High Grove Solar Preliminary Environmental Information Report Appendix 4.1 EIA Scoping Report

April 2025

RWE

High Grove Solar Environmental Impact Assessment Scoping Report

September 2024

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1 Introduction

1.1 Purpose of the EIA Scoping Report

1.1.1.1 RWE Renewables UK Solar and Storage Ltd (the Applicant) has commissioned this Environmental Impact Assessment (EIA) Scoping Report for High Grove Solar, a solar farm with co-located battery energy storage systems (BESS) (the Proposed Development).

1.1.1.2 The Proposed Development is a renewable energy system composed of solar photovoltaic (PV) panels, on-site energy storage (BESS), underground cables, associated infrastructure including substations. The Proposed Development will have the capacity to generate over 50 megawatts (MW) of alternating current (AC) electricity. A further description of the Proposed Development is provided in Chapter 2 of this EIA Scoping Report.

1.1.1.3 In accordance with Regulation 8(1)(b) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations), the Applicant confirms that an Environmental Statement (ES) will accompany a Development Consent Order (DCO) application to be submitted to the Planning Inspectorate (PINS) for the Proposed Development.

1.1.1.4 This EIA Scoping Report has been prepared to support an application for a Scoping Opinion from the Secretary of State (SoS) for Energy Security and Net Zero (DESNZ) for the purposes of Regulation 10 of the EIA Regulations for the Proposed Development.

1.1.1.5 The purpose of this EIA Scoping Report is to establish the scope, including content and extent of matters which should be covered in an ES to be prepared and submitted for the Proposed Development. It has been prepared in accordance with PINS Advice Note Seven [1] for all environmental factors (topics) set out in the EIA Regulations.

1.1.1.6 This chapter is supported by the following figure: Figure 1.1 Site Location Plan

1.2 The Applicant

1.2.1.1 The Applicant is a leading solar and battery energy storage developer with one of the largest development pipelines in the UK. RWE has supplied people and companies with electricity for more than 125 years. The RWE Solar and Storage team have achieved consent for projects delivering over 1.2 Gigawatt (GW) of generating capacity across the UK and Ireland.

1.2.1.2 The Applicant is currently developing a pipeline of solar and solar with storage projects with a potential generating capacity in excess of 4GW in the UK by 2025. In addition to the 800MW consented in the UK in the last 24 months, RWE have an additional 350MW already in the planning system across 11 sites and a

programme to submit planning applications for development in excess of 500MW in the coming year.

1.3 Need for the Proposed Development

1.3.1.1 The Proposed Development would provide new energy generating infrastructure, in line with national policy targets for decarbonisation, including meeting Net Zero targets, safeguarding energy supply and ensuring affordability.

1.3.1.2 The Energy Security Strategy [2] produced by the UK Government in April 2022 announced the intent to increase solar capacity in the UK from 14GW to 70GW by 2035. In addition, the Energy White Paper: Powering our Net Zero Future [3] outlined the need to 'build back greener' following the impact of Coronavirus, addressing the inter-generational challenge of climate change. The White Paper identifies the UK Government's aim for a fully decarbonised, reliable and low-cost power system by 2050. The 'Powering Up Britain' [4] policy paper further reiterates the Government commitment to solar energy, setting out a goal for a fivefold increase in solar power by 2035. The UK's decarbonisation target as described in The Climate Change Act 2008 [6] is to ensure that the UK net carbon account for the year 2050 is at least 100% lower than the 1990 baseline. The sixth carbon budget (2033 – 2037) has been set at 965 MtCO2e in line with the level advised by The Committee on Climate Change [7]

1.3.1.3 The Proposed Development would contribute to the UK Government's legally binding target to reach net-zero emissions by 2050 and respond to the projected increase in demand for electricity, as well as improving UK energy security and resilience in line with national strategy. The Overarching National Policy Statement for Energy (NPS EN-1) [5] designated in January 2024 establishes that the delivery of low carbon energy infrastructure, such as the Proposed Development, is of Critical National Priority (CNP).

1.4 The need for EIA

1.4.1.1 As the Proposed Development comprises the 'construction or extension of a generating station' and will have a 'capacity of more than 50MW', it is considered to be a Nationally Significant Infrastructure Project (NSIP) under Section 14(1)(a) and Section 15(2) of the Planning Act 2008 ('the Act'). Therefore, the Proposed Development requires an application for Development Consent Order (DCO) to be submitted to the Planning Inspectorate before being determined by the SoS for DESNZ.

1.4.1.2 In relation to NSIPs, an EIA is required for certain developments under the EIA Regulations. The EIA Regulations identify which developments are required to undergo EIA, and these are listed under either 'Schedule 1' or 'Schedule 2' of the EIA Regulations. Those developments listed under 'Schedule 1' must always be subject to EIA and 'Schedule 2' developments are only subject to EIA should it be judged, in accordance with Regulation 3(1) that the development is '*likely to have significant effects on the environment by virtue of factors such as its nature, size or*

location'. Schedule 3 of the EIA Regulations provides the selection criteria for screening to determine whether a Schedule 2 development requires EIA.

1.4.1.3 The Proposed Development is categorised as 'Schedule 2' development under Paragraph 3(a) of Schedule 2 of the EIA Regulations, as it comprises '*industrial installations for the production of electricity, steam and hot water*'. It must, therefore, be considered whether, under the criteria of Schedule 3, the Proposed Development constitutes EIA development.

1.4.1.4 The Applicant considers that due to the size, nature, and location of the Proposed Development, it has the potential to have significant effects on the environment and that an EIA will be required. Accordingly, under Regulation 8(1)(b) of the EIA Regulations the Applicant wishes to confirm to the SoS that an ES will be submitted with the DCO Application.

1.4.1.5 The stages of the DCO EIA process include:

- Screening (discretionary) (not formally undertaken as the Proposed Development is considered to be EIA Development);
- Scoping (discretionary) (the subject of this report);
- Preparation of a Preliminary Environmental Information Report (PEIR)– required for statutory consultation; and
- Preparation of an ES to support the DCO Application.

1.4.1.6 Further details on the approach to EIA for the Proposed Development are provided in Chapter 4 of this EIA Scoping Report.

1.5 Planning policy context

1.5.1 National policy

National Policy Statements

1.5.1.1 In accordance with Section 104(2) of the Act, the National Policy Statements (NPS) are the primary policy basis for NSIP development and the SoS is directed in the Act to determine a DCO application in accordance with the relevant NPS.

1.5.1.2 The following NPSs are relevant to the Proposed Development:

- Overarching NPS for Energy EN-1 [6]
- NPS EN-3 Renewable Energy Infrastructure [7]
- NPS EN-5 Electricity Networks Infrastructure [8]

<u>NPS EN-1</u>

1.5.1.3 The Overarching NPS for Energy (EN-1) sets out the overall national energy policy for nationally significant energy infrastructure. It is intended to be combined with relevant technology-specific NPSs to form the primary basis for decisions by the SoS. Chapter 2 of NPS EN-1 reflects the current national policy and legislative

position on energy infrastructure development, including the legally binding commitment made through the Climate Change Act 2008 to be net zero by 2050. Emphasis is made on decarbonising the power sector and ensuring security of energy supply, with reference to the Net Zero Strategy.

1.5.1.4 In addition, NPS EN-1 introduces the critical national priority (CNP) for low carbon energy infrastructure. NPS EN-1 sets out topic-specific 'assessment principles' and 'generic impacts' which set out how energy NSIP applications should be prepared by the Applicant and considered by the SoS.

NPS EN-3

1.5.1.5 NPS EN-3 is a technology-specific NPS, focusing on renewable energy generation projects. It is therefore to be considered alongside NPS EN-1 as the primary policy basis for decisions on renewable energy infrastructure DCO applications. Section 2.10 sets out policy specific to solar NSIP development, directing the approach to assessment and consideration of impacts which are additional to those detailed in NPS EN-1.

NPS EN-5

1.5.1.6 NPS EN-5 is a technology-specific NPS, focusing on infrastructure for electricity networks, to include transmissions systems (above or underground) and associated infrastructure such as substations and converter stations. It is therefore to be considered alongside NPS EN-1 as the primary policy basis for decisions on electricity network infrastructure DCO applications. It is considered to be a relevant NPS for the Proposed Development due to the inclusion of electricity network infrastructure (underground cables and on-site substations) within the project.

1.5.1.7 NPS EN-5 sets out assessment principles specific to electricity network infrastructure, with a predominant focus on overhead lines, in addition to those detailed in NPS EN-1.

National Planning Policy Framework

1.5.1.8 The National Planning Policy Framework (NPPF) [9] sets out the Government's planning policies for England and how these are expected to be applied.

1.5.1.9 Chapter 2 of the NPPF states the purpose of the planning system is to contribute to the achievement of sustainable development. It also details how the planning system should provide ways for the UK to meet the challenge of climate change and transition to a low carbon future.

1.5.1.10 The NPPF does not contain specific policies relating to NSIPs. These are determined in accordance with the decision-making framework in the Act (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the NPPF).

1.5.2 Local Policy

1.5.2.1 The Proposed Development would be located within an area of three tiers of local government; Breckland Council, Norfolk County Council and a number of civil parishes. Breckland Council is responsible for the majority of planning matters, other than transport and minerals and waste planning which are the responsibility of Norfolk County Council. Under Section 43 of the Act, both local authorities would be defined as 'host' authorities, and therefore be consulted as part of the planning process.

Breckland Council

1.5.2.2 Following the completion of the single policy update of the Breckland Council Local Plan (2019), Breckland Council adopted the Breckland Local Plan on 21 September 2023 [10], and sets out the framework for the District until 2036. Breckland Council is now in the process of undertaking a Full Update of the Plan [11] having just published a draft for consultation. The full update will cover the period 2021-2046 and will include the allocation of new developments and review of policies.

Norfolk County Council

1.5.2.3 Norfolk County Council are currently preparing a Norfolk Minerals and Waste Local Plan Review, to consolidate the three adopted Development Plan Documents (DPD) into one Local Plan, ensuring that the policies within them remain up-to-date and to extend the plan period to end of 2036. The Plan was submitted to the Planning Inspectorate for independent examination in December 2023.

- Core Strategy and Minerals and Waste Development Management Policies DPD 2010-2026 (adopted September 2011) [12]
- Minerals Site Specific Allocations Development Plan Documents (DPD) (adopted October 2013, amendment adopted December 2017) [13]
- Waste Site Specific Allocations Development Plan Document (DPD) (adopted October 2013) [14].

1.6 Structure of the EIA Scoping Report

1.6.1.1 The EIA Regulations set out the requirements for an Applicant who proposes to request a Scoping Opinion from the SoS. Regulation 10(3) of the EIA Regulations requires an EIA Scoping Report to 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."*

1.6.1.2 In accordance with the EIA Regulations, this EIA Scoping Report provides information to identify the location of the Proposed Development, including a plan. It also provides a description of the Proposed Development, its indicative layout and its technical capacity. Where aspects of the Proposed Development design remain subject to further assessment and option selection, this is identified. This EIA Scoping Report provides an explanation of the likely significant effects of the Proposed Development on the environment, setting out the proposed approach and methodology for further assessment. Finally, this EIA Scoping Report provides information and representations from the Applicant in relation to environmental assessment topics that are not considered necessary to scope into further assessment.

1.6.1.3 This EIA Scoping Report is provided in two parts. These are outlined further below.

1.6.1.4 This report provides the main text of this EIA Scoping Report and includes:

- Chapter 1: Introduction (this Chapter) – provides an introduction to the Proposed Development, the need for an EIA, and the purpose and structure of this EIA Scoping Report;
- Chapter 2: The Proposed Development – provides an overview of the Proposed Development, including construction, operation and decommissioning and the draft Order Limits;
- Chapter 3: Alternatives and design iteration - describes the alternatives considered, and provides a narrative on how the Proposed Development has been developed to date';
- Chapter 4: Approach to EIA – sets out the requirements for scoping and where they are addressed in this report, the general approach to EIA, provides definitions for some of the key terms used within the EIA process and information on topics to be scoped out of the EIA;
- Chapters 5-19: Topics chapters - sets out those environmental topics proposed to be included in the scope of the EIA, along with the methodologies and approaches to assessment proposed for those topics.
- Chapter 20: Cumulative effects - sets out the proposed approach to the cumulative effects assessment;
- Chapter 21: Structure and content of the PEIR - presents the proposed structure of the ES; and
- Chapter 22: Conclusion – provides a summary of this EIA Scoping Report and the issues to be scoped in/scoped out of the EIA and ES.

1.6.1.5 All the figures that are referenced in this report, with the exception of some in-text insets within chapters that are integrated into the main text, are provided in a separate document titled High Grove Solar Environmental Impact Assessment Scoping Report Figures (Part 1 – Part 4), for ease of reference.

1.6.1.6 Competent experts have prepared this EIA Scoping Report and will prepare the PEIR and ES. The Applicant has engaged Ove Arup and Partners Limited (Arup) to lead the EIA, along with expert topic inputs from Wardell Armstrong, Headlands

Archaeology and Reading Agricultural Consultants. Arup and Wardell Armstrong hold the Institute of Environmental Management and Assessment's (IEMA) EIA Quality Mark. See Section 4.8 of this EIA Scoping Report for further information.

2 The Proposed Development

2.1 Introduction

2.1.1.1 This chapter provides a high-level description of the location of the Proposed Development and the surrounding area, as well as an overview of the Proposed Development, including a description of its main components and an outline of the construction, operational and decommissioning requirements. A detailed description of the existing baseline is provided within the topic specific chapters (Chapters 5 – 19)

2.1.1.2 Planning Inspectorate (PINS) Advice Note Seven [1] requires a scoping request to explain the approach to addressing uncertainty (where it remains) in relation to elements of the Proposed Development. This EIA Scoping Report is based on draft parameters and standard design information for proposed elements of the Proposed Development, which is subject to ongoing design development and will be refined in response to the environmental and technical factors as identified as part of the EIA process, as well as consultation responses. For further information on the approach to addressing uncertainty, see Chapter 4 of this EIA Scoping Report.

2.1.1.3 The Proposed Development will be detailed further in the Preliminary Environmental Information Report (PEIR) which will support the statutory consultation, and preliminary design of the Proposed Development for which consent will be sought will be described in the Environmental Statement (ES) which will support the final Development Consent Order (DCO) application.

2.1.1.4 PINS Advice Note Seven also requires a scoping request to outline the reasonable alternatives considered and the reasons for selecting a preferred option. This information can be found in Chapter 3 of this EIA Scoping Report.

2.1.1.5 This chapter is supported by the following figures:

- Figure 2.1 draft Order Limits
- Figure 2.2 General Arrangement – Western Panel Area
- Figure 2.3 General Arrangement – Central Panel Area
- Figure 2.4 General Arrangement – Northern Panel Area
- Figure 2.5 General Arrangement – Eastern Panel Area
- Figure 2.6 General Arrangement – Southern Panel Area
- Figure 2.7 Environmental Designations
- Figure 2.8 Cross-section of a typical fixed solar panel
- Figure 2.9 Typical transformer, inverter and BESS arrangement
- Figure 2.10 Typical switchgear
- Figure 2.11 Typical Substation
- Figure 2.12 Typical fence and gate

- Figure 2.13 Typical CCTV pole
- Figure 2.14 Landscape Concept Plan

2.2 The draft Order Limits

2.2.1.1 The draft Order Limits for the Proposed Development consider the maximum area of land potentially required for the construction, operation and decommissioning of the Proposed Development and are shown on Figure 2.1 of this EIA Scoping Report.

2.2.1.2 The draft Order Limits are based on the land anticipated to be required temporarily, with permanent rights of access, or permanently for the construction, operation and decommissioning of the Proposed Development, in addition to all land necessary for any works where the Proposed Development interfaces with existing utilities.

2.2.1.3 The Proposed Development is subject to ongoing design development and the draft Order Limits will be refined in response to environmental and technical factors as identified as part of the EIA process, as well as discussions with landowners and consultation responses. This process will ensure that the Order Limits for the DCO application only include land which is required to deliver the Proposed Development and any essential mitigation.

2.2.1.4 The preferred cable corridor options for both the 33 kilovolt (kV) and the 132kV cables (explained further in paragraphs 2.4.5 and 2.4.9 respectively) are still being assessed and surveyed but are currently assumed to be within the corridors included in the draft Order Limits, as presented in Figure 2.2. The preferred cable corridor and substation locations will be confirmed as the design and assessment develop, considered in the EIA and described the ES.

2.2.2 The Rochdale Envelope and use of design parameters

2.2.2.1 The design of the Proposed Development will evolve throughout the EIA process through the use of an iterative design process. The iterative design process will take into account comments made during consultation, including in response to this EIA Scoping Report, and the ES will describe how the design of the Proposed Development has been influenced by such comments.

2.2.2.2 The Applicant proposes to use design parameters which will fix a worst-case scenario for any element of the design which is not fixed, dependent on the environmental aspect or matter in question. Parameters will be assessed in order to provide a worst-case scenario for the Proposed Development, and have therefore been considered in this EIA Scoping Report to ensure receptors and potential significant effects have been identified. For more information on indicative parameters, see Section 2.4.

2.2.2.3 It is therefore the intention of the Applicant to implement the advice within PINS Advice Note Nine: Using the ‘Rochdale Envelope’ [15] regarding the degree of

flexibility that may be considered appropriate with an application for development consent under the Planning Act 2008 ('the Act').

2.2.2.4 In particular, the Advice Note outlines that:

- The DCO application documents should explain the need for, and the timescales associated with, the flexibility sought, and this should be established within clearly defined parameters;
- The clearly defined parameters established for the Proposed Development must be sufficiently detailed to enable a proper assessment of the likely significant environmental effects and to allow for the identification of necessary mitigation, if necessary, within a range of possibilities;
- The assessments in the ES should be consistent with the clearly defined parameters and ensure a robust assessment of the likely significant effects;
- The DCO must not permit the Proposed Development to extend beyond the clearly defined parameters which have been requested and assessed. The Secretary of State (SoS) may choose to impose requirements to ensure that the Proposed Development is constrained in this way; and

2.2.2.5 Advice Note Nine also acknowledges that there may be aspects of the design that are not yet fixed, resulting in the need for the EIA to assess likely worst case variations to ensure that all foreseeable significant environmental effects of the Proposed Development are assessed.

2.2.2.6 This is of particular importance to maintain due to the ever-evolving technology and speed of development within solar PV module and energy storage markets. The Rochdale Envelope approach will be followed in the ES.

2.3 Site description

2.3.1.1 The total area within the proposed Order Limits is shown in Figure 2.1. The Order Limits comprise five Panel Areas (groups of solar PV panels), of which the areas being considered for solar development are defined in in Table 2-1 below, and shown on Figures 2.2 to 2.6.

Table 2-1 Overview of proposed Panel Areas

Panel Area	Size (ha)
Western Panel Area	162
Central Panel Area	580
Northern Panel Area	241
Eastern Panel Area	306
Southern Panel Area	426
Total	1,715

2.3.1.2 The draft Order Limits also comprise an area of search for the underground cable routes. The entirety of the Proposed Development is within the administrative boundary of Breckland Council.

2.3.1.3 The draft Order Limits include the maximum extent of land that currently expected to be included within the DCO Application for the Proposed Development, and considers land required for the solar PV modules, Battery Energy Storage Systems (BESS), underground cables, substations and other supporting infrastructure, as well as mitigation measures such as biodiversity net gain and landscape design.

2.3.1.4 The draft Order Limits are described in the following sections of this chapter, and are shown on Figures 2.2 – 2.6. Key environmental designations present across each Panel Area is described accordingly in Section 2.3.2, and a plan showing these designations across the draft Order Limits is shown on Figure 2.7.

2.3.1.5 The land within the draft Order Limits is generally rural and comprises undulating agricultural landscape ranging from 15m AOD to 95m AOD. The valley of the River Nar creates steeper sloping topography towards the north of the draft Order Limits.

2.3.1.6 Land uses on and in the areas surrounding the Proposed Development are focused on agricultural activities with dispersed settlements which support local services, including the towns of Swaffham and Dereham, but also smaller villages, hamlets and individual residential properties around Necton, Little Fransham, Bradenham, Ashill, Saham Hills, Wendling, Scarning and High Green. Royal Air Force (RAF) Marham is located to the west of the Western Panel Area.

2.3.1.7 Panel Areas are located either side of a number of major roads and routes, including the busy A47 trunk road, which crosses the draft Order Limits from west to east and the A1065 which runs north to south through the centre of Swaffham. Numerous minor roads cross the rural landscape, connecting small villages, hamlets and individual properties.

2.3.1.8 Pylons carrying 400kV power lines cross the draft Order Limits from South Acre in the west to Westfield in the east via Necton Substation which sits just outside the draft Order Limits.

2.3.1.9 Hedgerows and scattered trees form field boundaries between generally large-scale fields and smaller scale fields are generally located at the fringes of settlements. There are some small areas of broadleaved and mixed woodlands and plantations, along with hedgerows and lines of trees, generally these form the field margins. Small amounts of grassland are present, mainly as strips alongside hedgerows.

2.3.1.10 The Proposed Development is predominantly set within agricultural land, which due to its existing use, is not in itself a key recreational attraction or destination. The land does, however, play a role in providing a landscape context to recreational use of waterways and walking and cycling routes.

2.3.1.11 Members of the public can access countryside and nature through numerous Public Rights of Way (PRoW) through and immediately adjoining the draft Order Limits, predominately around the Central and Western Panel Areas around Swaffham, Drymere and South Acre. Peddar's Way and Norfolk Coast Path National Trail runs adjacent to the Central Panel Area.

2.3.2 Environmental designations

2.3.2.1 Statutory environmental designations, and other key features, are outlined on Figure 2.7

2.3.2.2 The Western Panel Area is located immediately adjacent to the Breckland Special Protection Area (SPA) and Breckland Forest Site of Special Scientific Interest (SSSI). Ancient woodland is present along the boundary of the draft Order Limits.

2.3.2.3 The draft Order Limits are located within National Character Area (NCA) Profile: 84 Mid Norfolk (NE523).

2.3.2.4 There are three Scheduled Monuments within the draft Order Limits:

- Hangour Hill (NHLE 1003160) – a prehistoric burial mound
- Roman enclosure 3/4 mile (1210m) NE of Panworth Hall (NHLE 1003965) – the earthwork remains of a Roman enclosure
- Devil's Dyke, Beechamwell and Barton Bendish. Section 1km in length West of Smeeth Wood (NHLE 1003973) – a large linear earthwork of possible early medieval date

2.3.2.5 Wendling Beck runs just outside draft Order Limits, along the boundary of the Northern Panel Area. There are several unnamed tributaries to Wendling Beck, some of which are within the draft Order Limits. The River Wissey flows through the Southern Panel Area, and the River Tud is located just outside the Eastern Panel Area.

2.3.2.6 The majority of land within the draft Order Limits are located within Flood Zone 1, an area with a low probability of flooding from rivers and the sea, with some minor instances of Flood Zones 2 and 3 located in the Northern and Southern Panel Areas.

2.4 Description of the Proposed Development

2.4.1 The Proposed Development

2.4.1.1 The Proposed Development consists of a solar farm capable of generating over 50MW Alternating Current (AC) of electricity with co-located BESS, located between Swaffham and Dereham in the county of Norfolk in the East of England.

2.4.1.2 The Proposed Development comprises five Panel Areas. Panel Areas are defined as an area within the draft Order Limits that contain a group of solar PV modules. The solar PV modules will either be fixed in position or will track the sun throughout

the day; this aspect of the Proposed Development remains under consideration and may be confirmed prior to the submission of a DCO Application. A total of up to 4no. 132 kV substations, a single 400kV substation (including accompanying transmission tower) may be located within the Order Limits.

2.4.1.3 The Proposed Development includes a series of 33kV underground cabling between the proposed Panel Areas and the up to 4no. on-site substations, as well as 132kV underground cabling to connect the Proposed Development to the 400kV substation which if required connects to the national grid. The transmission tower and cabling would allow connection of the Proposed Development into the existing distribution network which runs close to the draft Order Limits. This cabling could be placed either within roads or through an off-road option. A range of supporting infrastructure is required for the Proposed Development, comprising BESS; transformers and inverters for managing the electricity produced; storage containers to hold this equipment; and security measures such as fencing, closed circuit television (CCTV) and lighting.

2.4.1.4 The Proposed Development will include environmental mitigation and enhancement measures to avoid or reduce adverse impacts on the surrounding environment and nearby communities. The detailed design specifications of the Proposed Development have not yet been finalised and will be reviewed following the outcome of the specialist assessments undertaken as part of the ES, and statutory and non-statutory consultation feedback.

2.4.1.5 Due to rapidly changing and evolving solar and energy storage technology, the Proposed Development parameters are designed to maintain flexibility to allow the latest technology to be installed at the time of construction. However, as outlined in Section 2.2.2, the ES will assess the cautious worst-case scenario for key design parameters.

2.4.2 Solar panels

2.4.2.1 Solar panels generate electrical power by using a solar PV module to convert sun light into direct current (DC) electricity. Individual solar PV modules, more commonly known as solar panels, contain several PV cells wired and encapsulated by tempered glass. Solar PV modules are sealed for weatherproofing and held together by a metal frame in a mountable unit.

2.4.2.2 Individual solar PV modules are typically 2m by 1m in width and depth and can vary in height. However, as solar PV modules are rapidly developing due to innovation in technology and processing techniques for the PV cells, the dimensions of the solar PV modules available at the time of construction may vary. The ES will therefore consider a height parameter which represents the worst-case scenario in terms of identifying potential environmental effects.

2.4.2.3 It is possible to install the solar PV modules as fixed or as tracking which adjust the position of the solar PV modules to track the sun throughout the day. The exact number and arrangement of modules depends on a range of factors including the size of the system, the type of technology fixed or tracking, its location and the direction in which the panels are installed. As technology and equipment is

evolving, some flexibility in design will be required to accommodate technology advances.

2.4.2.4 Table 2-2 below presents a summary of the design parameters to be used for the ES, and therefore considered in this EIA Scoping Report, and the key differences between fixed and tracking solar PV modules . This approach ensures the worst-case scenario in terms of identifying potentially significant environmental effects is considered in this EIA Scoping Report and that all are assessed and reported in the ES. Typical solar PV module design is shown on Figure 2.8.

Table 2-2 Solar panel parameters

Design Parameter	Fixed	Tracking
Panel alignment	Rows of solar PV modules aligned in East-West rows with panels facing South	Rows of Solar PV modules mounted on a metal tracking system aligned in North-South rows with panels rotation East-West
Angle	+/- 10° to 30°	+/- 60°
Orientation	South	East-west
Separation distance	Minimum 4m and maximum 12m between rows	Approximately 4 – 6m between rows when the solar PV modules are at full vertical tilt
Height	- Maximum height of up to 3m - Minimum height of the lowest part of the panel would typically be 0.8m	- Maximum height of 3m, which would vary throughout the day - Minimum height of the lowest part of the panel would typically be between 0.4m-1m
Mounting structure	The mounting structure for the solar PV modules is a metal frame (usually anodised aluminium alloy) securely fixed to the ground by galvanized steel poles which are typically driven into the ground to a depth of approximately 1m.	

2.4.3 On-site supporting equipment

2.4.3.1 A range of equipment is required to support the solar PV modules to convert the electrical power generated, manage this power, and export power onto the national grid. The electrical output from the solar PV modules would be exported by low voltage cabling to shipping container style storage units which would contain an inverter, transformer and BESS. The function of each of these elements are as follows:

- Inverters convert the DC generated by the solar PV modules into AC that can be exported to the electricity distribution network;
- Transformers monitor, increase and control the voltage of the electricity produced before it reaches the up to four on-site 132kV substations. The transformers would be located adjacent to the inverters; and

- BESS would provide battery energy storage systems to allow the energy from the solar PVs to be stored then released when required and would comprise containerised battery storage systems, DC-DC converter boxes and ancillary equipment.

2.4.3.2 The inverters, transformers and BESS would be arranged together in locations across the Proposed Development. These would be placed on a compacted pad foundation and would measure approximately 3m in height, 2.5m in width and 12m in length. The typical layout of this supporting infrastructure, and access required to it, is provided in Figure 2.9.

2.4.3.3 Low voltage cabling within the Panel Areas would be required to connect solar PV modules and the BESS to inverters where the voltage is transformed from the lower voltage to 33kV. Cabling from the solar PV modules to the inverters would typically be installed above ground, fixed to the mounting structure of the modules, with a small section placed underground where it leaves the solar PV modules and connects to the inverters.

2.4.3.4 The Proposed Development would utilise switchgears to control, protect and isolate electrical currents and equipment. Switchgears allow parts of the solar PV system to be de-energised safely, allowing for routine maintenance or faults to be identified and work undertaken. A typical switchgear of the style likely to be used on the Proposed Development is shown in Figure 2.10.

2.4.4 Battery Energy Storage Systems (BESS)

2.4.4.1 The BESS is likely to consist of lithium-ion batteries and would allow energy to be stored within the Proposed Development, providing a balance in electricity generation where surplus electricity is produced. A typical layout is presented in Figure 2.9.

2.4.5 Underground cable route options

2.4.5.1 The electrical connection to the Proposed Development would comprise both 33kV and 132kV underground cables located between the Panel Areas and the point of connection, and are described further below.

33kV underground cables

2.4.5.2 33kV underground cables would connect the solar PV modules and Panel Areas to the proposed onsite 132kV substations which would be located in a number of locations across the Order Limits.

2.4.5.3 Where 33kV cables are outside of the Panel Areas the preference is to use off-road routes. These routes are currently under discussion with relevant landowners and being surveyed; they would be within the cable corridors shown on Figure 2.1.

2.4.5.4 Cable corridors for both on-road and off road cable route options are presented on Figure 2.1 which are being considered at this stage. Cable routes would be identified prior to submission of the DCO on the basis of ongoing survey work,

landowner agreement and any feedback received during the consultation and engagement process and therefore considered in the EIA and reported in the ES. Should options remain at PEIR stage, the PEIR will include an assessment of options at that stage of the project.

132kV underground cables

2.4.5.5 The 132kV cables would connect the on-site 132kV substations to the 400kV substation. The maximum dimension of the cable trench would be 1600mm depth x 2000mm wide. Alternatively, a cable plough would be used to lay the cable. This cable would use a route across agricultural land, subject to landowner agreement.

2.4.5.6 It has been assumed that the 400kV substation is part of the Proposed Development and would be located within the proposed draft Order Limits near to, or to the east of, the existing National Grid substation at Necton. For more information on the 400kV substation, see Section 2.4.7 below.

2.4.5.7 The cable route option is currently being surveyed, with the search areas shown on Figure 2.2. The preferred cable route will be confirmed in advance of the DCO application but will be within the draft Order Limits set.

2.4.6 On-site 132kV substations

2.4.6.1 It is currently assumed that 4 No. 132kV substations would be required for the Proposed Development to connect the Panel Areas to the electricity distribution network. The substations would also house other electrical equipment such as transformers, switchgear, and metering equipment.

2.4.6.2 The purpose of these on-site substations is to 'step up' low voltages from electricity generation to high voltages, using power transformers. The exact locations of these substations across the Panel Areas are yet to be defined and will be presented as part of the DCO application.

2.4.6.3 The substation compound will require an area of approximately 3,000m^2, with dimensions of around 67m in length and around 46m in width. The equipment within would have a maximum height of 15m (which would only relate to a communications tower, with the highest electrical equipment being 8m). A separate area for the construction compound would be needed, which is expected to be around 70m by 70m with a separate parking and turning area of around 30m by 70m.

2.4.6.4 A typical 132kV substation is shown in Figure 2.11.

2.4.7 400kV substation

2.4.7.1 A single 400kV substation would also be required, to connect the solar farm to the national electricity distribution network, or grid. The exact location of this substation is under consideration and is yet to be defined. This is dependent on many factors such as technical, design and environmental factors that will be considered in ongoing option appraisals; however, other factors outside the

control of the Applicant would also need to be considered including the requirements of National Grid, the owners of the national distribution network infrastructure.

2.4.7.2 This may result in the 400kV substation being located in an area outside of the current draft Order Limits or being excluded from the proposed application for development consent with planning consent sought separately. However, to inform this scoping exercise and ensure that potentially significant effects are identified and assessed appropriately in the EIA, the 400kV substation is included as part of the Proposed Development and would be located within the proposed draft Order Limits near to, or to the East of, the existing National Grid substation at Necton.

2.4.7.3 The 400kV substation would become permanent infrastructure and would not be decommissioned with the other elements of the Proposed Development. Requiring approximately 3 acres of permanent land take, the compound would be approximately 500m x 250m, and would also comprise supporting communications and electrical equipment with a maximum height of 15m. Should this change at a later stage of the EIA, this will be assessed appropriately for the operational and decommissioning stages.

2.4.7.4 Dependent on the siting of the substation, there may also be a requirement to construct and operate a new 400kV transmission tower, or to connect the substation to the national grid via an existing 400kV transmission tower through the development of new gantries.

2.4.8 Supporting infrastructure

2.4.8.1 Additional infrastructure would be required to support the operation of the Proposed Development. The following equipment would be installed across the draft Order Limits as follows:

- Fencing and gates – a perimeter security fence would be installed to enclose the operational areas of the Proposed Development. The fence is likely to be a deer fence with a height of 2m. The fence would be designed in such a way to allow small animals to pass through and would also be gated to allow access to and from the Proposed Development. Typical fencing is shown in Figure 2.12.
- CCTV – pole-mounted, infra-red security detection cameras would be mounted on poles of up to 3m in height located within the perimeter fence. These cameras would have motion detection technology for recording and would be pointed directly the Proposed Development and away from any land outside of the draft Order Limits. A typical CCTV pole is shown in Figure 2.13.
- Lighting – in general, the Proposed Development would not be lit. The exception would be at the substations, where sensor-triggered lighting will be needed for security/safety reasons. The substations would generally not be occupied by personnel overnight so the lighting would not be on continuously. The lighting infrastructure is expected to be approximately 10m in height.

- Access tracks – access to the Proposed Development during operation would be required for maintenance. A series of access tracks are proposed within the draft Order Limits to provide points of access onto the local highway network. Access tracks would be permeable to allow water to filtrate through and maintain greenfield runoff rates.
- Drainage – the detailed operational drainage design for the Proposed Development will be developed after development consent is granted but prior to construction, likely to be secured as a Requirement of the DCO. The overarching principle of the drainage strategy for the Proposed Development, which will be developed for the application and inform the EIA, is to provide sustainable drainage solutions (SuDS) at source, ensuring that surface water run-off is managed appropriately.
- Storage containers – it is anticipated that additional storage containers would be installed on site to contain extra equipment to support maintenance activities.

2.4.9 Environmental design

2.4.9.1 The design of the Proposed Development aims to avoid environmental impacts where possible and to integrate the Proposed Development into the wider landscape from the offset. This has been informed by understanding the environmental constraints of the draft Order Limits and steering development away from sensitive areas, whilst protecting space for appropriate mitigation.

2.4.9.2 An indicative concept plan, Figure 2.14, has been developed at this early design stage to illustrate the potential use of the land within the draft Order Limits. This has been developed in collaboration with ecologists and landscape architects to ensure a coherent design approach and avoid loss or damage to biodiversity, nature and communities as well as to ensure a biodiversity net gain.

Design Principles

2.4.9.3 As part of the aforementioned approach to design, a set of design principles is guiding the design of the Proposed Development, including:

- Impacts on public rights of way will be minimised through the use of buffer zones and planting.
- The Proposed Development will seek to be integrated into the wider landscape setting
- Where possible, all mature trees, woodland blocks and hedgerow boundaries within panel areas will be retained and enhanced, such as woodland blocks and hedges with additional planting to provide instant screening.
- A buffer between residential dwellings and the nearest panels will be maintained.

Embedded and Good practice mitigation

2.4.9.4 In addition, the following mitigation is already considered embedded within the design of the Proposed Development. These include, but are not limited to:

- 15m buffer from panels to ancient and veteran trees
- 15m buffer from panels to woodland
- The construction compound will be located on low diversity habitat.
- An appropriate buffer will be maintained between properties and construction areas
- 132kV and 400kV substations will be located will be located as far as reasonably possible from existing sensitive receptors
- Other sources of operational noise will be located as afar as reasonably possible from existing sensitive receptors
- Buffers for all other trees (none ancient / veteran) and hedgerows to be determined by RPA, but at least 5m buffer for trees with potential for bats, and a minimum 8m buffer between solar panels and hedgerows (reduced to 5m from panels for internal hedges)
- Careful consideration of cable routing will be given to avoid or minimise impacts on valued landscape features and habitats.
- Minimum 10m offset from all infrastructure (including fencing) from bank top of all riparian boundaries and watercourses
- 30m buffer from badger sett locations
- Fencing to be designed to let small mammals pass through (excluding that around the on-site 132 kV and 400kV substations)
- SuDS will be provided at source, ensuring that surface water run-off is managed consistently with existing site conditions
- Access tracks will be permeable using compacted gravel to allow water to filtrate through and maintain greenfield runoff rates
- If below ground archaeology constraints arise through further site investigation the mounting structure of solar panels will utilise options such as ballast slabs, anchor, or block which sit on the ground surface
- Any access tracks, cable routing and fencing will be located to pass through existing gates and gaps in hedgerows where feasible
- The placement of BESS and other infrastructure will avoid historic pits and compressible ground
- Existing hedgerows in poor condition / gappy will be reinforced with planting / management where feasible
- The Proposed Development would generally not be lit. The only lighting required would be demand responsive motion sense lights at the substations using passive infra-red (PIR) technology. This would only be on intermittently for security and/or safety reasons, and it will be designed and installed in a

manner which minimises impact. High quality habitats, such as existing areas of woodland would be retained, and other habitat features such as hedgerows, mature trees and watercourses would be retained and enhanced where practicable. Where temporary habitat loss will occur, such as the removal of sections of hedgerow to accommodate cable routes, these features will be reinstated following construction.

- Hedgerow planting along field boundaries to maximise landscape integration where appropriate.
- Deer fencing to be offset from PRoW by a minimum of 5m
- Where possible, underground cables would be installed using a cable plough or trenching. These are considered the most efficient and least impactful methods of cable installation, causing minimal disruption to the ground by cutting, installing and back-filling in one operation
- Installation of equipment that is compliant with the relevant exposure limits, in accordance with the provisions of the Government's Code of Practice on Compliance, which is compliant with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidance
- All solar farm infrastructure (solar panels, substations, BESS and inverters) will not be publicly accessible, and security measures such as fencing, CCTV and lighting will be installed
- 2m offset from cabling to existing utilities
- Avoid locating critical infrastructure within Flood Zones 2 and 3, ensuring that solar PV modules are raised above the predicted maximum flood depth for the 100 year plus climate change scenario.
- Appropriate buffer will be maintained between heritage assets and the construction works
- Minimum 250m offset from substations and BESS from landfill sites.
- Careful consideration of cable routing will be given to avoid or minimise impacts on valued landscape features and habitats.
- Existing access to community facilities/assets to be maintained at all times or a suitable equivalent provided
- Suitable stand offs from springs, spring catchments or boreholes.

2.5 Construction, operation and decommissioning

2.5.1.1 This section of the chapter considers the potential methodologies to construct, operate and decommission the Proposed Development.

2.5.1.2 An Outline Construction Environmental Management Plan (oCEMP) will be submitted in support of the DCO to set out the measures, commitments and actions identified in the ES to manage environmental effects during construction. These

measures, commitments and actions would be carried forward to a CEMP to be approved under a requirement of the DCO.

2.5.1.3 The CEMP will be substantially in accordance with the oCEMP, and submitted for approval by relevant local planning authorities prior to commencement of construction at stage one. For information on the construction stages, see Section 2.5.2 below.

2.5.2 Construction

Construction programme

2.5.2.1 It would take up to 24 months to construct the Proposed Development following the granting of the DCO application. A reasonable worst-case scenario for the construction programme will be assessed and presented in the ES, in accordance with the design parameter approach.

2.5.2.2 The final programme will be dependent on the detailed layout design and potential environmental constraints on the timing of construction activities.

2.5.2.3 The installation of solar PV modules does not involve any complex construction process or practices and therefore risk of delay beyond this programme would largely be driven by adverse weather conditions. Many component parts of the Proposed Development would arrive on-site ready to be installed. It is anticipated that Abnormal Indivisible Loads (AILs) would be required to enable construction of the on-site substation and the Transport Statement would confirm the number and suggested routing of these movements via A11, A47 and A1065.

Construction activities

2.5.2.4 The activities that are likely to be required for the construction of the Proposed Development are outlined below and it is anticipated that these activities would take place over several key stages.

2.5.2.5 The stages of construction for the Proposed Development are set out below in Table 5-1 with broad estimates for the time taken for each stage. It is the Applicant's preference to construct the Panel Areas in phases, however a detailed programme will be provided for the ES. A 24 month period for construction has been set for the purposes of EIA scoping.

Table 2-3 Typical overlapping construction stages

Stage	Description	Approximate time frames of overlapping stages
Stage 1	Preparatory works; Mobilisation; and Enabling works	4 months
Stage 2	Foundations	4 months

Stage	Description	Approximate time frames of overlapping stages
Stage 3	Module delivery and installation	9-12 months
Stage 4	Commissioning	3 months
Stage 5	Site Reinstatement and Habitat Creation	12 months

Stage 1 Preparatory Works, Mobilisation and Enabling works

2.5.2.6 The first stage of construction includes activities to enable and prepare the site for the construction of the Proposed Development. The types of activities that may be required during this stage are likely to include:

- Establishment of and/or works to site access point(s);
- Installation of any temporary / permanent culverts under water courses / ditches;
- Ground clearance activities;
- Construction of any access tracks and laydown areas with the Panel Areas - this will be one of the first items within the construction programme to ensure that the majority of the construction traffic enters the Panel Areas from their new access points;
- Establishment of construction compounds at each Panel Area;
- Establishment of mobilisation areas, running tracks and temporary construction compounds for cable installation;
- Erection of security fencing around the site perimeter, as well as access gates;
- Installation of security measures such as CCTV;
- Delivery of plant and machinery to site; and
- Delivery of materials to enable first stages of construction.

2.5.2.7 The design has been informed by utilities searches. However, there are still a number of utilities crossing the draft Order Limits. Prior to construction, the design team and Principal Contractor (PC) would review the utilities plans and use them to inform the plans for the proposed works to ensure all known utilities are avoided. Necessary offsets to known assets will be taken into account in the design and associated effects assessed and reported in the ES.

Stages 2 and 3 Construction of the Proposed Development – Foundations, and Module delivery and installation

2.5.2.8 Following the preparatory works, construction of the Proposed Development would commence, including foundations, and module delivery and installation.

2.5.2.9 The types of activities that may be required during these stages are likely to include:

- Solar PV module installation;

- Installation of solar PV module support structures;
- Mounting of solar PV modules;
- Installation of supporting infrastructure, such as inverters, transformers, battery stations and switchgear;
- Installation of the BESS;
- Construction of the on-site substations;
- Installation of storage containers;
- Cable installation;
- Site clearance activities such as stripping of topsoil, trenching (if required), storage and capping of soil;
- Installation of construction drainage with pumping (if required);
- Installation of cabling across the solar PV module areas and connection to the inverters; and
- Installation of cables between inverter platforms, transfer stations and collecting stations and onto the point of connection and the proposed 400kV substation (if required as part of the Proposed Development).

Panel Area installation and supporting infrastructure

2.5.2.10 The following activities would be required to install the solar PV modules:

- Import of components to the Order Limits;
- Site preparation and civils for the on-site substations;
- Piling and erection of solar PV module support structures, with foundations to a depth of circa 1m;
- Mounting of solar PV modules – this would be undertaken by hand;
- Trenching and installation of electric cabling;
- Transformer, inverter and switchgear foundation excavation and construction;
- Installation of transformers, inverters and switchgears. Cranes would be used to lift equipment into position;
- Installation of the substation; and
- Installation of control systems, monitoring and communication

Cable installation

2.5.2.11 The following activities would be required to construct the cable routes:

- Site preparation
- Cable ploughing, trenching and installation of electric cabling
- Reinstatement works where necessary

2.5.2.12 It is anticipated that underground cables would be installed using a cable plough or trenching, wherever possible. This is the most efficient and least impactful method of cable installation, causing minimal disruption to the ground, by cutting,

installing and back-filling in one operation. The underground cables would be located in existing gaps in hedgerows wherever feasible, however the assessment would assume the loss of some hedgerows as a worst case. Trees to be removed as part of the Proposed Development will be included within an Arboricultural Impact Assessment (AIA) which will support the DCO application.

2.5.2.13 Only in instances where the cable plough or trenching cannot be used, alternative methods, such as trenchless methods), would be used in more constrained locations such as going underneath water courses and roads.

Stage 4 Commissioning

2.5.2.14 Following construction, the Proposed Development would go through a stage of testing prior to being commissioned and the first electricity generated and supplied to the grid. This is likely to involve mechanical and visual inspection of the Proposed Development, as well as electrical and equipment testing.

Stage 5 Site reinstatement and habitat creation

2.5.2.15 A programme of landscape and habitat reinstatement and creation would commence during the construction phase. Generally, the implementation of landscape and habitat mitigation and enhancement works will follow on from the main construction activities in each part of the draft Order Limits. This is to avoid any abortive damage to proposed environmental features from construction. For example, it is anticipated that areas under the panels and in the adjacent landscape buffers around each panel area would be seeded with a locally suitable diverse meadow mix and managed mix. This is intended to significantly improve the ground flora, benefiting both biodiversity and soil structure over time.

2.5.2.16 Opportunities will be sought for any advance planting and seeding, which could take place during or even before the stages outlined above. Examples of this might include early planting of new or reinforcement hedgerow on the periphery of the site, or planting of woodland blocks or trees in areas where construction activities will not create a conflict.

2.5.2.17 Following after care maintenance, ongoing management of the landscape and ecological features and site reinstatement will be undertaken in accordance with an Outline Landscape and Ecological Management Plan (oLEMP) to be submitted as part of the DCO application. These measures, commitments and actions would be carried forward to a LEMP to be development by the PC substantially in accordance with the oLEMP and submitted to the local planning authority for approval, as a Requirement of the DCO. See Figure 2.14 indicative concept plan for likely landscaping plans for the Proposed Development.

Construction staff and hours of work

2.5.2.18 Working hours during the construction phase would be 07.00-19.00 Monday to Friday, 08.00-14.00 Saturday with no activities on Sunday or Bank/Public Holidays. It is anticipated there would be approximately 300 staff working on average with a peak of workers during Stage 3 for a limited period of time.

Plant and Proposed Development access

2.5.2.19 It is anticipated that the principal plant required to install the solar PV modules would include:

- Excavator
- Mobile crane
- Crawled Doze
- Push press piling rig
- Power generator
- Telehandler
- Truck
- Vibrating roller

2.5.2.20 Access into each of the Panel Areas would be required to facilitate construction, as well as allowing ongoing maintenance access from the local highway network. The requirements for access are accounted for within the draft Order Limits and at this stage of the Proposed Development, it is anticipated that access would be from existing access points.

Construction compounds

2.5.2.21 It is anticipated that up to 35 - 40 construction compounds would be required for the construction of the Proposed Development, including a central compound on each of the Panel Areas. The compounds would typically measure 60m in length and 30m in width. A 'Durabase Mat System' or a similar non-ground penetrating mat system would be used within the compounds.

2.5.2.22 The central construction compounds would contain construction worker welfare facilities, a site office, an appropriate number of parking spaces, wheel wash area, plant and machinery storage, Heavy Goods Vehicle (HGV) / delivery turning area and waste storage areas.

2.5.2.23 For security and safety purposes, any live construction areas would be closed to the public throughout the construction phase. Site security staff would patrol the site in addition to hazard warning signs and CCTV.

Waste Management

2.5.2.24 The Proposed Development is likely to generate waste comprising of general construction waste, including packaging waste from materials, and construction materials from access roads and supporting infrastructure which would be managed appropriately through best practice waste management requirements placed on the appointed contractor. During operation, it is anticipated that waste generation would be minimal. Waste from the decommissioning of the Proposed Development would be disposed of responsibly and undertaken in alignment with the future principles of recycling available at that time. Construction, operation

and decommissioning of the Proposed Development is therefore expected to generate minimal waste arisings.

2.5.2.25 An oCEMP and Outline Decommissioning Environmental Management Plan (oDEMP) will be submitted alongside the DCO application and will include the principles required to be adhered to in relation to waste management. The final plans will be secured through the DCO and approved by the local planning authority.

Construction lighting and energy use

2.5.2.26 Temporary construction lighting of up to 10m height would be intermittently used throughout the construction phase for select operations in isolated locations only at the construction compounds. Construction lighting may be used within the Panel Areas during nighttime hours in the winter if works require this. Requirements to minimise light spill, pollution and impacts during construction would be developed and included in the oCEMP.

2.5.3 Operation

2.5.3.1 The design life of the Proposed Development is 40 years. The proposed 400kV substation will remain in-situ and will be the responsibility of National Grid at time of decommissioning.

2.5.3.2 During the operational phase of the Proposed Development, on-site activities would be limited to maintenance activities, replacement of any components that fail, monitoring activities and vegetation management. The Panel Areas would be surrounded by a 2m deer fence. In addition, the Proposed Development would be monitored with pole-mounted CCTV cameras along the perimeter fencing.

2.5.3.3 At this stage of the Proposed Development, it is anticipated that access during operation would be from existing accesses wherever possible.

2.5.4 Decommissioning

2.5.4.1 As previously outlined, the design life of the Proposed Development is 40 years.

2.5.4.2 The process of decommissioning would involve the removal of all solar PV modules, cabling within the Panel Areas, and the majority of on-site supporting equipment from the draft Order Limits to be recycled or disposed of in accordance with good practice and processes at that time.

2.5.4.3 It is assumed that the proposed 400kV substation will remain in situ post decommissioning, and will be the responsibility of National Grid, therefore decommissioning of this asset would not be undertaken by the Applicant and these decommissioning works are not considered part of the Proposed Development subject to assessment. Should this change at a later stage of the EIA, this will be assessed appropriately for the operational and decommissioning stages.

2.5.4.4 Any requirements to leave certain elements of other infrastructure, for example access tracks, would be discussed and agreed with landowners as part of the decommissioning process. As this is not confirmed at this stage, the assessment will consider these assets removed during decommissioning; if they remain they will be considered as permanent infrastructure in the assessment.

2.5.4.5 Land within the Order Limits would be returned to its original use as far as possible and practical. Areas of established mitigation will be left in situ for the lifetime of the Proposed Development or other agreed management commitments. Ongoing negotiation with the landowner would identify whether this would be removed by the Applicant during decommissioning or remain in situ, once agreed this will be considered under decommissioning works or as permanent as appropriate in the assessment. .

2.5.4.6 Up to 99% of materials in a solar PV module are recyclable, with the number of solar panel recycling plants in the UK increasing. Companies which are aligned with the Waste Electrical and Electronic Equipment Recycling (WEEE) Regulations 2013 such as Recycle solar in Scunthorpe, Solar Recycling Solutions in Dartford and Waste Experts based in Huddersfield are all Approved Authorised Treatment Facilities for solar waste [16].

2.5.4.7 Decommissioning is expected to take up to 12 months and could be undertaken in phases.

2.5.4.8 The effects of decommissioning are often similar to, or less than the construction effects. The assessment undertaken as part the ES will be based on assumptions as to how decommissioning would take place and these assumptions are likely to change over time as practices for decommissioning evolve but are likely to result in improvements to the decommissioning process so unlikely to result in impacts which will be greater than in the ES.

2.5.4.9 An oDEMP will be submitted in support of the application for development consent and set out the general principles to be followed in the decommissioning of the Proposed Development. These measures, commitments and actions would be carried forward to a detailed DEMP prepared by Applicant, which will be secured through a Requirement in the DCO.

2.5.4.10 The DEMP would be prepared and agreed with relevant authorities at the time of decommissioning, in advance of the commencement of decommissioning works and would include timescales and methods for transportation of materials.

2.6 Management plans

2.6.1.1 A key control in limiting the impacts upon the environment from the Proposed Development will be to include a suite of outline management plans with the application for development consent, typically as appendices to the ES, which will described the measures to be implement and have been assumed in place in the ES. These plans are then developed to full or detailed management plans by the appropriate party in accordance with the outline plans, and be in place throughout

construction, operation and decommissioning. The full plans are secured by a Requirements of the DCO to ensure they are developed and implemented.

2.6.1.2 The following management plans set out in Table 2-4 will therefore be prepared alongside the ES and where indicated it is likely that a draft will be available at the Statutory Consultation (as part of the PEIR) stage for review and comment.

2.6.1.3 It is noted that further management plans may be identified as the Proposed Development progresses and as such this list is not exhaustive

Table 2-4 Proposed management plans

Management Plan	Purpose	Stage
Outline Construction Environmental Management Plan (oCEMP)	Sets out how adverse environmental impacts will be minimised and managed during construction.	Construction
Outline Construction Traffic Management Plan (oCTMP)	Sets out how construction traffic and staff vehicles will be managed during construction.	Construction
Outline Materials and Waste Management plan (oMWMP)	Sets out how excavated materials that will be generated during construction of the Proposed Development will be re-used, recycled or disposed of in a manner that is compatible with the Waste Framework Directive and associated regulations.	Construction
Outline Soil Resources Management Plan (oSRMP)	Sets out the overall approach to managing soil resources affected by the Proposed Development.	Construction Operation Decommissioning
Archaeological Mitigation Strategy	Sets out how archaeological remains, both known and currently unknown, will be managed during construction.	Construction
Outline Battery Fire Safety Management Plan (oBSMP)	Sets out the key measures to minimising the chances of a battery fire event and fire spread in the event of a fire. Sets out the proposed operational response to a fire event.	Operation
Outline Landscape and Ecological Management Plan (oLEMP)	Sets out the management of the landscape and ecological features of the Proposed Development.	Construction Operation Decommissioning
Outline Public Rights of Way Management Plan (oPRoWMP)	Sets out how PRoWs would be managed to ensure they remain safe to use, and disruption to users of the ProW is minimised.	Construction Operation Decommissioning
Arboricultural Impact Assessment (AIA)	Sets out the protection measures to be implemented during the construction phase, including activity supervision by a suitably qualified arboriculturist where appropriate.	Construction

Management Plan	Purpose	Stage
Outline Operational Environmental Management Plan (oOEMP)	Sets out how negative environmental impacts will be minimised during operation.	Operation
Outline Decommissioning Environmental Management Plan (oDEMP)	Sets out how negative environmental impacts will be minimised decommissioning.	Decommissioning

3 Alternatives and design iteration

3.1 Introduction

3.1.1.1 This chapter provides an overview of the alternatives considered for the Proposed Development at this EIA Scoping stage of the design development process, as well as the proposed approach for the assessment of alternatives as part of the ES.

