sites, as it provides advice on the use and protection of soil in construction projects, including the movement and management of soil resources.

Local Planning Policy

14.3.8 The Scheme falls within the administrative boundaries of LCC and NKDC. Central Lincolnshire refers to the combined area covered by the City of Lincoln, North Kesteven and West Lindsey. These three Councils have come together in a formal partnership with LCC to prepare a joint Local Plan for the area. The Local Plan for Central Lincolnshire (Ref 14-6) was adopted in April 2023. It contains planning policies and allocations for the growth and regeneration of Central Lincolnshire over the next 20 years.

14.3.9 The following local policies are of relevance to soils and agricultural land:

- Policy S14 relates to Renewable Energy identifies that the Central Lincolnshire Joint Strategic Planning Committee is committed to supporting the transition to a net zero carbon future and will seek to maximise appropriately located renewable energy generated in Central Lincolnshire (such energy likely being wind and solar based). Proposals for ground-based photovoltaics and associated infrastructure, including commercial large scale proposals, will be under a presumption in favour unless: the proposal is (following a site-specific soil assessment) to take place on Best and Most Versatile (BMV) agricultural land and does not meet the requirements of Policy S67.

- Policy S67 concerns Best and Most Versatile Agricultural Land. Proposals should protect the best and most versatile agricultural land so as to protect opportunities for food production and the continuance of the agricultural economy. With the exception of allocated sites, significant development resulting in the loss of the best and most versatile agricultural land will only be supported if:

  a) The need for the proposed development has been clearly established and there is insufficient lower grade land available at that settlement (unless development of such lower grade land would be inconsistent with other sustainability considerations);

  b) The benefits and/or sustainability considerations outweigh the need to protect such land, when taking into account the economic and other benefits of the best and most versatile agricultural land;

  c) The impacts of the proposal upon ongoing agricultural operations have been minimised through the use of appropriate design solutions; and

  d) Where feasible, once any development which is supported has ceased its useful life the land will be restored to its former use (this condition will be secured by planning condition where appropriate).

14.3.10 Where proposals are for sites of one hectare or larger, which would result in the loss of best and most versatile agricultural land, an agricultural land classification report should be submitted, setting out the justification for such a loss and how criterion b has been met.

14.4 Baseline Conditions

14.4.1 A preliminary review of the available baseline data has been undertaken and is summarised below.

Agricultural Land

14.4.2 The ALC (Ref 14-7) is the only standard method for classifying the quality of agricultural land in England and Wales. Land is assessed according to its versatility, productivity and workability, based upon inter-related parameters including climate, relief, soil characteristics and drainage. These factors form the basis for classifying agricultural land into one of five grades (with Grade 3 land divided into Subgrades 3a and 3b), ranked from excellent (Grade 1) to very poor (Grade 5).

14.4.3 The 1:250,000 scale Provisional ALC mapping, which is available via the Government's geographic information website, Magic.gov.uk (Ref 14-7), is the most current and detailed published ALC data covering the whole of the Study Area. However, it is important to note that these data pre-date the revised ALC methodology issued in 1988 (Ref 14-8) and as a result, the data do not differentiate between ALC Subgrades 3a (BMV) and 3b (non-BMV). Additionally, the scale of the mapping is such that it does not pick up variations in ALC grade for areas less than approximately 80 ha. The Provisional ALC mapping therefore provides an indication of the land quality in the Region, but the extent and distribution of BMV agricultural land within the Study Area cannot be defined from the Provisional mapping alone.

14.4.4 No ALC survey data collated after the revised ALC methodology are available locally in the vicinity of the Site. The Provisional ALC data suggests that the Solar PV Site is predominantly within areas classified as Grade 3 with areas of Grade 2 at its fringes.

Soils

14.4.5 Soil series are the lowest category in the soil classification system and are precisely defined based upon particle-size distribution, parent material (substrate) type, colour and mineralogical characteristics. The Soil Survey of England and Wales mapping shows soil associations which are groupings of related soil series.

14.4.6 Digital mapping has been purchased, but which was not available for the production of this chapter. The digital data will allow figure production for the PEIR and ES.

14.4.7 Cranfield University's 'Soilscapes Viewer' is an online soil reporting tool which produces summary soils information for a specific location (Ref 14-9). The soils are slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. Landcover is identified as principally grassland and arable with some woodland.

14.5 Consultation

14.5.1 Natural England's Guide to Assessing Development Proposals on Agricultural Land (Ref 14-5) sets out the government policies and legislation that developers and local planning authorities should refer to when considering development proposals that affect agricultural land. It also includes guidance on when Natural England should be consulted on development proposals, provides a detailed explanation of ALC and information on published ALC resources and explains circumstances in which new detailed surveys may be required. It also explains how ALC data should be used in the assessment of planning decisions and the need to include plans to protect soils. The guidance also summarises the required survey methodology (also presented in Natural England's 2012 Technical Information Note 049 (Ref 14-10)

14.6 Potential Effects and Mitigation

14.6.1 The Scheme would result in a short-term temporary land-use change from agricultural to non-agricultural for the duration of the construction period of the Grid Connection Corridor and Solar PV Site; and could potentially result in a long-term temporary land-use change from agricultural to non-agricultural for all or parts of the Solar PV Site depending upon whether sheep grazing (see Section 14.7.1) is to be undertaken during the Scheme's operational lifetime. Permanent loss of agricultural land within the Solar PV Site will be principally to any areas of ecological enhancement / habitat creation which are expected to remain after the Scheme has been decommissioned.

14.6.2 There is a reasonable expectation for BMV land to be present within the Solar PV Site (Provisional Grade 3) and therefore potential for short and long-term temporary and permanent loss of BMV agricultural land to occur, depending upon land use.

Soil Resource Quality

14.6.3 The disturbance of soil resources may occur in situ, for example through trafficking by vehicles or through soil removal, handling, storage and subsequent reinstatement. For both the construction and operational phase, activities that will cause disturbance to and potentially impact upon soil resources include the following:

- Stripping and stockpiling of topsoil and subsoil, storage and reinstatement;
- Ground excavation;
- Trenchless drilling (HDD);
- Stockpiling materials;
- Levelling ground;
- Cable trenching;
- Haul road construction; and

- Vehicle movements onsite.

14.6.4 This disturbance may result in the impairment of soil function, quality and resilience. This effect comprises such changes as:

- Compaction and smearing (damage to soil structure);
- Conditions within the soil profile conducive to excessive drying or wetness;
- Mixing of distinct soil horizons (e.g. topsoil with subsoil) reducing their potential reuse;
- Damage or removal of vegetation layer;
- Changes in the soil profile stone content;
- Loss of nutrients (e.g. nitrogen), biota (e.g. bacteria, fungi, earthworms) and reduction in soil fertility; and
- Loss of ecosystem services, such as the ability of the soil to support food production and habitat creation.

14.6.5 The solar PV frames are piled directly into the ground without prior soil removal with limited potential to damage soil in terms of soil structure, nutrient content and soil biological activity.

14.6.6 The majority of disturbance of soil resources will occur within the construction phase. This will be largely restricted to Grid Connection Corridor, and the substations and interconnecting cables and within the Solar PV Site. There will be some further small-scale disturbance associated with accesses, the battery storage facility and other infrastructure.

14.6.7 During the operational lifetime of the Scheme there is potential for additional disturbance of soil resources to occur during any maintenance or remedial works which may be required, especially in relation to the Grid Connection Corridor. The scale and extent of these works would be far less than required for initial construction, being confined to the specific areas where maintenance is required, and works would adhere to standard industry practice (i.e., embedded mitigation measures) and soil management as per the construction phase of works.

14.6.8 The removal of areas of the Solar PV Site from arable rotation for at least 40 years has the potential to deliver environmental benefits, the most important being increase in soil resource and land quality. This would occur through an increase soil organic matter (SOM) content due to the lack of regular disturbance by cultivation and potential inputs from the presence of livestock (sheep manure). Increase in SOM content equals carbon sequestration (SOM contains 58 % carbon), which would contribute to removing carbon dioxide from the atmosphere and mitigation of climate change. Increase in SOM content would also result in positive effects on other soil properties, such as water infiltration rates and water holding capacity (which contributes to flood alleviation), nutrient content, microbial diversity and

activity. Increased SOM would also increase the soil buffering capacity, reducing the frequency of liming. It is also likely that the subsoil structure would be improved owing to deep root systems of the permanent grassland vegetation and increased earthworm activity (promoted by lack of disturbance and ample plant food source) stimulating the aggregation of soil particles.

Loss of Soil Resources

14.6.9 It is assumed that as development is temporary, all soil resources will be retained onsite and not exported for reuse elsewhere. There is unlikely to be surplus soil from the proposed permanent development, if this is to occur all soil will be retained for reuse on site.

14.6.10 The inappropriate removal, handling and storage of soil resources during construction activities may also render them unsuitable for reuse in site restoration and, therefore, also constitutes a loss of soil resource (e.g., the mixing of topsoil and subsoil; the mixing of soils of differing textures, or the mixing of soils with non-soil substrate or other unsuitable materials) as this mixing cannot be reversed nor the constituent materials returned to their original state. Incorrect handling leading to mixing and loss of suitability is considered the greatest risk to soil retention.

14.6.11 The loss of soil resource may result in the impairment of the remaining soils' function, quality and resilience. This also comprises such changes as reduction of topsoil depth.

14.6.12 During large-scale projects such as the Scheme, there is the potential for disease and pathogen transfer between different areas of agricultural land (i.e., a biosecurity risk). This is considered in the loss of soil resource as the main cause of potential disease and pathogen transfer and is the transfer of soil from infected to uninfected areas via vehicles, plant and machinery.

Mitigation

14.6.13 The short-term temporary loss of agricultural land (including BMV) during construction of the Scheme and any maintenance works during operation cannot be avoided, however through consultation with landowners' measures will be taken to minimise impacts to the surrounding land and farming operations.

14.6.14 The principal permanent loss of agricultural land due to the Scheme will likely be to areas of ecological enhancement / habitat creation within the Solar PV Site which are expected to remain after the Scheme has been decommissioned. The loss of this land from agriculture has soil functional benefits. It cannot be mitigated but, where practicable and depending upon the habitats to be created, will be targeted on non-BMV land.

14.6.15 The potential for continued agricultural use within the Solar PV Site during operation by using the land as permanent pasture for sheep grazing is to be explored by the Applicant. Where this can be established the loss of agricultural use of the land would be avoided. It is noted that the density of grazing would be managed; and

grazing restricted to drier periods when the land is less prone to poaching and compaction to mitigate damage to soil resources.

14.6.16 Where possible, mitigation measures to avoid or reduce soil damage and loss will be incorporated into the design of the Scheme (embedded mitigation) such that they inform its alignment (Grid Connection Corridor), layout (Solar PV Site) and/or how it shall be constructed. Through iterative assessment, potential impacts will be predicted and opportunities to mitigate them identified with the aim of preventing or reducing impacts as much as possible. This approach provides the opportunity to prevent or reduce potential adverse impacts from the outset.

14.6.17 Industry standard guidance/current best working practice (for example measures set out in Ref 14-10 and Ref 14-11) will be followed in relation to soil workings throughout the construction and operational phases of the Scheme and, as such, is considered to provide embedded mitigation. This mitigation will be set out in a Framework Soil Management Plan (SMP) to be submitted with the ES; this will form the basis of a detailed SMP to be produced pre-construction. The SMP will also draw upon the soil survey data collected for the Scheme to ensure that the mitigation measures are tailored to the soils encountered.

14.6.18 To minimise risk of soil erosion within the Solar PV Site, grass cover would be managed through creation of permanent grassland mix matched to habitat creation requirements. This cover would be maintained for the lifetime of the Scheme and would protect the soil surface from the effects of surface run-off. Any areas where vegetation cover was damaged and/or bare soil surface was visible, would be re-seeded.

14.7 Assessment Methodology

14.7.1 The impacts to soils and agricultural land would be assessed for the construction and operational phases of the development. As set out in **Chapter 2: The Scheme**, decommissioning impacts are expected to be similar to, or of a lesser magnitude than, construction effects. Therefore, decommissioning effects will be considered to be the same as construction phase effects and will be scoped out of specific assessment within the ES.

14.7.2 The assessment will be undertaken in consideration of IEMA's guidance document 'A New Perspective on Land and Soil in EIA' (Ref 14-12). With particular reference to Section 9: Assessing Impacts on Land and Soil. Survey methodology of the Solar PV Site will follow the standard approach, with augered soil samples taken on a 100 m grid, supplemented with additional samples at the boundary of soil types and with soil pits to provide additional information for each soil type. Impacts to disturbed soils will be controlled through a Framework CEMP and accompanying Framework Soil Management Plan (SMP).

14.7.3 It is not proposed to undertake field survey of the Grid Connection Corridor as the disturbance to soils would be of short-term, temporary duration with excavated soils stored adjacent to the excavation, separating topsoil and subsoil. The soil layers would be reinstated in sequence. The cables will be buried below ground at

approximately 1.5 m depth. Underground cables are typically installed using an open trench method requiring 20–40 m working corridor, with trench widths approximately 2m wide and 1.5 m deep. The connection does not affect the design or EIA and the IEMA guidance recognises the low impact of temporary works. Soil assessment, of the Grid Connection Corridor will therefore be done post consent and pre construction.

14.7.4 The sensitivity of the Site is determined by the ALC grade. Within BMV land, ALC grades 1 and 2 are recognised as high sensitivity and subgrade 3a soils are of medium sensitivity. The IEMA guidelines provide threshold areas for the permanent sealing of land or land quality downgrading. Long term temporary development, such as that of the Scheme, presents a low impact magnitude, following the IEMA guidance.

14.7.5 The criteria for determining impact magnitude and sensitivity of agricultural soils will be combined in a matrix of significance of effects. Effects may be adverse, if they result in the permanent irreversible loss of land or land quality downgrading. Alternatively, they may be beneficial if there is permanent improvement to one or more soil functions due to remediation or restoration. The sensitivity of the Site is determined by the ALC conditions on-site. Sensitivity and magnitude criteria are presented in **Table 14-1** and **Table 14-2**.

Table 14-1: Sensitivity Criteria

Sensitivity / Value	Sensitivity / Value Criteria
High	ALC Grade 1 & 2
Medium	ALC Subgrade 3a
Low	ALC Subgrade 3b
Very Low	ALC Grade 4 & 5

Table 14-2: Magnitude Criteria

Magnitude	Magnitude
High	Permanent irreversible loss (including permanent sealing or land quality downgrading) or permanent improvement of one or more soil functions or soil volumes (due to remediation or restoration) over >20 hectares (ha) of agricultural land.
Medium	Permanent irreversible loss (including permanent sealing or land quality downgrading) or permanent improvement of one or more soil functions or soil volumes (due to remediation or restoration) over >5 ha <20 ha of agricultural land.
Low	Permanent irreversible loss (including permanent sealing or land quality downgrading) or permanent improvement of one or more

Magnitude	Magnitude
	soil functions or soil volumes (due to remediation or restoration) over <5 ha. Temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g., through degradation, compaction, erosion of soil resource).
Very Low	No discernible loss / reduction of soil function(s) that restrict current or approved future use.

14.7.6 The criteria for determining impact magnitude and sensitivity of agricultural soils are combined in a matrix of scale of effects, presented in **Table 14-3**. Major and moderate effects are considered significant, whilst minor and negligible effects are considered to be not significant.

Table 14-3: Scale of Effects

Receptor Value / Sensitivity	Magnitude of Impact: High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

14.7.7 A consideration of any combined and cumulative effects will also be included.

14.8 Limitations and Assumptions

14.8.1 There are no agreements confirmed for use of the land under and around the solar PV modules. Using all or part of the Solar PV Site for sheep grazing is currently being explored by the applicant, but if possible it would thereby mitigate the temporary loss of land for agricultural use during the operation of the Scheme. This potential is to be explored by the Applicant through landowner discussions.

14.8.2 It is assumed that as the Scheme is not permanent, and that all soil resources will be retained onsite and not exported for reuse elsewhere.

14.9 Summary of Elements Scoped In and Scoped Out

14.9.1 A summary of the elements scoped into and out of the cultural heritage assessment are presented in **Table 14-4**.

Table 14-4: Elements scoped in and out of the assessment of soils and agricultural land

Element	Scoped in / Scoped Out
Agricultural land and land use – Construction and Operation.	Scoped in. The Scheme has the potential to impact agricultural land.
Soil resource quality - Construction and Operation.	Scoped in. The Scheme has the potential to impact soil resources in terms of disturbance and damage. Improvements in soil quality may also arise.
Agricultural land and land use – Decommissioning.	Scoped out. The precise details of the decommissioning, although outlined in the Framework DEMP, are not known. However decommissioning effects are expected to be similar to, or of a lesser magnitude than, construction effects. Therefore, decommissioning effects are considered to be the same as construction phase effects and will be scoped out of specific assessment within the ES.
Soil resource quality - Decommissioning.	Scoped out. Improvements to soil quality may arise during the operational period from leaving land uncultivated. Decommissioning effects are expected to be similar to, or of a lesser magnitude than, construction effects. Therefore, decommissioning effects are considered to be the same as construction phase effects and will be scoped out of specific assessment within the ES.

15 Materials and Waste

15.1 Introduction

15.1.1 This chapter outlines the anticipated materials and waste scope of assessment for the Scheme.

15.1.2 This chapter presents an initial baseline for material and waste relevant to the Scheme. In addition, this section provides an overview of the assessment methodology to be followed for the environmental assessment and identifies the potential effects.

15.1.3 This section follows the methodology and checklist for action set out in the IEMA guide to: Materials and Waste in Environment Assessment, Guidance for a Proportionate Approach (referred from herein as the 'IEMA Guidance') (Ref 15-1).

15.1.4 For the purpose of this EIA Scoping Report, materials and waste comprise:

- The consumption of materials (key construction materials only including concrete, aggregate, asphalt and steel); and
- The generation and management of waste.

15.1.5 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."

15.1.6 Other material assets considered include built assets such as landfill void capacity and safeguarded mineral and waste sites. LCC use the term Site Specific Mineral Safeguarding Areas, allocated mineral site, allocated waste site and allocated waste areas.

15.1.7 Impacts on Mineral Safeguarding Areas (MSAs) are not assessed in a materials and waste assessment in accordance with the IEMA Guidance. MSAs are not considered to be a safeguarded mineral site (Site Specific Mineral Safeguarding Areas). **Chapter 12: Socio-economics and Land Use**, scopes out socio economic impacts to MSAs (subject to agreement with the Local Mineral Planning Authorities) due to the non-sterilisation of these reserves due to the temporary nature of the solar development.

15.1.8 Waste is defined as per the European Waste Framework Directive (Ref 15-2) as *"any substance or object which the holder discards or intends or is required to discard".*

15.1.9 There are no figures or appendices accompanying this chapter.

15.2 Study Area

15.2.1 The Study Areas for the assessment of impacts related to materials and waste are defined in line with the IEMA Guidance (Ref 15-1). The IEMA Guidance describes that two Study Areas should be defined as follows:

- The Scheme Study Area which comprises of the Site, and any areas required for temporary access, site compounds, working platforms and other enabling activities; and
- The Expansive Study Area extends to the availability of construction materials, and capacity of waste management infrastructure and landfill void within a defined region.

Scheme Study Area

15.2.2 The Scheme Study Area for construction, operational and decommissioning waste generation and use of construction materials (key construction materials only) comprises the Site Boundary. The Study Area is deemed to include the footprint of the works, together with any temporary land requirements during the construction. This may include temporary offices, compounds and storage areas.

15.2.3 The Scheme Study Area for the impacts on safeguard mineral and waste sites is defined by the Site Boundary. Impacts on safeguarded waste sites are not included in the IEMA Guidance, however they are included in this assessment for completeness.

15.2.4 The Scheme lies within NKDC in Lincolnshire. Local policy is considered at district, Central Lincolnshire (the Central Lincolnshire Local Plan adopted by the City of Lincoln, West Lindsey and North Kesteven District Councils) and LCC levels. The Minerals Planning Authority and Waste Planning Authority is LCC.

Expansive Study Area

15.2.5 The expansive Study Area for non-hazardous and inert waste management is the East Midlands region (as defined by the Environment Agency). This is the region in which the Site is located. The expansive Study Area includes the following sub-regions as outlined in the EA's 2023 Waste Summary Tables for England – Version 1 (Ref 15-3); Derbyshire, Leicestershire, Lincolnshire, Northamptonshire, Nottinghamshire. The expansive Study Area for non-hazardous and inert waste management is defined based on professional judgement and informed by consideration of the proximity principle and value for money.

15.2.6 The expansive Study Area for hazardous waste management is England. The Study Area is defined based on professional judgement and informed by consideration of the proximity principle and value for money.

15.2.7 The proximity principle for hazardous waste in England is outlined in Principle 2 – Infrastructure Provision in the Strategy for Hazardous Waste Management in

England *"We look to the market for the development of hazardous waste infrastructure, which implements the hierarchy for the management of hazardous waste and meets the needs of the UK to ensure that the country as a whole is self sufficient in hazardous waste disposal, facilities are put in place for hazardous waste recovery in England, and the proximity principle is met"* (Ref 15-4). Planning for hazardous waste management is also undertaken at a national level.

15.2.8 The expansive Study Area for availability of key construction materials (aggregates, asphalt, concrete and steel) is national (United Kingdom (UK) or Great Britain (GB)) and the East Midlands region (dependent on baseline information availability).

15.3 Legislation, Planning Policy Context and Guidance

15.3.1 The Legislation, Policy and Guidance section provides an overview of the relevant legislation, planning policy and technical guidance relevant to the materials and waste assessment.

Legislation

15.3.2 The following legislation is taken into account:

- European Waste Framework Directive (Ref 15-5);
- The Environmental Protection Act (1990) (Ref 15-6);
- The Hazardous Waste (England and Wales) Regulations (2005) as amended (Ref 15-7);
- The Waste (England and Wales) Regulations (2011) as amended (Ref 15-8);
- The Environmental Permitting (England and Wales) Regulations (2016) as amended (Ref 15-9); and
- The Environment Act 2021(Ref 15-10).

15.3.3 The Waste (England and Wales) Regulations 2011 (as amended) transpose the requirements of the European Waste Framework Directive in England and Wales and require the Secretary of State to establish waste prevention programmes and waste management plans that apply the waste hierarchy. The waste hierarchy is defined in the European Waste Framework Directive and prioritises waste prevention, followed by preparing for reuse, recycling, recovery and finally disposal as means of management of waste.

15.3.4 The Waste (England and Wales) Regulations 2011 (as amended) require businesses to apply the waste hierarchy when managing waste, and also require that measures are taken to ensure that, by the year 2020 and beyond, at least 70% by weight of non-hazardous construction and demolition waste is subjected to material recovery. The target specifically excludes naturally occurring materials with European Waste Catalogue (EWC) Code 17 05 04 (17 05 04 soil and stones other

than those mentioned in 17 05 03* (soils and stone containing dangerous substances)).

15.3.5 The following considerations must also be taken into account:

- Environmental protection principles of precaution and sustainability;
- Proximity principle for treatment and disposal of waste to be as close to its source as possible;
- Technical feasibility and economic viability;
- Protection of resources; and
- Overall environmental, human health, economic and social impacts.

National Planning Policy

15.3.6 The following national policies are also relevant to the Scheme:

- Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref 15-12)
- National Planning Policy Framework (NPPF) (Ref 15-11);
- National Planning Policy Guidance for Minerals (2014) (Ref 15-13):
- National Planning Policy Guidance for Waste (2015) (Ref 15-14);
- National Planning Policy for Waste (2014) (Ref 15-15);
- The Waste Management Plan for England (2021) (Ref 15-16);
- A Green Future: Our 25 Year Plan to Improve the Environment (2018) (Ref 15-17);
- Our Waste, Our Resources, A Strategy for England (Resources and Waste Strategy for England) (2018) (Ref 15-18); and
- Environmental Improvement Plan (2023) (Ref 15-19).

Local Planning Policy

15.3.7 The Scheme lies within NKDC, which is a member of the Central Lincolnshire Joint Strategic Planning Committee (CLJSPC). The Minerals Planning Authority and Waste Planning Authority is LCC. The following local planning documents are relevant to the Scheme:

- Central Lincolnshire Local Plan (Adopted April 2023) (Ref 15-20);
- Central Lincolnshire Adopted Policies Map and Interactive Map (Ref 15-21);

- Lincolnshire Minerals and Waste Plan (Adopted June 2016) (Ref 15-22);
- Lincolnshire Minerals and Waste Plan Site Locations (Adopted December 2017) (Ref 15-23).

15.3.8 Policy S10 of the Central Lincolnshire Local Plan (Ref 15-20) illustrates support for proposals that reduce waste and material consumption and support the principles of a circular economy.

15.3.9 Policy S11 of the Central Lincolnshire Local Plan (Ref 15-20) states that development should seek to reduce embodied carbon content.

15.3.10 Policy S53 of the Central Lincolnshire Local Plan (Ref 15-20) includes provision for the consideration of resource use and unnecessary waste.

15.3.11 The Lincolnshire Minerals and Waste Plan (Ref 15-22) sets out several policies in relation to guidance for minerals and waste development, and the safeguarding of mineral resources (Policy M11).

Guidance

15.3.12 The materials and waste assessment will be carried out considering the following guidance:

- IEMA Guidance (Ref 15-1);
- Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice (DoW CoP), v2 (2011) (Ref 15-24); and
- Waste and Resources Action Programme (WRAP) Designing Out Waste: A Design Team Guide for Civil Engineering (Ref 15-25).

15.4 Consultation

15.4.1 No materials and waste specific consultation has been undertaken to date. Consultation will be undertaken with LCC and the Environment Agency as appropriate.

15.5 Baseline Conditions

Availability of Key Construction Materials

15.5.1 At the time of writing, the exact quantities of key construction materials required for the Scheme are unknown as the design is in development. Key construction materials will include aggregates and concrete for hardstanding, access tracks and bases for supporting infrastructure and steel (or other metals) for mounting structures.

15.5.2 UK, GB and regional data has been used to establish a quantitative national baseline availability (inferred from consumption and sales) for key constructional materials. **Table 15-1** summarises national consumption in 2021 for aggregates, asphalt and concrete and national requirement in 2023 for steel (the most recent years for which data is available), which are the key construction materials expected to be used during the construction of the Scheme.

15.5.3 Regional data is presented in **Table 15-2** (Ref 15-26). It is assumed that the majority of key construction materials would be sourced locally, taking into account the proximity principle and value for money.

Table 15-1: National availability for key construction materials

Materials	National availability (million tonnes, year)	10% of national availability* (million tonnes)	Baseline data year	Data description
Steel	15	1.5	2023	UK steel requirement (Ref 15-26)
Aggregates of which:	279.8	27.98	2021	UK production of minerals and mineral products (Ref 15-27)
Crushed rock	148.2	14.82		
Sand and gravel – land won	47.7	4.77		
Sand and gravel - marine	14.3	1.43		
Recycled and secondary	69.6	6.96		
Asphalt	28.3	2.83		
Ready-mixed concrete	52.7	5.27		
Concrete products	24.8	2.48		
**10% of national availability noted as the point of significance for materials based on a sensitivity of low.*				

Table 15-2: Construction material sales by region (2022, Ref 15-27)

Construction material	East Midlands (million tonnes)	10% of regional availability* (tonnes)
Crushed rock	30.6	3,060,000
Sand and gravel	6.1	610,000

Construction material	East Midlands (million tonnes)	10% of regional availability* (tonnes)
Ready-mixed concrete (converted from 1.3 million m^3 using a density of 2.4 tonnes/m^3)	3.1	310,000
Asphalt	3.3	330,000
**10% of national availability noted as the point of significance for materials based on a sensitivity of low.*		

15.5.4 Potential recycled contents for the main construction materials are outlined in **Table 15-3**. These "good practice" rates are derived from the Waste Resources Action Plan's (WRAP) Designing Out Waste Tool for Civil Engineering (Ref 15-25).

Table 15-3: Potential Recycled Content

Material type	Potential recycled content (% by weight)
Concrete	16
Asphalt	25
Aggregates	50
Steel reinforcement	100
Structural steel	60

Landfill Capacity

15.5.5 Baseline information consists of current landfill capacity in the East Midlands for non-hazardous waste and England for hazardous waste, as outlined in the EA's 2023 Waste Summary Tables for England – Version 1 (Ref 15-3) and **Table 15-4** Landfill Capacity (2023) in East Midlands region and England.

15.5.6 Restricted landfills only accept waste from a restricted set of sources and producers, commonly the site operator e.g. a manufacturing site.

Table 15-4: Landfill capacity in the East Midlands region (2023)

Landfill type	East midlands Landfill capacity (000s m^3)	England landfill capacity (000s m^3)
Hazardous merchant	Not applicable, hazardous waste assessed at the England level	9,680
Non-hazardous with Stable Non-reactive Hazardous Waste (SNRHW) cell	16,069	Not applicable, non-hazardous and inert waste assessed at the regional level
Non-hazardous	14,700	
Inert	18,917	
Total non-hazardous and inert	49,686	

Waste Management Infrastructure

15.5.7 Capacity of other types of waste infrastructure is publicly available (e.g. Environmental Permitting Regulations – Waste Sites (Ref 15-28), however the permitted capacity is not necessarily representative of the actual operational capacity of the infrastructure. Therefore, input data are collated for the expansive Study Areas from the EA's Waste Data Interrogator 2023 – Waste Received (Excel) – Version 1 (Ref 15-3) and presented in **Table 15-5**. Inputs are not totalled since the double counting of waste in the Waste Data Interrogator cannot be discounted.

Table 15-5: Summary of Waste Inputs by Facility (2023)

Facility type	East Midlands (tonnes received)
Landfill	3,933,086
Metal Recycling Site	806,118
On/In Land	282,857
Transfer	4,477,926
Treatment	7,709,968
Combustion	196,422

Facility type	East Midlands (tonnes received)
Incineration	1,333,480
Mining	13,209
Storage	242,214
Processing	178,916
Associated Process	1,814

15.5.8 The IEMA Guidance (page 14) "does not consider waste processing and recovery facilities as sensitive receptors, rather: they are part of a system that has the potential to reduce the magnitude of adverse impacts associated with waste generation and disposal. Waste processing and recovery facilities are, hence, different to landfills, in that the latter are finite resources." Therefore, a full list of waste management infrastructure is not included in the baseline.

Historic and Permitted Landfills

15.5.9 There are no authorised landfills recorded within the Scheme Site Boundary, as outlined in the EA's Permitted Waste Sites – Authorised Landfill Site Boundaries (Ref 15-31).

15.5.10 There are no historic landfill sites located within the Scheme Site Boundary, as outlined in the EA's Permitted Waste Sites – Historic Landfill Site Boundaries (Ref 15-32).

Safeguarded Mineral and Waste Sites

15.5.11 There are no safeguarded mineral or waste sites (site specific mineral safeguarding areas, allocated mineral site, allocated waste site and allocated waste areas) within the Site Boundary as shown in the Central Lincolnshire Adopted Policies Map and Interactive Map (Ref 15-21), Lincolnshire Minerals and Waste Local Plan (Ref 15-22) and Lincolnshire Minerals and Waste Local Plan Site Locations (Ref 15-23). There are no permitted or waste site applications in the Site Boundary (Ref 15-28).

Targets

15.5.12 The national target for recovery of construction and demolition waste is 70% by weight, as set out in the European Waste Framework Directive (Ref 15-2) and the Waste Management Plan for England (Ref 15-16). The target specifically excludes naturally occurring materials with European Waste Catalogue (EWC) Code 17 05 04 (17 05 04 soil and stones other than those mentioned in 17 05 03* (soils and stone containing dangerous substances)). Recovery is deemed to include reuse, recycling and other recovery e.g. energy recovery.

15.5.13 A good practice landfill diversion target of 90% has been achieved and exceeded by major UK developments as outlined in the IEMA Guidance. In 2020, the UK generated 59.4 million tonnes of non-hazardous C&D waste, of which 55.0 million tonnes was recovered. This represents a recovery rate of 92.6% (Ref 15-33).

15.5.14 Standard, good and best practice recovery rates by material are provided by WRAP (Ref 15-34). Recovery rates for key construction materials and other construction wastes relevant to the Scheme are provided in **Table 15-6**.

Table 15-6: Standard, Good and Best Practice Recovery Rates by Material

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

15.5.15 There is no publicly available information on any potential changes to national or regional material availability by the time of the construction of the Scheme. 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 availability as the demand is unlikely to be linear and it is not possible to set a future baseline for materials. As such, future availability is assumed to remain the same as the current baseline as outlined in **Table 15-1** and **Table 15-2**.

15.5.16 There is no publicly available information regarding any potential changes to landfill capacity by the time of the Scheme's construction, operation and decommissioning.

15.5.17 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 current baseline as outlined in **Table 15-4**.

15.5.18 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 WPA will need to consent new landfill capacity to replace that which has been used up. Therefore, non-hazardous and hazardous landfill capacity is assumed to remain the same as the current baseline, as outlined in **Table 15-4**.

15.6 Potential Effects and Mitigation

Potential Effects

15.6.1 Mitigation measures being incorporated in the design and construction of the Scheme are set out below. Prior to the implementation of the mitigation, the Scheme has the potential to affect Materials and Waste, during construction, operation and maintenance, and during decommissioning, in the following ways:

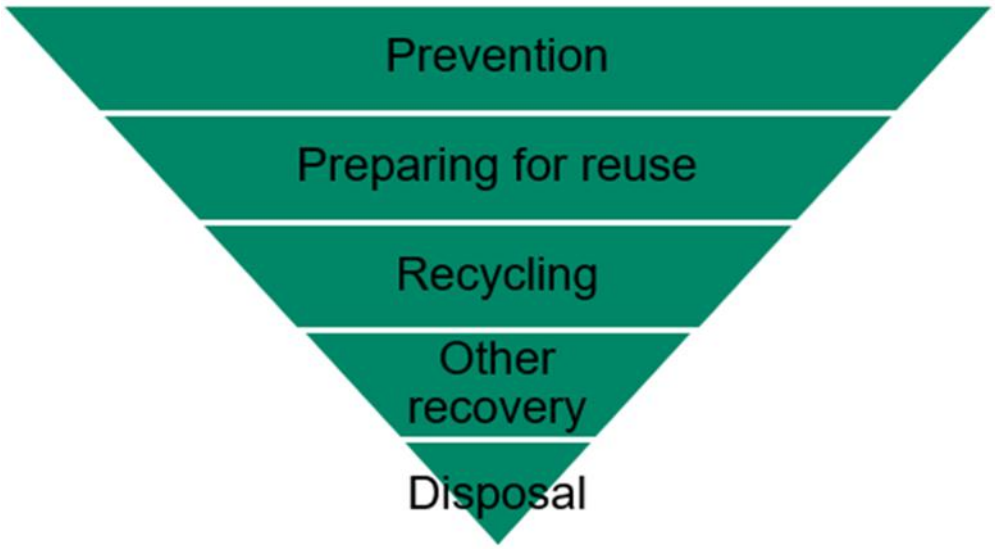
- Changes in availability of materials; and
- Changes in available landfill void capacity.

Embedded Mitigation

15.6.2 The following embedded measures have been and will be incorporated into the Scheme design, with detailed to be submitted with the DCO application.

15.6.3 The Scheme 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 15-1.

Plate 15-1 - The Waste Hierarchy, from Defra's Guidance on Applying the Waste Hierarchy, recreated by AECOM



15.6.4 All management of waste will be in accordance with the relevant regulations and waste will be transported by licensed waste hauliers to waste management sites which hold the necessary regulatory authorisation and/or permits for those wastes consigned to them.

15.6.5 The construction of the Scheme will be subject to measures and procedures defined within a CEMP and Site Waste Management Plan (SWMP). The CEMP and SWMP will be secured by a Requirement in the DCO and include the implementation of industry standard practice and control measures for environmental impacts arising during construction, including the approach for material and waste management on-site. These measures will be set out in the Framework CEMP and Framework SWMP submitted with the DCO application. The construction contractor will use the Framework CEMP and Framework SWMP to produce their CEMP and SWMP respectively, prior to works commencing on-site. Excavated material reuse would be via a Materials Management Plan in accordance with the CL:AIRE DoW CoP, exemption or environmental permit.

15.6.6 The operation of the Scheme will be subject to measures and procedures defined within an OEMP secured by a Requirement in the DCO. A Framework OEMP will be submitted as part of the DCO application which will include the approach for material and waste management on-site. The decommissioning contractor will use the Framework OEMP to produce their OEMP prior to decommissioning works on-site.

15.6.7 The decommissioning of the Scheme will be subject to measures and procedures defined within a DEMP secured by a Requirement in the DCO. A Framework DEMP will be submitted as part of the DCO application which will include the approach for material and waste management on-site. The decommissioning contractor will use the Framework DEMP to produce their DEMP prior to decommissioning works on-site.

15.7 Assessment Methodology

15.7.1 This section outlines the methodology employed for assessing the likely significant effects associated with materials and waste. The IEMA Guidance offers two methods for the assessment of waste. Method W1 – void capacity - has been selected as this is a more detailed methodology and is appropriate for larger and more complex projects.

15.7.2 The sensitive receptors for the assessment of the construction, operational and decommissioning phase of the materials and waste impacts are:

- Materials, national and regional availability of key construction materials – as outlined in the IEMA Guidance (Ref 15-1): “Materials are, in their own right, sensitive receptors. Consuming materials impacts upon their immediate and (in the case of primary material) long-term availability; this results in the depletion of natural resources and adversely impacts the environment”; and

- Landfill void capacity in the Expansive Study Area of the East Midlands (non-hazardous and inert landfill void capacity) and England (hazardous landfill void capacity) – as defined in the IEMA Guidance (Ref 15-1): “Landfill is a finite resource, and hence – through the ongoing disposal of waste – there is a continued need to expand existing and develop new facilities, this requires the depletion of natural and other resources which, in turn, adversely impacts the environment.”

15.7.3 Effects on material availability of key construction materials are adverse and temporary, the geographical scale is national or regional.

15.7.4 Effects on landfill void capacity are adverse, permanent, the geographical scale is national or regional.

15.7.5 The sensitivity of materials relates to the availability and type of construction materials to be consumed by the Scheme. The IEMA Guidance (Ref 15-1) criteria described within **Table 15-8** in Section 16.7 has been used to determine the sensitivity of materials.

15.7.6 Material receptor sensitivity is determined as “low”. On balance, the key construction materials required for the construction of the Scheme are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock. Key materials required for construction and operation are likely to be available comprising a high proportion of sustainable features and benefits (e.g. recycled content).

15.7.7 Potential recycled content for the main construction materials is outlined in **Table 15-4**.

15.7.8 The sensitivity of waste relates to availability of landfill capacity in the absence of the Scheme. This is outlined in the IEMA Guidance (Ref 15-1): “landfill capacity is recognised as an unsustainable and increasingly scarce option for managing

waste." The sensitivity of landfill capacity is assessed based on a review of historic landfill void capacity trends where available and information from relevant policy documents.

15.7.9 The criteria described within Table 15-8 and Table 15-9 have been used to determine the sensitivity of landfill capacity.

15.7.10 As stated in the IEMA Guidance "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" (Ref 15-1). However, the criteria in the IEMA Guidance are applied to decommissioning for the Proposed Scheme.

15.7.11 The waste receptor sensitivity is determined as "very high". A scenario in which no landfill void space is available is deemed to be unrealistic as outlined in the Future Baseline above, however, since there is no publicly available information on any potential changes to landfill capacity by the time of the construction, operation and decommissioning of the Scheme, a worst-case scenario is considered (e.g. landfill capacity is assumed to remain the same but a very considerable reduction in capacity cannot be excluded).

15.7.12 The assessment of materials and waste considers the following:

- Waste producers have a legal duty of care to manage their waste in accordance with regulations and to ensure that any waste leaving the site where it is generated is transferred to a suitably licensed facility for further treatment or disposal;
- Facilities transferring, treating or disposing of waste must be either licensed or apply for an exemption from a license, and impacts arising from the operation of waste management facilities are considered as part of the planning and permitting process for these facilities themselves;
- As part of their planning function, Waste Planning Authorities (WPAs) are required to ensure that sufficient 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; and
- 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.

15.7.13 A consideration of any combined and cumulative effects will also be included.

Methodology for Determining Construction, Operational and Decommissioning Effects

Materials

15.7.14 Effects upon materials during construction, operation and decommissioning of the Scheme are assessed by:

- Establishing the baseline for national and regional availability of key construction materials by weight;
- Assessing the sensitivity of materials as related to the availability and types of materials to be consumed by the Scheme in construction, operation and decommissioning;
- Establishing the quantities of key construction materials required for the construction, operation and decommissioning of the Scheme; and
- Comparing the total quantities of key construction materials with the most recent national and regional availability (utilising a percentage approach).

Waste

15.7.15 Effects upon waste during construction, operation and decommissioning of the Scheme are assessed by:

- Establishing the baseline landfill void capacity in the expansive Study Areas;
- Assessing the sensitivity of landfill void capacity;
- Establishing the quantities of construction, demolition and excavation waste to be generated during the construction, operation and decommissioning of the Scheme; and
- Comparing the total waste arising from the construction, operation and decommissioning of the Scheme against the landfill void capacity (using a percentage approach) assuming a worst case that waste goes to landfill.

Assessment Criteria

15.7.16 The assessment criteria in the IEMA Guidance which is a discipline specific guidance is used in the assessment of materials and waste rather than the general criteria set out in Chapter 5 of this EIA Scoping Report.

Sensitivity

15.7.17 The sensitivity of materials relates to the availability and type of construction material to be consumed by the Scheme. The IEMA Guidance criteria described within **Table 15-7** will used to determine the sensitivity of materials.

Table 15-7: Materials Receptor Sensitivity

Effects	Criteria for materials receptor sensitivity
Negligible	On balance, the key materials required for the construction of the Scheme are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock. And/or Are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials*
Low	On balance, the key materials required for the construction of the Scheme are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock. And/or Are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.
Medium	On balance, the key materials required for the construction of the Scheme are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock. And/or Are available comprising some sustainable features and benefits compared to industry-standard materials.
High	On balance, the key materials required for the construction of the Scheme are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock. And/or Comprise little or no sustainable features and benefits compared to industry-standard materials.
Very High	On balance, the key materials required for the construction of the Scheme are forecast are known to be insufficient in terms of production, supply and/or stock. And/or Comprise no sustainable features and benefits compared to industry-standard materials.