3.2 Legislative and policy context

3.2.1.1 The consideration of alternatives is undertaken within the context of legislative requirements and the national policy context for nationally significant energy projects.

3.2.1.2 Regulation 14(2)(d) of the EIA Regulations states that the ES must include:

"A description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment."

3.2.1.3 Paragraph 2 of Schedule 4 to the EIA Regulations further states that the following information must be included in the ES:

"A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".

3.2.1.4 The NPS EN-1 states at paragraph 4.3.9:

"As in any planning case, the relevance or otherwise to the decision making process of the existence (or alleged existence) of alternatives to the proposed development is, in the first instance, a matter of law. This NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option from a policy perspective. Although there are specific requirements in relation to compulsory acquisition and habitats sites, the NPS does not change requirements in relation to compulsory acquisition and habitats sites."

3.2.1.5 It confirms that there is no general requirement within the NPS to consider alternatives, or to establish that the Proposed Development represents the best option. NPS EN-1 does however identify in paragraph 4.3.10 and 4.3.22 the need to comply with any policy or legal requirement to consider alternatives, including those relating to the preparation of an ES, for example the EIA Regulations and policy guidance on flood risk assessment, or specific legislative requirements under the Conservation of Habitats and Species Regulations 2017 (as amended).

3.2.1.6 This chapter has been prepared in compliance with the requirements of the EIA Regulations to provide a description of the reasonable alternatives studied by the Applicant at this EIA Scoping stage of the design development process, as well as the proposed approach for the assessment of alternatives as part of the ES. This approach is also in accordance with NPS EN-1.

3.3 Approach to alternatives at EIA Scoping stage

3.3.1.1 To date the Applicant has considered reasonable alternatives in relation to three key aspects of design: site selection, indicative 400kV substation locations, Panel Area locations and cable route options.

3.3.2 Site selection

3.3.2.1 The location of the Proposed Development was selected to ensure that a site could be identified which would be suitable for solar energy generation and feasible to deliver, whilst avoiding and minimising the potential for harm to the environment and communities.

3.3.2.2 The process defined the location and maximum extent of the Proposed Development, taking into account irradiance and yield, grid connection capacity, environmental and planning constraints, the availability of land through agreement and initial identification of Panel Areas.

3.3.2.3 In doing so, the site selection process discounted a wide range of alternatives that would not have resulted in a viable development. A detailed account of the site selection process will be provided in the ES.

3.3.3 400kV substation locations

3.3.3.1 At this EIA Scoping stage, the draft Order Limits includes an area of search for the location of the 400kV substation. This area of search is primarily located within the Northern and Eastern Panel Areas.

3.3.3.2 Following the provision of a Grid Connection Agreement and determination of the preferred Grid Connection Corridor, the Applicant is working with National Grid to consider a range of alternatives for the proposed location and layout of the 400kV substation. This process is ongoing and will take into account the following factors:

- environmental designations, constraints and baseline;
- outcome of initial environmental assessments;
- engagement with landowners and impacts on property;
- capacity required for the Grid Connection Agreement; and
- likely or potential mitigation requirements.

3.3.3.3 The options for the location of the 400kV substation will be considered in the EIA once further technical assessment, National Grid engagement, surveys and consultation have been undertaken.

3.3.3.4 The ES will therefore provide a detailed account of the refinement and design process, identifying how alternatives were considered in selecting the preferred option.

3.3.4 Panel Area layout

3.3.4.1 Once the broad location of the Proposed Development was determined, the Applicant considered the locations of the Panel Areas. The Panel Areas as proposed within this EIA Scoping Report are provisional and have taken account of the following factors:

- environmental designations, constraints and baseline;
- outcome of initial environmental assessments;
- engagement with landowners and impacts on property;
- capacity required for the Grid Connection Agreement; and
- likely or potential mitigation requirements.

3.3.4.2 The Panel Areas and overall design of the Proposed Development will be further developed and refined ahead of the DCO application submission and following the consultation processes and conclusion of environmental surveys. The ES will therefore provide a detailed account of the refinement and design process, identifying how alternatives were considered in selecting the preferred option.

3.3.5 Underground cables route options

3.3.5.1 At this EIA Scoping stage, the draft Order Limits includes an area of search for the underground cables. This area of search is primarily located in off-road locations between the Northern and Central Panel Areas and the Central and Southern Panel Areas. An on-road route along Winscales Road is also being considered at this stage.

3.3.5.2 The areas of search within the draft Order Limits have been defined taking into account viability, cost and landowner options and the aim is to define cable routes prior to submission of the DCO application on the basis of ongoing survey work, landowner agreement and any feedback received during the consultation and engagement process.

3.3.5.3 The EIA Scoping Report has been prepared on the basis of including the land required for all cable route options and therefore represents a worst-case scenario for the gathering of baseline information and identification of receptors to identify likely significant effects. It is expected that the draft Order Limits related to the cable routes would reduce prior to the submission of the DCO application. Further detail on how the cable route options are selected, alternatives considered and the rationale for the final selected options will be provided in the ES.

3.4 Approach to consideration of alternatives in the ES

3.4.1.1 As outlined in Section 3.2, Regulation 14(2)(d) of the EIA Regulations outlines the approach that an ES must take to consideration of alternatives. The ES will therefore describe the reasonable alternatives that the Applicant has considered in developing the design of the Proposed Development. It will explain the main reasons for the options selected and how the effects of the development on the environment and sensitive receptors were taken into account as part of the options selection process.

3.4.1.2 The analysis of alternatives will focus on the following aspects of option selection:

- site selection;
- alternative site layouts;
- underground cable route alternatives;
- substation siting alternatives;
- consideration of energy storage facilities and other supporting infrastructure;
- alternative solar technologies; and
- alternative environmental design.

3.4.1.3 A 'no development' alternative would not provide the additional renewable electricity generation that would be delivered by the Proposed Development and has therefore not been considered further and will not be considered in the ES.

3.4.1.4 In providing a description of reasonable alternatives studied by the Applicant, the ES will demonstrate the rationale for the preferred design of the Proposed Development, taking into account its effects on the environment and sensitive receptors.

4 Approach to EIA

4.1 Introduction

4.1.1.1 The need for EIA for the Proposed Development is set out in Section 1.4.

4.1.1.2 An EIA assesses the likely significant environmental effects, either beneficial or adverse, of a proposed development. from the findings of the EIA are then presented in an ES for consideration by the determining authority (in this case, the SoS) when determining a planning application.

4.1.1.3 The EIA process includes the following key characteristics:

- Systematic – the EIA comprises a series of tasks that are defined by regulation, guidance and accepted industry practice;
- Analytical – the EIA must be used to inform the decision-making rather than promote the project itself;
- Consultative – the EIA process must allow for and provide opportunity for interested parties and statutory consultees to provide feedback on the project and assessments undertaken; and
- Iterative – the EIA process must allow for environmental concerns to be addressed during the planning and design stages of the project.

4.1.1.4 This chapter of the EIA Scoping Report outlines the general approach to EIA for the Proposed Development.

4.2 EIA guidance

4.2.1.1 The EIA will be carried out in accordance with the requirements of the EIA Regulations. In addition, the approach to the EIA will have regard to the guidance and advice provided within the following:

- Overarching NPS for Energy (EN-1) [6];
- NPS for Renewable Energy Infrastructure (EN-3) [7];
- NPS for Electricity Networks Infrastructure (EN-5) [8];
- NPPF [9];
- PINS Advice Note Six: preparation and submission of application documents [17];
- PINS Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statement [1];
- PINS Advice Note Nine: Rochdale Envelope [15];
- PINS Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects [18];
- PINS Advice Note Seventeen: Cumulative Effects Assessment [19]; and

- PINS Advice Note Eighteen: The Water Framework Directive [20].

4.3 The purpose and process of EIA

4.3.1 Purpose

4.3.1.1 The purpose of the EIA process is to identify, describe and assess the direct, indirect, cumulative, transboundary, temporary, permanent, beneficial and adverse likely significant effects of a project on the environment. This is achieved by establishing the baseline conditions and undertaking an assessment to identify the significance of the likely environmental effects of the Proposed Development, which typically considers the magnitude of the impact (degree of change) and the importance, sensitivity or value of the impacted receptor or resource. Mitigation is considered and applied to avoid, prevent or reduce any potential effects, where appropriate, and an assessment of the residual effects is carried out to establish whether there are any effects after mitigation is applied which are significant in EIA terms .

4.3.1.2 The Proposed Development is categorised as EIA development under 'Schedule 2' of the EIA Regulations as the potential for likely significant effects due to its nature and size has been identified. The Applicant has therefore decided to undertake an EIA and is seeking a Scoping Opinion from SoS.

4.3.1.3 Based on information contained in this EIA Scoping Report and taking into account representations made by regulators, the Scoping Opinion will confirm the expected basis upon which an EIA will be undertaken for the Proposed Development. The EIA will identify the likely significant environmental effects of the Proposed Development and report these within an ES.

4.3.2 Process

The EIA process, as outlined in Regulation 5 of the EIA Regulations and PINS Advice Note Seven, is used to identify the likely significant effects on the environment that could occur as a result of a Proposed Development. The information gathered through EIA is taken into account by the decision-making body (the SoS) when determining an application for development consent.

4.3.2.1 The main stages of the EIA process are as follows:

- EIA Screening: Screening is normally undertaken to determine whether a proposed development constitutes 'EIA development', where it is unclear if a project requires an EIA to be undertaken. Screening has not been formally undertaken as the Applicant considers the Proposed Development to be EIA Development);
- EIA Scoping: The EIA Scoping Report (this document) sets out the proposed scope of the Proposed Development's EIA. It also presents the data collected and the proposed assessment methodology and approach that will be used for

the EIA. The EIA Scoping Report is issued to consultees by PINS on behalf of the SoS for comment on the scope, methodology and approach proposed;

- PEIR: The PEIR sets out the information that '*is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development*' (Regulation12(2)(b) of the EIA Regulations) as set out in PINS Advice Note Seven, Section 8.3) [1]; and
- ES: The ES presents the results of the EIA undertaken for the Proposed Development. It sets out the likely significant effects that would result if the Proposed Development was implemented, and any proposed mitigation to reduce those significant effects. The ES is submitted as part of the application for development consent and is taken into account during the decision-making process.

4.3.2.2 The EIA process will be undertaken in accordance with the requirements of the EIA Regulations and PINS Advice Note Seven. The ES will provide the following relevant information as outlined in Part 14(2)(a)-(f) EIA Regulations and Schedule 4. A summary is listed below:

- A description of the Proposed Development comprising information on the site, design, size and other relevant features of the development;
- A description of the reasonable alternatives studied by the applicant, which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;
- A description of the baseline environment and likely evolution without the implementation of the development;
- A description of the factors likely to be significantly affected by the development: population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, and landscape;
- A description of the likely significant effects of the development on the environment;
- A description of the forecasting methods or evidence used to identify and assess effects on the environment;
- A description of any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- A description of adverse effects of the development on the environment from added risk of major accidents and/or disasters; and
- A non-technical summary of the information above, and a list of references.

4.3.3 Approach

4.3.3.1 The ES will set out details on the methodology and approach, along with the overall conclusions of the EIA process. It will also outline the main parameters and design aspects of the Proposed Development against which the assessment will be undertaken.

4.3.3.2 Development parameters will be determined and fixed for the purposes of the EIA through an iterative approach taking into account baseline environmental information, the evolving design and any associated technical requirements. This parameter approach will provide the Rochdale Envelope for the Proposed Development, in which the detailed design can be developed within the reasonable worst case assessment of effects reported in the ES. This provides confidence that the Proposed Development can be delivered with some flexibility for final design without resulting in any effect worse than those identified in the ES.

4.3.3.3 The EIA will assess the construction, operational and decommissioning phases of the Proposed Development.

4.3.4 EIA Scoping

4.3.4.1 This section summarises the key requirements of scoping under the EIA Regulations.

4.3.4.2 Regulation 10(1) of the EIA Regulations provides that any '*person who proposes to make an application for an order granting development consent may ask the SoS to confirm in writing its opinion as to the scope and level of detail of the information to be provided in the environmental statement*'. The request made under Regulation 10(3) must include the following (more information is provided in Table 4-1):

- *"a plan sufficient to identify the land"* (See Figure 2.1);
- *"a description of the proposed development, including its location and technical capacity"* (see Chapter 2 The Proposed Development);
- *"an explanation of the likely significant effects of the development on the environment"* (See Chapters 5-18); and
- *"such other information or representations as the person making the request may wish to provide or make".*

Table 4-1 Scoping information required

Recommended information for inclusion in the EIA Scoping Report	Relevant Section in this Scoping Report
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 Proposed Development and in Section 4.7 of this chapter.
Reference plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development	Figures 2.2 to 2.6
EIA Approach and Topic Area	
An outline of the reasonable alternatives considered and the reasons for selecting the preferred option	Chapter 3: Alternatives and design iteration

Recommended information for inclusion in the EIA Scoping Report	Relevant Section in this Scoping Report
A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues	Chapter 4: Approach to EIA Chapter 21: Conclusion
A detailed description of the aspects and matters proposed to be scoped out if further assessment with justification provided	Certain aspects of environmental topics scoped in within Chapters 5 – 19 are scoped out of further assessment within the summary of assessment scopes
Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspect or matter	Chapters 5 to 19
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 5 to 19
Information Sources	
References to any guidance and best practice to be relied upon	Chapters 5 to 19
Evidence of agreement reached with consultation bodies e.g. the statutory nature conservation bodies or local authorities	Chapters 5 to 19
An outline of the structure of the proposed ES	Chapter 21

4.4 Overview of approach to assessment

4.4.1.1 This section of the EIA Scoping Report sets out further detail on certain aspects of the assessment methodology that will be adopted in the EIA. The following general methodology will apply to all assessments undertaken unless otherwise specified within the individual topic methodologies.

4.4.2 Baseline Conditions and data collection

4.4.2.1 An important step in the EIA process is to establish a baseline against which to assess the effects of the Proposed Development. The ES will include a description of the current baseline and the future baseline for each environmental topic.

4.4.2.2 The future baseline scenario will describe the changes from the current baseline scenario as far as natural changes, and other development which could be completed before construction of the Proposed Development, can be established, although it is noted without the Proposed Development that the draft Order Limits would continue to be used for agricultural purposes.

4.4.2.3 Information relating to the existing environmental baseline will be collected in consultation with relevant stakeholders through field and desktop study specific to each aspect to be assessed and reported as part of that assessment, including:

- online/digital resources;
- data searches, e.g., Local Biological Record Centres, Historic Environment Record, etc.;
- baseline surveys; and
- available environmental information submitted in support of other planning applications for development in the vicinity.

4.4.3 Spatial and temporal scope

4.4.3.1 Spatially, the area over which effects could occur may be wider than the draft Order Limits. The appropriate study area will be determined for each environmental topic individually. Specific study areas will be defined in each topic section and will allow for assessment of indirect as well as direct effects, together with off-site factors such as traffic routes, where relevant.

4.4.3.2 Specific temporal periods will be defined for the assessment of baseline conditions and the impacts of the Proposal Development. In doing so, consideration will be given to the likely durations of construction and operational activities. Where relevant, consideration will be given to the duration for environmental design measures to become established and effective. Timeframes for which mitigation measures are likely to have achieved their desired outcome will be defined within the ES.

4.4.3.3 The assessment will consider effects at the construction, operation and decommissioning phases. The definitions of these are presented below:

- Construction phase: This relates to all works associated with construction (site preparation and installation);
- Operational phase: This relates to effects once the Proposed Development is installed and in use; and
- Decommissioning phase: This relates to effects after operation has ceased and the Proposed Development is subject to activities required to take it out of use.

4.4.4 Identification of receptors

4.4.4.1 Receptors are defined as the physical resource or 'user group' that would experience an effect. The environmental effect would depend on the spatial relationship between the source of the impact and the receptor. Some receptors will be more sensitive to certain environmental effects than others. The baseline studies will identify the potential environmental receptors.

4.5 Assessment of effects

4.5.1 Effect prediction

4.5.1.1 Some environmental topic assessments will use calculations and modelling to deter-mine the predicted impacts of the Proposed Development on receptors to assess the significance of effects. Other will use the professional judgement of the assessment team and initial assessments, taking into account relevant technical advice and guidance. Each environmental aspect assessment will present a clear justification for the strategy adopted and state all relevant assumptions to allow independent review.

4.5.2 Significance of effect

4.5.2.1 The EIA will identify the significance of environmental effects (beneficial or adverse) arising from three phases (construction, operation and decommissioning) of the Proposed Development. The significance of effects will be determined by reference to the criteria set out for each environmental topic. Residual effects are the effects that remain following the implementation of proposed mitigation measures.

4.5.2.2 The approach to assessing and assigning significance to an environmental effect is derived from a variety of sources including:

- Legislative requirements, including the EIA Regulations [21];
- National policy, including Overarching National Policy Statement for Energy (EN-1) [6], National Policy Statement for Renewable Energy Infrastructure (EN-3) [7]; NPS Energy networks (EN-5) [8], and the NPPF [22]
- Local planning policy and relevant planning practice guidance;
- Topic specific guidelines, standards and codes of practice;
- Advice from statutory consultees and other stakeholders; and
- Expert judgement of the EIA team.

4.5.2.3 The likely effect that the Proposed Development may have on identified environmental receptors will be influenced by a combination of the sensitivity or value of the receptor and the predicted magnitude of impact, or change from the baseline conditions.

4.5.2.4 Assignment of environmental sensitivity of a receptor will generally depend on the vulnerability, recoverability and value of the receptor. The environmental sensitivity (or importance) will be determined using the categories set out in each aspect chapter. Technical topics specify their approach to assessing and assigning sensitivity to a receptor in their respective chapters. An example of a general approach is provided in this chapter to aid understanding of the principles; an example set of categories for assigning the sensitivity of receptors is provided in Table 4-2.

Table 4-2 Indicative environmental sensitivity of a receptor

Sensitivity	Criteria
High	High importance and rarity, international level and very limited potential for substitution
Medium	High or medium importance and rarity, regional level and limited potential for substitution
Low	Low or medium importance and rarity; and local level
Very Low	Very low importance or rarity and local level

4.5.2.5 The categorization of the magnitude of impact will take into account the following factors:

- extent;
- duration;
- frequency; and
- reversibility.

4.5.2.6 Impacts will be defined as either beneficial or adverse. The magnitude of impact will be specified in each aspect chapter in line with industry guidance, a typical example of categories is outlined in Table 4-3.

Table 4-3 Indicative magnitude of impact

Magnitude	Criteria
High	Total loss or major alteration to key elements / features of the baseline (i.e. pre-development) conditions
Medium	Partial loss or alteration to one of more key elements / features of the baseline (i.e. pre-development) conditions
Low	Minor shift away from baseline (i.e. pre-development) conditions
Very Low	Very slight change from the baseline (i.e. pre-development) conditions

4.5.2.7 The overall significance of the effect will be assigned by the interaction of both sensitivity of the receptor and magnitude of impact. The level of significance will be determined in each of the environmental topic assessments and will consider relevant topic-specific legislation, planning policy and guidance. An example of how significance of effects is defined from sensitivity of receptor and magnitude of impact is provided in Table 4-4.

Table 4-4 Environmental effects matrix

		Magnitude of Impact			
		High	**Medium**	**Low**	**Very Low**
Sensitivity of receptor	**High**	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	Very Low	Minor	Negligible	Negligible	Negligible

4.5.2.8 Moderate or Major effect are generally considered significant in EIA terms, and Negligible or Minor not significant. Significance conclusions for each residual effect will incorporate confirmed design and mitigation measures.

4.5.2.9 This matrix approach is provided as an example guide and not prescriptive, professional judgement can be applied in determining significance of effect and the assessment will be supported by a clear narrative to justify the conclusions reached.

4.5.3 Cumulative effects

4.5.3.1 Cumulative effects are the result of multiple actions on environmental receptors or resources over time and are generally additive or interactive (synergistic) in nature. Two categories of cumulative effects are typically considered within the cumulative effects chapter of an ES:

- In-combination effects from the interrelationship between different environmental effects of the Proposed Development (intra-project)
- Cumulative effects from the interrelationship between different projects along with the Proposed Development (inter-project)

4.5.3.2 In-combination effects, or intra-project effects, occur when a resource, receptor or group of receptors are potentially affected by more than one source of direct environmental impact resulting from the same development. For example, a community may be affected by noise and dust effects resulting from the construction phase activities of a single development.

4.5.3.3 Cumulative effects, or inter-project effects, occur when a resource, receptor or group of receptors are potentially affected by more than one development at the same time. For example, the construction traffic effects of a development in isolation may not be significant, but when combined with the construction traffic effects of another development (using the same geographical area at the same time) may result in significant cumulative effects on the surrounding highway network.

4.5.3.4 Chapter 20 provides an overview of the approach to undertaking the cumulative effects assessment.

4.5.4 Limitations and assumptions

4.5.4.1 In accordance with the EIA Regulations, any limitations and assumptions used for assessment will be set out in the ES.

4.5.5 Overview of proposed EIA Scope

4.5.5.1 An overview of the topics considered for the proposed scope of the EIA is presented in Table 4-5. For each topic, the potential for likely significant effects on the environment has been considered for the construction, operation and decommissioning of the Proposed Development. Individual topic chapters provide detail on the specific aspects matter scoped in and out under each phase of the Proposed Development with appropriate justification.

4.5.5.2 Construction effects relate to effects that arise as a result of the construction process. For example, the effects of access from construction vehicles, land take, and the effects of noise and dust from the use of construction plant and machinery. These effects tend to be temporary in nature.

4.5.5.3 Once constructed, the operational lifespan of the Proposed Development would be 40 years. Following the operational phase the Proposed Development would require decommissioning (except for the 400kV substation which would remain in situ and will be the responsibility of National Grid).

Table 4-5 Summary of proposed scope of the EIA

Environmental Topic	Scoped in / out	Location in EIA Scoping Report
Agricultural land and soils	Scoped in	Chapter 5
Air Quality	Scoped out	Chapter 6
Biodiversity	Scoped in	Chapter 7
Climate change	Scoped in	Chapter 8
Cultural Heritage and Archaeology	Scoped in	Chapter 9
Electric, magnetic and electromagnetic fields	Scoped out	Chapter 10
Glint and glare	Scoped in	Chapter 11
Ground conditions	Scoped out	Chapter 12
Human health	Scoped out	Chapter 13
Landscape and visual	Scoped in	Chapter 14
Major accidents and disasters	Scoped out	Chapter 15
Materials and waste	Scoped out	Chapter 4
Noise and vibration	Scoped in	Chapter 16

Environmental Topic	Scoped in / out	Location in EIA Scoping Report
Socio-economics	Scoped in	Chapter 17
Traffic and transport	Scoped in	Chapter 18
Water resources and flood risk	Scoped in	Chapter 19

Materials and Waste

4.5.5.4 The land within the draft Order Limits is primarily agricultural land (arable and grazing), therefore no demolition waste will be produced as part of the Proposed Development. It is also anticipated that minimal site preparation and excavation waste and from supporting footings would be generated. The underground cabling runs through both agricultural land and roads, which are likely to generate minimal arisings from activities, and would be reused onsite as cable route cover.

4.5.5.5 All the electrical infrastructure such as solar PV modules, inverters, transformers, batteries and other supporting infrastructure will be manufactured offsite and delivered ready for installation. Therefore, construction and assembly waste is expected to be minimal, including packaging wastes (wood and plastics), fencing (metal and wood), Waste Electrical and Electronic Equipment (WEEE) and concrete.

4.5.5.6 Materials and waste generation during the operational phase will include maintenance and replacement of proposed infrastructure including the solar PV modules, inverters, BESS and transformers. No replacement of cabling is anticipated during the proposed design life of the Proposed Development.

4.5.5.7 The decommissioning of the Proposed Development would involve the removal of all solar infrastructure, including the solar PV modules, inverters, transformers, BESS and switchgear, with the exception of the 400kV substation which will remain in situ, and reinstatement of the land to its original use as far as possible and practicable.

4.5.5.8 In the UK, solar PV modules are subject to the WEEE Regulations 2013, as amended by the Waste (Miscellaneous Amendments) (EU Exit) (No. 2) Regulations 2019. The WEEE Regulations mandate that manufacturers must take back decommissioned solar PV modules for recycling. The aim is to ensure that the solar PV modules are disposed of responsibly and as much of the materials as possible are recycled. The Applicant will ensure that suppliers of solar PV modules for the Proposed Development are registered with a producer compliance scheme that has an industry managed take-back and recycling scheme.

4.5.5.9 Solar PV modules are made of a frame (typically aluminium), glass, crystalline silicon solar cells and copper wiring, of which between 90 - 99% can be recycled [23] [24].

4.5.5.10 Possibilities to re-use or recycle materials will be explored before resorting to landfill options in alignment with the Waste Management Plan for England 2021

[25] [26]. There is a new industry emerging for recycling solar PV modules [27]. This would be explored, in addition to any resale of any operational panels.

4.5.5.11 Assessment of potential impacts however, and inclusion of appropriate mitigation measures will be covered elsewhere in the ES and within supporting documentation, including:

- Climate change chapter of the ES will set out the waste generation assumptions from the construction, operational and decommissioning phases.
- oCEMP
- oDEMP
- oMWMP

4.5.5.12 The construction, operation and decommissioning of the Proposed Development would not result in notable amounts of waste that would impact waste management infrastructure, or consume materials in volumes that would notably impact supply chains. Therefore, no significant effects are expected and materials and waste are **scoped ou**t of further assessment and will not be considered further in the ES.

4.5.6 Standalone assessments

4.5.6.1 In addition to the ES, a number of standalone reports and assessments will support the DCO application for the Proposed Development, these include:

- Agricultural Land Classification Report
- Arboricultural Impact Assessment
- Biodiversity Net Gain Report
- Outline Drainage Strategy
- Flood Risk Assessment
- Transport Statement

4.5.6.2 The findings of these will support the ES where applicable, and feed into the mitigation proposals for the Proposed Development.

4.6 Mitigation measures and monitoring

4.6.1.1 The Proposed Development will include a range of measures to avoid and reduce or mitigate adverse effect identified. Mitigation will be defined within each environmental aspect chapter and fall into the following categories:

- **Embedded mitigation** – Measures that form part of the engineering design, developed through the iterative design process. The first stage of assessment is undertaken with embedded mitigation in place.
- **Good practice** – Standard approaches and actions commonly used on infrastructure projects to avoid or reduce environmental impacts, and typically applicable across the whole project regardless of whether an EIA is undertaken or

not. Management plans will incorporate standard good practice to be applied during the construction, operation and decommissioning of the Proposed Development and their development and implementation can be secure by Requirement of the DCO. The first stage of assessment is undertaken with good practice in place.

- **Further mitigation** – Any additional project specific measures identified during the EIA to avoid, reduce or offset potential impacts that could otherwise result in effects considered significant in the context of the EIA Regulations. Essential mitigation will be identified by environmental topic specialists, where required, taking into account the embedded mitigation and good practice commitments. The residual effects assessment is undertaken with further mitigation in place.

4.6.1.2 Where appropriate, monitoring procedures will be identified to address any likely residual significant adverse effects to measure the effectiveness of the mitigation proposed.

4.7 Uncertainty

4.7.1.1 Planning Inspectorate (PINS) Advice Note Seven [1] requires:

"*an explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development eg design parameters*"

4.7.1.2 Chapter 2 The Proposed Development provides a description of the parameters used to define those aspects of the Proposed Development that are still being developed, and will be further refined as part of the EIA process as well as environmental and technical factors and consultation responses.

4.7.1.3 Key areas of uncertainty in the preparation of this EIA Scoping Report include:

- The location of the 400kV substation to connect the Proposed Development to the national grid;
- The location of up to 4 onsite 132kV substations within the draft Order Limits;
- The layout of the Panels Areas, including specific locations of PV panels, BESS and support infrastructure; and
- The routes for the cable connections between the Panel Areas.

4.7.1.4 The scope of the proposed assessment and methodologies to be employed have been developed to ensure that all relevant receptors and potentially significant effects are identified and can account for these aspects being confirmed in the Proposed Development during the EIA. Typical design solutions for parts of Proposed Development have been considered in various locations, and the design principles described in Chapter 2 of this report would be followed. Therefore, the scope and methodology described in this report, and agreed through the Scoping Opinion, allows a reasonable level of flexibility and would remain appropriate for the final design of the Proposed Development

4.7.1.5 There are some aspects of the design of the Proposed Development where flexibility to meet the changing demands of the UK solar energy market and respond to changes in technology that may emerge prior to construction would remain at the submission of the DCO application. These areas, and how they have been accounted for in the assessment, will be described in the ES.

4.8 Competent experts

4.8.1.1 In accordance with the EIA Regulations, as amended, paragraph (14), a Statement of Competence will be included within the ES, outlining the relevant expertise or qualifications of the experts who undertook the EIA.

4.8.1.2 The introductory and summary chapters of this EIA Scoping Report (Chapters 1 to 4, and 19 to 21) have been prepared by Ove Arup and Partners Ltd. (Arup), drawing on material provided by the Applicant, which includes engineers, designers and external consultants. The design details contained in this document have been approved by the Applicant.

4.8.1.3 The topic-specific chapters of this EIA Scoping Report (Chapters 5 to 19) and their corresponding appendices have been prepared by Arup, Wardell Armstrong and a number of consultants on the Applicant's team, as summarised in Table 4-6.

4.8.1.4 Both Arup and Wardell Armstrong are members of the IEMA EIA Quality Mark. The EIA Quality Mark is a scheme operated by IEMA that allows organisations that lead the co-ordination of statutory EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed. The EIA Quality Mark is a voluntary scheme.

Table 4-6 Competent Authors

Chapter	Author
Chapter 1: Introduction	Arup
Chapter 2: The Proposed Development	Arup
Chapter 3: Alternatives and design iteration	Arup
Chapter 4: Approach to EIA	Arup
Chapter 5: Agricultural land and soils	Wardell Armstrong
Chapter 6: Air quality	Arup
Chapter 7: Biodiversity	Wardell Armstrong
Chapter 8: Climate change	Wardell Armstrong
Chapter 9: Cultural heritage	Headlands Archaeology
Chapter 10: Electric, magnetic and electromagnetic fields	Arup
Chapter 11: Glint and Glare	Wardell Armstrong

Chapter	Author
Chapter 12: Ground conditions	Arup
Chapter 13: Human health	Arup
Chapter 14: Landscape and visual	Arup
Chapter 15: Major accidents and disasters	Arup
Chapter 16: Noise and vibration	Wardell Armstrong
Chapter 17: Socio-economics	Arup
Chapter 18: Traffic and transport	Arup
Chapter 19: Water resources and flood risk	Arup
Chapter 20: Cumulative effects	Arup
Chapter 21: Structure and content of the PEIR	Arup
Chapter 22: Conclusion	Arup

4.9 Consultation

4.9.1.1 Effective and meaningful engagement and consultation with stakeholders is an essential aspect of developing the design of the Proposed Development and of undertaking a comprehensive EIA.

4.9.1.2 As advised by the Ministry of Housing, Communities and Local Government (MHCLG) guidance on pre-application consultation for major infrastructure projects [28], the Applicant's approach to engagement and consultation will be iterative to enable stakeholders to gain understanding of the proposals early on in the process and to have genuine opportunities for influence.

4.9.1.3 The Applicant will have regard to the guidance provided in PINS Advice Note Three [29] in taking a precautionary approach to identifying relevant consultees for the Proposed Development and ensuring compliance with the requirements of the EIA Regulations, the Act and the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009.

4.9.1.4 The Applicant will also ensure that reporting on engagement and consultation activities is carried out in accordance with PINS Advice Note Fourteen [30], with the submission of a Consultation Report as part of the DCO application which evidences how consultation has been carried out and how feedback has been taken into account in developing the proposals.

4.9.1.5 Stakeholder engagement for the Proposed Development will seek to achieve the following aims:

- engaging early to allow stakeholders and the public to shape the project's design at a formative stage;

- commit to understanding local issues that are important for communities;
- ensure community involvement is central to the project's ongoing design; and
- create a project that benefits the local area for the next 40 years (the design life).

4.9.1.6 Consultation with stakeholders will be undertaken throughout the EIA process to gather feedback on the emerging project proposals, baseline survey methodologies and results and assessment methodology. It is intended that non-statutory consultation and engagement activities will be undertaken to inform the design of the Proposed Development and its environmental assessment ahead of commencing pre-application statutory consultation as required under the Act and the EIA Regulations.

4.9.1.7 Compliance with the requirements of the Act and the EIA Regulations will be evidenced in the Consultation Report and ES submitted as part of DCO Application, in addition to details of the non-statutory engagement undertaken throughout the design and assessment of the Proposed Development.

4.9.2 Consultation to date

4.9.2.1 Consultation with statutory consultees and stakeholders has already commenced to help inform the content of this EIA Scoping Report and the design of the Proposed Development.

4.9.2.2 A number of meetings have taken place with the following stakeholders to provide an introduction to the Proposed Development and seek initial views:

- Norfolk County Council and Breckland Council, including topic specific discussions with:
  - The Lead Local Flood Authority (LLFA);
  - County Archaeologist;
  - Landscape Officer;
  - Highways Officer;
  - Biodiversity Officer;
- The Planning Inspectorate;
- Environment Agency; and
- Natural England.

4.9.2.3 Information on the Proposed Development and the approach to environmental assessment has also been shared via email with:

- Historic England

4.9.2.4 In addition to engagement with relevant statutory consultees, the Applicant has been in regular discussions with local landowners affected by the Proposed Development.

4.9.2.5 The Applicant will be launching a website for the Proposed Development shortly after the submission of this EIA Scoping Report, which will provide information to the wider community and the opportunity to contact the Applicant with any queries or for further information. Non-statutory consultation activities, to include representatives of the local community and relevant interest groups, will also be undertaken following the submission of this EIA Scoping Report.

5 Agricultural land and soils

5.1 Introduction

5.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of Agricultural Land and Soils.

5.1.1.2 It sets out Agricultural Land and Soils receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

5.1.1.3 The following matters have been considered as part of the scope and methodology for Agricultural Land and Soils:

- Loss (temporary and permanent) of productive agricultural land, including that of Best and Most Versatile (BMV) quality
- Loss of or damage to soil resources

5.1.1.4 All landowners with farm businesses who are involved in the Proposed Development have signed up by voluntary agreement and have therefore considered the potential effects on the overall viability of their farm businesses. This approach is supported by the fact that there is no relevant policy and guidance to support or maintain the viability of individual farms affected by development. Wider impacts to agricultural holdings / farm businesses are therefore not considered further and are **scoped out** of assessment.

5.1.1.5 This chapter should be read in conjunction with Chapter 2 The Proposed Development.

5.2 Relevant legislation, policy, standards and guidance

5.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for Agricultural Land and Soils and have informed the scope of the assessment.

5.2.2 Legislation

Table 5-1 Legislation

Legislation	Relevance to assessment
None applicable	

5.2.3 Policy

Table 5-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for Energy (EN-1), 2024 [31]	Sets broad national policy approach. Section 5.11 Land Use, Including open Space, Green Infrastructure, and Green Belt addresses agricultural land and soils, outlining approach to assessment of impacts and determining requirement for mitigation (if required), including the following paragraphs of relevance: Paragraph 5.11.12 indicates that "*applicants should seek to minimise impacts on the best and most versatile (BMV) agricultural land and preferably use land in areas of poorer quality (grades 3b, 4 and 5).*" Paragraph 5.11.13 states that "*applicants should also identify any effects and seek to minimise impacts on soil health and protect and improve soil quality taking into account any mitigation measures proposed*", principally through a Soil Management Plan to encourage the sustainable reuse of soils (paragraph 5.11.14). Paragraph 5.11.15 states that developments should contribute to and enhance the natural and local environment by preventing new and existing developments from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil pollution (amongst other matters). In respect of mitigation, paragraph 5.11.23 indicates that applicants should seek to minimise effects on the existing use of the proposed site and on uses near the site by applying good design principles, including the protection of soils during construction. Paragraph 5.11.34 indicates that *"the Secretary of State should ensure that applicants do not site their scheme on BMV agricultural land without justification. Where schemes are to be sited on BMV agricultural land, the Secretary of State should take into account the economic and other benefits of that land. Where development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality*."
National Policy Statement for Renewable Energy Infrastructure (EN-3), 2024 [32]	NPS EN-3 establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects.

Policy	Relevance to assessment
	The following paragraphs are of relevance to agricultural land and soils: Paragraph 2.10.10 indicates that solar power has an important role in delivering the government's goals for greater energy independence, and that the government is supportive of solar that is co-located with other functions, such as agriculture, to maximise the efficiency of land use. Paragraph 2.10.29 indicates that, while land type should not be a predominating factor in determining the suitability of the solar sites, "*applicants should, where possible, use previously developed land, brownfield land, contaminated land and industrial land. Where the use of any agricultural land has been shown to be necessary, poorer quality land should be preferred to higher quality land, avoiding the use of BMV agricultural land where possible.*" Paragraph 2.10.30 confirms that the development of solar farms is not prohibited on BMV agricultural land but the impacts will need to be considered in line with paragraphs 2.10.73-92 and 2.10.107-126 of EN-3. However, within these sections, only paragraph 2.10.81 is relevant in respect of impacts on soils (paragraphs 2.10.107-126 are concerned with cultural heritage and traffic and transport noise and vibration). Paragraph 2.10.31 recognises that it is likely that developments at this scale will use some agricultural land. "*Applicants should explain their choice of site, noting the preference for development to be on suitable brownfield, industrial and low and medium grade agricultural land.*" Paragraph 2.10.32 states that "*where sited on agricultural land, consideration should be given to whether the proposal allows for continued agricultural use and/or can be co-located with other functions.*" Paragraphs 2.10.33 and 34 indicate that Agricultural Land Classification (ALC) surveys should be carried out if necessary to establish the grade of land and inform a Soil Resources and Management Plan to use and manage soils sustainably throughout the various stages of a project. Mitigation measures for soils are set out in paragraph 2.10.127.
National Policy Statement for electricity networks infrastructure (EN-5), 2024 [33]	NPS EN-5 addresses policy for energy transmission, including the routing of overhead lines and undergrounding cables, and general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19) and with reference to undergrounding and subsea cables (paragraph 2.9.25). In respect of undergrounding cables, paragraph 2.9.25 (bullet 5) sets out that the Secretary of State should only grant consent for underground lines on the basis of the applicant's commitment to mitigate the potential detrimental effects on agricultural land (particularly BMV land) and soils (including peat soils), which would include developing and implementing a Soil Resources and Management Plan. There should be a commitment to guarantee appropriate handling of soil, backfilling, and return of the land to

Policy	Relevance to assessment
	the baseline ALC, thus ensuring no loss or degradation of agricultural land.
Written Ministerial Statement Solar projects must fit in with food security, 15 May 2024 [34]	The written ministerial statement published under the previous Government indicated that the best agricultural land should be protected for food production and that large-scale solar should avoid BMV land where possible. The written ministerial statement largely reiterates policy in NPS EN-3 but with increased emphasis on protecting the nation's food security.
National Planning Policy Framework (NPPF), 2023. Department for Levelling Up, Housing and Communities [35]	Paragraph 180 indicates that planning policies and decisions should contribute to and enhance the natural environment by protecting and enhancing soils, and recognising the wider benefits from natural capital and ecosystem services, including the economic and other benefits of BMV agricultural land. Footnote 62, which is aimed specifically at plan-making, states that "*where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of higher quality" and that "the availability of agricultural land use for food production should be considered."* Paragraph 88b states that, in order to support a prosperous rural economy, planning policies and decisions should enable the development and diversification of agricultural and other land-based businesses.
Breckland Local Plan, 2023 [36]	Policy ENV 10, Renewable Energy Development, indicates that the Council supports proposals for new renewable energy and low carbon development, subject to consideration of the impact of the development and whether this can be made acceptable. Proposals will be considered having regard to the extent to which there is the "*irreversible loss of the highest quality agricultural land*" (amongst other matters). Policy ENV 10 indicates that the factors that will need to be considered where a proposed solar farm involves greenfield land include: *"• the proposed use of any agricultural land has been shown to be necessary and poorer quality land has been used in preference to higher quality land, where possible; and* *• that the proposal allows for continued agricultural use where applicable and/or encourages biodiversity improvements around arrays."*

5.2.4 Standards and guidance

Table 5-3 Standards and guidance

Standards and guidance	Relevance to assessment
Planning Practice Guidance, 2024, Department for Levelling Up, Housing and Communities, and	Natural Environment paragraphs 001, which relates to how planning takes account of

Standards and guidance	Relevance to assessment
Ministry of Housing, Communities and Local Government: Natural Environment [37]; Renewable and low carbon energy [33] xxx	agricultural land, and 002, which relates to how planning can safeguard soils. Renewable and Low Carbon Energy paragraph 013 encourages the siting of large scale solar farms on previously developed and non-agricultural land, provided it is not of high environmental value; notes that the necessity of the use of agricultural land for solar farms needs to be considered, and that poorer quality land should be used in preference to higher quality land; that proposals should allow for continued agricultural use and/or encourage biodiversity improvements around arrays. The guidance also states that solar farms are normally temporary structures and planning conditions can be used to ensure that the installations can be removed when no longer in use and the land restored to its previous use.
Agricultural Land Classification of England and Wales – Revised guidelines and criteria for the grading of the quality of agricultural land, 1988, Ministry of Agriculture, Fisheries and Food [38]	Sets out the methodology for classifying agricultural land, as referenced in paragraph 2.10.33 of EN-3.
Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, 2009, Department for Environment, Food and Rural Affairs [39]	The Code provides advice on the use of soils in construction projects including best practice guidance for handling.
Agricultural Land Classification: Protecting the best and most versatile land, 2012, Natural England Technical Information Note 049 [40]	Summarises the ALC system, available data and methodology.
Guide to assessing development proposals on agricultural land, 2021, Natural England [41]	Sets out how the National Planning Policy Framework and the 25 Year Environment Plan aim to protect agricultural land and soils, with a focus on using ALC to inform planning decisions.
A New Perspective of Land and Soil in Environmental Assessment, 2022, Institute of Environmental Assessment and Management [38]	Provides guidance and an approach to assessing the impacts of development proposals on agricultural land and soil properties and functions.
Benefitting from Soil Management in Development and Construction, 2022, British Society of Soil Science, Working with Soil Guidance Note Document 3 [42]	Provides guidance on Soil Resource Surveys and Soil Management Plans.
Building on soil sustainability: Principles for soils in planning and construction, 2022, Soils in Planning and Construction Task Force [43]	Sets out guiding principles for soils in planning and construction.

5.3 Consultation

5.3.1.1 The following stakeholders will be consulted with regards to Agricultural Land and Soils as part of the assessment process:

- Natural England. Consultation is required on all developments that would result in the loss of 20ha or more of BMV agricultural land. Agreement on the soil and ALC survey methodology in terms of observation density is also sought.

5.3.1.1 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to agricultural land and soils.

5.3.1.2 A non-statutory consultation is planned from Autumn 2024 which will introduce the Proposed Development publicly and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

5.4 Study area

5.4.1.1 The study area for Agricultural Land and Soils comprises all agricultural land within the draft Order Limits.

5.5 Baseline conditions

5.5.1 Desktop sources used

5.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Mapping of bedrock and superficial geology [44]
- Mapping of soil associations (1:250,000 scale) [45]
- Soil survey bulletin [46]
- Provisional ALC mapping [47]

5.5.2 Surveys proposed

5.5.2.1 Reconnaissance-level ALC and soil surveys are proposed and results will be used to inform the initial developing layout and design of the Proposed Development and avoid BMV as far as reasonably practicable at this stage. Agreement will be sought with Natural England on the overall final scope of ALC surveys to be undertaken in 2024 and 2025 to inform the final design and assessment reported in the ES.

5.5.3 Existing baseline

5.5.3.1 The majority of land within the draft Order Limits is agricultural land, primarily in arable use.

5.5.3.2 The land within the draft Order Limits is underlain by various chalk formations all belonging to the White Chalk Subgroup of the Chalk Group. Across much of the

area east of Swaffham this is overlain by an extensive sheet of chalky, flinty till of the Lowestoft Formation. Superficial alluvium deposits are mapped in conjunction with the watercourses throughout the draft Order Limits.

5.5.3.3 The mapped soil information shows seven associations present within the draft Order Limits. The most extensive are:

- Beccles 1 – extensive across the Eastern, Northern and Southern Panel Areas, generally slowly permeable, seasonally waterlogged, fine loamy over clayey soils
- Burlingham 3 – mapped mainly in the Central Panel Area, between Swaffham and Bradenham, generally deep, fine loamy soils with slowly permeable subsoils and slight waterlogging
- Worlington – mainly around Swaffham in the Central Panel Area, generally deep, well drained, sandy soils
- Newmarket 1 – mapped across the Western Panel Area, generally shallow, well drained, calcareous sandy and coarse loamy soils over chalk or chalk rubble

5.5.3.4 The less extensive associations are:

- Burlingham 1 – mainly west of Dereham in areas of the Northern and Southern Panel Areas, generally deep, coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging
- Beccles 2 – west of Necton in the Central Panel Area, generally slowly permeable, fine and coarse loamy over clayey soils, with some deep, sandy soils affected by groundwater
- Isleham 2 – mapped in conjunction with a watercourse east of Bradenham covering a very small portion of the Southern Panel Area, generally deep, permeable sandy and peaty soils affected by groundwater

5.5.3.5 Agricultural land within the draft Order Limits is shown as a mix of Grades 2 and 3 on the Provisional ALC map. The distribution of these grades (and subgrades) will be determined once the detailed ALC survey and the layout and design of the Proposed Development are complete.

5.5.4 Future baseline

5.5.4.1 The future baseline for Agricultural Land and Soils is expected to remain as the current existing baseline, as described in section 5.5.3 above, in the absence of the Proposed Development proceeding due to the ALC being concerned with long-term physical characteristics and limitations rather than short-term use or management.

5.6 Potential impacts

5.6.1 Construction

5.6.1.1 Potential impacts relating to Agricultural Land and Soils are the loss of productive agricultural land area and damage to soil resources.

5.6.1.2 The land would be removed from primary arable agricultural production at the start of the construction phase and would remain largely unavailable for agricultural production during the lifetime of the Proposed Development. As this occurs at the commencement of the construction phase, it is considered an impact arising from construction rather than the operation of the Proposed Development.

5.6.1.3 Construction impacts on soils relate to the potential damage (from compaction) to soils from installing solar panels and damage to soils that need to be stripped and stored for access tracks, compounds and on-site infrastructure.

5.6.2 Operation

5.6.2.1 All impacts on Agricultural Land and Soils are anticipated to occur in the Construction and Decommissioning phases.

5.6.3 Decommissioning

5.6.3.1 Removal of the panels and all associated infrastructure could cause disturbance to the land, potentially affecting soil and agricultural land quality, for example from compaction.

5.6.3.2 Potential benefits to soil structures may arise due to the continued and undisturbed grass coverage of land previously under an arable rotation, although the longevity of any benefits after decommissioning would depend upon the reinstated land use.

5.7 Design, mitigation and enhancement measures

5.7.1 Design Principles

5.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

5.7.2 Embedded and good practice measures

5.7.2.1 Embedded measures are modifications to the design of a scheme, made during the design and assessment stage, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard

approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

5.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to Agricultural Land and Soils are likely to include:

- Where possible, underground cables would be installed using a cable plough or trenching. These are considered the most efficient and least impactful methods of cable installation, causing minimal disruption to the ground by cutting, installing and back-filling in one operation
- SuDS will be provided at source, ensuring that surface water run-off is managed consistently with existing site conditions

5.7.2.3 Further embedded measures are likely to include:

- Avoiding or reducing fragmentation of residual agricultural land
- Adopting and implementing good practice measures for all phases of the Proposed Development to minimise damage to soils that remain in place and those that are stripped, stockpiled and reinstated; minimise soil carbon losses; maintain water infiltration; and enhance soil biodiversity.

5.7.2.4 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

5.7.3 Further mitigation

5.7.3.1 Further mitigation comprises actions that require further activity in order to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for Agricultural Land and Soils will be defined in the ES once the level of effects is known. Options for further mitigation for the Proposed Development relevant to Agricultural Land and Soils may include:

- Co-location of solar panels and food production and other functions
- Regenerative soil management practices

5.7.4 Management plans

5.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, relevant to Agricultural Land and Soils including:

- oCEMP
- oLEMP, including general operational measures alongside those specific to landscape and ecology
- oDEMP
- oSRMP

5.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

5.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

5.8 Likely significant effects

5.8.1 Construction

5.8.1.1 The loss of approximately 1,400ha of productive arable land for a period of 40 years would be a long-term change in land use and would be likely to involve areas of BMV land. This could be significant in EIA terms and is therefore **scoped in** for further assessment.

5.8.1.2 The extent of soil disturbance during the construction phase would relate to the locations of compounds, access tracks and built structures which may require topsoil stripping and storage. Soil disturbance would also occur along the cable route/s. There are medium loamy topsoil textures which could be susceptible to damage through handling. Impacts on soil resources could be significant and are therefore **scoped in** for further assessment.

5.8.2 Operation

5.8.2.1 There are no operational impacts anticipated, therefore, effects during the operational phase are **scoped out** of further assessment.

5.8.3 Decommissioning

5.8.3.1 Decommissioning could return the land to full arable production, with the soils having been largely fallow for a period of 40 years. There would be potentially significant beneficial effects for agricultural land and soils to consider which are **scoped in** for further assessment.

5.9 Proposed assessment methodology

5.9.1.1 The proposed assessment methodology is based on determining the sensitivity and magnitude of change on the relevant receptors of agricultural land and soil resources. The sensitivity of the agricultural land and soil receptors has been taken from the IEMA guidance [38] and is set out in Table 5-4.

Table 5-4 Criteria for determining receptor sensitivity

Sensitivity	Agricultural land	Soil resources
Very High	Grades 1 and 2	Peat soils
High	Subgrade 3a	Soils with high clay and silt fractions (clays, silty clays, sandy clays, heavy silty clay loams and heavy clay loams) and organo-mineral and peaty soils where the Field Capacity Days (FCD) are 150 or greater or Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where the FCDs are 225 or greater or All soils in wetness class (WC) V or VI
Medium	Subgrade 3b	Clays, silty clays, sandy clays, heavy silty clay loams, heavy clay loams, silty loams and organo-mineral and peaty soils where the FCDs are fewer than 150 or Medium-textured soils (silt loams, medium silty clay loams, medium clay loams and sandy clay loams) where FCDs are fewer than 225 or Sands, loamy sands, sandy loams and sandy silt loams where the FCDs are 225 or greater or are in WCIII and WCIV
Low	Grades 4 and 5	Soils with a high sand fraction (sands, loamy sands, sandy loams and sandy silt loams) where the FCDs are fewer than 225 and are in WCI and II
Negligible	As for low sensitivity but with only indirect, tenuous and unproven links between sources of impact and soil functions (including ALC as a function of biomass production)	N/A

5.9.1.2 The magnitude of change is also taken from the IEMA guidance [38] and set out in Table 5-5. The guidance may not have envisaged the scale of the Proposed Development but, as a temporary reversible development, the guidance categorises the magnitude of change as minor.

Table 5-5 Criteria for determining the magnitude of change

Magnitude	Agricultural land and soils
Major	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20ha or loss of soil-related features (e.g. biomass production, habitat support, soil carbon, soil hydrology) or Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20ha, or gain in soil-related features
Moderate	Permanent, irreversible loss of one or more soil functions or soil volumes, over an area of between 5 and 20ha or loss of soil-related features or Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5 and 20ha, or gain in soil-related features
Minor	Permanent, irreversible loss over less than 5ha or a temporary, reversible loss of one or more soil functions or soil volumes, or temporary, reversible loss of soil-related features or Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5ha or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features
Negligible	No discernible loss or reduction or improvement of soil functions or soil volumes that restrict current or proposed land use

5.9.1.3 The overall significance of effect is then determined according to the standard significance criteria, provided in Chapter 4 Approach to EIA of this report.

5.10 Assumptions, limitations and uncertainties

5.10.1.1 The data on ALC within the draft Order Limits for the purposes of this Scoping Report is from desk-based information publicly available at the time of writing. ALC surveys will be undertaken following agreement with Natural England to inform the design development and the ES. Otherwise there are no assumptions, limitations or uncertainties relating to the assessment of effects on Agricultural Land and Soil.

5.11 Summary

Table 5-6 Agricultural Land and Soils scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Loss of agricultural land, including that of BMV quality	Scoped in	Scoped out	Scoped in	ALC surveys will be undertaken in 2024 and/or 2025. The survey approach will be confirmed following consultation with Natural England
Impacts to agricultural holdings / farm businesses	Scoped out	Scoped out	Scoped out	None
Loss of or damage to soil resources	Scoped in	Scoped out	Scoped in	Surveys will be undertaken in 2024 and/or 2025. The survey approach will be confirmed following consultation with Natural England

6 Air Quality

6.1 Introduction

6.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of air quality.