Effects	Criteria for materials receptor sensitivity
* *Subject to supporting evidence, sustainable features and benefits could include, for example, materials or products that: comprise reused, secondary or recycled content (including excavated and other arisings); support the drive to a circular economy; or in some other way reduce lifetime environmental impacts.*	

15.7.18 The sensitivity of waste relates to availability of landfill capacity in the absence of the Scheme. As outlined in the IEMA Guidance "*landfill capacity is recognised as an unsustainable and increasingly scarce option for managing waste*". The sensitivity of landfill capacity is assessed based on a review of historic landfill void capacity trends where available and information from relevant policy documents.

15.7.19 The criteria described within Table 15-8 and Table 15-9 will be used to determine the sensitivity of landfill capacity.

Table 15-8: Inert and Non-hazardous Landfill Capacity Sensitivity

Effects	Criteria for inert and non-hazardous landfill capacity sensitivity
Negligible	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional inert and non-hazardous landfill capacity expected to remain unchanged, or is expected to increase through a committed change in capacity.
Low	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional inert and non-hazardous landfill capacity is expected reduce minimally by <1% as a result of wastes forecast.
Medium	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional inert and non-hazardous landfill capacity is expected reduce noticeably by 1-5% as a result of wastes forecast.
High	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional inert and non-hazardous landfill capacity is expected reduce considerably: by 6-10% as a result of wastes forecast.

Effects	Criteria for inert and non-hazardous landfill capacity sensitivity
Very High	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional inert and non-hazardous landfill capacity: • is expected to reduce very considerably (by >10%); • is expected to end during construction or operation; • is already known to be unavailable; or • would require new capacity or infrastructure to be put in place to meet forecast demand.

Table 15-9: Hazardous Landfill Capacity Sensitivity

Effects	Criteria for hazardous landfill capacity sensitivity
Negligible	Across the construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional (or where justified, national) hazardous landfill capacity is expected to remain unchanged, or is expected to increase through a committed change in capacity.
Low	Across the construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional (or where justified, national) hazardous landfill capacity is expected to reduce minimally by <0.1% as a result of wastes forecast.
Medium	Across the construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional (or where justified, national) hazardous landfill capacity is: expected to reduce noticeably by 0.1-0.5% as a result of wastes forecast.
High	Across the construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional (or where justified, national) hazardous landfill capacity is expected to reduce considerably by 0.5-1% as a result of wastes forecast.

Effects	Criteria for hazardous landfill capacity sensitivity
Very High	Across the construction and/or operation phases, the baseline/future baseline (i.e. without the Scheme) of regional (or where justified, national) hazardous landfill capacity: • is expected to reduce very considerably (by >1%); • is expected to end during construction or operation; • is already known to be unavailable, or; • would require new capacity or infrastructure to be put in place to meet forecast demand.

Magnitude

15.7.20 The magnitude of impact describes the degree of variation from the baseline conditions as result of the Scheme. The methodology for assessing the magnitude of impact from materials comprises a percentage-based approach that determines the influence of construction materials use on the baseline national availability from the construction of the Scheme. The criteria used to assess the magnitude of impact for materials, as per the IEMA Guidance, are provided within **Table 15-10**.

Table 15-10: Materials Magnitude of Impact

Effects	Criteria for materials magnitude of impacts
No change	Consumption of no materials is required.
Negligible	Consumption of no individual material type is equal to or greater than 1% by volume of the national* baseline availability.
Minor	Consumption of one or more materials is between 1-5% by volume of the national* baseline availability.
Moderate	Consumption of one or more materials is between 6-10% by volume of the national* baseline availability.
Major	Consumption of one or more materials is >10% by volume of the national* baseline availability.
** A national baseline is used in the absence of regional construction material consumption data.*	

15.7.21 The methodology for assessing the magnitude of impact for waste comprises a percentage-based approach that determines the influence of waste generation from the construction of the Scheme on the baseline landfill capacity. The criteria used to

assess the magnitude of impact for resources and waste, as per the IEMA Guidance, are provided within **Table 15-11** and **Table 15-12**.

Table 15-11: Inert and Non-hazardous Waste Magnitude of Impact

Effects	Criteria for waste magnitude of impacts
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce expansive Study Area landfill capacity baseline* by <1%
Minor	Waste generated by the development will reduce expansive Study Area landfill capacity* baseline by 1-5%
Moderate	Waste generated by the development will reduce expansive Study Area landfill capacity baseline* by 6-10%.
Major	Waste generated by the development will reduce expansive Study Area landfill capacity baseline by >10%.
**Forecast as the worst-case scenario, during a defined construction and/or operational phase.*	

Table 15-12: Hazardous Waste Management Magnitude of Impact

Effects	Criteria for waste magnitude of impacts
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce expansive Study Area landfill capacity baseline* by <0.1%
Minor	Waste generated by the development will reduce expansive Study Area landfill capacity* baseline by <0.1-0.-5%
Moderate	Waste generated by the development will reduce expansive Study Area landfill capacity baseline* by <0.5-1%.
Major	Waste generated by the development will reduce expansive Study Area landfill capacity baseline by >1%.
**Forecast as the worst-case scenario, during a defined construction and/or operational phase.*	

Significance

15.7.22 Table 15-13 describes the effect thresholds used in determining the effects and

15.7.23 **Table 15-14** shows the significance of the effect.

Table 15-13: Effect Thresholds

		Magnitude of Impact				
		No Change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity of Receptor	Very High	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Sight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Table 15-14: Significance of Effect

Effect	Materials	Waste
Neutral	Not significant	Not significant
Slight		
Moderate	Significant	Significant
Large		
Very Large		

15.8 Limitations and Assumptions

15.8.1 The material and waste scoping has been undertaken on the basis of information available at the time of the assessment. Any assumptions made for scoping and the limitations this presents are reported including:

- The future baseline is assumed to be same as the current baseline as outlined in **Table 15-5**.

15.8.2 Construction material estimates at this stage are based on other similar Solar Nationally Significant Infrastructure Project (NSIP) schemes which have estimates construction materials to be no more than 10% of regional or national construction material availability.

15.9 Summary of Elements Scoped In and Scoped Out

15.9.1 The following elements are scoped out of the assessment:

- Waste arising from extraction, processing and manufacture of construction components and products. 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 in the ES as they relate to procurement decisions that cannot be assured.
- Other environmental impacts associated with the management of waste from the Scheme, 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 sections.
- Direct impacts on safeguarded mineral and waste sites. There are no safeguarded mineral or waste sites (site specific mineral safeguarding areas, allocated mineral site, allocated waste site and allocated waste areas) within the Scheme.
- Effects on the availability of materials during construction, operation and decommissioning are scoped out of the assessment.
    - Material receptor sensitivity is determined as “low”. At “low” material receptor sensitivity, the point of significance is a major magnitude of impact, Table 15-10 as the “consumption of one or more materials is >10% by volume of the baseline availability”.
    - Construction materials required to construct the Scheme are unlikely to be required in large quantities, i.e. more than 10% of regional or national construction material availability (**Table 15-1** and **Table 15-2**). Therefore, the magnitude of impact is anticipated to be negligible or minor, and the effect is slight, which is not significant. This assumption is based on the construction material requirements of similar sized solar farms.

15.9.2 Due to the limitation on information available at this stage, and the uncertainty about the nature of mitigation(s) and the method by which mitigation(s) would be secured,

waste generation during the construction, operation and decommissioning (changes in available landfill void capacity) of the Scheme is scoped into the assessment.

15.9.3 A summary of the elements scoped into and out of the Materials and Waste chapter are presented in **Table 15-15**.

Table 15-15: Elements scoped in and scoped out of the assessment of materials and waste

Element		Scoped In/ Scoped Out
Construction, operation and decommissioning	Changes in available landfill void capacity	Scoped in - Due to the limitation on design information available at this stage, and the uncertainty about the nature of mitigation(s) and the method by which mitigation(s) would be secured, waste generation during the construction, operation and decommissioning (changes in available landfill void capacity) of the Scheme is scoped into the assessment.
	Changes in availability of materials	Scoped out - Construction materials required to construct the Scheme are unlikely to be required in large quantities, i.e. more than 10% of regional or national construction material availability.
	Waste arising from extraction, processing and manufacture of construction components and products.	Scoped out - Such matters cannot be accurately predicted and assessed in the ES as they relate to procurement decisions that cannot be assured.
	Other environmental impacts associated with the management of waste from the Scheme	Scoped out - Other environmental impacts associated with the management of waste from the Scheme 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 sections.
	Changes to safeguarded mineral site	Scope out - There are no safeguarded mineral or waste sites (site specific mineral safeguarding areas, allocated

Element		Scoped In/ Scoped Out
	Changes to safeguarded waste site	mineral site, allocated waste site and allocated waste areas) within the Site Boundary.

16 Other Environmental Topics

16.1 Introduction

16.1.1 The aim of the scoping stage is to focus the EIA on those environmental aspects that may be significantly affected by the Scheme. The following sections provide a summary of 'other' environmental topics which have been considered during the preparation of this EIA Scoping Report and for which standalone chapters are not anticipated to be required in the ES. As described in paragraphs 5.7.2 and 5.7.3, from previous solar farm experience it is considered that for these topics the demonstration of no likely significant effects can be quickly established without the need for detailed information on legislation and policy, methodology and baseline conditions being provided. The 'Other Environmental Topics' chapter of the ES will include a brief assessment of each of the topics identified below, supported by a technical note that will be appended to the ES that will contain further information that evidences the ES section conclusion. The EIA methodology set out in **Chapter 5:Environmental Impact Assessment Methodology** of this EIA Scoping Report will not apply to this chapter; it may not be necessary, for example, to outline an assessment methodology or baseline conditions if a preliminary or screening assessment identifies that the impacts will be none or negligible.

16.1.2 For clarity, the topics covered in sections below are not scoped out of the EIA. Rather, they are addressed proportionately within the ES in relation to the likelihood for significant effects based on the scoping work undertaken to date.

16.2 Air Quality

Study Area

16.2.1 Based on the IAQM's Guidance on the Assessment of dust from demolition and construction (Ref 16-1), the Study Area for dust considers sensitive receptors:

- Within 250 m of the Scheme; and
- Within 50 m of the routes expected to be affected by the construction phase traffic on road links that are within 250 m of the Scheme access points.

16.2.2 For road traffic emission assessments, the Study Area includes the consideration of sensitive receptors within 200 m of the affected road links expected to be impacted by the construction phase traffic. Affected road links are determined using criteria outlined in the IAQM's guidance on land-use planning and development control: Planning for Air Quality (Ref 16-2).

Baseline Conditions

16.2.3 The Scheme is located close to Navenby, Lincolnshire, a predominantly rural area within the NKDC administrative area, within 1 km the South Kesteven District

Council (SKDC) administrative area. There are no Air Quality Management Areas (AQMAs) declared within the NKDC administrative area and one AQMA declared within the SKDC in Grantham, an urban area 25 km to the south of the Scheme.

16.2.4 NKDC and SKDC undertake ongoing monitoring of ambient air quality monitoring as part of their Local Air Quality Management (LAQM) responsibilities under Part IV of the Environment Act 1995, as amended by the Environment Act 2021 (Ref 16-3).

16.2.5 NKDC measured annual mean nitrogen dioxide concentrations at 22 sites within the administrative area, reporting annual mean nitrogen dioxide concentrations below the relevant annual mean objective of 40 µg/m³ at all locations in 2022 (the latest year for which data are publicly available). The measurement location in Navenby reports annual mean nitrogen dioxide concentrations within 1 km of the Scheme boundary as being 13 µg/m³ in 2022 (Ref 16-4). NKDC did not carry out any automatic (continuous) monitoring for any pollutants during 2022, hence there are no available measurements of particulate matter.

16.2.6 The Scheme itself is not located within SKDCs administrative area, however potential site access routes and parts for the affected road network may fall within this area. SKDC measured annual mean nitrogen dioxide concentrations at 35 sites within the wider urban areas of Grantham and Stamford but not in the area likely to be impacted by the Scheme (Ref 16-5).

16.2.7 Defra background maps report pollutant concentrations at less than 50% of the relevant objective values for nitrogen dioxide and particulate matter (PM10 and PM2.5 size fraction) (Ref 16-6). Overall, the current baseline standard of air quality within the Study Area is considered to be very good and there is no evidence that the future baseline conditions would be any different.

16.2.8 Sensitive receptors for air quality are generally public exposure receptors (sensitive locations where relevant exposure for the air quality criteria being assessed could occur, e.g. residential properties or schools) and ecological sites sensitive to dust deposition and nitrogen deposition.

16.2.9 As a preliminary review aerial photography, Defra's Magic Map Application (Ref 16-7) and Ordnance Survey (OS) mapping have been used to identify sensitive receptors. These include residential receptors in Navenby, Wellingore, Welbourn, and the surrounding area.

16.2.10 The sites within the Study Area that are potentially close enough (within 250 m) of the Site will be considered as receptors for air quality. Based on a preliminary review, there are no sensitive ecological sites within 250 m of the Site. Two potentially sensitive ecological receptors have been identified within 200 m of the A17 in the vicinity of the site. These include High Dyke SSSI and an area of ancient woodland (Old Wood).

16.2.11 The AQS objectives (as set out in the Air Quality Standards Regulations 2010 (Ref 16-8)) have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell.

As such the sensitivity of receptors was considered when setting the objectives and therefore no additional subdivision of human health receptors on the basis of building or location type is necessary. All locations that members of the public can reasonably be expected to be present for more than one hour are considered to be high sensitivity receptors. The Study Area includes receptors that would be sensitive to direct and indirect impacts if they were generated by the Scheme.

Potential Impacts

16.2.12 The potential air quality impacts of the Scheme are considered to be:

- Impacts of dust arising during the construction and decommissioning phases of the Scheme;
- Impacts of vehicle and plant emissions during the construction and decommissioning phases of the Scheme; and
- Impacts during the operation of the Scheme due to changes in vehicle emissions.

Assessment Methodology

16.2.13 The potential impacts from dust emissions arising from activities during the construction and decommissioning phases of the Scheme will be considered as part of the ES using an approach based on the IAQM guidance (2024) (Ref 16-2) for assessing impacts from such activities. This is a screening assessment and a risk-based qualitative assessment approach and is applied for air quality assessments throughout the UK. Mitigation measures will be identified and incorporated into the Framework CEMP.

16.2.14 As part of this assessment, potential sensitive receptors (with regard to both human health and those of ecological sensitivity) will be identified for the construction and decommissioning of the Scheme. For the purposes of the dust risk assessment, potentially affected air quality sensitive receptors will be identified for the assessment through a review of aerial photography, Defra's Magic Map Application (Ref 16-7), the Air Pollution Information System (APIS) database (Ref 16-9), construction and decommissioning phasing plans, and Ordnance Survey (OS) mapping.

16.2.15 Construction and decommissioning related plant emissions are likely to represent a small source of emissions relative to ambient local conditions in the vicinity of the Site Boundary based on the scale of construction that will occur and the number of plant vehicles that will be required. An assessment of plant related emissions is therefore scoped out. Suitable mitigation measures for plant and motorised equipment will be recommended based on advice prescribed in the IAQM (2024) (Ref 16-1) guidance and incorporated into the Framework CEMP.

16.2.16 The number of vehicles that will be in operation during the construction and decommissioning phases of the Scheme have been considered in the context of the guidance published by IAQM (2017) (Ref 16-2), which states that an air quality

assessment is required if the development will "*cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors*" or if the development will generate *"a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors*". It is considered likely that construction flows will be well below the criteria stated in IAQM (2017) (Ref 16-2) and can be scoped out.

16.2.17 During operation, no effects are likely due to the low number of vehicle movements required for maintenance. Further details regarding traffic movements can be found in Chapter 13. Due to the nature of the Scheme, no emissions of local air quality pollutants are likely from any on-site infrastructure. National Policy Statement EN-3 (Ref 16-10) paragraph 2.10.161 states that:

"Once solar farms are in operation, traffic movements to and from the site are generally very light, in some instances as little as a few visits each month by a light commercial vehicle or car. Should there be a need to replace machine components, this may generate heavier commercial vehicle movements, but these are likely to be infrequent. The Secretary of State is unlikely to give any more than limited weight to traffic and transport noise and vibration impacts from the operational phase of a project."

16.2.18 As such, further assessment of air quality impacts during operation of the Scheme is proposed to be scoped out of the EIA.

16.2.19 Incorporating air quality mitigation measures into the Framework CEMP will negate the need for a specific air quality chapter in the ES, whereby the potential impacts from dust emissions arising from activities during the construction and decommissioning phases of the Scheme will be considered as part of the Other Environmental Topics chapter of the ES using an approach based on the IAQM guidance (2024) (Ref 16-2).

16.2.20 Specific mitigation measures that can be committed to at this stage are included in Appendix E Environmental Mitigation and Commitments Register of this EIA Scoping Report as relevant.

16.3 Human Health

Introduction

16.3.1 The World Health Organisation (WHO) Europe defines health as *"…a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"*. Consequently, public health encompasses general well-being, not just the absence of illness. Health is defined as incorporating both physical and mental health and is affected by a range of factors, termed the 'wider determinants of health', which span bio-physical, social, behavioural, economic and institutional factors.

Legislation, Planning Policy Context and Guidance

16.3.2 The EIA Regulations (Ref 16-41) require the consideration of the likely significant direct or indirect effects of projects on 'population and human health'.

16.3.3 NPS EN-1 (Ref 16-42), with specific reference to Section 4.13, acknowledges that access to energy is beneficial to society as a whole and that the production, distribution, and use of energy may have negative impacts on some people's health.

16.3.4 NPPF (Ref 16-43) with specific reference to Section 8, 'Promoting healthy and safe communities' sets out the need for planning policies to promote healthy, inclusive and safe places.

16.3.5 The IEMA guidance on Determining Significance for Human Health in EIA (Ref 16-44) presents a framework for EIA practitioners to identify significant effects of a Scheme on human health. It defines significance as informed expert judgement of the importance, desirability or acceptability of a change. The guidance highlights the need to consider the significance of human health effects in relation to vulnerable groups.

16.3.6 Policy S54: Health and Wellbeing in the Central Lincolnshire Local Plan (Ref 16-45) states that development proposals must consider the potential for achieving positive mental and physical health outcomes. It states that "*where any potential adverse health impacts are identified, the applicant will be expected to demonstrate how these will be addressed and mitigated*".

16.3.7 North Lincolnshire's Health and Wellbeing Board has agreed the strategic direction and principles of the 2021-2026 Joint Health & Wellbeing Strategy (Ref 16-46). The strategy aims to improve health outcomes and reduce health inequalities through six key prioritises:

- Keep North Lincolnshire safe and well;
- Babies, infants and young people to have the best start in life;
- People live well to enjoy healthy lives;
- People experience equity of access to support their health and wellbeing;
- Communities are enabled to be healthy and resilient; and
- To have the best systems and enablers to effect change.

Baseline

16.3.8 A summary of the human health profile of the population currently residing in proximity to the Site is set out in Table 16-1: below, drawing on Public Health England and Census data (Ref 16-47, Ref 16-48). Data is presented for Lower Layer Super Output Area (LSOA) North Kesteven 006D, in which the Solar PV site is

located, and for the slightly larger Middle Layer Super Output Area (MSOA) North Kesteven 006 where indicators are not available at LSOA level.

16.3.9 Data is also presented for the local authorities (NKDC and LCC) and nations (England) in order to provide geographical comparators for the local population.

Table 16-1: Human health profile

	North Kesteven 006D (LSOA)	North Kesteven 006 (MSOA)	North Kesteven (District)	Lincolnshire (County)	England
Population (2021)	1,476	6,737	118,076	768,365	56,490,047
Population aged under 16 (%) (2021)	17.0%	14.4%	12.5%	16.7%	18.6%
Population aged over 65 (%) (2021)	23.4%	29.6%	33.3%	23.4%	18.4%
Unemployment (% working age population claiming out of work benefits) (2021/22)	-	2.1%	2.7%	4.3%	5.0%
Long-Term Unemployment- rate per 1,000 working age population (2021/22)	-	1.3%	1.1%	2.0%	1.9%
General Health – bad or very bad (%) (2021)	3.7%	4.3%	4.9%	5.8%	5.2%
Long term illness or disability (%) (2021)	19.4%	19.2%	18.7%	20.1%	17.3%
Emergency hospital admissions for all causes (SAR) (2016/17 - 20/21)	-	68.2	81.1	87.1	100.0
Deaths from respiratory diseases, all ages (SMR) (2016 – 2020)	-	97.8	87.7	97.2	100.0

Source: PHE Local Health: Small Area Public Health Data 2021 and 2021 Census.

16.3.10 The human health profile shows that:

- The proportion of the population aged under 16 in LSOA North Kesteven 006D (17.0%) is greater than in MSOA North Kesteven 006 (14.4%), North Kesteven district (12.5%), and Lincolnshire (16.7%), but is smaller than in England (18.6%).
- The proportion of the population aged over 65 in LSOA North Kesteven 006D (23.4%) is the same as the proportion in Lincolnshire (23.4%) and somewhat higher than the proportion in England (18.4%); however MSOA North Kesteven 006 (29.6%) and North Kesteven district (33.3%) both display a substantially higher proportion of population over 65.
- Long-term unemployment rates are lower in MSOA North Kesteven 006 (2.1%) and North Kesteven district (2.7%) than in Lincolnshire (4.3%) and England (5.0%).
- The percentage of people self-reporting their health as 'bad' or 'very bad' is lower in LSOA North Kesteven 006D (3.7%), MSOA North Kesteven 006 (4.3%), and North Kesteven district (4.9%) than in Lincolnshire (5.8%) and England (5.2%).
- The percentage of people with a long-term illness or disability in LSOA North Kesteven 006D (19.4%) and MSOA North Kesteven 006 (19.2%) was slightly higher than North Kesteven district (18.7%) and England (17.3%), but slightly lower than Lincolnshire (17.3%).

16.3.11 The rate of emergency hospital admissions for all causes in MSOA North Kesteven 006 (97.8), North Kesteven district (87.7), and Lincolnshire (97.2) is less than the national average (100.0). Similarly, all three areas have a lower standardised mortality ratio for deaths from respiratory diseases than the national average.

Potential effects

16.3.12 A standalone assessment of Human Health is proposed to be scoped out of the ES. This is because other chapters in the ES will comprehensively assess potential effects of the Scheme which could be relevant to health effects (both physical and mental), and given the nature of the development and its potential impacts this is considered a proportionate approach.

16.3.13 The following ES technical chapters will cover potential effects during the construction, operation, and decommissioning phases that could be relevant for health:

- Chapter 6 Climate Change;
- Chapter 9 Water Environment;
- Chapter 10 Landscape and Visual Amenity;

- Chapter 11 Noise and Vibration;
- Chapter 12 Socio-Economics and Land Use;
- Chapter 13 Traffic and Movement;
- Chapter 16 Other Environmental Topics (including Air Quality and Ground Conditions);
- Appendix B Long List of Major Accidents and Disasters; and
- EMF.

16.3.14 The Other Environmental Topics ES chapter will include a section clearly signposting the reader to these chapters and highlighting their relevance to human health.

16.3.15 Specific mitigation measures that can be committed to at this stage are included in Appendix E Environmental Mitigation and Commitments Register of this EIA Scoping Report as relevant.

16.4 Glint and Glare

16.4.1 Glint and glare is the effect of reflected sunlight causing harm or discomfort to a sensitive receptor. Glint is defined as a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel. Glare is a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel. The effect occurs when the solar panel is stationed between or at an angle of the sun and the receptor (Ref 16-10).

16.4.2 Glint and glare assessments are sometimes required to accompany planning applications for solar developments, depending on the determining authority's judgement of their need. There are no guidelines setting out a particular methodological approach, but the receptors of interest are specified in the NPPF (Ref 16-49) as well as guidance on renewable and low carbon energy issued by the Ministry of Housing, Communities and Local Government (MHCLG) (Ref 16-51) which states:

"Particular factors a local planning authority will need to consider include (…) the proposal's visual impact, the effect on landscape of glint and glare (…) and on neighbouring uses and aircraft safety"

16.4.3 NPS EN-3 (Ref 16-10) sets out specific policy in relation to glint and glare from solar development at Section 2.10.102 onwards, and paragraph 2.10.158 states *"Solar PV panels are designed to absorb, not reflect, irradiation. However, the Secretary of State should assess the potential impact of glint and glare on nearby homes, motorists, public rights of way, and aviation infrastructure (including aircraft departure and arrival flight paths)"* The requirement to consider diurnal (particularly

in the case of tracking panels) and seasonal differences within the assessment is also referenced.

16.4.4 As described in **Chapter 10: Landscape and Visual Amenity**, the effect of glint and glare on landscape will be considered in the EIA and presented within the LVIA chapter of the ES.

16.4.5 There are several potential receptors identified in the wider area as listed below:

- Residential homes within 1 km of the Solar PV site;
- Roads within 1 km of the Solar PV site (A607, A17, High Street, Marsh Lane, Church Lane)
- Sir William Robertson Academy;
- Brant Broughton sports pavilion;
- The Royal Air Force Station Waddington, including a five mile airspace restriction due to the Red Arrows aircraft team (Ref 16-50);
- Poachers Patch Caravan and Camp site; and
- Users of the local PRoWs.

16.4.6 Construction and decommissioning activities are expected to be undertaken in accordance with a CEMP, which will be in accordance with the Framework CEMP submitted with the DCO application. This will include information on how reflective surfaces are to be treated during construction and decommissioning phases with a view toward their final placement across the Site. It is expected that avoidance of the effects of glint and glare will be considered as part of construction and decommissioning planning. Further, the scale of the Site is such that the full areas will not be occupied for the duration of these phase activities and the movement of reflective surfaces will be temporarily localised to smaller areas on a rolling basis until works are complete. Based on the nature of the activities, the distances to receptors and the use of a CEMP, construction and decommissioning effects are proposed to be scoped out of the assessment.

16.4.7 Operational effects are considered to be fixed and will last for the duration of the Scheme. The interaction of solar PV panels with sensitive locations, for example vehicular junctions or pedestrian crossings on roads, or viewpoints along rail lines or roads, is primarily influenced by their siting, as solar PV panels require orientation toward the sunpath, and the choice of materials, where more reflective, or specular surfaces create a higher chance of creating distraction through discomfort or disability glare.

16.4.8 NPS EN-3 has been prepared considering the latest evidence base, and states that “whilst there is some evidence that glint and glare from solar farms can be experienced by pilots and air traffic controllers in certain conditions, there is no evidence that glint and glare from solar farms results in significant impairment on

aircraft safety. Therefore, unless a significant impairment can be demonstrated, the Secretary of State is unlikely to give any more than limited weight to claims of aviation interference because of glint and glare from solar farms." Based on the evidence, policy, and experience, it is not expected that there would be any significant impacts of glint and glare on aviation. This includes the Royal Airforce Station Waddington, whose pilots are trained and equipped with visors to cope with direct glare from the sun and indirect glint and glare from the ground attributed to features such as water bodies and windows (both of which reflect more sunlight than solar panels). The Applicant will liaise with the MoD with regards to flight activities at Royal Airforce Station Waddington and, should the MoD agree, will scope aviation matters out of the assessment. An assessment on aviation will be carried out if the MoD requires the Applicant to model the effects of glint and glare on its activities.

16.4.9 The setback mounting of the solar PV panels within the Site from its boundaries combined with the distance to potential receptors and angling of the panels from horizontal could help to limit how and where potential occurrences of glare could be created by the Solar PV Site.

16.4.10 Further, the dark colour and a matt material finish of the solar PV panels is designed to absorb light and could minimise potential occurrences of reflected light, reducing the likelihood that glare conditions could be created from the panels themselves.

16.4.11 Based on the expected design, screening and distance to sensitive receptors, significant effects are not considered likely. Nevertheless, as the design develops, consideration will be given to the potential for solar reflections to impact on sensitive receptors. This will include undertaking calculations to determine whether the solar PV panels will be visible from sensitive locations and if a solar reflection could occur, whether it is likely to be a significant nuisance or hazard. The calculations will made using specialised software based on the Sandia Laboratories Solar Glare Hazard Analysis Tool (SGHAT). If glint and glare is likely to be a nuisance or hazard, mitigation will be proposed.

16.4.12 The results and recommendations of the glint and glare calculations will be incorporated into the Scheme design and presented as a technical appendix to the ES. Any mitigation planting or fencing recommended by the modelling will be incorporated into the Scheme design and assessed by the other technical chapters. It is considered that this will negate the need for a specific glint and glare chapter in the ES, however the assessment will be summarised in the Other Environmental Topics chapter of the ES as described above.

16.4.13 Specific mitigation measures that can be committed to at this stage are included in Appendix E Environmental Mitigation and Commitments Register of this EIA Scoping Report as relevant.

16.5 Ground Conditions

Introduction

16.5.1 Ground conditions will be included in the Other Environmental Topics chapter of the ES and will include a brief assessment of the effects of the Scheme on ground conditions at the Site and surrounding area. For clarity, ground conditions are not scoped out of the EIA, but are addressed proportionately within the ES in relation to the likelihood for significant effects based on the work undertaken to date.

16.5.2 Throughout this chapter, 'Site' refers to the Solar PV and the Cable Grid Connection options Corridor.

Study Area

16.5.3 The Study Area for ground conditions assessment includes the Site plus a 100 m buffer. In the case of groundwater abstractions, this buffer is increased to 1 km, as is often standard practice for contaminated land desk-based assessments. Similarly, the zone of influence to inform the identification of cumulative effects is up to 1 km from the Site Boundary.

Legislation, Planning Policy Context and Guidance

16.5.4 Legislation, planning policy and guidance relating to the ground conditions and pertinent to the Scheme comprises:

Legislation

16.5.5 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 16-11);
- The Water Resources Act 1991 (Ref 16-12) and the Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 (Ref 16-13);
- Water Act 2003 (Ref 16-14);
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 16-15);
- Building Act 1984 (Ref 16-16); and
- The Building Regulations & c (Amendment) Regulations 2015 (Ref 16-17).

16.5.6 Other legislation of relevance to this topic includes:

- Environmental Permitting (England and Wales) Regulations 2016 (Ref 16-18) (as amended);

- Hazardous Waste (England and Wales) (Amendment) Regulations 2016 (Ref 16-19);
- Contaminated Land (England) (Amendment) Regulations 2012 (Ref 16-20);
- Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 16-21);
- Anti-Pollution Works Regulations 1999 (Ref 16-22); and
- The Control of Asbestos Regulations 2012 (Ref 16-23).

National Planning Policy

16.5.7 The following national planning policy has been considered in relation to ground conditions:

- National Planning Policy Framework (NPPF) (Ref 16-24);
- NPS EN-1 (Ref 16-25);
- The Planning Practice Guidance (PPG) (Ref 16-26);
- A Green Future: Our 25 Year Plan to Improve the Environment (Ref 16-27); and
- DEFRA's Environmental Improvement Plan published in 2023 (Ref 16-28).

Regional Planning Policy

16.5.8 The following regional planning policy has been considered in relation to ground conditions:

- Lincolnshire Minerals and Waste Local Plan – Core Strategy and Development Management Policies (Ref 16-31); and
- Lincolnshire Minerals and Waste Local Plan – Site Locations (Ref 16-32).

Local Planning Policy

16.5.9 The following local planning policy has been considered in relation to ground conditions:

- Central Lincolnshire Local Plan (Adopted April 2023) (Ref 16-33);
- Central Lincolnshire Adopted Policies Map and Interactive Map (Ref 16-34); and
- Lincolnshire Minerals and Waste Plan (Adopted June 2016) (Ref 16-35).

Consultation

16.5.10 The EIA Scoping Report will undergo consultation with statutory authorities which will be included in the ground conditions assessment. Consultation with local authorities on ground conditions issues will be undertaken if pertinent to the comments received.

Baseline Conditions

16.5.11 The following sources of information have been used to inform the baseline conditions within the Study Area:

- The Defra Magic Map online search tool (Ref 16-30);
- Lincolnshire Minerals and Waste Local Plan (Ref 16-31 and Ref 16-32);
- Environmental Agency Catchment Data Explorer (Ref 16-29); and
- BGS Geoindex Onshore online geological mapping (Ref 16-37).

Site Setting

16.5.12 The Solar PV Site is located between the outskirts of the villages of Leadenham, Brant Broughton, and Welbourn. The Grid Connection Corridor runs between the north of the village of Welbourn, passing to the south east of Wellingore towards the east of Navenby.

16.5.13 The landscape features within the Site consist predominately of agricultural fields.

Geology and Hydrogeology

16.5.14 According to the BGS Viewer, there are limited superficial deposits on the Site. There is no artificial ground mapped on Site by the BGS.

16.5.15 The geology of the Site comprises superficial deposits of Head in the east of the Site. In the west of the Site, there are areas of alluvium deposits (clay, silt, sand and gravel) and the Fulbeck Sand and Gravel Member in the vicinity of the River Brant.

16.5.16 The majority of the Site is underlain by the Charmouth Mudstone Formation consisting of dark grey laminated shales, and dark, pale and bluish grey mudstones, in the centre of the Site the Charmouth Mudstone Formation is more ironstone and nodular. A north-south striking strip of Loveden Gryphaea Bed is present in the centre of the Site.

16.5.17 A small section of the southeast of the Site is mapped as the Marlstone Rock Formation and a small section of the southwest of the Site is mapped as the Brandon Sandstone Bed.

16.5.18 A review of the Defra website indicates that the superficial deposits of the head deposits are designated as a Secondary (undifferentiated) aquifer and the alluvium

the Fulbeck Sand and Gravel Member deposits are designated as Secondary A aquifers. Secondary aquifers provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands.

16.5.19 The Charmouth Mudstone Formation in the north of the Site is designated as a Secondary B aquifer and in the south of the Site the same formation is designated as a Secondary (unproductive) aquifer. The Marlstone Rock Formation and Brandon Sandstone Bed are mapped as a Secondary A aquifer. The Loveden Gryphaea Bed is designated as an unproductive aquifer. Unproductive strata are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

16.5.20 The groundwater vulnerability at the Site is predominantly classified as Medium – High and High by the Defra Magic Map with a region classified as Medium - Low associated with the Loveden Gryphaea Bed.

16.5.21 No Mineral Safeguarding Areas or Geodiversity Parks identified within the Solar PV Site.

Hydrology

16.5.22 The Site is located within the Brant Lower Water Body (Moderate Ecological Status in 2022) which is adjacent to the west of the Site. There are various surface waterbodies including drainage ditches on-site and in the immediate vicinity of the Site.

16.5.23 The indicative floodplain map for the Site, published by the EA, shows that the Site is assessed as having a low risk of yearly surface water flooding and a very low yearly risk of yearly flooding from rivers. Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.

Sensitive Receptors

16.5.24 According to the Defra Magic Maps, the entire Site is within a Nitrate Vulnerable Zone (2017 Designations).

16.5.25 The east of the Site is located within a Site of Special Scientific Interest (SSSI) impact risk zone (for LPAs to determine likely impacts on terrestrial SSSIs and when to consult Natural England), this designation is in relation to the High Dyke SSSI.

Potential Effects and Mitigation

16.5.26 A number of environmental design and management measures will be employed as standard best practice to minimise impacts to both human health and controlled waters during the construction and decommissioning phases of the Scheme. These will be incorporated into the Framework CEMP which will be provided alongside the ES as part of the DCO application. This will be developed into a detailed CEMP prior to construction and implemented in accordance with the Framework CEMP.

16.5.27 **Table 16-2** below lists the standard mitigation measures which are anticipated to be implemented in order to avoid, prevent, reduce or offset the following potential impacts:

- Human exposure through direct contact / inhalation / dermal uptake of contaminants;
- Creation of preferential pathways and mobilisation of contamination;
- Contamination of natural soils, driving of contamination into an aquifer during piling, contamination of groundwater with concrete, paste or grout;
- Pollution and degradation of water quality of any underlying aquifer;
- Infiltration and / or runoff into the local drainage / sewerage network - pollution of drainage and sewerage network and any adjacent surface water features;
- Run-off and infiltration of contaminants from material stockpiles;
- Contamination of drainage and sewerage network and/or groundwater; and
- Spread of nuisance dusts and soils to the wider environment and local roads.

Table 16-2 Remediation, Decommissioning, Demolition and Construction Standard Environmental Mitigation Measures

Remediation, Decommissioning, Demolition and Construction Standard Environmental Mitigation Measures
Regulatory / Guidance 1. Work will be carried out in accordance with relevant Construction Design Management (CDM) Regulations 2015 (Ref 16-38), details of these measures will be presented within the Health and Safety Plan (H&SP), and the CEMP. A Framework CEMP will be developed to provide a framework of measures that will be further developed and implemented via detailed CEMPs by the Principal Contractor. 2. The CEMP will be prepared prior to commencement of the works, setting out the management, monitoring, auditing and training procedures, and the mitigation measures that will be put in place during decommissioning, demolition and construction, to maintain compliance with the applicable regulations. In order to reduce the likelihood of contamination and protect human health and controlled waters from effects related to ground conditions, the CEMP will include mitigation measures such as those presented here. 3. A competent/licensed contractor will survey (pre site preparation survey as defined by the HSE) and remove asbestos containing materials and other materials and structures contaminated with asbestos fibres. 4. A Pollution Response Plan will be drafted prior to the commencement of the works as part of the CEMP. The plan will outline key pollution mitigation measures including a Control of Substances Hazardous to Health (COSHH) / fuel inventory and key contacts to be notified in the event of a significant pollution incident, which may subsequently lead to the contamination of controlled waters. Tanks and dispensing pumps will be locked when not in use to prevent unauthorised access. Information regarding spill prevention and disposal of COSHH items will be provided as part of the standard site induction presentations and during regular toolbox talks and as the works progress. 5. Piling will be carried out in accordance with the Environment Agency Guidance Note on Piling / Penetrative Ground Improvement Methods on Land Affected by Contamination (Ref 16-39) and ground investigations will inform the Foundation / Piling Works Risk Assessment which will define the appropriate piling methods and foundation design to mitigate risk. 6. Specification of concrete used in foundations and building structures will be selected based on the results of the chemical composition of the Site’s soil and groundwater. Guidance is provided by the Building Research Establishment series 'Concrete in Aggressive Ground' (Ref 16-40).
Waste

Remediation, Decommissioning, Demolition and Construction Standard Environmental Mitigation Measures

1. Waste materials will be disposed of by the contractor/s to appropriate recycling facilities or appropriately licensed landfills in line with the SWMP or equivalent. The appropriate landfill for the disposal of any contaminated soil off-site will depend on the waste classification determined from the chemical analysis or Waste Acceptance Criteria testing as necessary.

2. If required, waste effluent will be tested for appropriate physical and chemical parameters and where necessary, disposed of at the correctly licensed facility by a licensed specialist contractor/s.

3. Complaints about dust will be investigated at the earliest opportunity and appropriate action taken to control the source or remedy the impact as appropriate in line with the CEMP.

4. Access roads will be regularly cleaned and damped down with water as set out in the CEMP.

5. All vehicles entering and leaving the Site during the construction periods will pass through a wheel washing facility as set out in the CEMP. Vehicles used to transport materials and aggregates will be enclosed or covered in a tarpaulin. Vehicle movements will be kept to a minimum and vehicle speeds within the Site will be limited.

6. Appropriate use of Personal Protective Equipment (PPE) and implementation and adherence to Health & Safety Protocols, Plans and Procedures. Construction workers will remain vigilant of ground conditions at all times and will report to the Principal Contractor any suspect areas of potential contamination.

7. Potentially contaminated made ground will be removed from excavations. Advice should be sought from an environmental specialist should materials suspected of being contaminated be uncovered. A procedure for dealing with unexpected contamination will be included within the CEMP.

Demolition and Construction Related

1. As set out in the CEMP, oils and hydrocarbons will be stored in designated locations with specific measures to prevent leakage and release of their contents, include the siting of storage areas away from surface water drains, on an impermeable base with an impermeable bund that has no outflow and is of adequate capacity to contain 110% of the contents. Valves and trigger guns will be protected from vandalism and kept locked up when not in use. Details of appropriate storage and handling measures will be presented within the CEMP.

2. Vehicles should be well maintained to prevent accidental pollution from leaks. Static machinery and plant should include drip trays beneath oil tanks/engines/gearboxes/hydraulics, which will be checked and emptied regularly via a licensed waste disposal operator.

Remediation, Decommissioning, Demolition and Construction Standard Environmental Mitigation Measures

3. The Lead Local Flood Authority (LLFA) and the appropriate utility company will be consulted on the potential requirement for an oil interceptor and sediment trap at the point where site surface water runoff enters the sewerage network.

4. A spillage Emergency Response Plan (ERP) will be produced (and could form part of the CEMP), which site 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.

5. CEMP will set out mitigation to ensure for appropriate handling and disposal of pile arisings, concrete, pastes and/or grouts during the laying of foundations. During the excavation, the contractor/s will employ dust suppression measures when necessary to prevent the potential mobilisation of contaminated dust particles and their migration off site, in line with the CEMP.

6. Stockpiles and material handling areas will be kept as clean as practicable to avoid nuisance from dust. Dusty materials will be dampened down using water sprays in dry weather or covered.

7. The length of time materials are stockpiled on-site before being removed for re-use, recycling or disposal is to be kept to a minimum and stockpiles are to be covered with tarpaulins prior to disposal.

8. Dust generating equipment e.g. mobile crushing and screening equipment will be located to minimise potential nuisance impacts to receptors, as far as practicable.

16.5.28 On-site activities when the Scheme is complete and operational will be limited to the maintenance of the Solar PV Site infrastructure. During maintenance activities there may be the need to use oils, grease, fuels, lubricants or cleaning agents on-site. There is a limited risk of chemical pollution arising from accidental spillages during these operations. A Framework OEMP will be prepared following grant of DCO to address all operational related issues. This will include 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.

16.5.29 Maintenance activities during the operational phase will be managed through an OEMP (to be prepared will be prepared following grant of DCO) which will be in accordance with the Framework OEMP submitted with the DCO application and as such operational and maintenance activities are scoped out of the assessment.

16.5.30 Additional mitigation measures may also be developed to address specific identified impacts. At this stage, the requirement for specific mitigation measures in respect of soils and geology could include for example, remedial works if a risk were to be identified from land contamination. The requirement for remedial works is usually informed by ground investigations and quantitative risk assessment. Ground investigations and quantitative risk assessment (if required) can be conducted following grant of the DCO.

Preliminary Risk Assessment Methodology

16.5.31 The guidance on Land Contamination Risk Management (LCRM) (Ref 16-29) indicates that the first step in evaluating land contamination risks is a PRA).

16.5.32 The objective of the PRA is to identify and evaluate potential land quality risks and development constraints associated with the Scheme and to construct an initial Conceptual Site Model (CSM) that can be used to inform future decision making and the design future ground investigation.

16.5.33 A Phase 1 PRA report is being prepared covering the Site which will be included with the PEIR.

16.5.34 The Phase 1 PRA includes the following:

- Details of land within the Site and surrounding land including development history, geology, hydrogeology, hydrology, soil and groundwater quality, and environmental setting;
- Details of any available site investigation, risk assessment, remediation, validation reports for land within the Site or asbestos surveys for any properties within the site;
- Details from a site walkover documenting:
  - The existing layout, current operations and condition of land within the Site, the property boundaries and immediately surrounding land;

- The visual inspection of any accessible site storm-water, foul and offsite effluent discharges; and
- A visual inspection (non-intrusive) of the external building fabric of potential structures and inspection of any asbestos registers (if available).

- A CSM and an evaluation of potential contamination linkages; and
- Conclusions and recommendations based on the findings.

16.5.35 The conclusions and recommendations of the Phase 1 PRA will identify additional mitigation measures.

16.5.36 The PRA will provide information on potential source, pathway, receptor linkages and recommendations for mitigation measures and further works, with the findings summarised in the Other Environmental Topics chapter of the ES.

16.5.37 Following these mitigation measures and recommendations, any residual effects on ground conditions are considered not significant.

Limitations and Assumptions

16.5.38 The assessment uses baseline data available at the time of assessment and assumes accuracy of third-party data.

16.6 Major Accidents or Disasters

16.6.1 This chapter describes the potential vulnerability of the Scheme to major accidents and disasters (MA&Ds) during construction and operation.

16.6.2 Major accidents and disasters are by nature very infrequent and low probability events, as such it would not be appropriate to consider the cumulative impacts associated with similar simultaneous events occurring at other nearby facilities where there is no direct connection. The method proposed would be for risk identification to be implemented which would identify, classify and evaluate risk and assessment guidance based on professional judgement.

Legislation

16.6.3 The EIA Regulations (Ref 16-53) has introduced a requirement to consider major accidents or disasters. It is considered likely that the original changes to the EIA Directive (Ref 16-54) to consider major accidents or disasters were made in order to bring certain other statutory requirements, mainly other European Union (EU) Directives, within the overall 'wrapper' of EIA and the Environmental Statement (ES). The Directive and domestic Regulations cite two specific directives as examples of risk assessments to be brought within EIA, these are Directive 2012/18/EU of the European Parliament and of the European Council (which deals with major accident

hazard registered sites) (Ref 16-54) and Council Directive 2009/71/Euratom (which deals with nuclear sites) (Ref 16-56). Neither of these Directives are relevant to the Scheme.

16.6.4 Schedule 4, Part 5d of the EIA Regulations (Ref 16-53) requires that the EIA contain "a description of the likely significant effects of the development on the environment resulting from the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)" and Schedule 4, Part 8 requires that the EIA contain "a description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned".

Assessment Methodology

16.6.5 The following methodology from the Major Accidents and Disasters in EIA: A Primer document (Ref 16-61) has been adopted where 'accidents' are considered to be an occurrence that happens by chance or without expectation in the course of construction and operation of a development (e.g., major emission, fire or explosion), and 'disasters' are considered to be a sudden accident or naturally occurring catastrophe that causes great damage or loss of life. These could include: extreme weather events or ground related hazard events (e.g., subsidence, landslide, earthquake). In general, major accidents or disasters, as they relate to the Scheme, fall into three categories:

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

16.6.6 An initial scoping exercise has been undertaken to identify all possible major accidents or disasters that could be relevant to the Scheme. This list was drawn from a number of sources, including the National Risk Register 2020 (Ref 16-55). Major accidents or disasters with little relevance in the UK were not included. The long list of major accidents or disasters is presented in Appendix B Long List of Major Accidents and Disasters. The long list was then reduced to form the short list presented in **Table 16-3**. This initial scoping exercise shows the potential vulnerability of the Project to the risk of a major accident and/or disaster associated with a variety of different events. **Table 16-4** also provides further clarity on the topics and events which have been scoped into the EIA, and those which have been scoped out, with suitable justification provided.

16.6.7 It is considered reasonable and proportionate to exclude certain receptor groups from the outset. Construction workers, as a receptor, can be excluded from the assessment, because existing legal protection is considered to be sufficient to minimise any risk from major accidents or disasters to a reasonable level. Legislation in force to ensure the protection of workers in the workplace includes:

- Health and Safety at Work etc. Act 1974 (Ref 16-57);
- The Management of Health and Safety at Work Regulations 1999 (Ref 16-58);
- The Workplace (Health, Safety and Welfare) Regulations 1992 (Ref 16-59); and
- Construction (Design and Management) (CDM) 2015 Regulations (Ref 16-60).

16.6.8 However, it is considered highly likely that as the design of the Scheme evolves in preparation of the DCO application, it will become clear that there is no real risk or serious possibility of these events interacting with the Scheme. In that eventuality, it is proposed to scope out from the ES the assessment of such major accidents or disasters. The ES would note and explain where this approach has been taken. Should the possibility of any events interacting with the Scheme remain, this would be assessed and presented in the ES.

16.6.9 Specific mitigation measures that can be committed to at this stage are included in **Appendix E** of this EIA Scoping Report as relevant.

Table 16-3: Major accidents or disasters shortlisted for further consideration

Major accident or disaster	Potential receptor	Comments
Floods	Property and people in areas of increased flood risk.	Both the vulnerability of the Scheme to flooding, and its potential to exacerbate flooding, will be covered in the Flood Risk Assessment, and also reported in ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme. Mitigation will be considered and, where necessary, incorporated into the Scheme design.
Fire	Local residents, habitats and species.	There may be some potential for fire as a result of the battery storage element of the Scheme. However, the battery energy storage system will include automatic cooling and suppression systems, which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. A Framework Battery Fire Safety Management Plan will be prepared for the Scheme. The development of the Framework Management Plan will be considered in the iterative design of the Scheme ensuring that design requirements to ensure fire safety (such as ensuring adequate provision of land for water storage) and management of any firewater runoff are captured. It is anticipated that this will be a stand-alone report submitted alongside the DCO application.
Road accidents	Aquatic environment Road users	The risk of road collisions and accidents will be addressed in the Transport Assessment. The risk posed by spillage from hazardous loads as a result of a road traffic accident during construction or decommissioning has been scoped out of the ES as there are no nearby road features which suggest that the transfer of materials poses a greater risk than would be normally expected on the general highway network. The general risks of spillages of hazardous materials / chemicals will be considered in the Water Environment chapter of the ES. The potential for glint and glare to affect road users will be considered within a technical

Major accident or disaster	Potential receptor	Comments
		appendix to the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.
Rail accidents	Rail users	The Site is not located close to a railway line. The closest railway line is the East Coast line that runs between Newark and Grantham, approximately 7.6km to the south-west of the Scheme at its closest.
Flood Defence Failure	Property and people in areas of increased flood risk	This will be covered in the Flood Risk Assessment and will also be reported in ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme.
Utilities failure (gas, electricity, water, sewage, oil, communications)	Employees and local residents	The Scheme has the potential to affect existing utility infrastructure above and below ground. To identify any existing infrastructure constraints, both consultation and a desk based study will be undertaken.
Mining / Extractive Industry	Employees	There is the potential for current or past quarrying activity in the vicinity to lead to unstable ground conditions due to nearby active quarries. However, the risk will be considered as part of the 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, due to climate change. The planting design will take account of biosecurity risks through a wider mix of species including some non-natives.
Aircraft accident	Aircraft users Property and people in the surrounding areas	The Solar PV Site is located approximately 8 km south of the Royal Air Force Station Waddington. The potential for glint and glare to affect aircraft users is proposed to be scoped out of the glint and glare assessment, pending MoD agreement, as discussed at paragraph 16.4.8.

Limitations and Assumptions

16.6.10 It is considered highly likely that as the design of the Scheme evolves in preparation of the DCO application, it will become clear that there is no real risk or serious possibility of these events interacting with the Scheme. In that eventuality, it is proposed to scope out the assessment of such major accidents or disasters from the ES. The ES would note and explain where this approach has been taken. Should the possibility of any events interacting with the Scheme remain, this would be assessed and presented in the ES.

Summary of Elements Scoped In and Scoped Out

16.6.11 A standalone chapter for Major Accidents and Disasters is not considered appropriate given the nature, scale and location of the Scheme. The Scheme is not considered to be vulnerable or give rise to significant impacts relating to Major Accidents and Disasters.

16.6.12 Therefore, the short listed elements of the Major Accidents and Disasters have been scoped out of the assessment. The scoped out elements are presented in **Table 16-4**.

Table 16-4 Elements scoped in and scoped out of the assessment of Major Accidents and Disasters

Environmental Topic	Scoped in / Scoped out
Floods	Scoped out – flood risk will be assessed within Chapter 9 Water Environment of the ES and within a Flood Risk Assessment to support the DCO application.
Fire	Scoped out – fire risks relating to the battery storage element will be considered within a Framework Battery Safety Management Plan.
Road Accidents	Scoped out – traffic related accidents will be detailed within Chapter 13 Traffic and Movement of the ES.
Flood Defences Failure	Scoped out – flood related risks will be detailed within Chapter 9 Water Environment of the ES and within a Flood Risk Assessment to support the DCO application.
Utilities failure (gas, electricity, water, sewage, oil and communications)	Scoped out – impacts to utilities will be discussed within the telecommunications and utilities section of Chapter 16 Other Environmental Topics of the ES.

Environmental Topic	Scoped in / Scoped out
Mining extractive industry	Scoped out – disasters relating to mining extraction will be considered as part of the geotechnical design. Therefore, it is not considered necessary to assess in this within the EIA
Plant disease	Scoped out – disasters relating to plant diseases will be detailed within the planting design and Framework LEMP. Therefore, it is not considered necessary to assess in the EIA.
Aircraft Accidents	Scoped out – disasters relating to Glint and Glare effects on aircrafts have been assessed in **Chapter 16.4: Other Environmental Topics** – **Glint and Glare** of this EIA Scoping Report and were scoped out due to low risk.

16.7 Telecommunications, Television Reception and Utilities

16.7.1 Solar farms have the potential to affect existing below ground utility infrastructure for example through 'cable strike' when piling the Solar PV frames or excavating the cable trenches, but are not at a height to affect above ground telecommunications. The Scheme will be designed to ensure appropriate buffers are applied in relation to the placement of solar PV panels and other infrastructure in relation to buried infrastructure and OHL to allow safe access and working areas.

16.7.2 To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. Consultation with relevant telecommunication and utilities providers is a routine part of development and consultees will include water, gas and electricity utilities providers and telecommunications providers as appropriate. Information obtained from consultation will be used to inform the Scheme design and appropriate protective provisions will be included in the DCO to ensure the protection of apparatus wherever any existing infrastructure has the potential to be affected by the Scheme.

16.7.3 Taking the above into account, relevant measures will be captured within the Scheme design and summarised within the Other Environmental Topics chapter of the ES; therefore, a separate utilities ES chapter is not considered to be required.

16.7.4 Specific mitigation measures that can be committed to at this stage are included in Appendix E Environmental Mitigation and Commitments Register of this EIA Scoping Report as relevant.

16.8 Electromagnetic Fields

16.8.1 Electromagnetic Fields (EMF) are areas of energy generated by electrical current, which is exhibited by electrical devices and transmission cables. There are two types of EMF, high frequency and low frequency. High frequency which is typically generated by devices such as mobile phones and televisions, and low frequency which is generated by the flow of electricity in infrastructure such as power cables, transformers and inverters (Ref 16-53) which are the impacts of interest for the Scheme.

16.8.2 The recent advice published by PINS 'Nationally Significant Infrastructure Projects: Technical Advice Page for Scoping Solar Development' (Ref 16-62) states the following:

"Where proposed cables are over 132kV, an EMF assessment should be provided in an appendix to the Environmental Statement. This should include the location, routing and voltages of any cables over 132kV and a risk assessment to any human and ecological sensitive receptors within the ZoI."

16.8.3 There is no evidence that EMF from buried cables affects or disturbs ecology, and the Scheme design does not currently include high voltage cables that cross river

habitats for migratory species. As such this section focusses on the potential impact to human health.

16.8.4 No overhead electricity cables will be used or constructed as part of the Scheme. With the exception of relatively short lengths of onsite electrical cabling connecting the solar panels and the inverters (which is typically above ground level and fixed to the mounting structure, or to other parts of nearby components), all cables will be buried underground. The dimension of the trenches will vary depending on the number of cables or ducts they contain, as described in Chapter 3.

16.8.5 The DECC guidance document (Ref 16-63) states that underground cables at voltages up to and including 400 kV are considered not capable of exceeding the International Commission on Non-Ionizing Radiation Protection (ICNIRP) exposure guidelines for EMF (Ref 16-64) and that compliance with exposure guidelines for such equipment can be assumed unless evidence is brought to the contrary in specific cases. There is potential for exceedances of 400 kV where infrastructure overlaps with other projects' infrastructure, but this is not the case for the Scheme.

16.8.6 The onsite electrical cabling will not be considered in the assessment as it would not significantly contribute to any increase in electromagnetic fields should it overlap with other infrastructure. Underground cables at voltages up to and including 400 kV are considered not to exceed the ICNIRP exposure guidelines (**Error! Reference source not found.**).

16.8.7 The Control of Electromagnetic Fields at Work Regulations 2016 (Ref 16-67) sets out the duties of employers in relation to controlling the risks of electro-magnetic fields to employees. This includes a requirement to assess employees' potential exposure to electro-magnetic fields with reference to action levels (ALs) and exposure limit values (ELVs). As the effects of EMFs on workers for the Scheme will be controlled and mitigated to acceptable levels through the legislative framework, impacts to workers will not be considered within the assessment.

16.8.8 Similarly, as noted in the National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (Ref 16-66), electromagnetic fields have the potential to have adverse impacts on aviation. At the distances of separation between the underground cables and potential aviation receptors, the levels of EMFs experienced by potential aviation receptors is considered to be negligible and therefore aviation receptors will not be included in the assessment.

16.8.9 Additionally, EN-5 (paragraph 2.9.58) (Ref 16-66) recognises that there is little evidence that exposure of crops and farm animals to transmission line electromagnetic fields has any agriculturally significant consequences. Therefore, consideration of the impacts to agriculture will not be included within the technical appendix.

16.8.10 There are properties which are in proximity to the Scheme, however it is unlikely that cables will be installed within 10m of any property due to the need for construction vehicles to manoeuvre both sides of the trench within the working width. The Applicant is expected to commit to a minimum 10m offset between the

400kV cables and any residential properties in the DCO application, therefore providing sufficient protection. Therefore, no significant effects to residential receptors are predicted to occur and this will not be assessed within the technical appendix.

16.8.11 The presence of the public either directly above or adjacent to underground cables associated with the Scheme 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 similar to (and a lot less than some) that associated with general household appliances (and noticeably less than associated with the exposure when using a vacuum cleaner) and as such will not be assessed within the technical appendix.

16.8.12 As the design develops, consideration will be given to the potential for EMF to impact on sensitive receptors. This will include undertaking calculations to determine whether EMF will be experienced by sensitive receptors and to what intensity. If it is likely to be a nuisance or hazard, mitigation will be proposed.

16.8.13 As appropriate, the results and recommendations of any EMF assessment will be incorporated into the Scheme design and an EMF assessment presented as a technical appendix to the ES. As electricity will only flow through the cabling and infrastructure during the operational phase, this assessment will only consider operational phase effects. Given the industry knowledge of exposure levels and the Applicant's commitment to a minimum 10m spacing between the high voltage cabling and residential receptors, it is therefore proposed that EMF does not warrant standalone ES chapter. It will be summarised within the Other Environmental Topics chapter of the ES, with the technical appendix and summary demonstrating the effects are not significant.

16.8.14 Specific mitigation measures that can be committed to at this stage are included in Appendix E Environmental Mitigation and Commitments Register of this EIA Scoping Report as relevant.

17 Structure of Environmental Statement

17.1.1 The ES will consist of three volumes and a Non-Technical Summary (NTS). This section provides a summary of each document that will form the ES.

17.1.2 **ES Volume 1: Main Report** — this will form the main body of the ES, detailing the results of the environmental assessment, likely significant effects arising from the Scheme, and the proposed mitigation measures. The ES will also identify opportunities for social and economic benefits and environmental enhancement. The ES will be divided into a number of background and technical chapters, each being supported with figures and tabular information. Each topic will be assigned a separate technical chapter in the ES as follows:

- Chapter 6: Climate Change;
- Chapter 7: Cultural Heritage;
- Chapter 8: Ecology and Nature Conservation;
- Chapter 9: Water Environment;
- Chapter 10: Landscape and Visual Amenity;
- Chapter 11: Noise and Vibration;
- Chapter 12: Socio-Economics and Land Use;
- Chapter 13: Traffic and Movement;
- Chapter 14: Soils and Agricultural Land;
- Chapter 15: Materials and Waste; and
- Chapter 16: Other Environmental Topics.

17.1.3 In addition to the above, the following chapters will be produced as part of the ES:

- Chapter 1: Introduction;
- Chapter 2: The Scheme;
- Chapter 3: Alternatives and Design Evolution;
- Chapter 4: Consultation;
- Chapter 5: Environmental Impact Assessment Methodology;
- Chapter 17: Effect Interactions; and
- Chapter 18: Summary of Environmental Effects.

17.1.4 **ES Volume 2: Figures** — A complete set of figures will be provided for reference which support the assessments in ES Volume 1.

17.1.5 **ES Volume 3: Technical Appendices** — A complete set of appendices will be provided for reference. These comprise of background data, technical reports, tables, figures and surveys which support the assessments in ES Volume 1.

17.1.6 **ES Non-Technical Summary (NTS)** — The NTS will be presented in a separate document and provides a concise description of the Scheme, the considered alternatives, baseline, assessment methodology, potential environmental effects and mitigation measures. The NTS will be designed to provide information on the Scheme in an accessible format which can be understood by a wide audience and to assist interested parties with their familiarisation of the project.

18 Summary and Conclusions

18.1.1 This EIA Scoping Report represents notification under Regulation 8(1)(b) of the EIA Regulations (Ref 18-1) that the Applicant will undertake an EIA in respect of the Scheme and produce an ES to report the findings of the EIA.

18.1.2 It also represents a formal application to the Secretary of State under Regulation 10 of the EIA Regulations for a 'Scoping Opinion' as to the information to be provided within the ES that will form part of the DCO application. This report has identified the environmental effects that are considered to have the potential to be significant and proposes the approach to be used in assessments that will be undertaken for the EIA to characterise and understand the significance of these effects. The prescribed consultees are invited to consider the contents of this report and comment accordingly within the statutory 42 day time period.

18.1.3 For clarity, **Table 18-1** presents a summary of the proposed scope of the technical topics as well as which elements of these topics that are to be scoped in and out and the rationale behind this decision.

18.1.4 **Table 18-2** summarises the approach taken to the topics discussed in Chapter 16: Other Environmental Topics of this EIA Scoping Report.

Table 18-1: Summary of matters proposed to be Scoped In and Out of the EIA

Aspect	Matter	Information to support scoping aspect / matter in / out of the EIA where relevant
Climate Change	**Climate Parameters**	Extreme weather events, precipitation changes, temperature changes, sea level rises, and wind are scoped in. A Lifecycle GHG Impact Assessment will be completed, along with a Climate Change Risk Assessment, and an In-Combination Climate Change Impact Assessment.
Cultural Heritage	**Built Heritage, Archaeology and Historic Landscape**	Built heritage, archaeology and historic landscape are scoped in. There will be an assessment of the impacts to built heritage and archaeology assets, including impacts arising from changes to their setting, and there will be an assessment of the impact on the historic landscape.
		The non-designated findspots (comprising the findspot of a coin and two pottery scatters) recorded within the Site Boundary are not considered extant assets and as such are scoped out of assessment.
Ecology	**Designated/Non-designated Sites**	Statutory designated sites (National) within 5 km are scoped in. Non-statutory designated sites within 2 km of the Site are scoped in.
		Statutory designated sites (European) within 10 km, and up to 30 km from the Site with mobile species as a qualifying criteria, are scoped out (none identified within the respective Study Areas). Statutory designated sites (European) that are located more than 10 km from the Site are scoped out. There are no potential impact pathways during any phase (construction, operation, or maintenance and decommissioning) at this distance. Statutory designated sites (National) that are located more than 5 km from the Site are scoped out. Beyond this distance there are no potential impact pathways during any phase (construction, operation, or maintenance and decommissioning). Non-statutory designated sites that are located more than 2 km from the Site are scoped out. Beyond this distance there are no potential impact pathways during any phase (construction, operation, or maintenance and decommissioning).
	Habitats	HaPI within the ZoI for the Site are scoped in.
		Common and widespread habitats of no conservation value and habitats outside of the Site are scoped out. There will be no direct impact to habitats outside of the Site and good practice construction methods will ensure that there are no indirect impacts to

Aspect	Matter	Information to support scoping aspect / matter in / out of the EIA where relevant
		habitats outside of the Site. Good practice measures will be included within a CEMP. Therefore, there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
	Biodiversity Net Gain	Biodiversity Net Gain is scoped in, this is a legal requirement.
	Terrestrial Invertebrates	Notable terrestrial invertebrate species and assemblages are scoped in.
		Common and widespread species of no conservation value and species outside of the Site are scoped out. Retention of the majority of habitats (e.g. woodland, hedgerows and ditches) within the Site, avoidance of off-Site habitats and good practice construction methods will ensure that there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
	Aquatic Macroinvertebrates	Notable aquatic macroinvertebrate species and assemblages are scoped in.
		Attraction of aquatic invertebrates to solar PV panels during operation is scoped out, along with common and widespread species of no conservation importance, and species outside of the Site. The Scheme is not located adjacent to water bodies, or near designated sites that are designated for supporting populations of notable aquatic invertebrates. The likelihood of aquatic insects being attracted to large open areas of shiny surfaces is considered low given that such species will preferentially use smaller shiny surfaces. Most of the aquatic insect species identified during the desk study are of low conservation value, and do not use open water areas for any of their behaviours (i.e. few Odonata (dragonflies) were recorded for example). The impact of solar panels on aquatic insects would therefore be negligible. Retention of the majority of habitats (e.g. watercourses and water bodies) within the Site, avoidance of off-Site habitats and good practice construction methods will ensure that there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme.
	Aquatic Macrophytes	Aquatic Macrophytes are scoped in. There are potential impact pathways for direct and indirect impacts.
	Fish	Fish are scoped in. There are potential impact pathways for direct and indirect impacts.

Aspect	Matter	Information to support scoping aspect / matter in / out of the EIA where relevant
	Amphibians including GCN	Amphibians are scoped in. Protected and notable amphibians have been identified within the Study Area.
	Reptiles	Reptiles are scoped in, and have been identified within the Study Area.
	Breeding and non-breeding birds	Breeding and non-breeding birds are scoped in, and have been identified within the Study Area.
		Potential collision / attraction to solar PV panels from breeding or non-breeding birds during operation is scoped out. The Scheme is not located adjacent to water bodies or on a migratory flyway / flightpath used by congregations of birds, e.g. between sites known to support large congregations of birds. Surveys of breeding and non-breeding birds will confirm the usage of the Site by birds, including of birds flying over the Site. There is no evidence in the UK that solar panels increase the risk of mortality or displacement of bird populations. Risk of collision with solar panels is therefore proposed to be scoped out of the assessment. The requirement for two years worth of data for surveys of non-breeding birds is scoped out. The Scheme is not within 20 km of any European Site or Ramsar site that is designated for birds and the land within the Site is therefore not functionally linked habitat or connected to any European Site. Therefore, a survey of non-breeding birds within a single winter period (between October and March) will be representative of the non-breeding bird population using the Site to allow the potential impacts of the Scheme on non-breeding birds to be assessed.
	Bats	Bats are scoped in – roosting and foraging/commuting bats have been identified within the Study Area.
	Riparian Mammals	Riparian Mammals are scoped in. Water Vole and Otter have been identified in the Study Area.
	Badger	Badger are scoped in, and have been identified within the Study Area.
	Surveys for Brown Hare, Hedgehog, Polecat and Harvest Mouse	Surveys for Brown Hare, Hedgehog, Polecat and Harvest Mouse are scoped out. Polecat is a rare species outside of its known distribution range and historical records of Polecat show a widespread but scarce distribution in the northern half of Lincolnshire. Therefore, given the paucity of records of this species within the Study Area and this species' rarity within Lincolnshire, Polecat is likely to be absent from the

Aspect	Matter	Information to support scoping aspect / matter in / out of the EIA where relevant
		Site. Brown Hare and Hedgehog are likely to be present within the Site and Harvest Mouse has the potential to be present, based on the habitat within the Site. Incidental records of these species will be recorded during other ecological surveys. Any embedded mitigation measures (which will be formalised in the CEMP secured as part of the DCO requirements) will ensure the integrity of retained habitats are not adversely affected and that there is no fragmentation of habitats, or of populations of species and that no species mortality occurs. Therefore, there are no impact pathways, either directly or indirectly, that would negatively impact upon Brown Hare (known to be present), Hedgehog or Harvest Mouse (if present) and mitigation will be adopted on a precautionary principle.
	Other mammals – e.g. common and widespread species of no conservation value	Other mammals are scoped out. The design of the perimeter fence will include gaps to allow mammals, including small deer to pass underneath at strategic locations to maintain ecological connectivity.
Water Environment	**Surface water, Groundwater, Hydromorphology, Flood risk**	Surface water drainage, groundwater, hydromorphology and flood risk are all scoped in. There is the potential for impacts to surface water and ground water during construction and operation of the Scheme. There is the potential for impacts to hydromorphology through impacts to infrastructure in the area of the River Brant, and watercourse crossings within its catchment. There is also the potential for impacts on the flood risk potential within the Scheme area, and downstream on watercourses.
	Surface water drainage / water supply, Nutrient neutrality assessment	Foul water drainage / water supply, and nutrient neutrality assessment are scoped out. There is no potential impact to foul drainage or water supply. There is no hydrologic continuity between the Site and the designated sites identified by Natural England as requiring assessment.
		An assessment of landscape and visual effects for all assessment phases is scoped in.

Aspect	Matter	Information to support scoping aspect / matter in / out of the EIA where relevant
Landscape and Visual Amenity	**Landscape and visual effects, and lighting**	A lighting assessment is scoped out – lighting during construction would be temporary and directed away from sensitive receptors. During operation lighting would also be temporary and directed at the Scheme infrastructure.
Noise and Vibration	**Noise and vibration levels, construction traffic noise and operational noise**	Noise and vibration levels associated with construction and decommissioning works are scoped in - temporary noise and vibration emissions from construction and decommissioning works may adversely impact on sensitive receptors. Construction traffic noise is scoped in - temporary noise from construction traffic movements may adversely affect receptors near public roads that are part of construction traffic routes. Operational noise is scoped in - permanent noise emissions from solar farm infrastructure may adversely affect nearby sensitive receptors.
	Construction traffic vibration, operational traffic noise, vibration from the operation of the Scheme, noise and vibration effects on PRoW users	Construction traffic vibration is scoped out – road traffic can cause vibration; however, DMRB LA 111 states: "*operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects.*" Consequently, traffic induced vibration is not considered to generate likely significant effects and is therefore scoped out. Operational traffic noise is scoped out – operational traffic flows would be minimal (e.g. a few vehicles per week) and not sufficient to result in a 1 dB increase in noise, which would require a 25% increase in traffic. Vibration from the operation of the Scheme is scoped out – no plant that would generate perceptible levels of vibration are part of the Scheme and, as such, there will be no associated operational vibration effects. It is proposed that operational ground-borne vibration is scoped out of any further assessment. Noise and vibration effects on PRoW users is scoped out – short-term exposure to noise and vibration for PRoW users would not constitute a significant effect on health and quality of life. All reasonable steps to minimise the effects of noise on PRoW users will be taken during the construction, operational and decommissioning phases of the Scheme.
Socio-economics and Land Use	**Employment, economic growth**	Employment, economic growth and training, community land and assets, and private land and assets (construction, operation and decommissioning), are scoped in.

Aspect	Matter	Information to support scoping aspect / matter in / out of the EIA where relevant
	and training, community land and assets, private land and assets, minerals and safeguarding	Local accommodation sector (construction phase) is scoped in. Community land and assets (construction, decommissioning and operation) are scoped in, Private land and assets (construction, operation and decommissioning) are scoped in.
		Minerals and safeguarding are scoped out – the Grid Connection Corridor runs through an MSA, although land take is very limited and the design will aim to minimise impacts on the MSA.
Transport and Access	**Construction**	During construction, additional severance to pedestrians and cyclists, delay to drivers and passengers, delay to pedestrians and cyclists, decline in pedestrian and cyclist amenity, additional fear and intimidation, decline in road safety, decline in pedestrian safety and impacts to PRoW through diversions and / or closures are scoped in.
	Hazardous loads, operational phase assessments, decommissioning phase assessments	Hazardous loads during construction are scoped out – no hazardous loads are expected as part of the construction process. Assessments for the operational phase are scoped out, as no significant effects are predicted due to low vehicle numbers. Assessments for the decommissioning phase are scoped out - the decommissioning phase will be accounted for by the assessment of the construction phase, which represents a worst-case. As such, consideration of the construction phase is considered robust in concluding the potential effects associated with the decommissioning phase.
Soils and Agricultural Land	**Agricultural land and land use and soil resource quality – construction and operation.**	Agricultural land and land use, and soil resource quality during construction and operation phase are scoped in. The Scheme has the potential to impact agricultural land and soil resources.
	Agricultural land and land use – decommissioning Soil resource quality - decommissioning	Agricultural land and land use, and soil resource quality during decommissioning phase are scoped out. The precise details of the decommissioning, although outlined in the Framework DEMP, are not known. However decommissioning effects are expected to be similar to, or of a lesser magnitude than, construction effects.

Aspect	Matter	Information to support scoping aspect / matter in / out of the EIA where relevant
		Therefore, decommissioning effects are considered to be the same as construction phase effects and will be scoped out of specific assessment within the ES.
Materials and waste	**Management of waste**	Changes in available landfill void capacity are scoped in, for construction, operation and decommissioning.
		Changes in availability of materials, waste arising from extraction, processing and manufacture of construction components and products, changes to safeguarded minerals and waste sites, and other environmental impacts from the management of waste, are all scoped out.

Table 18-2: Approach to other environmental topics

Environmental Topic	Proposed Approach
Air Quality	As assessment of impacts from dust emissions from the construction and decommissioning phases will be considered for the Scheme. Mitigation measures will be identified and incorporated into the Framework CEMP. Sensitive receptors will be identified for the Scheme. Construction and decommissioning plant related emissions are scoped out. Construction traffic flows are scoped out. Operational air quality impacts are scoped out.
Human Health	A standalone assessment of Human Health is proposed to be scoped out of the ES. This is because other chapters in the ES will comprehensively assess potential effects of the Scheme which could be relevant to health effects (both physical and mental), and given the nature of the development and its potential impacts this is considered a proportionate approach.

Environmental Topic	Proposed Approach
Glint and Glare	An assessment will be undertaken to identify the potential for solar reflections to impact on sensitive receptors for both orientation options to inform design development. Construction and decommissioning effects are proposed to be scoped out of the assessment. The Applicant will liaise with the MoD with regards to flight activities at Royal Airforce Station Waddington and, should the MoD agree, will scope aviation matters out of the assessment. An assessment on aviation will be carried out if the MoD requires the Applicant to model the effects of glint and glare on its activities.
Ground Conditions	A PRA will be included in the PEIR and the results and recommendations of this will be incorporated into the Framework CEMP. Maintenance activities during the operational phase will be managed through an Operational Environmental Management Plan and are proposed to be scoped out of the assessment.
Major Accidents and Disasters	Where the major accidents and disasters identified are not already being considered within the scope of existing technical assessments, they will continue to be reviewed with the design team to ensure the risks are understood and addressed through design as necessary. However, it is considered highly likely that as the design of the Scheme evolves in preparation of the DCO application, it will become clear that there is no real risk or serious possibility of the event interacting with the Scheme. In that eventuality, it is proposed to scope out from the ES the assessment of such major accidents or disasters. The ES would note and explain where this approach has been taken.
Telecommunications	Consultation and a desk-based study to identify any existing infrastructure constraints and this information will be used to inform the Scheme design.

Environmental Topic	Proposed Approach
EMF	As appropriate, the results and recommendations of any EMF assessment will be incorporated into the Scheme design and an EMF assessment presented as a technical appendix to the ES. Given the industry knowledge of exposure levels and the Applicant's commitment to a minimum 10m spacing between the high voltage cabling and residential receptors, it is therefore proposed that EMF does not warrant standalone ES chapter. It will be summarised within the Other Environmental Topics chapter of the ES, with the technical appendix and summary demonstrating the effects are not significant.

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Chapter 17: Structure of the Environmental Statement

n/a

Chapter 18: Summary and Conclusions

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20 Glossary

Agricultural Land Classification (ALC)	The standardised method for classifying agricultural land in England and Wales according to its versatility, productivity and workability, based upon inter-related parameters including climate, relief, soil characteristics and drainage, i.e. ALC assesses land quality based upon the type and level of agricultural production the land can potentially support. These factors form the basis for classifying agricultural land into one of five grades (with Grade 3 land divided into Subgrades 3a and 3b), ranked from excellent (Grade 1) to very poor (Grade 5).
Air Quality Management Area (AQMA)	Places where air quality objectives are not likely to be achieved. Where an AQMA is declared, the local authority is obliged to produce an Action Plan in pursuit of the achievement of the air quality objectives.
Baseline conditions	The conditions against which potential effects arising from the Scheme are identified and evaluated.
Battery energy storage system	Proposed development of a battery storage installation and associated development to allow for the storage and exportation of energy to the National Grid.
Best and most versatile (BMV) agricultural land	Best and most versatile (BMV) agricultural land of excellent (ALC Grade 1), very good (Grade 2) and good (Subgrade 3 a) agricultural quality.
Construction Environmental Management Plan (CEMP)	A site-specific plan developed to ensure that appropriate environmental management practices are followed during the construction phase of a project.
Cumulative Effects	Effects upon the environment that result from the incremental impact of an action when added to other past, present or reasonably foreseeable actions. Each impact by itself may not be significant but can become a significant effect when combined with other impacts.
Environmental Impact Assessment (EIA)	A process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making. For certain projects, EIA is a statutory requirement.
Environmental effect	The consequence of an action (impact) upon the environment such as the decline of a breeding bird population as a result of the removal of hedgerows and trees.

Environmental impact	The change in the environment from a development such as the removal of a hedgerow.
Environmental Statement	A document produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations to report the results of an EIA.
Preliminary Ecological Appraisal (PEA)	Comprises a desk study, Phase 1 Habitat Survey (which categorises habitats to a broad level using the methodologies set out by JNCC (1993 as amended) guidelines) and Protected Species Scoping survey (which includes preliminary survey work to identify the presence or potential presence of legally protected species).
Flood Zone 3	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone 2	This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Flood Zone 1	This is land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability (AEP)).
Geophysical survey	Geophysical survey is a non-intrusive pre-construction archaeological evaluation technique that exploits a variety of physical or chemical characteristics of rocks and soils etc, in an attempt to locate underground features of archaeological interest. Types of geophysical survey include magnetometer survey, magnetic susceptibility survey and resistivity survey.
Grid Connection Corridor	Corridor which represents the maximum extent of land within which the cable route would be located.
Heavy Goods Vehicle (HGV)	Vehicles with 3 axles (articulated) or 4 or more axles (rigid and articulated).
Historic Environment Record	The record of archaeological and built heritage features in a county or district, usually held and maintained by the relevant County Council.

Inverter	Inverters convert the direct current (DC) electricity collected by the PV modules into alternating current (AC), which allows the electricity generated to be exported to the National Grid. Battery energy storage systems also use inverters to convert between DC and AC. The batteries function in DC and electricity must be converted to AC to pass into or from the grid.
Jointing pit	Underground structures constructed at regular intervals along the cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Mitigation	Measures including any process, activity, or design to avoid, prevent, reduce, or, if possible, offset any identified significant adverse effects on the environment.
National Policy Statement (NPS)	National Policy Statements are produced by government. They comprise the government's central policy documents for the development of nationally significant infrastructure.
Nationally Significant Infrastructure Projects (NSIP)	NSIPs are large scale developments such as certain new harbours, power generating stations (including wind farms), highways developments and electricity transmission lines, which require a type of consent known as 'development consent' under procedures governed by the Planning Act 2008 (and amended by the Localism Act 2011).
Grid connection substation	A compound containing electrical equipment to enable connection to the National Grid.
Preliminary Environmental Information Report (PEIR)	PEIR is defined in the EIA Regulations as: *"information referred to in Regulation 14(2) which –* *(a) has been compiled by the applicant; and* *(b) is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)."*
Preliminary Risk Assessment	Report that presents a summary of readily-available information on the geotechnical and/or geo-environmental characteristics of the site and provides a qualitative assessment of geo-environmental and/or geotechnical risks in relation to the proposed development.
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Receptor	A component of the natural or man-made environment that is affected by an impact, including people.
Scheme	The Leoda Solar Farm comprising solar PV and battery storage and associated development for connection to the national transmission system via Grid Connection.
Setting	The surroundings within which a heritage asset is experienced and any element, which contributes to the understanding of its significance.
Soil (as referred to in Chapter 15 Soils and Agricultural land)	The upper layers of the earth's surface, comprising a mixture of mineral and organic components that contain air, water and micro-organisms. Soils provide a substrate for plant growth, a habitat for animals and storage for water and carbon. Generally, soils are considered to occur to a maximum depth of 1.2 m, but are often shallower
Soil Associations	Groupings of related soil series (see below).
Soil series	Soil series are the lowest category in the soil classification system and are precisely defined based upon particle-size distribution, parent material (substrate) type, colour and mineralogical characteristics.
Solar PV Site	The maximum extent of land potentially required for the solar photovoltaic (PV) generating panels and on-site energy storage facilities.
Site / Scheme Boundary	The maximum extent of land potentially required temporarily and/or permanently for the construction, operation and maintenance of the Scheme, including the Solar PV Site and the Grid Connection Corridor.
Source Protection Zone (SPZ)	SPZs show the risk of contamination from any activities that might cause pollution to groundwater sources such as wells, boreholes and springs used for public water supplies. The closer the activity, the greater the risk. SPZs can comprise of up to three main zones (inner, outer and total catchment). A fourth zone of special interest can also occasionally be applied to a groundwater source.
Sustainable drainage systems (SUDS)	Surface water drainage systems developed in line with the ideals of sustainable development (e.g. swales, ponds, basins, filtration flow control, etc).
Transformers	Transformers control the voltage of the electricity generated across the site before it reaches the electrical infrastructure.

Visual receptors	People with views of the development or associated activities. These are located within the visual envelope and are typically residents, motorists, pedestrians, recreational users in residential areas on publicly accessible roads, footpaths and open spaces.
Water Framework Directive	The Water Framework Directive ("WFD") introduced a new system for monitoring and classifying the quality of surface and ground waters. The Directive requires that Environmental Objectives be set for all surface waters and groundwater to enable them to achieve Good Ecological Potential/Status by a defined date.
Zone of Theoretical Visibility	The zone within which views of a proposed development may be experienced, as determined by analysis of OS data and field survey. It is influenced by many factors including topography and intermediate visual intrusions, such as blocks of woodland and buildings.