6.1.1.2 It sets out air quality receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

6.1.1.3 The following matters have been considered as part of the scope and methodology for air quality:

- Dust and particulate matter generation during the construction and decommissioning phases
- Impact of emissions from development-generated traffic in the construction, operational and decommissioning phases

6.1.1.4 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 7 Biodiversity, including:
  - Figure 7.2 Designated Wildlife Sites within 10km
  - Figure 7.3 Local Wildlife Sites within 2km
  - Figure 7.4 Ancient Woodland within 2km
  - Figure 7.5 Priority Habitats within 2km
- Chapter 16 Noise and Vibration, including:
  - Figure 16.1 Noise Sensitive Receptor Plan
- Chapter 18 Traffic and Transport

6.2 Relevant legislation, policy, standards and guidance

6.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for air quality and have informed the scope of the assessment.

6.2.2 Legislation

Table 6-1 Legislation

Legislation	Relevance to assessment
The Environment Act 2021 [48]	Required the UK government to prepare a national Air Quality Strategy. The latest air quality strategy was published in 2023 to fulfil the statutory requirement of the of the Environment Act 1995 as amended by the Environment Act 2021. The strategy sets out the actions local authorities are expected to take in support of long-term air quality goals, including ambitious new PM2.5 targets which have been set through the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 [49] .
The Air Quality Standards Regulations 2010 [50]	Transposes the EU limit values set out within the Ambient Air Quality Directive 2008/50/EC into UK legislation. These are largely the same as the Air Quality Standards and Objectives defined in earlier Air Quality Regulations as *"the maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale.".* *See also the Air Quality (Amendment of Domestic Regulation)* (EU Exit) Regulations 2019 [51]. This instrument amends domestic legislation that implements EU air quality legislation to ensure it continues to be operable after the withdrawal of the UK from the EU.

6.2.3 Policy

Table 6-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for energy (EN-1), 2024 [52]	Sets broad national policy approach. Section 5.2 addresses air quality outlining approach to assessment of impacts and determining requirement for mitigation (if required), including the following paragraphs of relevance: Paragraph 5.2.1 states: "*Energy infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emissions to air which could lead to adverse impacts on health, on protected species and habitats,169 or on the wider countryside and species. Air emissions include particulate matter (for example dust) up to a diameter of ten microns (PM10) and up to a diameter of 2.5 microns (PM2.5) as well as gases such as sulphur dioxide, carbon monoxide and nitrogen oxides (NOx).*" Paragraph 5.2.12 states: "*Where a proposed development is likely to lead to a breach of any relevant statutory air quality limits, objectives or targets, or affect the ability of a noncompliant area to achieve*

Policy	Relevance to assessment
	compliance within the timescales set out in the most recent relevant air quality plan/strategy at the time of the decision, the applicant should work with the relevant authorities to secure appropriate mitigation measures to ensure that those statutory limits, objectives or targets are not breached." In respect of mitigation, paragraph 5.2.14 states: "*The mitigations identified in Section 5.14 on traffic and transport impacts will help mitigate the effects of air emissions from transport*"
National Policy Statement for renewable energy infrastructure (EN-3), 2024 [53]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects.
National Policy Statement for electricity networks infrastructure (EN-5), 2024 [54]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for air quality, beyond those general requirements for 'good design' for the routing of new overhead lines and design and siting of substations in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19).
National Planning Policy Framework, December 2023 [9]	Defines how air quality is considered in relation to the planning process, at paragraph 192: "Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas (AQMAs) and Clean Air Zone (CAZs), and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in AQMAs and CAZs is consistent with the local air quality action plan."
Breckland Local Plan, September 2023 [10]	Local Plan currently in use, defines local planning policy in Breckland Council. Policies relevant to air quality as follows: Policy COM 01 – Design New development should be designed to the highest possible standards. All new development must achieve a specification of high architectural, urban and landscape design quality and contribute to the distinctive character and amenity of the local area. The Council will promote high quality design in the District by

Policy	Relevance to assessment
	requiring that the design of new development meets the following criteria: o. Development should be designed to reduce the impact on local air quality, particularly from road traffic, especially in those areas in or likely to impact on, areas identified as 'at risk' of exceeding air quality objectives. Policy COM 02 – Healthy Lifestyles New development will be expected to take appropriate steps to avoid/mitigate potential negative effects on the health of the population and facilitate enhanced health and well-being through the provision of conditions supportive of good physical and mental health iii) An assessment of the likely impact of the development on air quality, for development of 5 dwellings/1,000m2 of non-residential or more, in or impacting on areas identified as 'at risk' of exceeding air quality objectives. Policy COM 03 Protection of Amenity For all new development consideration will need to be given to general amenity impact issues, especially residential amenity. Development will not be permitted which causes unacceptable effects on the residential amenity of neighbouring occupants, or does not provide for adequate levels of amenity for future occupants. In assessing the impact of development on the living conditions of occupants, regard will be had to the following amenity considerations: 8. Other forms of pollution (including contaminated land, dust, air pollution, for example the emission of particulates etc).
Department of Environment, Food and Rural Affairs, Air Quality Strategy: Framework for Local Authority Delivery, August 2023 [54]	Establishes the framework for air quality management in England. Air quality standards and objectives are set out for eight pollutants which may potentially occur at levels that give cause for concern. The strategy also provides details of the role that local authorities are required to take in working towards improvements in air quality, known as the Local Air Quality Management (LAQM) regime. The current strategy supersedes the previous 2007 strategy in England only and provides a framework to enable local authorities to make the best use of their powers and make improvements for their communities. It also includes guidance on the new fine particulate matter targets for England.

6.2.4 Standards and guidance

Table 6-3 Standards and guidance

Standards and guidance	Relevance to assessment
Department for Communities and Local Government, Planning Practice Guidance: Air Quality (November 2019) [55]	States that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impacts in an area where air quality is known

Standards and guidance	Relevance to assessment
	to be poor, or where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of legislation (including that applicable to wildlife). Where a proposed development is anticipated to give rise to concerns about air quality, an appropriate assessment needs to be carried out. Where the assessment concludes that the proposed development (including mitigation) will not lead to an unacceptable risk from air pollution, prevent sustained compliance with national objectives or fail to comply with the requirements of the Habitats Regulations, then the local authority should proceed to decision with appropriate planning conditions and/or obligations.
Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance, August 2022 (LAQM.TG(22)) [56]	LAQM.TG(22) defines the air quality monitoring, data processing and assessment methodologies for Local Air Quality Management, and defines the assessment requirements and approaches for different pollutants and sources.
Institute for Air Quality Management (IAQM), Guidance on the Assessment of Dust from Demolition and Construction (January 2024) [57]	Provides assessment methodologies for assessment of the impacts of construction dust with emphasis on classifying levels of risk, in order to allow mitigation measures appropriate to the level of risk to be identified.
IAQM, Land-Use Planning and Development Control: Planning for Air Quality (January 2017) [58]	Sets out assessment methodologies for assessment of impacts of developments on local air quality, especially in relation to the impacts of development-generated road traffic on pollutant concentrations at existing receptor locations.

6.3 Consultation

6.3.1.1 The following stakeholders will be consulted with regards to air quality as part of the assessment process:

- The Environmental Health Officer (EHO) at Breckland Council

6.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to air quality.

6.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

6.4 Study area

6.4.1.1 In relation to construction dust, as well as dust emissions during the decommissioning phase, existing human sensitive receptors located within 250m of the draft Order Limits and/or within 50m of the route that construction vehicles will take (up to 500m from the draft Order Limits access points) have been identified.

6.4.1.2 The exact number and distribution of construction traffic on the network is not known at the time of writing, therefore, the Affected Road Network (ARN) is not yet confirmed. In line with Chapter 18 Traffic and Transport, the roads likely to be included in that assessment are:

- A47 from Narborough to Dereham (road safety and driver delay only)
- A1065 at the interchange with the A47 at Swaffham (road safety and driver delay only)
- A1075 from junction with A47 to Crowshill (road safety and driver delay only)
- A1122 between the junctions with the A37 and Chalk Lane
- Swaffham Road/Dereham Road at Wendling

6.4.1.3 The ARN for any air quality assessment, if required, would be only those links that meet criteria identified in IAQM Guidance [58]; those relevant to the Proposed Development include:

- A change of Light Duty Vehicle (LDV) (cars and small vans <3.5t gross vehicle weight) flow of:
  - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA
  - more than 500 AADT elsewhere.
- A change in Heavy Duty Vehicle (HDV) (goods vehicles and buses >3.5t gross vehicle weight) flow of:
  - more than 25 AADT within or adjacent to an AQMA
  - more than 100 AADT elsewhere.

6.5 Baseline conditions

6.5.1 Desktop sources used

6.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Breckland Council's Air Quality Status Report [59]
- Defra UK Air Quality Limits: National air quality objectives website [60]
- Defra MAGIC Mapping Tool [61]

6.5.2 Surveys undertaken and proposed

6.5.2.1 No surveys are required in respect of air quality.

6.5.3 Existing baseline

Air Quality Management Areas

6.5.3.1 The draft Order Limits are not located within an Air Quality Management Area (AQMA), which shows that the Proposed Development is located in an area where National air quality objectives are being met and concentrations of pollutants such as, nitrogen dioxide (NO_2) or fine particulate matter (PM_{10}), are not exceeding their annual mean air quality objective.

6.5.3.2 The nearest AQMA to the Proposed Development is Breckland Council AQMA Number 2, ID 1259, located approximately 900m south of the draft Order Limits at its closest point in Swaffham town centre alongside the A1065, and it has been declared for exceedances of the annual NO_2 air quality objective (AQO).

Air Quality Status Report

6.5.3.3 Breckland Council's Air Quality Status Report (ASR) (2023) [59] reports the air quality monitoring results for measured pollutants (NO_2 and PM_{10}). Currently $PM_{2.5}$ is not completed within Breckland, however, the $PM_{2.5}$ concentrations can be estimated from PM_{10} monitoring using either a local PM_{10} and $PM_{2.5}$ monitoring ratio, or a nationally derived correction ratio of 0.7. A new dual $PM_{2.5}$ and PM_{10} analyser has been purchased to replace faulty equipment and will allow for future $PM_{2.5}$ monitoring from 2023 within Breckland Council.

6.5.3.4 There have been no exceedances of the annual mean objective of 40µg/m^3 for NO_2 at any monitoring location in the past five years. In 2022, there were only three daily mean exceedances of 50µg/m^3 (which is below the allowed maximum of 35), and the annualised annual mean PM_{10} concentration at Breckland East Wretham (BRE01) air quality monitoring site was 15.0µg/m^3 (which is below the annual mean PM_{10} Air Quality Objective of 40µg/m^3). It should be noted, however, that the BRE01 site's data capture was low (67.6%) due to a sensor fault and emergency shutdowns for repairs. Due to lack of monitoring for $PM_{2.5}$, the nationally derived correction ratio of 0.7 was applied to the 2022 Breckland Council LAQM Annual Status Report 2023 PM_{10} concentration (15µg/m^3) at the automatic monitoring site BRE01. Based on this, there were no exceedances in $PM_{2.5}$ against the AQO [59].

Defra Predicted Concentrations

6.5.3.5 Background concentrations for the draft Order Limits have been obtained from the national maps published by Defra [60]. These estimated concentrations are produced on a 1km x 1km grid basis for the whole of the UK. The draft Order Limits fall into multiple grid squares, therefore a grid square for each Panel Area has been selected, and an overall average taken. Predicted concentrations for the grid squares for NO_2, PM_{10} and $PM_{2.5}$ for 2024 are provided in Table 6-4.

Table 6-4 Estimated Annual Mean Background Concentrations in 2022 in µg/m³ [60]

Panel Area	Grid Square	NO_2	PM_{10}	$PM_{2.5}$
Western Panel Area	X 575500 Y 308500	5.77	15.61	8.68
Central Panel Area	X 582500 Y 311500	5.79	15.99	8.67
Northern Panel Area	X 592500 Y 313500	6.18	15.15	8.59
Eastern Panel Area	X 595500 Y 311500	5.93	14.9	8.43
Southern Panel Area	X 589500 Y 306500	5.49	14.43	8.31
		5.83	**15.22**	**8.54**

6.5.3.6 Based on the results outlined in Table 6-4, the modelled background concentrations for the draft Order Limits are below the relevant annual mean objective levels for NO_2, PM_{10} (40µg/m³) and $PM_{2.5}$ (25µg/m³).

Existing Sensitive Receptors

6.5.3.7 There are a number of ecological receptors in the area, including Breckland Special Protection Area (SPA) and Breckland Forest Specialist Site of Scientific interest (SSSI) which is located immediately adjacent to the draft Order Limits for the western panel area, and is situated either side of the A1065 around 3.5km south of the Proposed Development and 2.5km south of Swaffham town centre. A full list of internationally, nationally and locally designated sites are located within Chapter 7 Biodiversity of this report and are presented on Figures 7.2 to 7.5.

6.5.3.8 Other sensitive receptors such as residential properties and local farms located within 500m of the draft Order Limits are listed in Chapter 16 Noise and Vibration of this report and are presented on Figure 16.1.

6.5.4 Future baseline

6.5.4.1 It is assumed that future baseline pollutant concentrations within the draft Order Limits would reduce compared to the present level, continuing the current trend. Emissions due to road traffic, especially those of NO_2, are gradually declining owing to changes in the composition of the vehicle fleet with improving emission performance of newer vehicles and the increasing uptake of low-emission vehicles and electric vehicles (EVs).

6.6 Potential impacts

6.6.1 Construction

6.6.1.1 During construction, there is the potential for dust soiling and human health effects as a result of dust and particulate matter (PM_{10}) emissions. These effects may be experienced at existing sensitive receptors as a result of, earthworks and construction, and through the track-out of dirt and mud onto the public highway.

6.6.1.2 During construction there is the potential for air quality effects on concentrations of NO_2, PM_{10} and $PM_{2.5}$ particularly at existing sensitive receptors within 200m of the proposed routes as a result of emissions from construction and Non-Road Mobile Machinery (NRMM) vehicles.

6.6.2 Operation

6.6.2.1 During the operation phase of the Proposed Development, there is the potential for emissions from operational vehicles servicing the Proposed Development impacting upon local air quality.

6.6.2.2 Owing to the nature of the Proposed Development as a solar farm, no emissions will be produced from the operational phase as no combustion is proposed. Operational traffic would be minimal, limited to occasional vehicles for maintenance activities, and the area is largely rural with low background traffic and emissions. Therefore, operational impacts from emissions are **scoped out** from further assessment.

6.6.3 Decommissioning

6.6.3.1 The decommissioning phase of the Proposed Development will comprise activities similar to the construction phase and as such impacts felt are expected to be the same.

6.7 Design, mitigation and enhancement measures

6.7.1 Design principles

6.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

6.7.2 Embedded and good practice measures

6.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

6.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to air quality are likely to include:

- An appropriate buffer will be maintained between properties and construction areas.

6.7.2.3 Construction dust assessment, with recommended mitigation measures following best practice measures set out in IAQM guidance. The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO. Examples of such measures include:

- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable;
- ensuring all vehicles switch off engines when stationary – no idling vehicles; and
- avoiding the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.

6.7.2.4 An oCTMP will support the DCO application and include measures such as appropriate traffic planning and HGV management, including a requirement to minimise the number of HGVs routing through Swaffham town centre.

6.7.3 Further mitigation

6.7.3.1 Further mitigation is actions that require further activity to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for air quality will be defined through the EIA process once the level of significance of effects is known.

6.7.3.2 It is considered that with appropriate site-specific construction and decommissioning dust mitigation in place, including management plans listed in section 12.7.4 below, the residual effects on receptor locations during the construction and decommissioning phases are anticipated to be not significant and as such further mitigation is unlikely to be required.

6.7.3.3 It is not anticipated that there will be any specific requirements for mitigation measures associated with the operational phase of the Proposed Development

6.7.4 Management plans

6.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to air quality include:

- oCEMP
- oDEMP
- oCTMP

6.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

6.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final

management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

6.8 Likely significant effects

6.8.1 Construction

6.8.1.1 During construction, there is the potential for dust soiling and human health effects as a result of dust and particulate matter (PM_{10}) emissions from both construction processes and the operation of NRMM on-site. This will be considered through undertaking a Construction Dust Assessment in line with relevant IAQM guidance to identify likely impacts and appropriate mitigation measures to be applied accordingly.

6.8.1.2 An oCEMP will be produced as part of the DCO application, which will include construction dust assessment and mitigation measures and follow the best practice measures set out in the IAQM guidance. These measures, commitments and actions will be carried forward to a CEMP which will be produced by appointed construction contractor and agreed with the relevant local planning authorities prior to the commencement of construction.

6.8.1.3 It is anticipated that with the implementation of suitable site-specific mitigation measures through the oCEMP, the residual effects of construction dust and particulates on existing sensitive receptors will not be significant.

6.8.1.4 During construction it is anticipated that there will be a maximum of 60 HGV trips per day (120 two-way movements) during peak construction periods, distributed across the network and access points around the draft Order Limits. Furthermore, a maximum of 60 car sharing trips and 8 mini-bus trips (LDVs) per day are estimated during peak construction activity to transport construction workers to and from the Panel Areas, distributed across the multiple construction compound locations yet to be identified.

6.8.1.5 The expected construction programme would be in stages over 24 months as described in Chapter 2 of this report. The anticipated peak construction activities and traffic flows are not likely to be maintained for a period of greater than a few months, therefore cannot be directly compared to the screening criteria in the IAQM Guidance which are provided in AADT. If the peak flows were converted to AADT, i.e. averaged over the year including periods of less than peak activity, the flows would likely be considerably below the IAQM criteria of 100 AADT for HGVs and 500 AADT for LDVs, where there is no AQMA. Therefore, there would be no ARN for air quality as no significant effects from construction traffic would be expected. Furthermore, the traffic flows would be distributed across several links and access points, further reducing the likely flows on any single link below screening criteria confirming that further assessment is not required.

6.8.1.6 As identified in section 6.5.3 there is an AQMA declared for NO_2 in Swaffham town centre, 900m south of the Proposed Development, alongside the A1065 which would mean the more stringent criteria in IAQM guidance should be considered for

this link. However, as Chapter 18 Traffic and Transport and section 6.4 of this report which describe the study area highlight, the influence of the Proposed Development on traffic along the A1065 to the south would be limited to north of the interchange with the A47, at which point construction traffic would use the A47 east and/or west rather than travel further south on the A1065 through Swaffham town centre. If the peak flows were converted to AADT, i.e. averaged over the year including periods of less than peak activity, the flows would likely be considerably below the IAQM criteria of 100 AADT for HGVs and 25 AADT for LDVs, adjacent to an AQMA. An oCTMP will support the DCO application and include measures such as appropriate traffic planning and HGV management, including a requirement for HGVs to avoid Swaffham town centre where practicable.

6.8.1.7 There are few other existing sensitive receptors in the surrounding area, such as residential properties and local farms (similar to noise sensitive receptors shown on Figure 16.1) or designated ecological sites (shown in Figures 7.2 to 7.5), which limits the potential number of receptors that could be affected. The proximity of these receptors to the highway is not relevant as no link is expected to experience changes in traffic above the screening criteria that would require further assessment as described in paragraph 6.8.1.5 above. It is therefore considered that the impact of emissions from construction vehicles at existing sensitive receptors will not be significant.

6.8.1.8 As a result, an assessment of effects upon air quality during construction, in addition to the proposed dust assessment, is **scoped out** from further assessment.

6.8.2 Operation

6.8.2.1 There will be no ongoing emissions generated from operation of the proposed infrastructure.

6.8.2.2 Traffic generation in the operational phase will be substantially lower than construction, and therefore lower than the Air Quality assessment criteria within IAQM guidance and as such, it is considered that the impact of emissions from development-generated traffic in the operational phase on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at existing sensitive receptors will not be significant.

6.8.2.3 As a result, an assessment of effects upon air quality during operation is **scoped out** from further assessment.

6.8.3 Decommissioning

6.8.3.1 The decommissioning phase of the Proposed Development will comprise activities similar to the construction phase and are not expected to result in any greater effects on air quality.

6.8.3.2 The potential limited effects of the Proposed Development on local air quality during decommissioning are associated with dust and traffic associated with movement of materials, as well as particulate emissions from NRMM.

6.8.3.3 It is anticipated that with the implementation of suitable site-specific mitigation measures through the oDEMP, the residual effects of decommissioning dust and PM_{10} on existing sensitive receptors will not be significant.

6.8.3.4 Decommissioning is likely to give rise to lower trip forecast compared to the construction phase as the 400kV substation will be left in situ. And as such anticipated traffic generation will be below the applicable IAQM thresholds for detailed assessment, namely a change of 500 Annual Average Daily Traffic (AADT) movements overall, or 100 AADT for HGVs. It is therefore considered that the impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at existing sensitive receptors resulting from emissions from vehicles associated with decommissioning activities will not be significant.

6.8.3.5 As a result an assessment of effects upon air quality during decommissioning is **scoped out** from further assessment.

6.9 Proposed assessment methodology

6.9.1.1 The ES will not contain an assessment of air quality impacts as all aspects have been scoped out of further assessment. However, a construction and decommissioning dust assessment will be undertaken to identify site specific mitigation measures required to be adopted, and will feed into the oCEMP and oDEMP that support the DCO application.

6.9.1.2 The construction phase dust assessment will be undertaken in accordance with the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction (January 2024)' [57]. The assessment will consider the potential dust soiling, human health and ecological effects (where applicable) at existing sensitive receptor locations, as a result of demolition, earthworks, construction and the trackout of dirt and mud onto the public highway.

6.10 Assumptions, limitations and uncertainties

6.10.1.1 In accordance with the methodology detailed in the IAQM guidance [57], the construction phase assessment will assume that no mitigation measures are applied, except those required by legislation such as on-site activities to operate in accordance with the Environmental Permitting Regulations 2010, i.e. Process Guidance Notes 3/16 and 3/1. Further information relating to legislation to control dust emissions from construction sites is provided in Sections 4.1 and 7.1 of the IAQM guidance.

6.10.1.2 Screening criteria to determine whether the level of traffic generation in the construction, operational and decommissioning phase requires detailed assessment has been applied as per the appropriate IAQM guidance [58]; this methodology assumes no mitigation.

6.11 Summary

Table 6-5 Air quality scoping summary

Aspect	**Construction**	**Operation**	**Decommissioning**	**Any required surveys?**
Dust and particulate matter	Scoped out - construction dust assessment will support the DCO application	Scoped out	Scoped out	None
Vehicle emissions	Scoped out	Scoped out	Scoped out	None
Combustion emissions	Scoped out	Scoped out	Scoped out	None

7 Biodiversity

7.1 Introduction

7.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of biodiversity.

7.1.1.2 It sets out ecological receptors of relevance, proposed ecological surveys that have been undertaken to date and will be undertaken to inform the assessment, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

7.1.1.3 The following matters have been considered as part of the scope and methodology for biodiversity:

- Impacts to statutory and non-statutory designated sites
- Loss of habitat
- Impacts to protected and notable species

7.1.1.4 This chapter is supported by the following figures:

- Figure 7.1 Waterbody Location Plan
- Figure 7.2 Designated Wildlife Sites within 10km
- Figure 7.3 Local Wildlife Sites within 2km
- Figure 7.4 Ancient Woodland within 2km
- Figure 7.5 Priority Habitats within 2km

7.1.1.5 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development, including:
  - Figure 2.1 the Draft Order Limits

7.2 Relevant legislation, policy, standards and guidance

7.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for biodiversity and have informed the scope of the assessment.

7.2.2 Legislation

Table 7-1 Legislation

Legislation	Relevance to assessment
The Environment Act 2021	The Environment Act (November 2021) makes it mandatory for the vast majority of development projects to deliver a 10% Biodiversity Net Gain (BNG). Further secondary legislation is required to apply the BNG requirement to NSIP developments. Previous consultation has set the expectation that a BNG requirement will be imposed on NSIP projects from November 2025, with the level of the requirement detailed within a BNG Statement(s) (subject to prior publication) but presently expected to be set at the same 10% level. A BNG assessment will be prepared for the project to describe the expected biodiversity change post-development.
Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations')	These regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna ('the Habitats Directive') into national law. They also transpose elements of Council Directive 2009/147/EC on the conservation of wild birds ('the Birds Directive'). The Habitats Regulations provide the framework for the protection of Natura 2000 sites (now referred to as the national site network following the amendments that came into force on 31 December 2020), and for certain flora and fauna (known as European Protected Species (EPS)). The regulations set out the process for the assessment of development. The Proposed Development may result in effects on constituents of the national site network and EPS which require assessment in line with the Habitats Regulations.
Natural Environment and Rural Communities Act 2006 (the 'NERC Act');	The NERC Act (amongst other matters) places a duty to conserve biodiversity on public authorities in England. This requires local authorities and government departments to have regard to the purposes of conserving biodiversity in a manner that is consistent with the exercise of their normal functions. The NERC Act also places a duty on the Secretary of State to maintain lists of species and habitats which are regarded as being of principal importance for the conservation of biodiversity in England. These Habitats of Principal Importance (HPI) and Species of Principal Importance (SPI) are used to guide decision makers in implementing their duties to have regard to the conservation of biodiversity in England when carrying out their normal functions. The Proposed Development may result in effects on HPI and SPI in England.
Countryside and Rights of Way Act 2000 (the 'CRoW Act')	The CroW Act, amongst other elements, details further measures for the management and protection of Sites of Special Scientific Interest (SSSI) and strengthens wildlife enforcement legislation. The Proposed Development may result in effects on SSSIs and protected flora and fauna.
The Hedgerows Regulations 1997 (the 'Hedgerow Regulations')	The Hedgerows Regulations facilitate the protection of hedgerows growing in or adjacent to common land, protected land or land used for agriculture, forestry or the breeding and keeping of horses, ponies, or donkeys. The Proposed Development may result in effects on hedgerows deemed important by the Hedgerows Regulations.

Legislation	Relevance to assessment
Protection of Badgers Act 1992 (the 'Protection of Badgers Act')	The Protection of Badgers Act consolidated and improved protection for badgers. It specifically makes it an offence to kill, injure or take a badger, or damage or interfere with a sett unless a licence has been obtained from a statutory authority. The Proposed Development may result in effects on badgers and their setts.
Wildlife and Countryside Act 1981 (as amended) (WCA)	The WCA consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats ('the Bern Convention') and Council Directive 79/409/EEC on the conservation of wild birds (Birds Directive). Amongst other matters it provides protection for wild birds, certain flora and fauna and sets the framework for the protection and management of SSSIs. The Proposed Development may result in effects on SSSIs and protected flora and fauna.
The Management of Hedgerows (England) Regulations 2024	The Management of Hedgerows Regulations outline cutting restrictions, buffer zones and hedgerow responsibilities. Cutting and trimming of important hedgerows is prohibited from March 1st to August 31st each year, with exceptions for safety reasons or maintaining public pathways.

7.2.3 Policy

Table 7-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for Energy (EN-1), 2024 [62]	Sets broad national policy approach. Section 5.4 Biodiversity and Geological Conservation addresses Biodiversity, outlining approach to assessment of impacts and determining requirement for mitigation (if required), including the following paragraphs of relevance: Paragraph 5.4.17 states: "*Where the development is subject to EIA, the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity, including irreplaceable habitats*." In respect of mitigation, paragraphs 5.4.35 – 5.4.40 outlines appropriate mitigation measures to minimise any adverse impacts.
National Policy Statement for Renewable Energy Infrastructure (EN-3), 2024 [63]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3..Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects,

Policy	Relevance to assessment
	the benefits [of the infrastructure] will generally be considered to outweigh residual effects.
National Policy Statement for electricity networks infrastructure (EN-5),2024 [64]	NPS EN-5 addresses policy for energy transmission, including the routing of overhead lines and undergrounding cables, and general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19).
25 Year Government Environment Plan [65]	The plan promotes biodiversity improvements through sustainable development. It outlines the potential impact of solar farms on landscapes and encourages developers to consider these impacts during the planning process.
Biodiversity 2020: A strategy for England's Wildlife and Ecosystem Services [66]	The strategy encourages practices that minimise environmental impact and contribute to biodiversity improvements through ecologically beneficial design and implementation of BNG strategies.
National Planning Policy Framework (2023) [9]	The NPPF sets out the government's planning policies for England and how these should be applied. While the National Planning Policy Framework (NPPF) outlines the planning policies, it doesn't solely determine decisions on Nationally Significant Infrastructure Projects (NSIPs). The assessment for this NSIP will focus on relevant sections of the NPPF, particularly paragraphs 179-182 within Section 15: Conserving and enhancing the natural environment.
Breckland Local Plan [10]	The plan sets a spatial vision and strategy for the District, with economic, social and environmental objectives. Key Polices include: GEN 01: Sustainable Development in Breckland ENV 01: Green Infrastructure ENV 02: Biodiversity Protection and Enhancement ENV 03: The Brecks Protected Habitats & Species ENV 06: Trees, Hedgerows and Development ENV 10: Renewable Energy Development
Norfolk Strategic Planning Framework [67]	The planning framework includes strategy for the County. Key Sections include: Section 8: Climate Change Section 9: Infrastructure and Environment

7.2.4 Standards and guidance

Table 7-3 Standards and guidance

Standards and guidance	Relevance to assessment
Guidelines for Preliminary Ecological Appraisal, 2nd ed. Chartered Institute of Ecology and Environmental Management CIEEM 2017 [68]	Approaches to survey scope and methodology are undertaken in accordance with best practice guidance.
Guidelines for Ecological Impact Assessment in the UK and Ireland CIEEM, 2016. [69].	Approaches to assessment are undertaken in accordance with best practice guidance.

Standards and guidance	Relevance to assessment
UKHab Habitat Classification Version 2.0. UKHab 2023. [70]	Classification criteria for habitats will be used in the assessment.
The Statutory Biodiversity Metric User Guide November 2023 [71]	Draft guidance regarding the use of the Statutory Metric in the assessment of Biodiversity Net Gain.
Bird Survey Guidelines for Assessing Ecological Impacts. Bird Survey & Assessment Steering Group. 2023 [72]	Guidance on the methodology/approach to breeding and wintering bird surveys.
Bat Surveys for Professional Ecologists. 2023. [73]	Approaches to survey scope and methodology are undertaken in accordance with best practice guidance.
Surveying Badgers (1989) [74]	Guidance on the methodology/approach to survey badger.
Monitoring the Otter (2003) [75]	Guidance on the methodology/approach to survey otter.
Water Vole Conservation Handbook (2011) [76]	Best practice guidelines to survey water vole.
How to survey ponds for aquatic macroinvertebrate families (2015). Surveying terrestrial and freshwater invertebrates for conservation evaluation (2007) [77] [78]	Survey guidance on best practice to survey terrestrial and aquatic invertebrates.
Froglife (1999) Advice Sheet 9. Reptile Survey. An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation [79]	Guidelines on reptile surveys.
Technical advice note for field and laboratory sampling of great crested newt environmental DNA (2014) [80]	Guidance on methodology used to complete eDNA surveys for Great Crested Newts (GCN).

7.3 Consultation

7.3.1.1 The following stakeholders will be consulted with regards to biodiversity as part of the assessment process:

- Natural England will be consulted to provide a Discretionary Advice Service (DAS) in relation to the Proposed Development. Topics for discussion will include proximity to Breckland Special Protection Area (SPA), Great Crested Newt approach and overall scope and approach to the ecological assessment.
- Norfolk Biodiversity Information Service (NBIS) was contacted to provide historical biological data regarding protected species and habitats records.
- Breckland Council will be consulted regarding potential impacts to local wildlife and confirmation of policies to be used in consideration of strategic significance.

- Norfolk Wildlife Trust will be consulted regarding potential impacts to local wildlife.

7.3.1.2 An initial meeting with Breckland Council and the Norfolk County Council ecologist was held on 28 August 2024 to discuss approach to baseline surveys and assessment.

7.3.1.3 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to biodiversity.

7.3.1.4 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

7.4 Study area

7.4.1.1 The proposed study areas to inform the relevant assessments covers the draft Order Limits, plus varying Zones of Influence (ZoI) where applicable. For Panel Areas, these are:

- Land within the draft Order Limits will be assessed for it's potential to support protected species (including bats, great crested newts (GCN), otters, water voles, reptiles, badgers, breeding birds and wintering birds) as part of the Preliminary Ecological Appraisal (PEA), however, surveys for protected species will only be undertaken within the Panel Areas owing to likely impacts associated with the works.
- Habitats and botanical species composition within the draft Order Limits will also be recorded to allow habitat condition assessment and Biodiversity Net Gain calculations.
- Waterbodies inside and within 100m of the Panel Areas will be subject to Habitat Suitability Index (HSI) surveys for GCN. Waterbodies identified as providing better than "poor" suitability for GCN will be subject to eDNA surveys for GCN.
- Up to 30m from the Panel Areas to survey for badger signs and setts.
- 500m from the Panel Areas for non-breeding (wintering) bird surveys.
- Panel Areas for breeding bird surveys
- Western Panel Area for the Nightjar surveys and stone curlew surveys
- Watercourses within and 100m from the Panel Areas will be assessed for signs of and potential to support otter and water vole.
- 10km around the draft Order Limits for the desk-based study for Statutory designated sites of International/European importance, including Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites.

- A 2km buffer from the draft Order Limits for the desk-based study of all other statutory and non-statutory designated sites, as well as parcels of known ancient woodland, and records of legally protected and otherwise notable species

7.4.1.2 The extent of the desk study area(s) and field survey area were determined based on best practice guidance and a high-level overview of the types of ecological features present, and the potential effects that could occur. The study areas were defined on a precautionary basis to ensure that, as a minimum, the ZoI relevant to all ecological features are covered during baseline data collection activities.

7.4.1.3 Whilst the entire draft Order Limits are subject to preliminary baseline data collection, those areas more likely to host solar panels are subject to a greater degree of survey effort at this stage than other areas of the draft Order Limits. For the purposes of this scoping report, the draft Order Limits have been divided into five discrete areas on Figure 2.1.

7.5 Baseline conditions

7.5.1 Desktop sources used

7.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Multi-Agency Geographic Information for the Countryside (MAGIC maps) [61]
- Satellite imagery
- Ordnance survey maps
- NBIS data records

7.5.2 Surveys undertaken and proposed

7.5.2.1 The following surveys are underway at the time of writing this report:

- PEA, including extended UK HAB (UK Habitat Classification) survey and condition assessment for Biodiversity Net Gain within the draft Order Limits
- HSI surveys for GCN for ponds within and 100m from the Panel Areas
- Wintering and breeding birds surveys, including for stone curlew, woodlark and nightjar (partially complete) within the Panel Areas
- Static bat detector surveys to sample bat activity in habitats within the Panel Areas

7.5.2.2 The following surveys are planned to be undertaken, and will inform the ES:

- Riparian Mammal surveys (otter and water vole)
- Great crested newt eDNA (Environmental DNA presence / absence)
- Seasonal Night-time Bat Walkover Surveys

- Badger surveys.
- Riparian Mammal Surveys

7.5.2.3 Water vole (*Arvicola amphibius*) and otter (*Lutra lutra)* surveys will be undertaken in the breeding season which runs from April to October, with the first visit in April-June and the second visit in July-October. The surveys involved a visual inspection of the banks of the watercourse to look for signs of these species such as latrines, burrows and footprints.

Great Crested Newt Surveys

7.5.2.4 Habitat suitability assessments and eDNA sampling will be undertaken for all suitable waterbodies within the proposed panel areas and a surrounding buffer of 100m where access is available.

Badger Survey

7.5.2.5 Badger surveys will be undertaken during the period April – September (inclusive). The surveys will involve searches for signs of presence including dung pits, latrines, hairs, prints and feeding signs/remains. The survey will also seek to confirm the status of any recorded setts (active or disused) and to classify the sett with respect to its likely function within the social group.

Night-time Bat Walkover

7.5.2.6 Activity surveys comprising 3 x walked transects (Spring, Summer and Autumn) will be done, together with sampling from the collection of data from automated bat detectors placed within representative habitats and sampling bat activity over 5 consecutive days each month during the period May – September 2024 (inclusive). The automated detectors will be deployed within both linear and open habitats (simultaneously) such that impacts from the construction and installation of the panel arrays (within open areas) can be compared to activity levels at linear habitats such as hedgelines/streams and woodland edge, which will be retained. The detector locations will be rotated to maximise spatial coverage.

Breeding and Wintering Birds

7.5.2.7 A single year of bird surveys will be undertaken to characterise the assemblage and a single nonbreeding survey period (January – March inclusive) plus a single breeding survey period (March – June). Wintering bird surveys are completed on the panel areas excluding one area to the west which was added at a later date. Target Species identified consisted of wetland birds such as waders, waterfowl and gulls and Annex 1/Schedule 1 raptors and owls. The results to date do not suggest that a second year/season of surveys will be required, given the absence of species which are qualifying features of the SPA/Ramsar sites, and the separation distance to coastal sites with waterbird assemblages. A further three survey visits for breeding birds will be undertaken with during late May and early June. The final survey visit will be undertaken during mid June 2024. It is not proposed to undertake specific nocturnal/crepuscular surveys although data will be

supplemented by records of owl species recorded during the proposed bat activity transects.

7.5.2.8 Surveys for Nightjar will record the presence and distribution of churring males in the western parcel.

7.5.2.9 Surveys for Stone curlew include daytime visits along transect routes within the western parcel.

7.5.3 Existing baseline

7.5.3.1 A PEA of the draft Order Limits commenced in April 2024, and will inform the ecological baseline conditions. A suite of further surveys are proposed, as set out in Section 7.5.2 above, which will fully inform the baseline level biodiversity upon completion.

7.5.3.2 The draft Order Limits are located between the towns of Dereham and Swaffham in Norfolk. Preliminary results confirm that the majority of the land within the draft Order Limits is arable. There are some small areas of broadleaved and mixed woodlands and plantations, along with hedgerows and lines of trees, generally these form the field margins. Small amounts of grassland are present, mainly as strips alongside hedgerows.

7.5.3.3 A larger section of woodland (part of Breckland SPA) runs along part of the eastern boundary of the Western Panel Area. Ancient woodland is present along the boundary of the draft Order Limits and some within. The draft Order Limits are located within National Character Area (NCA) Profile: 84 Mid Norfolk (NE523).

7.5.3.4 The location and extent of habitats within the draft Order Limits are displayed on Figure 7.5.

Designated Sites

7.5.3.5 The following internationally designated sites are present within 10 km of the draft Order Limits and their location is shown on Figure 7.2 of this report:

Table 7-4 Internationally Designated sites within 10km of the draft Order Limits

Site Name	Site location	Summary of feature
Breckland SPA	Immediately south	Breckland SPA is a combined area of multiple SSSIs designated for the significant population of Stone curlew (*Burhinus oedicnemus)*, Nightjar (*Caprimulgus europaeus)* and Woodlark (*Lullula arborea)*.
Norfolk Valley Fens SAC	1.7km west	These sites support alkaline fens, one of two sites in East Anglia where this habitat occurs.
Breckland SAC	4.6km south	Inland dunes with open Corynephorus and Agrostis grasslands.
River Wensum SAC	8.2km northeast	Water courses running from plain to montane level. With Ranunculus vegetation occurring sporadically throughout.

7.5.3.6 The following nationally designated sites are present within 10 km of the draft Order Limits and their location is shown on Figure 7.2 of this report:

Table 7-5 Nationally Designated sites within 10km of the draft Order Limits

Site Name	Site location	Summary of feature
Breckland Forest SSSI	Immediately south-west of the site.	Presence of breeding birds including; nightjar and woodlark. The presence of schedule 8 plants: wormwood (*Artemesia campestris)*, red-tipped cudweed (*Filago lutescens)*, perennial knawel (*Scleranthus perennis)*, spiked speedwell (*Veronica spicata)*. As well as England red list endangered native mammal, red squirrel (*Sciurus vulgaris)*.
Holly Farm Meadow, Wendling SSSI	500m northeast	Presence of lowland mire grassland and rush pasture, lowland neutral grassland and valley fen.
Honeypot Wood, Wendling SSSI	820m northeast	Presence of broadleaved and yew mixed woodland.
Narborough rail-way Embank-ment SSSI	1.2km northwest	Presence of lowland calcareous grassland, including scrub and invert assemblages associated with open short sward and bare sand and chalk.
Potter & Scarning fens, East Dereham SSSI	1.7km east	Presence of lowland fen, marsh and swamp, including lowland valley fen. With invertebrate assemblages associated with sphagnum bog, moss & tussock, reed-fen & pools. As well as nationally rare damselfly species the small red damselfly (*Ceriagrion tenellum).*
Dereham Rush Meadows SSSI	2.4km northeast	Presence of lowland neutral grassland with sections of wet woodland, lowland wet neutral grassland and floodplain fen.
Castle Acre Common SSSI	3.5km north	Presence of lowland neutral grassland, including lowland floodplain fen.
Bradley Moor SSSI	3.9km north	Presence of lowland fen, marsh and swamp, including lowland valley fen. With invertebrate assemblages associated with lowland grass and rush pastures, moss & tussock, reed-fen & pools.
Wayland Wood, Watton SSSI	4km south	Presence of lowland broadleaved, mixed and yew woodland.
Great Cressing-ham Fen SSSI	4.2km southwest	Lowland basin fen and lowland neutral grassland present.
River Nar SSSI	4.2km north	Neutral lowland grassland with river supporting habitat including rivers and streams.
Dillington Carr, Gressenhall SSSI	4.5km northwest	Presence of broadleaved mixed and yew woodland, with sections of wet woodland and assemblages of breeding birds associated with lowland open water and woodlands.

Site Name	Site location	Summary of feature
Horse Wood, Mileham SSSI	4.6km north	Lowland broadleaved mixed and yew woodland, containing wet woodland.
Potter's Carr Cranworth SSSI	4.8km southeast	Presence of lowland broadleaved, mixed and yew woodland, including wet woodland.
Stanford training Area SSSI	4.8km south	Presence of wet woodland, lowland dray heath, lowland dry acid grassland, lowland calcareous grassland, karst habitats. Presence of invertebrate assemblages associated with grassland and scrub matrix and dragonfly assemblages.
Old Bodney Camp SSSI	5.2km southwest	Presence of fixed dune grassland, lowland calcareous grassland and lowland dry acid grassland. Nationally rare moth species present including lunar yellow underwing *(Noctua orbona)* and tawny wave *(Scopula rubiginata).*
Breckland farmland SSSI	5.3km south	Breeding stone curlew present.
Hooks Well Meadow, Great Cressingham SSSI	5.3km southwest	Lowland fen marsh and swamp in favourable condition.
Mattishall Moor SSSI	5.5km west	Presence of fen, marsh and lowland swamp, with lowland valley fen.
East Walton and Adcock SSSI	5.5km northwest	Presence of lowland calcareous grassland, including lowland neutral grassland, lowland mire grassland and rush pasture, lowland calcareous grassland, lowland floodplain fen and lowland basin fen. Invertebrate assemblages associated with moss & tussock fen and populations of Desmoulin's whorl snail and slender green feather moss *(Hamatocoulis vernicosus).*
Beetley & Hoe Meadows SSSI	5.9km northeast	Presence of valley fen, lowland neutral grassland, lowland mire grassland and rush pasture and lowland dry acid grassland.
Thompson water, Carr and Common SSSI	6.8km south	Presence of lowland calcareous grassland with great crested newt, associated invertebrate assemblages and assemblages of lowland open water breeding birds.
Rosie Curstons Meadow, Mattishall SSSI	7km west	Favourable condition lowland neutral grassland.
Boughton fen SSSI	7.1km southwest	Presence of fen, marsh and swamp, including lowland floodplain fen.

Site Name	Site location	Summary of feature
Field Barn Heaths, Hilborough SSSI	7.1km southwest	Lowland calcareous grassland.
Scoulton Mere (SSSI)	7.3km east	Presence of lowland fen marsh, swamp and mixed woodland. With a population of red data book plant crested buckler-fern *(Dryopteris cristata).*
Foulden Common SSSI	7.4km southwest	Presence of wet woodland, valley fen, lowland calcareous grassland; and invert assemblages associated with reed-fen & pools, moss & tussock fens and undisturbed fluctuating fen.
Gooderstone Warren SSSI	7.6km southwest	Presence of breeding stone curlew, fixed dune grassland, lowland calcareous grassland and lowland dry acid grassland.
East Winch Common SSSI	7.9km northwest	Presence of lowland dwarf shrub heath, including lowland dry heath and lowland wet heath.
River Wensum SSSI	8.2km northeast	Rivers and streams containing white-clawed crayfish *(Austopotamobius pallipes*), populations of mollusc Desmoulin's whorl snail (*Vertigo moulinsiana*), bullhead (*Cottus gobio*) and brook lamprey (*Lampetra planeri*).
Coston fen Runhall SSSI	9.4km southwest	Presence of lowland fen, marsh and swamp, including lowland valley fen and mire grassland.
Cranberry Rough Hockham SSSI	9.5km south	Presence of lowland fen marsh and swamp, including floodplain fen, wet woodland, basin fen with associated plant assemblages.

7.5.3.7 The following locally designated sites within 2 km of the draft Order Limits are described in Table 7-5 (shown in Figure 7.5 of this report) and will be included in the assessment if they meet one or more of the following criteria for potentially being affected:

- Occur within 2km of the draft Order Limits and meet at least one of the following criteria
- Occur within 500m of the draft Order Limits
- Are strongly connected by habitat to the draft Order Limits (e.g. by a river or continuous woodland
- Are cited for particularly mobile species such as birds, bats or highly mobile invertebrates (e.g. from Lepidoptera, Hymenoptera and Odonata)

Table 7-6 Non-Statutory Designated sites within 2km of the draft Order Limits

Site Name	Site location	Summary of feature
Necton Wood	Adjacent to the Northern Panel Area (centred on British National Grid Reference: TF90221080);	Ancient woodland
Sporle Wood	Immediately north of the Central Panel Area	Ancient woodland
Great Wood	Adjacent to the Northern Panel Area (centred on British National Grid Reference: TF91401023);	Ancient woodland
High Grove	Adjacent to the Southern Panel Area (centred on British National Grid Reference: TF92150710).	Ancient woodland
Church Farm Meadow (County Wildlife Site (CWS) REF 1011)	Located 380m east of the Northern Panel Area	Diverse grassland area hydrologically connected to the proposed panel area.
Wendling Carr (CWS REF 1013)	Located 1km northeast of the Eastern Panel Area	Damp grassland area
Smeeth Wood & Devil's Dyke (CWS REF 884)	Adjacent to the Western Panel Area	Wet Woodland
Disused Railway (CWS REF 718)	Located within the Southern Panel Area	Line of trees and scrub as part of the disused railway.
Land Northeast of Woodbottom (CWS REF 716)	Located 1.1km from the Southern Panel Area	Woodland
Saham Wood (CWS REF 714)	Located 1km from the Southern Panel Area	Woodland

Habitats

Habitats of Principal Importance

7.5.3.8 The desk study identified seven types of Habitats of Principal Importance present within 1 km of the draft Order Limits. These are listed, below, and illustrated on Figure 7.5:

- Deciduous woodland
- Chalk rivers
- Standing open water - ponds
- Coastal and floodplain grazing marsh
- Arable field margins
- Hedgerows
- Lowland calcareous grassland.

Habitats Potentially within the draft Order Limits

7.5.3.9 Priority habitats which are likely to be present within the draft Order Limits given the desk study and UKHab findings to date include:

- Deciduous woodland
- Standing open water - ponds
- Arable field margins
- Hedgerows.

7.5.3.10 No invasive non-native species (INNS) have been identified to date during the PEAs, and there are no records of invasive species within the draft Order Limits.

Protected and notable species

7.5.3.11 The following taxa and/or species are considered to be present or potentially present within the ZoI, based on the findings of the extended UKHab survey to date and the desk study.

Table 7-7 Locally Recorded Protected Species potentially within ZoI

Species	Summary of potential for species to occur within ZOI	Species protection
Great crested newts (*Triturus cristatus*);	There are a number of waterbodies located inside and within 100m from the Panel Areas with potential to support GCN. 86 records of GCN found within 2km of the draft Order Limits.	European protected species
Badgers (*Meles meles*);	Arable landscape with hedgerows, woodland and waterbody provides suitable habitat for badgers. Whilst no setts have been found to date, a number of latrines have been found. As such badgers setts may be present within the ZoI.	The Protection of Badgers Act
Bats	A number of mature trees within the draft Order Limits may provide roosting opportunities for bats. Woodlands and hedgerows provided within the ZoI provide potential habitat for foraging and commuting bats.	European protected species
Reptiles	Grass snake (*Natrix helvetica*) can traverse arable sites to connect to better habitat. May also be present in low density across the draft Order Limits where there is a suitable mosaic of habitat. Grass snake often found near waterbodies – of which there are a number across the draft Order Limits. It is conceivable that other species of reptiles such as common lizard (*Zootoca vivipara*) could occasionally be present within the draft Order Limits in low numbers. Four records of grass snake (*Natrix helvetica)* found within 2km of the draft Order Limits.	Protected under the Wildlife and Countryside Act
Nesting birds	All nesting birds are protected. The draft Order Limits offers suitable habitat for nesting including arable open landscape for ground nesting birds. A variety of other nesting opportunities for birds including	All nests/ eggs protected by Wildlife and Countryside Act

Species	Summary of potential for species to occur within ZOI	Species protection
	hedgerows, scrub, woodlands and waterbodies. Birds species are further discussed in Table 7-8 below.	
Riparian mammals	Streams and wet ditches that may be suitable for otter (*Lutra lutra*) and water voles (*Arvicola amphibius*) within the draft Order Limits. 19 records of otter within 2km of the draft Order Limits. 14 Records of water vole recorded within the draft Order limits.	Protected under the Wildlife and Countryside Act
Small mammals including hedgehog and brown hare	Suitable habitat for mammals including hedgehog (*Erinaceus europaeus*) and brown hare (*Lepus europaeus*) for these species across the draft Order Limits.	Partial protection under Wildlife and Countryside Act and NERC Act depending on species
Red Data Book and priority species invertebrates	Veteran trees may support Red Data Book and priority saproxylic invertebrate species. Hedgerows may support priority invertebrate species and provide supporting habitat for Red Data Book saproxylic invertebrate species. Records of invertebrates within 2km of the draft Order Limits include but are not limited to: Breckland Leatherbug (*Arenocoris waltlii*) and Small Egger (*Eriogaster lanestris)*	Partial Protection under Wildlife and Countryside Act and NERC Act depending on species

Table 7-8 Locally Recorded Bird Species potentially within 2km ZoI

Species	Summary of potential for species within 2km of the draft Order Limits	Species protection
Stone curlew	Favour open sandy/stoney land including arable land for nesting as found in the west of the draft Order Limits.	Schedule 1
Barn owl (*Tyto alba*)	Mature trees and nearby agricultural buildings offer nesting potential.	Schedule 1
Lapwing (*Vanellus vanellus*)	Lapwing require open grassland or arable land for nesting. Arable habitat present across the draft Order Limits.	Schedule 1
Corn bunting (*Emberiza calandra*)	Corn bunting are ground-nesting birds favour arable farmland with scattered trees and hedgerows.	Schedule 1
Farmland bird species especially Skylark (*Alauda arvensis*)	Skylark require open grassland or arable land for nesting. Arable habitat present across the draft Order Limits. Other species largely associated with hedgerows and rough grassland.	NERC Act
Woodlark	Woodlark require areas of mosaic or rotational woodland for nesting. This habitat is present immediately adjacent to the draft Order Limits.	Schedule 1

Species	Summary of potential for species within 2km of the draft Order Limits	Species protection
Nightjar	Nightjar require areas of mosaic or rotational woodland for nesting. This habitat is present immediately adjacent to the draft Order Limits.	Schedule 1

7.5.4 Future baseline

7.5.4.1 The future baseline conditions for biodiversity are expected to remain as the current existing baseline in the absence of the Proposed Development proceeding, due to them being dominated by relatively stable management practices (predominantly arable agriculture). It is anticipated that the protected species baseline would be subject to ongoing fluctuations in-line with shifting population distribution associated with a range of factors including climate change.

7.6 Potential impacts

7.6.1 Construction

7.6.1.1 The following potential impacts on ecological features could occur during the construction phase of the Proposed Development:

- Indirect impacts on statutory and non-statutory designated sites located in close proximity to the Proposed Development
- Indirect impacts on the four ancient woodlands located directly adjacent to the draft Order Limits
- Loss of habitat to accommodate the four onsite substations, 400kV substation and other infrastructure related to the Proposed Development
- Potential direct impacts from long-term land take (e.g. for the installation of panels). This will be in primarily arable land and is likely to include an element of habitat creation/enhancement to support BNG
- Temporary loss of land (e.g. for the installation of cables and creation of equipment laydown areas)
- Incidental mortality or injury of species as a result of construction activity (e.g. vehicle impact or during habitat clearance)
- Displacement/disturbance and loss of forging habitat used by species such as great crested newts, reptiles, small mammals and amphibians
- Fragmentation of habitats and/or populations, where a previously continuous ecological network (e.g. hedgerows) is broken up physically (e.g. hedgerow removal) or by light or noise pollution on the hedgerow (or similar) creating a barrier to animals crossing. This can prevent sensitive species (e.g. bats) crossing from their dwellings to their feeding area
- Disturbance. Where the conditions onsite change (e.g., presence of humans, additional noise, light or vibration), individuals or populations may change their behaviour or range including INNS

- Habitat modification and degradation which could reduce the value of the existing habitat from physical means (e.g. soil compaction from construction vehicles) or chemical changes (e.g. pollution of watercourses)

7.6.2 Operation

7.6.2.1 There is the potential for the following impacts on ecological features during the operational phase of the Proposed Development:

- Impacts to bats through any security lighting (expected to be very limited).
- Potential increase in botanical, birds and invertebrate species-richness due to managing habitats and enhancing field boundaries for the benefit of biodiversity.

7.6.2.2 Risk of impacts to ground nesting farmland and wintering birds during maintenance operations (via vehicle movements) would be expected to be similar or less than current agricultural operations.

7.6.3 Decommissioning

7.6.3.1 The Proposed Development will be decommissioned and removed at the end of its operational life (excluding the 400kV substation). Potential impacts are likely to be similar to those outlined for construction, apart from the reversal of long-term land take for photovoltaic (PV) modules.

7.7 Design, mitigation and enhancement measures

7.7.1 Design principles

7.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

7.7.2 Embedded and Good practice measures

7.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

7.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to biodiversity are likely to include:

- The construction compounds will be located on low diversity habitat.
- 15m buffer from panels to ancient and veteran trees

- 15m buffer from panels to woodland
- Buffers for all other trees (none ancient / veteran) and hedgerows to be determined by RPA, but at least 5m buffer for trees with potential for bats, and a minimum 8m buffer between solar panels and hedgerows (reduced to 5m from panels for internal hedges)
- Minimum 10m offset from all infrastructure (including fencing) from bank top of all riparian boundaries and watercourses
- 30m buffer from badger sett locations
- Fencing to be designed to let small mammals pass through (excluding that around the on-site 132 kV and 400kV substations)
- Any access tracks, cable routing and fencing will be located to pass through existing gates and gaps in hedgerows where feasible
- Existing hedgerows in poor condition / gappy will be reinforced with planting / management where feasible
- The Proposed Development would generally not be lit. The only lighting required would be demand responsive motion sense lights at the 400/132kV sub-stations and the main 33kV substation using passive infra-red (PIR) technology. This would only be on intermittently for security and/or safety reasons, and it will be designed and installed in a manner which minimises impact.
- High quality habitats, such as existing areas of woodland would be retained, and other habitat features such as hedgerows, mature trees and watercourses would be retained and enhanced where practicable. Where temporary habitat loss will occur, such as the removal of sections of hedgerow to accommodate cable routes, these features will be reinstated following construction.
- Hedgerow planting along field boundaries to maximise landscape integration, where appropriate.

7.7.2.3 Further embedded measures are likely to include:

- There will be limited nighttime construction activity. Working hours during the construction phase would be 07.00-19.00 Monday to Friday, 08.00-14.00 Saturday, this will reduce impacts to foraging/commuting bats which will not be subject to lighting impacts other than for a short period potentially during spring/autumn when bat activity at dusk may overlap with end of day and start of day working
- Construction access will use existing access points wherever possible to reduce further habitat loss.

7.7.2.4 The measures confirmed as part of the EIA process will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

7.7.3 Further mitigation

7.7.3.1 Further mitigation are actions that require further activity to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for biodiversity will be defined, if required, through the EIA process once the level of significance of effects is known. Options for further mitigation for the Proposed Development relevant to biodiversity will be dependent upon the ecological features found during the baseline survey. This will include assessing the condition of habitats to provide a baseline for BNG. Once the value of the ecological features and the likely effects on them are fully understood, the following mitigation hierarchy will be adopted:

- Avoid impacts (e.g. move aspects of the Proposed Developments to avoid features entirely);
- Minimise impacts (e.g. reducing the area of land take); and
- Restore after impacts (e.g. restoring a habitat damaged during construction)

7.7.3.2 If none of the above can be carried out, compensation (e.g. creating additional habitat to that embedded in the design where it was not previously found) would be undertaken.

7.7.3.3 As far as practicable, the Proposed Development design will be guided to avoid ecological impacts. The mitigation to be described in the ES chapter on Biodiversity will focus on minimising, restoring and compensating for impacts that cannot be avoided. Where the design incorporates avoidance of ecological features, this will be identified. The proposed mitigation will be designed to be proportionate to the value of the feature and consequent impacts of the Proposed Development. Where there is uncertainty in the level of effect, a precautionary approach will be taken.

7.7.3.4 Bespoke mitigation, using widely accepted methods, is likely to be required to ensure that sufficient habitat within the draft Order Limits remains and is managed appropriately to allow for continued nesting and foraging habitat for ground nesting birds. Mitigation will also be required to ensure suitable foraging habitat and food source remains for red-listed Birds of Conservation Concern. This habitat will be developed in collaboration with the design engineers and landscape architect and will be an integral part of the design of the Proposed Development.

7.7.3.5 An environmental masterplan would be prepared highlighting how the long-term management of the land within and adjacent to the Proposed Development will deliver a substantial net gain in biodiversity, and this will be demonstrated through the appropriate use of the Defra Biodiversity Metric. Opportunities will also be sought in the development of an environmental masterplan to:

- Connect and extend existing woodland and hedgerows to strengthen the landscape pattern and habitat connectivity as part of the green infrastructure and nature network.
- Achieve early establishment and maximise visual screening through advanced planting.

- Enhance existing PRoW and permissive paths.
- Enhance existing hedgerow in poor condition and reinforce with planting and management, where appropriate.
- Enhance habitats in consultation with landowners in the context of wider environmental net gain,
- Hedgerow planting along exisiting or remnant field boundaries to maximise landscape integration where appropriate,
- Reinforce the existing landscape pattern, including enhancement of field boundaries where appropriate.

7.7.3.6 Other further mitigation which may be required for the Proposed Development relevant to species and habitats may include:

- Further surveys may reveal the requirement for licences with bespoke mitigation solutions for protected species such as bats, great crested newts and water voles.
- Further assessment may reveal that bespoke mitigation solutions are required to ensure there are no impacts to nearby designated sites, especially for Breckland SPA which is close proximity to the draft Order Limits.
- To support BNG appropriate to the landscape, strategically significant habitats (e.g. valuable habitats which are limited or have been lost from the local area) would be restored or created where practicable. Such habitats would be identified by referring to available guidance such as Natural England's National Character Area profiles or Local Nature Recovery Strategy.
- Timing construction works to avoid the bird breeding season, to avoid disturbance impact to nesting birds (or provision of Ecological Clerk of Works (ECoW) to check for the presence of active nests, establish appropriate buffer zones and monitor disturbance).
- Ensuring all open excavations are either ramped or fenced such that unintended entrapment of fauna does not occur.
- Provision of an ECoW to minimise impacts to great crested newt, reptiles and nesting birds during construction, via conducting searches of habitats in advance and establishing temporary buffer zones.
- Establishment of a sensitive lighting plan covering construction and operational lighting to ensure lighting of suitable bat commuting, foraging and roosting habitats and otter/water vole habitat is minimised.
- Installation of mammal 'gates' or similar access features within perimeter fencing to maintain cross site connectivity for terrestrial mammals.
- Measures to avoid pollution or sediment transfer during construction.

7.7.4 Management plans

7.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to biodiversity include:

- oCEMP, including best practice measures and invasive species management measures (if required);
- oLEMP, including general operational measures alongside those specific to landscape and ecology and habitat management measures; and
- oDEMP.

7.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

7.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

7.8 Likely significant effects

7.8.1 Construction, Operation and Decommissioning

7.8.1.1 The construction, operation and decommissioning phases of the Proposed Development could result in significant ecological impacts, as detailed in Section 7.6 of this report. These potential effects are identified for further assessment and summarised in Tables 7-9 to 7-15 below.

Table 7-9 Biodiversity Scoping Summary – Designated Sites

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
Breckland (SPA)	Immediately south	Breckland SPA is a combined area of multiple SSSIs designated for the significant population of Stone curlew , Nightjar and Woodlark.	Breckland SPA is located within close proximity and has significant populations of stone curlew, nightjar and woodlark which could be disturbed as a result of the Proposed Development	Scoped in for construction, operation, decommissioning
Breckland Forest (SSSI)	Immediately southwest of the site.	Presence of breeding birds including; nightjar and woodlark. The presence of schedule 8 plants: wormwood , red-tipped cudweed, perennial knawel , spiked speedwell. As well as England	Breckland Forest is located within close proximity and has significant populations of nightjars and woodlarks which could be disturbed as a result of the Proposed Development. Other	Scoped in for construction, operation, decommissioning

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
		red list endangered native mammal, red squirrel.	ecological features such as rare plants and red squirrel are present and have the potential to impacted by proposed works.	
Holly Farm Meadow, Wendling (SSSI)	500m northeast	Presence of lowland mire grassland and rush pasture, lowland neutral grassland and valley fen.	Potential for adverse impact due to potential for hydrological connection.	Scoped in for construction, operation, decommissioning
Honeypot Wood, Wendling (SSSI)	820m northeast	Presence of broadleaved and yew mixed woodland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Narborough railway Embankment (SSSI)	1.2km northwest	Presence of lowland calcareous grassland, including scrub and invert assemblages associated with open short sward and bare sand and chalk.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Norfolk Valley Fens (SAC)	1.7km west	These sites support alkaline fens, one of two sites in East Anglia where this habitat occurs.	Potential for adverse impact due to potential for hydrological connection.	Scoped in for construction, operation, decommissioning
Potter & Scarning fens, East Dereham (SSSI)	1.7km east	Presence of lowland fen, marsh and swamp, including lowland valley fen. With invertebrate assemblages associated with sphagnum bog, moss & tussock, reed-fen & pools. As well as nationally rare dragonfly species the small red damselfly .	Potential for adverse impact due to potential for hydrological connection.	Scoped in for construction, operation, decommissioning

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
Dereham Rush Meadows (SSSI)	2.4km northeast	Presence of lowland neutral grassland with sections of wet woodland, lowland wet neutral grassland and floodplain fen.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Castle Acre Common (SSSI)	3.5km north	Presence of lowland neutral grassland, including lowland floodplain fen.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Bradley Moor (SSSI)	3.9km north	Presence of lowland fen, marsh and swamp, including lowland valley fen. With invertebrate assemblages associated with lowland grass and rush pastures, moss & tussock, reed-fen & pools.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Wayland Wood, Watton (SSSI)	4km south	Presence of lowland broadleaved, mixed and yew woodland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Great Cressingham Fen (SSSI)	4.2km southwest	Lowland basin fen and lowland neutral grassland present.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
River Nar (SSSI)	4.2km north	Neutral lowland grassland with river supporting habitat including rivers and streams.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Dillington Carr, Gressenhall (SSSI)	4.5km northwest	Presence of broadleaved mixed and yew woodland, with sections of wet woodland and assemblages of breeding birds associated with lowland open	Given distance and that water and woodland habitats on the Site to be retained, interest features unlikely to be adversely impacted if using these habitats on site	Scoped out for construction, operation, decommissioning

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
		water and woodlands.	as supporting habitat.	
Breckland (SAC)	4.6km south	Inland dunes with open Corynephorus and Agrostis grasslands.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Horse Wood, Mileham (SSSI)	4.6km north	Lowland broadleaved mixed and yew woodland, containing wet woodland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Potter's Carr Cranworth (SSSI)	4.8km southeast	Presence of lowland broadleaved, mixed and yew woodland, including wet woodland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Stanford training Area (SSSI)	4.8km south	Presence of wet woodland, lowland dry heath, lowland dry acid grassland, lowland calcareous grassland, karst habitats. Presence of invertebrate assemblages associated with grassland and scrub matrix and dragonfly assemblages.	Bats from this SSSI may forage along the hedgerows on the Site.	Scoped out for construction, operation, decommissioning
Old Bodney Camp (SSSI)	5.2km southwest	Presence of fixed dune grassland, lowland calcareous grassland and lowland dry acid grassland. Nationally rare moth species present including lunar yellow underwing and tawny wave.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Breckland farmland (SSSI)	5.3km south	Breeding stone curlew present.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
Hooks Well Meadow, Great Cressingham (SSSI)	5.3km southwest	Lowland fen marsh and swamp in favourable condition.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Mattishall Moor (SSSI)	5.5km west	Presence of fen, marsh and lowland swamp, with lowland valley fen.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
East Walton and Adcock (SSSI)	5.5km northwest	Presence of lowland calcareous grassland, including lowland neutral grassland, lowland mire grassland and rush pasture, lowland calcareous grassland, lowland floodplain fen and lowland basin fen. Invertebrate assemblages associated with moss & tussock fen and populations of Desmoulin's whorl snail and slender green feather moss.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Beetley & Hoe Meadows (SSSI)	5.9km northeast	Presence of valley fen, lowland neutral grassland, lowland mire grassland and rush pasture and lowland dry acid grassland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Thompson water, Carr and Common (SSSI)	6.8km south	Presence of lowland calcareous grassland with great crested newt, associated invertebrate assemblages and assemblages of lowland open water breeding birds.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
Rosie Curstons Meadow, Mattishall (SSSI)	7km west	Favourable condition lowland neutral grassland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Boughton fen (SSSI)	7.1km southwest	Presence of fen, marsh and swamp, including lowland floodplain fen.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Field Barn Heaths, Hilborough (SSSI)	7.1km southwest	Lowland calcareous grassland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Scoulton Mere (SSSI)	7.3km east	Presence of lowland fen marsh, swamp and mixed woodland. With a population of red data book plant crested buckler-fern.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Foulden Common (SSSI)	7.4km southwest	Presence of wet woodland, valley fen, lowland calcareous grassland; and invert assemblages associated with reed-fen & pools, moss & tussock fens and undisturbed fluctuating fen.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Gooderstone Warren (SSSI)	7.6km southwest	Presence of breeding stone curlew, fixed dune grassland, lowland calcareous grassland and lowland dry acid grassland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
East Winch Common (SSSI)	7.9km northwest	Presence of lowland dwarf shrub heath, including lowland dry heath and lowland wet heath.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
River Wensum (SAC)	8.2km northeast	Water courses running from plain	No likely significant effects due to	Scoped out for construction,

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
(Also SSSI see below)		to montane level. With Ranunculus vegetation occurring sporadically throughout.	distance and lack of suitable connecting habitat.	operation, decommissioning
River Wensum (SSSI)	8.2km northeast	Rivers and streams containing white-clawed crayfish, populations of RDB mollusc Desmoulin's whorl snail, bullhead and brook lamprey.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Coston fen Runhall (SSSI)	9.4km southwest	Presence of lowland fen, marsh and swamp, including lowland valley fen and mire grassland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Cranberry Rough Hockham (SSSI)	9.5km south	Presence of lowland fen marsh and swamp, including floodplain fen, wet woodland, basin fen with associated plant assemblages.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Litcham Common (LNR)	4.2km north	Varied heathland, with areas of wet and dry heath and acid grassland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning
Great Eastern Pingo Trail (LNR)	7.6km south	A mosaic of habitats from wet low-lying grassland with small pools, fens, scrub and woodland.	No likely significant effects due to distance and lack of suitable connecting habitat.	Scoped out for construction, operation, decommissioning

7.8.1.2 Due to potential significant effects arising from the Proposed Development to a number of designated sites, a HRA will be required to discuss options for prevention of impact and required mitigation.

Table 7-10 Biodiversity Scoping Summary – Ancient Woodlands and County Wildlife Sites

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
Sporle Wood	Immediately north of the Central Panel Area	Ancient woodland	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Necton Wood	Adjacent to the Northern Panel Area (centred on British National Grid Reference: TF90221080)	Ancient woodland	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Great Wood	Adjacent to the Northern Panel Area (centred on British National Grid Reference: TF91401023)	Ancient woodland	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
High Grove	Adjacent to the Southern Panel Area (centred on British National Grid Reference: TF92150710	Ancient woodland	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Church Farm Meadow (County Wildlife Site (CWS) REF 1011)	Located 380m east of the Northern Panel Area	Diverse grassland area hydrologically connected.	Potential for adverse impact due hydrological connectivity	Scoped in for construction, operation, decommissioning
Wendling Carr (CWS REF 1013)	Located 1km northeast of the Eastern Panel Area	Damp grassland area possibly hydrologically connected	Potential for adverse impact due to potential for hydrological connection.	Scoped in for construction, operation, decommissioning
Smeeth Wood & Devil's Dyke (CWS REF 884)	Adjacent to the Western Panel Area	Wet Woodland	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Disused Railway (CWS REF 718)	Located within the Southern Panel Area	Line of trees and scrub as part of the disused railway.	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning

Site Name	Site Location	Summary of Features	Potential for Significant Effects	Scoped in/ out for further assessment
Land Northeast of Woodbottom (CWS REF 716)	Located 1.1km from the Southern Panel Area	Woodland	Potential for adverse impact due to habitat connectivity	Scoped in for construction, operation, decommissioning
Saham Wood (CWS REF 714)	Located 1km from the Southern Panel Area	Woodland	Potential for adverse impact due to habitat connectivity	Scoped in for construction, operation, decommissioning

Table 7-11 Biodiversity Scoping Summary – Other Priority Habitats in the Zone of Influence

Habitat	Potential for Significant Effects	Scoped in/ out for further assessment
Deciduous woodland	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Chalk rivers	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Standing open water - ponds	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Arable field margins	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning
Hedgerows	Potential for adverse impact due to close proximity	Scoped in for construction, operation, decommissioning

Table 7-12 Biodiversity Scoping Summary – Significant Species Potentially in Zones of Influence

Species	Summary of potential for species within the ZoI	Potential for Significant Effects	Scoped in/ out for further assessment
Great crested newts	There are a number of waterbodies located within the Site boundary and within a 500m buffer. These have the potential to support great crested newts.	Potential for adverse impact due to close proximity of waterbodies and some suitable foraging habitat on Site.	Scoped in for construction, operation, decommissioning
Badgers	Arable landscape with hedgerows, woodland and waterbody provides suitable habitat for badgers. Whilst no setts have been	Potential for adverse impacts as badger setts may be present on or within the vicinity of the Site.	Scoped in for construction, operation, decommissioning

Species	Summary of potential for species within the ZoI	Potential for Significant Effects	Scoped in/ out for further assessment
	found to date, a number of latrines have been found. As such badgers are present within proximity to the site.		
Bats	A number of mature trees on site which may provide roosting opportunities for bats Woodlands and hedgerows provide on site provide habitat for foraging and commuting bats.	Potential for adverse impact due to suitable roosting, foraging and commuting habitat across the Site.	Scoped in for construction, operation, decommissioning
Reptiles	Grass snake can traverse arable sites to connect to better habitat. May also be present in low density across the Site where there is a suitable mosaic of habitat. Grass snake often found near waterbodies – which there are a number of across the Site. It is conceivable that other species of reptiles such as common lizard could occasionally be present on Site.	Potential for adverse impact due to some suitable habitat within the vicinity of the Site.	Scoped in for construction, operation, decommissioning
Nesting birds	All nesting birds are protected. The site offers suitable habitat for nesting including arable open landscape for ground nesting birds. A variety of other nesting opportunities for birds including hedgerows, scrub, woodlands and waterbodies. Birds species are further discussed in the Table below.	Potential for adverse impact due to suitable nesting habitat within the Site.	Scoped in for construction, operation, decommissioning
Riparian mammals	Suitable habitat for otter and water voles within the Site.	Potential for adverse impact due to suitable habitat within the Site.	Scoped in for construction, operation, decommissioning
Small mammals including hedgehog and brown hare	Suitable habitat for mammals including hedgehog and brown hare these species across the Site.	Potential for adverse impact due to suitable habitat within the Site.	Scoped in for construction, operation, decommissioning

Species	Summary of potential for species within the ZoI	Potential for Significant Effects	Scoped in/ out for further assessment
Red Data Book and priority species invertebrates	Veteran trees may support Red Data Book and priority saproxylic invertebrate species. Hedgerows may support priority invertebrate species and provide supporting habitat for Red Data Book saproxylic invertebrate species.	Potential for adverse im-pact due to suitable habitat within the Site.	Scoped in for construction, operation, decommissioning

Table 7-13 Biodiversity Scoping Summary – Significant Bird Species Potentially in Zones of Influence

Species	Summary of potential for species within the ZoI	Potential for Significant Effects	Scoped in/ out for further assessment
Barn owl	Mature trees and nearby agricultural buildings offer nesting potential.	Potential for adverse im-pact due to suitable nesting and foraging habitat within the Site.	Scoped in for construction, operation, decommissioning
Lapwing	Lapwing require open grassland or arable land for nesting. Arable habitat present across the site.	Potential for adverse im-pact due to suitable nesting and foraging habitat within the Site.	Scoped in for construction, operation, decommissioning
Corn bunting	Corn bunting are ground-nesting birds favor arable farmland with scattered trees and hedgerows.	Potential for adverse im-pact due to suitable nesting and foraging habitat within the Site.	Scoped in for construction, operation, decommissioning
Farmland bird species especially Skylark	Skylark require open grassland or arable land for nesting. Arable habitat present across the site. Other species largely associated with hedgerows and rough grassland.	Potential for adverse im-pact due to suitable nesting and foraging habitat within the Site.	Scoped in for construction, operation, decommissioning

7.8.1.3 No INNS have been identified to date during the PEAs, and there are no records of invasive species within the draft Order Limits from a desktop review. INNS will be managed through measures included in the oCEMP, oLEMP and oDEMP to be submitted with the DCO application, therefore impacts from INNS are scoped out from further assessment.

7.8.1.4 Due to the potential for significant ecological impact on protected species, further ecological surveys are necessary to inform the Environmental Impact Assessment.

These surveys will determine the distribution and/or populations of protected species present and as applicable within the surrounding area. This information is vital for developing mitigation strategies to minimise harm to wildlife and their habitat. Additionally, the surveys will help identify if any European Protected Species (EPS) are present, potentially triggering the need for specific licenses under the Habitats Regulations 2017.

7.9 Proposed assessment methodology

7.9.1 Overview

7.9.1.1 The assessment will be based on the Guidelines for Ecological Impact Assessment in the UK and Ireland produced by CIEEM [69]. The assessment will contain a detailed description of the baseline conditions, following completion of surveys and collection of historical desk study data. Comments and feedback from statutory bodies and interested parties will be reviewed and considered in the assessment. The assessment will document the valued features including habitats, species and conservation sites within influencing distance of the Proposed Development and will include an assessment of the ecological value of these within the context of the Order Limits.

7.9.1.2 Potential effects resulting from the construction, operation and decommissioning of the Proposed Development will be assessed and reported in terms of their significance for the integrity and conservation status of all relevant, valued ecological features.

7.9.1.3 When considering potentially significant effects on ecological features, whether adverse or beneficial, the following characteristics of environmental change are taken into account:

- Extent – the spatial or geographical area over which the environmental change may occur;
- Magnitude – the size, amount, intensity or volume of the environmental change;
- Duration – the length of time over which the environmental change may occur;
- Frequency – the number of times the environmental change may occur;
- Timing – the periods of the day/year etc. during which an environmental change may occur; and
- Reversibility – whether the environmental change can be reversed through restoration actions.

7.9.1.4 The CIEEM Guidelines also stress consideration of the likelihood that ‘a change/activity will occur and also the degree of confidence in the assessment of the impact on ecological structure and function’. Likelihood is then specified using the following terms;

- Certain (95% probability or higher);
- Probable (50-94% probability);

- Unlikely (5-49% probability); or
- Extremely unlikely (less than 5% probability).

7.9.1.5 The assessment of potential impacts will be undertaken with the inclusion of embedded mitigation for the Proposed Development. Residual impacts will consider any additional mitigation measures required. An assessment will be made of the significance of residual effects, i.e. the significance of the effects that are predicted to remain after the implementation of all committed mitigation measures.

Valuing Ecological Receptors

7.9.1.6 Where protected species are present and there is the potential for a breach of the legislation, those species should always be considered as 'important' features. With the exception of such species receiving specific legal protection or those subject to legal control (e.g. invasive species), all ecological features that were determined to be important at negligible level would be scoped out of the assessment at the ES stage. Further, ecological features of local importance, where there was a specific technical justification, will be scoped out in the ES. This is because a significant effect in EIA terms could not occur and would not influence the decision-making about whether or not consent should be granted for the Proposed Development. This approach is consistent with that described in the CIEEM (2018) Guidance.

7.9.1.7 Where part of a designated site is located within the ecological ZoI relating to a particular biophysical change as a result of the Proposed Development, an assessment will be made of the effects on the designated site as a whole. A similar approach will be taken for areas of notable habitat.

7.9.1.8 For the fauna species that are present within the ZoI, the assessment will consider the total area that is used by the affected individuals and/or the local population of the species (e.g. for foraging or as breeding territories).

7.9.1.9 As the importance of ecological features is determined with regard to the extent of habitat or size of population that may be affected by the Proposed Development, each status can differ from that which would be conferred by legislative protection or identification as a conservation notable species. For example, house sparrow is important at a national level because it is a SPI and features on the Birds of Conservation Concern (BoCC) Red-List. However, a small population that could be affected by a development would be assessed as being of less than national importance due to the large, albeit declining, national population (in excess of 5 million pairs). Similarly, a small length of hedgerow, even if deemed to be 'important' with regard to the Hedgerow Regulations, may be considered to be less than of national importance due to the extent of this habitat type across a given county.

7.9.1.10 Wherever possible, information regarding the extent and population size, population trends and distribution of the ecological features would be used, to inform the categorisation described in Table 7-14 to determine importance at the project level. Where detailed criteria or contextual data are not available, professional judgement would be used to determine importance.

Table 7-14 Importance of Impact of Ecological Features as a Result of the Proposed Development

Geographical context of importance	Criteria Example/ Description
International or European	1. European sites including SPAs, SACs, candidate SACs and Sites of Community Importance (SCI). Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites (designated under international convention) and proposed Ramsar sites should also be considered in the same manner in accordance with national planning policy. 2. Areas of habitat or populations of species which meet the published selection criteria based on discussions with Natural England and field data collected to inform the assessment for designation as a European site or Ramsar site, but which are not themselves currently designated at this level.
National	1. A nationally designated site including SSSIs and National Nature Reserves. 2. Areas (and the populations of species which inhabit them) which meet the published selection criteria guidelines for selection of biological SSSIs but which are not themselves designated based on field data collected to inform the assessment, and in agreement with Natural England. 3. HPI and SPI, Red listed and legally protected species that are not addressed directly in Part 2 of the Guidelines for Selection of Biological SSSIs, but can be determined to be of national importance using the principles described in Part 1 of the guidance. 4. Areas of Ancient Woodland e.g. woodland listed within the Ancient Woodland Inventory and ancient and veteran trees.
Regional	1. Regularly occurring HPI and populations of SPI, Red-listed and legally protected species may be of regional importance in the context of published information on population size and distribution.
County	1. LNRs and Non-Statutory Designated sites - LWSs designated in the county/metropolitan context. 2. Areas which based on field data collected to inform the Ecological Impact Assessment meet the published selection criteria for those sites listed above (for habitats or species, including those listed in relevant Local Biodiversity Action Plans (BAP) {7}) but which are not themselves designated.
Local	1. HPI and SPI, Red listed and legally protected species that based on their extent, population size, quality etc are determined to be at a lesser level of importance than the geographic contexts above. 2. Common and widespread semi-natural habitats occurring within the study area in proportions greater than may be expected in the local context. 3. Common and widespread native species occurring within the relevant study area in numbers greater than may be expected in the local context.
Negligible	1. Common and widespread semi-natural habitats and species that do not occur in levels elevated above those of the surrounding area. 2. Areas of heavily modified or managed land uses (e.g. hard standing used for car parking, as roads etc.)

7.9.2 Magnitude of Change

7.9.2.1 The scale for the magnitude of the environmental change (i.e. impact) as a result of the Proposed Development is described within Table 7-15 and will be used to provide an understanding of the relative change from the baseline position.

Table 7-15 Magnitude of Change

Scale of Change	Criteria and resultant effect
High	The change permanently (or over the long-term) affects the conservation status of a habitat/species, reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area. Relative to the wider habitat resource/species population, a large area of habitat or large proportion of the wider species population is affected. For designated sites, integrity is compromised. There may be a change in the level of importance of the receptor in the context of the project.
Medium	The change permanently (or over the long term) affects the conservation status of a habitat/species reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area. Relative to the wider habitat resource/species population, a small-medium area of habitat or small-medium proportion of the wider species population is affected. There may be a change in the level of importance of this receptor in the context of the project.
Low	The quality or extent of designated sites or habitats or the sizes of species' populations, experience some small-scale reduction or increase. These changes are likely to be within the range of natural variability and they are not expected to result in any permanent change in the conservation status of the species/habitat or integrity of the designated site. The change is unlikely to modify the evaluation of the receptor in terms of its importance.
Very Low	Although there may be some effects on individuals or parts of a habitat area or designated site, the quality or extent of sites and habitats, or the size of species populations, means that they would experience little or no change. Any changes are also likely to be within the range of natural variability and there would be no short-term or long-term change to conservation status of habitats/species receptors or the integrity of designated sites.
Negligible	A change, the level of which is so low, that it is not discernible on designated sites or habitats or the size of species' populations, or changes that balance each other out over the lifespan of a project and result in a neutral position.

7.9.3 Determining Significance

7.9.3.1 Adverse effects are assessed as Significant if the favourable conservation status of an ecological feature would be lost as a result of the Proposed Development. Beneficial effects are assessed as those where a resulting change from baseline improves the quality of the environment (e.g. increases species diversity, increases the extent of a particular habitat or halts/slows down an existing decline). For a beneficial effect to be Significant, the conservation status would need to positively

increase in-line with a magnitude of change of 'High', as described in Table 7-15, above.

7.9.3.2 Conservation status is defined as follows (as per the CIEEM 2018 Guidance):

- "For habitats, conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and typical species within a given geographical area;
- For species, conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area."

7.9.3.3 The decision as to whether the conservation status of an ecological feature would alter will be made using professional judgement, drawing upon the information produced through the desk study, field survey and assessment of how each feature is likely to be affected by the Proposed Development.

7.9.3.4 A similar procedure will be used where designated sites may be affected by the Proposed Development, except that the focus will be on the effects on the integrity of each site. The assessment of effects on the integrity of each site will draw upon the assessment of effects on the conservation status of the features for which the site has been designated.

7.9.4 Habitat Regulations Assessment

7.9.4.1 The draft Order Limits are located within close proximity to Breckland SPA, therefore, a separate Habitats Regulations Assessment (HRA) Appropriate Assessment (Stage 1) will be undertaken to determine whether the Development will have any Likely Significant Effects (LSE) on the qualifying features of the designations.

7.9.4.2 In the event that LSE cannot be ruled out without the application of mitigation controls, a Stage 2 Appropriate Assessment will be provided. The Appropriate Assessment will consider whether, following the application of mitigation the Proposed Development would result in adverse impacts to the integrity of the designation(s), in relation to the sites features and conservation objectives.

7.10 Assumptions, limitations and uncertainties

7.10.1.1 Assumptions have been made with regard to the potential/likely presence of protected and notable species based on the presence of recent records/desk study data, presence of suitable habitat and known patterns of geographical distribution. Information relating to the presence of statutory and non-statutory conservation sites was that in place at the time of writing and baseline habitat data has been subject to provisional mapping and UKHab classification.

7.10.1.2 Baseline surveys are ongoing and those surveys undertaken after EIA Scoping may find the presence of new significant ecological features that could be affected by the Proposed Development, and will be considered within the assessment and reported in the ES.

7.11 Summary

Table 7-16 Biodiversity Scoping Summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Statutory Designated Sites.	Scoped in	Scoped out	Scoped in	Covered under relevant qualifying species sections below.
Non- statutory Designated Sites	Scoped in	Scoped out	Scoped in	Covered under relevant species sections below.
Priority Habitats including Ancient Woodlands	Scoped in	Scoped out	Scoped in	UKHab classification across site.
Bats	Scoped in	Scoped in	Scoped in	Seasonal Night-time Bat Walkover surveys and monthly static bat detector are ongoing. 1/3 Night-time bat walkovers have been completed. 1/6 monthly static surveys have been completed.
Great crested newts	Scoped in	Scoped out	Scoped in	Great crested newt surveys including habitat suitability index assessment and environmental DNA surveys to take place. Habitat suitability index has taken place on >90% of onsite ponds. eDNA to commence 10th June 2024.
Riparian mammals (otter and water vole)	Scoped in	Scoped out	Scoped in	Otter and water vole surveys to take place in the appropriate season.
Reptiles	Scoped in	Scoped out	Scoped in	Reptile surveys may be required depending on PEA results and location of site access points etc.
Invertebrates	Scoped in	Scoped in	Scoped in	Invertebrate surveys may be required depending on PEA results.
Badger	Scoped in	Scoped out	Scoped in	Badger survey to take place.
Breeding birds	Scoped in	Scoped in	Scoped in	Breeding bird surveys ongoing.
Wintering birds	Scoped in	Scoped in	Scoped in	Wintering bird surveys complete on original panel

Aspect	Construction	Operation	Decommissioning	Any required surveys?
				areas but further surveys will be required on additional land.

8 Climate Change

8.1 Introduction

8.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of climate change.

8.1.1.2 It sets out relevant climate change receptors and the approach to the assessment of the Proposed Development's impacts during construction, operation, and decommissioning.

8.1.1.3 The following matters have been considered as part of the scope and methodology for climate change:

- Assessment of the effects of the Proposed Development on climate. The Greenhouse Gas (GHG) assessment considers the change in GHG emissions due to the Proposed Development through an assessment of whole life carbon.
- An assessment of the vulnerability of the Proposed Development to climate change. A review of the resilience of the Proposed Development to the potential effects arising from projected changes in future climate.
- In-Combination Climate Change Impacts (ICCI): An assessment of the potential impacts of future climate conditions to act in-combination with the impacts of the Proposed Development on other environmental receptors - the ICCI assessment ensures that environmental receptors that are vulnerable to other impacts from the Proposed Development and climatic factors are considered in the context of the changing climate.

8.1.1.4 This chapter should be read in conjunction with Chapter 2 The Proposed Development.

8.2 Relevant legislation, policy, standards and guidance

8.2.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for climate change and have informed the scope of the assessment.

8.2.2 Legislation

Table 8-1 Legislation

Legislation	Relevance to assessment
The Climate Change Act 2008, as amended by the Climate Change Act (2050 Target Amendment) Order 2019 [81]	The Act creates a framework which enables the UK to meet its domestic targets as well as ensuring the UK can meet its existing and future international commitments for emissions reductions. The Act provided a pathway to achieving long-term carbon reduction goals by setting legally binding carbon limits in its 'carbon budgets'. These oblige the Government to put in place polices to help facilitate delivery of emission reduction, for example, by enabling low carbon generation schemes to take place where impacts can be shown to be acceptable. The amendment in this Order increases the minimum percentage by which the net UK carbon account for the year 2050 must be lower than the 1990 baseline from 80% to 100%.
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 [82]	This legislation sets out the requirements for assessment within the EIA framework: "5.2 *The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors*—[inter alia] *c) land, soil, water, air and climate;"* Schedule 4 provides further information: *"INFORMATION FOR INCLUSION IN ENVIRONMENTAL STATEMENTS* *...* *4. A description of the factors specified in regulation 5(2) likely to be significantly affected by the development:* [inter alia] *climate (for example greenhouse gas emissions, impacts relevant to adaptation)..."* *5. A description of the likely significant effects of the development on the environment resulting from, inter alia—* *(f)the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;*

8.2.3 Policy

Table 8-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for Energy, 2024 (EN-1) **[62]**	Sets broad national policy approach. Section 4.10 addresses climate change outlining the generic considerations that applicants should consider in order to ensure that electricity

Policy	Relevance to assessment
	networks infrastructure is resilient to the effects of climate change. Paragraph 4.10.11 states that *"applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on climate change projections".* Paragraph 5.3.4 outlines the contents of GHG assessments for energy infrastructure projects. These include: • *"A whole life GHG assessment showing construction, operational and decommissioning GHG impacts, including impacts from change of land use.* • *An explanation of the steps that have been taken to drive down the climate change impacts at each of those stages.* • *Measurement of embodied GHG impact from the construction stage.* • *How reduction in energy demand and consumption during operation has been prioritised in comparison with other measures.* • *How operational emissions have been reduced as much as possible through the application of best available techniques for that type of technology.* • *Calculation of operational energy consumption and associated carbon emissions.* • *Whether and how any residual GHG emissions will be (voluntarily) offset or removed using a recognised framework.* • *Where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in combination with other developments at a regional or national level, or sector level, if sectoral targets are developed."*
National Policy Statement for Renewable Energy Infrastructure, 2024 (EN-3) **[53]**	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects.

Policy	Relevance to assessment
	Paragraph 2.4.11 states "*Solar photovoltaic (PV) sites may also be proposed in low lying exposed sites. For these proposals, applicants should consider, in particular, how plant will be resilient to:* • *increased risk of flooding; and* • *impact of higher temperatures.*"
National Policy Statement for Electricity Networks Infrastructure, 2024 (EN-5) **[54]**	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for air quality, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19). Section 2.3 Climate change adaptation and resilience states that applicants should consider any impact on the development from flooding, effects of wind and storms on overhead lines, storms, ground and coastal movements and droughts.
National Planning Policy Framework 2023 [54]	The NPFF highlights national transition to low carbon future in a changing climate and emphasizes the need for the increased supply of renewable and low carbon energy. Relevant policies to climate change, can be found in Chapter 14, 'Meeting the challenge of climate change, flooding and coastal change'. Paragraph 157 states that the planning system should, inter alia,*" support the transition to a low carbon future in a changing climate", "shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience"*, and "*support renewable and low carbon energy and associated infrastructure*". Paragraph 158-164 provides instructions on planning requirements for new developments in relation to climate change.
UK Climate Change Risk Assessment Third National Adaptation Programme (NAP3) **[83]**	NAP3 sets out the actions that government and others will take to adapt to the impacts of climate change from 2023 to 2028. NAP3 sets out actions for infrastructure (including energy). It recognises "*as the energy system decarbonises and other infrastructure systems electrify to meet the UK's net zero targets, the exposure of the energy system to climate hazards will change. Continuing to embed climate resilience in both the current and future energy systems is therefore essential to securing our energy supply*."
The Clean Growth Strategy **[84]**	This strategy document sets out key policies and proposals to accelerate clean growth. It projects power sector emissions, taking into account the clean growth pathway between 1990 and 2050.
Sixth Carbon Budget **[85]**	The Carbon Budget Order 2021 sets the carbon budget for the sixth budgetary period (2033-2037) (the sixth carbon budget), at 965 million tonnes of carbon dioxide equivalent. This report provides additional justification to support emissions reduction as part of the EIA process.
Energy Security Strategy **[86]**	The Energy Security Strategy is a proposal that intends to speed up the UK's efforts towards a low-carbon, energy-independent future. It's primary aim is to expand the number of sources of home-grown, low-carbon energy (such as Solar PV) in the UK over the next 20 years.
UK's Nationally Determined Contribution **[87]**	The UK's Nationally Determined Contribution was updated in 2022. The UK commits to reducing economy-wide greenhouse gas emissions by at least 68%, compared to 1990 levels.

Policy	Relevance to assessment
Breckland Council Local Plan 2019 (Partial update in 2023) **[88]**	The Breckland Council Local Development Plan (LDP) was adopted in 2019 had a partial update in 2023. Breckland's Strategic Vision states 'new growth will be balanced, ensuring that the District adapts to, and mitigates against the impacts of climate change. Policy GEN 01 – "*The Local Plan will seek and enable development that improves the economic, social and environmental objectives of Breckland through the application of the following national and locally distinctive sustainable development principles:* • *Mitigate and adapt to climate change"* Policy COM 01 – Design requires new development to be 'designed to the highest possible standards'. This policy requires new development "*Incorporates sustainable design and durable construction, observing best practice in energy efficiency and climate change mitigation, and is accessible and adaptable to different activities and land uses and the changing needs of all, including disabled and older people"* Policy ENV 01 Green Infrastructure. "*Green infrastructure performs many functions and plays a significant role in helping to attract people, employment and investment to the District. Green infrastructure also helps in meeting social and environmental goals, such as encouraging active, healthy lifestyles and helping the District to be resilient to more frequent occurrence of extreme weather events resulting from climate change*."

8.2.4 Standards and guidance

Table 8-3 Standards and guidance

Standards and guidance	Relevance to assessment
Environmental Impact Assessment: Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022), Institute of Environmental Management and Assessment [89]	This is the most recent guidance available and is applicable to the UK. It is also considered to be the most holistic method of assessing GHG emissions as it applies a whole lifecycle methodology, incorporating not just the construction and operational phase of a development, but also the decommissioning/end of life and beyond asset lifecycle stages. The whole lifecycle methodology allows for a more robust 'worst case scenario' to be applied which is proportionate to the nature and scale of the Proposed Development.
Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2020), Institute of Environmental Management and Assessment [90]	This guide will be applied to the assessment of resilience of the Proposed Development to climate change as this is the most recent available and is applicable to the UK.

Standards and guidance	Relevance to assessment
The European Investment Bank (EIB) 'EIB Project Carbon Footprint Methodologies. Methodologies for the Assessment of Project GHG Emissions and Emissions Variations' (2023), Version 11.3, European Investment Bank [91]	The EIB Project Carbon Footprint Methodologies (2023) guidance is used to expand upon the IEMA guidance to establish the baseline scenarios for the assessment. This goes into greater detail in terms of a baseline methodology and allows for easier comparison of impacts where there is no prior development in an area.
Royal Institution of Charted Surveyors (RICS), 'Whole life carbon assessment for the built environment' (2nd Edition, Version 2, 2023); [92]	The document provides a comprehensive guideline for industry professionals to calculate and report the quantity of carbon impacts expected throughout all life cycle stages of a project, from manufacturing, transport, installation, use and end of life. This also considers assessment of the potential benefits and loads occurring beyond the system boundary. The solar farms fall under the category of 'Power-generation plants' in infrastructure assets/civil engineering works which are applicable for such assessments as listed in annex D of the guideline. It mentioned that *'All those undertaking the role of WLC assessor must follow the mandatory requirements included in this methodology in order for the WLCA to be compliant with this standard.'* The timeline of the assessment is required to undertake the assessment *'during the early design, technical design, construction and post-completion phases of a project, in order to be integrated into the decision-making framework for a project".*
BSI - PAS 2080:2023 'Carbon Management in Buildings and Infrastructure' (2023), The Green Construction Board, Construction Leadership Council, the British Standards Institution. [93]	This provides guidance for whole life carbon management in infrastructure and any development to be in line with government's Net Zero 2050 pathway.
United Nations Economic Commission Europe's (UNECE), 'Carbon Neutrality in the UNECE Region: Integrated Life-cycle Assessment of Electricity Sources' (2022); United Nations [94]	The report presents an assessment of various electricity generation technologies and their associated environmental impacts across its various metrices such as health, ecosystems, and resource requirement through their life cycle. It also provides an update on existing data and the status of the technology in the international context. It gives information on global statics of PV solar, comparison of different life cycle inventories, specific environmental impacts associated with each PV technology such Silicon-based or thin film based, ground mounted or roof mounted etc. The document also provides information on energy storage, comparison of lifecycle impacts of selected electricity storage options which could be useful in the design stage and during considering alternatives that have a minimum carbon footprint.

8.3 Consultation

8.3.1.1 The following stakeholders will be consulted with regards to climate change as part of the assessment process:

- Breckland Council Environmental Protection Team

8.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to climate change.

8.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

8.4 Study area

8.4.1 Greenhouse gas emissions

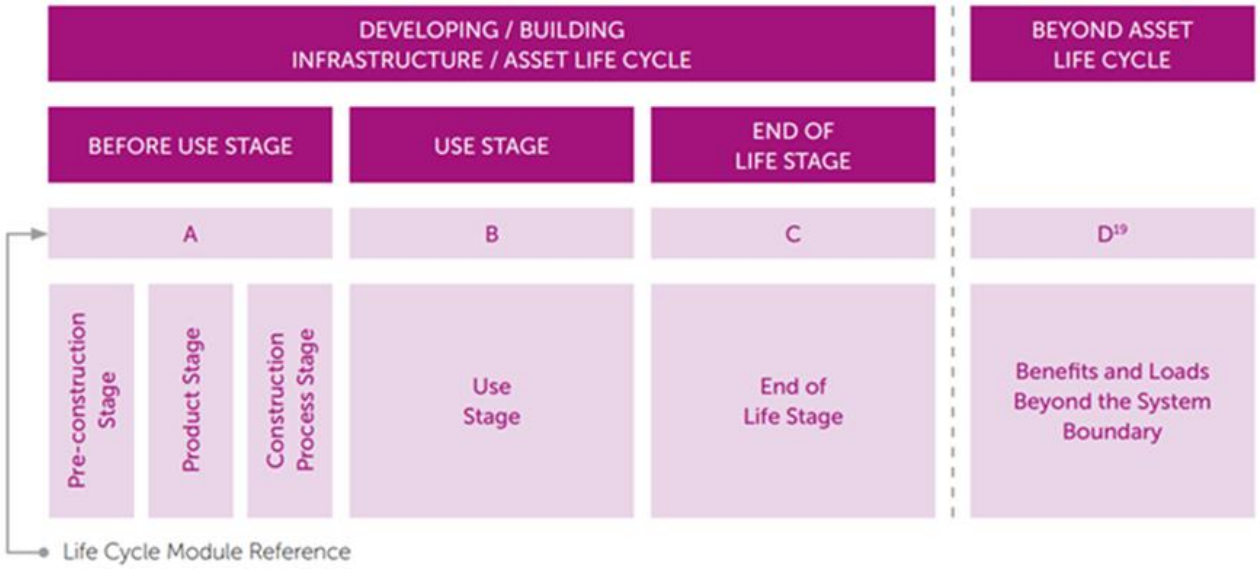
8.4.1.1 The study area for this topic differs from other technical disciplines, which focuses on the impact within a defined boundary. In line with IEMA guidance [95], a reference study period for the Proposed Development will be chosen as the basis for the GHG emissions assessment based on the expected service and construction period. The study period comprises up to 24 months for construction, 40 years for operation and 12 months for decommissioning of the Proposed Development. it is assumed that the 400kV substation will remain in situ post decommissioning and will be retained as part of the wider grid network by National Grid after the solar farm is decommissioned, it will no longer be associated with the Proposed Development. Therefore, the construction and 40 year operational life will be assessed for the 400kV substation, but not its later life or decommissioning. Should this change at a later stage of the EIA the 400kV substation will be assessed appropriately for the operational and decommissioning stages.

8.4.1.2 Climate change is a global phenomenon, and the Proposed Development will impact global GHG concentrations. Therefore, within a climate change context, the key sensitive receptor to the impacts of the Proposed Development will be the global climate. This receptor differs from others listed within an EIA context as it is not at a distinct local scale but a global one. The study area will consider all the greenhouse gas emissions that arise throughout the lifecycle of the Proposed Development.

8.4.1.3 All sources of GHG emissions will have a long-term adverse effect on the climate by contributing to (human-enhanced) global warming. Therefore, a different approach to defining the extent of the study area is required for the assessment of impacts. The assessment will consider the whole lifecycle emissions from the Proposed Development that will contribute to global climate change based on the information available at the planning stage. A ‘cradle to grave’ system boundary

will be applied to cover the whole lifecycle stages of the development. These lifecycle modules have been simplified in the diagram in Inset 8-1, below, but include the following:

- before use stage (pre-construction, product, and construction process stage);
- use stage;
- end of life stage; and
- beyond asset life cycle (benefits and loads beyond the system boundary).



Inset 8-1 Simplified modular lifecycle stages for EIA GHG emissions assessment [95]

8.4.2 Climate Resilience

8.4.2.1 In terms of climate resilience, the location of a site has a considerable influence when assessing vulnerability and adaptability to future climate change. Site location features within the draft Order Limits that may have the potential to cause, mitigate, or be at risk from climate change will be identified during the assessment.

8.4.2.2 As with the assessment of GHG emissions, the study period will be 43 years to encompass the construction, operation and decommissioning of the Proposed Development.

8.5 Baseline conditions

8.5.1 Desktop sources used

Greenhouse gas emissions

8.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area for GHG emissions assessment:

- UK local authority and regional greenhouse gas emissions national statistics [96]

Climate Resilience

8.5.1.2 The following desktop sources have been used to inform the existing baseline conditions of the study area for the assessment of climate resilience:

- Current climate data from the UK Met Office will be used to determine the existing baseline for the vulnerability of the Proposed Development to climate change [97].
- The projected climate data for the East of England region – UK Climate Projections 2018 (UKCP18), for high emissions scenario (RCP8.5), and 50% probability of occurrence [98]. Using RCP8.5 at the 50th percentile is recommended as best practice in the IEMA 2020 guidance [90]. There are four Representative Concentration Pathways (RCPs) available in the UKCP18 climate projections. These are 2.6, 4.5, 6.0 and 8.5. They are named according to the concentration of greenhouse gases modelled to occur in the atmosphere in 2100.

8.5.2 Surveys undertaken and proposed

8.5.2.1 No surveys are required with respect of the climate change impact assessment.

8.5.3 Existing baseline

Greenhouse gas emissions

8.5.3.1 The draft Order Limits are located within the open countryside between Swaffham and Dereham in the county of Norfolk in the East of England. The land use is predominately arable. Agricultural land typically emits emissions in the form of methane (CH_4) and nitrous oxide (N_2O) from the soils. There are no existing buildings within the draft Order Limits. The draft Order Limits has no existing demands for regulated or unregulated energy and, therefore, no emissions are associated with these sources.

8.5.3.2 Baseline emissions will also include emissions that may be avoided as a result of the Proposed Development, i.e., existing emissions from the generation of grid electricity if the Proposed Development does not go ahead. This will be a cumulative total of all emissions avoided over the lifetime of the Proposed Development, assuming 100% of the energy generated by the Proposed Development is displacing energy generated by fossil fuels.

Climate resilience

8.5.3.3 The current climate baseline is a temperate oceanic climate with warm summers and milder winters. Temperate climates are defined by the Met Office [99].The average temperature at the climate station in Marham, near the draft Order Limits, is 10.4°C. The region experiences an average rainfall of 660mm per year [100].

8.5.4 Future baseline

Greenhouse gas emissions

8.5.4.1 For GHG emissions assessment, the future (sectoral) baseline will represent a typical 'business as usual' development of a similar type built elsewhere to minimum regulatory standards.

Climate resilience

8.5.4.2 The future climate baseline is based on the UK climate change projections for a regional 25km grid surrounding the draft Order Limits. An initial review of UKCP18 [101] data for the East of England Region, within which the Proposed Development is located, suggest that the region will experience an increase of mean temperature of 2.1°C in winter and 3.1°C in summer compared to a 1981-2000 baseline. In the same period, precipitation is estimated to increase by 11.2% in winter and decrease 31.0% in summer.

8.6 Potential impacts

8.6.1 Greenhouse gas emissions

8.6.1.1 A potential impact of the Proposed Development is the release of GHG emissions from its lifecycle stages. The lifecycle stages are described in para 8.4.1.3. For this assessment, it is considered that any increase or decrease in GHG emissions compared to the baseline has the potential to impact the global climate.

Construction

8.6.1.2 The release of short-term (over up to 24 months) GHG emissions into the atmosphere as a result of construction of the Proposed Development will occur. Although construction emissions will be modest, they will contribute towards long-term effects on the global climate. It is important to recognise that the construction phase is necessary to facilitate the climate change benefits that will be delivered in the operational phase. The embodied carbon associated with the solar photovoltaic panels is likely to result in the biggest proportion of whole lifecycle emissions.

8.6.1.3 Table 8-4 summarises all the potential impacts of the Proposed Development during the construction stage.

Table 8-4 Summary of the potential impacts and emissions sources.

Activity	Emission source and Impact
Raw material extraction and manufacturing of the materials and components required to build the Proposed Development	The embodied greenhouse gas emissions from fossil fuel energy are used to extract and manufacture materials and components.

Activity	Emission source and Impact
Transportation of the materials to the manufacturing centre and transport of the manufactured materials to the draft Order Limits by Heavy Goods Vehicle (HGV)	Emissions from diesel, petrol, or other fuels are used in construction vehicles to transport materials and components.
Construction activities to build Proposed Development.	Emissions from construction undertaken within the draft Order Limits due to energy consumption, such as electricity and other fuels from plant, vehicles, and generators.
Use of construction infrastructure, including construction worker welfare facilities, a site office, wheel wash area, plant and machinery storage, waste storage areas	Emissions from energy consumption such as gas and electricity in temporary built infrastructure.
Disposal and treatment of construction waste	Emissions from diesel or other fuel use in HGV or other vehicles to transport waste to appropriate waste centre.
Land use change	Release of emissions from carbon sink as a result of soil disruption
Water use and treatment	Emissions from the provision of clean water to activities carried out within the draft Order Limits and energy use associated with offsite wastewater treatment from comfort facilities provided within construction compounds during construction.
Site workers and managers travel to and from the draft Order Limits.	Emissions from fuel use in vehicles by construction workers and visitors.

Operation

8.6.1.4 The release of long-term (over 40 years) GHG emissions into the atmosphere as a result of the operation of the Proposed Development will have long-term, positive and negative, effects on the global climate.

8.6.1.5 Table 8-5 summarises the potential impact of the Proposed Development and the source of emissions during the operational phase.

Table 8-5 Summary of the potential impacts and emissions sources.

Activity	Emission source and impact
Maintenance of the solar array	Release of greenhouse gas emissions from energy consumption during maintenance operations. Emissions released by material sourcing, and manufacture will be considered. Waste generation as a result of ongoing site maintenance will release emissions on a periodic basis.
Travel to the Proposed Development for maintenance purposes.	Release of emissions from vehicles used to travel to the Proposed Development for maintenance operations.
Generation of renewable electricity	Displace the use of fossil fuels and reduce the carbon intensity of the National Grid, lowering emissions at the national level.

Decommissioning

8.6.1.6 The release of short-term (12 months) emissions into the atmosphere as a result of the decommissioning of the Proposed Development will have long-term effects on global climate.

8.6.1.7 Table 8-6 summarises the impact of the Proposed Development.

Table 8-6 Summary of the potential impacts and emission sources.

Activity	Impact
On-site decommissioning activity	Consumption of energy on-site for decommissioning purposes.
Transportation and disposal of waste materials	Release of emissions from transportation of waste
Worker travel	Release of emissions from the vehicles used by workers.

8.6.2 Climate resilience

8.6.2.1 The Proposed Development could potentially be affected by the impacts of climate change. Table 8-7 shows the potential impacts of climate change on the Proposed Development and how they can affect the Proposed Development without embedded mitigation, these are applicable across all phases: construction, operation and decommissioning.