21 Abbreviations

AADT	Average Annual Daily Traffic Flow
AC	Alternating current
AEP	Annual Exceedance Probability
agl	Above ground level
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
APFP	Applications: Prescribed Forms and Procedure
AQMA	Air Quality Management Area
ATC	Automatic Traffic Counts
BAP	Biodiversity Action Plan
BGS	British Geological Survey
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
BOD	Biological Oxygen Demand
BPM	Best Practicable Means
BRE	Building Research Establishment
BS	British Standard
CBC	Common Bird Census
CCC	Climate Change Committee
CCTV	Closed circuit television
CDM	Construction Design Management
CEMP	Construction Environmental Management Plan

CH_4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute of Archaeologists
CO_2	Carbon dioxide
COPA	Control of Pollution Act 1974
COSHH	Control of Substances Hazardous to Health
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
DBA	Desk-Based Assessment
DC	Direct current
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DEMP	Decommissioning Environmental Management Plan
DLL	District Level Licence
DMRB	Design Manual for Roads and Bridges
EC	European Commission
EcIA	Ecological Impact Assessment
eDNA	Environmental DNA
EEA	European Economic Association
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan

EPS	European Protected Species
EPSM	European Protected Species Mitigation
EPUK	Environmental Protection UK
ERP	Emergency Response Plan
ES	Environmental Statement
ESRC	Economic and Social Research Council
EU	European Union
FRA	Flood Risk Assessment
GCN	Great Crested Newt
GHG	Greenhouse gas
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GRP	Glass reinforced plastic
GVA	Gross Value Added
GWDTE	Groundwater Dependent Terrestrial Ecosystem
H&SP	Health and Safety Plan
ha	hectare
HDD	Horizontal Directional Drilling
HER	Historic Environmental Record
HFCs	Hydrofluorocarbons
HGV	Heavy goods vehicle
HIA	Health Impact Assessment
HLC	Historic Landscape Characterisation
HMSO	Her Majesty’s Stationery Office

HMWB	Heavily Modified Water Body
HRA	Habitat Regulation Assessment
HSI	Habitat Suitability Index
HUDU	Healthy Urban Development Unit
HV	High voltage
HVAC	Heating, ventilation and cooling
IAQM	Institute of Air Quality Management
IAS	Invasive Alien Species
IBD	Internal Drainage Board
ICCI	In-combination climate change impact
ICE	Inventory of Carbon and Energy
IEA	Institute of Environmental Assessment
IEMA	Institute of Environmental Management and Assessment
IHBC	Institute of Historic Building Conservation
INNS	Invasive Non-Native Species
ISO	International Organisation for Standardisation
JNCC	Joint Nature Conservation Committee
km	Kilometre
kV	Kilovolt
LCC	Lincolnshire County Council
LDR	Long Distance Route
LFA	Lead Flood Authority
LHA	Local Highway Authority

LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LPA	Local Planning Authorities
LRN	Local Road Network
LSE	Likely significant Effects
LSOAs	Lower Layer Super Output Areas
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographical Information for the Countryside
MHCLG	Ministry of Housing, Communities and Local Government
MSA	Mineral Safeguarding Areas
MSOA	Middle Layer Super Output Area
MW	Megawatts
NCA	National Character Area
NERC	The Natural Environmental and Rural Communities
NEYEDC	North and East Yorkshire Ecological Data Centre
NF_3	Nitrogen trifluoride
NGET	National Grid Electricity Transmission
NGR	National Grid Reference
NHLE	National Heritage List for England
NHS	National Health Service
NKDC	North Kesteven District Council
NNR	National Nature Reserve

NO_2	Nitrogen Dioxide
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
NVQ	National Vocational Qualification
NVZ	Nitrate Vulnerable Zone
OHL	Over Head Lines
ONS	Office for National Statistics
OS	Ordnance Survey
PBDE	Polybrominated diphenyl ethers
PCAN	Place Based Climate Action Network
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report
PFCs	Perfluorocarbons
PFOS	Perfluoroctane sulphate
PHE	Public Health England
PIA	Personal Injury Accident
PINS	Planning Inspectorate
PPE	Personal protective equipment
PPG	Pollution Prevention Guidance

PPG	Planning Practice Guidance
PRA	Preliminary Risk Assessment
PRF	Preliminary Roost Assessment
PRF	Potential Roost Features
PRoW	Public Right of Way
PV	Photovoltaic
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SAR	Standardised Admission Ratio
SDLP	Selby District Local Plan
SF_6	Sulphur hexafluoride
SFRA	Strategic Flood Risk Assessment
SGHAT	Sandia Laboratories Solar Glare Hazard Analysis Tool
SINC	Sites of Nature Conservation Interest
SMR	Standardised Mortality Ratio
SoCC	Statement of Community Consultation
SoS	Secretary of State
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest

SuDS	Sustainable Drainage System
SWMP	Site Waste Management Plan
TA	Transport Assessment
TAG	Transport Assessment Guidance
tCO_2 e	Tonnes of carbon dioxide equivalent
TRL	Transport Research Laboratory
UK	United Kingdom
UKBAP	UK Biodiversity Action Plan
UKCIP	UK Climate Impacts Programme
UKCP18	UK Climate Projections 2018
W	Watts
Waste FD	Waste Framework Directive
WCA	Wildlife and Countryside Act 1981
WFD	Water Framework Directive
WHIASU	Wales Health Impact Assessment Support Unit
WSI	Written Scheme of Investigation
WTN	Waste Transfer Note
ZOI	Zone of influence
ZTV	Zone of Theoretical Visibility

Appendix A Transboundary Effects Screening Matrix

Regulation 32 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires the consideration of any likely significant effects on the environment of European Economic Association (EEA) States.

Guidance upon the consideration of transboundary effects is provided in the Planning Inspectorates Advice Notes 12: Development with significant transboundary impacts consultation[2].

The following screening matrix provides the consideration of transboundary effects for the Scheme, taking guidance from Advice Note 12 (Annex 1).

Table A1: Screening matrix for possible substantial effects on the environment of EEA States

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
Characteristics of the development • Size of the development • Use of natural resources • Production of waste • Pollution and nuisance • Risk of accidents • Use of technologies	The resources required for the construction of the Scheme are likely to be obtained from the global market, but it is envisaged that materials would be obtained locally wherever possible. No waste, nuisances or accidents are likely to extend beyond the border of the UK. No novel technologies are proposed that have the potential for transboundary effects.
Location of development (including existing use) and Geographical area • What is the existing use? • What is the distance to another EEA state? • What is the extent of the area of a likely impact under the jurisdiction of another EEA state?	The Scheme's closest EEA boundary is France, located approximately 285 km to the south-east. No impacts are likely to extend beyond the jurisdiction of the UK, with the exception of potential greenhouse gas emissions. The latter is expected to be minimal given the nature of the Scheme, which will not emit GHG emissions during its operation (except for any emissions associated with maintenance vehicles and repair works).

[2] https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-twelve-transboundary-impacts-and-process/

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
Environmental importance • Are particular environmental values (e.g., protected areas – name them) likely to be affected? • Capacity of the natural environment. • Wetlands, coastal zones, mountain and forest areas, nature reserves and parks, Natura 2000 sites, areas where environmental quality standards already exceeded, densely populated areas, landscapes of historical, cultural or archaeological significance.	There are no sites statutory designated for their biodiversity value at an international or European level within 10 km of the Site and no European sites within 20 km and 30 km of the Site for which birds or bats, respectively, are a qualifying feature. The closest European site is Birklands and Bilhaugh SAC, which is approximately 33 km west of the Site and is designated for its old acidophilous oak woods. The potential for significant effects relating to these designated sites will be accounted for in the EIA. However, it is not anticipated that there is potential for transboundary effects (and therefore any effects on important environmental receptors beyond the UK).
Potential impacts and carrier • By what means could impacts be spread (i.e., what pathways)?	The only potential transboundary environmental impact which is considered likely is from GHG emissions. These emissions would be spread by atmospheric processes and are anticipated to be minimal given the nature of the Scheme. The Scheme is expected to offset GHG emissions through the generation of clean electricity, that otherwise would have been generated from a typical fuel mix comprising technologies such as gas fired power stations for example.
Extent • What is the likely extent of the impact (geographical area and size of the affected population)?	The only potential transboundary environmental impact which is considered likely is from greenhouse gas emissions, which are known to contribute to changes on climate on a global scale.
Magnitude • What will the likely magnitude of the change in relevant variables relative to the status quo, taking into account the sensitivity of the variable?	The impact of GHG emissions is considered irreversible within human lifetimes, however as above, the emissions are expected to be minimal during construction and decommissioning (in the order of one to three years) and is expected to lead to a

Criteria and Relevant Considerations	Commentary with Regard to Proposed Scheme
Probability What is the degree of probability of the impact? Is the impact likely to occur as a consequence of normal conditions or exceptional situations, such as accidents?	beneficial contribution to UK GHG emissions during operation (assumed to be 40 to 60 years). The temporal pattern of GHG emissions is likely to be relatively constant during the construction and decommissioning phases. It is proposed to calculate the likely GHG emissions as part of the EIA. GHG impacts will be put into context in terms of their impact on the UK's five-year carbon budgets which set legally binding targets for greenhouse gas emissions. The GHG emissions offset through the production of cleaner electricity during the operational phase will be accounted for within the GHG emissions calculations. In any event, the global nature of GHG impacts means that it is not possible to apportion or identify any impact in GHG emissions in terms of environmental effects on any particular country or state. It follows that there is no potential for significant effects on the environment of any EEA State or group of EEA States resulting from GHG emissions from the Scheme, as the environmental receptor in this regard is the global atmosphere, rather than the environment of any country or state or group of countries or states. The GHG emissions are considered at a global level, and so are captured by the assessment in any event.
Duration Is the impact likely to be temporary, short-term or long-term? Is the impact likely to relate to the construction, operation or decommissioning phase of the activity?	
Frequency What is the likely to be the temporal pattern of the impact?	
Reversibility Is the impact likely to be reversible or irreversible?	
Cumulative Impacts Are other major developments close by?	Proposed developments within 5 km of the Scheme will be taken into consideration in the Environmental Impact Assessment (EIA). However, it is not anticipated that there is potential for significant cumulative transboundary effects.

Appendix B Long List of Major Accidents and Disasters

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
1	Geological disasters				
1.1	Landslides	No	The risk of landslides will be considered as part of the geotechnical design, ensuring that the risk is designed out, both in terms of the vulnerability of the Scheme to these types of events; however given the flat nature of the land this risk is considered minimal. The Scheme is not anticipated to increase the risk of landslip happening onsite or elsewhere (it is not substantially heavy, and the Site is relatively flat); it will not significantly change the erosion potential of the soil or stability of the land.	N/A	N/A
1.2	Earthquakes	No	The Scheme is not located in a geologically active area and as such earthquakes are not considered to be a real risk or serious possibility.	N/A	N/A
1.3	Sinkholes	No	The risk of sinkholes will be considered as part of the geotechnical design and the construction method and Scheme	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
			design amended if needed, ensuring that the risk is designed out, both in terms of the vulnerability of the Scheme to these types of events, and also in terms of the potential for the Scheme to increase the risk of such an event happening.		
2	Hydrological disasters				
2.1	Floods	Yes	Both the vulnerability of the Scheme to flooding, and its potential to exacerbate flooding, will be covered in the Flood Risk Assessment, and also reported in the ES (both in terms of the risk to the Scheme and increased risk caused by the Scheme).	Property and people in areas of increased flood risk.	Chapter 9 Water Environment (including Flood Risk Assessment). Mitigation will be considered and, where necessary, incorporated into the Scheme design.
2.2	Limnic eruptions	No	Not applicable as there are no lakes nearby.	N/A	N/A
2.3	Tsunami/Storm surge	No	Not applicable as the Scheme is not in a coastal location.	N/A	N/A
3	Meteorological disasters				
3.1	Blizzards	No	The Scheme is considered to be no more vulnerable than any other development. It will be designed to cope	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
			with the UK climate and extreme weather events; blizzards should not affect the Scheme integrity.		
3.2	Cyclonic storms	No	Although there are storms in the UK, their destructive force tends to be much less than in other parts of the world and the Scheme is not particularly vulnerable to any potential effects. It will be designed for the British climate and weather extremes.	N/A	N/A
3.3	Droughts	No	Droughts are only considered as a disaster due to water shortages for essential services and where there are indirect impacts on food production, loss of soils etc. The Scheme is not considered to be vulnerable to drought.	N/A	N/A
3.4	Thunderstorms	No	As the Scheme includes metal components, there is a risk of lightning strikes. However, these risks will be removed or reduced through inbuilt control systems and can be scoped out at this stage.	N/A	N/A
3.5	Hailstorms	No	The Scheme is considered to be no more vulnerable than any other development.	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
3.6	Heat waves	No	While impacts are expected as a result of projected temperature increases (due to climate change), these temperature increases are not expected to have a significant impact on the Scheme. It is anticipated that the cooling systems for the battery energy storage systems, will regulate temperatures to within safe conditions.	N/A	No
3.7	Tornadoes	No	Although there are tornadoes in the UK, their destructive force tends to be much less than in other parts of the world and the Scheme is not particularly vulnerable to any potential effects.	N/A	No
3.8	Fires	Yes	There may be some potential for fire as a result of the battery storage element of the Scheme. 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. In addition, the Scheme design will include adequate separation between battery banks to ensure that an isolated fire would not become widespread and lead to a major incident. Fire detection and suppression features would be installed	Local residents, habitats and species.	Chapter 2 The Scheme

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
			to detect (e.g. multispectrum infrared flame detectors) and suppress fire (e.g. water base suppression systems) to minimise the effect of any fire. A Framework Battery Fire Safety Management Plan will be prepared for the Scheme. The development of the Framework Management Plan will be considered in the iterative design of the Scheme ensuring that design requirements to ensure fire safety (such as ensuring adequate provision of land for water storage) and management of any firewater runoff are captured.		
3.9	Air Quality Events	No	The Scheme is not located within any Air Quality Management Areas (AQMA). The nearest AQMA is 25km south of the Scheme. Although there are likely to be emissions during construction and decommissioning of the Scheme, it is considered that these can be managed through the implementation of a CEMP. Good practice measures will be set out in a Framework CEMP to be appended to the ES.	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
4	Transport				
4.1	Road Accidents	Yes	The risk posed by construction/operation/decommissioning traffic on the Local Road Network will be considered as relevant in the Traffic and Movement chapter of the ES. 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 glare to affect road users will be considered as relevant within a technical appendix to the ES if any risks are identified.	Aquatic environment Road users	Chapter 13 Traffic and Movement Chapter 9 Water Environment Glint and Glare Study Mitigation will be considered and, where necessary, incorporated into the Scheme design.
4.2	Rail Accidents	Yes	The site is not located close to any railway lines. The potential for glint and glare to affect trains will be considered where relevant within a technical appendix to the ES if any risks are identified.	Rail users	Glint and Glare Study Mitigation will be considered and, where necessary, incorporated into the Scheme design.
4.3	Aircraft Disasters	No	The potential for glint and glare to affect aviation is scoped out of the assessment, as discussed, as	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
			discussed in Chapter 16 of this EIA Scoping Report.		
5	Engineering Accidents/Failures				
5.1	Bridge Failure	No	Not applicable as no bridges used or constructed as part of Scheme.	N/A	N/A
5.2	Tunnel Failure or Fire	No	None nearby.	N/A	N/A
5.3	Dam Failure	Yes	Flood risk will be covered in the Flood Risk Assessment and will be reported in the ES, both in terms of the risks to the Scheme and increased risk to third parties caused by the Scheme.	Property and people in areas of increased flood risk.	Chapter 9 Water Environment Mitigation will be considered and, where necessary, incorporated into the Scheme design.
5.4	Flood Defence Failure	Yes	This will be covered in the Flood Risk Assessment and will also be reported in ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme.	Property and people in areas of increased flood risk.	Chapter 9 Water Environment Mitigation will be considered and, where necessary, incorporated into the Scheme design.
5.5	Mast and Tower Collapse	No	Not applicable as there are no masts or towers nearby.	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
5.6	Building failure or fire	No	No buildings are close enough to the Scheme for it to be affected by building failure or fire.	N/A	N/A
5.7	Utilities failure (gas, electricity, water, sewage, oil, communications)	Yes	The Scheme has the potential to affect existing utility infrastructure above and below ground. To identify any existing infrastructure constraints, both consultation and a desk based study will be undertaken.	Employees and local residents	Chapter 14 Other Environmental Considerations. Consultation with relevant utilities providers is a routine part of solar development and consultees will include water, gas and electricity utilities providers and telecommunications providers as appropriate. Information obtained from consultation will be used to inform the layout design.
6	Industrial Accidents				
6.1	Defence industry	No	Not applicable as there is no defence manufacturing nearby.	N/A	N/A
6.2	Energy Industry (fossil fuel)	No	Not applicable as there is no energy industry (fossil fuel) nearby.	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
6.3	Nuclear Power	No	Not applicable as there are no nuclear power stations nearby.	N/A	N/A
6.4	Oil and gas refinery/storage	No	Not applicable as there is no relevant industry nearby.	N/A	N/A
6.5	Food Industry	No	Not applicable as there is no relevant industry nearby.	N/A	N/A
6.6	Chemical Industry	No	Not applicable as there no relevant industry nearby.	N/A	N/A
6.7	Manufacturing Industry	No	Not applicable as there no relevant industry nearby.	N/A	N/A
6.8	Mining / Extractive Industry	Yes	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 geotechnical design, ensuring that the risk is designed out.	Employees and local residents	N/A
7	Terrorism/Crime/Civil unrest	No	The Scheme is unlikely to be a target for these types of incidents due to its rural location and low number of exposed targets.	N/A	N/A

	Major accident or disaster	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES? If so, where?
8	War	No	The Scheme is no more vulnerable than any other infrastructure.	N/A	N/A
9	Disease				
9.1	Human disease	No	The Scheme is considered no more vulnerable than any other infrastructure.	N/A	N/A
9.2	Animal disease	No	The Scheme is considered no more vulnerable than any other infrastructure.	N/A	N/A
9.3	Plant disease	Yes	New planting may be susceptible to biosecurity issues, such as the increased prevalence of pests and diseases, due to climate change. A Biosecurity Plan will be produced prior to construction and decommissioning which will set out procedures to ensure that no invasive species are brought onto the Site, exported out of the Site or spread within it. Measures are likely to include appropriate cleaning and/or disinfection of machinery and equipment in areas considered to be at high risk.	Habitats and species	Chapter 8 Ecology and Nature Conservation Chapter 10 Landscape and Visual Amenity The planting design will take account of biosecurity risks through a wider mix of species including some non-natives.

Appendix C Gazetteer of Heritage Assets

Leoda Solar Farm

Appendix C: Cultural Heritage Gazetteer

January 2025

Delivering a better world

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Table of Contents

Appendix C Designated Heritage Assets

C.1 Designated Heritage Assets within 3km

NHLE	HER	Name	Grade	Description	NGR
1005015		Somerton Castle	SM	N/A	SK 95393 58787
1009214		Wellingore Village Cross	SM	A standing cross is a free standing upright structure, usually of stone, mostly erected during the medieval period (mid 10th to mid 16th centuries AD). Standing crosses served a variety of functions. In churchyards they served as stations for outdoor processions, particularly in the observance of Palm Sunday. Elsewhere, standing crosses were used within settlements as places for preaching, public proclamation and penance, as well as defining rights of sanctuary.	SK 98381 56794
1009223 1360293		Fulbeck Village Cross	SM and II	A standing cross is a free standing upright structure, usually of stone, mostly erected during the medieval period (mid 10th to mid 16th centuries AD). Standing crosses served a variety of functions. In churchyards they served as stations for outdoor processions, particularly in the observance of Palm Sunday. Elsewhere, standing crosses were used within settlements as places for preaching, public proclamation and penance, as well as defining rights of sanctuary.	SK 94774 50378
1020436		Castle Hill Ringwork	SM	The monument includes the earthwork and buried remains of a medieval ringwork known as Castle Hill, located in the northern part of Welbourn village. Following the Conquest, land at Welbourn was held by Robert Malet. The manor lands were divided, and in the early 12th century land granted to the lord of Bayeux became the manor of `le Northalle', referred to in a document of 1158 as being walled in stone. The other part of the manor, lying to the south of Castle Hill, was known as `le Southalle' and was first mentioned in the 14th century. The two manors remained independent throughout the 13th century, but by 1334 both were held by Isabel de Vescy. The amalgamation of the two estates is thought to have led to the abandonment of `Northalle', and in 1374 the site was said to be waste and entirely without buildings.	SK 96812 54323
1062406		Washdyke Farm	II	Farmhouse, 1837, chequered brickwork with dark headers, pantile roof with gable stacks. Two storeys with eaves cornice, 3 bay front. Central six panelled door with triple overlight in moulded wooden doorcase with flat hood. Flanked by single glazing bar sash windows. The three first floor windows are similar. All windows have flat gauged brick lintels. To either side of the facade are shaped side walls with stone copings which are ramped over single openings with slatted lights. Date of 1837 is picked out in dark headers in the north gable wall.	SK9492150050
1360297		Old Hall Farm House	II	House, C17 with C19 and C20 alterations. Coursed limestone rubble with ashlar quoins and dressings, slate roof, stone coped gables and a single ridge stack with paired moulded tunnels. T-plan; to left of main block is a single storey 2 bay extension with concrete slate roof, and to the right is a single bay lean-to outshut. The off centre C20 planked door is actually contained in the left hand extension; to the left is a 3 light casement. To the right is a 3 light plain casement with wooden mullions beneath a C17 moulded cornice, a 2 light Yorkshire sash, and a 3 light C17 mullioned window with moulded surround and cornice. On the first floor to the left is a single 3 light C17 mullioned window with cornice, and to the right a 3 light plain casement with timber lintel.	SK9478050076
1062411		Old Farmhouse	II	House, C16 with C17 and C19 alterations and additions. Coursed limestone rubble with ashlar dressings, pantiled roof with stone coped gable and a single brick ridge stack. L-plan, east front of single storey plus attic, 3 bays. Central planked door beneath C16 4 centred ashlar arch with moulded frame and hollow spandrels.	SK 94462 49948
1308994		Wheelwright's House	II	House, early C19. Brick with ashlar dressings, pantiled roof and 2 gable stacks. 2 storey 3 bay front; the front wall has a decorative chequer pattern of dark headers, a first floor band and a decorative eaves course. The central 6 panelled door has a triple overlight and a moulded wooden doorcase having a flat hood with a cusped underside. Flanked by single glazing bar sash windows with broken serpentine ashlar lintels with keyblocks. On the first floor are 3 further single sashes having flat splayed lintels with keyblocks.	SK 94645 50116

NHLE	HER	Name	Grade	Description	NGR
1360295		Toad Hall	II	House, C17 with C19 alterations. Coursed limestone rubble with ashlar dressings, pantiled roof with single stone coped gable and brick ridge stack. 2 storey 3 bay front. Off centre planked glazed C19 door with to left a single 2 light casement. On first floor, a Yorkshire glazing bar sash over the door and to left a circular fixed stone light. In the centre of the front is evidence of blocked door and first floor window. All openings have timber lintels. Inluded for group value only	SK 94713 50205
1309010		Holly Cottage	II	Cottage, C17 with C19 alterations. Coursed limestone rubble with pantiled roof and brick ridge stack. Gable on to road. Single storey 2 bay front with garret; single bay lean to extension on right covered by catslide roof. Off centre C19 planked door decorated with 2 centred arches in the Gothick taste; narrow hood mould over. To the right is a 3 light casement window, and on the first floor a similar 2 light window; all openings have timber lintels. To the right is a second planked door leading into the extension.	SK 94702 50262
1062408		Ermine House	II*	Small country house; C17 with substantial early C18 remodelling, possibly by William Sands the Younger. (c/f. peaked parapet at Wyberton Hall, Nr. Boston). Iron gutter remains dated 1710. Coursed limestone rubble with brick quoins and first floor band and ashlar dressings.	SK 94697 50296
1166164		Church of St Nicholas	I	Coursed limestone rubble and ashlar,slate and lead roofs.West tower,nave,north and south aisles,chancel.West tower of three stages,lowest is basically C13 of coursed rubble with ashlar clasping and midwall buttresses,roll moulded plinth,C15 stair up west side,C15 3 light perpendicular window in west wall with four-centred arched door to stairs.C18 door with timber lintel in south side.	SK 94756 50438
1147388	MLI82769	Church of St Swithin	I	Parish church. C13. C14. C15. 1841 and C20. Limestone ashlar with lead roofs, coped gables with cross finials, moulded parapet with octagonal corner pinnacles to east of nave and chancel. Gabled angle buttresses with set-offs. Moulded and chamfered double plinth. All openings have hood moulds and label stops.	SK 95038 51747
1147759		The Garth	II	Cottage. Mid C18 and early C19. Coursed limestone rubble with ashlar and brick dressings. Pantile roof. A single ridge and 2 gable brick stacks. Rubble and brick plinth, flush ashlar quoins, brick dentilated eaves. 3-bay plus single bay addition to the east. Single storey. Central doorway with slightly projecting C19 brick gabled porch and C20 half-glazed door, flanked by single 2-light glazing bar sliding sashes and with another similar window beyond to the left. All openings have segment brick heads.	SK 98437 56576
1450080		Fulbeck War Memorial	II	First World War memorial, unveiled and dedicated in 1921, with Second World War additions. It was designed by WS Weatherley of London and executed by Messrs Earp and Hobbs Ltd of London and Manchester.	SK9486950386
1309001		Hare and Hounds Public House	II	Public house, formerly house, C17 with C18 and C19 alterations. Coursed limestone rubble, ashlar quoins, brick dressings, pantiled roof with stone coped gables, a single ridge and 2 gable stacks. 5 bay 2 storey front plus attics. Off centre C19 door with overlight and flat hood supported by brackets. To the left is a 3 light casement window, a blocked doorway with segmental brick head and a further 3 light casement. Right of the door is a C19 canted bay window with a single glazing bar sash, moulded cornice and flat lead roof. On the first floor are 3 triple light glazing bar casements. All windows except the bay have brick segmental heads and decorative brick surrounds. In the roof are three2-light yorkshire sashes in gabled dormers with rendered cheeks.	SK 94799 50356
1061872	MLI86607	The Kennels	II	Kennels. c.1820. Dressed limestone, ashlar and brick with a hipped plain tile roof and a single central ridge stack. T-plan. single storey. 3-bay kennel house, with 3 doorways and plank doors. In front is a small exercise yard surrounded by a high stone wall, with square corner piers and central gate piers, now blocked with breeze blocks, either side are spear headed rail- ings which top the wall, which is coped and ramped either end, the yard is now divided by a C20 brick wall.	SK 95201 51645
1360572		Gates and Wall to Wellingore Hall	II	3 sets of gatepiers joined by a wall 110 metres long. c1770 and c1830. Coursed and dressed limestone rubble and ashlar. To the west a pair of early C19 rusticated gate piers with knopped ball finials. Stretching along Hall Street a 2 metre high wall with flat ashlar coping which rises to 3 metres 50 metres along. 25 metres further along is the original gateway, c1770.	SK9830556583
1061870	MLI86604	The George Hotel	II	Public house. Mid C18 and early C19. Coursed limestone rubble and ashlar. Slate roof with ashlar coped gables. 2 brick gable stacks. Ashlar plinth and raised quoins, plus first and second floor bands. 3 bay. 2½ storey. Central doorway, with rusticated ashlar door surround topped with a broken pediment containing a coat of arms. Double half glazed doors with overlight and C19 lamp on iron	SK 95067 52188

NHLE	HER	Name	Grade	Description	NGR
				bracket. Either side are single glazing bar sashes, above 3 similar windows, all with flush ashlar lintels with raised keystones. Above again 3 small glazing bar sashes, the top floor was added in the early C19 and is faced with ashlar.	
1360552		Stables at Stragglethorpe Hall	II	Brant Broughton And Stragglethorpe Stragglethorpe Lane SK 95 SW (east side) 6/59 Stables at Straggle- thorpe Hall 23.8.67 GV II Stable block. C16, C18 restored 1912-14 by Biddulph Pinchard. Coursed rubble with ashlar dressings. Pantile roof with 3 sets of tall brick stacks on stone bases.	SK 91330 52150
1147649		The Cottage	II	House. Early C17 and 1670. Coursed limestone rubble with ashlar dressings. Pantile roof and ashlar coped gables. A single gable and 2 ridge brick stacks. L-plan. 2-storey. North street front, has single glazing bar window under wooden lintel to the right, and to the left a 3-light ovolo mullion window in chamfered surround with hood mould. Above a small 2-light sliding sash.	SK 98059 56629
1061860		The Island and Outbuilding and Garden Wall	II	Cottage, formerly 2 cottages and outbuildings. Mid C18 and early Cl9. Coursed limestone rubble and brick. Pantile roof with 2 gable brick stacks. South front, single storey, plus attic, 3 bays with a central doorway with a C20 glazed door. Flanked by single 2-light casements, all under wooden lintels.	SK 98413 56606
1308381		Double Oxer	II	Cottage. Late C18. Coursed limestone rubble with ashlar and brick dressings. Pantile roof with 2 brick gable stacks. Flush ashlar quoins. Single storey plus attic. Three-bay. Central doorway with C20 half-glazed door, flanked by single glazing-bar sashes, all under segment brick heads. Above two gable dormers with bargeboards and 2-light glazing bar casements.	SK 98408 56643
1360573		The Close	II	GV II House and former barn. C17 and early C19. Coursed limestone rubble and ashlar dressings. C20 pantile roof and ashlar coped gables with finials. 2 brick ridge stacks. Flush ashlar quoins and moulded first floor band.	SK 98349 56626
1308375		Sundial 3 metres east of The Close	II	Sundial. 1631. Ashlar and bronze. Plain ashlar column with moulded rim, standing on a circular base. Bronze time plate inscribed '1631' with ornate bronze gnomon.	SK 98356 56619
1308383		The Den	II	Cottage. Late C18. Coursed limestone rubble, ashlar and brick, all painted. Pantile roof and a single brick gable stack. Dentilated brick eaves. Single storey plus attic. 2-bay. Doorway to left, up 3 brick steps, with 6-panel door, and ashlar lintel with 4 centred arched head. To the right a single glazing bar sash under a wooden lintel. Above a single square dormer with a 2-light casement.	SK 98508 56597
1147803		Stragglethorpe Hall	II	Country house. C16 restored and greatly extended in 1912-14 by Biddulph Pinchard. Close studded timber-framing with curved braces and coursed rubble with ashlar dressings. Plain tile roof, with 4 external moulded stone stacks with set-offs, a single moulded stone ridge stack, and 3 tall brick stacks.	SK 91325 52103
1061868	MLI86600	49, High Street	II	Cottage. Late C18 and early C19. Squared rubble and ashlar dressings. Pantile roof with 2 brick gable stacks. Ashlar plinth and flush quoins. 2 storey. Central doorway with C20 half-glazed door flanked by single 2-light sliding sashes, all these openings have segment headed wedge lintels of pink ashlar. Above 2 smaller, 2-light sliding sash with segment headed wedge lintels. To the south a single storey coursed rubble extension with a blank facade.	SK 95104 52264
1147761		Stragglethorpe Grange	II	Late C18. Red stretcher and brown header brick bond. C20 concrete tile roof. 2 central wall stacks.	SK 89981 52722
1061861		The Cottage south-east of Sunningdale	II	Cottage. Mid C18. Coursed limestone rubble. Pantile roof, with 2 brick gable stacks. Chamfered rubble plinth. 2-storey. 3-bay. Central doorway with C19 panel door and overlight. Either side single glazing bar sashes. All under wooden lintels. Above three 2-light sliding sashes.	SK9838956665
1147775		Saddlers Cottage	II	Cottage formerly shop. Late C17 and late C18. Coursed limestone rubble with ashlar dressings. Pantile steep pitched roof with ashlar coped gables. Single ridge and single gable brick stacks. Single storey plus attics. 3-bay. North, street front has off-centre partially blocked doorway, now filled with 2-light casement, to the left a similar 2-light casement, both under wooden lintels. To the right a pair	SK 98304 56682

NHLE	HER	Name	Grade	Description	NGR
				of C18 bow windows with glazing bars, and between a C20 glazed door. Above 2 small square dormers, each with a 2-light sliding sash.	
1360574	MLI85991	Corner House		House. Mid C18. Coursed limestone rubble. Pantile roof with a single gable and a single ridge brick stacks. Brick plinth. 2-storey. 3-bay. North street front has off-centre doorway with Cl9 panel door, and to the right a 3-light sliding sash, all under a single wooden lintel. Either side are single 3-light sliding sashes with external shutters and wooden lintels. Above three, 3-light sliding sashes. The west gable wall has a larger 3-light casement with a small glazing bar panes.	SK9826456684
1061867	MLI86599	Field House	II	House. Mid C18 and early C19. Brick with ashlar dressings. Pantile roof with ashlar coped gables and 3 brick gable stacks. Ashlar plinth, raised quoins and first floor band. 3-bay 2-storey. Central doorway with round headed painted, moulded ashlar surround with top keystone and impost blocks, 4-panel door and ornate fanlight. Flanked by single glazing bar sashes, with 3 similar sashes above. All windows have curly gauged brick lintels with ash- lar keystones all now painted. To the south a single storey, 2-bay addition, with a small 2-light casement and a large 2-light sliding sash, both segment brick heads.	SK 94985 52084
1360597		Barn in Theaker's Yard	II	Barn. Late C18 and early C19. Coursed limestone rubble with brick dressings. Pantile roof, and brick dentilated eaves. West front has a large opening, now partially blocked with early C19 double plank doors in a flush brick surround with segment head. To the right another pair of double plank doors under a wooden lintel with above a small 2-light casement also under a wooden lintel. Included for group value only.	SK 98023 56677
1147678		Cottage to north of The Annexe	II	Cottage, formerly 2 cottages and attached barn. Early C18. Coursed limestone rubble and brick. Pantile roof. Tall double red brick gable stack. Centre cottage has central doorway with 4-panel door flanked by single 3-light slid- ing sashes, to the right another 3-light sliding sash and a blocked doorway. All openings have thick wooden lintels. To the left an opening with plank shutters to the original barn.	SK 98241 56672
1309022		Gateway opposite Fulbeck Hall	II	Gateway, 1583. Ashlar with early C19 wrought iron gates. Plain Flanking pilasters support moulded cornices; an entablature in the frieze of which is a plaque bearing the date 1583, flanked by 2 single shields bearing the initials TF and MF. The moulded pediment contains an heraldic device. This gateway is apparently ex situ, and came from Tudely, Kent. (Pevsner).	SK9491250550
1309048		Fulbeck House	II*	Small country house, circa 1700 with alterations and additions of late C18, C19 and C20. Coursed limestone rubble with ashlar dressings, hipped slate roof with lead dressings, two moulded ridge stacks. Originally a simple box plan, but with late C18 left hand wing and right hand block of circa 1850 with canted bay window.	SK 94888 50674
1062407		Manor Farm	II	House, C17 with extensive rebuilding of 1884. Coursed limestone rubble lower walls, ashlar above; ashlar quoins and dressings, slate roofs with kneelers, stone coped gables with ball finials and 2 moulded ridge stacks. T-plan. West front of 3 bays and 2 storeys, the right hand bay being advanced. Central C19 panelled door with moulded surround and drip mould. Above the door is a panel inscribed H. Fane, 1884. To left is a 3 light mullioned window, to the right a 4 light similar window. These windows have cavetto moulded mullions, and the moulded reveals appear to be C17. The 2 first floor windows are single 2 and 3 light mullions; all windows have cornices. Above the right hand first floor window is a recessed square panel bearing the arms of the Fanes.	SK 94809 50393
1061823		Cottages in Ttheaker's Yard	II	Two cottages. Late C18 and early C19. Coursed limestone rubble with ashlar and brick dressings. Pantile roof with a single ridge and 2 gable brick stacks. Flush quoins. 2-storey. 5-bay. Central 3-light sliding sash with ashlar lintel, to right a doorway with C20 glazed door and an ashlar lintel, beyond a similar 3-light sliding sash. To the left a doorway with a C20 glazed door with a brick lintel, beyond a single 3-light casement with a brick lintel. Above three 5-light casements with brick lintels, each rising into a small gable. All openings have segment heads.	SK 98045 56692
1147781		The Marquis of Granby	II	Public house. Mid and late C18. Coursed limestone rubble with ashlar dressings. Pantile and slate roofs. 3 brick gable stacks. 2-bay plus 3-bays. 2-storey. To the left two tall glazing bar sashes, that to the left has an adjoining doorway with C20 door. To the right a central doorway with a C20 door flanked by single, smaller glazing bar sashes. Above to the left 2 tall glazing bar sashes, and to the right 2 smaller glazing bar sashes to the eaves. All the other openings have flush ashlar wedge lintels.	SK9834956693

NHLE	HER	Name	Grade	Description	NGR
1061862		The Old Sweet Shop	II	Cottage. Mid C17 and C20. Coursed limestone rubble and ashlar. Steep pitched pantile roof with coped gables. A single brick gable stack. 2 storeys plus garrets. South, street front rebuilt C20, has blocked central doorway with a 2-light sliding sash to the left and a 3-light sliding sash to the right. Above 3 C20 2-light casements. West gable wall has a single 3-light ovolo mullion window in chamfered surround with hood mould. A similar 2-light mullion window above and a similar single light window above in the gable. To the rear a C20, 2-storey addition.	SK 98336 56695
1061871		Home Farmhouse, Leadenham	II	Farmhouse. 1603 and early C19. Coursed limestone rubble with ashlar and white brick dressings. Slate roof. 2 gable stacks, one rendered, and a single ridge and a single lateral white brick stacks. 2 ashlar coped gables. lobby entrance plan, extended early C19 to L-plan. 2-storey. Street, single bay gable front has a single 3-light chamfered mullion window with hood to each floor, and above a flush ashlar plaque inscribed 'T. K. 1603'.	SK 95146 52300
1061869	MLI86602	The Old Hall	II*	Small country house. c1600, c1700 and early C19. Dressed and coursed limestone rubble with ashlar dressings. Hipped pantile roof with central ridge and rear gable stacks. Raised quoins, moulded plinth and moulded ground and first floor lintel bands, plus moulded cornice with downpipe holders. 2 storey.	SK 95184 52501
1061900	MLI82788	Church of St Michael	I	Brant Broughton And Stragglethorpe Stragglethorpe Lane SK 95 SW (west side) 6/57 Church of St Michael 23.8.67 GV I Parish Church, now vested in the Historic Churches Preservation Trust. C11, late C12, C15 and C18, restored c1980.	SK 91337 52416
1308378	MLI86037	Brant House Farmhouse	II	- Brant House Farmhouse GV II Farmhouse. C17, Mid C18 and early C19. Red brick, partially stuccoed. Plain tile roof with stone coped gables. 2 gable and a single ridge stacks. L-plan. 2 storey.	SK 91403 52320
1062405		Waterloo Farm	II	Farmhouse, circa 1815. Brick with hipped slate roof and 2 wall stacks. 2 storey 3 bay front, the middle bay slightly projecting. Central doorway covered by a porch with semicircular headed opening and gabled slate roof. Flanked by single glazing bar sashes with segmental heads. On the first floor are 3 2-light glazing bar casements with segmental heads.	SK 92358 51179
1360292		Gates of Fulbeck Hall	II*	Gates to Fulbeck Hall. 1733. Coursed limestone rubble, ashlar and wrought iron. Gate of 2 leaves with ramped side screens and elaborate overthrow. Side screens rest on dwarf walls with plain copings. The piers are square in plan with repousse capitals. The overthrow has much scrollwork enriched with grotesques and oak leaf sprays supporting the bull's head crest and arms of Sir Francis Fane and his wife Elizabeth. The design is clearly influenced by the Frenchman Tijou, and could be the work of either John Warren of Cambridge (c/f Belton gates) or else of Edward Nutt, who made similar gates at Grimsthorpe Castle in 1730.	SK9488450501
1270291		Fulbeck Hall	II*	Country house; Fragment of early C17 house, main block of 1733 with additions of 1784, 1802, 1840, 1894 and 1934. 1733 house probably by George Portwood of Stamford, and the porch before it, brought from Syston Park in 1934, probably by L. Vulliamy, 1824. Ashlar and gault brick with hipped slate roof having lead dressings, 4 ridge and 2 moulded wall stacks. Main east front is of 3 principal phases; first the main 3 storey block of 1733, second the apsidal ended gault brick wing added to the right in 1802 third the C19 porch.	SK 94733 50518
1360596		Lodge	II	Cottage, formerly a pair of cottages. Early C19. Coursed limestone rubble and brick. Pantile roof with a single brick ridge stack. Brick dentilated eaves. Single storey plus attic. 4 bays. Off-centre doorway, with C20 glazed door, flanked on either side by single 2-light casements, and beyond to the left a further 2-light casement in a partially blocked doorway. All these openings have segment headed rubble wedge lintels. Above 2-brick gabled dormers, each with a 2-light casement.	SK9805456703
1061853		Hill House	II	House. Late C18 and early C19. Brick and white-washed cement render. Hipped stone slate roof with deeply over-hanging eaves and 2-brick ridge stacks. 2-storey. 4-bays. Off-centre doorway, with half glazed door and ornate fan- light, surround has fluted pilasters with consoles supporting an open pediment, ornate C19 iron porch with hipped roof. To the left a single glazing bar sash window and beyond a C19 canted bay window with plain sashes, to the right a similar canted bay window. Above 4-glazing bar sashes. Set back to the right is a 2-storey wing, behind a rubble wall with two red brick pointed arched openings.	SK 97953 56716
1147800		Rovistan House	II	House. Early C19. Coursed limestone rubble with brick dressings. Pantile roof with 2-brick gable stacks. Brick flush quoins and dentilated eaves. 2-storey. 3-bay. Central doorway with C20 half-glazed door, flanked by single 2-light sliding sashes. Above 2 similar sliding sashes. All openings have segment brick heads, and flush brick quoin jambs. Included for group value only.	SK 98213 56728

NHLE	HER	Name	Grade	Description	NGR
1360576		Greystones	II	House. Early C17. Coursed limestone rubble with ashlar dressings. Pantile roof with a single brick ridge stack. 2-storey. 4-bay. Doorway to the right with plank door and moulded and chamfered 4-centred arched surround, to the left a 5-light ovolo mullion window in chamfered surround with hood mould con- tinuing over the doorway as well, to the right a small pilaster buttress. To the left another doorway with plank door and a 2-light casement immediately to the left, beyond a 3-light casement. Above a single 2-light recessed and chamfered mullion window with drip mould, and a 2-light casement to the left. Interior has chamfered beams and a fine 4-centred arched fireplace with moulded surround.	SK 98229 56731
1147811		Goat Cottage	II	Cottage. Late C18. Coursed limestone rubble and brick. Pantile roof with 2- brick gable stacks. Single storey plus attic. 3 bays. Central doorway with half-glazed door, enclosed by C20 half glazed porch. Flanked on either side by single 2-slight sliding sashes. Above two, 2-light gabled brick dormers. To the west a lower range with a single 3-light casement. All openings have wooden lintels. To the east a C20 brick extension of no special interest.	SK 98071 56727
1061864		1 and 2, West Street	II	Pair of cottages. 1692 restored 1984. Coursed limestone rubble with ashlar dressings. Steep pitched pantile roof with ashlar coped gables and 2 brick gable stacks. Single storey plus attic. 6-bays. Each cottage has a central plank door, flanked by single 3-light sliding sashes, all under wooden lintels. Above 4 square dormers, each with a 2-light sliding sash. The eastern gable wall has a plaque inscribed, 'W. M. 1692'.	SK 98179 56720
1360575		The Old Mill House	II	House. Early C18. Coursed limestone rubble. Steep pitched pantile roof with ashlar coped gables. A single ridge and 2 gable brick stacks. Dentilated brick eaves. Lobby entry plan. 2-storey. Off-centre doorway has C18 6-panel door with pointed ashlar hood supported on plain brackets. Either side are single 2-light sliding sashes, beyond to the left another 2-light sliding sash. Above three, 2-light sliding sashes all under wooden lintels.	SK 98276 56698
1360296		Lamb's Cottage	II	House, C17 with late C18 and C20 alterations and additions. Coursed limestone rubble with ashlar quoins and brick dressings; pantiled roof with one stone coped gable and one hip with a moulded stone gable stack.L-plant 3 bay 2 storey front with central door covered by a C20 porch with glazed outer door flanked by single lights with a gabled pantiled roof. To either side of the door are large single glazing bar sashes with brick segmental heads and decorative brick surrounds. On the first floor are 3 similar windows to the eaves.	SK 94748 50349
1062410		Gateway to Fulbeck Manor	II	Gate to Fulbeck Manor. C19. Ashlar and wrought iron. Gateway flanked by single square pillars with plinths and moulded cornices, surmounted by large stone balls. The outer faces of the pillars are panelled with countersunk margin mouldings. Two leaved open work gate with ramped top; vertical and floral decorative rails.	SK 94860 50253
1309000		Barn at the Old Farm House	II	Barn C17 with C19 alterations. Coursed limestone rubble with brick dressings and pantiled roof. Internally there are 6 bays. Off centre doorway with C19 split stable door with timber lintel. To left are 2 small C19 brick lined openings, the lower a hatchway, the upper a window with a 2 light Yorkshire sash. There are 3 small vertical ventilation slits in the wall; one to the left of the door and the others beneath the eaves. Inside, 4 bays of the C17 butt purlin roof remain in the right hand part, but the 2 bays to the left are C19 replacements and are divided off by a later wall. Included for group value only.	SK 94586 50255
1147477		Clint House, and Clint Cottage	II	House. Late C18. Coursed limestone rubble and ashlar. Pantile roof with ashlar coped gables and kneelers. 2 brick gable stacks. Moulded eaves cornice. Rubble plinth. 3-bay. 3-storey. Central doorway with half glazed 6-panel door and fanlight in rendered plain band surround. Either side are single C20 cross casements. Above 3 similar windows. Above again a similar, smaller central window flanked by single glazing bar sashes. All the windows have ashlar wedge lintels with keystones. To the south are 2 lower attached outbuildings with a single fixed light. Lower 2 storey range to rear.	SK9884257483
1061975		South-west Outbuilding at Somerton Castle	I	Base of circular tower, originally at corner of Castle walls, C14. Coursed rubble. Circular, lower stages of tower now amalgamated amongst C19 farmbuildings. Ancient Monument.	SK 95385 58759