Table 8-7 Potential Impacts on Proposed Development across all phases

Climatic Factor	General impact
Soil drying as a result of increased heatwaves	Increased risk of soil drying may affect water tables and could affect foundations in clay soils, leading to a collapse of solar farms due to ground shrinkage.
Wildfire as a result of increased heatwaves	Increased risk of wildfires as higher temperatures and longer dry spells, lead to increased combustibility in the environment, especially during summer periods.
Increase in temperature	Increases in average and maximum annual temperature will affect the efficiency of PV modules and potentially the operation of the Proposed Development. High temperatures may cause overheating on solar farms, affecting their lifespan.
Extreme rainfall and flooding	More extreme seasonal increases and decreases in rainfall will affect water tables and the durability of the PV system and substations. Flood risk for surrounding infrastructure, associated electrical infrastructure, or buildings, which may lead to damages to wires, substations, and risk of failure of the associated electrical infrastructure.
Snow and ice	The increase will affect the productivity of the PV system due to snow cover.
Gales, storms, extreme weather	The increase will affect the stability and productivity of the array structure and associated electrical infrastructure, which will affect the efficiency of the system. Extreme weather events, gales, and storms may cause damage to the solar array structure.
Cloud cover	Clouds will affect number of sunshine hours and the amount of solar irradiance reaching the solar panels. For large arrays, rapid

Climatic Factor	General impact
	fluctuation in sunlight availability and generation can cause localised voltage and power quality.
Sea level rise	Sea level rise may cause flooding of the Proposed Development.

8.7 Design, mitigation and enhancement measures

8.7.1 Design principles

8.7.1.1 The Proposed Development is being designed with regard to a set of design principles, as described in Chapter 2, paragraph 2.4.9.3 of this report.

8.7.2 Embedded and Good practice measures

8.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

8.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to climate change are likely to include:

- Avoid locating critical infrastructure within Flood Zones 2 and 3, ensuring that solar PV modules are raised above the predicted maximum flood depth for the 100 year plus climate change scenario.
- Sustainable drainage solutions (SuDS) will be provided at source, ensuring that surface water run-off is managed consistently with existing site conditions.
- In general, the Proposed Development would not be lit. The exception would be at the substations, where sensor-triggered lighting will be needed for security/safety reasons. The substations would generally not be occupied by personnel overnight so the lighting would not be on continuously. The lighting infrastructure is expected to be approximately 10m in height.
- Access tracks will be permeable using compacted gravel to allow water to filtrate through and maintain greenfield runoff rates

8.7.3 Further mitigation

8.7.3.1 Further mitigation is actions that require further activity to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation of climate change will be defined through the EIA process once the level of significance of effects is known. Options for further mitigation for the Proposed Development relevant to climate change impact assessment may include:

- Exploring plant optimisation techniques.
- Specification of alternative materials with lower embodied GHG emissions.
- Low carbon design specifications such as energy-efficient lighting and durable construction materials to reduce maintenance and placement cycles.
- Use of recycled materials wherever possible.
- Additional planting and/or enhancement of existing habitats will seek to use native species that are climate resilient.

8.7.4 Management plans

8.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to climate change impact assessment include:

- oCEMP;
- oLEMP, including general operational measures alongside those specific to landscape and ecology
- oDEMP
- oSRMP
- oBSMP

8.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

8.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

8.8 Likely significant effects

8.8.1 Greenhouse gas emissions

8.8.1.1 The Proposed Development will generate GHG emissions throughout its whole life cycle (i.e., construction, operation, and decommissioning).

Construction

8.8.1.2 The likely significant effect of the Proposed Development is the release of greenhouse gas emissions over the up to 24-month construction period from the associated activities required to build the Proposed Development.

8.8.1.3 The embodied carbon within construction activities will form the largest proportion of whole life cycle emissions and, as noted in IEMA GHG guidance [95], all emissions of carbon contribute to climate change. When considering

construction emissions, the key test is whether the emissions expended will go on to facilitate "*aligning project emissions with a science-based 1.5 ° C compatible trajectory, and achieving net zero by 2050*".

8.8.1.4 Since the release of greenhouse gas emissions during construction could impact the global climate in the long term, the assessment of construction emissions is **scoped in** to further assessment in the ES.

Operation

8.8.1.5 Once operational, solar farms will convert sunlight into electricity (direct current) through the use of PV cells, which are converted to alternating current and exported to the national grid. As the fuel source is sunlight, there are no greenhouse gas emissions associated with the operation of the Proposed Development, except those from operations and maintenance vehicles associated with cleaning, repairing and maintaining the panels, electrical infrastructure and wider site, and other onsite grid connected electrical equipment such as security cameras and Supervisory Control and Data Acquisition (SCADA) equipment.

8.8.1.6 The 'In Use' lifecycle stage for PV panels is likely to result in an emissions reduction when compared with alternative technologies (e.g., combined cycle gas turbines (CCGT)) that deliver an equivalent amount of energy.

8.8.1.7 The operational element of the Proposed Development is, therefore, expected to have a positive impact on climate change with no further mitigation measures required.

8.8.1.8 However, the IEMA definition of a beneficial impact [95] is where "*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.*" Since solar panels will only ever contribute towards net zero requirements without exceeding these (i.e. sequestering carbon) then under this definition the development would be assessed as having a negligible impact rather than a beneficial one.

8.8.1.9 Consequently, operational emissions are being **scoped in** to further assessment in the ES

Decommissioning

8.8.1.10 The release of emissions into the atmosphere as a result of the 12 month decommissioning of the Proposed Development will have long-term effects on global climate.

8.8.1.11 The precise decommissioning effects are difficult to predict as it is not certain what technologies will be in use at the time of decommissioning. If it is assumed that current technologies, such as machines and vehicles powered by internal combustion engines, remain the primary plant used for removing components from site, then there are likely to be comparable decommissioning emissions to

those released during construction. This would represent a worst-case scenario as electric plant or hydrogen-fuelled HGVs may be in use by that time. Given the uncertainty the worst-case scenario will be used for the assessment and hence, a likely carbon-intense decommissioning phase, with potential to impact the global climate in the long term, would be assessed, leading to decommissioning being **scoped in** to further assessment in the ES.

8.8.2 Climate resilience

8.8.2.1 The Proposed Development is assumed to have a design life of 40 years, plus the time required to construct and decommission. Climate conditions are expected to change over this period and have the potential to negatively impact the Proposed Development, affect the efficiency of solar generation and potentially increase the frequency of repair and replacement. Table 8-8 identifies the climate resilience effects and presents justification for scoping them in or out of further assessment in the EIA.

Table 8-8 Likely significant effects of climate change that may affect the Proposed Development

Parameter	Scoped in/ out	Scoping conclusion
Soil drying	Scoped in	The Proposed Development may be vulnerable to ground shrinkage failure due to affected foundations in clay soils.
Increase in temperature	Scoped in	High temperatures and heat waves may result in overheating and/or heat stress of materials and structures.
Extreme rainfall and flooding	Scoped in	The Proposed Development may be vulnerable to damage to wires, landslides or ground shrinkage, and damage to structures or drainage systems.
Snow and ice	Scoped out	The Proposed Development is not located in an area that is susceptible to levels of snow cover that would have a substantial impact on the generation potential of the Proposed Development for long periods of time.
Gales, storms, extreme weather	Scoped in	The Proposed Development may be vulnerable to extreme weather events such as storm damage to structures and assets.
Cloud cover	Scoped out	The Proposed Development is not located in an area that is susceptible to unusual levels of cloud cover [102].
Sea level rise	Scoped out	The Proposed Development is not susceptible to sea level rise, according to Check Long Term Flood Service.gov.uk [103]

In-combination climate change impact assessment

8.8.2.2 The ICCI assessment identifies how the resilience of various receptors in the surrounding environment is affected by a combination of future climate conditions and the Proposed Development. The climate parameters relevant to the Proposed Development are detailed in Table 8-9 below together with the rationale for scoping.

8.8.2.3 On the basis of the information presented in Table 8-9, an ICCI assessment is proposed to be scoped out.

Table 8-9 Potential impacts on Proposed Development across all phases

Parameter	Scoped in/ out	Scoping conclusion
Temperature change	Scoped out	Projected temperature increases in combination with the Proposed Development are not expected to have a significant impact upon environmental receptors identified by other topic disciplines.
Sea level rise	Scoped out	The Proposed Development is not located in an area that is susceptible to sea level rise.
Precipitation change (frequency and magnitude of precipitation events and droughts)	Scoped out	Climate change may lead to an increase in substantial precipitation events that could lead to flash flooding or changes to groundwater levels. However, no significant impacts on surface water or groundwater levels are expected as a result of precipitation changes, in combination with the Proposed Development, as the flow of precipitation to ground will not be significantly hindered as a result of the Proposed Development. The Proposed Development, in combination with projected changes in precipitation, is also not expected to have a significant impact upon receptors identified by other environmental disciplines. There is a potential for drought, in combination with higher temperatures, to increase the risk of fire. Adequate fire safety measures will be incorporated into the design, reducing this risk to non-significant.
Wind	Scoped out	Projected changes in wind patterns in-combination with the Proposed Development are not expected to have a significant impact upon environmental receptors identified by other topic disciplines.

8.9 Proposed assessment methodology

8.9.1 Greenhouse gas emissions

8.9.1.1 IEMA (2022) [95] will act as the primary guidance for the climate change assessment, as this is the most recent available and is applicable to the UK. It is considered to meet the requirements of the NPS EN-1 and be the most holistic method of assessing GHG emissions as it applies a whole life cycle methodology incorporating not just the construction and operational phase of development, but also the decommissioning/end of life and beyond asset life cycle stages, allowing a more robust "worst case scenario" to be applied.

Scope of assessment

8.9.1.2 The scope of the GHG assessment includes those activities associated with the Proposed Development that either directly or indirectly release GHG emissions

that contribute to climate change effects, irrespective of their source, and across all relevant project lifecycle stages (whole lifecycle carbon emissions). The system boundary applied for this assessment will be Cradle-to-Grave as this is proportional to the nature and scale of the Proposed Development.

8.9.1.3 A reference study period, incorporating construction, the 40 year operational life and decommissioning, will be used as the basis of the GHG emissions assessment, and this will form the temporal boundary for the assessment.

8.9.1.4 The objective of the assessment is to ensure the minimum overall lifetime carbon emissions and the maximum lifetime resource efficiency, and to demonstrate how the Proposed Development will mitigate the impact it will have on climate change through the release of GHG emissions in the longer term.

Setting a baseline

8.9.1.5 A baseline is a reference point against which the impact of a development can be compared. In addition to the current emissions baseline, it is necessary to establish a second (sectoral) emissions baseline against which the project can be meaningfully compared. This is represented by a typical 'Business as Usual' (BaU) development of a similar type built elsewhere to minimum regulatory standards, where assumptions are made on current or future GHG emissions. These are summarised as baselines A and B below:

A. GHG emissions within the boundary of the GHG quantification but without the proposed project; or

B. GHG emissions arising from an alternative project design and/or BaU for a project of this type. The alternative project design will consider the equivalent electrical generation but from a fossil fuel generator for comparison.

8.9.1.6 The assessment will consider both forms of baseline represented by points A and B to provide a meaningful comparison of impacts associated with the Proposed Development. As stated in the IEMA (2022) guidance [95], the goal of establishing a baseline is assessing and reporting the proposed project's net GHG impact. The EIB 'Project Carbon Footprint Methodologies' (2022) guidance [91] will be used to establish the baseline scenario, as this goes into greater detail in terms of baseline methodology for assessing GHG emissions from projects.

8.9.1.7 The current baseline represents existing GHG emissions before construction and operation of the Proposed Development, and should account for expected land use change resulting in the release of previously sequestered carbon (such as the disturbance of soils). The baseline will represent a realistic worst-case scenario as considered best practice. Where alternative baselines are to be considered, the EIA will also include either quantitative or qualitative assessment of emissions associated with the relevant scenarios.

8.9.1.8 The future baseline will capture both direct and indirect operational and user GHG emissions associated with the baseline scenarios, irrespective of their source as recommended by the updated 2022 IEMA guidance.

8.9.1.9 The approach to setting a credible baseline for this assessment is endorsed by a 2019 Technical Note published by European Bank for Reconstruction and Development (EBRD) [104]. This Technical Note states that this type of baseline is appropriate since "*it is recognised that 'something' must be done*" and allows for a comparison of relative effects.

8.9.1.10 This assessment method for setting a baseline is a slightly different approach to other technical disciplines which describe a 'no development scenario' as the future baseline for the assessment of impacts within the ES, however, it is still compliant with the requirements of the EIA Regulations.

Estimating emissions within the system boundary

8.9.1.11 Emissions will be calculated by multiplying the activity data with the emission factors published annually by the Department for Energy Security and Net Zero (DESNZ) and the Department of Environment, Food and Rural Affairs (DEFRA), in line with IEMA (2022) best practice guidance. The general equation for emission estimation is:

GHG emission factor × Activity data = GHG emission or removal

8.9.1.12 Activities where expected emissions are less than 1% of the total emissions will be excluded, but only where all exclusions total up to a maximum of 5% of total overall emissions associated with the Proposed Development across all project lifecycle modules within the applied system boundary (the whole lifecycle carbon emissions).

8.9.1.13 Emissions are expressed in terms of tonnes of carbon dioxide equivalent (tCO_2e). This is a universal metric measure used to compare the emissions from various greenhouse gases on the basis of their global warming potential (GWP), by converting amounts of other gases to the equivalent amount of CO_2 with the same GWP.

8.9.1.14 In terms of CO_2e emissions, the project as a whole is assessed for its 'relative emissions (Re)' or net emissions. This is expressed as the difference between absolute emissions generated by the Proposed Development and the baseline emissions for a 'typical' development of a similar type.

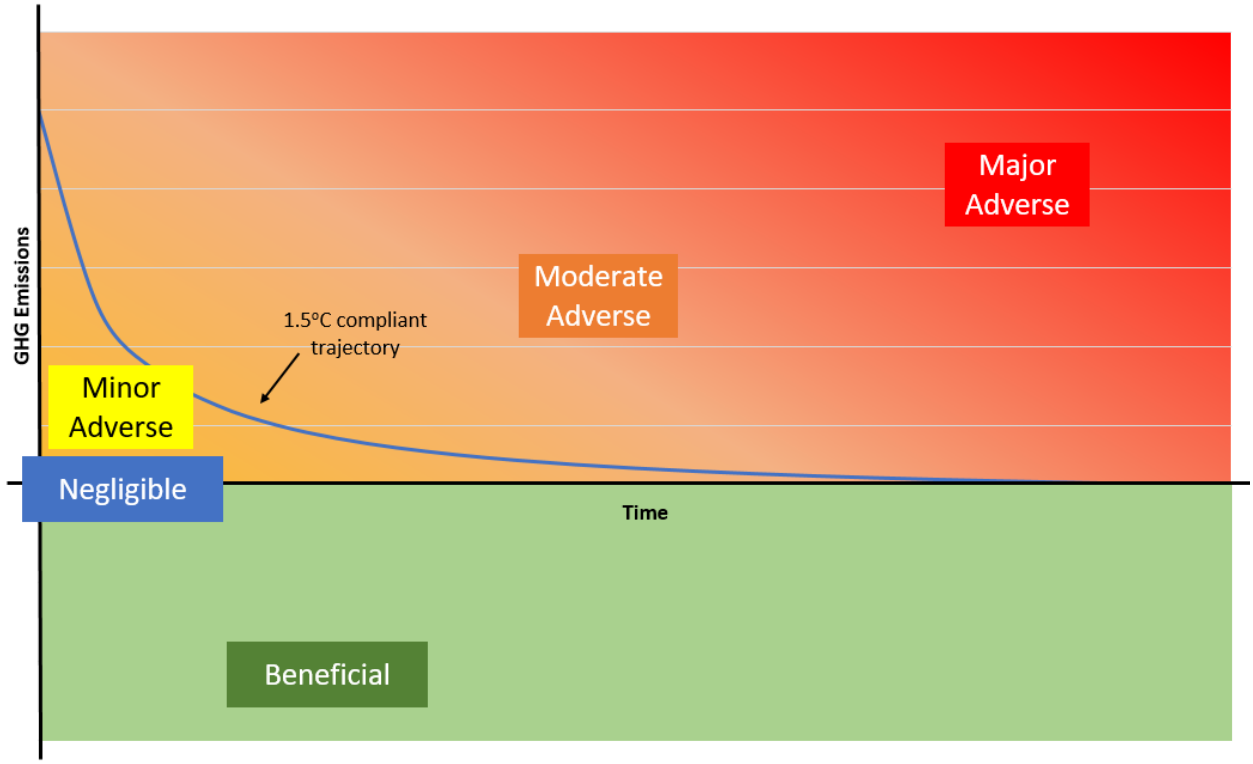
Relative Emissions (Re) = Absolute Emissions (Ab) – Baseline Emissions (Be)

8.9.1.15 The relative emissions are then used a reference point in combination with industry expertise on carbon reduction targets to evaluate the project against the defined significance criteria.

8.9.1.16 This methodological approach is recommended by the EIB (2023) and is fully compatible with the EIA regulations.

Significance

8.9.1.17 The significance of the impacts associated with the Proposed Development will be assessed in line with the criteria set out within the IEMA guidance (2022) and illustrated in Inset 8-2 below. Where GHG emissions cannot be avoided, the goal of the EIA process is to reduce the project's residual emissions at all stages.



Inset 8-2 Different levels of significance plotted against the UK's net zero compatible trajectory

(Derived from: IEMA 2022)

8.9.1.18 All sources of GHG emissions will contribute to global climate change. The atmospheric concentration of GHG emissions is defined by IEMA [95] as being of high sensitivity to further emissions. Therefore, all emissions are considered to have an adverse impact on climate change in the short, medium, and long term.

8.9.1.19 Minor adverse and negligible effects are not considered to be significant. Impacts are only considered to be minor adverse if the project's GHG impacts are fully consistent with existing and emerging policy requirements and good practice. Impacts are only considered to be negligible if the development goes well beyond existing policy and design standards. It needs to be viewed as well 'ahead of the curve' for the net zero trajectory and have minimal residual emissions. Projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.

8.9.2 Climate resilience

8.9.2.1 IEMA's guidance ' [90] presents a methodology for the consideration of climate change resilience and adaption in the EIA process, which will be followed in the EIA.

8.9.2.2 The aim of the second part of the assessment will be to assess the vulnerability of the Proposed Development to global climate change, which will highlight the potential risk of major accidents, and to identify adaptation and resilience measures to mitigate risk.

8.9.2.3 The first stage of the assessment is to is review the future climate projections published by the Met Office (through the UK Climate Projections (UKPC18, [101]) website), which includes variables such as annual mean temperatures and annual changes in summer and winter precipitation.

8.9.2.4 It is proposed that the draft Order Limits are assessed for climate projections under four different future climate scenarios, to cover the life of the development in varying future conditions. These range from RCP2.6 where atmospheric emission concentrations are strongly reduced through to the worst-case scenario, RCP8.5, where emission concentrations continue to rise, unmitigated. A range of probability levels are available, although this study will use the 50% probability level (i.e. a central estimate with less uncertainty).

8.9.2.5 The principal steps that will be undertaken are to:

- define the current climate at the draft Order Limits and surrounding region;
- assess the future climate scenario for the draft Order Limits and region;
- qualitatively assess, using professional judgement, how any sensitive receptors identified across other EIA topics are likely to be affected by the future climate scenario described above; and
- consider and identify the resilience and adaptive measures associated with the Proposed Development's design or management to mitigate the risk to receptors and the Proposed Development as a whole.

8.9.2.6 Assessing the impacts of climate change on a development varies from the assessment of impacts arising from a scheme in other EIA topics, since it focusses on the global impact of an external factor (climate change) on the development, rather than the local impact of the development on receptors in a confined geographical location. The resilience of the Proposed Development to climate change would be assessed based on the susceptibility and vulnerability of a range of different receptors.

8.9.2.7 Potential receptors within elements of the Proposed Development relevant to the location, nature and scale of the development will be identified and receptor groups are expected to include:

- Infrastructure receptors (including equipment and building operations).

- Human health receptors (e.g. construction workers, site users and building occupants).
- Environmental receptors (e.g. habitats and species).
- Climatic systems (e.g. water cycle).

8.9.2.8 The extent of the study area for an assessment of vulnerability to climate change are the features within and surrounding the draft Order Limits, which include:

- users adjacent to the draft Order Limits
- A47 and other public, private and country side roads within and surrounding the draft Order Limits
- residential areas surrounding the draft Order Limits
- species and habitats within the draft Order Limits

8.9.2.9 Following the IEMA guidance , the assessment of resilience will use a combination of probability and consequence to reach a reasoned conclusion on the magnitude of the effect of climate change on the Proposed Development, including the risk of vulnerability to increased heatwaves, flooding, and extreme weather. It is likely that if the probability and/or consequence of the effect is high, then the magnitude of the effect will also be high.

8.9.2.10 A likelihood category is detailed in Table 8-10 below.

Table 8-10 Definitions of the likelihood of the climate impact affecting the receptors

Likelihood category	Description (probability and frequency of occurrence)
Very High	The event occurs multiple times during the lifetime of the Proposed Development (assumed 43 years), e.g. approximately annually, typically 43 events.
High	The event occurs several times during the lifetime of the Proposed Development (43 years), e.g. approximately once every five years, typically 7 events.
Medium	The event occurs limited times during the lifetime of the Proposed Development (43 years), e.g. approximately once every 15 years, typically 2 events.
Low	The event occurs during the lifetime of the Proposed Development (43 years), e.g. once in 43 years.
Very Low	The event may occur once during the lifetime of the Proposed Development (43 years).

8.9.2.11 Consequence of impact will be determined as indicated in Table 8-11 below.

Table 8-11 Consequence of climatic impact and the description of varying consequence of impact on the receptor

Consequence of impact	Description of impact
Extreme Adverse	National-level (or greater) disruption lasting more than 1 week.
Major Adverse	National-level disruption lasting more than 1 day but less than 1 week.
Moderate Adverse	Or Regional-level disruption lasting more than 1 week.

Consequence of impact	Description of impact
Minor Adverse	Regional-level disruption lasting more than 1 day but less than 1 week.
Negligible	Regional-level disruption lasting less than 1 day.

Significance

8.9.2.12 The significance of the effects of climate change impacts on the Proposed Development will be determined using the significance matrix for climate resilience as shown in Table 8-12 below. Effects of Moderate or Major adverse are considered significant, and Minor or Negligible effects considered not significant, however professional judgment can be applied to the determination of significance.

Table 8-12 Significance criteria for climate resilience

Climate resilience significance matrix		Measure of likelihood				
		Very low	**Low**	**Medium**	**High**	**Very high**
Measure of Consequence (Impact)	Negligible	Negligible (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)
	Minor	Negligible (Not Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	Moderate Adverse (Significant)	Moderate Adverse (Significant)
	Moderate	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	Moderate Adverse (Significant)	Moderate Adverse (Significant)	Moderate Adverse (Significant)
	Major	Minor Adverse (Not Significant)	Moderate Adverse (Significant)	Moderate Adverse (Significant)	Moderate Adverse (Significant)	Moderate Adverse (Significant)
	Extreme	Minor – Moderate Adverse (Not Significant)	Moderate Adverse (Significant)	Moderate - Major Adverse (Significant)	Major Adverse (Significant)	Major Adverse (Significant)

8.10 Assumptions, limitations and uncertainties

8.10.1.1 The following limitations and assumptions have been identified:

- The Greenhouse Gas Emissions calculations are based on assumptions relating to the build specifications and materials that will be used. These have been provided by the Applicant, where material choices are known.
- Emissions factors that have been used are derived from published datasets and/or peer-reviewed literature. They may not reflect exact emissions factors associated with specific materials as many of these are still subject to tendering

and procurement decisions, however, they are expected to be representative of the materials to be used onsite.

- Where possible, conservative estimates have been adopted to provide reasonable worst-case scenario modelling.
- Uncertainties associated with probabilistic climate change projections are outside of the Applicant's control and cannot be fully mitigated.
- The Applicant can implement measures to reduce the impacts and increase climate resilience according to global and regional climate projections that are relevant to the scale of the Proposed Development.
- Further investigation may be required into possible mitigation measures that can be implemented.

8.11 Summary

Table 8-13 Climate change scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
GHG emissions	Scoped in	Scoped in	Scoped in	No
Climate resilience	Scoped in	Scoped in	Scoped in	No
ICCI	Scoped out	Scoped out	Scoped out	No

9 Cultural Heritage and Archaeology

9.1 Introduction

9.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of cultural heritage and archaeology.

9.1.1.2 It sets out cultural heritage and archaeological receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

9.1.1.3 The following matters have been considered as part of the scope and methodology for cultural heritage and archaeology:

- Direct and indirect impacts to designated heritage assets (listed buildings, scheduled monuments, registered parks and gardens, registered battlefields, conservation areas, world heritage properties, protected wrecks);
- Direct and indirect impacts to non-designated heritage assets (including below ground and earthwork archaeological remains, non-listed buildings of historic interest, non-registered parks and gardens of historic interest).

9.1.1.4 This chapter is supported by Figure 9.1 Heritage assets within 2km of the draft Order Limits.

9.1.1.5 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 14 Landscape and Visual

9.2 Relevant legislation, policy, standards and guidance

9.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidance which underpin the assessment methodology for cultural heritage and archaeology and have informed the scope of the assessment.

9.2.2 Legislation

Table 9-1 Legislation

Legislation	Relevance to assessment
Ancient Monuments and Archaeological Areas Act 1979	It is a criminal offence to carry out any works physically affecting a Scheduled Monument without Scheduled Monument Consent. Development must preserve in-situ protected archaeological remains and landscapes of acknowledged significance and protect their settings. There are Scheduled Monuments adjacent to the draft Order Limits.
Planning (Listed Buildings and Conservation Areas) Act 1990	Section 1 of the Listed Buildings Act requires the Secretary of State to compile and maintain lists of buildings of special architectural or historic interest. The principal statutory duty under the Act is to preserve the special character of these heritage assets, including their setting. Buildings on the list are assessed and graded against the criteria of architectural and historic interest. Buildings listed at Grade I are defined as those considered to be of exceptional interest. Grade II* listed buildings are particularly important buildings of more than special interest, while Grade II listed buildings are of special interest. This may include the extent to which the exterior of a building contributes to the interest of a group of buildings, i.e. 'group value'. Relevant Statutory Tests of the Act are as follows: Section 66: General duty as respects listed buildings in exercise of planning functions. (1) In considering whether to grant planning permission [or permission in principle] for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses. (2) Without prejudice to section 72, in the exercise of the powers of appropriation, disposal and development (including redevelopment) conferred by the provisions of sections 232, 233 and 235(1) of the principal Act, a local authority shall have regard to the desirability of preserving features of special architectural or historic interest, and in particular, listed buildings. Section 72: General duty as respects conservation areas in exercise of planning functions. (1) In the exercise, with respect to any buildings or other land in a conservation area, of any [functions under or by virtue of] any of the provisions mentioned in subsection (2), special attention shall be paid to the desirability of preserving or enhancing the character or appearance of that area. There are listed buildings within the study area which may experience change to their setting.
Treasure Act 1996	The 1996 Act defines 'Treasure' as any object that is at least 10% gold or silver, associated with coins or groups of coins which are

Legislation	Relevance to assessment
	over 300 years old, objects formerly classed as 'treasure trove' (i.e. deliberately deposited items with a high content of gold or silver) and any objects found in association with the above (even if found at different times). The Secretary of State may designate any class of object as treasure which they consider to be of outstanding historical, archaeological or cultural importance. Any find of 'Treasure' must be reported to the local Coroner. Intrusive archaeological investigations may reveal finds of treasure.
Burial Act 1857	Under Section 25 of the 1857 Act, it is generally a criminal offence to remove human remains from any place of burial without an appropriate licence issued by the Ministry of Justice (MoJ), although recent legislative changes indicate that some cases are exempt from this requirement. Intrusive archaeological investigations have potential to reveal human remains.
Protection of Military Remains Act 1986	An Act of Parliament in the United Kingdom which provides protection for the wreckage of military aircraft and designated military vessels. Certain activities are prohibited at protected sites, without the authority of the Ministry of Defence. The draft Order Limits contain a WWII crash site.
Historic Buildings and Ancient Monuments Act 1953	The Historic Buildings and Ancient Monuments Act 1953 authorises Historic England to compile a register of "gardens and other land" situated in England that appear to be of special historic interest. Registered Parks and Gardens The Register was established in 1984 and there are currently over 1,600 sites included. Sites are graded I, II*, or II along the same lines as listed buildings. A registered park or garden is not protected by a separate consent regime, but applications for planning permission will give great weight to their conservation. The National Planning Policy Framework (NPPF [105],see Table 9.2) defines them as designated heritage assets and as such their conservation should be an objective of all sustainable development. Substantial harm to or total loss of a Grade II registered park or garden should be exceptional and for a Grade II* or I registered park or garden such loss or harm should be wholly exceptional. The Grade II registered Narford Hall is within the study area and may experience changes to its setting that may constitute harm.

9.2.3 Policy

Table 9-2 Policy

Policy	Relevance to assessment
National Planning Policy Statement for Energy (NPS EN-1) 2024 [106]	Sets broad national policy approach. Section 5.9 refers to the significance of heritage assets, the scope of assessment required and mitigation and recording of the historic environment, including the following paragraphs of relevance: Paragraph 3.10.101 refers to the positive impacts that solar developments can have on the historic environment by removing areas from regular ploughing. Paragraph 3.10.106 notes that evaluation should be proportionate to the sensitivity and extent of proposed ground disturbance.
National Policy Statement for Renewable Energy Infrastructure (NPS EN-3) 2024 [107]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects. Section 3.10 gives specific consideration to solar development including assessment of heritage impacts.
National Policy Statement for electricity networks infrastructure (EN-5) [108]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for cultural heritage, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19) and with reference to undergrounding and subsea cables (paragraph 2.9.25).
National Planning Policy Framework (NPPF) [105]	The NPPF endorses the conservation and enhancement of the historic environment, defines the role of the planning system as to promote and achieve sustainable development and involves protecting and enhancing our 'natural, built and historic environment' (ibid. para:20). Chapter 16 sets out policies relevant to the historic environment
Breckland Council Local Development Plan 2023 [109]	Policy ENV 07 Designated Heritage Assets and Policy ENV 08 Non-Designated Heritage Assets expand upon the policies in NPPF and NPS EN-1 and NPS EN-3, including requirements for the provision of proportionate evidence to an assets importance, sufficient to identify its significance and any contribution that its setting makes to enable any impact to be fully assessed.

9.2.4 Standards and guidance

Table 9-3 Standards and guidance

Standards and guidance	Relevance to assessment
Chartered Institute for Archaeologists Standard and Guidance for Historic Environment Desk-Based Assessment [110]	A desk-based assessment will form part of the baseline data gathering for the assessment.
Chartered Institute for Archaeologists Code of Conduct [111]	Sets out ethical behaviours for those working in the historic environment
Historic England Historic Environment Good Practice Advice in Planning 3: The Setting of Heritage Assets (GPA3) [112]	Provides a methodology for assessing the setting of heritage assets
Historic England Historic England Advice Note 12: Statements of Heritage Significance: Analysing Significance in Heritage Assets (HEAN 12) [113]	Provides a methodology for analysing the heritage significance of heritage assets
Historic England Historic Environment Good Practice Advice in Planning 2: Managing Significance in Decision-Taking in the Historic Environment (GPA2) [114]	Provides a methodology for decision makers to follow when taking a staged approach to understanding significance and assessing the impacts of proposals
Institute of Environmental Management and Assessment, Institute of Historic Building Conservation and Chartered Institute for Archaeologists Principles of Cultural Heritage Impact Assessment in the UK [115]	Provides guidance for cultural heritage practitioners in regard to the principles of (a) understanding cultural heritage assets; and (b) evaluating the consequences of change.
Historic England Historic England Advice Note 15: Commercial Renewable Energy Development and the Historic Environment (HEAN15) [116]	explains how the historic environment is taken fully into account during the planning and delivery of commercial renewable energy developments.

9.3 Consultation

9.3.1.1 The following stakeholders will be consulted with regards to cultural heritage and archaeology as part of the assessment process:

- Historic England – for their interest in designated heritage assets (including Grade I and II* listed buildings; registered parks and gardens, registered battle-fields, scheduled monuments).

- Norfolk County Council (NCC)'s archaeological advisor – for their interest in non-designated heritage assets.
- Breckland Council's Conservation Officer – for their interest in Grade II listed buildings and conservation areas.

9.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to air quality.

9.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

9.4 Study area

9.4.1 Direct effects to heritage assets

9.4.1.1 A study area of 1km from the draft Order Limits (shown on Figure 9.1) will be used for the desk-based assessment to identify known designated and non-designated heritage assets that may extend into the draft Order Limits and be directly affected by construction of the Proposed Development and to inform an assessment of the potential for currently unknown archaeological remains within the draft Order Limits.

9.4.2 Indirect effects to heritage assets

9.4.2.1 For the assessment of potential indirect effects on heritage assets (both designated and non-designated) resulting from changes in their setting, study areas reflecting the relative importance of heritage assets will be used as follows:

- Up to 1km from the draft Order Limits: all heritage assets.
- Up to 2km from the draft Order Limits: all designated heritage assets and assets of demonstrably equivalent importance as defined in NPS EN-1 paragraph 5.9.5 [106].
- Beyond 2km up to the limits of the Zone of Theoretical Visibility (ZTV) which is proposed in Chapter 14 Landscape and Visual to be 3km from the draft Order Limits : designated heritage assets of particular sensitivity to visual changes in their wider setting at this range, e.g. Grade I and II* registered parks and gardens and listed buildings with designed views. .

9.5 Baseline conditions

9.5.1 Desktop sources used

9.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study areas:

- Information on designated heritage assets obtained as a digital data extract from Historic England in February 2024 [117].
- Information on non-designated heritage assets recorded by the Norfolk Historic Environment Record (HER) obtained via email as a digital data extract on 17 April 2024 [118].
- Information on Conservation Areas derived from Breckland Council's "My Maps" website [119].

9.5.2 Surveys undertaken and proposed

9.5.2.1 No surveys, beyond initial data gathering on known heritage assets, have so far been completed at the time of writing.

9.5.2.2 Geophysical surveys commenced in April 2024 and are ongoing. The results will be reported in the ES.

9.5.2.3 The proposed approach to surveys allows adequate information to inform a robust assessment of the likely significant effects of the Proposed Development and inform decision making, as well as allowing appropriate management of risk and mitigation measures to be identified in proportion to potential risk and impacts. The following surveys are planned to be undertaken, and will inform ES:

- Full archaeological desk-based assessment, including field visit, for assessment with the 1km study area for all heritage assets.
- Stage 1 setting assessment, including visits where necessary, of all heritage assets within the 1km study area for all heritage assets, and those of medium or high importance within the study area of 2km.
- Detailed setting assessments, including visits, of selected assets of notable value identified as potentially subject to effect above negligible following Stage 1 Setting Assessment and further consultation with statutory consultees.
- Geophysical survey of Panel Areas in which solar Photovoltaic (PV) panels and supporting infrastructure, such as inverters, battery energy storage systems, and substations, are proposed. As there remains uncertainty as to the location of the cable routes for the Proposed Development, these have not been included within the geophysical survey remit so as to limit any potential impacts where construction will not eventually occur. Should it be required, provision will be made to undertake geophysical survey across any off-road cable routes which are not already covered by results from the survey carried out in support

of the DCO. The requirement for this will be agreed in consultation with the local authority.

- Pre consent trial trenching in the Panel Areas would be proposed only where the geophysical survey has identified notable features or areas of high risk of encountering archaeological remains. If required this will inform the EIA in the ES. Any further trial trenching required after consent if granted and prior to construction would be based on the findings of the other surveys above and in consultation with relevant statutory bodies

9.5.3 Existing baseline

9.5.3.1 The currently known designated and non-designated heritage assets within the 2km study area are shown on Figure 9.1 of this EIA Scoping Report. A gazetteer of known assets is provided in Appendix 9.1 of this EIA Scoping Report. Designated assets are referred to by their National Heritage List for England (NHLE) reference number, except for Conservation Areas which are not included in the NHLE and are referred to by name. Non-designated heritage assets are referred to by their Norfolk HER preferred reference.

9.5.3.2 There are no registered battlefields, world heritage properties or protected wrecks within the study areas.

Designated heritage assets within the draft Order Limits

9.5.3.3 The only designated heritage assets within the draft Order Limits are three scheduled monuments:

- Hangour Hill (NHLE 1003160) – a prehistoric burial mound
- Roman enclosure 3/4 mile (1210m) NE of Panworth Hall (NHLE 1003965) – the earthwork remains of a Roman enclosure
- Devil's Dyke, Beechamwell and Barton Bendish. Section 1km in length West of Smeeth Wood (NHLE 1003973) – a large linear earthwork of possible early medieval date

Non-Designated heritage assets within the draft Order Limits

9.5.3.4 The Norfolk HER contains 251entries that are located within the draft Order Limits. Full details of these records are provided in the gazetteer at Appendix 9.1; in summary they comprise:

- 156 find spots of artefacts ranging from Lower Palaeolithic to WWII date
- Bronze Age barrows
- Prehistoric “burnt mounds”
- Iron Age settlement sites
- Evidence of Roman settlement
- Evidence of early medieval and medieval settlement including moated sites and deserted settlements

- The sites of post-medieval brick kilns
- A WWI airfield
- A WWII aeroplane crash site
- WWII defensive structures such as pill boxes and bombing decoys

9.5.3.5 In addition, there is one entry for "negative evidence" - i.e. locations where archaeological investigations have found no remains. These records are therefore not considered to relate to heritage assets.

9.5.3.6 The majority of these remains are of low importance, though some may contribute to the regional archaeological research agenda aims. The aeroplane crash site will be treated as a high importance asset due to the legislative protection given to these sites. The full archaeological desk-based assessment will identify the relative importance of all heritage assets within the draft Order Limits.

Designated heritage assets within 1km study area

9.5.3.7 There are no registered parks and gardens within the 1km study area.

9.5.3.8 There are an additional seven scheduled monuments within the 1km study area, but outside the draft Order Limits. These comprise:

- 4 moated sites
- The site of Wendling Abbey
- Another earthwork section of Devil's Dyke
- The site of Panworth Hall and medieval settlement (which is located immediately adjacent to the draft Order Limits)
- the deserted medieval village of Great Palgrave

9.5.3.9 There are two conservation areas within the 1km study area: Necton and Swaffham. The Necton Conservation Area protects the historic core of the village focused around the church. The Swaffham Conservation Area likewise protects the historic core of the market town. The town centre is a market "triangle" and there are multiple focal buildings within the conservation area including the 1783 Butter Cross, the Church of St Peter and St Paul and the Corn Hall.

9.5.3.10 There are 58 listed buildings within the 1km study area, comprising six Grade I, five Grade II* and 47 Grade II. The Grade I listed buildings are all churches and are listed at this level chiefly due to having surviving medieval fabric. The Grade II* listed buildings comprise another medieval church, a 14th century table tomb, two farmhouses (Hyde Hall (NHLE 1077469) and The Old Hall (NHLE 1152599) and a manor house (NHLE 1269575). The Grade II listed buildings comprise:

- 11houses or groups of houses within settlements
- 12 farmhouses or former farmhouses
- 5 large houses (or former large houses) and 5 associated structures within their grounds:

  - Holme Hale Hall (NHLE 1077264) and associated iron foot bridge (NHLE 1152072), lodge (NHLE 1263629) and gatepiers, gates and railings (NHLE 1263630)
  - The Lodge (NHLE 1152264)
  - Bradenham Hall (NHLE 1304966)
  - Stables to Necton Hall (NHLE 1342604)
  - Scarning Dale (NHLE 1342578)
  - Bury's Hall (NHLE 1342582)
  - Obelisk south east of Dunham Lodge (NHLE 1169330)
- 5 war memorials
- 2 barns and a stable block associated with farmhouses
- 4 former rectories or vicarages
- A K6 telephone kiosk
- A Baptist chapel and hall
- The boundary walls and gates to a pair of houses (NHLE 1269547)

Non-Designated heritage assets within 1km study area

9.5.3.11 The Norfolk HER includes 836 records of non-designated heritage assets within the 1km study area but outside the draft Order Limits. Full details are provided in the gazetteer at Appendix 9.1 of this EIA Scoping Report; in summary these comprise:

- 467 findspots ranging from Lower Palaeolithic to post-medieval in date
- 9107 buildings of post-medieval or later date
- 6 designed landscapes or landscape parks
- 4 Bronze Age ring ditches or barrows
- 4 cropmark or earthwork features including a Bronze Age mound and a de-serted medieval settlement
- Further evidence of prehistoric activity including 44 burnt mounds
- Further evidence of Roman settlement activity
- 3 early Saxon and 1 medieval earthwork bank and further evidence of Saxon and medieval settlement
- The sites of 2 post-medieval houses recorded from map evidence
- The sites of post-medieval windmills and further extraction activity from map evidence
- 2 WWI airfields
- The sites of 2 WWII aircraft crash sites
- Further WWII defensive sites

9.5.3.12 In addition, the HER records 3 sites of "negative evidence" - i.e. locations where archaeological investigations have found no remains. These records are therefore not considered to relate to heritage assets.

Designated heritage assets within 2km study area

9.5.3.13 There is one registered park and garden within the 2km study area. This is Narford Hall, grade II registered, a late 18th century landscape park with 19th century additions which contains surviving elements of an early 18th century formal layout.

9.5.3.14 There are three conservation areas within the 2km study area. These are Dereham, Little Dunham and Shipdham.

9.5.3.15 There are four scheduled monuments within the 2km study area. These are: the Old Hall moated site (NHLE 1020791), a Roman settlement (NHLE 1003170), Mona Hill (a Bronze Age round barrow (NHLE 1003154)) and High Banks (a possible Iron Age or Roman fort (NHLE 1004038)).

9.5.3.16 There are 136listed buildings within the 2km study area. These comprise seven Grade I listed buildings, threeGrade II* listed buildings and 126 Grade II listed buildings, full details are provided in the gazetteer at Appendix 9.1 of this EIA Scoping Report. The Grade I listed buildings comprise six churches and the Swaffham Market Cross. The Grade II* listed buildings comprise one further church, Dunham Lodge (NHLE 1077493) a late 18th century mansion, and Oakleigh House (NHLE 1269627) a late 16th or early 17th century house remodelled in the mid-18th century. The Grade II listed buildings comprise:

- 67 houses within settlements (some of which have been converted to commercial uses)
- 14 farmhouses and former farmhouses
- 8 gates, gate piers, and churchyard and boundary walls
- 9 inns, public houses and hotels
- 3 war memorials
- 4 public buildings or former public buildings (an assembly room, a town hall, a shire hall now converted to flats and the former rural district council offices now converted to a house)
- 3 former rectories
- 3 large houses – Shipdham Manor House and Holmwood House (now both homes for the elderly) and White Hall
- 2 churchyard monuments (a headstone and a table tomb)
- A barn
- A K6 telephone kiosk
- A former school (now church hall)
- A former corn hall (now offices)
- A town pound

- A post office
- A Methodist church
- A former foundry now a shopping arcade
- Further buildings and structures associated with large houses:
  - Dovecote to Holme Hall Hall
  - Stables and coach house to Holme Hale Hall
  - Stables to Dunham Lodge
  - Gardener's cottage to Dunham Lodge
  - Gardeners Cottage to (the unlisted) Saham Hall

9.5.4 Future baseline

9.5.4.1 The future baseline for cultural heritage and archaeology is expected to remain as the current existing baseline in the absence of the Proposed Development proceeding, as the resource will not be altered or increased. However, in the absence of the Proposed Development the future baseline for cultural heritage and archaeology could change in the following ways:

- New heritage assets may be designated and/or currently designated heritage assets may be removed from statutory lists/registers.
- New heritage assets may be identified.
- Upstanding remains pertaining to built heritage and archaeological heritage assets may be degraded by the impacts of weather and the growth or proliferation of vegetation.
- Below-ground archaeological remains may be disturbed or truncated by agricultural activities such as ploughing or the establishment of new tree plantations or may be negatively impacted by changes in soil moisture levels, particularly if flooding occurs within the study area.

9.5.4.2 Changes to the designated status of assets within the study areas will be monitored and the baseline data from the Norfolk HER will be refreshed during the EIA process to ensure that the ES is based on up to date information.

9.5.4.3 Changes to the integrity of heritage assets as a result of weather, vegetation growth, and agricultural practices would be relatively slow to become apparent an unlikely to alter the heritage significance of heritage assets between submission and construction but will be reviewed through the EIA process to ensure that the ES is based on up to date information.

9.6 Potential impacts

9.6.1 Construction

9.6.1.1 Construction of the Proposed Development, including activities such as the insertion of piled foundations, excavation of cable trenches, works associated with and installation of supporting infrastructure (inverters, substations and

compounds) could directly impact on below ground archaeological remains within the draft Order Limits depending on the final layout. Depending on the sensitivity of the archaeological remains affected these effects could be significant.

9.6.1.2 Construction activity could adversely affect the significance of heritage assets beyond the draft Order Limits if it alters the contribution that setting makes to the heritage significance of these assets. Given the short-term nature of construction phase changes within the setting of heritage assets these effects are unlikely to be significant. No direct effects on heritage assets beyond the draft Order Limits are predicted during construction.

9.6.2 Operation

9.6.2.1 Significant operational phase effects could occur where the contribution that the setting of heritage assets makes to their heritage significance is adversely affected by the presence of the Proposed Development.

9.6.2.2 No impacts are likely from the Proposed Development to buried archaeological remains during the operational phase as impacts would occur during construction.

9.6.3 Decommissioning

9.6.3.1 At the end of the 40-year operational lifespan of the Proposed Development, the PV modules and associated infrastructure will be removed to decommission the Proposed Development. It is anticipated that no further adverse indirect impacts to the significance of designated heritage assets would result from the restoration works to the draft Order Limits assuming the land is returned to its former use and as a result of the short time period for works.

9.6.3.2 No direct impacts to the potential archaeological resource are anticipated to result from the decommissioning phase, impacts having resulted as part of the construction phase.

9.6.3.3 This is predicated upon:

- the assumption that no further land take will be required for decommissioning, and therefore no additional physical disturbance can be caused to any heritage assets through intrusive works; and
- the understanding that decommissioning will remove all elements of the Proposed Development (with the exception of the 400kV substation) and thus return the landscape to its previous state (as it is now) therefore removing any ongoing impact on heritage assets through a change in setting, with the exception of any impacts resulting from the substation alone which will be assessed as permanent impacts.

9.6.3.4 No direct effects are predicted to heritage assets beyond the draft Order Limits during decommissioning.

9.7 Design, mitigation and enhancement measures

9.7.1 Design principles

9.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

9.7.2 Embedded and Good practice measures

9.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

9.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to cultural heritage and archaeology are likely to include:

- Avoidance of physical disturbance to known heritage assets through design, including appropriate stand-offs between heritage assets and the construction and relocation and/or minimisation of module mounting structures, foundations and underground cables within areas known to include archaeological remains.
- If below ground archaeology constraints arise through further site investigation the mounting structure of solar panels will avoid impacts to these through alterations to the layout (where remains of high importance are identified) or will utilise options such as ballast slabs, anchor, or block which sit on the ground surface where this is necessary and appropriate to mitigate any impacts to the archaeological remains
- Existing hedgerows in poor condition / gappy will be reinforced with planting / management where feasible as long as this does not adversely affect the setting of heritage assets.
- The Proposed Development would generally not be lit. The only lighting required would be demand responsive motion sense lights at the substations using passive infra-red (PIR) technology. This would only be on intermittently for security and/or safety reasons, and it will be designed and installed in a manner which minimises impact.
- Hedgerow planting along field boundaries to maximise landscape integration where appropriate.
- Development of an environmental masterplan incorporating screening mitigation and filter planting.

- Visible structures such as substations, fencing, BESS, inverters will be blended into the landscape through the careful selection of colours and/or cladding.
- Appropriate buffer will be maintained between heritage assets and the construction works. This will be assessed as part of the Heritage Impact Assessment.

9.7.2.3 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

9.7.3 Further mitigation

9.7.3.1 Further mitigation is defined as actions that require further activity in order to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for cultural heritage and archaeology will be defined through the EIA process once the level of significance of effects is known, and reported in the ES. Options for further mitigation for the Proposed Development relevant to cultural heritage and archaeology may include:

- Use of non-intrusive construction methods to protect below ground archaeological remains of high importance (preservation in situ).
- Targeted set-piece archaeological excavation in advance of construction for archaeological remains that do not merit preservation in situ but would be significantly adversely affected by construction activities.
- Archaeological monitoring and recording of any archaeological remains during construction.

9.7.4 Management plans

9.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, relevant to cultural heritage and archaeology include:

- Archaeological Mitigation Strategy (including Outline Written Scheme of Investigation for archaeology (oWSI))
- oCEMP
- oLEMP, including general operational measures alongside those specific to landscape and ecology
- oDEMP

9.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

9.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

9.8 Likely significant effects

9.8.1 Construction

9.8.1.1 No direct effects to heritage assets outside the draft Order Limits are predicted during the construction phase. Indirect effects to heritage assets outside the draft Order Limits may occur as a result of temporary changes within their setting, but significant effects are unlikely due to the short-term and reversible nature of these changes. These effects are therefore **scoped out** of further assessment.

9.8.1.2 Potential direct and indirect impacts to designated and non-designated heritage assets within the draft Order Limits would be **scoped in** for further assessment due to the potential for the Proposed Development to give rise to potentially significant effects during construction.

9.8.1.3 The design of the Proposed Development will take account of the designated and non-designated heritage assets within the draft Order Limits to ensure that their heritage significance is conserved proportionally, along with information on any further archaeological remains. In addition, the oCEMP will include measures to ensure the preservation of these assets proportionate to their significance.

9.8.1.4 A full desk-based assessment (DBA), geophysical survey of areas where solar PV modules and associated infrastructure are proposed, and any intrusive evaluation will be undertaken to identify, confirm, and fully assess the predicted potential direct impacts to known and potential archaeological remains and to confirm/assess the predicted potential indirect impacts to designated heritage assets from the Proposed Development.

9.8.2 Operation

9.8.2.1 Visibility of PV modules during the operational phase of the Proposed Development has the potential to indirectly, adversely affect the contribution that setting makes to the heritage significance of heritage assets, where this contribution:

- Includes designed views from the asset over the surrounding landscape.
- Derives from views of the asset from the surrounding landscape (which may be obscured by the Proposed Development).
- Draws on the current agricultural use of the land within the draft Order Limits (which would be visually altered by the Proposed Development).

9.8.2.2 Potential indirect impacts from the operational phase of the Proposed Development on designated heritage assets will be **scoped in** for further assessment. Potential indirect impacts from the operational phase of the Proposed Development on non-designated heritage assets will be **scoped out** on the basis that significant effects are unlikely to occur given the low importance of the assets and the degree of harm to significance that could occur through changes in setting alone.

9.8.2.3 A Stage 1 Setting Assessment in accordance with Historic England guidance will be prepared to identify those assets where significant effects may occur depending on the final design of the Proposed Development in order to refine the scope of the EIA. The Stage 1 Setting Assessment will form an appendix to the ES.

9.8.2.4 An assessment of direct impacts to buried archaeological remains is **scoped out** of further assessment as the impacts would occur during construction or would be avoided through the implementation of measures set out in Section 9.7.

9.8.3 Decommissioning

9.8.3.1 It is anticipated that all impacts to below ground heritage assets (archaeological remains) within the draft Order Limits will have occurred and been mitigated for during the construction phase (direct) and operation phase (indirect). Any additional potential impacts to either below ground heritage assets (archaeological remains) within the draft Order Limits or to heritage assets in the surrounding area would be avoided through implementation of measures in a DEMP. These effects are therefore **scoped out**.

9.9 Proposed assessment methodology

9.9.1 Importance of heritage assets

9.9.1.1 The importance of a heritage asset is a measure of the degree to which the heritage significance [1] of that asset is sought to be protected through legislation and planning policy [120]. The level of importance will therefore reflect any statutory and non-statutory heritage designation or, in the case of undesignated assets, the professional judgement of the assessor as to the degree of importance that the asset has with reference to regional research frameworks.

9.9.1.2 The criteria presented in Table 9-4 will be used to establish the importance of heritage assets. In the absence of specific guidance for England, these criteria have been based on national planning policy, guidance and professional judgement.

Table 9-4 Criteria for establishing importance of heritage assets

Importance	**Description of receptors**
Very High	World heritage sites; assets of acknowledged international importance; assets that can contribute significantly to acknowledged international research objectives; Historic landscapes of international value (designated or not) and extremely well preserved historic landscapes with exceptional coherence, time depth or other critical factor(s).
High	Scheduled monuments and non-designated assets of schedulable quality and importance; Grade I and II* listed buildings and Grade II listed buildings that

[1] Defined by NPPF as "*The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.*"

Importance	**Description of receptors**
	can be shown to have exceptional qualities in their fabric or associations; Conservation Areas with exceptional qualities; non-designated structures of clear national importance; designated and non-designated historic landscapes of historic interest; assets that can contribute significantly to acknowledged national research objectives. This includes assets "*of demonstrable equivalence to Scheduled Monuments*" [105, p. footnote 66] as defined in NPS EN-1 paragraph 5.9.5 [106]
Medium	Grade II listed buildings; Non-designated assets that contribute to regional research objectives; Locally listed buildings and other historic unlisted buildings that have exceptional qualities; Conservation Areas.
Low	Non-designated assets of local importance including those compromised by poor preservation; assets of limited value but with the potential to contribute to local research objectives; robust non-designated historic landscapes.
Negligible	Assets with very little surviving archaeological interest; buildings of little architectural or historic note; landscapes with little historic interest

9.9.2 Magnitude of impact

9.9.2.1 The assessed magnitude of impact will reflect the scale of change which would be caused by the Proposed Development and on the degree to which this would alter the ability to interpret heritage significance and appreciate the asset. Impacts can result either from physical changes to a heritage asset or through sensory changes within its setting where this contributes to heritage significance.

9.9.2.2 An impact may be positive where for example, as part of the Proposed Development, an intrusive building or feature is removed or replaced with a more harmonious one; historic features are restored or revealed; a new feature is added which adds to public appreciation; new views are introduced that add to public experience of an asset; or public interpretation or access is improved to an asset or its setting.

9.9.2.3 Impacts may impart major change, for example where groundworks completely destroy important archaeological remains, to minor change to part of a heritage asset's setting, leading to a limited impact on our ability to interpret it, or its context.

9.9.2.4 Utilising the key principles for assessing the implications of change outlined above, an assessment of the magnitude of impact will be implemented for each baseline heritage asset using the criteria presented in Table 9-5 below. As above, in the absence of specific guidance for England, these criteria have been based on professional judgement.

9.9.2.5 Conclusions of the assessed magnitude of impacts are a product of the consideration of the elements of an asset and its setting that contribute to its heritage significance and the degree to which the Proposed Development would change these contributing elements. The assessment therefore reflects the varying

degrees of sensitivity of different assets to change brought about by different types of development.

9.9.2.6 This definition of magnitude and assessment methodology applies to likely effects resulting from change in the setting as well as likely physical effects on the fabric of an asset.

9.9.2.7 Impacts of Major magnitude are considered to equate to "substantial harm" as used in the NPPF [105], other impacts are considered to equate to "less than substantial harm" and no change is considered to equate to no harm.

Table 9-5 Criteria for classifying magnitude of impact upon heritage significance

Impact Magnitude	Criteria
Major	Change to key historic building elements so that an asset is totally altered; change to most/all key archaeological materials such that the resource is totally altered; comprehensive change to the setting such that the significance of the asset is severely compromised.
Moderate	Change to many key historic building elements, such that the asset is significantly modified; changes to many key archaeological materials such that the resource is clearly modified; changes to setting of an asset, such that the significance of the asset is compromised.
Minor	Change to key historic building elements, such that the asset is slightly different; changes to key archaeological materials such that the asset is slightly altered; changes to setting of an historic building, such that its significance is slightly compromised.
Negligible	Very minor changes to historic building elements, archaeological materials or setting that hardly affect them/it.
No Change	No change to fabric, archaeological materials or the contribution made by setting to the significance of the asset.

9.9.3 Significance of Effect

9.9.3.1 The assessment will combine analysis of the data gathered during the desk-based assessment and site visit, photographs and any wireframe visualisations of the Proposed Development, produced as part of the Landscape and Visual Impact Assessment. These assessments will be carried out using professional judgement, taking into account designations and heritage significance as assessed against national standards.

9.9.3.2 Significance of effect conclusions will be based on a combination of importance (in other disciplines sometimes referred to as sensitivity of the receptor) and magnitude of impact. The significance of effect matrix is presented in Table 9-6 below and provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the importance or impact magnitude levels are not clear or are borderline between categories. EIA significance may be described on a continuous scale from negligible to major and relates the importance to the magnitude of impact (incorporating contribution

from setting where relevant) to establish the likely significance of effect. As above, in the absence of specific guidance for England, the matrix has been based on professional judgement. Where the matrix allows for two potential options, professional judgement will be used to determine the single conclusion on significance of effect.

9.9.3.3 It is also common practice to identify effects as significant or not significant, and in this sense major and moderate effects are regarded as significant, while minor and negligible effects are not significant.

9.9.3.4 Effects can be beneficial or adverse, and the duration of an effect can be permanent or temporary in nature. Temporary effects generally make reference to effects limited to the construction phase of the Proposed Development.

9.9.3.5 All effects derived from direct impacts are permanent. Effects which are derived from indirect impacts are long term, but fully reversible upon decommissioning.

Table 9-6 Criteria for assessing the significance of effect

		Importance / Sensitivity				
		Negligible	**Low**	**Medium**	**High**	**Very High**
Impact Magnitude	**Major**	Minor	Minor or Moderate	Moderate	Major	Major
	Moderate	Negligible	Minor	Moderate	Moderate	Major
	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Negligible	Negligible	Negligible	Minor	Minor
	No Change	No effect	No effect	No effect	No effect	No effect

9.10 Assumptions, limitations and uncertainties

9.10.1.1 The baseline assessment will be based on information readily available at the time of undertaking the assessment and relies on the accuracy of secondary source data. There is always some degree of uncertainty in relation to these sources. The geophysical survey currently in progress will also further investigate the potential for below ground archaeological remains.

9.11 Summary

Table 9-7 Cultural heritage and archaeology scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Direct impacts to unknown buried archaeological remains within the draft Order Limits	Scoped in	Scoped out	Scoped out	Geophysical survey
Direct impacts to designated heritage assets within the draft Order Limits	Scoped in	Scoped in	Scoped in	Setting assessment site visits
Direct impacts to non-designated heritage assets within the draft Order Limits	Scoped in	Scoped in	Scoped out	Desk-based assessment field visit and setting assessment site visits
Potential indirect impacts to the setting of designated heritage assets (up to 2km study area) (Scheduled Monuments, listed buildings, Conservation Areas and Registered Parks and Gardens)	Scoped out	Scoped in	Scoped out	Setting assessment site visits
Potential indirect impacts to the setting of non-designated heritage assets (up to 1km study area)	Scoped out	Scoped out	Scoped out	None

10 EMF

10.1 Introduction

10.1.1.1 This chapter outlines the potential impacts that may result in likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of Electromagnetic Fields (EMF).

10.1.1.2 It sets out receptors of relevance to EMF, and the potential impacts during construction, operation and decommissioning as well as any measures that would avoid, reduce or minimise those impacts.

10.1.1.3 EMF arise from the generation, transmission, distribution, and use of electricity. They occur around all electronic infrastructure. In relation to the Proposed Development the most significant sources are from electricity cables and associated infrastructure which will connect the Proposed Development to the grid.

10.1.1.4 EMF comprise electric and magnetic fields and are the result of voltages applied to electrical conductors and equipment. Fences, shrubs and buildings easily block electric fields. Magnetic fields are produced by the flow of electric current; however, unlike electric fields, most materials do not readily block magnetic fields. The intensity of both electric fields and magnetic fields diminishes with increasing distance from the source. EMF can have both direct and indirect effects on human health.

10.1.1.5 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development, including figures:
  - Figure 2.1 the draft Order Limits
  - Figure 2.7 Environmental Designations
  - Figure 16.1 Noise Sensitive Receptor Plan

10.2 Relevant legislation, policy, standards and guidance

10.2.1.1 This section identifies the relevant legislation, planning policy, standards and guidelines (described in Table 10-1, Table 10-2, Table 10-3 respectively) which underpin the assessment methodology for EMF and have informed the scope of the assessment.

10.2.2 Legislation

Table 10-1 Legislation

Legislation	Relevance to assessment
The Control of Electromagnetic Fields at Work Regulations 2016	These regulations set exposure limits on EMFs to ensure the safety of employees.

10.2.3 Policy

Table 10-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for energy, 2024 (EN-1), 2024 **[121]**	Sets broad national policy approach. EN-1 does not include further requirements for EMF.
National Policy Statement for renewable energy infrastructure (EN-3), 2024 **[122]**	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for air quality, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19).
National Policy Statement for Electricity Networks Infrastructure (EN-5) [123] (Whilst this NPS is not targeted towards renewable energy as EN-3 [122] is, the general detail on EMF limits is considered relevant)	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for air quality, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19). Paragraphs 2.9.44 – 2.9.58 on EMF include reference to the following guidance: The International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed health protection guidelines in 1998 relating to exposure to EMF. In March 2004, the National Radiological Protection Board (NRPB) (now part of NIHP CRCE), published advice on limiting public exposure to EMF. The advice recommended the adoption in the UK of the EMF exposure guidelines published by ICNIRP in 1998 [124]. In addition, paragraphs 2.9.56 - 2.9.58 set out the likelihood of harm from EMF.

10.2.4 Standards and guidance

Table 10-3 Standards and guidance

Standards and guidance	Relevance to assessment
Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz), ICNIRP 1998 **[124]**	Underground cables at voltages up to and including 132 kV are not capable of exceeding the ICNIRP exposure guidelines.
Advice on Limiting Exposure to EMF (0-300 GHz), Volume 15, No 2, 2004, National Radiological Protection Board **[125]**	The Board of NRPB has recommended the adoption in the UK of the guidelines of the ICNIRP for limiting exposures to EMFs between 0 and 300 GHz.
Power lines: demonstrating compliance with EMF public exposure guidelines, a voluntary code of practice, Department of Energy and Climate Change **(**DECC) **[126]**	The guidelines state that overhead powerlines at voltages up to and including 132KV, underground cables at voltages up to and including 132kV, and substations at and beyond the publicly accessible perimeter are not capable of exceeding the ICNIRP exposure guidelines for EMF.

10.3 Consultation

10.3.1.1 Utility providers such as UK Power Networks, BT Openreach and MBNL, relevant to the land within the draft Order Limits, will be engaged throughout the design and assessment process to inform design and construction controls.

10.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to EMF.

10.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

10.4 Study area

10.4.1.1 The intensity of both electric fields and magnetic fields diminishes with increasing distance from the source. It is considered appropriate to restrict the study area to the draft Order Limits and any immediately adjacent residential receptors.

10.5 Baseline conditions

10.5.1 Desktop sources used

10.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Readily available mapping of the draft Order Limits, including Bing maps.
- The Planning Inspectorate Projects Portal Projects page [127].

10.5.2 Existing baseline

10.5.2.1 The area within draft Order Limits is predominantly agricultural land.

10.5.2.2 National Grid's Necton substation is located outside of the draft Order Limits, located adjacent to the cable corridor between the Central and Western Panel Areas (see Figure 2.1).

10.5.2.3 Utilities run through the draft Order Limits, including the Electricity Distribution Company – UK Power Networks associated with the National Grid Electricity Transmission network of existing overhead line (OHL) which runs through the Northern and Eastern Panel Areas, along with BT Openreach and MBNL telecoms cabling. The existing baseline is presented Figures 2.1, 2.7 and 16.1.

Western Panel Area

Properties in towns and settlements

10.5.2.4 No existing sensitive receptors have been identified within the study area.

Local Farms

10.5.2.5 No existing local farms have been identified within the study area.

Public Rights of Way

10.5.2.6 There is one Public Right of Way (PRoW) within the Western Panel Area:

- Beachamwell Bridleway (BR)2

Central Panel Area

Properties in towns and settlements

10.5.2.7 The town of Swaffham is located approximately 1km to the south of the Central Panel Area. The village of Sporle is located in-between the Central Panel Area, as shown on Figure 2.1.

Local Farms

10.5.2.8 The following local farms have been identified within the study area:

- Grange Farm is located approximately 100m to the east
- Bridge Farm is located adjacent to the east

Public Rights of Way

10.5.2.9 There are four PRoW within the Central Panel Area, including:

- Sporle with Palgrave BR5
- Swaffham Restricted Byway (RB)55
- Swaffham RB40
- Sporle with Palgrave BR4 which connects to the Peddars Way and Norfolk Coast Path National Trail

Northern Panel Area

Properties in towns and settlements

10.5.2.10 The village of Wendling is located approx. 500m to the north and east of the Northern Panel Area.

Local Farms

10.5.2.11 The following local farms have been identified within the study area:

- Willow Farm is located within 50m to the south
- Lower Farm Home Farm within 300m to the north
- High Green Farm within 90m to the north
- Mistletoe Farm within approximately 70m to the west

Public Rights of Way

10.5.2.12 There are no PRoW within the Northern Panel Area.

Eastern Panel Area

Properties in towns and settlements

10.5.2.13 The village of Scarning is located approx. 300m to the north of the Eastern Panel Area.

Local Farms

10.5.2.14 The following local farms have been identified within the study area:

- Park Farm is located within 80m to the north

- New Church Farm within 20m to the east
- Lawrence Farm within 220m to the west
- High House Farm 20m to the south
- White House Farm within 130m to the east

Public Rights of Way

10.5.2.15 There is one PRoW within the Western Panel Area:

- Scarning Byway Open to All Traffic (BOAT) 8

10.5.2.16 In addition, the National Cycle Network (NCN) Route 13 runs along the boundary of the Eastern Panel Area.

Southern Panel Area

Properties in towns and settlements

10.5.2.17 The village of Saham Hills is located approximately 100m to the east.

Local Farms

10.5.2.18 The following local farms have been identified within the study area:

- Park Farm is located within approximately 340m
- Quidney Farm within approx. 200m to the east
- Allotment Farm within approx. 20m

Public Rights of Way

10.5.2.19 There are no PRoW within the Southern Panel Area.

10.5.3 Future baseline

10.5.3.1 The future baseline for EMF is expected to remain as the current existing baseline in the absence of the Proposed Development proceeding, bar any pressure from potential future developments occurring within the Order Limits introducing new human receptors.

10.5.3.2 It is to be noted that the Proposed Development is located within the Order Limits for two offshore wind Development Consent Order (DCO) applications: Norfolk Vanguard and Norfolk Boreas. Both applications were granted in December 2021 and February 2022 respectively. The two applications include a grid connection agreement which connects into an extended existing substation at Necton, granted planning permission under a separate Town and Country Planning Act application, and 400kV cabling.

10.5.3.3 These projects are currently under construction however they are anticipated to be finished and operational in Q4 2024, before work commences for the Proposed Development if development consent is granted as per publicly available

information. Therefore, these projects would be considered in the future baseline. The Applicant will review progress on these applications and confirm how these projects will be considered in the ES.

10.6 Potential impacts

10.6.1 Construction

10.6.1.1 The construction of the Proposed Development would not generate any EMFs, and if any effects to existing below ground utilities, these would be for temporary isolations for safety purposes.

10.6.1.2 The construction of the Proposed Development will require connection to the existing OHL from the 400kV substation and 400kV transmission tower in order to connect to the grid. Although the location of the 400kV substation has not yet been determined, there is a strong preference for its location near to, or to the east of, the existing National Grid substation at Necton. The area is sparsely populated and there is a lack of PRoW routes in this area and the surrounding area which limits the potential number of receptors that would be affected.

10.6.1.3 In light of this there are not expected to be any potential impacts that could result in significant effects related to EMF on human receptors both within and immediately adjacent to the Proposed Development.

10.6.2 Operation

10.6.2.1 During operation, electromagnetic effects may arise from the on-site substations, cable route and 400kV substation.

10.6.2.2 Whilst there is no statutory provision in the planning system regarding protection from EMFs, DECC [126] suggests that guidelines published by ICNIRP in 1998 [124] for both occupational and public exposure should be considered. It states that 'overhead power lines at voltages up to and including 132kV, underground cables at voltages up to and including 132kV, and substations at and beyond the publicly accessible perimeter' are not capable of exceeding the ICNIRP exposure guidelines.

10.6.2.3 As the maximum voltages of the cables and on-site substations being installed as part of the Proposed Development do not exceed 132kV, and are therefore not anticipated to exceed the ICNIRP exposure guidelines.

10.6.2.4 The 400kV substation is over 132kV, however the substation will not be publicly accessible and will be located as far as reasonably possible from existing sensitive receptors, and therefore is also not anticipated to exceed the ICNIRP exposure guidelines.

10.6.2.5 In light of this there are not expected to be any potential impacts that could result in significant effects related to EMF on human receptors both within and immediately adjacent to the Proposed Development.

10.6.3 Decommissioning

10.6.3.1 The process of decommissioning will include the removal of all solar infrastructure, including any below and above ground equipment, with the exception of the 400kV substation which will remain in-situ. Decommissioning effects are expected to be similar to, or of a lesser magnitude than, construction effects and not include activities that generate EMF.

10.7 Design, mitigation and enhancement measures

10.7.1 Design principles

10.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

10.7.2 Embedded and Good practice measures

10.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

10.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to EMF are likely to include:

- Installation of equipment that is compliant with the relevant exposure limits, in accordance with the provisions of the Government's Code of Practice on Compliance, which is compliant with the ICNIRP guidance.
- 132kV and 400kV substations will be located will be located as far as reasonably possible from existing sensitive receptors
- All solar farm infrastructure (solar panels, substations, BESS and inverters) will not be publicly accessible, and security measures such as fencing, CCTV and lighting will be installed
- 2m offset from cabling to existing utilities

10.7.2.3 Good practice measures will also be included to protect against any interference with below ground utilities during construction and decommissioning.

10.7.2.4 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

10.7.3 Further mitigation

10.7.3.1 No further mitigation is required for EMF.

10.7.4 Management plans

10.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to EMF include:

- oCEMP
- oDEMP

10.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process. Their development to detailed plans and implementation of the measures described , will likely be secure by Requirement of the DCO.

10.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

10.8 Likely significant effects

10.8.1.1 No likely significant effects are expected for EMF from the Proposed Development, therefore this aspect is scoped out of further assessment and will not be considered in the ES.

10.9 Proposed assessment methodology

10.9.1.1 Further assessment is proposed to be scoped out, therefore no methodology is proposed or required.

10.10 Assumptions, limitations and uncertainties

10.10.1.1 The conclusion to scope out EMF is based on accepted industry guidance that confirms that effects are not significant for the infrastructure proposed as they will not exceed 132kV and the 400kV substation will not be publicly accessible. Therefore, the Proposed Development is not capable of exceeding the ICNIRP exposure guidelines.

10.11 Summary

Table 10-4 EMF scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
EMF	Scoped out	Scoped out	Scoped out	None

11 Glint and Glare

11.1 Introduction

11.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of glint and glare.

11.1.1.2 It sets out glint and glare receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

11.1.1.3 The following matters have been considered as part of the scope and methodology for glint and glare:

- Aviation receptors including local airfields and Royal Air Force (RAF) bases
- Transport routes including local roads and railway lines
- National Trails and Public Rights of Way (PRoW)
- Fixed receptors including dwellings and commercial properties

11.1.1.4 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 14 Landscape and Visual

11.2 Relevant legislation, policy, standards and guidance

11.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for glint and glare and have informed the scope of the assessment.

11.2.2 Legislation

11.2.2.1 There is no legislation specifically relevant to the assessment of glint and glare in relation to the Proposed Development

11.2.3 Policy

Table 11-1 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for Energy (EN-1),	Sets broad national policy approach. Section 5.7 Dust, Odour, Artificial Light, Smoke, Steam, and Insect Infestation outlines approach to

Policy	Relevance to assessment
2024 [52]	assessment of impacts and determining requirement for mitigation (if required), including the following paragraphs of relevance: Paragraph 5.7.5 states: *"The applicant should assess the potential for insect infestation and emissions of odour, dust, steam, smoke, and artificial light to have a detrimental impact on amenity, as part of the ES.* *In particular, the assessment provided by the applicant should describe:* • *the type, quantity and timing of emissions* • *aspects of the development which may give rise to emissions* • *premises or locations that may be affected by the emissions* • *effects of the emission on identified premises or locations* • *measures to be employed in preventing or mitigating the emissions* In terms of civil or military aviation, paragraphs 5.5.37 and 5.5.39 state: *"Where the proposed development may affect the performance of civil or military aviation Communication, Navigation and Surveillance (CNS), meteorological radars and/or other defence assets an assessment of potential effects should be set out in the ES."* *"The applicant should consult the MOD, Met Office, Civil Aviation Authority (CAA), NATS and any aerodrome – licensed or otherwise – likely to be affected by the proposed development in preparing an assessment of the proposal on aviation, meteorological or other defence interests"*
National Policy Statement for Renewable Energy (EN-3) – 2024 [107]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects. Under the subsection 'Glint and Glare', specific guidance is given from Paragraph 2.10.102: "*Solar panels are specifically designed to absorb, not reflect, irradiation. However, solar panels may reflect the sun's rays at certain angles, causing glint and glare. 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.* *"Applicants should map receptors to qualitatively identify potential glint and glare issues and determine if a glint and glare assessment is necessary as part of the application.* *"When a quantitative glint and glare assessment is necessary, applicants are expected to consider the geometric possibility of glint and glare affecting nearby receptors and provide an assessment of potential impact and impairment based on the angle and duration of incidence and the intensity of the reflection.*

Policy	Relevance to assessment
	"The extent of reflectivity analysis required to assess potential impacts will depend on the specific project site and design. This may need to account for 'tracking' panels if they are proposed as these may cause differential diurnal and/or seasonal impacts. *"When a glint and glare assessment is undertaken, the potential for solar PV panels, frames and supports to have a combined reflective quality may need to be assessed, although the glint and glare of the frames and supports is likely to be significantly less than the panels."* It continues to discuss mitigation at Paragraph 2.10.134: *"Applicants should consider using, and in some cases the Secretary of State may require, solar panels to comprise of (or be covered with) anti-glare/anti-reflective coating with a specified angle of maximum reflection attenuation for the lifetime of the permission.* *"Applicants may consider using screening between potentially affected receptors and the reflecting panels to mitigate the effects.* *"Applicants may consider adjusting the azimuth alignment of, or changing the elevation tilt angle of, a solar panel within the economically viable range, to alter the angle of incidence. In practice this is unlikely to remove the potential impact altogether but in marginal cases may contribute to a mitigation strategy."* And further information is provided in relation to receptors, especially aviation receptors, at Paragraph 2.10.158: *"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).* *"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."*
National Policy Statement for electricity networks infrastructure (EN-5), 2024 [123]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for glint and glare, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19).
National Planning Policy Framework, December 2023 [9]	The National Planning Policy Framework (NPPF) is intended for applications submitted under the Town and Country Planning Regulations and provides a strategic framework for considering planning applications. Specific guidance on solar development is limited, and there is no direct mention of glint and glare, but Paragraph 163 states: *"When determining planning applications for renewable and low carbon development, local planning authorities should:* *a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions;* *b) approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon*

Policy	Relevance to assessment
	energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas
Breckland Local Plan, 2023 [88]	This policy mentions glint and glare in relation to: *"Planning considerations include the quality of agricultural land, the visual and landscape impact, the effect on landscape of glint and glare and on neighbouring uses and aircraft safety, the impact of security infrastructure such as lights and fencing and the impact on the setting of heritage assets."*

11.2.4 Standards and guidance

Table 11-2 Standards and guidance

Standards and guidance	Relevance to assessment
National Planning Practice Guidance (NPPG) [128]	The National Planning Practice Guidance (NPPG) planning practice guidance sets out guidance for large ground mounted solar farms under the section entitled 'Renewable and Low Carbon Energy'. Paragraph 013 states: "*What are the particular planning considerations that relate to large scale ground-mounted solar photovoltaic Farms?"* "*The deployment of large-scale solar farms can have a negative impact on the rural environment, particularly in undulating landscapes. However, the visual impact of a well-planned and well-screened solar farm can be properly addressed within the landscape if planned sensitively.* *"Particular factors a local planning authority will need to consider include [inter alia]:* • *the proposal's visual impact, the effect on landscape of glint and glare (see guidance on landscape assessment) and on neighbouring uses and aircraft safety;* • *the extent to which there may be additional impacts if solar arrays follow the daily movement of the sun;* • *the potential to mitigate landscape and visual impacts through, for example, screening with native hedges;* *"The approach to assessing cumulative landscape and visual impact of large scale solar farms is likely to be the same as assessing the impact of wind turbines. However, in the case of ground-mounted solar panels it should be noted that with effective screening and appropriate land topography the area of a zone of visual influence could be zero*."
Site Layout Planning for Daylight and Sunlight: A guide to good practice, 2011, Building Research Establishment (BRE) [129]	In the UK at the domestic level the closest guidelines regarding glint are the BRE guidelines on 'Site layout planning for Daylight and Sunlight'. With regard to solar dazzle these state that: "*Glare or dazzle can occur when sunlight is reflected from a glazed façade or an area of metal cladding. This can affect road users outside*

Standards and guidance	Relevance to assessment
	and the occupants of adjoining buildings. The problem can occur where there are large areas of reflective glass or cladding on the façade, or where there are areas of glass or cladding slope back so that high altitude sunlight can be reflected along the ground. Thus solar dazzle is only a long-term problem for some heavily glazed (or mirror clad) buildings. Photovoltaic panels tend to cause less dazzle because they are designed to absorb light. *If it is likely that a building may cause solar dazzle the exact scale of the problem should be evaluated. This is done by identifying key locations such as road junctions and windows of nearby buildings, and working out the numbers of hours of the year that sunlight can be reflected to these points.* *Glare to motorists approaching the building can be an issue. The worst problems occur when drivers are travelling directly towards the building and sunlight can reflect off surfaces in the driver's direct line of sight (usually this will be off the lower parts of the building).*"
Interim CAA Guidance - Solar Photovoltaic Systems, 2010, Civil Aviation Authority (CAA) [130]	*This interim guidance makes the following recommendations (p.2-3):* *"8. It is recommended that, as part of a planning application, the SPV [Solar photovoltaic] developer provide safety assurance documentation (including risk assessment) regarding the full potential impact of the SPV installation on aviation interests.* *9. Guidance on safeguarding procedures at CAA licensed aerodromes is published within CAP (Civil Aviation Publication)738 Safeguarding of Aerodromes and advice for unlicensed aerodromes is contained within CAP 793 Safe Operating Practices at Unlicensed Aerodromes.* *10. Where proposed developments in the vicinity of aerodromes require an application for planning permission the relevant LPA [local planning authority] normally consults aerodrome operators or NATS when aeronautical interests might be affected. This consultation procedure is a statutory obligation in the case of certain major airports, and may include military establishments and certain air traffic surveillance technical sites. These arrangements are explained in Department for Transport Circular 1/2003 and for Scotland, Scottish Government Circular 2/2003.* *13. During the installation and associated construction of SPV systems there may also be a need to liaise with nearby aerodromes if cranes are to be used; CAA notification and permission is not required.* *14. The CAA aims to replace this informal guidance with formal policy in due course and reserves the right to cancel, amend or alter the guidance provided in this document at its discretion upon receipt of new information.* *15. Further guidance may be obtained from CAA's Aerodrome Standards Department via aerodromes@caa.co.uk."*
Civil Aviation Publication (CAP) 738 document, 2020, CAA [131]	*The CAA Civil Aviation Publication (CAP) 738 document notes:* *"In 2010 the CAA published interim guidance on Solar Photovoltaic Cells (SPCs). At that time, it was agreed that we would review our policy based on research carried out by the Federal Aviation Authorities (FAA) in the United States, in addition to reviewing guidance issued by other National Aviation Authorities. New information and field experience, particularly with respect to*

Standards and guidance	Relevance to assessment
	compatibility and glare, has resulted in the FAA reviewing its original document 'Technical Guidance for Evaluating Selected Solar Technologies on Airports', which is likely to be subject to change, see link; *https://www.federalregister.gov/documents/2013/10/23/2013-24729/interimpolicy-faa-review-of-solar-energy-system-projects-on-federally-obligated-airports* *In the United Kingdom there has been a further increase in SPV cells, including some located close to aerodrome boundaries; to date the CAA has not received any detrimental comments or issues of glare at these established sites. Whilst this early indication is encouraging, those responsible for safeguarding should remain vigilant to the possibility."*
14CRF Part 77 - FAA Policy: Review of Solar Energy System Projects on Federally Obligated Airports, 2021, US Federal Aviation Administration (FAA) [132]	In April 2018 the FAA released a new version (Version 1.1) of the '*Technical Guidance for Evaluating Selected Solar Technologies on Airports', and in May 2021 it provided a further set of guidance entitled '14CRF Part 77 - FAA Policy: Review of Solar Energy System Projects on Federally Obligated Airports'.* In this last review the FAA concluded, contrary to its initial beliefs, that: *"...in most cases, the glint and glare from solar energy systems to pilots on final approach is similar to glint and glare pilots routinely experience from water bodies, glass façade buildings, parking lots, and similar features. However, FAA has continued to receive reports of potential glint and glare from on-airport solar energy systems on personnel working in Air Traffic Control Tower (ATCT) cabs. Therefore, FAA has determined the scope of agency policy should be focused on the impact of on airport solar energy systems to federally obligated towered airports, specifically the airport's ATCT cab."*
Combined Aerodrome Safeguarding Team (CAST) Guidance [133]	With regard to glint, it suggests that the developer should supply: "*... a glint and glare survey when a development is within a distance specified by the aerodrome from an Aerodrome Reference Point (ARP) (5km in most cases)*". The document also states that: "*For many aerodromes, 5km is the distance of choice but it could be considered out to 10km. In exceptional circumstances, assessments may be required beyond 10km.*" The document provides some considerations on safety and states: "Safety considerations must be assessed for the design of the planned solar photovoltaic development for Air Traffic Services (ATS) personnel, pilots and for CNS equipment: ▪ ATS personnel – The control tower (if applicable) is the most important location for visual surveillance across an aerodrome for monitoring operations on the ground as well as in the air. It is therefore of critical importance that the development of solar photovoltaic developments does not significantly hinder the view from a control tower's visual control room (VCR). This may be from redesigning the layout and design of the proposed solar development to avoid glare from the solar panels or by avoiding the physical blocking of key viewpoints.

Standards and guidance	Relevance to assessment
	▪ Pilot – A pilot's ability to safely navigate the airspace around an aerodrome is paramount. A pilot is required to look for other aircraft and obstructions on the ground, as well as navigate towards a runway or reference points. This applies to both pilots of fixed wing aircraft and helicopters in the air, and sometimes on the ground. The standard operations that should be considered are: o pilots on approach o pilots in a visual circuit o pilots on the ground (departing and taxiing aircraft)." The document also makes note of other available guidance: "*The UK CAA and US FAA have produced guidance with respect to glint and glare however neither of them mandates a specific methodology for assessing the effects of glint and glare. The effects of glare may mean that some solar PV developments are unacceptable, however layout modifications (such as changes to panel tilt and elevation angle) can often alleviate these concerns and overcome objections. The benefit of early consultation with the aerodrome authority cannot be understated."* The document comments on the Aerodrome Operator's Safety Assurance stating: "*The aerodrome operator in conjunction with any ATS personnel should, as part of the change management process in their safety management system, consider all the potential hazards posed by solar photovoltaic developments… The developer should provide the aerodrome with a safety survey which should include:* • *a glint and glare survey when a development is within a distance specified by the aerodrome from an Aerodrome Reference Point (ARP) (5km in most cases)* *The aerodrome operator should also ensure both impact and safety assessments are undertaken to provide assurance that any on- or off-aerodrome planned development does not introduce unacceptable hazards to aircrew, ATS personnel, RFFS and aerodrome vehicle operators undertaking their tasks.* *As part of the aerodrome and or ATS change management process, safety assurances should take into account any potential adverse effect to critical ATS infrastructure and equipment.* *The assessment must also consider any impacts to aircraft utilising instrument flight procedures and aircraft in the visual circuit.* *Developers should apply the same principals for safety assurance for unlicensed aerodromes and airfields as required by this policy that are not officially safeguarded.* *The developer in conjunction with the aerodrome operator, ATS personnel, RFFS and aerodrome operations should develop adequate mitigation to mitigate any risks identified.* *Should risk mitigation or agreement not be possible, the aerodrome operator should follow Local Planning Authority procedures and lodge an objection regarding the development under their statutory obligations.*"

11.3 Consultation

11.3.1.1 The following key stakeholders will be consulted with regards to glint and glare as part of the assessment process:

- Ministry of Defence (MOD) due to the proximity to RAF Marham to the west.
- Mid Norfolk Railway due to the heritage railway line and Yaxham station to the east of the Eastern Panel Area
- Network Rail (for the Mid Norfolk Heritage Railway and Yaxham Train Station)
- National Highways due to the proximity to A47 and A1065. (National Highways are also responsible for looking after some Historical Railways Estate assets on behalf of the Department for Transport. It is not clear whether they have specific responsibility in relation to Mid Norfolk Railway, but they will also be consulted in case this is the case.)

11.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to glint and glare.

11.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

11.4 Study area

11.4.1.1 The study area for general ground-based receptors is taken to be the area within 5km of the Panel Areas. For aviation assets, where aircraft (and occupants of any air traffic control tower (ATCT)) may be at a much higher elevation, the distance is increased. Any airfields within 20km of the draft Order Limits will be considered in the EIA. This study area is consistent with standard practice and hard limits within the ForgeSolar modelling software. The ForgeSolar modelling software is the primary tool used to assess glint and glare around the world. It is considered to be industry best practice and is the most widely available software for assessing these effects, however, it cannot assess ground-based receptors or cumulative solar farms that are further than 5km away from the centre of the drawn Panel Area for the draft Order Limits.

11.4.1.2 A Zone of Theoretical Visibility (ZTV) and Ground Glint Zone (GGZ) will be used to refine the number of receptors in the local vicinity down to those where it is geometrically possible for them to experience glint effects, and eliminating those receptors which could not be affected.

11.5 Baseline conditions

11.5.1 Desktop sources used

11.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Google Maps for satellite imagery and captured street level photography
- Various background raster maps including Ordnance Survey maps and Open-StreetMap maps
- Various internet resources to help identify features and receptors

11.5.2 Surveys undertaken and proposed

11.5.2.1 No surveys have been undertaken to date.

11.5.2.2 The following surveys are planned to be undertaken, and will inform the ES:

- A glint and glare walkover survey is scheduled to occur. It will include a walkover across the boundary of the draft Order Limits to access visibility into the fields and then at key receptors out to 5km from the draft Order Limits to access visibility at these points (likely to include local roads, residential areas). Receptors will be determined by the ZTV and use of Google Maps.

11.5.3 Existing baseline

11.5.3.1 Within the draft Order Limits area, the existing baseline consists of agricultural fields primarily in arable use.

11.5.3.2 In the surrounding study area of the draft Order Limits, there are existing sources of glint and glare that could be perceived at receptors due to the presence of multiple reflective surfaces in the local area. Reflective surfaces include, but are not limited to, other solar farms, glasshouses, waterbodies, agricultural polythene, windows in buildings, and windscreens in vehicles.

11.5.3.3 The receptors susceptible to glint and glare impacts identified within 5km from the solar panel array areas are summarised in this section. The receptors include:

- Aviation receptors including local airfields and RAF bases
- Transport routes including local roads and railway lines
- National Trails and PRoW
- Fixed receptors including dwellings and commercial properties

Aviation receptors

11.5.3.4 The receptors included here are aviation receptors. They include two RAF bases. There are no other active smaller airfields within 15km of the draft Order Limits

Table 11-3 Aviation receptors

No.	Receptor	Receptor or receptor group
1	Aviation	RAF Marham (340m to the west of the most western panel area at its closest point)
2	Aviation	RAF Sculthorpe (17km to the north of the draft Order Limits)

Transport receptors

11.5.3.5 The receptors included here are ground-based transport and pedestrian routes. They include features such as railway lines, roads and PRoW. Often a named receptor will represent the whole length of a road. These receptors will be described in more detail and assessed in the ES.

11.5.3.6 The receptors listed here have been identified in conjunction with those identified in Chapter 14 Landscape and Visual.

Table 11-4 Transport Ground Receptors

No.	Receptor	Receptor or receptor group
1	Rail	Mid Norfolk Railway - Heritage Railway
2	Rail	Yaxham Train Station
3	Motorists	People travelling on Swaffham Road/A1122
4	Motorists	People traveling on A1065
5	Motorists	People travelling along A17
6	Motorists	People travelling along Beeston Road
7	Motorists	People travelling on A47
8	Motorists	People travelling along Love Lane
9	Motorists	People travelling along Dereham Road
10	Motorists	People travelling along Hulver Street
11	Motorists	People travelling along Goggles Lane
12	Motorists	People travelling along Crown Lane
13	Motorists	People travelling along the rural lane connecting Bradenham Lane and Crown Lane
14	Motorists	People travelling along Bradenham Lane
15	Motorists	People travelling along Shipdham Lane
16	Motorists	People travelling along Watery Lane
17	Motorists	People travelling along the rural lane at High Green
18	Motorists	People travelling along the rural lane at Southend
19	Motorists	People travelling along Wood Lane
20	Motorists	People travelling along Watton Road
21	Motorists	People travelling along Narborough Hill
22	Motorists	People travelling along West Acre Road
23	Motorists	People travelling along Washpit Road
24	Motorists	People travelling along Sporle Road
25	Motorists	People travelling along Norwich Road

No.	Receptor	Receptor or receptor group
26	Motorists	People travelling along Hale Road
27	Motorists	People travelling along Hills Road
28	Recreational users	Users of PROW Beachamwell BR2 and the wider PROW network.
29	Recreational users	Users of PROW Sporle with Palgrave BR5 and the wider PROW network.
30	Recreational users	Users of PROW Swaffham RB55 and the wider PROW network.
31	Recreational users	Visitors to Castle Acre Castle and Bailey Gate.
32	Recreational users	Visitors to Castle Priory, Castle Acre.
33	Recreational users	Users of PROW Sporle with Palgrave BR9 and the wider PROW network.
34	Recreational users	Users of PROW Scarning BOAT8 and the wider PROW network.
35	Recreational users	Users of PROW Shipdham FP1 and the wider PROW network.
36	Recreational users	Users of Ashill Common.
37	Recreational users	Users of permissive footpath between Dunnets Close and Ashill RB11.
38	Recreational users	Users of PROW Ashill RB11 and the wider PROW network.
39	Recreational users	Users of PROW Ashill FP7 and the wider PROW network.
40	Recreational users	Users of PROW Swaffham RB36 and the wider PROW network.
41	Recreational users	Users of Peddars Way and Norfolk Coast Path National Trail
42	Recreational users	Users of National Cycle Route 13

Fixed ground-based receptors

11.5.3.7 The receptors included under this subheading are fixed and on the ground. They include features such as residential dwellings, commercial buildings, schools and specific sites of interest. Often a named receptor will represent multiple fixed receptors (such as individual properties in a residential area or a parade of shops). These receptors will be identified in more detail and impacts assessed in the ES.

11.5.3.8 Any receptors to the north of the draft Order Limits are scoped out as they will only have visibility of the backs of the solar PV modules and therefore will not experience glint effects.

Table 11-5 Fixed ground based receptors

No.	Receptor or receptor group
1	Residents in Marham
2	Residents in Upper Marham
3	Swaffham Raceway club
4	Chalk Farm
5	Residents in Swaffham
6	Residents in Sporle
7	Refcroft Farmhouse
8	Residents at Wolferton Cottages
9	Residents at Wolferton Barn

No.	Receptor or receptor group
10	Residents at Wolferton House
11	Property on A47 near Sporle
12	Boundary Byre
13	Boundary Farmhouse
14	Boundary Cottages
15	Residents in Necton
16	Residents in Holme Hale
17	Clay Pit Farm
18	Rose Farm
19	Mona Farm
20	Residents at Steading Mews
21	Residents along Granary Fields
22	Residents in Ashill
23	Residents in Saham Hills
24	Lodge Farm
25	Park Farm
26	Residential Properties on Long Road
27	Residents in Shipdham
28	Residents in Bradenham
29	Residents in Little Fransham
30	Bradenham Hall Farms
31	Residents in Dafty Green
32	Residents in Thorpe Row
33	Residents in Westfield
34	Residents in Scarning
35	Residents in Toftwood
36	Residents in Wendling
40	Residents in High Green

11.5.4 Future baseline

11.5.4.1 The likely evolution of the current baseline, as described in section 11.5.3 above, if the Proposed Development were not to go ahead would be the continuation of the existing agricultural practices; therefore the future baseline will broadly remain the same as the current baseline considered relevant for glint and glare.

11.6 Potential impacts

11.6.1.1 The Proposed Development has the potential to affect receptors (those identified in Section 11.5) during construction, in operation and during decommissioning.

11.6.1.2 The potential impacts during the construction and decommissioning phases are similar, as the decommissioning phase is a reverse of the construction phase.

11.6.2 Construction

11.6.2.1 During the construction phase of the Proposed Development, there are likely to be temporary glint and glare impacts which arise due to activities that are unique to this phase. Sources of glint and glare that may arise during this phase include reflections from the solar PV panels as they are installed, and reflections from the metal legs that the solar panels will be mounted on, although visibility to these will be limited as soon as the solar panels are fixed on top of them.

11.6.2.2 Other potential temporary sources of construction glint and glare include:

- Reflections from the windscreens of vehicles used in site preparation works;
- The presence of construction machinery and equipment used to construct the panels and associated structures, that have reflective materials;

11.6.2.3 It is not proposed to assess the glint and glare impacts that might occur from transitory vehicles and mobile machinery as this will change depending on the location they are in. Any glint or glare impacts that might occur from transitory vehicles and mobile machinery are expected to be very minor. Effects are not expected to differ from reflections from many other mobile sources in the local environment and therefore it is proposed to scope this specific aspect out of the EIA.

11.6.2.4 The potential impacts across the receptors during this phase include:

- **Aviation** - glint and glare could be experienced at the aviation receptors during flight times, at take-off and landing. Depending on the type of glare, there could be a risk to health and safety.
- **Roads** - glint and glare could be experienced along the route if there are breaks in the screening to the solar PV modules, allowing visibility of glare causing panels to potentially occur. However, the glare experienced would be no worse than seeing direct sunlight which drivers are routinely exposed to.
- **Rail** - similar to roads, any visible glint and glare could impact a train driver's ability to see although any glare experienced will likely be no worse than seeing direct sunlight.
- **National Trails and Public Rights of Way (PRoW)** – glint and glare could be experienced by recreational users of these paths if there are breaks in the screening. However, any glare experienced will likely be no worse than seeing direct sunlight and is not a health and safety risk to walkers, cyclists or horse riders.
- **Fixed ground-based receptors** – including buildings such as residential properties. Glint and glare could be experienced at higher storeys even if ground floor windows are screened by perimeter hedgerows.

11.6.2.5 The impacts will be considered qualitatively rather than quantitatively because they cannot be assessed in the ForgeSolar software (the industry-standard software available to assess glint and glare). They will be considered using professional judgement rather than numerical analysis. This accords with guidance and industry best practice.

11.6.3 Operation

11.6.3.1 During the operational phase of the Proposed Development there are likely to be glint and glare impacts from sunlight reflecting off solar PV modules, depending on the type of receptor and the level of screening present. These impacts will vary during the course of each year as the sun attains different heights in the sky and weather patterns vary.

11.6.3.2 The potential impacts on the different receptors are categorised below:

- **Aviation** - glint and glare could be experienced at the aviation receptors during flight times, at take-off and landing. Depending on the type of glare, there could be a risk to health and safety.
- **Roads** - glint and glare could be experienced along the route if there are breaks in the screening to the solar PV modules, allowing visibility of glare causing panels to potentially occur. However, the glare experienced would be no worse than seeing direct sunlight which drivers are routinely exposed to.
- **Rail** - similar to roads, any visible glint and glare could impact a train driver's ability to see although any glare experienced will likely be no worse than seeing direct sunlight.
- **National Trails and Public Rights of Way (PRoW)** – glint and glare could be experienced by recreational users of these paths if there are breaks in the screening. However any glare experienced will likely be no worse than seeing direct sunlight and is not a health and safety risk to walkers, cyclists or horse riders.
- **Fixed ground-based receptors** – including buildings such as residential properties. Glint and glare could be experienced at higher storeys even if ground floors windows are screened by perimeter hedgerows.

11.6.3.3 The impacts will be considered quantitatively rather than qualitatively because they can be assessed in the ForgeSolar software during the operational phase as the PV modules can be modelled. They will be considered using numerical analysis. This accords with guidance and industry best practice.

11.6.4 Decommissioning

11.6.4.1 The impacts of the decommissioning phase will be the same or less than the construction phase, with activities involving the removal of the site's infrastructure piece-by-piece. As panels are removed from the mounting frames, the mounting structures will become more visible again and these will still have potential to reflect glint and glare. It is anticipated that the Proposed Development will be

decommissioned in sections, with solar PV modules being removed from one section, then the mounting structures, cabling and other site infrastructure being removed before the next section undergoes the same procedure.

11.6.4.2 Whilst the mounting structures are visible, there is some potential for glare to be reflected back towards receptors, but this will be a temporary impact for a short period of time, so it is not considered necessary to further mitigate against it.

11.6.4.3 Glint and glare impacts arising from decommissioning of the Proposed Development are considered to be the same as those identified during the construction phase. Operational effects continue until the solar panels have been removed in totality.

11.6.4.4 As with the construction phase, impacts will be considered qualitatively rather than quantitatively because they cannot be directly assessed in the ForgeSolar software. They will be considered using professional judgement rather than numerical analysis. This accords with guidance and industry best practice.

11.7 Design, mitigation and enhancement measures

11.7.1 Design principles

11.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

11.7.2 Embedded and Good practice measures

11.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

11.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to glint and glare are likely to include:

- An appropriate buffer will be maintained between properties and construction areas
- Existing hedgerows in poor condition / gappy will be reinforced with planting / management where feasible
- The Proposed Development would generally not be lit. The only lighting required would be demand responsive motion sense lights at the substations using passive infra-red (PIR) technology. This would only be on intermittently for security and/or safety reasons, and it will be designed and installed in a manner which minimises impact.

- Modern solar PV modules have an anti-reflective coating that gives the panels a dark colour with a textured finish. This feature reduces the potential of glint and glare effects occurring but cannot prevent effects entirely.

11.7.2.3 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

11.7.3 Further mitigation

11.7.3.1 Further mitigation are actions that require further activity to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for glint and glare will be defined through the EIA process once the level of significance of effects is known. Options for further mitigation will be determined through the EIA process and reported in the ES.

11.7.3.2 If any significant impacts are identified, possible further mitigation measures could include:

- Varying the type of panel (smooth with anti-reflective coating or textured glass)
- Using addition of screening such as hedgerow planting or fencing to enclose the panels to prevent glint and glare visibility

11.7.4 Management plans

11.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to glint and glare include:

- oCEMP
- oLEMP, including general operational measures alongside those specific to landscape and ecology
- oDEMP

11.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

11.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

11.8 Likely significant effects

11.8.1 Construction

11.8.1.1 Effects during the construction phase would be short-lived and temporary.

11.8.1.2 For the construction phase the glint and glare effects will be assessed qualitatively.

11.8.1.3 During the initial construction works there are not likely to be any reflections present other than possibly from the windscreens of vehicles used in the site preparation works and delivery of machinery and components associated with the installation of the solar PV modules. The effect of any such reflections is considered to be so low that this element is proposed to be scoped out of further assessment.

11.8.1.4 As the legs are piled into the ground there may be some potential for reflections to be visible from the legs. The assessment will consider whether this is likely, if the impacts are likely to be significant and will propose mitigation if it is. Once the panels start being deployed on top of the legs, these will obstruct light from reaching the legs and reflections will only be possible from the panels themselves. Once all of the panels have been deployed the potential impacts will be equivalent to the situation present during the operational phase.

11.8.1.5 The construction of the Proposed Development could affect aviation receptors temporarily due to glint and glare from reflective materials present during this phase. Whilst there could be some reflection from vertical components such as the piled legs, greater potential for glint effects will occur once the panels start being deployed on the legs. Construction impacts on aviation receptors are **scoped in** and will be considered in the assessment.

11.8.1.6 The construction of the Proposed Development could affect ground-based transport routes such as rail, road and PRoWs due to glint and glare from reflective materials present during this phase. Construction impacts on transport routes are **scoped in** and will be considered in the assessment.

11.8.1.7 Fixed ground receptors (residential properties) may be affected temporarily during the construction phase, because of the presence of glint and glare from reflective materials. Construction impacts on fixed ground receptors are **scoped in** and will be considered in the assessment.

11.8.2 Operation

11.8.2.1 During the operational phase, glint and glare impacts will vary during the course of each year as the sun attains different heights in the sky and weather patterns vary. The glint and glare effects have the potential to effect different receptors as described below.

11.8.2.2 Aviation receptors have potential to see direct reflections from the solar panels as they transit across the sky. Generally, it is not possible to screen panels from aviation receptors and effects will need to be considered in more detail as part of the EIA process. Operational impacts on aviation receptors are therefore **scoped in** and will be considered in the assessment.

11.8.2.3 Ground transport routes including rail, road and PROWs will have potential visibility to glint and glare from panels during the operational phase. There may be sufficient screening present to help prevent this, but it will need to be assessed in

detail or each receptor as part of the EIA process. Operational effects on these receptors are therefore **scoped in** and will be considered in the assessment.

11.8.2.4 Fixed ground receptors will experience the same effects as once the panels are deployed during the construction phase. Screening may prevent visibility to some of the receptors but without detailed assessment as part of the EIA it is not possible to definitively identify which receptors will be affected. Consequently, operational effects on ground receptors are **scoped in** and will be considered in the assessment.

11.8.3 Decommissioning

11.8.3.1 At the outset of the decommissioning phase, the likely level of glint and glare effects will be similar to and not greater than those observed near completion of the construction phase. This is because it is likely that any vegetation planted during the construction phase as part of the mitigation in the Landscaping strategy will have matured and will provide an even greater level of screening.

11.8.3.2 Effects during the decommissioning phase would be short-lived and temporary and would diminish as the decommissioning activities progress.

11.8.3.3 For the decommissioning phase there is no quantitative assessment as there is not likely to be any reflections present other than from the panels and steelwork as they are removed. Professional judgement will therefore be used to assess effects during decommissioning qualitatively.

11.8.3.4 As with the construction phase, it is proposed to scope out any residual risk of glint and glare from the windscreens of vehicles used in the site preparation works associated machinery and components of the solar PV modules, as this is considered to be negligible.

11.8.3.5 Activities are expected to involve the removal of the site infrastructure piece-by-piece. As panels are removed from the mounting frames, the mounting structures will become more visible again and these will still have potential to reflect light. It is anticipated that the Proposed Development will be decommissioned in sections, with panels being removed from one section, then the mounting structures, cabling and other site infrastructure being removed before the next section of the draft Order Limits undergoes the same procedure.

11.8.3.6 It is recognised that technological improvements may mean that the technology used to decommission the Proposed Development may have evolved from that used during construction. however, at this stage it is assumed that methods will be in line with those used for construction.

11.8.3.7 Assuming the same aviation receptors are present at the time of decommissioning as during construction, these will experience similar effects and are **scoped in**.

11.8.3.8 Similarly, ground transport routes including rail, road and PRoWs are expected to experience broadly the same effects as during the construction phase and these are **scoped in**.

11.8.3.9 Fixed ground receptors, such as dwellings, are also likely to experience the same effects as during the construction phase, albeit with the potential for greater screening as a result of more mature vegetation. These receptors are also **scoped in.**

11.9 Proposed assessment methodology

11.9.1 Overview

11.9.1.1 Despite 'glint and glare' being acknowledged within several guidance and policy documents in the UK, there is no specific guidance on how to assess glint and glare effects across all phases of development.

11.9.1.2 The scope of the glint and glare assessment focuses on all phases of the Proposed Development. It is proposed to assess the construction and decommissioning phases using a qualitative assessment based on professional judgement due to the inherent uncertainty and variability in the conditions onsite. The operational phase will be considered in a quantitative assessment employing the GlareGauge software tool in ForgeSolar to model glint and glare effects on receptors.

11.9.1.3 For clarity, the methodology for the quantitative assessment for the operational phase will be discussed in this report first, followed by the qualitative assessment for both the construction and decommissioning phases.

11.9.2 Quantitative Glint and Glare Assessment for the Operational Phase of the Proposed Development

11.9.2.1 The quantitative assessment of operational effects will rely on software used effectively in numerous countries around the world including extensively in the UK. The software used is the GlareGauge tool that was originally developed in the United States by the Sandia National Laboratory and since improved upon and licensed to ForgeSolar.

11.9.2.2 It is assumed that the receptors considered within the assessment are fixed and present over the Proposed Development lifetime. However, the operational effects of glint and glare will vary at a particular receptor as effects change with differing times of the day and seasons of the year.

11.9.2.3 Receptors that may be susceptible to glint and glare effects from the Proposed Development will be identified and assessed using ForgeSolar's GlareGauge software tool (a licensed version of the SGHAT tool) to model the effects of glint and glare on receptors for a given panel array and specification.

11.9.2.4 The ForgeSolar software output defines glare under a traffic light system, as 'green glare', 'yellow glare' and 'red glare'. In this report, in line with the ForgeSolar modelling software, the term 'glare' can be used as an umbrella term to cover glint and glare effects when referencing glare predicted by the software.

11.9.2.5 The model can predict 'low intensity glare', which is termed 'green glare', and 'medium intensity glare with potential for temporary after image', which is termed 'yellow glare'. Temporary after image is a phenomenon whereby, after glancing at a bright light, the image remains burned into the retina for a short time after looking away. High intensity glare ('red glare') only occurs where there is concentrated solar energy focused on a single point. Even an observer looking directly at the sun will only experience medium intensity glare.

11.9.2.6 The glint and glare prediction model will indicate effects from within the draft Order Limits on receptors that may be exposed to glare, if there are any at all over the course of a full year. This will include key data on the timing and frequencies of any predicted glare events. The frequency of theoretical glare events based on geometric analysis will be processed further to present more realistic results with respect to the local weather conditions occurring at the location.

11.9.2.7 Glint and glare effects for both ground-based, which includes both point and route receptors, and aerial receptors will be assessed. A preliminary assessment of potentially susceptible receptors has identified a wide range of fixed-point receptors within 5km of the draft Order Limits. These are traditionally characterised as residential dwellings, commercial properties and industrial sites.

11.9.2.8 Parts of the draft Order Limits appear to be poorly screened, with potential visibility from numerous isolated properties in the surrounding land, as well as nearby settlements, including Dareham, Wendling, Scarning, Little Fransham, Nekton, Shipdham, Ashill, High Green, Bradenham, Sporle and Swaffham. Careful consideration will need to be given for the potential glare effects on all these dwellings. In addition to these, there are several route receptors that will also be assessed given the extent of the draft Order Limits.

11.9.2.9 Motorists are particularly sensitive to glint and glare effects as highlighted in the UK's Road Safety Guidance, which encourages motorists as follows: "*If you are dazzled by bright sunlight, slow down and if necessary, stop"* (Rule 237, The Highway Code, 2021) [134].