NHLE	HER	Name	Grade	Description	NGR
1061974		Somerton Castle and Outbuilding to north-west	i	GI Remains of Medieval Castle converted into a farmhouse. Early C14,late C16 and C19.Coursed rubble,ashlar and brick. Plain tile and pantile roofs.Licence to crenellate granted to Antony Bele.Bishop of Durham 1281,castle probably complete by 1305.Single tower survives with L-shaped late C16 wing added,more minor additions in C19.	SK 95431 58760
1147557		Tana Cottage	II	GV II Cottage. Early and late C18. Coursed limestone rubble and red brick. Pantile roofs, with three brick gable stacks. Plinth and flush quoins. Two storey, raised in brick in late C18. Three bay. Double range plan. Central doorway reached up three semicircular steps, with C19 plank door. Either side are single glazing bar sashes. Above two glazing bar sashes. All openings have wooden lintels.	SK9887857511
1061881		Stoneacres	II	Cottage. Late C17. Coursed limestone rubble. Steeply pitched pantile roof with a single ridge and a single gable brick stacks. Quoins. Single storey plus attics. 4-bay. Off-centre doorway, now partially blocked by a C20 case- ment window, flanked by single glazing bar sashes, all with wooden lintels. To the left a single C20 casement. Above 4-brick gabled dormers with C20 casements.	SK 98613 57490
1166284		Ermine Cottage	II	House, early C19, brick with ashlar dressings, hipped slate roof and end stacks. Two storey three bay front with central 4 panelled door with plain stone surround and flat head supported on stone consoles. Flanked by single glazing bar sash windows with flat splayed ashlar lintels, three first floor windows are similar.	SK 94550 50261
1406722		Wellingore Garage	II	Purpose-built garage and petrol station, built in 1933 to designs by F. Glanville Goodin, and extended in the 1980s.	SK9839656850
1147665		Wellingore Mill	II	Windmill. Early C19. Tarred brick. Battered round tower, 6 storeys. Seg- ment headed doorway to south with plank door on the ground floor, iron case- ments to each single window on each floor all with segment heads. The second stage has a wooden gallery all the way round. Cap missing.	SK 98439 57043
1062409		Apple Cross House	II	GV II Former shop, early C19. Brick with ashlar dressings, slate roof with two gable stacks. Front is in patterned brickwork having dark headers with first and second floor bands. Two bay three storey front. Off centre six panelled door with timber panelled reveal, triple overlight and splayed lintel. To the left is a small fixed glazing bar light with flat lintel and beyond again a large glazing bar sash with flanking sunken panels and fascia board over. On the first floor is a single glazing bar sash with splayed lintel, and on the second floor a similar window to the eaves.	SK9468650206
1166245		North View	II	House, C18 with C19 alterations. Coursed limestone rubble with ashlar dressings, pantiled roof and 2 brick gable stacks. 2 storey 4 bay front with off centre panelled door, flanked by single 2 light casement windows with, at the left, an opening to the rear. All ground floor openings have ashlar lintels. On the first floor is a central blind recessed panel flanked by single 2 light casements to the eaves.	SK9470250207
1062412		The Old Farm House	II	House, C17 with C19 and C20 alterations. Coursed limestone rubble with ashlar quoins and dressings, stone coped gables, plain tiled and pantiled roofs, 2 brick ridge stacks. 5 bay, 2 storey front with single storey 3 bay extension to right. Main block has off centre C20 panelled door flanked by to the left a 3 light mullioned window. To the right are single 3 and 4 light mullioned windows, with beyond in the extension a 2 light mullioned window, a C20 planked door, and a single C20 light. On the first floor are 3 triple light mullioned windows. All mullioned windows are good C19 copies of C17 originals with moulded frames, ovolo mullions and moulded cornices.	SK 94584 50227
1360294		The Old Reading Room	II	GV II Cottage, C17 with C19 and C20 alterations and additions. Coursed limestone rubble with ashlar dressings, pantiled roof having a stone coped gable with a low roll finial. Three bay single storey front with attics. The central C19 rectangular ashlar bay window has a plinth with a three light mullioned sash window above beneath a dentillated cornice and a flat roof. In the roof are a single two and three light dormers, both C20, with boarded cheeks and flat roofs. To the left is a C20 stair with an openwork wrought iron balustrade.	SK9469550225
1309011		The Reading Room Cottage	II	Irregular five bay two storey front, the right hand two bays being of a different build. The off centre panelled door is covered by a C19 open porch supported on rustic timber uprights with a tiled gabled roof. To the left is a small square window in a C19 moulded surround and beyond a C20 glazing bar casement bow window. To the right is a blocked doorway, a fixed light glazing bar window, a two light Yorkshire sash and a further fixed light window. On the first floor to the left of the door are a single fixed light and a two light	SK9470050236

NHLE	HER	Name	Grade	Description	NGR
				Yorkshire sash. To the right are a three light Yorkshire sash, a single fixed light and a further three light Yorkshire sash. All windows have timber lintels.	
1166259		Fulbeck Manor	II*	Country house. C17 with C18 and late C19 alterations and additions. Coursed limestone rubble with ashlar quoins and dressings, slate roof having stone coped gables with pyramidal finials and 2 stone ridge stacks on main north front. L-plan. 2 storey 5 bay front with garrets; advanced central gabled entry bay of 3 storeys with finial.	SK 94784 50249
1061844	MLI85681	Stables to Welbourn Manor	II	Cowhouse now stables. Late C18. Coursed rubble with ashlar dressings. Pan- tile roof. Ashlar quoined piers at either end of north front which has 6 open bays with seven wooden columns between. Set back inside is a series of stables with plank doors. Included for group value only.	SK 96669 54022
1061845	MLI85706	Welland Cottage	II	Cottage. Early C18. Coursed rubble and brick, all painted. Pantile roof with 2 brick gable stacks. 2 storeys. Central doorway with 6 panel door, flanked by single glazing bar sashes, all with segment brick heads. Above 2, 2-light glazing bar sliding sashes.	SK 96729 54097
1061846	MLI85707	The Old House	II	House. Mid C18. Coursed rubble with red brick dressings. Pantile roof, with a single ridge and 2 gable brick stacks. Brick dentilated eaves. 2-storey plus attic, 3-bay house has central doorway with 6-panel door and lead hood supported on thin iron columns, flanked by single glazing bar sashes and above 3 glazing bar sashes. To the east a 2-bay wing with a single doorway and a plank door and a single wide glazing bar sash to east above 2-glazing bar sashes. All windows have segment brick heads. Above 5 large square dormers each with a glazing bar sash.	SK 96670 53951
1061847	MLI85708	Burtts Cottage	II	Cottage. Mid C18. Coursed rubble and brick. Pantile roof with a single gable and a single ridge stack. Single storey, plus attic. From the left a 2-light casement, and a 3-light casement under a single wooden lintel and be- yond. 2, 3-light sliding sashes under separate wooden lintels. Above 2- square dormers each with a 2-light sliding casement. Included for group value only.	SK 96658 53897
1061848	MLI85711	Myrtle Cottage and Co-operative Cottages	II	3 cottages, one formerly a shop. Late C18. Coursed rubble, partly render, and ashlar dressings. Slate roof with a single gable and 2 ridge brick stacks. 2-storey. From the left a single glazing bar sash, a doorway with C20 door Bind overlight, then a 4-panel door flanked by 3-light shop windows flanked by pilasters and topped with a simple entablature, beyond another glazing bar sash, a plank door with overlight, then a glazing bar sash and finally a C20 plank door with narrow overlight. Above 5 irregularly spaced glazing bar sashes. All the openings have flush ashlar surrounds.	SK 96630 53859
1061849	MLI85656	Blacksmith's Fforge	II	Forge. 1864. Dressed rubble with brick dressings. Pantile roof, with a single gable and a single ridge brick stack. Single storey. South front has a large cart entrance with double doors and brick quoined jambs, and a single window under a segmental stone head, with external plank shutters. In the gable wall is a plaque with a horseshoe and the date '1864'. Included for group value only.	SK 96557 53959
1061850	MLI85674	27, High Street	II	Cottage. Early C19. Coursed rubble with ashlar and brick dressings. Concrete tile roof with 2 brick gable stacks. Ashlar quoins. 2-storey. Central doorway with segment brick head and plank door, flanked by single 2- light glazing bar sliding sashes also under segment brick heads. Above 2, 2- light casements. Included for group value only.	SK 96636 54148
1061851	MLI85671	Welbourn House	II	House now 2 dwellings. Mid C18. Coursed rubble with ashlar dressings. Pan- tile roof, with ashlar coped gables and 3 moulded ashlar gable stack. Deep chamfered plinth. Ashlar quoins. L-plan. 3-storey. East entrance front has off-centre doorway with partly glazed 6-panel door, with to the right 2 glazing bar sashes, and to the left 2 closely spaced cross casement windows. Above the doorway a single cross casement, to the right 2 glazing bar sashes and to the left a single cross casement. Above again, over the doorway a single cross casement, to the right 2 glazing bar sashes, and to the left 2 cross casements.	SK 96647 54194
1061852	MLI82792	Church of St Chad	I	Parish church. C12, C13, C14, C15. 1854 restored 1884. Coursed limestone rubble and ashlar. Slate roofs with coped gables and finials. Heavily moulded plinth. Angled gable buttresses, except on the tower. All openings have hood moulds with label stops. West tower with spire, nave and aisles, chancel and south porch. Tower, 4 stages C12, coursed rubble with low later buttresses with set-offs and topped with C14 coped battlements and octagonal crocketed spire with 3 sets of alternating lucarnes, and 4 thin flying but- tresses and pinnacles.	SK 96868 54510

NHLE	HER	Name	Grade	Description	NGR
1061854		Field House	II	House. Mid C18 and early C19. Brick with ashlar dressings. Pantile roof with ashlar coped gables and 3 brick gable stacks. Ashlar plinth, raised quoins and first floor band. 3-bay 2-storey. Central doorway with round headed painted, moulded ashlar surround with top keystone and impost blocks, 4-panel door and ornate fanlight. Flanked by single glazing bar sashes, with 3 similar sashes above. All windows have curly gauged brick lintels with ash- lar keystones all now painted. To the south a single storey, 2-bay addition, with a small 2-light casement and a large 2-light sliding sash, both segment brick heads.	SK 94985 52084
1061855		49, High Street	II	Cottage. Late C18 and early C19. Squared rubble and ashlar dressings. Pantile roof with 2 brick gable stacks. Ashlar plinth and flush quoins. 2 storey. Central doorway with C20 half-glazed door flanked by single 2-light sliding sashes, all these openings have segment headed wedge lintels of pink ashlar. Above 2 smaller, 2-light sliding sash with segment headed wedge lintels. To the south a single storey coursed rubble extension with a blank facade.	SK 95104 52264
1061856		The Old Hall	II*	Small country house. c1600, c1700 and early C19. Dressed and coursed limestone rubble with ashlar dressings. Hipped pantile roof with central ridge and rear gable stacks. Raised quoins, moulded plinth and moulded ground and first floor lintel bands, plus moulded cornice with downpipe holders. 2 storey.	SK 95184 52501
1061858		Home Farmhouse, Wellingore	II	Farmhouse. 1603 and early C19. Coursed limestone rubble with ashlar and white brick dressings. Slate roof. 2 gable stacks, one rendered, and a single ridge and a single lateral white brick stacks. 2 ashlar coped gables. lobby entrance plan, extended early C19 to L-plan.	SK 95146 52300
1061873	MLI86609	Well Head	II	Drinking fountain. 1867. Ashlar with a diamond patterned slate roof. Octagonal in plan, standing on a 2-step raised octagonal platform. At each corner a column of pink ashlar, with base and capital supporting 8 flattened arches with staff moulds, and above a cornice. The frieze contains an inscription in Gothic lettering 'In memory of John and Susan Reeve ...., 1867'. The roof is octagonal with lead ridge ribs, topped by an ornate iron cross. Under this canopy is an iron and ashlar pump with a pyramidal top and octago- nal basin.	SK 95112 52072
1061875	MLI86643	Lychgate and Walls	II	Lychgate. 1897. Coursed limestone rubble, ashlar and timber, with a fish- scale tile roof with gablettes and a lead ridge topped with a tall ornate iron cross. Either side are low coursed rubble walls with ashlar coping. The chamfered timber piers and beams are supported by curved braces. A pair of wooden gates with trefoil decoration. Inscribed over the gate on the inner lintel 'In memory of John Reeve 1897'. Included for group value only.	SK 95060 51817
1061876	MLI86611	High House	II	House. Late C18 and early C19. Dressed limestone rubble and ashlar. Slate roof with ashlar coped gables and 2 moulded ashlar gable stacks. Flush quoins and plinth. First and second floor raised bands. 2½ storey. 3-bay. Central round headed doorway, with 6-panel door and ornate fanlight over, moulded ash- lar surround with small brackets supporting an open pediment. Either side a single plain sash in a plain raised surround, above 3 similar sashes and above again 3 smaller glazing bar sashes in similar surrounds. To the north a single storey extension, and to the rear an extensive 2 storey early C19 addition under a slate hipped roof.	SK 94993 51989
1061877	MLI86614	Leadenham House	II*	Small country house. 1790-9 additions 1826-9. L,Vulliamy and c.1903 Detmar Blow. Ashlar and dressed limestone rubble with ashlar dressings. Slate hipped roof and 2 ashlar ridge stacks. 2½ storey. West entrance front 7 bays with plinth, ground floor cill band, first floor band and cill band, second floor band and moulded cornice with parapet.	SK 94936 51823
1061878	MLI86616	The Rectory	II	Rectory. 1565, late C18 and late C19. Coursed limestone rubble and ashlar slate roofs with ashlar coped gates and bracketed wooden eaves. 2 large, moulded ashlar gable stacks. Flush ashlar quoins. East entrance front, late C19. 4-bay, 2-storey. Off-centre doorway with 6 panel door and rectangular overlight, moulded door surround with flat hood supported on brackets.	SK 94988 51848
1061879	MLI94119	Coach-House at The Rectory	II	Coach-house. Early C19. Coursed limestone rubble and ashlar. Slate hipped roof. Ashlar quoins and plinth. 5-bay front. Central slightly projecting front has double plank doors with rectangular overlight set in segmental relieving arch, above a pediment containing a small diocletian window. To the right a single glazing bar sash and a blocked carriage entrance to the left a small C20 casement and a carriage entrance with large plank doors. Included for group value only.	SK 94978 51815

NHLE	HER	Name	Grade	Description	NGR
1061887	MLI85989	The Cottage, south of J A Kenwell's Stores	II	The Cottage, south of - J A Kenwell's Stores GV II Cottage. Late C18. Red brick with some white stretchers. Pantile roof, with brick coped gables with kneelers. 2 gable stacks. First floor brick band and decorated eaves. 2 storeys. 3 bay. Central doorway with six panel door and overlight, flanked by single glazing bar sashes, with 3 similar sashes above. All openings have segment heads.	SK 91716 54343
1061888	MLI85990	The Corner	II	Corner GV II House. 1768. Brick, with pantile roof and brick coped gables with kneelers. 2 gable stacks. First floor brick band, and decorated eaves. 2 storey, 3 bay with slightly projecting central bay. Central doorway, with door surround and open pediment on brackets. Six panel door and overlight. Flanked by a glazing bar sash to left and a C20 casement to the right. Above a central C20 casement with a similar window to the left and a glazing bar sash to the right. All the windows have segment heads. Over the central window is a stone plaque, almost illegible, bearing the date '1768'.	SK 91701 54289
1061889		Corner House	II	Corner House - II House. Late C18. Brick, with pantile roof and single ridge and 2 gable stacks. Brick coped gables with kneelers. First floor brick band, decorated eaves. 3 bay front with single bay to west. Central doorway, with six panel door flanked to left by C20 casement window and to right by glazing bar sash. Above central narrow glazing bar sash, flanked by single glazing bar sashes. To the west a single glazing bar sash and a C20 glazed door, with a single C20 casement above.	SK 91679 54218
1061890	MLI85954	Brant House	II	Mid C18. Painted brick with ashlar quoins and first floor band. Slate hipped roof with lead flashings. 2 brick ridge stacks. 2 storeys plus attic. 5 bay by 2 bay. Square plan. East front has central round headed doorway with recessed moulded wooden frame, 6 panel door and elegant fanlight, flanked by 2 glazing bar sashes with segment heads. Above, central blank panel, flanked by single glazing bar sashes, flanked by single blank panels all with segment heads. Above 2 small glazing bar sash, gabled dormers.	SK 91657 54115
1061891	MLI85996	Cobblers	II	GV II House. Early C18. Coursed rubble with ashlar quoins. Slate roof with single ridge and two gable brick stacks. Ashlar coped gables with kneelers. Off-centre doorway, with six panel part glazed door, and wooden C20 lean-to glazed porch. Flanked by single metal C20 2-light casements under wooden lintels. 3 similar casements above also under wooden lintels.	SK 91655 54083
1061928	MLI85953	Lister Place, Gates and Gatepiers	II*	Brant Brought On And Stragglethorpe Church Street SK 95 SW 6/23 (west side) 23.8.67 Belle Vista, Gates and Gatepiers (formerly listed as Lister House) GV II* The address shall be amended to read: CHURCH WALK (west side) Lister Place, Gates and Gatepiers In the descriptive notes the following sentence shall be added at the end: "The remaining garden walls to the south are not of special interest".	SK 91578 54087
1061892	MLI85999	Grey Garth	II	Early C18, altered mid C19. Coursed rubble with ashlar dressings. Pantile roof, with ashlar coped gables with moulded kneelers. 2 square gable stacks. Quoins. Rendered plinth and moulded ashlar eaves band. T-plan. 2 storeys plus attic. 3 bays. Central doorway has C19 half glazed door with wooden C19 decorated gabled porch, flanked by single 2 light chamfered mullion windows under drip moulds. Above 3 similar 2-light windows with drip moulds. Above again, 2 gabled dormers with plain casements. To rear a long, 2 storey wing with various chamfered mullion windows.	SK 91634 53896
1061893	MLI86003	The Cottages and Railings north of the Old Hall	II	The Cottages and _ Railings north of The Old Hall GV II Row of 3 cottages. Early C19. Rendered brick. Concrete tile hipped roof, with 2 ridge and a single end wall stack. 2 storey, 6 bay. 3 doorways with wooden bracketted flat hoods, doors and ornate overlights, alternating with 3 glazing bar sashes. Above 6 glazing bar sashes. All windows have segment heads. Outside continuous spear headed gates and railings. Included for group value only.	SK 91737 54315
1061894	MLI86005	Jasmine Cottage	II	GV II Cottage. Early C19. Brick, dark stretchers and pale headers. Pantile roof, with single gable stack. Decorated eaves. 2 storey. 3 bay. Central half- glazed door with overlight, and C20 lean-to porch, supported on thin iron posts. Flanked by single glazing sashes, 3 similar sashes above, all with segment heads. Included for group value only.	SK9170654211
1061895	MLI86007	The Hollies and attached walls and gates	II	67 gates GV II House. Mid C18. Brick with a pantile hipped roof. Brick coped gables with kneelers and 2 gable stacks. First floor brick band and decorated eaves. 3 bay, 2 storey. Central doorway with moulded frame topped with brackets supporting an open pediment, panelled door and fanlight. Flanked by single glazing bar sashes, with 3 similar sashes above, all with segment heads. Brick garden walls with round brick coping ramped to tall brick and ashlar gate piers, topped with ashlar caps. Iron gates.	SK 91723 54108

NHLE	HER	Name	Grade	Description	NGR
1061896	MLI86009	Smithy attached to Primrose Cottage	II	Late C18. Coursed rubble and brick. Pantile roof, with large glazed roof light, and single brick gable stack to south. Irregular quoins. Brick decorated eaves. Single storey, 3 bay. Central stable door. Flanked by single 2-light glazing bar sliding sashes under wooden lintels.	SK9167854068
1061902	MLI94122	Garden Wall south east of Almshouses	II	Brant Broughton And Stragglethorpe West Street SK 95 SW (west side) 6/61B Garden Wall south east of Almshouses GV II Garden wall. Built in 1860 for Sir John Sutton. Red brick with diagonally crossing blue brick headers, in diamond pattern. Single brick ramp coping and small plain wooden gate. Included for group value only.	SK 91490 54334
1147835	MLI94159	Outhouses behind Almshouses	II	Brant Broughton And Stragglethorpe West Street SK 95 SW (west side) Outhouses behind 6/61A - Almshouses GV II Three small outhouses. Built in 1860 for Sir John Sutton. Red brick with blue brick headers in diamond pattern, fishscale and plain tile roofs. Brick plinth. Each outbuilding has a pair of 2 centred arched doorways in east wall with side door and open side bay. Included for group value only.	SK 91497 54347
1061901	MLI60252	Almshouses	II	Brant Broughton And Stragglethorpe West Street SK 95 SW (west side) 6/61 Almshouses (Formerly listed under Back Street) 11.4.85 II GV Terrace of six almshouses. Built in 1860 for Sir John Sutton. Red brick with blue brick small and large diamond patterning. Fishscale tile and plain tile roof. 2 gable end and 2 ridge moulded stacks. Plinth and first floor band. 1½ storey, 6 bay with 5 deep buttresses, the end ones projecting diagonally from the corners. 6 plank doors with segment heads and 6 3-light leaded pane casements also with segment heads, all with alternating red and white brick voussoirs. Above 6 gabled, through eaves, dormers with 2-light leaded pane casements.	SK 91506 54343
1061897	MLI86011	Warburton House	II	GV II House. Late C18. Brick, with pantile hipped roof and 2 end wall stacks. Brick plinth, first floor band and decorative eaves cornice. 3 bay, 2 storey. Central doorway has flat wooden hood, with half-glazed door and margin light overlight. Flanked by single glazing bar sashes, 3 similar sashes above, all with segment heads.	SK 91682 53920
1147818	MLI86018	Guildford House	II	Brant Broughton And Stragglethorpe West Street SK 95 SW (west side) 6/60 Guildford House - - II House. Late C18, top storey added early C19. Brick with pantile roof and 2 gable stacks. First floor brick band and decorated eaves. 2½ storey, 3 bay, the central bay projects slightly. Central doorway with moulded wooden surround, six panel door with fanlight in rectangular opening. Flanked by single margin light sashes, with above, 3 similar sashes, all with pointed brick lintels. Above again, 3 small glazing bar sashes, under wooden lintels.	SK 91558 54554
1308424		Church of All Saints	I	Parish church. Late C12, C13, C14, C15 restored 1881. Coursed limestone, rubble and ashlar, with ashlar dressings. Plain tile roofs with stone coped gables with finials. Flush ashlar quoins, and plinth. West tower, with spire, nave with aisles and north porch and chancel with north chantry chapel. A plain unbuttressed 3- stage tower has a moulded plinth to the west and a single tall lancet.	SK 98222 56538
1147669		Barn at Home Farm	II	Parish church. Late C12, C13, C14, C15 restored 1881. Coursed limestone, rubble and ashlar, with ashlar dressings. Plain tile roofs with stone coped gables with finials. Flush ashlar quoins, and plinth. West tower, with spire, nave with aisles and north porch and chancel with north chantry chapel. A plain unbuttressed 3- stage tower has a moulded plinth to the west and a single tall lancet.	SK 98188 56560
1147685		The Old Workhouse Cottages and attached outbuilding	II	Pair of cottages reputedly the old workhouse. 1782 and early C19. Coursed limestone rubble and brick. Pantile roof with 2 gable and a single rear lateral brick stacks. Brick dentillated eaves. 2-storey. 6-bays. Cottage to left has central doorway with plank door flanked by single 2-light sliding sashes all with segment brick heads. Above 2 cross casements to eaves. Cottage to right has central half-glazed door flanked by single plain 3-light sliding sashes, with 2 similar windows above. All with wooden lintels. Beyond to the right is a single storey outbuilding with a single plank door. In the north gable is a plaque inscribed 'W. M. 1782'.	SK 98610 56567
1147748		Wellingore Hall and attached RC Church of St Augustine	II*	Country house, now offices and flats, with attached private chapel now RC Church. Palladian Villa, built c1760 for Neville family, extended c1800 and again 1876 by J MacVicar Anderson. Limestone ashlar with slate hipped roofs. Many ashlar moulded stacks. Plinth, first floor band and moulded cornice with coped parapet. Central block, 5-bay, 3-storey including basement, piano nobile and mezzanine floors. Slightly projecting central 3 bays crowned with a pediment. North entrance front has projecting single storey porch with moulded cornice and parapet topped with ball finials. Moulded ashlar door surround with double keystone and pediment supported on brackets.	SK 98312 56533

NHLE	HER	Name	Grade	Description	NGR
1061898	MLI85956	Manor House	II*	Former C17 barn, cottage and stable, converted to a Quaker Meeting House in about 1701. C18, C19, C20 and C21 alterations.	SK 91653 54219
1061863		Beehive Cottage	II	Cottage. Early C19. Coursed limestone rubble and ashlar. Pantile roof and 2-brick gable stacks. Ashlar quoins. Single storey plus attic. 3-bay. Central doorway with plank door and glazed gable porch, flanked on either side by single 2-light sliding sashes under segment headed wedge lintels. Above 3-gable dormers with wavy barge boards, each with a single 2-light casement. Included for group value only.	SK 98645 56525
1061859		The Old Bakehouse	II	House formerly bakehouse. Late C18. Coursed limestone rubble and brick with a pantile roof. 2 brick gable stacks. Flush stone quoins. Plinth. 2 storey plus attic. Irregular 3-bay front. Off-centre doorway with 6-panel door and overlight, to the right a blocked doorway and beyond a 2-light casement, to the left another 2-light casement. Above 2 single light glazing bar casements. Above again a single small gabled brick dormer. Attached to the left is a very narrow single bay extension with a tiny fixed light and above a small C19 brick dormer with a 2-light glazing bar sliding sash.	SK 98426 56574
1308386		Doughty's Cottage	II	Cottage. 1797. Red brick and coursed limestone rubble. Pantile roof with brick coped gables with kneelers. 2-brick gable stacks. 2-storey. 3-bay. Central doorway with 4-panel door, and C20 rustic timber porch, flanked by single 2-light sliding sashes under brick segment heads. Above 2 smaller 2- light sliding sashes under wooden lintels. Above the door is a small plaque inscribed 'John Doughty. 1797'.	SK 98060 56575
1061886	MLI85987	Lodge to Manor House	II	Brant Broughton And Stragglethorpe High Street SK 95 SW (west side) 6/28 - Lodge to Manor House GV II Lodge. Early C19. Brick with pantile roof and 2 gable stacks. Decorated eaves. 2 storey, 3 bay. Central doorway with wooden pilaster surround supporting pediment. Six fielded panel door and overlight. Flanked by single glazing bar sashes. Above a single central blank panel, flanked by single glazing bar sashes. All with rendered flat lintels. Included for group value only.	SK 91820 54647
1360547	MLI85958	Manor House	II	Brant Broughton And Stragglethorpe High Street SK 95 SW (west side) 6/29 - Manor House GV II House. C17 and early C18. Coursed rubble ashlar and brick. Plain tile roof with central moulded ashlar stack. Rear wing has brick coped gable and stack. 2 storey. T-plan. Main, south front, 4 bay. Ground floor coursed rubble and ashlar, with ashlar quoins and first floor moulded band, and first floor brick with decorated eaves. Single tripartite glazing bar sash to right and single large C20 canted bay window to left. Above 4 glazing bar sashes.	SK 91776 54607
1061928		Lister Place, Gates and Gatepiers	II*	c1720. Brick with ashlar dressings. Plain tile roof with 4 gable stacks. Stone coped gables with kneelers. Plain ashlar quoins, plinth, first and second floor bands and coved eaves cornice. T-plan. 2 storey plus attic. 5 bay east front with slightly projecting central bay topped by a tall pediment. Central doorway approached up 2 semi-circular steps, has plain ashlar surround with narrow staff moulding topped by segmental pediment.	SK 91578 54087
1061929	MLI85959	Dovecote at Dovecote House	II	Dovecote at Dovecote House (formerly listed as Dovecote at the Gables) II Pigeoncote. C17. Coursed rubble and brick. Pantile roof. Coursed rubble walls with dressed stone grains, and brick gables. Single low doorway in east side, with chamfered 4-centred arch. Pigeonholes in gable to south, fixed light in north gable.	SK 91557 54303
1147376	MLI86608	Manor House	II	House. C17 and 1867. Coursed rubble and rock faced stone with ashlar dressings. Slate roofs. South range 1867, 2-storey, 3-bay, with ashlar coped gables with kneelers and quoins. 2 rear wall moulded stacks. Central bay projects slightly and is topped by a coped gable with kneelers.	SK 95079 51842
1147380	MLI86610	The Old Sstation House	II	Former railway station built in 1876 for the Great Northern Railway. The C20 lean-to brick extension on the east elevation, the single-storey stone extension added to the lean-to at the north end, the garage attached to the north-west corner of this, the early-C21 conservatory and attached new house to the south, are not included in the listing.	SK9563952746

NHLE	HER	Name	Grade	Description	NGR
1147403	MLI82970	Leadenham Mill	II	Windmill. Mid C19. Tarred red brick. Circular battered tower mill. 5 storey. Ground floor has a single doorway with a plank door, and above an iron casement, then another doorway, and above again 2 single iron casements. All openings have segment brick heads. Cap missing.	SK 92082 53168
1147415	MLI86613	Gateway to Leadenham House	II	Gateway. c.1900. Dressed limestone rubble and ashlar. Chamfered round arched opening with moulded impost blocks and a plain keystone, topped with simple pediment containing a shield bearing the Reeve's coat of arms. Either side short curved and ramped walls with ashlar coping, which terminate in square piers with pyramidal tops. The large iron gates, in an elaborate early C18 style, by Coldron of Brant Broughton.	SK 94970 51972
1061874	MLI86612	South Gate to Leadenham House	II	Gates. Late C19. Ashlar. A pair of square gate piers with chamfered plinths, plain bands and pyramidal caps supporting large ball finials. To either side dire curved coped walls, also with a chamfered plinth, which terminate in another pair of similar gate piers.	SK9514251551
1147454	MLI86617	5 and 7, Station Terrace	II	Pair of cottages formerly house. C17 and Cl9. Coursed limestone rubble and brick. Pantile roof with a single ridge and 2 gable brick stacks. Brick coped gables. 2 storey. 5-bay with central 3-light C20 casement flanked by single plank doors. To the right a single 3-light C19 casement and to the left a deeply recessed 3-light casement. All openings have wooden lintels. Above 2 small 2-light sliding casements and a single 2-light square dormer.	SK 95295 52648
1147497	MLI85950	Church of St Helen	I	Parish church. C11, C13, late C14 and early C16. 1812. 1873-76 restored and altered by G F Bodley for Canon Frederick Sutton. He rebuilt the early C19 chancel and added the vestry and north chapel all in a late decorated style. West steeple and nave with aisles and porches.	SK 91544 53899
1147538	MLI85985	Barn, Outbuildings and attached Cottage of Lister Place	II	Barn, Outbuildings and - attached Cottage of GV Belle Vista II Barn, outbuildings and attached cottage. Early C18 and late C18. Brick with pantile roofs. Large barn has brick coped gables with kneelers. A large opening to the east with C20 double doors, then a C20 casement, a stable door and another C20 casement.	SK 91550 54105
1147545	MLI85986	Barn and outbuilding at The Priory	II	Barn and Outbuilding at the Priory GV II Barn and outbuilding. Mid C18 and C19. brick with pantile roofs, and dentilated eaves. Barn has brick coped gables with kneelers, and a single large opening with double plank doors under a segment arch.	SK 91536 54052
1147619	MLI85672	Trevella	II	House. Late C17. Coursed rubble and ashlar. Pantile roof, with ashlar coped gables and kneelers. A single gable and a single ridge stacks of white brick and ashlar. High chamfered plinth and ashlar quoins. L-plan. 2 storey plus attic. Gabled, single bay street, front has a C20 glazing bar casement on the ground floor, above a plain C20 casement and above again a small C20 glaz- ing bar casement. The south entrance front has an off-centre doorway with a 6-panel door. To the right a C20 glazing bar casement and to the left 2 similar windows, with 3 similar windows above, all openings have wooden lintels.	SK 96620 54107
1147625	MLI85668	Barn at Preengates	II	Barn now garage. Mid C18. Coursed rubble and ashlar. Pantile roof, with ashlar coped gables with kneelers. Ashlar quoins. Off-centre cart entrance with flush quoined surround and segment arch with keystones. Flanked on either side by single glazing bar sashes, under ashlar lintels with keystones. Included for group value only.	SK 96621 54178
1147631	MLI85646	Welbourn Farmhouse	II	Farmhouse. Mid C18 and mid C19. Coursed limestone rubble, brick and ashlar. Slate roof with 2 brick gable stacks. Ashlar quoins. L-plan with C19 wing added. Refronted in brick in C19. 2-storey, 3-bay. Central doorway with half glazed door with wooden reeded surround. Flanked on either side by single canted bay windows with plain sashes. Above 3 plain sashes, all under segment brick heads. Dentilated brick eaves. Included for group value only.	SK 96834 54461
1061866	MLI86004	K6 Telephone Kiosk outside	II	Telephone kiosk. Type K6. Designed 1935 by Sir Giles Gilbert Scott. Made by various contractors. Cast iron. Square kiosk with domed roof. Unperforated crowns to top panels and margin glazing to windows and door.	SK9169654200

NHLE	HER	Name	Grade	Description	NGR
		Jasmine Ccottage			
1147635	MLI85998	Brant Broughton Church of England School	II	Brant Broughton And Stragglethorpe High Street SK 95 SW (west side) 6/38 Brant Broughton Church of England School 15.4.85 GV II School. Formerly School and Schoolmasters house. 1871.	SK 91633 53918
1147661	MLI86000	Stone Cottage	II	Mid C18 with C19 alterations. Coursed rubble with brick and ashlar dressings. Stone quoins. Concrete tile roof and ashlar coped gables with moulded kneelers. 2 brick gable stacks. Decorated brick eaves. Central doorway with 6 panel door, flanked by glazing bar sash to the right and a C19 3-light casement to the left.	SK 91636 53875
1147696	MLI85957	The Old Hall	II	House. Late C17 and early C18, with early C19 additions and alterations. Coursed rubble with ashlar dressings and rendered brick additions. C19 slate hipped roof with large rubble and brick stack. Chamfered stone plinth and brick band above first floor. 2 storey with extra half storey added in C19. 3 bay by 2 bay rectangular plan.	SK 91737 54297
1147709	MLI85955	The Old House	II	Mid C18. Brick part colour-washed, with pantile roof. Brick coped gables with kneelers and 2 gable stacks. First floor band and decorated eaves. 2 storey, 3 bay with slightly projecting central bay topped with a pediment. Central semi-circular headed doorway has wooden moulded frame, topped with keystone. 6 fielded panel door with fanlight. Flanked by tripartite glazing bar sashes. Above 3 glazing bar sashes. All windows have flat brick painted lintels with keystones. The pediment contains a semi-circular blind panel also topped with a keystone.	SK 91696 54139
1147723	MLI86008	Primrose Cottage	II	Late C18. Brick, part colour-washed. Pantile roof, brick coped gables with kneelers and 2 gable stacks. Decorated eaves. 2 storey, 3 bay. Central C20 door, flanked by single C19 sashes. Above central narrow C18 glazing bar sash, flanked by single C20 casements. All openings are segment headed.	SK9168254075
1241051	MLI85676	K6 Telephone Kiosk on the village green	II	Telephone kiosk. Type K6. Designed 1935 by Sir Giles Gilbert Scott. Made by various contractors. Cast iron. Square kiosk with domed roof. Unperforated crowns to top panels and margin glazing to windows and door.	SK 96641 53917
1308369	MLI86017	West House	II	BRANT BROUGHTON AND STRAGGLETHORPE WEST STREET SK 95 SW (west side) 6/62 West House with attached gate and 9.12.85 railings GV II House. Early C19. Brick with slate hipped roof and 2 brick end wall stacks. Bracketed wooden eaves. 2 storey, 3 bay. Central doorway with moulded wooden surround topped with brackets and open pediment. Six panel door and fanlight. flanked by single glazing bar sashes, with above 3 similar sashes, all with flat ashlar painted lintels. Attached C19 spiked railings with matching gate.	SK 91412 54156
1360549	MLI85994	The Cottage to north of the Post Office	II	BRANT BROUGHTON AND STRAGGLETHORPE HIGH STREET SK 95 SW (east side) 6/34 The Cottage to north - of the Post Office GV II Cottage. Late C18. Brick with a pantile roof, and brick coped gables with kneelers, 2 gable stacks. First floor brick band and dentilated eaves. 2 storey.' 3 bay. Central doorway with C20 wooden pedimented surround and door. Flanked by a single glazing bar sash to the right and a C20 glazing bar casement to the left. Above a central sliding sash with a similar sash to the right and a C20 2 light casement to the left, all rising to the eaves.	SK9166954171
1308399	MLI86012	Bylands	II	Cottage. Late C18. Brick with pantile roofs. 2 gable stacks. Decorated eaves. 3 bay, with lower 2 bay wing to left. 1½ storey. Main wing has doorway to right with C20 brick gabled porch, and glazed door. To left, 2 2-light casements. Left wing has 2 2-light casements with single similar window above. All ground floor windows have segment heads. Main wing has 2 sloping dormers.	SK 91688 54414
1308412	MLI86002	Digby House	II	Early C18 and 1769. Coursed rubble and brick with ashlar dressings. Plain tile roof with brick coped gable with kneelers and 2 brick gable stacks. Coursed rubble ground floor with ashlar quoins, topped with ashlar chamfered band. Brick above with dentilated eaves. 2 storey. 3 bay. Slightly off-centre doorway with C20 half glazed door and overlight. C20 half glazed lean-to porch. Flanked by single glazing bar sashes in staff-moulded surrounds. Above 3 similar sashes with flat brick heads. Above the central window a stone plaque inscribed 'G B 1769'. Lower wing to rear with mostly C20 fenestration.	SK 91809 54536

NHLE	HER	Name	Grade	Description	NGR
1308462	MLI85713	Stable to rear of Greystone Cottage	II	Early C18. Coursed rubble. Pantile roof. 2 storey. 3-bay. Slightly off-centre doorway with divided stable door and wooden lintel. Either side single breathers. Above 2 pitchings openings to eaves with plank doors. Included for group value only.	SK 96684 53817
1308542	MLI86615	The Stables to Leadenham House	II	Coursed limestone rubble and ashlar. Slate roofs. Ashlar plinth, quoins and plain bands. Quadrangular plan, with gate and walls to west side. Single storey and attics. West front has cen- tral slightly projecting ashlar gateway, with large moulded round arched open- ing and plain impost band, wood and iron gates, topped with plain cornice and parapet.	SK 94924 51930
1360526	MLI85978	Church Lane Farmhouse	II	Farmhouse. Late C18. Brick. Pantile roof with 2 gable stacks. Brick coped gables with kneelers. First floor brick band and dentilated eaves. 2 storey 3 bay.	SK 91606 54111
1360527	MLI85952	The Priory, Gates and Gatepiers	II*	House. 1658, built for William Garnon. Coursed rubble with ashlar dressings. Pantile hipped roof with 3 wall stacks with broad moulded stone bases with set- offs topped by tall brick shafts, and a single moulded stone ridge stack.	SK 91535 54027
1360548	MLI85991	Gaskells Shop	II	Formerly house. Late C18 with early C19 shop front. Brick, with pantile roof. Brick coped gables with kneelers. 2 brick gable stacks.	SK 91696 54272
1,360549		The Cottage to north of the Post Office	II	Late C18. Brick with a pantile roof, and brick coped gables with kneelers, 2 gable stacks. First floor brick band and dentilated eaves. 2 storey.' 3 bay. Central doorway with C20 wooden pedimented surround and door. Flanked by a single glazing bar sash to the right and a C20 glazing bar casement to the left. Above a central sliding sash with a similar sash to the right and a C20 2 light casement to the left, all rising to the eaves.	SK9166954171
1360550	MLI85997	The Rectory	II	The Rectory GV II House. Early C19. Brick with slate hipped roof. 2 brick stacks, and wooden eaves band. Central doorway with moulded wooden surround, with brackets supporting flat hood. Six fielded panel door with ornate overlight. Flanked by single margin light sashes. Above 3 glazing bar sashes.	SK 91631 53999
1360551	MLI85960	Broughton House School	II	School formerly small country house. 1707, remodelled 1821. Coursed rubble and brick. Shallow pitched, hipped slate roof. 8, C19 white brick stacks. Quoins and decorated brick eaves. 2 storey, 3 bay coursed rubble centre with small single bay brick projections topped with pyramidal roofs.	SK 91549 53809
1360567	MLI85677	Welbourn Manor	II*	Small country house. Early C14, C15, C17 and heavily restored 1904, Coursed and dressed limestone rubble with ashlar dressings. Plain tile roofs, with ashlar coped gables with finials. 2 external, a single ridge and 3-gable moulded ashlar stacks. 2-storey plus garrets. H plan with central hall and cross wings.	SK 96637 53982
1360568	MLI85683	Wheelwright Cottage	II	Cottage. Late C18. Coursed rubble and brick with a pantile roof. A single gable and a single ridge brick stacks. Single storey plus attic. Off-centre doorway with C20 half-glazed door and segment brick head. To left a single plain sash with a wooden lintel and to the right a C20 glazing bar casement under a segment brick head. Above a single square dormer with a plain sash window.	SK 96728 54176
1360569	MLI85710	Long Cottage	II	Cottage C17 and Cl9. Coursed rubble with a pantile roof. 2-ridge and a a single gable brick stacks. Single storey. 7-bay. Off-centre plank door has C20 wooden hood flanked on either side by single large 3-light glazing bar casements, flanked again by small similar casements with to the right 2 small 2-light glazing bar casements. All the windows have painted stone lintels.	SK 96472 53761
1360570	MLI85709	Hunt House	II	House. 1807 and mid C19. Coursed rubble, ashlar and brick dressings. Slate roof. 2 brick gable stacks. Ashlar quoins. First floor band. Brick denti- lated eaves. 2-storey, 3-bay. Central doorway with 6-panel door with to left a single plain sash and to the right a C19 canted bay window with plain sashes and a lead roof. Above 3 plain sashes. Inscribed on an upper quoin to right T. B. 1807. To rear late C19 wing, with C20 metal casements.	SK 96617 53896
1360571	MLI85712	Greystone Cottage	II	Cottage. Early C17. Coursed rubble with ashlar dressings. Pantile roof, with a single ridge and 2-gable brick stacks. Lobby entrance, 3-bay plan. Single storey plus attic. Off-centre doorway with C19 half-glazed door. To the right 2, 3-light recessed and chamfered mullion	SK 96669 53841

NHLE	HER	Name	Grade	Description	NGR
				windows, to the left is a lean-to extension under a continuous catslide roof. Above 2 square dormers each with a 2-light casement. Interior has chamfered beams, a bressummer fireplace, a C17 winder stair and some contemporary doors with L-hinges.	
1360578	MLI86598	The Feathers	II	House, formerly public house. C17, C19 and C20. Coursed limestone rubble and ashlar. Pantile roof with ashlar coped gables. Brick single ridge and single gable stacks. Quoins. 2 storey, brick third floor was added in C19 Bind removed c.1980. 4-bay. To the west a blocked doorway, then two, 4-light recessed and chamfered mullion windows under hood moulds, then a C20 ashlar chamfered doorway and a 2-light recessed and chamfered mullion window under hood mould, another blocked doorway and a 3-light recessed and chamfered mullion window under a hood mould. Above three, 3-light and a single 2-light recessed and chamfered mullion windows under hood moulds. In the west gable is a single 3-light recessed and chamfered mullion window under a hood mould.	SK 94966 52030
1360579	MLI86601	51, High Street	II	Cottage, formerly also shop. Early C19. Coursed limestone rubble with ashlar dressings. Slate roof. Single ashlar coped gable. Single brick gable stack, plus single ashlar moulded gable stack, and similar ridge stack. Flush quoins and plinth. 2-storey. 5-bay. To the south a large glazing bar shop window, then a plank door, then a 2-light glazing bar sliding sash, a C20 door and another 2-light glazing bar sliding sash, all openings have segment headed ashlar wedge lintels. Above five, 2-light glazing bar sliding sashes, those over the doorways being slightly narrower.	SK 95112 52277
1360580	MLI86603	Stables to the Old Hall	II	Stable block. Early C19. Coursed limestone rubble. Slate hipped roof flush ashlar quoins. 2-storey. 6 irregular bays. To the left 2 glazing bar sashes, then a plank door and a single glazing bar sash, then another plank door and a further single glazing bar sash. Above two 2-light sliding sashes. All openings have wooden lintels. At the east end is a set of brick and ashlar steps which rise around the corner to an upper doorway on the east wall.	SK 95209 52504
1360581	MLI86605	Redberry House	II	House. Mid and late C18. Red brick and coursed limestone rubble. Pantile roofs, with 3-brick gable stack and a single brick coped gable with kneelers topping the south coursed rubble wall. Dentilated brick eaves. Brick fronted. Mid C18 low 2-storey, 2-bay range to the south with 2, 2-light sliding sashes tinder wooden lintels, and 2 similar windows above. To the north a taller late C18 range with a round headed doorway, with 6-panel door and fanlight over, to the left a single 2-light glazing bar sliding sash under a segment brick head. Above a first floor brick band, and 3 similar smaller sliding sashes.	SK 95118 52255
1360511		Orchard Outbuilding at Somerton Castle	I	Base of circular tower, originally at corner of Castle walls, C14. Coursed rubble. Circular with central column, and stone vaulting, 12 arches around, corbels between supporting vault ribs. Small projecting chamber with pointed barrel vault to south-west. Ancient Monument.	SK 95460 58828
1247059		K6 opposite the Lion and Royal Public House	II	Telephone kiosk, Type K6. Designed 1935 by Sir Giles Gilbert Scott. Made by various contractors. Cast iron. Square kiosk with domed roof. Unperforated crowns to top panels and margin glazing to windows and door.	SK 98850 57648
1061885		63, High Street	II	House. Early C18. Coursed limestone rubble with ashlar dressings. Pantile roof with a single ashlar and a single brick coped gables. 2-brick gable stacks. Flush ashlar quoins, 2-storey. 3-bay. Central doorway with 6-panel door flanked by C19 3-light sliding sashes. Above 2 similar sliding sashes. All openings have wooden lintels.	SK 98885 57618

C.2 Designated assets of high value within 5km

NHLE	Name	Grade	Description	NGR
1007686	Remains of preceptory church, Temple Bruer	SM	A preceptory is a monastery of the military orders of Knights Templars and Knights Hospitallers (also known as the Knights of St John of Jerusalem). At least one preceptory of the Knights of St Lazarus is also known to have existed in England. Preceptories were founded to raise revenues to fund the 12th and 13th century crusades to Jerusalem. In the 15th century the Hospitallers directed their revenue toward defending Rhodes from the Turks. In addition, the preceptories of the Templars functioned as recruiting and training barracks for the knights whilst those of the Hospitallers provided hospices which offered hospitality to pilgrims and travellers and distributed alms to the poor. Lazarine preceptories had leprosy hospitals attached. Like other monastic sites, the buildings of preceptories included provision for worship and communal living.	
1009215	Churchyard Cross, All Saints' churchyard	SM	A standing cross is a free standing upright structure, usually of stone, mostly erected during the medieval period (mid 10th to mid 16th centuries AD). Standing crosses served a variety of functions. In churchyards they served as stations for outdoor processions, particularly in the observance of Palm Sunday. Elsewhere, standing crosses were used within settlements as places for preaching, public proclamation and penance, as well as defining rights of sanctuary.	
1009216	Churchyard Cross, All Saints' churchyard	SM	A standing cross is a free standing upright structure, usually of stone, mostly erected during the medieval period (mid 10th to mid 16th centuries AD). Standing crosses served a variety of functions. In churchyards they served as stations for outdoor processions, particularly in the observance of Palm Sunday. Elsewhere, standing crosses were used within settlements as places for preaching, public proclamation and penance, as well as defining rights of sanctuary.	
1009225	Churchyard Cross, St Vincent's churchyard	SM	A standing cross is a free standing upright structure, usually of stone, mostly erected during the medieval period (mid 10th to mid 16th centuries AD). Standing crosses served a variety of functions. In churchyards they served as stations for outdoor processions, particularly in the observance of Palm Sunday.	
1254328	Church tower to the north of Temple Farmhouse	I	Temple Bruer with Temple Bruer TF 05 SW Temple High Grange 3/59 Church Tower to the north of Temple Farmhouse 1.2.67 GV I Church tower. Early C13, restored early C20. Limestone ashlar, with a plain tile hipped roof with deeply overhanging eaves. Moulded chamfered plinth. 4-stage square tower, once attached to other buildings, on the north and west.	TF 00851 53709
1062429	Caythorpe Court	II*	Agricultural College, formerly country house. 1899, Sir R.Blomfield. Coursed limestone and ironstone rubble, banded in parts, ashlar dressings, 4 moulded wall stacks on main block, one ridge and one gable stacks on service range at rear, slate roofs. Principal range is L-shaped with kitchen yard surrounded by service ranges on 3 sides at rear. House is in C17 style with local vernacular details; banded work, moulded string courses end steeply pitched stone coped gables with ball finials.	SK 95756 48281
1062914	Church of All Saints	I	Parish church, C12, C13, C14, C15, 1838, restored 1875 and 1888. Coursed ironstone rubble, Ancaster stone ashlar, blue lias, red brick, some rendering, lead and slate roofs. West tower with spire, nave with north and south aisles, south porch and rectangular chancel.	SK 87852 50686
1360525	Church of All Saints	I	I Parish church. C12, C13, C14, C15 restored 1888. West tower, nave with aisles and south porch, chancel and north vestry. Ashlar and coursed rubble with ashlar dressings. Lead and slate roofs. Ashlar coped gables topped with cross finials. Angle buttresses with set-offs, some gabled. Moulded plinth except on chancel. All windows except aisle window have hood moulds with label stops.	SK8756353805
1165323	Caythorpe Hall	II*	Country House; 1823 by William Parsons, for Col. G. Hussey Packe. Ashlar with hipped slate roof with lead dressings and balanced pair of moulded stone ridge stacks. Principal east front of two storeys with first floor band, heavily moulded cornice and plain parapet.	SK 93848 48882
1147458	Church of St Peter	I	Parish church. C13, C14, C15, mid C18, restored 1875-6 and C20 addition. Coursed limestone rubble and ashlar with ashlar dressings. Slate nave and chancel roofs and lead aisle roofs with ashlar coped gables with kneelers and cross finials. Double moulded plinth to chancel and small plinth to remainder of building. All openings have hood moulds and label stops. West tower, nave and aisles, and south porch chancel and north vestry.	SK 98650 57843
1062396	Pickworth House	II*	Pickworth House (No 33) 192-52 (formerly listed as Ivy House and Cottage adjoining) G.V. II* House, 1684, with C18 and C19 alterations. Ashlar with stone coped gables, pantiled roof and two ridge stacks. Balanced H plan front with rear projecting wing on left side. 2 storeys with garrets, 5 bay front, middle 3 bays recessed.	SK 93812 48244
1317320	Parish Church of St Vincent	I	Parish Church. C13, C14, C16, C17, C18, 1860 addition and restoration by Sir G. G. Scott. Nave, north aisle, central tower, north and south aisle 'stubs', chancel. Coursed and banded ironstone and limestone rubble, ashlar quoins and dressings, slate roofs.	SK 93894 48566

1360553	Church of Saint Mary	I	Carlton-Le-Moorland Church Street SK 95 NW 4/63 Church of St Mary 23.8.67 GV I Parish church. C11, C13, C15, late C16 restored 1890-1 by C Hodgson Fowler. West tower, nave, chancel and north chapel now vestry. Nave rebuilt and tower remodelled late C16.	SK 90809 57895
1166332	Brandon Old Hall	II*	Brandon Old Hall (Formerly 3/96 listed as Brandon Old Hall 19-2-52 and garden wall) G.V. II* House. Early C16, 1637, C18, C19, C20. Coursed dark gold bands of ironstone, light gold bands of ironstone, narrow bands of blue lias and limestone ashlar dressings, slate, plaintile and pantile roofs with stone coped gables, finials, slight kneelers and 2 coped stone ridge stacks.	SK 90412 48338

Appendix C Non-Designated Heritage Assets

MonUID / NMP	Record Type	Name	Period	GridRef
MLI127058	FS	Early Neolithic flint core, Main Road, Leadenham	Neolithic	SK 9543 5253
MLI60655	FS	Prehistoric worked flint from near St Helen's church, Brant Broughton	Neolithic	SK 9140 5393
MLI82004	MON	Neolithic pit alignment, Leadenham Quarry, Welbourn	Neolithic	SK 9637 5256
MLI85691	MON	Flint arrowheads, Welbourn	Neolithic	SK 968 544
MLI86032	MON	Multiple-ditched boundary lying to the west of the River Brant, north of Brant Broughton	Neolithic	SK 930 553
MLI81874	FS	Early Iron Age pottery, Hall Orchard Lane, Welbourn	Iron Age	SK 965 543
MLI82010	FS	Sherd of probable Iron Age pottery, Leadenham Quarry, Welbourn	Iron Age	SK 963 524
MLI86640	MON	Possible prehistoric cropmark pit alignment, north of Field House, Leadenham Low Fields	Prehistoric	SK 9247 5379
MLI60657	MON	Roman pottery from near St Helen's church, Brant Broughton	Roman	SK 9142 5394
MLI60784	MON	Roman Finds, east of Welbourn	Roman	SK 9758 5396
MLI81870	MON	Late Roman settlement activity, Hall Orchard Lane, Welbourn	Roman	SK 9653 5436
MLI82016	MON	Late Roman settlement, Leadenham Quarry, Welbourn	Roman	SK 9637 5256
MLI60366	MON	Romano-British burials and finds, near Ludlow Hole Plantation, Leadenham	Roman	SK 9598 5259
MLI85684	MON	Earthwork remains of alleged Roman Encampment, Welbourn	Roman	SK 9665 5445
MLI85693	MON	Romano-British pottery scatter, north of Leadenham Quarry, Welbourn	Roman	SK 963 527
MLI85696	MON	Romano-British artefact scatter, Welbourn	Roman	SK 966 542
MLI86623	MON	Romano-British pottery scatter, Field House Farm, Leadenham	Roman	SK 9242 5325
MLI86624	MON	Romano-British pottery scatter, Leadenham Low Fields	Roman	SK 9225 5344
MLI86641	MON	Romano-British settlement, north of Field House, Leadenham Low Fields	Roman	SK 9236 5380
MLI85714	MON	Romano-British pottery scatter, near the River Brant, Welbourn	Roman	SK 9335 5476
MLI60758	FS	Roman artefacts, Welbourn	Roman	SK 9699 5457
MLI85967	FS	Roman pottery found during restoration of St Helen's church, Brant Broughton	Roman	SK 9154 5389
MLI85969	FS	Roman coin from garden on High Street, Brant Broughton	Roman	SK 9172 5439
MLI85975	FS	Roman coin from near Dovecote House, Brant Broughton	Roman	SK 916 543

MLI91173	FS	Roman glass found off Beck Road, Welbourn	Roman	SK 96803 54174
MLI85690	FS	Roman Coins, recovered from near the church, Welbourn	Roman	SK 968 545
MLI85689	MON	Settlement of Welbourn	Early Medieval	SK 9679 5413
MLI60574	MON	Possible Saxo-Norman activity, Welbourn	Early Medieval	SK 9659 5415
MLI60781	MON	Settlement of Brant Broughton	Early Medieval	SK 9165 5420
MLI60389	MON	Fragment of Anglo-Saxon grave cover, St Helen's church, Brant Broughton	Early Medieval	SK 9155 5390
MLI91172	MON	Late Saxon features off Beck Road, near Castle Hill, Welbourn	Early Medieval	SK 96810 54182
MLI85704	MON	Late medieval earthwork ridge and furrow, Welbourn	Medieval	SK 9552 5306
MLI85715	MON	Earthwork ridge and furrow, Welbourn	Medieval	SK 9482 5431
MLI86026	MON	Medieval ridge and furrow located to the south east of Brant Broughton	Medieval	SK 9167 5366
MLI86027	MON	Medieval ridge and furrow located to the west of Brant Broughton	Medieval	SK 9127 5438
MLI86558	MON	Former ridge and furrow earthworks, said to have been a 'camp', west of Wellingore	Medieval	SK 960 569
MLI80739	MON	Settlement of Leadenham	Medieval	SK 9505 5217
MLI85705	MON	Late medieval earthwork ridge and furrow, Welbourn	Medieval	SK 9608 5461
MLI60741	MON	Castle Hill, Welbourn	Medieval	SK 9681 5432
MLI86639	MON	Probable medieval ridge and furrow earthworks, Leadenham Park	Medieval	SK 9463 5154
MLI99487	MON	Ridge and Furrow visible just north of Brant Broughton	Medieval	SK 9201 5482
MLI60503	FS	Coin of Edward I, and other metal object, Welbourn.	Medieval	SK 9630 5430
MLI85946	FS	Medieval lead seal found south east of the church, Brant Broughton	Medieval	SK 917 537
MLI86626	MON	Probably late medieval earthwork ridge and furrow, west of Leadenham	Medieval	SK 9507 5286
MLI85688	MON	Hamlet of Sapperton, Welbourn	Medieval	SK 9635 5355
MLI85702	FS	16th century German jetton, Welbourn	Medieval	SK 9675 5435
MLI60388	MON	Medieval cross base and war memorial St Helen's churchyard, Brant Broughton	Medieval	SK 9153 5387
MLI85948	MON	Settlement of Stragglethorpe	Medieval	SK 9128 5223
MLI86571	MON	Brick field, south of Wellingore	Post Medieval	SK 9793 5559
MLI86632	MON	Old Brickworks, Leadenham Low Fields	Post Medieval	SK 9217 5311
MLI82034	MON	Post-medieval pottery scatter, Leadenham Quarry, Welbourn	Post Medieval	SK 9638 5256
MLI86637	BLD	Smithy, Main Road, Leadenham	Post Medieval	SK 95058 51959
MLI86638	BLD	Icehouse to the rear of The Old Hall, Leadenham	Post Medieval	SK 95085 52556
MLI89536	MON	Brickworks to the south of Brant Broughton	Post Medieval	SK 91366 53207

MLI92388	MON	Welbourn Hall park, Welbourn	Post Medieval	SK 96729 53703
MLI120993	MON	Unnamed farmstead, Wellingore	Post Medieval	SK 9630 5556
MLI126823	MON	Site of Former School, Welbourn	Post Medieval	SK 9667 5425
MLI121066	MON	Unnamed farmstead, Welbourn	Post Medieval	SK 9505 5367
MLI121067	MON	Unnamed farmstead, Welbourn	Post Medieval	SK 9545 5487
MLI120998	MON	Oak Trees, Leadenham	Post Medieval	SK 9195 5346
MLI85951	BLD	Wesleyan Reform chapel, Maltkiln Lane, Brant Broughton	Post Medieval	SK 91726 54420
MLI85963	BLD	Wesleyan chapel, Mill Lane, Brant Broughton	Post Medieval	SK 91446 54226
MLI85995	BLD	Large school attached to Wesleyan chapel, Mill Lane, Brant Broughton	Post Medieval	SK 91432 54233
MLI86001	MON	Site of windmill, Mill Lane, Brant Broughton	Post Medieval	SK 91291 54236
MLI86006	MON	Site of smithy, south of No 100 High Street, Brant Broughton	Post Medieval	SK 91748 54360
MLI86604	BLD	The George Hotel, High Street, Leadenham	Post Medieval	SK 95067 52187
MLI86606	BLD	Home Farmhouse, High Street, Leadenham	Post Medieval	SK 95155 52296
MLI86625	BLD	Wesleyan Chapel, High Street, Leadenham	Post Medieval	SK 94997 52154
MLI120985	BLD	Manor Farm, Navenby	Post Medieval	SK 9451 5614
MLI120992	BLD	South Barn Cottage (Wellingore Sourthern Barn), Wellingore	Post Medieval	SK 9787 5464
MLI120994	BLD	Oak Farm, Wellingore	Post Medieval	SK 9623 5596
MLI120997	BLD	Wood Farm, Wellingore	Post Medieval	SK 9568 5567
MLI120999	BLD	Glebe Farm, Leadenham	Post Medieval	SK 9242 5287
MLI121000	BLD	The Millhouse (Leadenham Mills), Leadenham	Post Medieval	SK 9206 5311
MLI121001	BLD	Field House, Leadenham	Post Medieval	SK 9244 5323
MLI121003	BLD	Homelea, Leadenham	Post Medieval	SK 9512 5241
MLI121004	BLD	Hill Top Farms, Leadenham	Post Medieval	SK 9595 5213
MLI121005	BLD	Hill Top Farm, Leadenham	Post Medieval	SK 9586 5174
MLI121061	BLD	Rectory Field House, Brant Broughton and Stragglethorpe	Post Medieval	SK 9155 5395
MLI121062	BLD	The Grange, Brant Broughton and Stragglethorpe	Post Medieval	SK 9180 5440
MLI121064	BLD	Fox Covert Cottages, Welbourn	Post Medieval	SK 9447 5386
MLI121065	BLD	Lowfields Farm, Welbourn	Post Medieval	SK 9477 5444
MLI121069	BLD	Barn Cottage, Welbourn	Post Medieval	SK 9608 5328
MLI121070	BLD	The Green Farm, Welbourn	Post Medieval	SK 9641 5371

MLI121071	BLD	Field House, Welbourn	Post Medieval	SK 9659 5364
MLI121072	BLD	Unnamed farmstead, Welbourn	Post Medieval	SK 9662 5405
MLI121073	BLD	Gartholm Farm, Welbourn	Post Medieval	SK 9651 5415
MLI121074	BLD	Home Close (Willow cottage), Welbourn	Post Medieval	SK 9707 5449
MLI86634	MON	Icehouse, Leadenham House	Post Medieval	SK 9513 5151
MLI86636	BLD	Primary School, Leadenham	Post Medieval	SK 95131 52094
MLI86635	MON	Leadenham Park	Post Medieval	SK 9443 5156
MLI97097	BLD	Old Chapel Cottages, High Street, Welbourn	Post Medieval	SK 96696 54259
MLI116256	MON	Friends Burial Ground, Meeting House Lane, Brant Broughton	Post Medieval	SK 91640 54208
MLI125255	MON	Leadenham War Memorial	Modern	SK 9507 5179
MLI125329	MON	Welbourn War Memorial	Modern	SK 9685 5450
MLI126022	MON	Anti-Tank Cylinders, Leadenham House	Modern	SK 9514 5155
MLI90570	MON	Heath Camp, Pottergate Plantation, Wellingore	Modern	SK 98029 55458
MLI91782	MON	Undated pit on land adjacent to 3 Hall Orchard Lane, Welbourn	Unknown	SK 96639 54326
MLI82033	MON	Undated features, Leadenham Quarry, Welbourn	Unknown	SK 9637 5257
MLI82429	MON	Undated features on land adjacent to Crosby Lane, Welbourn	Unknown	SK 9654 5396
MLI85685	MON	Brickworks, Boggin Lane, Welbourn	Unknown	SK 9778 5432
MLI85686	MON	Stone pits and lime kilns immediately south of Boggin Lane, Welbourn	Unknown	SK 9779 5421
MLI97315	MON	Former Culvert on Hall Orchard Lane, Welbourn	Undated	SK 96697 54343
MLI86644	MON	St Ann's Well, St Ann's Plantation, south of Leadenham	Unknown	SK 9524 5150
MLI86559	MON	Possible road or footpath, Wellingore Low Fields	Unknown	SK 973 556

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Appendix D Water Framework Screening

Leoda Solar Farm

Appendix D: Water Framework Directive Screening & Scoping Assessment

Project number:

January 2025

Delivering a better world

Quality information

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Table of Contents

Tables

1 Introduction

Background

1.1 AECOM Limited (AECOM Ltd) was commissioned by Telis Energy UK Limited (hereafter referred to as 'the Applicant') to undertake a Water Framework Directive (WFD) Screening and Scoping Assessment, in support of the Environmental Impact Assessment (EIA) Scoping Report for the Leoda Solar Farm (Ref. 1) (hereafter referred to as 'the Scheme').

1.2 The Scheme will comprise the installation of solar photovoltaic (PV) generating panels, on-site energy storage facilities, Battery Energy Storage Systems (BESS), and on-site substations across a proposed site in Lincolnshire ('Solar PV Site'), along with associated infrastructure for connection to the National Grid ('Grid Connection Corridor'). The Scheme would allow for an anticipated export of approximately 400 megawatts (MW) electrical capacity.

1.3 A full description of the Scheme is included in **Chapter 2: The Scheme** of the EIA Scoping Report (Ref. 1).

Study Area

1.4 The Scheme is located within the administrative areas of Lincolnshire County Council, and North Kesteven District Council. The Solar PV Site is approximately centred on National Grid Reference (NGR) SK 94373 53368, and it comprises three groups of land plots with a total area of approximately 900 hectares (ha) (excluding the Grid Connection Corridor). The Solar PV Site boundary represents the current maximum extent of land being considered and will be further refined; some of this land will also be used for landscaping and habitat enhancement rather than solar PV or BESS infrastructure.

1.5 The grid connection cable working right of way will be located within the Grid Connection Corridor. It will be further refined prior to statutory consultation based on the findings of the engineering, EIA and other relevant studies, and will be designed to avoid sensitive receptors as far as possible. Underground interconnecting cables connecting the Site will be required and are currently under design, and therefore not known at this stage.

1.6 For the purposes of this assessment, and to maintain consistency with **Chapter 6: Water Environment** of this EIA Scoping Report (Ref. 1), a general Study Area (or Zone of Influence) of 1 km beyond the boundary of the Site has been used to identify water bodies that are hydrologically connected to the Scheme and have the potential to be directly impacted by the activities associated with it. However, given that impacts may propagate downstream, relevant risks have also been checked for downstream connecting WFD water bodies. Professional judgement has been applied to identify the extent to which such features are considered.

1.7 The Scheme is located within the Anglian River Basin District and lies within two WFD surface water bodies:

- Brant – Lower (ID: GB105030056110),
- Brant – Upper (ID: GB105030056110).

1.8 These WFD surface water bodies comprise one river, the River Brant, with an approximate total length of 23.3 km. A number of unnamed watercourses and agricultural drains and ditches join the River Brant within the Scheme extent.

1.9 There are two other surface water bodies outside the Scheme red line boundary but potentially within it's Zone of Influence:

- Sand Beck (ID: GB105030056160) is a tributary to the River Brant to the west of the Scheme
- Fulbeck Beck (ID: GB105030056120) drains into the River Brant (Brant – Upper WFD water body) approximately 1.5 km upstream of the Scheme, Fulbeck Beck.

1.10 The Scheme extends across two WFD groundwater bodies:

- Witham Lias (ID: GB40502G401400)
- Witham Limestone Unit A (ID: GB40501G444800).

The Water Framework Directive

1.11 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, commonly referred to as the Water Framework Directive (WFD), aims to protect and enhance the water environment.

1.12 The WFD takes a holistic approach to sustainable management of the water environment by considering interactions between surface water, groundwater and water-dependent ecosystems. Ecosystem conditions are evaluated according to interactions between classes of biological, chemical, physico-chemical and hydromorphological elements known as 'Quality Elements'.

1.13 Under the WFD, 'water bodies' are the basic management units, defined as all or part of a river system or aquifer. Waterbodies form part of a larger 'river basin district' (RBD), for which 'River Basin Management Plans' (RBMPs) are used to summarise baseline conditions and set broad improvement objectives. RBMPs are produced every six years, in accordance with the river basin management planning cycle. The current RBMPs are in Cycle 3 that were published in 2022.

1.14 In England, the EA is the competent authority for implementing the WFD, although objectives are delivered in partnership with other public bodies and private organisations, for example local planning authorities, water companies, rivers trusts, and private landowners and developers.

1.15 The EA is also responsible for managing flood risk and other activities on Main Rivers. Local planning authorities or drainage boards are typically responsible for consenting activities on Ordinary Watercourses. Local planning authorities are typically responsible for highways drains, and landowners are typically responsible for ditches and watercourses within their property including piped watercourses and culverts. While the EA is ultimately responsible for enforcing the WFD on any water body, local authorities are required to plan and consent WFD related activities on Ordinary Watercourses.

1.16 The Environment Agency has a duty to exercise its relevant functions so as to best secure that the requirements of WFD for the achievement of environmental objectives are co-ordinated. The Planning Inspectorate's Advice Note 18 (**Error! Reference source not found.**) summarises the overall aims and objectives of the WFD as to:

- Enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystems;
- Ensure progressive reduction of groundwater pollution;
- Reduce pollution of water, especially by Priority Substances and Certain Other Pollutants;
- Contribute to mitigating the effects of floods and droughts;
- Promote sustainable water use; and
- Achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2015 or 2027 (or good ecological potential in the case of artificial or heavily modified water bodies).

1.17 Regulation 33 of the Water Environment Regulations 2017 (i.e. the WFD) states that public bodies "must, in exercising their functions so far as affecting a river basin district, have regard to - (a) the river basin management plan for that district as approved under regulation 31, and (b) any supplementary plan prepared under regulation 32."

1.18 In determining whether a development is compliant or non-compliant with the WFD objectives for a water body, the EA and partnering organisations must also consider the conservation objectives of any Protected Areas (e.g., Natura 2000 sites or water dependent Sites of Special Scientific Interest (SSSIs)) and adjacent WFD water bodies, where relevant. As a result, new developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the WFD objectives of the potentially affected water bodies. It must be demonstrated that there is no deterioration or prevention of future improvement against any WFD element for a designated water body.

2 Methodology

2.1 There are no fixed methods for WFD assessment. The nature of the water environment and the breadth of the legislation mean that assessments are tailored to proposals on a case-by-case basis.

2.2 The following general guidance is available which has been applied for this assessment:

- Environment Agency (2016). *Water Framework Directive risk assessment: How to assess the risk of your activity* (Ref. 2).
- JASPERS (2018). EU-level guidance document *Water Framework Directive - Project assessment checklist tool*, published by the Joint Assistance to Support Projects in European Regions (Ref. 3).
- The Planning Inspectorate (2024). *Advice Note 18: The Water Framework Directive* (Ref. 4).

2.3 A stepwise approach consisting of screening, scoping and impact assessment phases is generally followed in order to: (a) rationalise the levels of WFD assessment and impact mitigation that are required; and (b) verify that proposals meet the requirements of the WFD. The general approach is described in *Advice Note 18* by the Planning Inspectorate (2017) (Ref. 4) and briefly summarised below. This report comprises the screening and scoping phases only.

Stage 1: Screening

2.4 Screening identifies the zone of influence of a proposed development, and if proposed activities pose a risk to the water environment. It is used to identify if there are activities that do not require further consideration for WFD objectives, for example activities which have been ongoing since before the current RBMP plan cycle and which have thus formed part of the baseline.

Stage 2: Scoping

2.5 Scoping is used to identify any potential impacts of the proposed activities to specific WFD receptors and their water quality elements. This involves review of WFD impact pathways, shortlisting which WFD water bodies and quality elements could or could not be affected by proposed activities, and collecting baseline information from the relevant RBMP on the status and objectives for each water body.

Stage 3: Impact Assessment

2.6 This involves rationalised assessment of water bodies and quality elements that could be affected by proposed activities, in order to identify any areas of WFD non-compliance. Proposed activities are reviewed in terms of both positive and negative impacts, and the baseline mitigation measures, enhancements, and contributions to the WFD objectives described in the RBMP. Any proposed activities with potentially deleterious impacts are reviewed simultaneously with their corresponding mitigation proposals, to determine a net effect on WFD objectives.

Mitigation Commitments

2.7 Proposed mitigation activities relied upon to demonstrate compliance at any of the stages referred to above must be appropriately defined and sufficiently secured. Mitigation could be secured through Development Consent Order (DCO) requirements, or other legally binding methods.

Further Assessment if WFD Derogation is to be Considered by the Applicant

2.8 WFD Regulation 17 and Regulation 19 set out ‘last resort’ planning and legal processes for WFD derogation that are not part of this report. Case review of any proposed justification by an applicant would be a matter for the Secretary of State, and is likely to require a substantial body of multi-disciplinary evidence.

2.9 Where the potential for deterioration of water bodies is identified, and the "body of water is so affected by human activity or its natural condition is such that the achievement of the environmental objectives set would be infeasible or disproportionately expensive", it is possible for an applicant to present further assessments in the context of WFD Regulation 17. Derogation has not been considered herein and would require detailed further analyses of options, environmental impacts and business cases, for WFD and all relevant legislation pertaining to planning and sustainability. For WFD context, WFD Regulation 17 covers part of the procedures for WFD derogation, including but not limited to that "the environmental and socio-economic needs served by such human activity cannot be achieved by other means which are a significantly better environmental option not entailing disproportionate costs".

2.10 Where the potential for "failure is the result of new modifications to the physical characteristics of the body of surface water or alterations to the level of the body of groundwater", it is possible for an applicant to present further assessments in the context of WFD Regulation 19. Regulation 19 is also still commonly referred to as Article 4.7 of the original EU Directive. Derogation has not been considered herein and as above would require detailed further analyses. For WFD context, WFD Regulation 19 covers part of the procedures for WFD derogation, including but not limited to that:

- *"all practicable steps are taken to mitigate the adverse impact on the status of the body of water".*
- *"the reasons for the modifications or alterations, or for the sustainable development activities, are of overriding public interest".*
- *"the benefits to the environment and to society of achieving the environmental objectives are outweighed by the benefits of the new modifications or alterations, or of the sustainable development activities, to human health, to the maintenance of human safety, or (in the case of modifications or alterations) to sustainable development".*
- *"the beneficial objectives served by the modifications or alterations, or by the sustainable development activities, cannot, for reasons of technical feasibility or disproportionate cost, be achieved by other means which are a significantly better option".*

Desk study

2.11 A desk-based study was carried out to capture information pertaining to the Scheme and to develop an understanding of the baseline conditions of the water environment within the Study Area. The following data sources were used for the desk study:

- WFD Catchment Data (Ref. 5),
- Historical maps and aerial imagery (Ref. 6; Ref. 7),
- Geology data (Ref. 8),
- Land cover data (Ref. 9),
- Designation data (Ref.10),
- Hydrological information (Ref. 11),
- Climate information (Ref. 12).

Assumptions and Limitations

2.12 This WFD Screening and Scoping exercise is based on the baseline and Scheme design information available at the time of writing. It is based on the Scheme design set out in Chapter 2: The Scheme of the EIA Scoping Report (Ref. 1). At this scoping stage, where there is not detailed design, reasonable assumptions have been made and these are described at relevant points within this assessment. Further assessment or updates may therefore be required if there are material changes to the design elements at later design stages or it is determined that proposed embedded mitigation cannot be implemented as currently proposed for whatever reason.

2.13 This assessment relies entirely on published data sources as no hydromorphological, or ecological surveys have yet to be conducted. Whilst the available data is considered robust enough for defining receptor importance, there may be inherent uncertainties or gaps in the data. Uncertainty regarding baseline conditions will be reduced in future assessment stages after site surveys have been conducted.

3 WFD Screening

3.1 The purpose of the WFD screening stage is to identify a Zone of Influence of the Scheme and to determine whether that influence has the potential to adversely impact upon WFD water body receptors. In this case, the Zone of Influence is considered to comprise the area within the Site boundary plus a 1 km buffer outside the Site boundary.

3.2 The screening stage also identifies specific components of the Scheme that could affect receptor water bodies' WFD status and carries them forward to subsequent stages of the assessment process. Water body receptors or activities that are screened out are not carried forward, and justification is provided.

Screening of WFD Water Bodies

3.3 The Scheme has the potential to interact with two WFD surface water bodies and two WFD groundwater bodies. WFD Screening of these water bodies is provided in **Table 1**. Smaller tributaries within each of the WFD water body catchments that may be impacted by the Scheme are considered in this assessment. Any other remaining downstream water bodies not mentioned below have been screened out because they are considered to be far enough downstream that they would not be impacted by the Scheme.

Table 1: Screening of WFD water bodies potentially impacted by the Scheme.

Surface Water Bodies	*Screening Outcome*	*Justification*
Brant – Lower (ID: GB105030056110)	In	These water bodies are located within the Scheme site and therefore, may be directly impacted by the Scheme (in the construction, operational, and decommissioning phases) in such a way that could lead to a decline in their WFD status or impede the water bodies from meeting their WFD objectives.
Brant – Upper (ID: GB105030056770)		
Fulbeck Beck (ID: GB105030056120)	Out	The water body is a tributary of the River Brant that joins 1.5 km upstream of the Scheme and, therefore, is unlikely to be directly impacted by the Scheme in such a way that could lead to a decline in its WFD status of prevent the water body from meeting its WFD objectives.
Sand Beck (ID: GB105030056160)		The water body is a tributary of the River Brant that joins on the edge the Scheme boundary. As all of the watercourse is upstream of the Scheme site, it is unlikely to be directly impacted by the Scheme in such a way that could lead to a decline in their WFD status of impeded the water body from meeting its WFD objectives.
Groundwater Bodies		
Witham Lias (ID: GB40502G401400)	In	These WFD groundwater bodies underlie the Scheme and therefore may be impacted depending on the depth of foundations/excavations and thickness of any overlying superficial deposits. Therefore, these water bodies are screened in for further assessment. However, this is based on a precautionary assessment due to limitations on available scheme information. It is possible that once further scheme information is known this screening decision could be altered.
Witham Limestone Unit (ID: GB40501G444800)		

Screening of Sensitive Sites

3.4 A review of sensitive habitats and sites on Defra's Multi- Agency Geographic Information for the Countryside (MAGIC) Map website (Ref. 10) indicates that there are no Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs), Local Nature Reserves (LNRs), National Nature Reserves (NNRs), Ramsar Sites, or Special Protection Areas (SPAs) within 2 km of the Scheme.

3.5 The closest sensitive site to the Scheme is the High Dyke SSSI, however this is located approximately 3 km away from the Scheme and does not have freshwater dependent habitats. This site is therefore unlikely to be impacted by the Scheme and its proposed activities, and as such is screened out of the assessment.

Screening of Activities

3.6 As described in Chapter 2: The Scheme of the EIA Scoping Report (Ref. 1), the Scheme comprises several activities that may present a potential risk to the WFD status of the water bodies screened in in **Table 1**.

3.7 For relevant WFD water bodies, the screening assessment of activities pertaining to the Scheme is provided in **Table 2**.

Table 2: Screening of the Scheme activities.

Activity	*Description*	*Screening Outcome*	*Justification*
Solar photovoltaic (PV) modules and mounting structures.	Solar PV modules convert sunlight into electrical current (as direct current, DC). Individual panels are typically up to 2.4 m long and up to 1.3 m wide, typically consisting of a series of photovoltaic cells beneath a layer of toughened glass (other PV technologies are developing rapidly and may be available at the time of construction). The module frame is typically built from anodised aluminium. Each module could have a DC generating capacity of between 400 and 900 watts (W), or more depending on advances in technology at the time of construction (the latest technology under development is up to 900 W). The modules are fixed to a mounting structure in rows known as 'strings'. Various factors will help to inform the number and arrangement of modules in each string, and it is likely some flexibility will be required to accommodate future technology developments. There are various types of PV module mounting structures. Whilst fixed, south-facing mounts are the most commonly used on solar PV facilities in the UK, the ongoing technological advances and economic considerations make other options increasingly more feasible. The type of mounting structures to be used for the Scheme is currently being evaluated by the Applicant. Each string of modules will be mounted on a metal rack, known as a frame. The frames are usually supported by galvanised steel poles typically driven 1 m or up to 3 m into the ground depending on local geology, with tracker systems typically requiring deeper depth of pile between 2 m and 3 m.	**Screen Out:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)** **Witham Lias (ID: GB40502G401400)** **Witham Limestone Unit A (ID: GB40501G444800)**	This activity is unlikely to have an impact on water bodies, although without final designs it is impossible to categorically rule out any impact. The following reasonable assumptions are made to screen out WFD impact risks for this hydrological site setting and with regards to typical solar farm infrastructure. - Solar PV modules will not be installed within 10 m of watercourses to ensure that there are no direct hydromorphological impacts. This will also allow a riparian buffer to be maintained and access to the watercourse, as applicable. - Solar PV modules do not contain any liquid that could contaminate rainwater and minimising pollution risk arising from runoff. It is assumed that the solar PV panels will be cleaned every two years, and it is assumed that a tractor mounted cleaning system utilising clean water without cleaning products/chemicals would be used. - The solar PV panels should be held above ground on narrow (<100 mm) diameter piled legs to prevent sealing the ground with an impermeable surface and so allow any rainwater to infiltrate the ground. - To limit the potential for channelisation from rainfall dripping off the end of the panels, the areas between, under and surrounding the Solar PV panels should be planted with native grassland. This planting would intercept and absorb rainfall running off the panels, preventing it from concentrating and potentially forming channels in the ground. The land will no longer require any fertilisation or other treatments for crop growing, therefore the current pollution associated with agriculture will be removed.
Supporting Infrastructure: Inverters, Transformers, and Switchgear.	Inverters are required to convert the DC electricity collected by the PV modules into alternating current (AC), which allows the electricity generated to be exported to the National Grid. Inverters are sized to deal with the level of voltage and current, which is output from the strings of PV modules. Transformers are required to step up the voltage of the electricity generated across the Solar PV Site from low voltage (0.8 kV) produced by the PV panels to medium voltage (33 kV)	**Screen Out:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	This activity is unlikely to have an impact on water bodies. As above, the following reasonable assumptions are made to screen out WFD impact risks: - Supporting infrastructure would not be located within close proximity (<10 m) of surface water bodies so there is no mechanism for direct hydromorphological or water quality impacts to surface water bodies.