11.9.2.10 Given the proximity of the rail tracks to some of the Eastern Panel Area in particular, the effects on the heritage train drivers are likely to be an important consideration. Mid Norfolk Railway (who operate this railway line) will be one of the consultees and are likely to want to understand if the driver will have any visibility to glint and glare from the Panel Area.

11.9.2.11 Modern solar PV modules have an anti-reflective coating that gives the panels a dark colour with a textured finish. This feature reduces the potential of glint and glare effects occurring but cannot prevent effects entirely.

11.9.2.12 The quantitative assessment will identify glint and glare effects that are predicted to occur for ground-based receptors during the operational phase. Consideration will be given to the following:

- The visibility of the panels from the receptor, based on a ZTV;
- The geometrical area within which glare reflections can theoretically occur;

- The screening that is present in the form of trees, hedgerows and buildings et-cetera; and
- Historic weather conditions in the region and the likelihood of glare-producing sunlight being present.

11.9.2.13 For licensed aviation receptors, the assessment will be made in-line with FAA requirements, which, in the absence of their own specific guidance, have been accepted by the UK CAA. The FAA recently relaxed the requirement that no '*medium intensity glare with potential for temporary after image*' (yellow glare) be visible to pilots on final approach to the runway, from their normal viewing angles, citing glare to be an occurrence that pilots routinely deal with in the built and natural environment. However, it remains a requirement that no glare (red, yellow or green) be visible at an Air Traffic Control Tower (ATCT).

11.9.2.14 Although it is noted that unlicensed aviation receptors are afforded less safeguarding protection than their licensed equivalents, the same considerations will be given for determining the level of effect that these will experience.

Sensitivity

11.9.2.15 For the purposes of this assessment, the sensitivity of the receptor is based on the likely consequence of a negative effect. For example, the potential consequence of a motorist or train driver being dazzled by glint and glare could be (in a worst-case scenario) a collision or major accident. A receptor that is considered to present a possible health and safety risk is allocated as having High sensitivity. A receptor that has little or no potential for physical harm, but where residents could experience a nuisance, such as glare being visible from a property, is allocated as Medium sensitivity. A receptor that is uninhabited and irregularly frequented, or a building that does not have windows, such as a substation or warehouse, is allocated as Low sensitivity. A place where people are not usually present, such as an agricultural field with no public access, is considered to have Negligible sensitivity (i.e. it is unlikely to cause any issues even if glare were to be visible).

11.9.2.16 The distance from the draft Order Limits also affects the level of sensitivity of a receptor (except in the case of ATCTs). With increasing distance, the sensitivity of a receptor decreases as typically there are greater screening features and the intensity of glare is reduced with separation from the source. However, during the EIA, each receptor is assessed individually.

11.9.2.17 Table 11-6 illustrates how the sensitivity is defined for each receptor.

Table 11-6 Sensitivity Criteria for Receptors during the Operational Phase

Type of Receptor		SENSITIVITY								
		Dwelling	Commercial Property	National Trails/PROWs	Minor Road	Major Road	Motorway	Railway	Aviation Receptors	ATCT
Distance from Receptor	0-500m	High	Medium	Low	Medium	High	High	High	Medium	High
	500m-1km	Medium	Medium	Low	Low	Medium	High	High	Medium	High
	1km-2km	Medium	Low	Low	Low	Medium	High	Medium	Medium	High
	2km-3km	Low	Low	Low	Low	Low	Medium	Low	Low	High
	3km-4km	Low	Negligible	Negligible	Low	Low	Medium	Low	Low	High
	4km-5km	Negligible	Negligible	Negligible	Low	Low	Low	Low	Low	High

11.9.2.18 In summary, the key sensitive receptors, if present within the study area, that will need to be assessed, include:

- Ground based fixed receptors including dwellings and commercial properties;
- Ground based transportational routes including local roads and railway lines;
- Aviation receptors including local airfields and RAF bases; and
- National Trails and PRoW.

11.9.2.19 In each case, understanding the distance from the draft Order Limits and the features in the immediate vicinity of the receptor will determine its sensitivity.

Magnitude

11.9.2.20 For the purpose of the quantitative assessment for the operational phase, the magnitude of impact on a receptor is defined by the type of glare and total amount of glare predicted at that receptor in a year. Glint and glare effects can only occur when there is unobstructed sunlight (i.e. there is no cloud or fog cover) and there is visibility to the area of the draft Order Limits that is predicting glare.

11.9.2.21 The magnitude of impact on a receptor intensifies if the predicted glare has the potential for temporary after image (i.e. yellow glare is predicted) and if the glare is predicted to occur at times of the day where the receptor will experience greater use. The total duration of glare predicted throughout the year also influences the magnitude of impact on a receptor.

11.9.2.22 The magnitude of impact is quantified by the output of the software which will identify the total predicted minutes of glare annually and more specifically will demonstrate which month and what specific time of day the glare is expected to occur.

11.9.2.23 The quantitative assessment will be primarily based on the output of the computer model, which, in the event that any glare is visible, provides a binary result for standard glare effects. The model has a number of built in assumptions which are

likely to make its assessment more precautionary. This is discussed in more detail below.

11.9.2.24 As previously mentioned, the software output defines glare under a traffic light system, as 'green glare', 'yellow glare' and 'red glare'.

11.9.2.25 The computer model predicts glare effects in the absence of any consideration of screening and it assumes optimum sunlight conditions persist throughout the year. It does not recognise whether there is any intervisibility between the solar panels and the receptor and does not of its own accord account for changing weather conditions. These elements of assessment require human intervention to consider whether, in reality, visibility to panels capable of reflecting light is possible.

11.9.2.26 Table 11-7 illustrates how the magnitude of impact is defined depending on the level of screening, the computer model output of minutes of glare and the type of glare.

11.9.2.27 The magnitude of impact on a receptor varies with the time of day that the glare is expected to occur. The time of day can be defined as 'peak' or 'off peak' and this is defined individually for each receptor. For example, along a local major road, if there is glare predicted during rush hour in the 'peak' times of the day, the magnitude of impact is greater than if the glare occurs at 04:30 in the morning.

11.9.2.28 The definition of peak hours that will be applied for the assessment varies for different receptors. For example, for roads, peak hours will be considered to be between 07:00 and 21:00 each day. Outside of these hours, the roads are likely to be much quieter and therefore there is a lower risk posed to users.

11.9.2.29 For airports and airfields, the operating hours will be considered to be the peak hours and the time outside the operating hours when they are closed will be considered off peak.

11.9.2.30 For rail receptors, if train services are not running between certain hours these will be considered off peak times and normal operating hours will be considered peak.

11.9.2.31 For commercial properties, during the specific receptor's opening hours (usually 08:00-18:00) will be considered peak times and anytime outside of this will be considered off peak.

11.9.2.32 For residential dwellings, the time during which residents are usually sleeping (considered to be between 22:00-07:00) will also be considered off peak.

Table 11-7 Magnitude Criteria during the Operational Phase

	MAGNITUDE						
TOTAL ANNUAL MINUTES OF GLARE (mins/yr)	Green Glare			Yellow Glare			Red Glare
	No Screening	**Partial screening**	**Full Screening**	**No Screening**	**Partial screening**	**Full Screening**	**All Instances**
0-1,500 mins/yr Peak	Minor	Minor	Negligible	Major	Moderate	Negligible	Major

	MAGNITUDE						
TOTAL ANNUAL MINUTES OF GLARE (mins/yr)	Green Glare			Yellow Glare			Red Glare
	No Screening	**Partial screening**	**Full Screening**	**No Screening**	**Partial screening**	**Full Screening**	**All Instances**
1,500-3,000 mins/yr Off Peak	Negligible	Negligible	Negligible	Moderate	Minor	Negligible	Major
3,000-6,000 mins/yr Peak	Minor	Minor	Negligible	Major	Moderate	Negligible	Major
3,000-6,000 mins/yr Off Peak	Negligible	Negligible	Negligible	Moderate	Minor	Negligible	Major
6,000-9,000 mins/yr Peak	Minor	Minor	Negligible	Major	Moderate	Negligible	Major
6,000-9,000 mins/yr Off Peak	Negligible	Negligible	Negligible	Moderate	Minor	Negligible	Major
9000 + mins/yr Peak	Minor	Minor	Negligible	Major	Moderate	Negligible	Major
9000 + mins/yr Off Peak	Negligible	Negligible	Negligible	Moderate	Minor	Negligible	Major

Significance

11.9.2.33 For the purpose of the quantitative assessment for the operational phase, the significance of effect is based on the sensitivity of the receptor and the magnitude of impact on the receptor.

11.9.2.34 If the magnitude of impact on a receptor is major (i.e. it is predicted red glare or yellow glare without screening during both peak time and off peak times) and the sensitivity of the receptor is High, Medium or Low, the effects will be considered Significant.

11.9.2.35 The only case where this differs is for ATCT where regardless of what the magnitude of impact is, the effects are always Significant. Red, yellow and green glare is not permitted to be predicted at ATCTs.

11.9.2.36 It should be noted that if yellow glare is predicted in the ForgeSolar model (which does not account for screening), but, in reality, the receptor is already screened and there is no visibility or if visibility to potential glare effects will be removed by existing screening / vegetation, then effects at these receptors will be considered to be Not Significant.

11.9.2.37 Table 11-8 illustrates how the significance of effect is derived from the magnitude of impact and the sensitivity of the receptors assessed.

Table 11-8 Significance of Effect Matrix during the Operational Phase

		Sensitivity of Receptor			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Impact on the Receptor	**Major**	Significant	Significant	Significant	Significant
	Moderate	Significant	Significant	Not Significant	Not Significant
	Minor	Not Significant*	Not Significant	Not Significant	Not Significant
	Negligible	Not Significant*	Not Significant	Not Significant	Not Significant

** except for ATCT's where effects are always considered Significant regardless of the Magnitude of Impact*

11.9.3 Qualitative Glare Assessment for the Construction and Decommissioning Phases of the Proposed Development

11.9.3.1 It is expected that the construction and decommissioning phases of the Proposed Development will be undertaken in line with commitments contained in the Construction Environmental Management Plan (CEMP).

11.9.3.2 Recommendations around minimising construction and decommissioning glare will be made but no formal quantitative assessment of the glare effects will be undertaken; only a qualitative assessment will be undertaken for the construction and decommissioning phases of the Proposed Development based on professional judgment and knowledge of similar projects. In doing so, due consideration will be given to the ZTV, the receptor sensitivity and consideration of the existing screening / vegetation present. This is considered best practice within the industry.

11.10 Assumptions, limitations and uncertainties

11.10.1.1 This section sets out the assumptions which have been made and the limitations which inform the scope of the glare scoping assessment.

11.10.1.2 Uncertainties at this stage regarding the final layout, orientation, angles and heights of the solar panels. The glare study area and associated receptors will be reviewed accordingly in relation to the heights of these features, informed by further ZTVs.

11.10.1.3 The assessment is limited to the analysis of data readily available through third party sources. Therefore, there is a limitation around definitive determination of visibility of the draft Order Limits, based on the resources available.

11.11 Summary

Table 11-9 Glint and glare scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Residential Properties	Scoped in	Scoped in	Scoped in	Yes – walkover survey
Commercial Properties	Scoped in	Scoped in	Scoped in	Yes – walkover survey
Motorists on Local Roads	Scoped in	Scoped in	Scoped in	Yes – walkover survey
Railway Receptors	Scoped in	Scoped in	Scoped in	Yes – walkover survey
Aviation Receptors (Airfields)	Scoped in	Scoped in	Scoped in	None

12 Ground Conditions

12.1 Introduction

12.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of ground conditions.

12.1.1.2 It sets out ground conditions receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

12.1.1.3 The following matters have been considered as part of the scope and methodology for ground conditions:

- Human health
- Ecological receptors
- Controlled Waters
- Infrastructure

12.1.1.4 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 5 Agricultural Land and Soils
- Chapter 17 Socio-economics
- Chapter 19 Water Resources and Flood Risk

12.2 Relevant legislation, policy, standards and guidance

12.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for ground conditions and have informed the scope of the assessment.

12.2.2 Legislation

Table 12-1 Legislation

Legislation	Relevance to assessment
Environmental Protection Act (EPA) 1990: Part 2A Contaminated Land Statutory Guidance [135]	Provides key definitions and overall legislative framework for assessment relating to the contamination of land and Controlled Waters.

Legislation	Relevance to assessment
The Control of Asbestos Regulations 2012 [136]	Relevant to the risks from exposure to asbestos in soils.
The Contaminated Land (England) Regulations 2006 [137]	Relate to the designation and remediation of contaminated land.
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 [138]	Requirement to ensure that the development will not cause damage to ecosystems, Controlled Waters or land.
The Control of Pollution (Oil Storage) Regulations 2001 [139]	Relate to the environmentally safe storage of diesel/petrol fuels.
The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 [140]	Provides legislative context for the protection of organisms within the surface water bodies of England and Wales.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 [141]	Provides UK legislative context for compliance with Water Framework Directive (WFD).

12.2.3 Policy

Table 12-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for energy (EN-1), 2024 [142]	Sets broad national policy approach. Section 11 addresses ground conditions, outlining approach to assessment of impacts and determining requirement for mitigation (if required), including the following paragraphs of relevance: Paragraphs 5.11.4 and 5.11.5 state: "*Development of land will affect soil resources, including physical loss of and damage to soil resources, through land contamination and structural damage. Indirect impacts may also arise from changes in the local water regime, organic matter content, soil biodiversity and soil process.* *Where pre-existing land contamination is being considered within a development, the objective is to ensure that the site is suitable for its intended use. Risks would require consideration in accordance with the contaminated land statutory guidance as a minimum.*" Paragraph 5.11.8 states: "*The ES (see Section 4.3) should identify existing and proposed252 land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a*

Policy	Relevance to assessment
	new development or use proposed in the development plan. The assessment should be proportionate to the scale of the preferred scheme and its likely impacts on such receptors. For developments on previously developed land, the applicant should ensure that they have considered the risk posed by land contamination and how it is proposed to address this." Paragraph 5.11.14 states: "*Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination. The sustainable reuse of soils needs to be carefully considered in line with good practice guidance where large quantities of soils are surplus to requirements or are affected by contamination.*" Paragraphs 5.11.17 and 5.11.8 state: "*Applicants should ensure that a site is suitable for its proposed use, taking account of ground conditions and any risks arising from land instability and contamination.* *For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination, and where contamination is present, applicants should consider opportunities for remediation where possible. It is important to do this as early as possible as part of engagement with the relevant bodies before the official pre-application stage*. "
National Policy Statement for Renewable Energy Infrastructure (EN-3), 2024 [143]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects. The relevant paragraphs for Ground Conditions are as follows: Paragraph 2.10.34 states: "*Applicants are encouraged to develop and implement a Soil Resources and Management Plan which could help to use and manage soils sustainably and minimise adverse impacts on soil health and potential land contamination. This should be in line with the ambition set out in the Environmental Improvement Plan to bring at least 40% of England's agricultural soils into sustainable management by 2028 and increase this up to 60% by 2030*." Paragraph 2.10.60 states: "*As set out above applicants will consider several factors when considering the design and layout of sites,*

Policy	Relevance to assessment
	including proximity to available grid capacity to accommodate the scale of generation, orientation, topography, previous land–use, and ability to mitigate environmental impacts and flood risk."
National Policy Statement for electricity networks infrastructure (EN-5), 2024 [54]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for air quality, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19) and with reference to undergrounding and subsea cables (paragraph 2.9.25).
National Planning Policy Framework, 2023 [144]	Sets out the governments planning policies for England and how these should be applied. Chapter 11 Making effective use of land paragraph 124 (c) and Chapter 15 Conserving and enhancing the natural environment Paragraph 180 (a, e, and f) and paragraphs 189 - 194 are considered the most relevant to Ground Conditions
Breckland Local Plan, September 2023 [10]	Local Plan currently in use, defines local planning policy in Breckland Council. Policies relevant to contamination as follows: Policy COM 03 Protection of Amenity *For all new development consideration will need to be given to general amenity impact issues, especially residential amenity. Development will not be permitted which causes unacceptable effects on the residential amenity of neighbouring occupants, or does not provide for adequate levels of amenity for future occupants. In assessing the impact of development on the living conditions of occupants, regard will be had to the following amenity considerations:* *8. Other forms of pollution (including contaminated land, dust, air pollution, for example the emission of particulates etc).*

12.2.4 Standards and guidance

Table 12-3 Standards and guidance

Standards and guidance	Relevance to assessment
Environment Agency Land Contamination Risk Management (LCRM), 2023 [145]	Describes how to assess and manage the risk from land contamination through a stage risk-based approach. Stage 1 Risk Assessment is relevant to this EIA Scoping Report.
BS 10175:2011+A2:2017. Investigation of potentially contaminated sites – Code of practice [146]	Sets out best practice for the investigation of sites that have the potential to contain contamination.
CL:AIRE, The Definition of Waste: Development Industry Code of Practice,2011 [147]	Provides guidance for how waste soils are to be dealt with and disposed of.
BS8576:2013. Guidance on investigation for ground gas –	Guidance on the monitoring and sampling of ground gases including volatile organic compounds and carbon dioxide,

Standards and guidance	Relevance to assessment
Permanent Gases and Volatile Organic Compounds [148]	methane and oxygen. Relevant as a result of historical mining activity onsite.
BRE Special Digest 1: 2005. Concrete in Aggressive Ground [149]	Guidance on specification of concrete for installation in natural ground and in brownfield locations.
CIRIA Publication C552: 2001. Contaminated Land Risk Assessment: A Guide to Good Practice [150].	Guidance on the risk assessment of contaminated land.
CIRIA Publication C665:2007. Assessing risks posed by hazardous ground gases to buildings [151]	Outlines methods of analysing the potential risks from ground gases and site classification.
CIRIA Publication C733: 2014. Asbestos in soil and made ground: a guide to understanding and managing risks [152].	Guidance on risk assessment and risk management for sites that contain made ground and soils potentially contaminated by asbestos.
CL:AIRE:2016. Control of Asbestos Regulations 2012 Interpretation for Managing and Working with Asbestos in Soils in Construction and Demolition Materials [153].	Guidance on the legal requirements of Control of Asbestos Regulations 2012.
Environment Agency: 2009. Updated Technical Background for CLEA Model [154]	Update on the Contaminated Land Exposure Assessment (CLEA) model and the rationale for the generic land use scenarios to derive soil guideline values.
Environment Agency 2018. The Environment Agency's approach to groundwater protection [155]	Guidance on how the Environment Agency manages and protects groundwater, and how they can deliver on government policy.
CL:AIRE Good Practice for Risk Assessment for Coal Mine Gas Emissions, 2021 [156]	Guidance on understanding and undertaking coal mine gas risk assessment.
Land Quality Management and the Chartered Institute for Environmental Health: 2014. The LQM/CIEH S4ULs for Human Health Risk Assessment [157]	Outlines suitable for use levels for Human Health, based on toxicological data and modelling.

12.3 Consultation

12.3.1.1 The following stakeholders will be consulted with regards to ground conditions as part of the assessment process:

- Environmental Health Officer (EHO) at Breckland Council and Norfolk County Council

12.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to ground conditions.

12.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

12.4 Study area

12.4.1.1 The study area includes all potential contaminated land sites that intersect the Proposed Development and those sites that have plausible pollutant linkages that may impact the Proposed Development, typically within 250m of the draft Order Limits. However, contamination pollution linkages are considered on a case-by-case basis.

12.4.1.2 The study area used to assess the potential impacts on geology and hydrogeology considers features within the draft Order Limits, as well as hydrogeological features and sensitive receptors within 500m of the draft Order Limits.

12.5 Baseline conditions

12.5.1 Desktop sources used

12.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- British Geological Survey (BGS) GeoIndex online viewer [158]
- Defra MAGIC Map application [61]
- National Library of Scotland historical map [159]
- Groundsure free online environmental data viewer [160]
- The Coal Authority interactive map [161]
- Zetica Unexploded Ordnance (UXO) Risk maps [162]
- Landis Soilscapes Viewer [163]
- Norfolk County Council – Norfolk Minerals and Waste Local Plan Publication [164]
- Bing maps - ordnance survey map [165]
- Google earth aerial imagery [166]
- Norfolk Inspire and Open Data [167]

12.5.2 Surveys undertaken and proposed

12.5.2.1 No surveys are considered to be required in respect of ground conditions.

12.5.3 Existing baseline

Historic Land Use

12.5.3.1 Based on a review of available historical maps, the draft Order Limits have been used as agricultural land with local farm holdings off-site, some of which are shown in the earliest available maps (1885-1900). Smithies are noted in the 1885-1900 map in proximity to the Central Panel Area, cable corridor between the Central Panel Area and Northern Panel Area and the Eastern Panel Area. These smithies are no longer noted in the 1937-61 map. Other notable features include Roman Remains in proximity to the Southern Panel Area, noted in the 1885-1900 and 1937-61 maps [159].

Geology

12.5.3.2 The BGS GeoIndex online viewer [158] does not indicate the presence of made/artificial ground within the draft Order Limits. The geological map shows the majority of the draft Order Limits to be underlain with Lowestoft Formation – diamicton (an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays). Lowestoft Formation (sand and gravel) is shown to be locally present (Central Panel Area and Eastern Panel Area). Alluvium deposits (clay, silt, sand and gravel) are also shown to be locally present (Northern Panel Area, Eastern Panel Area, and Southern Panel Area). There are no superficial deposits beneath the Western Panel Area.

12.5.3.3 The solid geology [158] beneath the draft Order Limits comprises two main bedrock formations including:

- Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated) – Chalk (Western Panel Area)
- Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation and Culver Chalk Formation (Undifferentiated) – Chalk (Central Panel Area, Northen Panel Area, Eastern Panel Area, Southern Panel Area)

12.5.3.4 There are no faults shown to run through the draft Order Limits.

12.5.3.5 There are no Sites of Special Scientific Interest (SSSI) designated for geology within the study area.

12.5.3.6 There are no locally listed County Geodiversity Sites (CWS) within the study area [164].

Soils

12.5.3.7 Across the Northern and Eastern Panel Areas, the east of the Central Panel Area and north of the Southern Panel Area, the topsoil is sandy clay loam or sandy loam, typically of 30-40cm depth. Across the Western Panel Area, the west of the Central Panel Area and the south of the Southern Panel Area, the topsoil is sandy loam or loamy sand, also typically of 30-40cm depth [163].

12.5.3.8 The subsoil characteristics are variable, ranging from slowly permeable clay and permeable sandy loams both commonly found in the east; loamy sand and sand found roughly centrally; and chalk in the west.

12.5.3.9 For further information, see Chapter 5 Agricultural Land and Soils of this report.

Hydrogeology

12.5.3.10 The draft Order Limits are underlain by the bedrock deposits of White Chalk Subgroup (Upper and Middle Chalk) classified as a Principal Aquifer. The superficial deposits are a mix of mostly diamicton of the Lowestoft Formation, but also small areas of sand and gravel, and clay and slit, both of the Lowestoft Formation. Areas of alluvial deposits and River Terrace Deposits (clay, sand and gravel) are present along watercourses including Wendling Beck and the River Wissey.

12.5.3.11 Based on information provided by the EA, the majority of the draft Order Limits is within a Source Protection Zone (SPZ) Zone 3 Total Catchment. There are seven Environment Agency groundwater level monitoring stations (of which one is logged data) and no groundwater quality monitoring stations within the study area.

12.5.3.12 There is one designated Main River within the study area, Wendling Beck, which runs through the north of the study area. The river runs just outside draft Order Limits, along the boundary of the Northern Panel Area, there are also several unnamed tributaries to Wendling Beck, some of which are within the draft Order Limits. Wendling Beck flows north-east to join Black Water, north of Dereham. Other rivers within the study area include: the River Tud and River Wissey, in addition to several ordinary watercourses which flow through the draft Order Limits.

12.5.3.13 The majority of the draft Order Limits are located within Flood Zone 1, with some minor instances of Flood Zones 2 and 3 located in the Northern Panel Area and Southern Panel Area. For further information, see Chapter 19 Water Resources and Flood Risk of this report.

Mineral extraction and Mineral Safeguarding Areas

12.5.3.14 There are unspecified mining and quarry pits identified across the draft Order Limits, identified within BGS data [158], however all pits within the draft Order Limits are ceased.

12.5.3.15 The draft Order Limits are partially located within Mineral Safeguarding Areas (MSAs) for sand and gravel, as designated within the Norfolk Minerals and Waste Local Plan [164]. For further information on MSAs, see Chapter 17 Socio-economics and Land Use of this report.

Landfill and Historic Landfill Sites

12.5.3.16 There is one closed Environment Agency authorised landfill Baco – Compac – Chalk farm (EP3799NE) for which the landfill site boundary is partially within the cable corridor between the Western Panel Area and the Central Panel Area [168]. The extent of the area is now used as Chalk Farm Clay Ground for clay shooting.

12.5.3.17 There is one historic landfill site within the draft Order Limits, this being Narborough (EAHLD00709). There is also one further historic landfill site within 50m of the draft Order Limits, this being Tavisbay Railway Cutting (EAHLD01420 – first waste input – 15/12/1977). Both are within, or within 50m, of the cable corridor between the Western Panel Area and the Central Panel Area [167] [61].

Other Designations

12.5.3.18 The draft Order Limits are not within a Coal Authority reporting area [161].

12.5.3.19 The Zetica UXO map indicates that the draft Order Limits are within a low bomb risk area (areas indicated as having fifteen bombs per 1000 acre or less) [162].

Potential for Contamination

12.5.3.20 As land within the draft Order Limits are currently, and have historically been, used for agricultural practices, there is very low potential for contamination (limited to land contamination associated with agricultural activities on-site and the presence of the local farm holdings off-site). There is potential risk from leachate contamination and ground gas in relation to the identified historic landfills.

12.5.4 Future baseline

12.5.4.1 Excluding potential future development pressures that may come forward, the future baseline for ground conditions is largely expected to remain the same as the existing baseline.

12.5.4.2 Climate change may result in drier seasonal periods which could result in wildfire occurrence, contaminant breakdown and drying out of surface soils. During wetter seasonal periods which could result in an increase percolation of rainwater and increase of groundwater level.

12.6 Potential impacts

12.6.1 Conceptual Site Model

12.6.1.1 Current best practice in the assessment of contaminated land risk assessment is to develop a Conceptual Site Model (CSM) that describes all the potential sources, pathways and receptors and the relationships between them. The CSM for the draft Order Limits has been developed for the proposed land end use of solar arrays and associated infrastructure.

Sources

12.6.1.2 There is one closed Environment Agency authorised landfill and two historic landfills within the study area. Baco – Compac – Chalk farm (EP3799NE) is partially located within the cable corridor, Narborough (EAHLD00709) which is located within cable corridor, and Tavisbay Railway Cutting (EAHLD01420) which is located within 50m of the draft Order Limits.

12.6.1.3 There are sporadic unspecified mining pits of ceased activity identified across the draft Order Limits, identified within BGS data.

Pathways

12.6.1.4 The potential pathways are identified below:

- Direct ingestion of soil and soil derived dust
- Dermal contact with soil and soil derived dust
- Inhalation of dust with elevated concentration of determinands
- Surface water flow
- Mine water migration
- Vertical and lateral migration of leachable contaminants

Receptors

12.6.1.5 The potential receptors relating to ground conditions are:

- Construction workers and nearby land users, such as farmers, in relation to human health risks from contamination
- Wendling Beck Main River, the River Tud and River Wissey and other ordinary watercourses located within the draft Order Limits
- Groundwater within the superficial deposits and bedrock underlaying the draft Order Limits which has been classified as Principal and Secondary Aquifers
- Any ecological receptors that may be present within the draft Order Limits
- Grazing of livestock during the operational phase
- Maintenance workers during the operational phase
- Infrastructure associated with Proposed Development

12.6.2 Construction

12.6.2.1 The following potential impacts could occur during the construction phase of the Proposed Development:

- The nature of construction activities (e.g. excavation of trenches for cable routes) will give rise to close contact with dust/soil. There is potential for soil contamination associated with former site usage or nearby landfill to present a risk to human health and/or ecological receptors.

- The construction phase also has the potential to increase the risk of contaminant leaching (both physical and chemical) to groundwater and surface water run-off to Wendling Beck, the River Tud and River Wissey and other ordinary watercourses located within the draft Order Limits.
- The creation of excavations and trenches during the construction phase increases the risk of exposure to contaminants from the underground pits and hazardous ground gases for construction workers.
- Construction activities and movement / stockpiling of soils (if required) have the potential to create dusts and / or release asbestos fibres (if present).

12.6.3 Operation

12.6.3.1 The operational phase is not considered to have an effect on the grazing stock, operational workers, Wendling Beck, the River Tud and River Wissey and other ordinary watercourses and/or groundwater.

12.6.4 Decommissioning

12.6.4.1 Similar to construction, activities within the decommissioning phase such as the movement of heavy machinery or plant, have the potential to give rise to close contact with dust/soil. There is potential for soil contamination associated with former site usage or nearby landfill to present a risk to human health and/or ecological receptors.

12.6.4.2 The decommissioning phase has the potential to increase the risk of contaminant leaching (both physical and chemical to groundwater and surface water runoff to the Wendling Beck, the River Tud and River Wissey and other ordinary watercourses, where excavation works are undertaken.

12.6.4.3 The re-excavation of cable trenches during the decommissioning phases may also increase the risk of exposure to contaminants from the underground pits and hazardous ground gases for decommissioning workers. The removal of infrastructure from the Proposed Development, such as solar PV module 'pins'/piles have the potential to expose any contaminated soils.

12.7 Design, mitigation and enhancement measures

12.7.1 Design principles

12.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

12.7.2 Embedded and Good practice measures

12.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require

additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

12.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to ground conditions are likely to include:

- Sustainable drainage solutions (SuDS) will be provided at source, ensuring that surface water run-off is managed consistently with existing site conditions.
- Minimum 10m offset from all infrastructure (including fencing) from bank top of all riparian boundaries and watercourses.
- Minimum 250m offset from substations and BESS from landfill sites. The final design considering pit locations to minimise impacts.
- Construction/decommissioning workers would be provided with appropriate Personal Protective Equipment (PPE) and required to follow best practice measures with regards to limiting the risks associated with ground contamination and instability.
- For watercourse crossings where required, use of appropriate trenchless methodology.
- Where possible, underground cables would be installed using a cable plough or trenching. These are considered the most efficient and least impactful methods of cable installation, causing minimal disruption to the ground by cutting, installing and back-filling in one operation.
- Use of piling methodology that minimises likelihood of creating pollution pathway to groundwater.

12.7.2.3 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

12.7.3 Further mitigation

12.7.3.1 Further mitigation is actions that require further activity in order to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for ground conditions will be defined through the EIA process once the level of significance of effects is known.

12.7.3.2 It is considered that with appropriate site-specific construction and decommissioning mitigation in place, including management plans listed in section 12.7.4 below, the residual effects on receptor locations during the construction and decommissioning phases are anticipated to be not significant. Options for further mitigation for the Proposed Development relevant to Ground Conditions may include:

- If required, arisings from cable routes to be stockpiled separately and an appropriate distance from other material, until laboratory analysis has confirmed suitability for re-use or waste classification for disposal.
- Excavations and storage of stockpiles to be undertaken in accordance with best practice measures set out in guidance and under DoWCoP (Definition of Waste: Code of Practice).

12.7.3.3 It is not anticipated that there will be any specific requirements for mitigation measures associated with the operational phase of the Proposed Development

12.7.4 Management plans

12.7.4.1 A suite of management plans will submitted with the DCO application for the Proposed Development, those relevant to ground conditions include:

- oCEMP
- oDEMP
- oSRMP

12.7.4.2 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

12.8 Likely significant effects

12.8.1.1 There is a notable number of unspecified mining pits withing the draft Order Limits which may acts as constraints to the location of some parts of the Proposed Development as a result of potential risks of instability, ground gas, or potential contamination. These pits are small, localised and identified on publicly available mapping. Flexibility in the design and layout of the proposed infrastructure allows these pits to be avoided as far as practical. If works are required in the vicinity of any potential pits, appropriate Ground Investigation will be undertaken prior to construction commencement in locations identified as a potential risk by desktop reporting to understand what these pits now contain, and whether they require any treatment. SuDS will be provided at source, ensuring that surface water run-off is managed consistently with existing site conditions, trenchless methodologies will be employed for any watercourse crossings, and piling methodologies will be employed that minimises the likelihood of creating any pollution pathways. Larger infrastructure such as the substations, BESS and other associated infrastructure will be sited away from these mining pits where possible, and a minimum of 10m from bank top of all riparian boundaries and watercourses. Therefore, impact to these pits will be avoided and an assessment of effects to from the historic mining legacy and effects upon ground water quality and surface water as a result of contaminant leaching are therefore **scoped out** of further assessment.

12.8.1.2 The oCEMP will require appropriate PPE and use of best practice measures, therefore, potential harm to human health from exposure to soil contamination (including dust or vapours originating from the soil) is not expected to be significant. This, in addition, the 250m offset for substations, BESS and other associated infrastructure to be located away from identified landfill in the area mean that no likely significant effects to human health are expected and are **scoped out** of further assessment.

12.8.2 Operation

12.8.2.1 Any potential contamination would have been appropriately managed during the construction phase, therefore effects to human health and livestock and effects from the historic mining are not likely to be significant and further assessment is **scoped out** of the assessment.

12.8.2.2 No further impacts are likely from the operational phase on ground water and surface water quality from the nature of the Proposed Development as it does not represent a potential pollution source. Therefore, an assessment of effects upon ground water quality and surface water as a result of contaminant leaching are therefore **scoped out** of further assessment.

12.8.3 Decommissioning

12.8.3.1 The removal of solar array 'pins'/piles have the potential to expose Made Ground and contaminated soils that have the potential risk to human health. However, an oDEMP will be followed which will provide the mitigation measures required and ensure this risk remains low, and therefore is **scoped out** of assessment.

12.9 Proposed assessment methodology

12.9.1.1 The ES will not contain an assessment on ground conditions as all aspects have been scoped out of further assessment.

12.9.1.2 Site specific mitigation as outlined in Section 12.7 will be included within the oCEMP and oDEMP that will support the DCO application.

12.10 Assumptions, limitations and uncertainties

12.10.1.1 The assessment is limited to the analysis of data readily available through the publicly accessible sources listed above.

12.11 Summary

Table 12-4 Ground Conditions scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Human health	Scoped Out	Scoped Out	Scoped Out	None
Historic mining legacy	Scoped Out	Scoped Out	Scoped Out	None
Controlled waters	Scoped Out	Scoped Out	Scoped Out	None
Ecological Receptors / grazing livestock	N/A	Scoped Out	N/A	None

13 Human Health

13.1 Introduction

13.1.1.1 This chapter outlines the potential for likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of human health.

13.1.1.2 It sets out human health receptors of relevance, the potential impacts and measures that would be in place to avoid, minimise and manage those impacts during construction, operation and decommissioning.

13.1.1.3 The following matters have been considered as part of the scope and methodology for human health:

- Impacts on population health as a result of changes to health determinants such as access to health, social care and other social infrastructure, access to open space and nature, neighbourhood amenity, accessibility and active travel, community safety, access to work and training, social cohesion and climate change.

13.1.1.4 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 6 Air quality
- Chapter 8 Climate change
- Chapter 10 Electric, magnetic and electromagnetic fields
- Chapter 12 Ground conditions
- Chapter 14 Landscape and visual
- Chapter 15 Major accidents and disasters
- Chapter 16 Noise and vibration
- Chapter 17 Socio-economics
- Chapter 18 Traffic and transport
- Chapter 19 Water resources and flood risk

13.2 Relevant legislation, policy, standards and guidance

13.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines (described in Table 13-1, Table 13-2, and Table 13-3 respectively) which would underpin an assessment of human health impacts and have informed this scoping exercise.

13.2.2 Legislation

Table 13-1 Legislation

Legislation	Relevance to assessment
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017	"*5(2) The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors—* (a) *population and human health;"*

13.2.3 Policy

Table 13-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for energy(EN-1), 2024 [121]	Sets broad national policy approach. Section 4.4 addresses health outlining approach to assessment of impacts and determining requirement for mitigation (if required). "*4.4.2 The direct impacts on health may include: increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests*" "*4.4.4 As described in the relevant sections of this NPS and in the technology specific NPSs, where the proposed project has an effect on humans, the ES should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate*."
National Policy Statement for renewable energy infrastructure (EN-3), 2024 [107]	Establishes policy specific to renewable energy schemes (including solar). EN-3 does not include further requirements for health in relation to solar schemes, beyond those general requirements of EN-1 for all energy infrastructure schemes.
National Policy Statement for electricity networks infrastructure (EN-5), 2024 [169]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for health, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19) and with reference to effects from electric and magnetic fields (paragraphs 2.9.44 - 2.9.58).
National Planning Policy Framework (NPPF) 2023 [9]	Section 8. Promoting healthy and safe communities sets out requirements for promoting healthy and safe communities, which includes requirements to aim to achieve healthy, inclusive and safe place which promote social interaction, are safe and accessible and enable and support healthy lifestyles (paragraph 96). Paragraph 97 sets out requirements relating to social, recreational and cultural facilities, and paragraphs 102 - 107 include requirements and protection open spaces and recreation facilities, including public rights of way.

Policy	Relevance to assessment
Breckland Council Local Plan [170]	"*Policy COM 02 Healthy Lifestyles* *New development will be expected to take appropriate steps to avoid/mitigate potential negative effects on the health of the population and facilitate enhanced health and well-being through the provision of conditions supportive of good physical and mental health. Where possible, new development should also seek to reduce disparities in health between different parts of Breckland by addressing detrimental environmental social and economic conditions.*" "*Policy COM 03 Protection of Amenity* *For all new development consideration will need to be given to general amenity impact issues, especially residential amenity. Development will not be permitted which causes unacceptable effects on the residential amenity of neighbouring occupants, or does not provide for adequate levels of amenity for future occupants. In assessing the impact of development on the living conditions of occupants, regard will be had to the following amenity considerations:* *1.The protection of adequate areas of usable and scheduled private amenity space for the occupiers of existing dwellings; 2.The provision of adequate areas of usable and secluded private amenity space for the occupiers of proposed dwellings, in keeping with the character of the immediate surrounding areas; 3. Overlooking of windows of habitable rooms and private amenity space; 4. Overbearing impact/visual dominance; 5. Overshadowing of private amenity space; 6. Loss of daylight and/or sunlight to existing windows of habitable rooms; 7. Odour, noise, vibration or other forms of nuisance such as artificial light pollution, insects and vermin; and 8. Other forms of pollution (including contaminated land, dust, air pollution, for example the emission of particulates etc).*"

13.2.4 Standards and guidance

Table 13-3 Standards and guidance

Standards and guidance	Relevance to assessment
Planning Practice Guidance: Healthy and safe communities, 2022 [171]	Guidance on promoting healthy and safe communities, particularly Paragraph: 004 Reference ID:53-004-20190722.

13.3 Consultation

13.3.1.1 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to air quality.

13.3.1.2 A non-statutory consultation is planned from Autumn 2024 , this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

13.4 Study area

13.4.1.1 The study area considers the draft Order Limits and any immediately adjoining receptors relevant to human health, and more generally the local authority area of Breckland Council.

13.5 Baseline conditions

13.5.1 Desktop sources used

13.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Office for National Statistics, Census 2021 [172]
- NHS, Find services near you [173]
- Police UK, Norfolk Constabulary: Dereham and Swaffham Crimes [174]
- Crash Map, CrashMap Data: Great Britain 1999 – 2022 [175]
- Met Office, UK Climate Projections: Headline Findings [176]

13.5.2 Surveys undertaken and proposed

13.5.2.1 No surveys are required in respect of human health.

13.5.3 Existing baseline

13.5.3.1 Breckland had a population of 141,500 in 2021 and was the third least densely populated of the East of England's 45 local authority areas [172].

13.5.3.2 The majority of the population in Breckland are between 25 – 64 years (44%), which is slightly lower than the average for England (46%). The proportion of residents aged 65-84 in Breckland and Norfolk is above average (both 19%) in comparison with England and the East of England (14% and 15% respectively) [172].

13.5.3.3 In 2019, 10% of the population of Breckland was income deprived and is ranked 127 out of the 317 national boroughs in the English Indices of Deprivation. The Gross Value Added (GVA) per head in 2015 was £19,761, which is less than the GVA per head of the East of England Region and England as a whole. [177]

13.5.3.4 Much of the study area is in areas of relatively low deprivation, with the majority of areas of deprivation centred around larger towns such as Swaffham, Dereham, and Thetford [178].

13.5.3.5 According to the 2021 census, the population in Breckland is predominately white (96.5%), while 1.4% identified their ethic group within the 'mixed or multiple' category [178].

13.5.3.6 In May 2024, Breckland's employment rate for people aged 16 to 64 was 72.6%. Across the East of England, 77.5% of people in the same age group were employed during the same period. The unemployment rate in June 2023 in Breckland was 3.7%, approximately 2,400 people aged 16 and over. Approximately 25.7% of people aged 16 to 64 in Breckland were economically inactive, meaning they were neither employed nor seeking work [179].

13.5.3.7 According to Breckland District's employment study in 2013 the largest sectors were manufacturing (16%), retail (11.3%), healthcare (9.2%), construction (8.4%) and education (7.6%), with wholesale, transport and professional services also accounting for a significant share of employment, with the financial, IT, and business service sectors under-represented compared with regional or national averages [180]. Presently, key sectors include manufacturing, automotive repair, construction, human health and social work, administrative and accommodation and food services. [180]

13.5.3.8 In 2021, 44.7% of people in Breckland described their health as 'very good' increasing from 43.1% in 2011. Life expectancy for someone born in Breckland is 82 years, with a higher life expectancy for females than males (84 years to 80 years respectively) [181].

13.5.3.9 Land uses on and in the areas surrounding the Proposed Development are focused on agricultural activities with dispersed settlements which support local services, including the towns of Swaffham and Dereham, but also smaller villages, hamlets and individual residential properties around Necton, Little Fransham, Bradenham, Ashill, Saham Hills, Wendling, Scarning and High Green.

13.5.3.10 The A47 runs east to west between Swaffham and Dereham, and the A1065 runs north to south through Swaffham.

13.5.3.11 The Proposed Development is predominantly set within agricultural land, which due to its existing use, is not in itself a key recreational attraction or destination. The land does, however, play a role in providing a landscape context to recreational use of waterways and walking and cycling routes.

13.5.3.12 There are no health, social care and other social infrastructure within the draft Order Limits. The closest is Plowright Medical Centre in Swaffham, located approximately 350m south of the draft Order Limits [173].

13.5.3.13 Members of the public can access open space and nature through numerous Public Rights of Way (PRoW) through and immediately adjoining the draft Order Limits, predominately around the Central and Western Panel Areas near Swaffham. Peddar's Way and Norfolk Coast Path National Trail runs through the Central Panel Area.

13.5.3.14 There are no rail stations within or within close proximity to the draft Order Limits. There are multiple bus routes within the vicinity of the draft Order Limits,

including routes; 6, 10, 11A, 13, 31, 32, 52, 60, 111, 113 and A, B, and C "Excel" services. Destinations served include Swaffham, Dereham, Shipdham, and Kings Lynn.

13.5.3.15 There have been approximately 276 reported crimes in March 2024 within the Norfolk Constabulary, Swaffham and Dereham areas [174]. The majority of which were within the towns of Swaffham and Dereham, located within the vicinity of the draft Order Limits.

13.5.3.16 In 2022, the latest data available, there were 4 fatal and several serious road traffic accidents along the stretch of the A47 that runs along the width of the draft Order Limits [175].

13.5.3.17 The area within and around the draft Order Limits is rural, which are considered to have stronger community relations than urban areas, and as such social cohesion may expected to be high [182].

13.5.3.18 For topic specific baseline conditions of relevance to human health, refer to the following sections of the EIA Scoping Report:

- Chapter 6 Air quality
- Chapter 8 Climate change
- Chapter 10 Electric, magnetic and electromagnetic fields
- Chapter 12 Ground conditions
- Chapter 14 Landscape and visual
- Chapter 15 Major accidents and disasters
- Chapter 16 Noise and vibration
- Chapter 17 Socio-economics
- Chapter 18 Traffic and transport
- Chapter 19 Water resources and flood risk

13.5.4 Future baseline

13.5.4.1 Considerations for human health include factors such as areas of proposed new development, which may have the potential to influence the demographic characteristics of an area, or the likely routes and journeys people will need to make in the future. Due to the short time period between assessment and probable construction, if consent is granted, there is unlikely to be a notable change in the baseline conditions. , Following an initial review of developments in proximity to the draft Order Limits, there are no change proposed that could alter the baseline relevant to potential impacts relating to human health (for example if new health facilities were proposed).

13.5.4.2 The influence of climate change will also affect health priorities and health risks in the future. This may include the risks to health from increased heatwaves or other extreme weather events. General climate change trends projected over UK land for the 21st century in UKCP18 [176] are broadly consistent with earlier projections (UKCP09) showing an increased chance of warmer, wetter winters and hotter,

drier summers along with an increase in the frequency and intensity of extremes. This is not expected to alter the baseline conditions relevant to determining potential impacts on health determinants. The Proposed Development is intended to contribute to reducing impacts on climate.

13.6 Potential impacts

13.6.1 Construction

13.6.1.1 The construction of the Proposed Development has limited potential for impacts on human health. These are likely to principally relate to:

- potential impacts on neighbourhood quality and residential amenity, air quality and noise due to construction activity and traffic; and
- employment opportunities from construction.

13.6.2 Operation

13.6.2.1 The operation of the Proposed Development has limited potential for impacts on human health. These are likely to principally relate to:

- neighbourhood quality and residential amenity, air quality, noise and lighting impacts due to operational activity and traffic; and
- potential impacts to access of open space and nature, community safety and climate change.

13.6.3 Decommissioning

13.6.3.1 The decommissioning of the Proposed Development has limited potential for impacts on human health. These impacts are likely to principally relate to the impacts on air quality, noise and traffic associated with decommissioning activities.

13.7 Design, mitigation and enhancement measures

13.7.1 Design principles

13.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

13.7.2 Embedded and Good practice measures

13.7.2.1 Embedded measures are modifications to the design of a scheme, made during design and assessment, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches

and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

13.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development, of relevance to human health are likely to include:

- 132kV and 400kV substations will be located will be located as far as reasonably possible from existing sensitive receptors
- Other sources of operational noise will be located as afar as reasonably possible from existing sensitive receptors
- An appropriate buffer will be maintained between properties and construction areas.
- Existing hedgerows in poor condition / gappy will be reinforced with planting / management where feasible
- The Proposed Development would generally not be lit. The only lighting required would be demand responsive motion sense lights at the substations using passive infra-red (PIR) technology. This would only be on intermittently for security and/or safety reasons, and it will be designed and installed in a manner which minimises impact.
- Hedgerow planting along field boundaries to maximise landscape integration where appropriate.
- Installation of equipment that is compliant with the relevant exposure limits, in accordance with the provisions of the Government's Code of Practice on Compliance, which is compliant with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidance
- All solar farm infrastructure (solar panels, substations, BESS and inverters) will not be publicly accessible, and security measures such as fencing, CCTV and lighting will be installed
- Measures to control noise as defined in Annex B of BS 5228:2009+A1:2014 Part 1 and Section 8 of BS 5228:2009+A1:2014 Part 2 [15] will be adopted where reason-ably practicable. These measures represent 'Best Practicable Means' (BPM) (as de-fined by Section 72 of the Control of Pollution Act 1974) to manage noise and vibration emissions from construction activities. An Environmental Clerk of Works will also be required to be appointed to advise and supervise the mitigation measures during construction and decommissioning.
- Construction dust assessment, with recommended mitigation measures following best practice measures set out in IAQM guidance. Examples of such measures include:
    - plan site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable;
    - ensuring all vehicles switch off engines when stationary – no idling vehicles; and

    - avoiding the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
- An oCTMP will support the DCO application and include measures such as appropriate traffic planning and HGV management, including a requirement to minimise the number of HGVs routing through Swaffham town centre.
- New planting to provide visual screening, to break-up of the extent of development and to link existing habitats will be provided.

13.7.2.3 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

13.7.3 Further mitigation

13.7.3.1 Further mitigation include actions that require further activity to achieve a reduction in the magnitude of an impact and anticipated effect.

13.7.3.2 Further mitigation for the Proposed Development, of relevance to human health, is likely to include the following measures:

- Modifications to construction methods and plans to protect sensitive receptors.
- Plant selection, siting, screening and enclosures as appropriate.
- Locating key infrastructure away from sensitive receptors.

13.7.4 Management plans

13.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to human health include:

- oCEMP
- oLEMP, including general operational measures alongside those specific to landscape and ecology
- oDEMP
- oCTMP
- oBSMP
- oPROWMP

13.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

13.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

13.8 Likely significant effects

13.8.1 Construction

13.8.1.1 The construction of the Proposed Development has limited potential for adverse impacts on human health. The assessment of impacts associated with other environmental aspects considered in this report, and inclusion of appropriate mitigation measures to avoid, reduce or minimise those impacts, inherently includes consideration of health and mitigates those potential impacts. Human health and measures to manage potential impacts will therefore be inherently included elsewhere in the ES and supporting documentation, including:

- Noise, landscape and visual, transport and socio-economics chapters of the ES
- the oCEMP
- the oCTMP
- the Transport Statement
- the Construction Dust Assessment

13.8.1.2 Therefore, as it is not anticipated that the construction of the Proposed Development would result in significant effects on human health, and/or the assessment and mitigation of construction effects will be considered elsewhere in the ES, a separate human health ES chapter is not required.

13.8.2 Operation

13.8.2.1 The operation of the Proposed Development has limited potential for adverse impacts on human health.

13.8.2.2 The ES will include an assessment of climate change, landscape and visual, noise and socio-economics in the respective chapters which will include impacts relevant to health determinants. Any mitigation measures required during the operation of the Proposed Development would be reported within these assessments or supporting documentation such as the oBSMP.

13.8.2.3 This scoping exercise has identified that any likely operational air quality impacts could be readily managed and mitigated by the embedded and good practice measures proposed and would not be significant; therefore, they are scoped out of the EIA as no further assessment is required (see Chapter 6 Air Quality).

13.8.2.4 This scoping exercise has also identified that operational traffic will be minimal with occasional maintenance visits taking place which would have limited impacts on the local road network, operational traffic has therefore been scoped out of the EIA (see Chapter 18 Traffic and Transport).

13.8.2.5 Information obtained from these assessments will be used to inform the design of the Proposed Development to ensure no likely significant effects on human health during the operational phase. In addition, the design of the Proposed Development,

and its supporting infrastructure, would be maintained to operate safely so as not to present a risk to human health.

13.8.2.6 Therefore, as the assessment and mitigation of operational effects will be considered elsewhere in the ES or supporting assessments, and it is not anticipated that the operation of the Proposed Development would result in significant effects of human health, a separate human health ES chapter is not required.

13.8.3 Decommissioning

13.8.3.1 The decommissioning of the Proposed Development has limited potential for impacts on human health.

13.8.3.2 The ES will include an assessment of climate change, landscape and visual, noise and socio-economics in the respective chapters which will include impacts relevant to health determinants. Any mitigation measures required during the operation of the Proposed Development would be reported within these assessments or supporting documentation such as the oDEMP.

13.8.3.3 An oDEMP will be in place and will incorporate standard industry best practice. This will include measures to manage decommissioning traffic.

13.8.3.4 Therefore, as it is not anticipated that the decommissioning of the Proposed Development would result in significant effects of human health, and/or the assessment and mitigation of decommissioning effects will be considered elsewhere in the ES, a separate human health ES chapter is not required.

13.9 Proposed assessment methodology

13.9.1.1 The assessment of human health impacts, as a separate ES chapter, is scoped out of further assessment therefor no assessment methodology is proposed or required.

13.10 Assumptions, limitations and uncertainties

13.10.1.1 The assessments and suite of management plans which will cover the matters typically considered in relation to human health include:

- **Neighbourhood quality and residential amenity** – Chapter 14 Landscape and visual, oLEMP, including general operational measures
- **Air quality** – Construction Dust Assessment, oCEMP, oLEMP, including general operational measures, oDEMP.
- **Noise** – Chapter 15 Noise and vibration, oCEMP, oLEMP, including general operational measures, oDEMP
- **Lighting** – Chapter 14 Landscape and visual, oCEMP, oLEMP, including general operational measures.

- **Open space and nature** – Chapter 7 Biodiversity, Chapter 14 Landscape and visual, Chapter 17 Socio-economics, oPRoWMP, oLEMP, including general operational measures,
- **Community safety** - oLEMP, oCEMP, oPRoWMP, including general operational measures, oBSMP
- **Climate change** – Chapter 8 Climate change, oLEMP, including general operational measures

13.11 Summary

Table 13-4 Human health scoping summary

Aspect	**Construction**	**Operation**	**Decommissioning**	**Any required surveys?**
Human health	Scoped out	Scoped out	Scoped out	None required

14 Landscape and visual

14.1 Introduction

14.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of the topic landscape and visual amenity, herein referred to as the Landscape and Visual Impact Assessment (LVIA).

14.1.1.2 It sets out LVIA receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

14.1.1.3 There are clear differences between landscape effects and visual effects and the following distinctions have been made:

- 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.
- 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 Proposed Development.