Activity	Description	Screening Outcome	Justification
	to high voltage (132 kV) ready for transmission to the National Grid Drax Substation. Switchgears are the combination of electrical disconnect switches, fuses, or circuit breakers used to control, protect, and isolate electrical equipment. Switchgear is used both to protect and isolate/ de-energise equipment to allow work to be done and to clear faults downstream. The Applicant is currently exploring the configuration of these supporting infrastructure. As the Scheme design develops, the configuration of the supporting infrastructure would be determined based upon environmental and technical factors.		- Transformers should be installed with suitable bunds to contain any oil spillage in case of an oil leakage event. Bunds would be designed to contain at least 110% of the volume of the oil to ensure there is some tolerance to prevent breaching of the bund. - A Flood Risk Assessment (FRA) and Framework Drainage Strategy should be developed and implemented to provide attenuation of surface water runoff from areas of hardstanding associated with the BESS Area and the On-Site Substation. In accordance with planning policy guidance (Ref 15), runoff from the Scheme should be attenuated to ensure no increase in surface water discharge rates and to provide water quality treatment of runoff water.
Interconnecting Cabling.	Low and medium voltage electrical cabling is required to connect the PV modules and BESS to inverters and the inverters to the transformers (typically via 0.6/1 kV cables). The dimensions of the trenches vary depending on the number of cables or ducts they contain, but would typically be up to 0.8 m in width and 0.6 m to 0.8 m in depth. Cabling between PV modules / BESS and the inverters would typically be required to be above ground level (along a row of racks), fixed to the mounting structure, and then underground if required (between racks and in the inverter's input). All other cabling would be underground. Medium voltage cables (normally 33 kV) are required between the transformers/ switchgears and the substations. These cables would be buried underground. The dimensions of the trenches vary depending on the number of cables or ducts they contain but could be typically up to 1.2 m in width and up to 1.2 m in depth. Data cables (typically fibre optic) would be installed, typically alongside electrical cables in order to allow for monitoring during operation, such as the collection of solar data from pyranometers.	**Screen In:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)** **Witham Lias (ID: GB40502G401400)** **Witham Limestone Unit A (ID: GB40501G444800)**	Cabling, specifically its installation and trenching, has the potential to impact these water bodies by opening up pollution drainage pathways. For example, trenchless crossing can result in the direct contamination of water bodies as a result of leakage/spillage of fuels, oils, drilling fluids/muds etc., which could impact water quality and biological elements. Whereas, open cut trenches can result in the direct loss of riverbed and bank habitats, impacting hydromorphological elements, and the use of pumps/flumes can disrupt longitudinal connectivity, which could impact hydromorphological (e.g., alter sediment transport) and biological elements (disturb fish migration/passage). As such, this activity has been screened in for future assessment once the design has been confirmed. Below is a list of recommendations that, if followed, should minimise the risk of an impact: - If watercourse crossing is required, it should be done using trenchless techniques such as horizontal directional drilling (HDD) where ground conditions allow. - Launch and receive pits required for HDD (or similar) should be located at least 10 m from the channel margins and the depth of the crossing should be at least 1.5 m below the bed. This will minimise the risk of indirect impact to the watercourse from uncontrolled releases of construction site runoff that may include high levels of fine sediment, oils, and drilling muds and will avoid physical disturbance of the water body.

Activity	Description	Screening Outcome	Justification
			- The potential for drilling fluids to break out into the watercourse should be mitigated by a site-specific hydraulic breakout risk assessment that would be developed post-consent. - Should open cut trenching be required, then a pre-works hydromorphological and riparian survey would be undertaken to provide a baseline against which reinstatement would be measured. During the works, water flow would be maintained by fluming or over-pumping, and water quality monitoring should be undertaken before, during and after works. Silt fences, geotextile matting or straw bales should be used initially to capture mobilised sediment until settled. Monitoring would be undertaken post-works to check vegetation re-establishment. Mitigation designs will be needed to prove that WFD risks from this activity can be managed effectively.
Battery Energy Storage Systems (BESS).	The Scheme will include an associated BESS. The BESS is designed to provide peak generation and grid balancing services to the electricity grid. It will do this primarily by allowing excess electricity generated from the solar PV panels to be stored in batteries and dispatched at strategic times of the day. There are a number of different designs for the BESS that will be explored as part of the iterative design process. Maximum parameters for the compound layouts will be defined in the DCO application in order to present and assess a worst case in the WFD Assessment. Batteries will either be in individual enclosures or housed within a larger building or buildings. The precise number of individual battery storage enclosures will depend upon the level of power capacity and duration of energy storage that the Scheme will require; investigations are ongoing to determine this. The location of the BESS, transformers, and dedicated switchgear will be determined in part by whether the BESS is AC-coupled or DC-coupled. If the system is AC-coupled they will be located together in one or more 'centralised' areas, which can be installed, operated, and maintained easily. If the systems are DC-coupled they will be spread around the Solar PV Site and located alongside the centralised inverters. Each BESS will require a heating, ventilation and cooling (HVAC) system to ensure the efficiency of the batteries, which are integrated into the containers. This may involve a HVAC system that is	**Screen Out:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	As above, design details are not yet available, but this activity is unlikely to have an impact on water bodies. The following reasonable assumptions are made to screen out WFD impact risks: - The BESS area will not be located within close proximity (<10 m) of surface water bodies so there is no mechanism for direct hydromorphological or water quality impacts to surface water bodies. - A flood risk and Framework Drainage Strategy will be developed and implemented to provide attenuation of surface water runoff from areas of hardstanding associated with the BESS Area and the On-Site Substation. In accordance with planning policy guidance (Ref 15), runoff from the Scheme should be attenuated to ensure no increase in surface water discharge rates and to provide water quality treatment of runoff water. - In the unlikely event of a malfunction to one of the BESS Containers, there should be a range of controls that would activate depending on the extent and severity of the event. In case the malfunction progresses to a catastrophic fire event then a Fire Safety Management Plan would be implemented. Water would be stored on the site for firefighting purposes. Any potentially contaminated fire water would be captured and temporarily stored before testing and being released or pumped out for off-site disposal if required. BESS Containers will also have an internal and sealed fire suppression system to prevent

Activity	Description	Screening Outcome	Justification
	external to the containerised unit located either on the top of the unit or attached to the side of the unit. If this uses air to heat and cool it will have a fan built into it that is powered by auxiliary power. The Switchgear/Control Room operates, isolates and controls the exported power from the energy storage system. This would comprise a building of similar dimensions to the containers; either an adapted container or built from glass reinforced plastic (GRP), located within the main BESS compound. As the Scheme design develops, the likely configuration of equipment will be determined based upon environmental and technical factors. A reasonable worst-case scenario will be assessed in the WFD Assessment.		chemicals from escaping. Consultation with the emergency services will be undertaken as part of the Applicant's pre-application work. On the basis of these controls, impacts from firewater would likely be screened out of further assessment.
Grid Connection Substation(s)	Two 132 kV/33 kV substations will receive electricity from the 33 kV field substations and step up the voltage to 132 kV ready to be exported to National Grid Drax Substation via 132 kV cables. A typical 132 kV/33 kV substation is approximately 50 m by 25 m in plan with equipment 6 m high, securely fenced with a separate control building measuring 4 m by 4 m in plan and 4 m high.	**Screen Out:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	As above, design details are not yet available, but this activity is unlikely to have an impact on water bodies. The following reasonable assumptions are made to screen out WFD impact risks: - Substations will not be located within close proximity of surface water bodies to ensure that there are no mechanisms for hydromorphological impacts to surface water bodies. - A flood risk and Framework Drainage Strategy should be developed and implemented to provide attenuation of surface water runoff from areas of hardstanding associated with the substations. In accordance with planning policy guidance (Ref 15), runoff from the Scheme should be attenuated to ensure no increase in surface water discharge rates and to provide water quality treatment of runoff water. - Excavation of foundations could be subject to ingress of groundwater, with potential for high groundwater across the Site. Appropriate construction methodologies will be developed as a Construction Environmental Management Plan (CEMP), associated Water Management Plan (WMP) and if required a Construction Dewatering Strategy.
Electricity Export Connection to National Grid	The electricity generated by the Scheme is expected to be imported and exported via interface cables to the National Grid at one or more substations within the Solar PV Site or Grid Connection Corridor Search Area. Connection options are still being considered. Each circuit may comprise up to three cables. An earth cable and a fibre optic cable may also be laid alongside the 132 kV	**Screen In:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	There is potential for excavations and channel crossings to generate impacts upon WFD surface water and groundwater receptors in terms of pollution drainage pathways. Approaches for crossing watercourses can result in a number of impacts. For example, trenchless crossing can result in the direct contamination of water bodies as a result of leakage/spillage of fuels, oils, drilling fluids/muds etc., which could impact water quality and biological

Activity	Description	Screening Outcome	Justification
	cables. The cables will be buried below ground at approximately 1.2 m depth. Underground cables are typically installed using an open trench method requiring 20–40 m working corridor, with trench widths approximately 2 m wide and 2 m deep. At certain locations, such as river, railway and road crossings, trenchless methods of cable installation may be required. Trenchless methods include horizontal directional drilling (HDD), micro-tunnelling and boring.	**Witham Lias (ID: GB40502G401400)** **Witham Limestone Unit A (ID: GB40501G444800)**	elements. Whereas, open cut trenches can result in the direct loss of riverbed and bank habitats, impacting hydromorphological elements, and the use of pumps/flumes can disrupt longitudinal connectivity, which could impact hydromorphological (e.g., alter sediment transport) and biological elements (disturb fish migration/passage). Scheme designs and mitigation for WFD compliance should consider the following: - All watercourses should be crossed by trenchless techniques such as horizontal directional drilling (HDD) where possible. - Launch and receive pits required for HDD should be located at least 10 m from the channel margins. This will minimise the risk of indirect impact to the watercourse from uncontrolled releases of construction site runoff that may include high levels of fine sediment, oils, and drilling muds and will avoid physical disturbance of the water body. - The potential for drilling fluids to break out into the watercourse should be mitigated by a site-specific hydraulic breakout risk assessment that would be developed post consent. - Should open cut trenching be required, then a pre-works hydromorphological and riparian survey should be undertaken to provide a baseline against which reinstatement would be measured. During the works, water flow should be maintained by fluming or over-pumping, and water quality monitoring would be undertaken before, during and after works. Once complete, silt fences, geotextile matting or straw bales would be used initially to capture mobilised sediment until the watercourse has settled. Monitoring should be undertaken post-works to check vegetation re-establishment.
Operations and Maintenance Hub (inc. Welfare Facilities)	A permanent operations and maintenance storage area may be established onsite within the two existing agricultural buildings (barns), as well as converting a derelict building adjacent to the barns into a permanent maintenance office and staff welfare facilities. *It has been assumed that the conversion of existing buildings will not involve the excavation of new foundations and has therefore, not been assessed. If new buildings are added to the*	**Screen Out:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	Conversion of existing buildings and new small-footprint buildings are unlikely to impact water bodies. The following reasonable assumptions are made to screen out WFD impact risks: - Foul water (from welfare facilities) will be captured within a sealed cess pit and/or temporary facilities (e.g., portable welfare units) and treated off-site, if existing sewer connections are not available or feasible.

Activity	Description	Screening Outcome	Justification
	design, additional design recommendations maybe suggested to ensure there are no impacts on receptor water bodies.		
Fencing and Security	A security fence will enclose the operational areas of the Solar PV Site. Public Rights of Way (PRoWs) that cross the Solar PV Site will be preserved with the fence installed either side of them. The fence is likely to be a 'stock deer fence' or other mesh security fencing, approximately 2.5 to 3 m in height. Pole mounted internal facing closed circuit television (CCTV) systems are also likely to be deployed around the perimeter of the operational areas of the Solar PV Site. It is anticipated that these would be up to 5 m high. CCTV cameras would have fixed, inward-facing viewsheds and will be aligned to capture only the Scheme fence and the area inside the fence.	**Screen Out:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	Fencing and security are unlikely to impart impacts to WFD quality element receptors and therefore this element is screened out of further assessment.
Access Tracks	Access tracks would be constructed across the Solar PV Site. These would typically be 3.5 m to 5 m wide compacted stone tracks with 1:2 gradient slopes on either side (where required).	**Screen In:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	Access tracks, and especially watercourse crossings, have the potential to physically impact waterbodies, and to impact pollution pathways to water bodies, for example, increasing fine sediment inputs into watercourses and/or impact floodplain connectivity if raised (i.e., form artificial embankments). Scheme designs and mitigation for WFD compliance should consider the following: - Access tracks should not be located within close proximity (<10 m) of surface water bodies, except where crossings are required, so that there is no mechanism for direct hydromorphological or water quality impacts to surface water bodies. - To ensure WFD compliance, there should be no increase in culverts across the Study Area. If modification of existing culverts is required then this should be done so with a view to maintaining or improving connectivity along the watercourse for water, sediment, aquatic species and riparian mammals, where these are known to be present.
Surface Water Drainage	An Outline Surface Water Drainage Strategy will be included in the DCO application. The detailed operational drainage design will be carried out pre-construction with the objective of ensuring that drainage of the land to the present level is maintained. It will follow either the design of a new drainage system taking into account the proposed new infrastructure (access tracks, cable trenches, structure foundations) to be	**Screen In:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	Drainage design and outfalls have the potential to impact these water bodies depending on the approach adopted (e.g., discharge to ground or surface watercourses, design of outfalls), and so has been screened in for future assessment once the drainage design has been confirmed. It seems likely, however, that the Scheme footprint of hardstanding and impermeable surfacing will be small enough to be managed by

Activity	Description	Screening Outcome	Justification
	constructed, or, if during the construction of any of the infrastructure, there is any interruption to existing schemes of land drainage, then new sections of drainage will be constructed. The design of new drainage systems will be based on the Flood Risk Assessment (FRA) and hydrological assessment to be undertaken. Infiltration drainage design will be in accordance with Building Research Establishment (BRE) Digest 365: Soakaway Design and Sewers for Adoption and infrastructure will be placed at least 10 m away from watercourses.		infiltration SuDS without significant impacts on the aquatic habitat network. Scheme designs and mitigation for WFD compliance should review infiltration and runoff rates, apply CEMPs for the construction phase, and avoid hard engineering structures such as headwalls in watercourses in the operational phase.
Landscaping and Biodiversity Enhancement.	The Scheme would involve field boundary enhancement and planting of seed mixes within the Solar PV Site. Planting will also be used to provide screening. The enhancements and planting would increase biodiversity throughout the landscape and contribute to the Scheme achieving Biodiversity Net Gain (BNG) in line with the requirements of the Environment Act 2021, the National Planning Policy Framework and local planning policy. The Scheme design will aim to achieve BNG levels greater than the minimum10% required by the Environment Act 2021. At the time of writing, details on planting are yet to be confirmed and so this will be updated accordingly through subsequent assessment stages.	**Screen Out:** **Brant – Lower (ID: GB105030056110)** **Brant – Upper (ID: GB105030056770)**	Landscape and biodiversity enhancements are unlikely to impact to WFD quality element receptors. Replacing existing impactful land use practices such as arable and cattle farming with native grasses and areas of wild flower (for example) could have benefits to WFD receptors in terms of reducing or removing sediment and contaminant / excess nutrient mobilisation to aquatic habitats; therefore, this element is screened out of further assessment.

Summary of Screening Assessment

3.8 Screening of WFD water bodies based on their potential to be impacted by the Scheme was presented in **Table 1**. In total, two surface WFD water bodies and two WFD groundwater bodies were screened in, and two WFD surface water bodies were screened out. The following WFD surface and groundwater bodies were screened in:

- Surface water bodies:
  - Brant – Lower (GB105030056110),
  - Brant – Upper (GB105030056770).
- Groundwater bodies:
  - Witham Lias (GB40502G401400),
  - Witham Limestone Unit A (GB40501G444800).

3.9 A sensitive sites screening assessment was carried out and no sensitive sites were screened in.

3.10 The screening of activities relating to the Scheme was assessed in **Table 2**, and considered the potential of any proposed activities to impact the WFD water bodies.

4 WFD Scoping

4.1 The WFD scoping stage defines the level of detail required for further WFD assessment. This includes identifying risks to the WFD receptors from the Scheme's activities.

4.2 The scoping stage assessment is presented in **Table 3**.

Table 3: WFD scoping of the Scheme's activities against WFD quality elements.

WFD Quality Element	*Potential Risk to Receptor*	*Key Risk*	*Scoping Outcomes*
Biological Quality Elements			
Fish	Yes	Risks of water pollution during construction works and during the operational phases. Potential loss/decrease in quality of riverbed spawning/refugia habitats within the Scheme site and downstream, if fine sediment inputs are increased during construction. Any direct physical works to watercourses during construction (e.g., open-cut trenching or culverting) could impact on habitat quality.	In
Invertebrates	Yes	Risks of water pollution during construction works and during the operational phases. Potential loss/decrease in quality of riverbed spawning/refugia habitats within the Scheme site and downstream, if fine sediment inputs are increased during construction. Any direct physical works to watercourses during construction (e.g., open-cut trenching or culverting) could impact on habitat quality.	In
Macrophytes and Phytobenthos	Yes	Risks of water pollution during construction works and during the operational phases. Potential loss/decrease in quality of riverbed spawning/refugia habitats within the Scheme site and downstream, if fine sediment inputs are increased during construction. Any direct physical works to watercourses during construction (e.g., open-cut trenching or culverting) could impact on habitat quality.	In
Physico-chemical Quality Elements			
Thermal Conditions	Yes	Any instream structures e.g., culverts could increase shading of watercourses and impacting thermal conditions.	In
Oxygenation Conditions	Yes	Chemical spillages during construction could temporarily alter oxygenation conditions in the water body. Increased inputs of fine sediment during construction (e.g., excavations) and operational runoff, could temporarily decrease dissolved oxygen concentrations.	In
Salinity	No	No known risks.	Out
Acidification Status	Yes	Chemical spillages during construction could alter acidification conditions in the water body.	In
Nutrient Conditions	Yes	Increased inputs of fine sediment during construction (e.g., excavations) and operational runoff, could temporarily increase nutrients, especially if sourced from previously fertilised agricultural land.	In

WFD Quality Element	Potential Risk to Receptor	Key Risk	Scoping Outcomes
Hydromorphological Quality Elements			
Quality and Dynamics of Water Flow	Yes	Any direct physical works in watercourses during construction phase (e.g., open-cut trenching or culverting) could temporally degrade the quality and dynamics of flow within the water body. Any operational structures e.g., culverts, could permanently alter the quality and dynamics of flow within the water body.	In
Connection to Groundwater Bodies	No	No known risks.	Out
River Continuity	Yes	Any direct physical works in watercourses during construction phase (e.g., open-cut trenching or culverting) could temporally degrade the quality longitudinal connectivity throughout the impacted reach and upstream and downstream. Any operational structures e.g., culverts, could permanently alter the quality and dynamics of flow within the water body.	In
River Depth and Width Variation	Yes	Any direct physical works in watercourses during construction phase (e.g., open-cut trenching or culverting) could directly alter channel planform and cross-sectional geometry within the footprint of the works and indirectly through changes in patterns of bank erosion. River depth and width of river systems could be permeability altered if not reinstated to original geometry or if instream structures (e.g., culverts) are kept during the operational phase of the Scheme.	In
Structure and Substrate of Riverbed	Yes	Increased inputs of fine sediment during construction (e.g., excavations) and operational runoff, could alter riverbed substrate if deposited. Any direct physical works in watercourses during construction phase (e.g., open-cut trenching or culverting) could directly alter the structure and substrate of the riverbed.	In
Groundwater Quality Elements			
Quantitative Elements	Yes	The WFD ground water bodies underlay the Scheme and therefore may be impacted depending on the depth of foundations/excavations and thickness of overlying superficial deposits. Therefore, these water bodies are screened in for further assessment. However, this is based on a precautionary assessment due to limitations on available scheme information. It is possible that once further scheme information is known this initial screening decision could be altered	In
Chemical Elements	Yes		

5 Desk Study

Catchment Characteristics

Topography and Land Use

5.1 The topography of the area of the Solar PV site, and surrounding Study Area is summarised as lower level land rising towards the east and an escarpment rising to the east of Leadenham village. The western area of the Solar PV site, near the River Brant is approximately 13 m above Ordnance Datum (AOD), rising to 48 m AOD west of the A607 which runs north-south through the village of Leadenham. Eastwards within the Study Area, the land rises to approximately 100 m AOD. This area of higher ground is a north-south trending scarp slope.

5.2 From west to east within the area of the potential Grid Connection Corridor, the topography lies at approximately 40 m AOD in the area of the A607, and rises to 85 m AOD in the area of the north-south Pottergate Road, a distance of approximately 600 m. 85 m AOD is close to the high point of the scarp, the land then slopes eastwards down towards the eastern edge of the Grid Connection Corridor area, where the height is in the area of 50-52 m AOD.

5.3 Overall, the Study Area is predominantly arable land, with small, isolated patches of broadleaved woodland and improved grassland throughout (Ref. 9). A number of small residences are located within the Scheme's site and several villages are located on the border of the Study Area, including Leadenham (south-east), Welbourn (east), Brant Broughton (west), and Wellingore/Navenby (north).

Geology

5.4 Bedrock geology of the Solar PV Site, where the River Brant is located, is composed of Jurassic strata. The majority of the site incorporates mudstone and ironstone nodular (Charmouth Mudstone Formation), with a small strip of shelly mudstone (Loveden Gryphaea Bed) across the centre, from south to north (Ref. 8).

5.5 Bedrock geology of the Grid Connection Corridor Site is composed of Jurassic strata. The site predominantly incorporates limestone (Upper Lincolnshire Limestone Member and Lower Lincolnshire Limestone Member), lime-mudstone and lime-wackestone (Lower Lincolnshire Limestone Member). The western area of the site incorporates mudstone (Whitby Mudstone Formation and Charmouth Mudstone Formation), with a small strip of ooidal ironstone (Northampton Sand Formation) and sandstone, siltstone and mudstone (Grantham Formation) (Ref. 8).

5.6 Patches of superficial deposits throughout the Solar PV Site are predominantly composed of head and Fulbeck Sand and Gravel Member (sand and gravel). Alluvial deposits are present in the north-west region of the site, associated with the River Brant and its floodplains. There are few superficial deposits within the Grid Connection Corridor Site, with a small area of blown sand located on the southern edge (Ref. 8).

Hydrology

5.7 The closest EA hydrological gauging station to the Scheme on the River Brant is Brant at Brant Broughton (ID: 3033) (Ref. 11). The gauging station is located at SK 92911 54581, within the Scheme's footprint. This drains a catchment of 66 km2. The annual mean flow is 0.256 m3/sec, with a flow that is exceeded 95% of the time (Q95) of 0.007 m3/sec.

5.8 The nearest weather station is Waddington in Lincolnshire (SK 98700 65200), approximately 16 km north of Leadenham village (Ref. 12). Using data from this weather station, for the period 1991-2020, it is estimated that the Study Area experiences approximately 615 mm of rainfall per year, with it raining more than 1 mm on approximately 116 days per year, which are both low in the UK context. This is relevant to the whole Study Area.

WFD Status

WFD Status – Surface Water

5.9 The two WFD surface water bodies potentially impacted by the Scheme, Brant – Upper and Brant – Lower, are both designated as a Heavily Modified Water Body (HMWB) (Ref. 5). This designation is due to physical modifications in the water body that cannot be addressed without substantial impacts on social and/or economic activity within the catchment. HMWB have to achieve an alternative objective of "good ecological potential" (GEP) instead of "good ecological status" (GES), which takes into account the constraints imposed by social and/or economic activities.

5.10 WFD Overall Status for the two WFD surface water bodies within the potential Zone of Influence of the Scheme for each cycle are summarised in **Table 4**.

5.11 WFD status data for each of the quality elements in Cycle 3 (2016 – 2021) for the two WFD surface water bodies within the potential Zone of Influence of the proposed works are summarised in **Table 5**.

5.12 Reasons for not achieving good (RNAG) status in 2022 for the two WFD surface water bodies within the potential Zone of Influence of the proposed works for each cycle are summarised in **Table 6** and **Table 7**.

Table 4: Summary of WFD surface water bodies Overall Status data (Ref. 5).

Surface Water Body	*Overall Status Cycle 1 (2009 – 2011)*	*Overall Status Cycle 2 (2013 - 2015)*	*Overall Status Cycle 3 (2016 – 2021)*
Brant – Lower	Bad	Moderate	Moderate
Brant – Upper	Moderate	Moderate	Moderate

Table 5: WFD status of each of the quality elements in cycle 3 (2022) for the WFD surface water bodies. (NA – not assessed) (Ref. 5).

Water Body	*Brant – Lower*	*Brant – Upper*
Water Body ID	GB105030056770	GB105030056110
Water Body Type	River	River
Water Body Area	88.9 km^2	22.3 km^2
Hydromorphological Designation	Heavily modified	Heavily modified
Overall Ecological Potential (2022)	Moderate	Moderate
Current Overall Status	Moderate	Moderate
Potential Objective (overall)	Good by 2027	Good by 2027
Biological Quality Elements	Moderate	Good
Fish	Moderate	NA
Invertebrates	High	Good
Macrophytes and Phytobenthos Combined	Moderate	NA
Macrophytes Sub Element	Bad	NA
Phytobenthos Sub Element	Moderate	NA
Physio-chemical Quality Elements	Moderate	Moderate
Acid Neutralising Capacity	High	High
Ammonia (Phys-Chem)	High	High
Biological Oxygen Demand (BOD)	High	High
Dissolved oxygen	Good	High
Phosphate	Poor	Moderate
Temperature	High	High
pH	High	High
Hydromorphological Quality Elements	Supports good	Supports good

Hydrological Regime	Supports good	Supports good
Morphology	NA	NA
Supporting elements (Surface Water)	Moderate	Good
Mitigation Measures Assessment	Moderate or less	Good
Specific pollutants	High	High
Chemical	Fail (2019)	Fail (2019)
Priority hazardous substances	Fail (2019)	Fail (2019)
Priority substances	Good (2019)	Good (2019)

Table 6: Brant – Upper (GB105030056110) WFD surface water body – Reasons for not achieving good (RNAG) status in 2022 (Ref. 5).

SWMI	*Activity*	*Category*	*Classification Element*
Diffuse source	Poor livestock management	Agriculture and rural land management	Phosphate
	Poor nutrient management		
Point source	Sewage discharge (continuous)	Water Industry	Phosphate
Measures delivered to address reason, awaiting recovery	Not applicable	No sector responsible	Mercury and its compounds
			Polybrominated diphenyl ethers (PBDE)
Unknown (pending investigation)	Unknown (pending investigation)	Sector under investigation	Perfluorooctane sulphonate (PFOS)

Table 7: Brant – Lower (GB105030056770) WFD surface water body – Reasons for not achieving good (RNAG) status in 2022 (Ref. 5).

SWMI	*Activity*	*Category*	*Classification Element*
Physical modification	Land drainage	Agriculture and rural land management	Fish
			Macrophytes and Phytobenthos Combined
			Mitigation Measures Assessment
		Local and Central Government	
Diffuse source	Poor nutrient management	Agriculture and rural land management	Macrophytes and Phytobenthos Combined
			Dissolved oxygen
			Phosphate
	Riparian/in-river activities (inc. bankside erosion)		Fish
	Poor Livestock Management		Phosphate
Point source	Sewage discharge (continuous)	Water Industry	Macrophytes and Phytobenthos Combined
			Dissolved oxygen
			Phosphate

Flow	Surface water abstraction	Agriculture and rural land management	Fish
Measures delivered to address reason, awaiting recovery	Not applicable	No sector responsible	Mercury and its compounds
			Polybrominated diphenyl ethers (PBDE)
			Benzo(g-h-i)perylene
Unknown (pending investigation)	Unknown (pending investigation)	Sector under investigation	Perfluorooctane sulphonate (PFOS)

WFD Status – Groundwater

5.13 WFD status data for each of the quality elements in Cycle 3 (2016 – 2021) for the two WFD groundwater bodies within the potential zone of influence of the proposed works are summarised in **Table 8**.

Table 8: WFD status of each of the quality elements in cycle 3 (2022) for the WFD groundwater bodies (Ref. 5).

Water Body	*Witham Lias*	*Witham Limestone Unit A*
Water Body ID	GB40502G401400	GB40501G444800
Water Body Type	Groundwater Body	Groundwater Body
Water Body Area	683.6 km^2	340.5 km^2
Current Overall Status	Good	Poor
Quantitative	Good	Poor
Quantitative Status Element	Good	Poor
Quantitative Dependent Surface Water Body Status	Good	Poor
Quantitative GWDTEs test	Good	Good
Quantitative Saline Intrusion	Good	Good
Quantitative Water Balance	Good	Good
Chemical (GW)	Good	Poor
Chemical Status element	Good	Poor
Chemical Dependent Surface Water Body Status	Good	Good
Chemical Drinking Water Protected Area	Good	Good
Chemical GWDTEs test	Good	Good
Chemical Saline Intrusion	Good	Good
General Chemical Test	Good	Poor

Baseline Characteristics of WFD Quality Elements

Biological Quality Elements

5.14 WFD aquatic ecology data were collated from the EA Ecology & Fish Data Explorer for each biological trophic group for the last 10 years (or the most recent survey) within 1 km of the study reach (or closest location) (Ref. 13). The relevant aquatic ecological surveys are summarised in **Table 9**.

Table 9: Summary of aquatic ecology survey data within 1 km of the study reaches, from the last 10 years or the most recent survey (Ref. 13).

Water Body	Location	Date	Survey
Diatoms			
Brant - Lower	7.3 km downstream of the Scheme (SK 94867 62563)	2014 (April & September)	– 655 individuals identified across two surveys. – 38 species identified. – Trophic Diatom Index (TDI) 5 score of 68 and 99 indicating moderate to high nutrient enrichment. – No non-native invasive species (INNS) or protected species identified.
Aquatic Macrophytes			
Brant - Lower	Within the Scheme footprint (SK 92920 54599).	2015 (July)	– 12 species identified (incl. two algae). – No INNS or protected species identified.
Brant - Upper	2.3 km upstream of the Scheme (SK 91518 50894).	2024 (September)	– 15 species identified (incl. two algae and one moss). – No INNS or protected species identified.
Fulbeck Beck	1 km upstream of the Scheme (SK 91634 52050).	2015 (July)	– 7 species identified. – No INNS or protected species identified.
Invertebrates			
Brant - Upper	3.8 km upstream of the Scheme (SK 91501 50755).	2014 – 2017 (March & October); 2019 (October); 2020 (March & September)	– 9272 individuals identified across 11 surveys. – 117 species identified. – Biological Monitoring Working Party (BMWP) values of 84 to 124, indicating a slightly pollution to a non-pollution impacted system. – One INNS identified: Jenkins' Spire Snail (*Potamopyrgus antipodarum*). – No protected species identified.
Sand Beck	0.3 km upstream of the Scheme (SK 91635 53758).	2015 (March & October)	– 610 individuals identified across two surveys. – 58 species identified. – BMWP values of 97 and 102, indicating a slightly pollution to a non-pollution impacted system. – Two INNS identified: Jenkins' Spire Snail (*Potamopyrgus antipodarum),* and Northern River shrimp (*Crangonyx pseudogracilis*). – No protected species identified.
Fulbeck Beck	1 km upstream of the Scheme (SK 91634 52050).	2016 (March & October)	– 763 individuals identified across two surveys. – 42 species identified. – BMWP values of 53 and 104, indicating a moderately pollution to non-pollution impacted system. – One INNS identified: Jenkins' Spire Snail (*Potamopyrgus antipodarum*). – No protected species identified.
Fish			

Brant - Lower	2.7 km downstream of the Scheme (SK 94000 58000)	2014 (April)	– Electro-fishing surveys.
			– 11 species of fish identified:
			  – Roach (*Rutilus rutilus*), 173 individuals identified.
			  – Perch (*Perca fluviatilis*), 80 individuals identified.
			  – Dace (*Leuciscus leuciscus*), 19 individuals identified.
			  – European eel (*Anguilla anguilla*), 15 individuals identified.
			  – Gudgeon (*Gobio gobio*), 13 individuals identified.
			  – Pike (*Esox lucius*), 5 individuals identified.
			  – Chub (*Leuciscus cephalus*), 5 individuals identified.
			  – Bleak (*Alburnus alburnus*), 1 individual identified.
			  – Stone loach (*Barbatula barbatula*), present.
			  – 3-spined stickleback (*Gasterosteus aculeatus*), present.
			  – Minnow (*Phoxinus phoxinus*), present.

	2017 (April)	– Electro-fishing surveys
		– Five species of fish identified:
		  – Pike (*Esox lucius*), 3 individuals identified.
		  – Gudgeon (*Gobio gobio*), 3 individuals identified.
		  – Tench (*Tinca tinca*), 3 individuals identified.
		  – Stone loach (*Barbatula barbatula*), 10-99 individuals identified.
		  – 3-spined stickleback (*Gasterosteus aculeatus*), present, 100 – 999 individuals identified.

	2023 (July)	– Electro-fishing surveys
		– Four species of fish identified:
		  – Roach (*Rutilus rutilus*), 52 individuals identified.
		  – Chub (*Leuciscus cephalus*), 2 individuals identified.
		  – 3-spined stickleback (*Gasterosteus aculeatus*), 100 – 999 individuals identified.
		  – Minnow (*Phoxinus phoxinus*), 100 – 999 individuals identified.

Physico-chemical Quality Monitoring

5.15 Physio-chemical data were collated from the EA Water Quality Archive from the closest (still operating) monitoring point to the Scheme on the River Brant, R.Brant Leadenham Mills (ID: AN-BRAN2) (Ref. 14). The monitoring point is located at SK 91707 53208, at the northern border of the Scheme.

5.16 Data from this monitoring point are summarised in **Table 10**.

Table 10: Summary of key WFD physio-chemical data relating to the Scheme and River Brant for the last 6 months of 2024 (July - December) (Ref. 14).

Pollutant	*July*	*August*	*September*	*October*	*November*	*December*
pH	8.01	7.79	7.94	7.74	8.32	8.02
Temperature (ºC)	14.4	19.0	16.3	11.8	10.0	7.4
Conductivity (µs/cm)	822	903	856	673	858	635
Ammoniacal Nitrogen (as N) (mg/l)	0.06	0.08	0.03	<0.03	<0.03	<0.03
Nitrogen (Total oxidised as N) (mg/l)	5.7	4.6	3.9	18.0	8.5	13.0
Nitrate (as N) (mg/l)	5.66	4.48	3.88	18.0	8.49	13.0
Nitrite (as N) (mg/l)	0.04	0.12	0.02	0.05	0.01	0.02
Ammonia un-ionised (as N) (mg/l)	0.0014	0.0017	0.0008	<0.0004	<0.0006	<0.0005
Alkalinity to pH (as CaCO3) (mg/l)	220	230	180	150	240	170
Orthophosphate (reactive as P) (mg/l)	0.06	0.06	0.03	0.12	0.05	0.09
Dissolved Oxygen (% saturation) (%)	82.7	81.3	118.7	73.4	95.4	96.2
Dissolved Oxygen (as O_2) (mg/l)	8.43	7.52	11.6	7.93	10.7	11.5

Hydromorphological Quality Elements

5.17 At the time of writing, there have been no hydromorphological surveys of the potentially impacted water bodies and so the hydromorphological condition and quality of water bodies within the Study Area has been assessed through a desk study only.

5.18 The Brant – Lower and Brant – Upper WFD surface water bodies are composed of one river, the River Brant, which has a combined length of 23.3 km and is designated as a HMWB. For the majority of its length the River Brant flows through a rural landscape, and like most lowland river systems in England, has a long history of anthropogenic modifications, including straightening, re-alignment, and re-sectioning, particularly for agricultural and flood defence purposes. This has resulted in over-deepened and over-widened reaches, that are disconnected from the floodplain (Ref. 7), that have inhibited natural geomorphological processes and reduced habitat diversity.

5.19 The majority of modifications to the channel planform (i.e., realignment and straightening) occurred prior to the earliest OS maps of the region (c. 1840 – 1880) (Ref. 6) and were likely carried out during the late 18th and early 19th centuries in association with the intensification of agriculture. The unmodified channel planform of a number of reaches of the River Brant is shown on the c.1840 – 1880 OS maps and highlights the substantial reaches have been realigned and straightened, especially in the Lower – Brant water body (Ref .6). Artificial embankments were also constructed alongside these channel planform modifications, the majority of which persist today, further disconnecting the river channel with its floodplains (Ref. 7). Superficial deposits of alluvium throughout the catchment indicate that the unmodified channel likely migrated laterally across the floodplain and regularly inundated the floodplain during high flow and flood events, especially in the lower reaches of the River Brant, where alluvium deposits in the floodplains are extensive (Ref. 8).

6 Construction, Operation and Decommissioning Risks

Potential Construction Phase Risks

6.1 There are a number of general adverse impacts to the water environment which may occur from the construction activity for the Scheme, including:

- Impacts on surface water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, through uncontrolled site run-off (including dewatering of excavations).
- Potential changes in on-site and off-site flood risk due to changes in the volume, rate, and flow of surface water runoff from the construction site.
- Construction activities such as excavations, site preparation, riparian vegetation removal, machinery access, levelling and grading operations resulting in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to the River Brant where it can result in adverse impacts on water quality, flora, and fauna.
- Contamination of surface waters, groundwater, and soil could result from leakage and spills of fuels, oils, and chemicals during construction affecting the River Brant indirectly via site runoff or directly where works are close to and within the water body. Contamination may reduce water quality and impact aquatic fauna and flora.
- Any construction works that impede the floodplain have the potential to increase the rate and volume of runoff and increase risk of blockages in the River Brant, which could lead to flow being impeded, a potential rise in flood risk, and potential contraction scour. The compaction of the ground and vegetation clearance may also alter flow pathways and increase the volume rate of runoff.

Construction Mitigation

6.2 Prior to the construction, a Construction Environmental Management Plan (CEMP) should be prepared by the Contractor(s), to be approved by the consenting authority. The CEMP should detail the measures necessary to avoid, prevent and reduce adverse effects, where possible, upon the local water environment.

6.3 The CEMP should also include a Water Management Plan (WMP) as a technical appendix that would provide site specific information of how the risks to the water environment from potential pollution and the risk of physical damage will be managed. These measures require Contractor input and thus the WMP would not be developed until during the detailed design phase and pre-construction planning period.

6.4 The CEMP should consider the following best practice guidelines:

- CIRIA - Control of water pollution from construction sites. Guidance for consultants and contractors (C532) (Ref. 15).
- CIRIA – Environmental good practice on site guide (fifth edition) (Ref. 16).
- British Standard - Code of practice for surface water management for development sites (BS8582:2013) (Ref. 17).
- SEPA guidance developed for Engineering in the Water Environment Good Practice Guide, including:
    - WAT-SG-26 – Sediment Management (Ref. 18).
    - WAT-SG-25 – River Crossing (Ref. 19).
    - WAT-SG-44 – Riparian Vegetation Management (Ref. 20).
    - WAT-SG-29 – Temporary Construction Methods (Ref. 21).

Management of Construction Runoff

6.5 Measures for the management of fine sediment in surface water runoff as a result of construction activities to be included in the CEMP should include, but may not necessarily be limited to, the following:

- All reasonably practicable measures will be taken to prevent the deposition of fine sediment or other material in, and the pollution by sediment of the River Brant, arising from construction activities. The measures will accord with the principles set out in industry guidelines including the CIRIA report *'C532: Control of water pollution from construction sites'* (Ref. 15).
- Where possible, works adjacent to the River Brant will be undertaken during the drier months of the year. When undertaking works, periods of wet weather will be avoided, to minimise the risk of generating runoff contaminated with fine particulates. If working during wet weather periods is unavoidable, mitigation measures will need to be implemented to control fine sediment laden runoff.
- To protect the River Brant from fine sediment runoff, any removed topsoil/subsoil will be stored a minimum of 20 m from watercourses, on flat lying land (and further if the ground is sloping, subject to onsite risk assessment and observational monitoring). Where this is not possible, and it is to be stockpiled for longer than a two-week period, the material will either be covered with geotextile mats, seeded to promote vegetation growth or other measures to limit fine sediment laden runoff.
- Where semi-mobile large plant (e.g., excavators) need to work on the channel banks, the banks should be stabilised to minimise bank collapse and erosion of fine sediment in to the River Brant.
- Mud deposits will be controlled at entry and exit points to the construction works area (at least 10 m from watercourses) using wheel washing facilities and/or other times as considered necessary.
- Equipment and plant will be washed out and cleaned in designated areas within the construction works area (at least 10 m from watercourses), where runoff can be isolated for treatment before drainage to the River Brant, with formal approval from the EA. If not suitable, contaminated wastewater should be disposed of off-site at appropriate facilities.
- Debris and other material will be prevented from entering the River Brant, through maintenance of a clean and tidy site, provision of clearly labelled waste receptacles, grid covers, and the presence of site security fencing.

Management of Spillage Risk

6.6 Measures for the management of spillages and leaks as a result of construction activities to be included in the CEMP should include, but may not necessarily be limited to, the following:

- An Emergency Response Plan or similar entitled plan would be prepared and included in the CEMP and implemented by the Contractor(s) on site.
- Spill kits and oil absorbent material (e.g., plant nappies) will be carried on all mobile plants and located at high-risk locations across the construction works area and regularly topped up. All construction workers will receive spill response training and toolbox talks.
- All spills to be cleaned up immediately, with resultant wastes (soils, rags, and absorbent material) appropriately stored and disposed of by an appropriately licensed waste contractor as controlled waste. All spills reported and investigated as required.
- Re-fuelling will take place in designated areas within the compound with drip trays/plant nappies and on flat land, at least 20 m from the River Brant. Certain semi-mobile large plants (e.g., excavators) may need to be re-fuelled in-situ, within 20 m of the water body and would require site-specific risk assessments by the Contractor(s).
- Biodegradable lubricant and hydraulic oils should be used for all vehicles and plant within the Scheme, where possible.
- Storage of fuel would be in accordance with *The Control of Pollution (Oil Storage) (England) Regulations (2001)*. Safety Data Sheets (SDSs) for all chemicals stored on-site will be kept on file and made available on-site.
- Any potentially contaminating substances (e.g., cement/adhesives) stored on site, will be in leak-proof containers and stored at least 20 m away from the River Brant (except for in fixed/large plants associated with the construction). The containers would be protected by temporary impermeable bunds (or drip trays for small containers) with a capacity of 110% of the maximum stored volume.

- Any permanent oil storage tanks and temporary storage of 200 L or more of oil in drums and mobile bowsers (and their ancillary pipe work, valve, filters, sight gauges etc.) must be stored in a secondary containment system e.g., bunding or drip trays.
- Cement mixing and washing areas should be situated on an impermeable designated area, at least 20 m away from the water body and should have settlement and re-circulation systems for water reuse, to minimise pollution risk. Contaminated wastewater from cement works cannot be discharged into water bodies and should be disposed of off-site at appropriate facilities.
- All plant and equipment will be regularly serviced to reduce emissions and the chance of leaks/spillage, ideally off-site. If servicing is required to be completed on-site, then control measures must be implemented to contain potential hydrocarbon leaks during servicing (e.g., drip trays when changing oil).
- Temporary environmental screens will be erected, sufficient to prevent construction debris oils, chemicals, or other construction materials from entering any watercourse/ drain for the duration of the works.
- The Scheme site is to be secure to prevent any vandalism that could lead to a pollution incident.
- The Contractor's method statement should make specific reference to measures for the protection of river quality.

Management of Biosecurity Risk

6.7 In accordance with The Wildlife and Country Act 1981 it is an offence to plant or otherwise cause to grow in the wild any plant listed in Part II of Schedule 9 of the Act. Measures for the control of the spread and colonisation of invasive, non-native species (INNS) as a result of construction activities to be detailed in the CEMP should include, but may not necessarily be limited to, the following:

- Prior to land clearance, earth works and construction activities, the site should be inspected for the presence of INNS. All occurrence of INNS should be recorded on plans to be retained by the Contractor(s) for reference.
- A site management plan would be prepared and implemented by the Contractor(s) on site, that sets out the measures for the control of the spread and colonisation of INNS within and beyond the Scheme site.
- Potential treatment and management of INNS and contaminated soils should operate within the conditions in *Treatment and disposal of invasive non-native plants: RPS 178* (Ref. 22).
- During activities that will disturb the INNS, temporary environmental screens will be erected, sufficient to prevent INNS propagules (e.g., plant fragments) from entering watercourses and travelling downstream. Any material trapped by the screens should be disposed of appropriately.
- Contaminated waste (e.g., plant fragments, infected soils) must be sent to landfill site or incineration facility that has the correct type of permit to deal with the identified INNS and notify the EA that this has been carried out.
- Screened and/or sieved soils from sites with Japanese Knotweed cannot be reused at any other sites than where it came from, within 50 m of watercourses, existing amenity areas and in places that may be used by people or livestock.
- Vehicles that have been in areas of INNS should be washed down and visually inspected for the presence of plant propagules, at least 20 m from watercourses, to prevent the spread of INNS species downstream and to other sites.

Monitoring During Construction

6.8 The Contractor(s) should continuously monitor the water quality within the Scheme site and downstream of the site, throughout construction.

6.9 Should there be an uncontrolled discharge of construction site runoff (laden within fine sediment) or in the event of a chemical spillage (e.g., fuel), construction works should immediately stop, and action should be taken to contain the pollution event. The Contractor(s) should contact the EA to seek advice on how to proceed with the pollution event containment and clean up.

Potential Operational Phase Risks

6.10 Once constructed the Scheme is expected to have little detrimental impact on the WFD quality elements compared with the baseline (existing) scenario. However, there are a number of general adverse impacts to the water environment which may occur from operation activity, including:

- Impacts on surface water and/or groundwater quality due to the deposition of soils, sediments, oils, fuels, or other construction chemicals from site run-off or through accidental spillages during maintenance activities. Contamination may reduce water quality of the River Brant and impact aquatic fauna and flora.
- Impacts on surface water and/or groundwater quality as a result of the use of firewater in the event of a fire in the BESS Area. Contamination may reduce water quality of the River Brant and impact aquatic fauna and flora.
- Changes in the hydrological regime due to changes in the volume, rate, and flow of surface water runoff entering the River Brant from the site. Changes in the hydrological regime of the River Brant may impact aquatic fauna and flora.
- Permanent hydromorphological impacts to watercourses. For example, river depth and width of watercourses could be permeability altered if instream construction structures (e.g., culverts) are kept during the operational phase of the Scheme.

Operational Mitigation

6.11 The operation will take place in accordance with an Operations Environmental Management Plane (OEMP), a framework version of which will be submitted alongside the DCO Application. This will set out the general environmental principles to be followed during the operational phase of the Scheme. The Framework OEMP will be used as the basis for a detailed OEMP to be prepared prior to commencement of operation.

6.12 The Framework OEMP will outline how the operational mitigation measures will be implemented and will set out the monitoring and auditing activities designed to ensure that such mitigation measures are carried out, and that are effective.

6.13 The key elements of the Framework OEMP may include:

- An overview of the Scheme and associated operation programme.
- Prior assessment of environmental impacts (through the EIA).
- Reduction of potential adverse impacts through design and other mitigation measures.
- Monitoring of effectiveness of mitigation measures.
- Corrective action procedure.
- Links to other complementary plans and procedures.

6.14 A Surface Water Drainage Strategy will be prepared and submitted within the ES for the Scheme. The design of drainage systems aims to ensure that there would be no substantial increases in flood risk downstream, during storms up to and including the 1 in 100 (1%) annual probability design flood, with an allowance for climate change.

6.15 Careful consideration of the Sustainable Urban Drainage Systems (SuDS), such as Rural SuDS (RSuDS) techniques or other appropriate solutions, should be undertaken to ensure that the Surface Water Drainage Strategy adequately attenuates and treats runoff from the Scheme, whilst minimising flood risk to the Site and surrounding area. This should be developed in keeping with local planning policy and through liaison with relevant stakeholders, and take into account Defra guidance on the use, design and construction of SuDS, and current best practice guidance on the planning for and design of SuDS treatment, for example, CIRIA's SuDS Manual (Ref. 23).

6.16 A water quality risk assessment of all solar infrastructure will be undertaken using the Simple Index Approach described in The SuDS Manual (CIRIA C753) (Ref. 24). This will inform what, if any treatment measures are required to manage the risk from diffuse urban runoff to the River Brant, unnamed tributaries and/or groundwater.

6.17 Permanent impacts to watercourses, including the extension or creation of new crossings, would require compensation enhancements. These enhancements would need to be determined based on the level of impact and informed by WFD Impact Assessment and hydromorphological assessments. Compensation enhancements would also need to be agreed with the EA. Where this is a potential impact, there may be a requirement for mitigation on a length-for-length basis within the watercourse, i.e., where 10 m of a watercourse is impacted, the compensation / improvement of a 10 m stretch of the watercourse outside the area of impact would be investigated.

6.18 Where possible, new culverts, and extensions to culverts, should be avoided in favour of less intrusive watercourse crossing methods. Where other crossing methods cannot be implemented, the culverts should be appropriately designed to allow continuity of water, sediment, and biota. If works are required to existing culverts, opportunities to improve the culvert should be explored.

Potential Decommissioning Phase Risks

6.19 When the operational and maintenance phase ends, the Solar PV Site would be decommissioned. All Solar PV Panels, mounting piles and concrete blocks, cabling, inverters, transformers, switchgear, BESS and the containerised unit of the Operations and Maintenance Hub would be removed from the Solar PV Site and recycled or disposed of in accordance with good practice and market conditions at that time.

6.20 Should the Grid Connection Cables be decommissioned, the mode of their decommissioning would be dependent upon government policy and good practice at that time. Currently, the most environmentally acceptable option is leaving the cables in situ, as this avoids disturbance to overlying land and habitats and to neighbouring communities. Alternatively, the cables can be removed by opening up the ground at regular intervals and pulling the cable through to the extraction point, avoiding the need to open up the entire length of the cable route.

6.21 As such, decommissioning impacts would be less than those during construction and would be mitigated by measures set out within the Framework Decommissioning Environmental Management Plan (DEMP).

Decommissioning Mitigation

6.22 The decommissioning will take place in accordance with the Framework DEMP. The Framework DEMP will detail the measures that would be undertaken during decommissioning to mitigate the temporary effects on the water environment.

6.23 The key elements of the Framework DEMP include:

- An overview of the Scheme and associated decommissioning programme.
- Prior assessment of environmental impacts (through the EIA).
- Reduction of potential adverse impacts through mitigation measures.
- Monitoring of effectiveness of mitigation measures.
- Corrective action procedure.
- Links to other complementary plans and procedures.

7 Conclusion

7.1 AECOM was commissioned by Telis Energy UK Limited to undertake a Water Framework Directive (WFD) Screening and Scoping Assessment, in support of the Environmental Impact Assessment (EIA) Scoping Report for the Leoda Solar Farm insofar as it has been developed to date.

7.2 The Scheme will comprise the installation of solar photovoltaic (PV) generating panels, on-site energy storage facilities, Battery Energy Storage Systems (BESS), and on-site substations across a proposed site in Lincolnshire ('Solar PV Site'), along with associated infrastructure for connection to the National Grid ('Grid Connection Corridor').

7.3 The Scheme is at an early stage of planning and there are no outline or detailed infrastructure designs available as yet. Available information has been screened to demonstrate compliance with WFD objectives, and to advise where WFD mitigation measures will need to be embedded into forthcoming designs. Some rationalised further WFD assessment has therefore been 'Scoped In' for proportionate review when design details become available, in order to demonstrate how the full Scheme is compliant with WFD objectives.

7.4 The following WFD water bodies were Screened In as being within the footprint of the Scheme:

- Surface water bodies:
    - Brant – Lower (GB105030056110).
    - Brant – Upper (GB105030056770).
- Groundwater bodies:
    - Witham Lias (GB40502G401400),
    - Witham Limestone Unit A (GB40501G444800).

7.5 The following Scheme activities can be Screened Out of having any significant WFD impact risks assuming they avoid watercourses:

- Solar photovoltaic (PV) modules and mounting structures.
- Supporting Infrastructure: Inverters, Transformers, and Switchgear.
- Battery Energy Storage Systems (BESS).
- Grid Connection Substation(s)
- Operations and Maintenance Hub (inc. Welfare Facilities)
- Fencing and Security
- Landscaping and Biodiversity Enhancement.

7.6 The following Scheme activities remain Screened In for the waterbodies identified above, because at this stage it is not possible to rule out WFD impacts with certainty. These Scheme elements will therefore require further proportionate assessment to verify WFD compliance as the Scheme designs are finalised:

- Interconnecting Cabling.
- Electricity Export Connection to National Grid
- Access Tracks
- Surface Water Drainage

8 References

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Ref 17 The British Standards Institution. 2013. Code of practice for surface water management for development sites (BS 8582:2013). BSI.

Ref 18 Scottish Environment Protection Agency. 2010. Engineering in the Water Environment Good Practice Guide – Sediment Management (WAT-SG-25).

Ref 19 Scottish Environment Protection Agency. 2010. Engineering in the Water Environment Good Practice Guide – River Crossings (WAT-SG-25).

Ref 20 Scottish Environment Protection Agency. 2009. Engineering in the Water Environment Good Practice Guide – Riparian Vegetation Management (WAT-SG-44).

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Appendix E Environmental Mitigation and Commitments Register

Table 1. Leoda Solar Farm Environmental Mitigation and Commitments Register

Note, this Environmental Management and Commitment Register follows the Planning Inspectorate Nationally Significant Infrastructure Projects: Commitments Register Guidance (September 2024). This Guidance notes that to maximise the benefits of the Commitments Register, the Planning Inspectorate recommends that versions of the register are agreed with relevant stakeholders and submitted to the Planning Inspectorate at a number of milestones of the planning process, with the first iteration submitted with the scoping request setting out "*where applicants rely on commitments as the basis for scoping matters out or refining the scope of assessment*". As such, this Environmental Management and Commitment Register focusses on such commitments, whereby industry best practice measures have been omitted to avoid excessive detail at this stage given that they are not commitments relied upon to scope out matters, or refine the scope, of assessment. The Applicant will adhere with good industry practice measures and will include these within the PEIR and ES iterations of this Environmental Management and Commitment Register as relevant.

ID	Primary Topic (primary driver for commitment)	Other Topics relevant to the commitment	Commitment Measures (including any monitoring required)	Phase (Construction, Operation or Decommissioning)	Likely Securing Mechanism
CC-01	Climate Change	-	Engagement will be undertaken with relevant environmental disciplines and the engineering design team to discuss the Climate Change Risk Assessment and identify appropriate mitigation measures to improve the resilience of the Scheme to future climate change impacts and incorporate such measures into the design. These embedded measures will then be considered as part of the assessment.	Construction Operation Decommissioning	CEMP OEMP DEMP
CH-01	Cultural Heritage	Transport and Access	The planning of construction and decommissioning traffic routes and modes of transport will seek to reduce impacts to numerous receptors, including heritage assets. For example, stopping large construction traffic from impacting the surrounding villages, which contains numerous heritage assets.	Construction Decommissioning	CEMP CTMP Draft DCO
CH-02	Cultural Heritage	-	The Scheme will be designed to avoid or minimise potential changes to the setting of designated heritage assets, including Grade I, Grade II* and Grade II listed buildings, with a minimum 100m offset from any designated heritage asset implemented as part of the Scheme design.	Construction	Detailed Design Approval CEMP
CH-03	Cultural Heritage	Landscape and Visual Amenity	The external finish of infrastructure within Field Stations will be typically in keeping with the prevailing surrounding environment, to minimise the visual impact. External finish varies between manufacturers and colour would be confirmed during detailed design but is most often a grey or green painted finish.	Operation	Design Principles
CH-04	Cultural Heritage	-	The desk-based research will be supported by a programme of archaeological investigation. A geophysical survey of the Site will be undertaken to establish the potential for the presence of below-ground archaeological remains within the Site Boundary. The scope of geophysical survey will be agreed with the Historic Environment Officers for LCC and will be undertaken within areas of the Site Boundary that are suitable for survey and where land access can be obtained by way of landowner agreement. Further archaeological evaluation may be undertaken as part of the assessment process, the scope of which will be informed by the DBA, the outcomes of the geophysical survey, aerial photograph and LiDAR analysis and through consultation with the Historic Environment Officers for LCC. These additional surveys (if required) may include, but are not limited to: • Monitoring of geotechnical ground investigations to establish the geoarchaeological baseline conditions and to assess the potential for deposits containing palaeoenvironmental data to be present; and • Archaeological trial trench evaluation to confirm the results of the geophysical survey, characterise the nature, extent and preservation level of archaeological remains in order to understand their heritage value, and to inform a suitable mitigation response.	Construction	CEMP
ENC-01	Ecology and Nature Conservation	Landscape and Visual Amenity Soils and Agricultural Land	Field surveys will be undertaken in advance of decommissioning to define the ecological baseline at the time of decommissioning and to ensure that impacts on ecological features are identified, avoided and, or, mitigated. Upon decommissioning, the above-ground physical infrastructure will be removed and the Site returned to landowners in the condition as at the end of operation, including the established habitats.	Decommissioning	DEMP
ENC-02	Ecology and Nature Conservation	Arboriculture	Further arboriculture survey will be undertaken to determine the location of any veteran or notable trees not recorded in the Ancient Tree Inventory within the Site and also inform the design of the Scheme and subsequent assessment.	-	-

ID	Primary Topic (primary driver for commitment)	Other Topics relevant to the commitment	Commitment Measures (including any monitoring required)	Phase (Construction, Operation or Decommissioning)	Likely Securing Mechanism
ENC-03	Ecology and Nature Conservation		The Survey Areas that will be used in the assessment will ensure sufficient data is gathered to meet any design iterations which may change the likely Zone of Influence used to undertake the impact assessment. The data gathered from these surveys will be used to inform the final assessment presented in the ES. These surveys will also inform any European Protected Species (EPS) mitigation licences (where required). As part of the DCO application for the Scheme these will be prepared in draft for advisory comment from Natural England.	-	
ENC-04	Ecology and Nature Conservation	-	Water bodies and ditches located within and close to the Site may support common and widespread amphibian species (e.g. Common Frog and Smooth Newt) and the Site also offers suitable terrestrial habitats for these species in the form of hedgerows, scrub, semi-improved grassland and woodland. Surveys are not required for such species, as they receive limited legislative protection and as such will not be specifically undertaken for these species, but observations of these species will be recorded during ecological surveys. Embedded mitigation described and included in the ES, submitted as part of the DCO Application, will ensure that there is no injury or killing of such species (if present) during construction of the Scheme.	Construction	CEMP
ENC-05	Ecology and Nature Conservation	-	The Scheme will achieve at least 10% BNG in all habitat units within the baseline (i.e., area, linear and watercourse habitats where applicable (as set out in the incoming legislation)). A BNG assessment will be undertaken (using Defra's Statutory Biodiversity Metric Tool or the most up to date metric) to identify on-site opportunities to deliver BNG. These opportunities will be identified and set out within the ES. A Framework LEMP will be submitted with the DCO application and will specify mitigation and enhancement measures that would deliver BNG. A UKHab Survey, including Habitat Condition Assessment for Biodiversity Net Gain will be undertaken.	Construction Operation	CEMP OEMP LEMP BNG Report Draft DCO
ENC-06	Ecology and Nature Conservation	Landscape and Visual Amenity	The design for the Scheme will include consideration of Important Ecological Features (IEFs) and will incorporate, where reasonably practical, measures to avoid or reduce the potential for adverse effects on these, in accordance with the mitigation hierarchy. The measures that will be identified and adopted include those that are inherent to the design of the Scheme, and those that can realistically be expected to be applied as part of environmental best practice, or as a result of legislative requirements.	Construction Operation	Design Principles CEMP OEMP Draft DCO
ENC-07	Ecology and Nature Conservation	-	Standard best practice construction measures will be set out within a Framework CEMP, secured through the DCO, to avoid any potential harmful impacts on IEFs and ensure compliance with environmental legislation. The CEMP will detail and formalise measures that will be implemented prior to and during construction of the Scheme to mitigate construction-related effects on IEFs.	Construction	CEMP
ENC-08	Ecology and Nature Conservation	Landscape and Visual Amenity	The Scheme will occur mostly on lower value habitats (i.e. arable). Use of these lower valued habitats substantially reduces the potential for the Scheme to result in significant adverse effects on ecological features. The Scheme will be designed so that impacts upon important habitats (e.g. woodland, hedgerows and arable margins) are avoided or reduced, where reasonably practicable and compensated for where not, through the creation of replacement habitat.	Construction Operation	CEMP OEMP Design Principles
ENC-09	Ecology and Nature Conservation	Arboriculture Landscape and Visual Amenity Water Environment	The Scheme will aim to avoid, protect and retain notable habitats where practicable, all of which will be included in the design. This will include offsets of: • at least 10 m from watercourses and water bodies; • at least 15 m from existing woodland features; • at least 5 m from hedgerows without trees; and • offsets applicable to each tree's RPA for individual trees and trees occurring within hedgerows.	Construction Operation	CEMP OEMP Design Principles
ENC-10	Ecology and Nature Conservation	Landscape and Visual Amenity	Where practicable, retained trees will be protected as per British Standard BS: 5837 Trees in relation to design, demolition and construction – Recommendations. Fencing, as appropriate, will be included around working areas to protect above-ground vegetation and below-ground root systems.	Construction Operation	CEMP OEMP Design Principles

ID	Primary Topic (primary driver for commitment)	Other Topics relevant to the commitment	Commitment Measures (including any monitoring required)	Phase (Construction, Operation or Decommissioning)	Likely Securing Mechanism
ENC-11	Ecology and Nature Conservation	Landscape and Visual Amenity	The Scheme will aim to avoid, protect and retain protected or notable species where practicable, all of which will be included in the design. This will include offsets of: • retaining Badger setts, with an undeveloped zone of at least 30 m from the sett (dependent on the activity); and • retaining trees with the potential to support roosting bats, with an undeveloped zone of at least 15 m around the tree.	Construction Operation Decommissioning	CEMP OEMP Design Principles
ENC-12	Ecology and Nature Conservation	Landscape and Visual Amenity Water Environment	The following habitats will be retained as part of the Scheme: woodlands, water bodies (including ponds), watercourses (assuming watercourses are not lost as a whole and small crossings of minor watercourses could be required but any main rivers would be crossed using trenchless techniques) and the majority of hedgerows (assuming hedgerows are not lost as a whole, but could require either a temporary or permanent gap through occasionally, which would be minimised to smallest necessary).	Construction Operation Decommissioning	CEMP OEMP DEMP Design Principles
ENC-13	Ecology and Nature Conservation		Should there be the requirement for the potential mitigation of ecological features and recommended enhancement measures, suitable on-site areas will be made available to deliver the required outcomes.	Construction Operation Decommissioning	CEMP OEMP Design Principles
ENC-14	Ecology and Nature Conservation	-	Baseline ecological surveys commenced in 2024 (within accessible areas of the Site) and will continue through 2025 to determine the baseline ecological conditions and inform the PEIR and ES assessments. The surveys may highlight new IEFs with potential to be significantly affected which have not been identified to date (or considered not to be significant) at this stage of the assessment. Mitigation will be developed as relevant alongside the design team to mitigate adverse effects.	Construction Operation Decommissioning	CEMP OEMP DEMP Design Principles
ENC-15	Ecology and Nature Conservation	-	Whilst no European sites have been identified within the respective Study Areas, and as such an assessment of European sites has been scoped out, if the Site changes and where appropriate, the potential impact pathways will be considered in the assessment provided in the ES, to determine whether there are any pathways to effects on any such sites.	Construction Operation Decommissioning	CEMP OEMP DEMP Design Principles
ENC-16	Ecology and Nature Conservation	-	There will be no direct impact to habitats outside of the Site and good practice construction methods will ensure that there are no indirect impacts to habitats outside of the Site.	Construction	CEMP
ENC-17	Ecology and Nature Conservation	-	Efforts will be made to ensure the retention of the majority of habitats (e.g. woodland, hedgerows and ditches) within the Site, avoidance of off-site habitats and good practice construction methods so that there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme upon terrestrial invertebrates.	Construction Operation Decommissioning	CEMP Design Principles
ENC-18	Ecology and Nature Conservation	-	Efforts will be made to ensure the retention of the majority of habitats (e.g. watercourses and water bodies) within the Site, avoidance of off-site habitats and good practice construction methods so that there are no potential impact pathways during any phase (construction, operation and maintenance and decommissioning) of the Scheme upon aquatic macroinvertebrates.	Construction Operation Decommissioning	CEMP Design Principles
ENC-19	Ecology and Nature Conservation	-	Brown Hare and Hedgehog are likely to be present within the Site and Harvest Mouse has the potential to be present, based on the habitat within the Site. Incidental records of these species will be recorded during other ecological surveys and any embedded mitigation measures (which will be formalised in the Framework CEMP	Construction	CEMP

ID	Primary Topic (primary driver for commitment)	Other Topics relevant to the commitment	Commitment Measures (including any monitoring required)	Phase (Construction, Operation or Decommissioning)	Likely Securing Mechanism
			secured as part of the DCO requirements) will ensure the integrity of retained habitats are not adversely affected and that there is no fragmentation of habitats, or of populations of species and that no species mortality occurs.		
ENC-20	Ecology and Nature Conservation	-	The design of the perimeter fence will include gaps to allow mammals, including small deer to pass underneath at strategic locations to maintain ecological connectivity.	Construction Operation Decommissioning	Design Principles
ENC-21	Ecology and Nature Conservation	-	Pre-construction and pre-decommissioning surveys will be undertaken where required to provide an update on the presence and location of any INNS that could be impacted by the Scheme, the findings of which will inform the implementation of measures to prevent their spread.	Construction Decommissioning	CEMP DEMP
ENC-22	Ecology and Nature Conservation	Soils and Agricultural Land MA&D	A Biosecurity Plan will be produced prior to construction and decommissioning which will set out procedures to ensure that no invasive species are brought onto the Site, exported out of the Site or spread within it (e.g. Wildlife and Countryside Act 1981 (as amended) Schedule 9 species).	Construction Decommissioning	CEMP DEMP
ENC-23	Ecology and Nature Conservation	-	Ongoing monitoring of habitats and species will be undertaken throughout construction and decommissioning, overseen by an appointed ECoW of suitable qualifications and experience, or in charge of a team of appropriately qualified ecologists.	Construction Decommissioning	CEMP DEMP
ENC-24	Ecology and Nature Conservation	-	Vegetation clearance will be undertaken in advance of construction and decommissioning and at an appropriate time of year to avoid the nesting bird period and minimise incidental injuring or killing of reptiles and amphibians. Therefore, construction will avoid the nesting bird period (i.e. March to August inclusive) for vegetation clearance and, in areas suitable for reptiles, would be undertaken at an appropriate time of year, concordant with requirements for other species (such as nesting birds and brown hare). Where vegetation clearance within the nesting bird period is unavoidable, vegetation will be checked for the presence of any nests by a suitably experienced ornithologist, prior to removal. If active nests are found, appropriate buffer zones will be put in place and the area monitored until the young birds have fledged.	Construction Decommissioning	CEMP DEMP
ENC-25	Ecology and Nature Conservation	-	Vegetation with the potential to support reptiles will be cut in a phased approach, firstly cutting to 30cm (centimetres), then, following a period of no less than 24 hours, to 15cm and then to ground level, after another 24 hours. Any habitat features which may conceal hibernating reptiles (e.g., log piles, rubble mound bunds, any other debris) will not be dismantled during winter months (i.e., between November and February) and will be conducted during the reptile active season (i.e., March (dependent on weather) to October) during warm weather conditions (i.e., above 5°C) to avoid killing or injuring potential hibernating reptiles.	Construction Decommissioning	CEMP DEMP
ENC-26	Ecology and Nature Conservation	Water Environment	Where watercourses/ditches (not Main Rivers) are crossed by cabling works and open cut techniques are required, habitats that are temporarily lost will be reinstated after installation. Where small watercourses/ditches (not Main Rivers) are crossed for access, either temporarily during construction or permanently during operation, new crossings will be clear span and wide enough to avoid the loss of in-channel and riparian habitats. Tracks will be permeable, and localised SuDS, such as swales and infiltration trenches, will be used to control runoff if required. Habitats will be reinstated upon completion of the works, and allowed to re-vegetate naturally. For these crossings water flow would be maintained by damming and over-pumping, except where works are undertaken in the drier months and this is not necessary.	Construction	Design Principles CEMP
ENC - 27	Ecology and Nature Conservation	Arboriculture	Trees with moderate and high bat roost suitability will be avoided through design. Where the removal or reduction of trees with low bat roost suitability is unavoidable, they will be soft/section felled in accordance with a Method Statement, under an ecological watching brief. Should additional trees be identified for removal or reduction which are suitable for roosting bats, further surveys will be undertaken as necessary, which may identify the requirement for additional mitigation and/or a Natural England mitigation licence, where impacts to roosting bats cannot be avoided. Where further surveys are necessary, and for the subsequent requirements and mitigation regarding loss of or disturbance to trees, the relevant guidance at the time would need to be followed which may differ from that in place when previous surveys were conducted.	Construction	Design Principles CEMP
WE-01	Water Environment	-	A qualitative assessment of potential effects on surface water quality from construction, operation and decommissioning of the Scheme will be undertaken. This will consider the risk to surface water features resulting from construction, decommissioning works or future operation activity using a source-pathway-receptor approach. Where there is a risk of pollution, mitigation measures will be described with reference to best practice guidance.	Construction Operation Decommissioning	CEMP OEMP DEMP

ID	Primary Topic (primary driver for commitment)	Other Topics relevant to the commitment	Commitment Measures (including any monitoring required)	Phase (Construction, Operation or Decommissioning)	Likely Securing Mechanism
WE-02	Water Environment	-	The design of drainage systems will aim to ensure that there will be no significant increases in flood risk downstream, during storms up to and including the 1 in 100 (1%) annual probability design flood, with an allowance for climate change.	Construction Operation	CEMP Design Principles
WE-03	Water Environment	-	In accordance with planning policies of LCC and NKDC and general good practice, mitigation will be provided by restricting surface water discharge rates and providing on-site attenuation, primarily via SuDS, such as Rural SuDS (RSuDS) techniques or other appropriate solutions, to ensure there will be no increase in flood risk elsewhere.	Construction Operation	CEMP Design Principles
WE-04	Water Environment	-	As the Scheme is classified as essential infrastructure and parts of the Solar PV Site are located in Flood Zone 3 an Exception Test is required to be undertaken as part of the FRA. For the Exception Test to be passed allowing development in Flood Zone 3 the FRA will be required to demonstrate that the development will be safe for its lifetime, this requirement will influence positioning of infrastructure within the Solar PV Site and heights of panels. Cable routes are not generally considered in flood risk terms, other than temporary works during installation. However, the approach to the Sequential and Exception Tests for the Grid Construction Corridor will be clarified with the Environment Agency and the LLFA as required.	Construction Operation	Design Principles
WE-05	Water Environment	-	Due to the potential impacts upon WFD water bodies, initially a Screening and Scoping WFD Assessment will be undertaken. The assessment would determine the potential for any non-compliance of the Scheme with WFD objectives for affected water bodies, using readily available information. This will include a qualitative examination of the potential construction, operation and decommissioning phase impacts of the Scheme on relevant WFD hydromorphological, biological and physio-chemical parameters. Depending on the outcomes of the preliminary assessment, more detailed investigations may be required, which will be determined in consultation with the Environment Agency.	Construction Operation Decommissioning	CEMP OEMP DEMP
WE-06	Water Environment	-	Requirements for hydraulic modelling of watercourses will be discussed with the Environment Agency / LLFA; any modelling required will be undertaken as part of the ES to inform the FRA and Surface Water Drainage Strategy. The IDB will be consulted on the FRA and Surface Water Drainage Strategy.	Construction Operation	-
WE-07	Water Environment	-	Solar PV panels will be off set from watercourses by a minimum of 10 m measured from the centre line of the channel (as bank top is a variable feature). The purpose of this buffer reduces the risk of any pollutants entering the watercourse directly during construction or direct physical impacts, whilst also providing space for mitigation measures (e.g., fabric silt fences) should they be required.	Construction Operation	Design Principles
WE-08	Water Environment	-	It is not assumed that wastewater generated from the Scheme will be managed by either connection to an available public sewer, if close enough, or a self-contained independent non-mains domestic storage. This would be a self-contained foul drainage system to a sealed cesspit or similar sealed system. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor. Therefore, impact on foul drainage or water supply has been scoped out of further assessment.	Construction Operation	Design Principles
WE-09	Water Environment	-	To protect watercourses from fine sediment runoff, topsoil/subsoil will be stored a minimum of 20 m from watercourses on flat lying land. Where this is not practicable, and it is to be stockpiled for longer than a two-week period, the material will either be covered with geotextile mats, seeded to promote vegetation growth, or runoff prevented from draining to a watercourse without prior treatment.	Construction Decommissioning	CEMP DEMP
WE-10	Water Environment	Ecology and Nature Conservation	Where extensions to existing culverts are required, they will be designed appropriately to maintain connectivity along watercourses for aquatic species and riparian mammals, where these are shown to be present.	Construction	Design Principles CEMP
LV-01	Landscape and Visual Amenity	Ecology and Nature Conservation	The effects on landscape and visual receptors will be mitigated as far as practicable to avoid, prevent, reduce, or offset effects through the integrated design and mitigation strategy for the Scheme. This will comprise primary and secondary measures. Primary measures are those developed through the iterative design process that will become integrated or embedded into the project design along with standard construction and operational management practices for avoiding and reducing environmental effects. Secondary measures are those, as noted in GLVI3, that are “designed to address any residual adverse effects remaining after primary measures and standard construction practices have been incorporated into the scheme”. The LVIA will inform the iterative design process of the Scheme and the mitigation measures, specifically with regards to the siting, layout of the solar panels and associated structures; and choice of and colour tones for the associated structures to reduce their visibility and perceived scale and mass within the landscape.	Construction Operation Decommissioning	CEMP LEMP OEMP DEMP Design Principles

ID	Primary Topic (primary driver for commitment)	Other Topics relevant to the commitment	Commitment Measures (including any monitoring required)	Phase (Construction, Operation or Decommissioning)	Likely Securing Mechanism
			The LVIA will also inform the iterative design process via identifying opportunities for new Green Infrastructure (e.g., planting and improvements to recreational routes).		
LV-02	Landscape and Visual Amenity	Ecology and Nature Conservation	A security fence will enclose the operational areas of the Solar PV Site. PRoWs that cross the Solar PV Site will be preserved with the fence installed either side of them. The fence will stand approximately 2.5 to 3 m in height.	Construction	Design Principles LEMP CEMP
LV-03	Landscape and Visual Amenity	Ecology and Nature Conservation	A lighting assessment is scoped out of the assessment, as during the construction phase no lighting is proposed between the hours of 19:00 and 07:00. During operation the only visible lighting would be motion detection lighting at the substation when nighttime maintenance is required. Any lighting will be directional and designed to minimise potential for light spillage beyond the Site, particularly towards houses, live traffic and ecological habitats in so far as it is reasonably practicable.	Construction Operation	CEMP OEMP
ARB-01	Arboriculture	Ecology and Nature Conservation Landscape and Visual Amenity	No ancient or veteran trees will be removed.	Construction	Design Principles LEMP CEMP
ARB-02	Arboriculture	Ecology and Nature Conservation Landscape and Visual Amenity	Where trees require pruning, the extent of pruning will be the minimum feasible to achieve the objective and works will be carried out in accordance with the principles of BS3998: 2010 Treework – Recommendations. The final extent of any pruning will be determined by the AMS submitted as part of the detailed CEMP and DEMP.	Construction Decommissioning	LEMP CEMP DEMP
NV-01	Noise and Vibration	-	All reasonable steps to minimise the effects of noise on PRoW users will be taken during the construction, operational and decommissioning phases of the Scheme.	Construction Operation Decommissioning	CEMP OEMP DEMP
NV-02	Noise and Vibration	-	Noise generating activities near residential properties, such as use of power tools or piling, would be limited to the hours between 08:00 and 18:00 from Monday to Friday and between 08:00 and 13:00 on Saturday.	Construction Decommissioning	CEMP DEMP
NV-03	Noise and Vibration	-	A minimum distance offset between solar/power conversion stations and residential receptors will be determined through noise modelling and included in the Design Principles.	Operation	Design Principles
SO-01	Socio-Economics and Land Use	Transport and Access Human Health	Several PRoWs will require management to ensure user safety and accessibility. Management measures include, but are not limited to: • Maximising visibility between construction and decommissioning vehicles and other users (i.e., pedestrians, cyclists, equestrian); • Implementing traffic management (e.g., advanced signage to advise other users of the works); and • Use of manned controls where the Scheme crosses PRoW (i.e., marshals or banksmen), with a default priority that decommissioning traffic will give-way to other users.	Construction Decommissioning	CEMP OEMP PRoW Management Plan
TM-01	Traffic and Movement	Noise and Vibration	Potential mitigation measures that could be implemented during the construction phase may include: • Development of a Framework Construction Traffic Management Plan (CTMP), to include details such as restrictions of HGV movements to certain routes, days of the week and times of the day; • Development of a Framework Construction Worker Travel Plan (CWTP), which may include details of methods to be used to encourage sustainable travel to / from sites for workers. This information could also potentially be incorporated into the Framework CTMP; and • Development of a Framework Public Rights of Way (PRoW) Management Plan to include details of how the PRoWs will be maintained/ managed through the lifespan of the development.	Construction Operation	CTMP CEMP OEMP CWTP PRoW Management Plan
TM-02	Traffic and Movement	Noise and Vibration Landscape and Visual Amenity	It is anticipated that all mitigation required will be set out within the outline designs where required for route improvements between the strategic road network and the Site. Swept path analysis will be presented to support these designs where required. Temporary diversion or other mitigation measures for foot/cycle paths and PRoWs will be proposed where necessary.	Construction Operation	CTMP CEMP

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					OEMP CWTP PRoW Management Plan
SAL-01	Soils and Agricultural Land	Ecology and Nature Conservation Landscape and Visual Amenity	The potential for continued agricultural use within the Solar PV Site during operation by using the land as permanent pasture for sheep grazing is to be explored by the Applicant. Where this can be established the loss of agricultural use of the land would be avoided. It is noted that the density of grazing would be managed; and grazing restricted to drier periods when the land is less prone to poaching and compaction to mitigate damage to soil resources.	Construction Operation Decommissioning	CEMP LEMP OEMP Design Principles
SAL-02	Soils and Agricultural Land	Ecology and Nature Conservation Landscape and Visual Amenity	Where possible, mitigation measures to avoid or reduce soil damage and loss will be incorporated into the design of the Scheme (embedded mitigation) such that they inform its alignment (Grid Connection Corridor), layout (Solar PV Site) and/or how it shall be constructed. Through iterative assessment, potential impacts will be predicted and opportunities to mitigate them identified with the aim of preventing or reducing impacts as much as possible. This approach provides the opportunity to prevent or reduce potential adverse impacts from the outset.	Construction Operation Decommissioning	CEMP LEMP OEMP
SAL-03	Soils and Agricultural Land	-	The Study Area includes the Grid Connection Corridor but will be assessed using secondary data only without carrying out surveys. This is because any works within this area would represent a temporary impact only and would not change the agricultural land classification or prevent farming once the cable is installed. The cable would be buried below ground at approximately 1.2 m depth, therefore allowing existing agricultural activity including cultivations to enable return of the land to arable. Survey of soils and agricultural land classification would be done pre-construction to feed into the Soil Management Plan and determine appropriate storage methods for the soil.	Construction Operation Decommissioning	SMP CEMP OEMP DEMP
MW-01	Materials and Waste	-	The construction of the Scheme will be subject to measures and procedures defined within a CEMP and Site Waste Management Plan (SWMP). The CEMP and SWMP will be secured by a Requirement in the DCO and include the implementation of industry standard practice and control measures for environmental impacts arising during construction, including the approach for material and waste management on-site. These measures will be set out in the Framework CEMP and Framework SWMP submitted with the DCO application.	Construction Operation Decommissioning	CEMP / SWMP OEMP DEMP
AQ-01	Air Quality	-	Air quality mitigation measures will be developed and incorporated into the Framework CEMP, including measures that will be implemented as part of a Dust Management Plan which will consider the potential impacts from dust emissions arising from activities during the construction and decommissioning phases of the Scheme and develop appropriate measures to mitigate issues. With regards to the scope of the EIA, the development of air quality mitigation measures will remove the potential for likely significant effects and therefore negate the need for a specific air quality chapter in the ES.	Construction Decommissioning	CEMP
GG-01	Glint and Glare	-	Construction and decommissioning activities are expected to be undertaken in accordance with a CEMP, which will be in accordance with the Framework CEMP submitted with the DCO application. This will include information on how reflective surfaces are to be treated during construction and decommissioning phases with a view toward their final placement across the Site. It is expected that avoidance of the effects of glint and glare will be considered as part of construction and decommissioning planning. Further, the scale of the Site is such that the full areas will not be occupied for the duration of these phase activities and the movement of reflective surfaces will be temporarily localised to smaller areas on a rolling basis until works are complete.	Construction	CEMP
GG-02	Glint and Glare	Landscape and Visual Amenity	Based on the expected design, screening and distance to sensitive receptors, significant effects are not considered likely. Nevertheless, as the design develops, consideration will be given to the potential for solar reflections to impact on sensitive receptors. This will include undertaking calculations to determine whether the solar PV panels will be visible from sensitive locations and if a solar reflection could occur, whether it is likely to be a significant nuisance or hazard. The calculations will made using specialised software based on the Sandia Laboratories Solar Glare Hazard Analysis Tool (SGHAT). If glint and glare is likely to be a nuisance or hazard, mitigation will be proposed. The results and recommendations of the glint and glare calculations will be incorporated into the Scheme design and presented as a technical appendix to the ES. Any mitigation planting or fencing recommended by the modelling will be incorporated into the Scheme design and assessed by the other technical chapters.	Operation	Design Principles
GC-01	Ground Conditions	-	A number of environmental design and management measures will be employed as standard best practice to minimise impacts to both human health and controlled waters during the construction and decommissioning phases of the Scheme. These will be incorporated into the Framework CEMP and Framework DEMP which will be provided alongside the ES as part of the DCO application. This will be developed into a detailed CEMP and DEMP prior to construction and decommissioning and implemented in accordance with the Framework CEMP and Framework DEMP.	Construction Decommissioning	CEMP DEMP

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GC-02	Ground Conditions	-	On-site activities when the Scheme is complete and operational will be limited to the maintenance of the Solar PV Site infrastructure. During maintenance activities there may be the need to use oils, grease, fuels, lubricants or cleaning agents on-site. There is a limited risk of chemical pollution arising from accidental spillages during these operations. A Framework OEMP will be prepared following grant of DCO to address all operational related issues. This will include a spillage Emergency Response Plan (ERP), which maintenance staff will be required to have read and understood.	Operation	OEMP ERP
MAD-01	Major Accidents and Disasters	-	It is considered highly likely that as the design of the Scheme evolves in preparation of the DCO application, it will become clear that there is no real risk or serious possibility of major accidents or disaster events interacting with the Scheme. This is as a result of mitigation being developed in line with technical assessments, such as the Flood Risk Assessment, which will incorporated into the Scheme design as necessary to manage potential impacts upon receptors. As such, it is proposed to scope out from the ES the assessment of such major accidents or disasters. The ES would note and explain where this approach has been taken. Should the possibility of any events interacting with the Scheme remain, this would be assessed and presented in the ES.	Construction Operation Decommissioning	Design Principles
MAD-02	Major Accidents and Disasters		There may be some potential for fire as a result of the battery storage element of the Scheme. However, the battery energy storage system will include automatic cooling and suppression systems, which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. A Framework Battery Fire Safety Management Plan will be prepared for the Scheme. The development of the Framework Management Plan will be considered in the iterative design of the Scheme ensuring that design requirements to ensure fire safety (such as ensuring adequate provision of land for water storage) and management of any firewater runoff are captured.	Construction Operation Decommissioning	BFSMP
MAD-03	Major Accidents and Disasters	Ecology Arboriculture Soils and Agricultural Land	A Biosecurity Plan will be provided post consent. This will provide measures to prevent the spread of plant or animal diseases and the transfer of injurious weed species and invasive species. Measures are likely to include appropriate cleaning and/or disinfection of machinery and equipment in areas considered to be at high risk.	Construction Decommissioning	LEMP CEMP DEMP SMP
TTRU-01	Telecommunications, Television Reception and Utilities	-	To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. Consultation with relevant telecommunication and utilities providers is a routine part of development and consultees will include water, gas and electricity utilities providers and telecommunications providers as appropriate. Information obtained from consultation will be used to inform the Scheme design and appropriate protective provisions will be included in the DCO to ensure the protection of apparatus wherever any existing infrastructure has the potential to be affected by the Scheme.	Construction Operation	Draft DCO
EMF-01	Electromagnetic Fields	-	The potential effects of EMFs on workers for the Scheme will be controlled and mitigated to acceptable levels through the legislative framework, impacts to workers will not be considered within the EMF assessment.	Operation	Draft DCO
EMF-02	Electromagnetic Fields	-	Cables will not be installed within 10m of any property due to the need for construction vehicles to manoeuvre both sides of the trench within the working width.	Construction Operation	Design Principles
EMF-03	Electromagnetic Fields	-	The presence of the public either directly above or adjacent to underground cables associated with the Scheme 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 similar to (and a lot less than some) that associated with general household appliances (and noticeably less than associated with the exposure when using a vacuum cleaner) and as such will not be assessed within the technical appendix. As the design develops, consideration will be given to the potential for EMF to impact on sensitive receptors. This will include undertaking calculations to determine whether EMF will be experienced by sensitive receptors and to what intensity. If it is likely to be a nuisance or hazard, mitigation will be proposed. As appropriate, the results and recommendations of any EMF assessment will be incorporated into the Scheme design and an EMF assessment presented as a technical appendix to the ES. As electricity will only flow through the cabling and infrastructure during the operational phase, this assessment will only consider operational phase effects.	Operation	Design Principles