14.1.1.4 Landscape effects and visual effects will therefore be assessed and reported separately.

14.1.1.5 The following matters have been considered as part of the scope and methodology for the LVIA:

- Landscape receptors (National Character Areas (NCA), Landscape Character Areas (LCAs), Local Landscape Character Areas (LLCA) and physical landscape features)
- Visual receptors (residents, people using recreational routes and transport routes)
- Landscape effects, including cumulative
- Visual effects, including cumulative
- Night-time lighting

14.1.1.6 The LVIA will be undertaken with reference to other environmental topics, including agriculture, biodiversity, cultural heritage, arboriculture and glint and glare. This chapter is supported by the following figures:

- Figure 14.1 Site location and study area
- Figure 14.2 Relevant designations
- Figure 14.3 Published Landscape Character Areas
- Figure 14.4 Local Landscape Character Areas

- Figure 14.5 Zone of Theoretical Visibility (bare earth) and proposed representative viewpoints
- Figure 14.6 Zone of Theoretical Visibility (screening) and proposed representative viewpoints

14.1.1.7 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 5 Agricultural Land and Soils
- Chapter 7 Biodiversity
- Chapter 9 Cultural Heritage and Archaeology
- Chapter 11 Glint and Glare

14.2 Relevant legislation, policy, standards and guidance

14.2.1.1 This section identifies the key legislation, planning policy, standards and guidelines and explains, where relevant, how they have informed the assessment and design of the Proposed Development.

14.2.2 Legislation

Table 14-1 Legislation

Legislation	Relevance to assessment
European Landscape Convention (ELC) [183]	The European Landscape Convention (ELC) is designed to achieve improved approaches to the planning, management and protection of landscapes throughout Europe and to put people at the heart of this process. Although no longer in the European Union, the UK did ratify this convention as part of the Council of Europe. The ELC defines landscape as: *"…an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."*
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 No. 572 [184]	5. (2) The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors— (d) material assets, cultural heritage and the landscape; Schedule 4 4.A description of the factors specified in regulation 5(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora),land (for example land take), soil (for example organic matter, erosion, compaction, sealing),water (for example hydromorphological

Legislation	Relevance to assessment
	changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

14.2.3 Policy

Table 14-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for Energy (EN-1), 2024 [185]	Sets broad national policy approach. Section 4.6 of NPS EN-1 sets out polices with respect to environment and Biodiversity Net Gain. It requires applicants to submit a statement with applications for development consent, demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into proposals as part of good design of the project. Section 4.7 notes the need for careful siting and criteria for good design which takes account of potential impacts on landscape and visual amenity in order to minimise negative effects and recognising opportunities for enhancement. Section 5.10 recognises that virtually all nationally significant energy infrastructure projects will have adverse effects on the landscape. It sets out the requirements for applicants to carry out a landscape and visual impact assessment, including cumulative effects in accordance with relevant guidance. Content should include effects on landscape character, landscape components and visibility during construction and operation.
National Policy Statement for Renewable Energy Infrastructure (EN-3), 2024 [186]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects. NPS EN-3 sets out relevant considerations for applicants with regards to renewable energy infrastructure, including solar farm development and its potential impacts on landscape and visual amenity, including visual impacts from public rights of way, visual

Policy	Relevance to assessment
	impacts of security and lighting measures and the need to mitigate these as far as possible. In the cases of solar farm development, it states in paragraph 2.10.95 that whilst it may be the case that the development covers a significant surface area, in the case of ground-mounted solar panels it should be noted that with effective screening and appropriate land topography, the area of a zone of visual influence could be appropriately minimised.
National Policy Statement for Electricity Networks Infrastructure (EN-5), 2024 [187]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for air quality, beyond those general requirements for 'good design' for the routing of new overhead lines and design and siting of substations in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19).
National Planning Policy Framework, 2023 [188]	Section 12 of the NPPF requires that planning decisions ensure developments "…*are sympathetic to local character*" (paragraph 135c) Section 15 requires planning decisions to "*contribute to and enhance the natural and local environment, by: a) [inter alia] protecting and enhancing valued landscapes*…" and "b) recognising the intrinsic character and beauty of the countryside" (paragraph 180a)
Breckland Local Plan, 2024 [189]	Local Plan currently in use, defines local planning policy in Breckland Council. Policies relevant to landscape and visual as follows: GEN 01- Sustainable Development in Breckland "*The Local Plan will seek and enable development that improves the economic, social and environmental objectives of Breckland through the application of the following national and locally distinctive sustainable development principles:* • *…Protect and enhance the natural, built and historic environment;*" GEN 02- Promoting High Quality Design "*The Council will require high quality design in all development within the District that:* • *respects and is sensitive to the character of the surrounding area and makes a positive architectural and urban design contribution to its context and location;* • *contributes positively to the public realm and public spaces, protecting the high levels of amenity and quality of life making Breckland an attractive, successful and vibrant place for residents, workers and visitors;* • *creates high quality, safe and sustainably designed buildings, places and streets; and*

Policy	Relevance to assessment
	• *maximises connectivity within and through a development and to the surrounding areas, including the provision of high quality and safe pedestrian and cycle routes*." Policy ENV 01 Green Infrastructure states the network of green infrastructure policies should be "safeguarded, retained and, where opportunities arise, enhanced". Policy ENV 02 Biodiversity protection and enhancement Policy ENV 05 Protection and Enhancement of the Landscape Considering the rural character of the district "*development proposals will be expected to contribute to and where possible enhance the local environment*". Proposals should take into account the Council's Landscape Character Assessment. Policy ENV 06 Trees, Hedgerows and Development notes "*trees and significant hedge and shrub masses form part of the green infrastructure network and should be retained*" where viable. Where trees and hedgerows are affected, mitigation measures should be put into place considering short term and long term impacts. Policy ENV 07 Designated Heritage Assets notes these assets will be "*conserved, or wherever possible enhanced*". Policy ENV 08 Non-Designated Heritage Assets Policy ENV 10 Renewable Energy Development notes the council supports proposals for new renewable energy development subject to its impact. Proposals will be considered having regard to the extent to which there are: i. adverse impacts on the local landscape, townscape or designated and non-designated heritage assets assessed in line with Policies ENV 05, ENV 07 and ENV 08 in the plan; ii. adverse effects on residential amenity by virtue of outlook/overbearing impact, traffic generation, noise, vibration, overshadowing, glare or any other associated detrimental emissions, during construction, operation and decommissioning; iii. an irreversible loss of the highest quality agricultural land; iv. cumulative impacts of renewable energy development on an area; and v. adverse impacts upon designated wildlife sites; nature conservation interests; and biodiversity, assessed in line with Policies ENV 02 and ENV 03 in the plan.

Policy	Relevance to assessment
	Regarding solar energy development, the "*effective use of land on previously developed and non-agricultural land*" is encouraged "*providing that it is not of high environmental value*". Where the proposal involves greenfield land, the council will have particular factors to consider. Solar Photovoltaic Farm Planning Considerations 5.85 As a rural District, Breckland is particularly suited to solar farms. The Government's solar Photovoltaic (PV) strategy was published in 2014. The aim is to create more financial certainty and investor confidence in order to realise the long term potential for solar PV in the UK at a large and small scale. There is no cap on capacity. It is the Government's ambition to see "*more ambitious deployment, perhaps approaching 20 Gigawatts (GW) early in the next decade*". The past four years has seen a growth in the delivery of such facilities and their associated energy production capacity, but as at June 2013, the capacity of PV was 2.4 GW, forecast to reach 10 GW by 2020. 5.86 Whilst large scale facilities provide an opportunity for greater energy production (as well as potential enhancement to biodiversity), it is also of importance that they are carefully planned and screened to ensure any amenity and visual impacts are minimised. The NPPF states that applicants for energy development should not have to demonstrate the overall need for renewable or low carbon energy and that applications should be approved if their impacts are (or can be made) acceptable. 5.87 The Governments' Planning Practice Guidance (PPG) on renewable and low carbon energy sets out a set of planning considerations at a national level to assess the impact of large scale ground-mounted solar photovoltaic farms. Development proposals should have regard to the PPG, in addition to this local policy on renewable energy in order to ensure the proposal is acceptable and can be supported by the Council. Key planning considerations include the quality of agricultural land, the visual and landscape impact, the effect on landscape of glint and glare and on neighbouring uses and aircraft safety, the impact of security infrastructure such as lights and fencing and the impact on the setting of heritage assets. 5.88 The Council will consider favourably opportunities for biodiversity enhancements around arrays, the potential for complete restoration of the land and appropriate mitigation such as landscape buffers (trees and hedgerows) where compatible in the context of the Council's Landscape Character Assessment and Settlement Fringe Study.

Policy	Relevance to assessment
	5.89 Whilst large scale ground-mounted PV solar farms developments can have a negative impact on the rural environment, particularly in undulating landscapes, the visual impact of a well-planned and well-screened solar farm can be properly addressed within the landscape if planned sensitively. All Renewable Energy Environmental Concerns 5.96 In relation to all renewable or low carbon energy development the Government's NPPG also states that: the need for renewable or low carbon energy does not automatically override environmental protections; cumulative impacts require particular attention, especially the increasing impact that large scale solar farms can have on landscape and local amenity as the number of solar arrays in an area increases; local topography is an important factor in assessing whether large scale solar farms could have a damaging effect on landscape and recognise that the impact can be as great in predominately flat landscapes as in hilly or mountainous areas; also, that great care should be taken to ensure heritage assets are conserved in a manner appropriate to their significance, including the impact of proposals on views important to their setting. Policy COM 02 Healthy lifestyles sets out policy to ensure appropriate steps to "*avoid/mitigate potential negative effects on the health of the population*" including "*safeguarding and enhancing green infrastructure*". Policy COM 1 – Design notes the design of new development should be designed to the highest possible standard, in particular "*preserves or enhances the special character of the historic environment, and complements the district's heritage assets, in accordance with policy ENV 07 and ENV 08*" criteria a, "*opportunities to introduce green urban design solutions are optimised*" criteria f, "*Preserves key and important views, as illustrated in the Breckland Historic Characterisation Study (2017)*" criteria I.
Saham Toney Neighbourhood Development Plan 2019 – 2036 [190] [190]	Policy 3A: Design P3A.2 Local context notes "*New development shall "Respond positively to, and where possible, reinforce and enhance the characteristic features of the local built environment*." P3A.6 Layout and landscaping notes "*Design and layout shall:* *a) Make use of opportunities to mitigate surface water flood risk by the incorporation of appropriate natural features;* *b) Wherever possible, increase the area of habitats that sequester and store carbon, including through an appropriate increase of tree cover;*

Policy	Relevance to assessment
	c) *Incorporate attractive and coherent boundary treatments which reflect or enhance the local vernacular;* d) *Where applicable, and where opportunities exist, contribute to the enhancement of Key Views*" Policy 3F: Climate Change Adaptation and Mitigation outlines the requirement for all developments to encourage and embed the principles of climate change adaptation and mitigation and provides supporting information on implementation. Policy 7A: Landscape Character Conservation and Enhancement P7A.3 "*The conservation and where possible enhancement of landscape shall be achieved by recognising, respecting and having due regard to the landscape features, landscape and visual sensitivity and characteristics of the character area*." Consideration of the principles set out section T7A.1 and if relevant T7A.3 Highlighting a Landscape and Visual Appraisal shall be undertaken. Policy 7B: Key Views P7B.1 "*Development proposals shall seek opportunities to preserve, incorporate and where possible enhance the Key Views listed below and shown on Policy Map 7B*" Policy 7D: Biodiversity and Habitats This policy recognises proposals likely to have an adverse impact upon areas of significant biodiversity importance should demonstrate appropriate mitigation. Policy 7E: Green Infrastructure notes "*every opportunity to conserve and where possible, enhance green infrastructure features of value and connectivity between them*" Policy 7F: Trees and Hedges "*trees, copses and woodlands of good arboricultural or amenity value shall not be removed as a result of development unless justified by an on site assessment*"
Swaffham Neighbourhood Plan 2016 -2036 [191]	Policy ENV2: Climate change notes "*Renewable energy developments, including wind and solar options, will be supported*" in the following instances. i. They avoid or adequately mitigate shadow flicker, noise and unacceptable adverse impacts on air traffic operations, radar and air traffic installations;

Policy	Relevance to assessment
	ii. They would not have an overshadowing or overbearing effect on properties in the surrounding area; and iii. They would not have a detrimental impact on the wider landscape setting of the town by virtue of their positioning, height or design either individually or in combination with other such development. Policy ENV4: Important public local views and vistas Recognises that "*Development proposals within or which would affect an important public local view and vista should ensure that they respect and take account of the view concerned*".
Watton Neighbourhood Plan 2021-2036 [192]	Policy WTN 3: Design Considerations notes "*Proposals for new development must reflect the local characteristics and circumstances in the Neighbourhood Plan Area, including those identified in the Watton Character Appraisal, and create and contribute to a high quality, safe and sustainable environment. They should also demonstrate regard to the National Design Guide (January 2021).*" "*In addition, proposals will only be supported where they:* *…* *iv. taking mitigation measures into account, do not affect adversely:* *a) any historic, architectural or archaeological heritage assets of the site and its surroundings; and* *b) important landscape characteristics including trees and ancient hedgerows and other prominent topographic features; and* c) *important views into, out of, or within the town;*"

14.2.4 Standards and guidance

Table 14-3 Standards and guidance

Standards and guidance	Relevance to assessment
An Approach to Landscape Character Assessment [193]	Informs the methodology for defining and describing the landscape character baseline.
Assessing landscape value outside national designations, Technical Guidance Note 02/21 [194]	Informs the methodology for assessing the value attached to the landscape and whether a landscape can be considered "valued landscape" in the context of NPPF paragraph 180(a).
Design Principles for National Infrastructure [195]	Informs the development of design principles.
Guidelines for Landscape and Visual Impact Assessment, 3rd edition [196]	Underpins the methodology for undertaking LVIAs.
Infrastructure, Technical Guidance Note 04/20 [197]	Background information for the planning and design process for infrastructure projects for landscape.

Standards and guidance	Relevance to assessment
Planning Practice Guidance (PPG), Natural Environment (Landscape) [198]	Sets out the benefits of landscape character assessments and the importance of considering Green Infrastructure in the early stages of schemes.
Planning Practice Guidance, Renewable and Low Carbon Energy [199]	Sets out that planning has an important role in the delivery of new renewable and low carbon energy infrastructure. The PPG identifies several LVIA considerations, including visual impact, mitigation through screening and glint and glare.
Townscape Character Assessment Technical Information Note 05/17 [200]	Sets out how the principles and general approach of landscape character assessment can be applied to townscape character assessment.
Visual Representation of Development Proposals, Technical Guidance Note 06/19 [201]	Informs the process for producing visualisations and photomontages.

14.3 Consultation

14.3.1.1 The Applicant will consult with relevant stakeholder regularly, to inform and seek to agree the scope, the receptors upon which the assessment will be based, the location of viewpoints and the methodology and proposed approach, including for photomontages. Consultees will include:

- Landscape officer at Norfolk County Council
- Landscape officer at Breckland Council

14.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to landscape and visual.

14.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

14.4 Study area

14.4.1.1 The study area for the LVIA is illustrated in Figure 14.1. The geographical extent of the study area proposed is sufficiently wide to enable the assessment of potentially significant landscape and visual effects, in accordance with GLVIA3 [196].

14.4.1.2 The first stage of defining the study area was informed by detailed desk study, including the preparation of a computer-generated Zone of Theoretical Visibility (ZTV). A ZTV is defined in GLVIA3 [196] as "*a map, usually digitally produced, showing areas of land within which, a development is theoretically visible*." ZTVs do not indicate how much of the Proposed Development will be visible. The purpose of the ZTV is to:

- Identify the theoretical extents of visibility of the Proposed Development, i.e. areas from which it would not be visible and areas from which it could potentially appear in existing views.
- Assist in the identification of the study area.
- Identify areas of landscape and visual receptors likely to be affected by the Proposed Development.
- Identify locations that are representative of the views experienced by visual receptors at different locations within the study area (representative viewpoints).
- Inform the design, including the extent and type of proposed mitigation.

14.4.1.3 Two ZTVs have been modelled using the 'Viewshed' tool in ESRI ArcGIS Pro GIS Software.

14.4.1.4 A bare earth ZTV was first prepared using digital terrain model (DTM) data with a resolution of 2m. This ZTV represents a worst-case scenario as it does not include features such as existing buildings or vegetation which can screen or filter views. It is based on the current maximum parameters of the proposed solar PV modules and assumes that they would be built out to their full extent and to a height of 3m above ground level The location of sub-stations has not been confirmed and these will be modelled into future iterations of the ZTV and presented in the ES.

14.4.1.5 A second ZTV was then prepared using a Digital Surface Model (DSM) with a resolution of 2m as the base. This includes surface features including buildings and vegetation. The DSM ZTV shows a reduced extent of visibility, particularly for views from the north-west and south-west of the study area where there is substantial woodland cover.

14.4.1.6 Review of the ZTVs has identified an initial area of search extending to approximately 5km. The results are illustrated in Figure 14.5 Zone of Theoretical Visibility (bare earth) and Figure 14.6 Zone of Theoretical Visibility (with screening), which shows areas from which the Proposed Development would theoretically be visible or not visible. An assumed viewing height of 1.7m above ground level has been used to simulate the eye level of a person at the top of the range set out in paragraph 6.11 of GLVIA3 [196] to represent the worst-case scenario.

14.4.1.7 Fieldwork was carried out in April 2024 to test the assumptions made through the detailed desk study. This identified further existing features including built development and vegetation, which limit potential landscape and visual interactions with the Proposed Development.

14.4.1.8 The detailed desk study and fieldwork carried out to date show that intervening landform, buildings and vegetation generally limit the extent of views to within 3km of the draft Order limits. The study area extends further to include views from Castle Acre to the north, approximately 3.5km from the draft Order limits. Beyond this distance, significant landscape and visual effects are not likely. This judgement is informed by an understanding of the wider landscape character and views and experience of working on similar solar farm projects.

14.4.1.9 The proposed study area for the LVIA is therefore 3km from the draft Order limits with a localised extension to 3.5km to include views at Castle Acre. The study area is shown on Figure 14.1.

14.4.1.10 The geographical extent of the study area is sufficiently wide to enable the assessment of potentially significant landscape and visual effects, in accordance with GLVIA3 [196]. The study area may be further refined as more detailed analysis is undertaken and following consultation with local planning authorities (LPAs) and other relevant stakeholders. The justification for its final extent will be set out in the ES.

14.5 Baseline conditions

14.5.1 Desktop sources used

14.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area for LVIA:

- Ordnance Survey mapping [202] and aerial imagery [203]
- LiDAR Digital Terrain Map (DTM) – 2m resolution [204]
- LiDAR Digital Surface Model (DSM) – 2m resolution [205]
- National Character Areas [206]
- East of England Landscape Framework [207]
- Brecks and Fen Edge Historic Landscape Characterisation (Draft) [208]
- Breckland District Landscape Character Assessment [209]
- King's Lynn and West Norfolk Borough Landscape Character Assessment [210]

14.5.2 Surveys undertaken and proposed

14.5.2.1 An initial site walkover in April 2024 was carried out to appraise the local landscape character and determine the extent of views. This fieldwork also assisted in identifying landscape and visual receptors which could potentially be impacted by the Proposed Development.

14.5.2.2 Initial fieldwork was undertaken based on the draft Order Limits and Panel Areas. The location of a 400kV substation and accompanying transmission tower and 132kV substations, which would be located somewhere within the draft Order Limits has not been confirmed. ZTVs will be re-run for these elements along with further fieldwork to inform any necessary extension to the study area and the selection of landscape and visual receptors and representative viewpoints.

14.5.2.3 Further fieldwork will be undertaken to inform the EIA. This will cover winter and summer seasons. Fixed-point photography will be captured for each viewpoint and measured surveys will be carried out for viewpoints where photomontages are proposed.

14.5.2.4 The LVIA will also be informed by arboricultural surveys, which will record the extent, type and condition of trees within and surrounding the draft Order Limits. The results of these surveys, along with habitat surveys, including hedgerow surveys, will inform an assessment of landscape features and the mitigation and enhancement measures embedded in the design.

14.5.3 Existing baseline

Site context

14.5.3.1 The study area is generally rural and comprises undulating agricultural landscape ranging from 15m AOD to 95m AOD. The draft Order Limits lie principally between the settlements of Swaffham and Dereham. The valley of the River Nar creates steeper sloping topography towards the north of the study area. Panel Areas are dissected by a number of major roads and routes, including the busy A47 trunk road, which cuts across the study area from west to east and the A1065 which runs north to south through the centre of Swaffham. Numerous minor roads cross the rural landscape, connecting small villages, hamlets and individual properties. Hedgerows and scattered trees form field boundaries between generally large-scale fields and smaller scale fields are generally located at the fringes of settlements. Pylons carrying 400kV power lines cut across the study area from South Acre in the west to Westfield in the east. The west of the study area is well connected by Public Rights of Way (PRoW) routes around Swaffham, Drymere and South Acre which includes the Peddars Way and Norfolk Coast National Trail. The Nar Valley Way long distance trail runs east to west to the north of the study area. The east of the study area has limited number of PRoW routes.

Landscape designations

14.5.3.2 The location of the Proposed Development has been selected to intentionally avoid designated landscapes, in accordance with NPS EN-1 section 5.10.

14.5.3.3 There are no statutory landscape designations (i.e. National Parks or National Landscapes) within the draft Order Limits or study area. The Norfolk Coast National Landscape is located approximately 25km north of the draft Order Limits and the Broads National Park is located approximately 25km to the east. Due to the distance and intervening features, there are unlikely to be any impacts on these designated landscapes and an assessment of is therefore **scoped out** of the LVIA.

14.5.3.4 There are no local landscape designations within the study area. This does not discount the potential for parts of the landscape to be considered 'valued landscape' in the context of NPPF paragraph 180, and this is addressed further in section 14.9 of this chapter.

Other relevant designations

14.5.3.5 Other relevant designations within the study area are listed in Table 14-4. Ecological, heritage and policy designations are included because of their contribution to landscape character and visual amenity, in particular their contribution to landscape value. Further detail regarding these designations is

provided in Chapter Biodiversity and Chapter 9 Cultural heritage of this EIA Scoping Report.

Table 14-4 Other Designations

Other designations and key landscape features within the study area	Direction and approximate nearest distance from the draft Order Limits t
Registered Common Land: Potters Fen, The Fen and Wells Green	Potters Fen is located approximately 1.8km to the east. The Fen is located approximately 1.7km to the east. Wells Green is located approximately 2km to the north.
Land dedicated as 'access land' under the Countryside and Rights of Way Act, 2000, to the west of Swaffham	Area of woodland plantation approximately 2km to the east of Swaffham.
Registered Parks and Gardens: Narford Hall and Pickenham Hall.	Narford Hall is located to the north-west, approximately 1.6km from the draft Order Limits. Pickenham Hall is located to the south-west, approximately 3km from the draft Order Limits.
Scheduled Monuments including, '1015870' - Castle Acre Priory, '1017909' - Castle Acre Castle, town defences and Bailey Gate, '1002894' - Deserted medieval village, Great Palgrave, '1002892' Site of Panworth Hall, medieval settlement and '1003964' - Wendling Abbey and '1003965' Roman enclosure 3/4 mile (1210m) NE of Panworth Hall.	Castle Acre Priory and Castle Acre Castle, town defences and Bailey Gate are located to the north, approximately 3km from the draft Order Limits. Deserted medieval village, Great Palgrave is located to the north, directly adjacent the draft Order Limits. Site of Panworth Hall and medieval settlement is located to the south-west, approximately 300m from the draft Order Limits. Wendling Abbey is located to the north-east, approximately 300m from the draft Order Limits. Roman enclosure 3/4 mile (1210m) NE of Panworth Hall is located within the draft Order Limits to the south.
Conservation Areas	Conservation areas within the study area are located within the following settlements: Swaffham, Necton, Castle Acre, South Acre, Little Dunham, Shipdham, Dereham, Watton. There are no conservation areas located within the draft Order Limits.
Listed Buildings, including, Canister Hall, Dunham Lodge, Castle Acre Castle, Little Palgrave Hall, Bradehnam Hall, The Old Hall	Canister Hall and Dunahm Lodge are located in Little Dunham, approximately 1.4km from the draft Order Limits. Castle Acre Castle is located to the north, approximately 3km from the draft Order Limits. Little Palgrave is located to the north, approximately 1.5km from the draft Order Limits. Bradenham Hall is located centrally, approximately 600m from the draft Order Limits. The Old Hall is located at Little Fransham approximately 800m from the draft Order Limits.
SSSI sites including Breckland Forest, River Nar and Honeypot Wood	Breckland Forest SSSI is located directly adjacent the draft Order Limits to the west of Swaffham. The River Nar SSSI is located to the north, approximately 4.2km from the draft Order Limits. Honeypot Wood SSSI is located to the north-east approximately 820m from the draft Order Limits.
Breckland Special Protection Area (SPA)	Breckland SPA is located directly adjacent the draft Order Limits to the west of Swaffham.
Norfolk Valley Fens Special Area of Conservation (SAC)	Norfolk Valley Fens SAC is located approximately 1.7km from the draft Order Limits.

Other designations and key landscape features within the study area	Direction and approximate nearest distance from the draft Order Limits t
Semi-natural ancient woodland sites including High Grove, Necton Wood and Honeypot Wood	High Grove Wood is located to the south-west, directly adjacent the draft Order Limits. Necton Wood is located centrally, directly adjacent to the draft Order Limits. Honeypot Wood is located to the north-east approximately 820m from the draft Order Limits.
Peddars Way and Norfolk Coast Path National Trail	Intersects the Central Panel Area, connecting Castle Acre and North Pickenham.
Nar Valley Way long distance trail	The Nar Valley Way intersects the study area at Castle Acre and runs east to west along the River Nar valley.
National Cycle Network (NCN) Route 13	Route 13 of the NCN intersect the study area in the east and south connecting the settlements of Dereham and Bradenham.

Landscape character

14.5.3.6 GLVIA3 [196] defines landscape receptors as" *aspects of the landscape resource that have the potential to be affected by a proposal*" . Landscape receptors have been identified via a review of published landscape character assessments, maps and aerial photography, relevant planning policy and fieldwork surveys.

14.5.3.7 Landscape character is defined by GLVIA3 [196] as "*a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse*."

14.5.3.8 Published landscape character assessments at the national, regional and local level have been reviewed to identify Landscape Character Types (LCT) and LCA. These are mapped in Figure 14.3.

14.5.3.9 The geographical extent of LCAs in published assessments at the national level are generally large and extend beyond the study area. As explained in paragraph 5.14 of GLVIA3 [196],"*broad-scale assessments at national or regional level can be helpful in setting the landscape context, but are unlikely to be helpful on their own as the basis for LVIA*". The majority of the draft Order Limits fall within NCA 84: Mid-Norfolk and effects on this receptor will be assessed in the ES because of the proportion of the area which would be affected.

14.5.3.10 The LCAs that will be referred to in the LVIA are listed in Table 14-5. The LVIA will assess the impacts on the landscape at the national, district and local scale to provide an understanding of the geographical extent of effects. Other LCAs defined at the national and regional scale will be included to provide context but effects on these receptors will not be assessed. The baseline landscape character will be mapped and described in detail in the ES, with reference to the published landscape character areas.

Table 14-5 Published landscape character assessments and relevant landscape character areas

Landscape character assessment	Relevant character areas	Approximate distance from the draft Order Limits
National – Natural England NCA profiles	NCA 84: Mid Norfolk NCA 85: The Brecks	Within the draft Order limits
	NCA 76: North West Norfolk	Within the study area
Regional	At a regional scale, the East of England Landscape Framework identifies Landscape Types. There is no landscape character assessment at the county scale for Norfolk.	
Local – Breckland District Landscape Character Assessment	LCA B5: River Wissey Tributary Farmland LCA B6: River Wensum and Tud Tributary Farmland LCA D1: Swaffham Heath LCA E5: Central Breckland Plateau LCA E7: Beeston Plateau	Within the draft Order Limits
	LCA A3: River Wissey LCA A4: River Wensum and Blackwater LCA B4: River Blackwater Tributary Farmland LCA B7: River Nar Tributary Farmland LCA D2: Stanta Heath LCA E4: Wayland Plateau LCA E8: Dereham Plateau LCA F1: River Nar Valley	Within the study area
Local - King's Lynn and West Norfolk Borough Council Landscape Character Assessment	LCA E2: Saddlebow and Wormegay LCA H2: Fincham	Within the study area

Local Landscape Character

14.5.3.11 The review of published landscape character assessments has identified that these are generally dated, having been published in 2007, and the LCAs defined do not allow for a nuanced assessment of landscape effects at the local level. There are gaps in existing information relating to urban areas on the edge of the study area. Therefore, Local Landscape Character Areas (LLCA) have also been defined via desk study and fieldwork to provide full coverage of the study area.

14.5.3.12 A total of 27 LLCA have been defined. These LLCA, which are shown in Figure 14.4, are intended to provide an additional level of detail to the published studies set out above and a consistent scale against which to assess the effects of the Proposed Development.

Landscape features

14.5.3.13 Key landscape features which contribute to the character and value attached to the landscape include existing field boundaries and other vegetation within the draft Order Limits, including hedgerows, trees and woodland, which may be directly affected by the Proposed Development. The LVIA will describe the patterns of landcover with reference to the Arboricultural Impact Assessment and habitat surveys included in the ES.

Views and visual amenity

14.5.3.14 Preliminary ZTVs are shown in Figure 14.5 and 14.6. These have been prepared to inform this EIA Scoping Report, based on the design information currently available. As certain features of the Proposed Development are unknown at this stage, such as the location of ancillary buildings and structures, these have not been included in the ZTV. Further ZTVs will be produced to support the ES.

14.5.3.15 The preliminary ZTV gives an indication of the potential visibility of the proposed current maximum parameters of the proposed Panel Areas. This assumes that they would be built out to their full extent and to a height of 3m above ground level to represent a worse-case scenario. The location of 132kV substations and a 400kV substation and accompanying transmission tower has not been confirmed and these will be modelled into future iterations of the ZTV and presented in the ES. This indicates that the Proposed Development is likely to be most visible within approximate 1km of each Panel Area with longer distance views generally restricted by landform and land cover such as hedgerows, woodland and built form. Views from roads such as A1065, A17 and A47 have been identified as well as views from rural lanes across the study area, these are generally limited to glimpsed views due to gaps in hedgerows, though some locations have been identified where large sections of road have no roadside vegetation.

14.5.3.16 There are several villages and isolated properties within the study area where there are potential views of the Proposed Development. These include Great Palgrave, Sporle, Saham Hills, High Green, Daffy Green, Scarning, Ashill and Wendling. There are also several footpaths traversing the landscape, particularly to the west of the study area around Swaffham and Drymere. PRoW include parts of Peddars Way and Norfolk Coast National Trail. The Nar Valley Way long distance trail is located to the north of the study area with potential views towards the draft Order Limits from Castle Acre.

Visual receptor groups

14.5.3.17 Visual receptors are defined in GLVIA3 as "*individuals and/or defined groups of people who have the potential to be affected by a proposal*". This includes, for example, residents, users of PRoW and motorists.

14.5.3.18 Visual receptors likely to experience views of the Proposed Development have been identified through interrogation of the preliminary ZTVs, desktop analysis of maps and Google Earth, and fieldwork surveys. Where a collection of visual receptors in the same category are likely to experience similar views, they have been grouped. These are set out in Table 14-6 below.

Table 14-6 Visual receptors

Receptor type	Receptor or receptor group
Residents	Residents of properties at Castle Acre.
Residents	Residents of Priory Close, Sporle.
Residents	Residents of High Green Farm
Residents	Residents of Home Farm
Residents	Residents of properties on eastern side of Beeston Road.
Residents	Residents of properties on western side of Beeston Road.
Residents	Residents of Willow Farm
Residents	Residents of properties along Dereham Road.
Residents	Residents of properties along Hulver Street
Residents	Residents of High House Farm.
Residents	Residents of Little Flint.
Residents	Residents of properties along Brandenham Lane.
Residents	Residents of Park Farm.
Residents	Residents of properties on Park Lane.
Residents	Residents of properties on northern side of Shipdham Lane.
Residents	Residents of properties along Shipdham Lane.
Residents	Residents of properties along Herne Lane.
Residents	Residents of Leys Farm.
Residents	Residents of Comar Cottage.
Residents	Residents of properties along Comar Lane.
Residents	Residents of properties on eastern side of Bradenham Road.
Residents	Residents of properties at High Green.
Residents	Residents of Grounds Cottage.
Residents	Residents of Cutbush Farm.

Receptor type	Receptor or receptor group
Residents	Residents within property to east of Cutbush Farm.
Residents	Residents of properties along Hills Road.
Residents	Residents of properties at northern edge of Swaffham.
Residents	Residents of properties along Palgrave Road.
Residents	Residents of properties at Little Dunham.
Residents	Residents of properties along Pages Lane.
Residents	Residents of properties at Bradenham.
Residents	Residents of properties at western edge of Shipdham.
Residents	Residents of Broadway Farm.
Residents	Residents at Boundary Farm Cottages.
Residents	Residents at Boundary Farm House.
Residents	Residents of properties along Hale Road.
Residents	Residents at properties to the south of Dereham.
Residents	Residents of properties along New Sporle Lane.
Residents	Residents of properties to the north of Sporle.
Residents	Residents of properties at Little Fransham.
Residents	Residents of properties at Ivy Todd.
Residents	Residents of properties at West End.
Motorists	People travelling along Swaffham Road.
Motorists	People traveling along the A1065.
Motorists	People travelling along the A17.
Motorists	People travelling along Beeston Road.
Motorists	People travelling along the A47.
Motorists	People travelling along Love Lane.
Motorists	People travelling along Dereham Road.
Motorists	People travelling along Hulver Street
Motorists	People travelling along Crown Lane.
Motorists	People travelling along Bradenham Lane.
Motorists	People travelling along Shipdham Lane.

Receptor type	Receptor or receptor group
Motorists	People travelling along Watery Lane.
Motorists	People travelling along the rural lane at High Green.
Motorists	People travelling along the rural lane at Southend.
Motorists	People travelling along Wood Lane.
Motorists	People travelling along Watton Road.
Motorists	People travelling along Hale Road.
Motorists	People travelling along Watton Road and Pages Lane.
Motorists	People travelling along Hills Road.
Motorists	People travelling along the road connecting Swan Lane and Shipdham Lane.
Motorists	People travelling along Watery Lane.
Motorists	People traveling along Bradenham Lane.
Motorists	Residents of properties at Dereham.
Motorists	People travelling along Swaffham Road.
Motorists	People travelling along Dunham Road.
Motorists	People travelling along New Sporle Lane.
Recreational users	People travelling along the Peddars Way and Norfolk Coast Path National Trail, which is a promoted route.
Recreational users	People travelling along National Cycle Network Route 13, which is a promoted route.
Recreational users	People travelling along the Nar Valley Way, which is a promoted route.
Recreational users	People travelling along PRoW Beachamwell BR2 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Sporle with Palgrave BR5 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Swaffham RB55 and the wider PRoW network, which are not promoted routes.
Recreational users	Visitors to Castle Acre Castle and Bailey Gate.
Recreational users	Visitors to Castle Priory, Castle Acre.
Recreational users	People travelling along PRoW Sporle with Palgrave BR9 and the wider PRoW network, which are not promoted routes.

Receptor type	Receptor or receptor group
Recreational users	People travelling along PRoW Scarning BOAT8 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Shipdham FP1 and the wider PRoW network, which are not promoted routes.
Recreational users	Users of Ashill Common.
Recreational users	People travelling along permissive footpath between Dunnets Close and Ashill RB11, which are not promoted routes.
Recreational users	People travelling along PRoW Ashill RB11 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Ashill FP7 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Swaffham RB36 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Sporle with Palgrave BR4 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Swaffham RB38b and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Little Dunham FP2 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along Narborough RB9 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Sporle with Palgrave BR2 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Swaffham RB53 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Saham Toney RB1 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Shipdham FP17 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Wendling FP2 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Scarning FP5 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Newton by Castle Acre RB and the wider PRoW network, which are not promoted routes.
Recreational users	Users of Wells Green common land.

Receptor type	Receptor or receptor group
Recreational users	People travelling along Sporle with Palgrave BR8 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along Sporle with Palgrave BR9 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Fransham RB7 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Beachamwell BR3 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Little Dunham FP4 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Dereham FP14 and the wider PRoW network, which are not promoted routes.
Recreational users	Users of Potters Fen common land.
Recreational users	People travelling along PRoW Wendling FP1 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Fransham RB7 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Swaffham RB2 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along Swaffham RB15 and the wider PRoW network, which are not promoted routes.
Recreational users	People travelling along PRoW Little Dunham FP2 and the wider PRoW network, which are not promoted routes.

Viewpoints

14.5.3.19 Representative viewpoints will be used to assist in describing the baseline view and the effects likely to be experienced by visual receptor groups. These viewpoints have been selected on the basis that they cover a range of viewing distances, elevations and orientations from locations in the study area with different viewing experiences of the Proposed Development, the Applicant will seek to agree viewpoints with the local planning authority through the EIA process. In some cases, a viewpoint may therefore be representative of more than one visual receptor group. These viewpoints are set out in Table 14-7 and are shown in Figure 14.5 and 14.6. The selection of representative viewpoints has been informed by the following criteria:

- Accessibility to the public
- Number and sensitivity of people whose views could be affected
- Viewing direction, distance, openness and elevation

- Nature of the viewing experience

Table 14-7 Proposed viewpoints

No.	Viewpoint location	Description	Visual receptors
1	Swaffham Road	Views, through gaps in roadside hedgerows, across agricultural land in the Western Panel Area.	People travelling on Swaffham Road.
2	Beachamwell BR2	Northern extent of the PRoW, where it passes through the Western Panel Area.	People travelling along PRoW Beachamwell BR2.
3	A1065	Views, through gaps in roadside hedgerows, across agricultural land identified the Western Panel Area.	People traveling on the A1065. People travelling along the Peddars Way and Norfolk Coast Path National Trail.
4	Sporle with Palgrave BR5	Central location along the PRoW, where it passes through the Central Panel Area.	People travelling along PRoW Sporle with Palgrave BR5.
5	Swaffham RB55	Central location along the PRoW, where it passes through the Central Panel Area.	People travelling along PRoW Swaffham RB55. People travelling along the Peddars Way and Norfolk Coast Path National Trail.
6	Castle Acre	Distant views to the south towards the Central Panel Area from Castle Acre, including the Castle and Bailey Gate and Castle Priory.	Visitors to Castle and Bailey Gate and Castle Priory. Residents of Castle Acre. People travelling along the Peddars Way and Norfolk Coast Path National Trail. People travelling along the Nar Valley Way long distance trail.
7	Sporle	Views from properties along Priory Close, which back onto agricultural land adjacent to the Central Panel Area.	Residents along Priory Close, Sporle.
8	A17	Views through gaps in roadside hedgerows, across agricultural land identified in the Central Panel Area.	People travelling along the A17.
9	Sporle with Palgrave BR9	Views into the Central Panel Area from the eastern end of the PRoW where it joins with North Pickenham Road.	People travelling along PRoW Sporle with Palgrave BR8 and PRoW Sporle with Palgrave BR9..
10	Beeston Road	Views through gaps in roadside hedgerows, across agricultural land in the Northern Panel Area. High Green Farm is located to the north of the Northern Panel Area, surrounded	Residents of High Green Farm and users of PRoW Wendling FP1.

No.	Viewpoint location	Description	Visual receptors
		by vegetation but with potential for views from the access track.	
11	Beeston Road (adjacent Home Farm)	Views into the Northern Panel Area from properties on the eastern and western side of Beeston Road.	Residents of Home Farm and properties on eastern and western side of Beeston Road. People travelling along Beeston Road.
12	A47	Open views into the Northern Panel Area and potential for glimpsed views.	People travelling on the A47.
13	Love Lane / Access to Willow Farm	Open views across agricultural land withinthe Northern Panel Area. Willow Farm is located south of the Northern Panel Area with mature trees along its northern boundary.	Residents of Willow Farm and people travelling along Love Lane.
14	Dereham Road	Open view from Dereham Road and properties across the Northern Panel Area.	Residents of properties along Dereham Road and people travelling along Dereham Road.
15	Hulver Street	The majority of properties along Hulver Street have well vegetated boundaries forming a buffer the Northern Panel Area. Some properties have low boundaries with potential for views of development in parcels the Northern Panel Area. Glimpsed views of agricultural land within the Northern Panel Area, through gaps in roadside hedgerows.	Residents of properties along Hulver Street and people travelling along Hulver Street.
16	Swaffham RB2	Views to the east across agricultural land and West Acre Road towards the Central Panel Area.	People travelling along PRoW Swaffham RB2.
17	Crown Lane / Fransham RB7	The PRoW has view across agricultural land to the south towards parcels the Northern Panel Area. Gaps in hedgerows along Corwn Lane provide glimpsed views into agricultural land towards the Northern Panel Area.	People travelling along Crown Lane and People travelling along Fransham RB7.
18	Crown Lane at Little Flint	Little Flint is surrounded by mature vegetation and trees with potential views across the Northern Panel Area. Majority Crown Lane has mature roadside hedgerows screening views into adjacent agricultural land.	Residents of Little Flint. People travelling along Crown Lane.

No.	Viewpoint location	Description	Visual receptors
19	New Sporle Lane	Open views from properties on New Sporle lane to the north-east towards the Central Panel Area.	Residents of properties along New Sporle Lane. People travelling along New Sporle Lane.
20	Bradenham Lane	Bradenham Lane runs the Eastern Panel Area with a hedgerow along its southern boundary and intermittent trees along its northern boundary providing open views to north.	People travelling along Bradenham Lane.
21	Shipdham Lane adjacent High Property Farm	High Property Farm is located on elevated land adjacent to the Eastern Panel Area but has well vegetated boundaries. Shipdham Lane runs alongside the Eastern Panel Area with no roadside vegetation providing open views across agricultural land.	Residents of High Property Farm and people travelling along Shipdham Lane.
22	Shipdham Lane adjacent Leys Farm	Large sections of Shipdham Lane have no roadside vegetation to the north providing open views across the Eastern Panel Area.	People travelling along Shipdham Lane.
23	Bradenham Lane adjacent White Property Farm	Bradenham Lane has intermittent trees along its western boundary affording views the Eastern Panel Area. There are also views from properties along the lane including White Property Farm and to the north with views across the Eastern Panel Area.	People travelling along Bradenham Lane and Residents of properties along Brandenham Lane.
24	Park Lane at Park Farm	Park Lane is located on elevated land north of the Eastern Panel Area. The property is adjacent woodland, and the topography rises immediately to the south before falling into the sites.	Residents of Park Farm.
25	Park Lane / The Watlings	Properties along Park Lane have views to the south across part of the Eastern Panel Area.	Residents of properties on Park Lane.
26	Scarning BOAT8	The PRoW has mature vegetation alongside its western boundary which abuts the Eastern Panel Area.	People travelling along PRoW Scarning BOAT8
27	Bear's Lane / Swaffham RB15	Potential views to the north-east towards parcels the Central Panel Area.	People travelling along Swaffham RB15.

No.	Viewpoint location	Description	Visual receptors
28	Shipdham Lane adjacent Juby's Farm	Views across agricultural land towards the Eastern Panel Area to the north through gaps in hedgerows along Shipdham Lane and from properties on its northern side.	Residents of properties on northern side of Shipdham Lane and people travelling along Shipdham Lane.
29	Shipdham Lane / Watery Lane	Watery Lane and Shipdham Lane run alongside the Eastern Panel Area which sits on elevated land.	People travelling along Shipdham Lane and Watery Lane. People travelling along National Cycle Network Route 13.
30	Shipdham Lane	Properties along Shipdham Lane have surrounding mature vegetation. However, properties are directly adjacent to the Eastern Panel Area.	Residents of properties along Shipdham Lane.
31	Shipdham FP1	The PRoW runs along Herne Lane before emerging in open agricultural land. Views from adjacent properties across agricultural land within the Eastern Panel Area to the north.	People travelling along PRoW Shipdham FP1 and Residents of properties along Herne Lane.
32	Comar Lane adjacent Leys Farm	Views from the Property at Leys Farm across open agricultural land to the south-west, to the Southern Panel Area.	Residents of Leys Farm.
33	Comar Lane at Comar Cottage	Views from Properties across agricultural land to the north in the Southern Panel Area.	Residents of Comar Cottage and properties along Comar Lane. Residents of properties at Bradenham.
34	Bradenham Road	Views to the south-west from properties on the eastern side of Bradenham Road across open agricultural land. Bradenham Road has long sections with no roadside hedgerow affording open views. Both road users and residents have views towards the Southern Panel Area.	Residents of properties on eastern side of Bradenham Road and people travelling along Bradenham Road.
35	High Green	Potential for views across agricultural land. A long section of the lane has no roadside hedgerow and therefore there are open views across agricultural land including the Southern Panel Area.	Residents of properties at High Green and people travelling along the rural lane.
36	Southend	Rural Lane providing access to properties at Southend. Properties are located close to the Southern Panel Area.	People travelling along the rural lane.

No.	Viewpoint location	Description	Visual receptors
37	Hale Road / Lower Road	Views from the property located on Wood Lane directly adjacent to the Southern Panel Area.	Residents of Grounds Cottage and people travelling along Wood Lane. Residents of properties along Hale Road. People travelling along Hale Road.
38	Ashill Common	Ashill Common is used as public space but is not formally designated. Open views across agricultural land are available to the north across the Southern Panel Area.	People travelling along the permissive footpath between Dunnets Close and Ashill RB11 and users of Ashill Common.
39	Southacre Road / Sporle Road	Potential views south towards the Central Panel Area.	Residents of properties to the north of Sporle.
40	Farm east of Cutbush Farm	Views from the property located within the Southern Panel Area.	Residents of Cutbush Farm. Residents ofproperty to east of Cutbush Farm.
41	Ashill RB11	There are mature hedgerows along both sides of the PRoW and where it joins a rural lane connecting to Dunnets Close to the west. The PRoW terminates at the Southern Panel Area.	People travelling along PRoW Ashill RB11.
42	Ashill FP7	Open views from the PRoW where it crosses agricultural land with views into adjacent fields. Part of the Southern Panel Area is located to the south.	People travelling along PRoW Ashill FP7.
43	Hills Road	Views from properties along Hills Road which back onto agricultural land across the Southern Panel Area.	Residents of properties along Hills Road.
44	Watton Road	There are mature hedgerows along the eastern boundary, however gaps in hedgerows afford glimpsed views across part of the Southern Panel Area.	People travelling along Watton Road.
45	Swaffham RB36	The PRoW runs across agricultural land to the north of Swaffham. Part of the Central Panel Area is located north of the viewpoint beyond the A47.	People travelling along PRoW Swaffham RB36. Residents of properties at northern edge of Swaffham.
46	Palgrave Road / Sporle with Palgrave BR4	The PRoW follows Palgrave Road, most of which is lined with mature hedgerows. Properties on Palgrave	People travelling along PRoW Sporle with Palgrave BR4 and residents of properties along Palgrave Road.

No.	Viewpoint location	Description	Visual receptors
		Road back onto the Central Panel Area.	People travelling along the Peddars Way and Norfolk Coast Path National Trail. People travelling along the Peddars Way Long Distance Footpath.
47	Swaffham RB38b	Open views from the PRoW across the Central Panel Area.	People travelling along PRoW Swaffham RB38b.
48	Little Dunham / Little Dunham FP2	The PRoW is located at the edge of Little Dunham with views across agricultural land to the south towards the Central Panel Area, around 800m away.	People travelling along PRoW Little Dunham FP2 and residents of properties at Little Dunham.
49	Hale Road	Spaced tree planting along road provides views to the east towards the Southern Panel Area.	People travelling along Hale Road.
50	Narborough RB9 / Chalk Lane	The PRoW provides views to the south across a wooded landscape towards the Western Panel Area.	People travelling along PRoW Narborough RB9.
51	Sporle with Palgrave BR2	The PRoW provides views to the south across a wooded landscape towards the Central Panel Area.	People travelling along PRoW Sporle with Palgrave BR2.
52	Swaffham RB53	The PRoW provides a longer distance view to the north-east at North Pickenham Road. Views towards the Central Panel Area.	People travelling along PRoW Swaffham RB53.
53	Watton Road / Pages Lane junctions	Views across agricultural land from the road and potential views for properties along Pages Lane towards the Southern Panel Area.	People travelling along Watton Road and Pages Lane. Residents of properties along Pages Lane.
54	Hills Road	Views across agricultural land to the north-east from Hills Road, towards the Southern Panel Area.	People travelling along Hills Road.
55	Saham Toney RB1	Views across agricultural land to the north, towards the Southern Panel Area.	People travelling along PRoW Saham Toney RB1.
56	Hale Road	Views to the south from Hale Road, towards the Southern Panel Area and properties at Bradenham with potential views.	People travelling along Hale Road and residents of properties at Bradenham.
57	Shipdham FP17	Views to the north from the PRoW and residents of adjacent properties	People travelling along PRoW Shipdham FP17 and residents of

No.	Viewpoint location	Description	Visual receptors
		have potential views to the north towards the Southern Panel Area.	properties at western edge of Shipdham.
58	Road connecting Swan Lae and Shipdham Lane	The road has views across agricultural land to the west towards the Southern Panel Area.	People travelling along the road connecting Swan Lane and Shipdham Lane.
59	Watery Lane adjacent Broadway Farm	The road has views to the south-west across agricultural land towards the Eastern Panel Area. The farm also has potential views towards the Southern Panel Area.	People travelling along Watery Lane and residents of Broadway Farm.
60	Bradenham Lane	Views to the west across agricultural land towards the Northern Panel Area.	People traveling along Bradenham Lane.
61	Wendling FP2	Views to the west from the PRoW towards the Northern Panel Area.	People travelling along PRoW Wendling FP2.
62	Scarning FP5	Views to the south-west from the PRoW and potential views from properties at edge of Dereham, towards the Eastern Panel Area	People travelling along PRoW Scarning FP5 and residents of properties at Dereham.
63	Wells Green / Newton by Castle Acre RB7	Views to the south from the common land and PRoW towards the Central Panel Area.	People travelling along PRoW Newton by Castle Acre RB7 and users of Wells Green common land.
64	Swaffham Road	Views to the north-east from Swaffham road towards the Western Panel Area.	People travelling along Swaffham Road.
65	Sporle with Palgrave BR8	Views to the north-east from the PRoW towards the Central Panel Area.	People travelling along Sporle with Palgrave BR8.
66	Dunham Road adjacent Boundary Farm Cottages.	Views to the west across agricultural land towards the Central Panel Area.	Residents at Boundary Farm Cottages and Boundary Farm House. People travelling along Dunham Road.
67	Herne Lane south of Dereham	Residents of properties to the south of Dereham and PRoW network have potential views south-west towards the Eastern Panel Area.	Residents at properties to the south of Dereham. People travelling along PRoW Shipdham FP1.
68	Beachamwell BR3	Views to the east from the PRoW towards the Western Panel Area. A gap in woodland plantation provides potential views.	People travelling along PRoW Beachamwell BR3.

No.	Viewpoint location	Description	Visual receptors
69	Little Dunham FP4 adjacent Dunham Lodge	Views to the south-west from the PRoW towards the Central Panel Area.	People travelling along PRoW Little Dunham FP4.
70	Potters Fen / Dereham FP14	Views to the south-west towards the Eastern Panel Area.	People travelling along PRoW Dereham FP14 and users of Potters Fen common land.
71	Little Dunham FP2	Views to the south towards the Central Panel Area.	People travelling along PRoW Little Dunham FP2.
72	Little Fransham along A47	Potential views south from Little Fransham towards the Northern Panel Area.	Residents of properties at Little Fransham. People travelling along the A47.
73	Ivy Todd / West End	Potential views to the north-east towards the Northern Panel Area.	Residents of properties at Ivy Todd. Residents of properties at West End.

Visual representations

14.5.3.20 Photographs taken during fieldwork surveys will be provided in the ES to help demonstrate the nature of baseline views including the extent of existing screening. These photographs will be presented as 'Type 1 annotated photographs'[2], as defined in Landscape Institute TGN 06/19 [201].

14.5.3.21 'Type 4 photomontages'[3] will also be provided from a selection of viewpoints to illustrate the likely extent and nature of changes in baseline views in winter (year 1 of operation, worst-case) and summer (year 15 of operation, residual effects following the establishment of proposed planting). All photographs and photomontages will be prepared in accordance with Landscape Institute TGN 06/19: Visual representation of development proposals [201].

14.5.3.22 Viewpoints 2, 6, 7, 13, 16, 21, 25, 29, 33, 34, 38, 45 and 46 are proposed for the production of photomontages across the study area. These viewpoints cover a range of receptors and parts of the Proposed Development where significant effects are likely. The Applicant will seek to agree these viewpoints with relevant local authorities.

[2] Annotated Viewpoint Photograph: Reproduced at a size which aids clear understanding of the view and context, these simply show the extent of the site within the view, and annotate any key features within the view. Type 1 is the most basic form of visual representation with a focus on the baseline information. Landscape Institute TGN 06/19: Visual representation of development proposals [19]

[3] Photomontage / Photowire (survey / scale verifiable): Type 4 photomontages and / or photowires require the use of equipment and processes which provide quantifiable verification data, such that they may be checked for accuracy. Type 4 visualisations represent the highest level of accuracy and verifiability for use in the most demanding of situations. Landscape Institute TGN 06/19: Visual representation of development proposals [19]

Future baseline

14.5.3.23 The future baseline will include committed developments of a similar type and scale to the Proposed Development that will be delivered prior to commencement of construction.

14.5.3.24 If changes are identified within the Climate Change chapter of the ES that could alter the character of the landscape prior to commencement of construction, these changes will be considered in the future baseline. The LVIA chapter will cross-reference the Climate Change chapter providing a summary of the anticipated changes.

14.6 Potential impacts

14.6.1.1 The Proposed Development has the potential to affect landscape and visual receptors during construction, in operation and during decommissioning.

14.6.2 Construction

14.6.2.1 The assessment of landscape and visual construction effects will identify and assess the temporary impacts which arise because of activities and elements that are unique to the construction phase. Sources of temporary construction impacts (the construction activities and processes) on landscape and visual receptors include:

- Disturbance of natural landform through excavation and temporary storage of soils.
- Temporary loss of vegetation where replanting and regrowth would be anticipated.
- The presence of plant and construction compounds including welfare facilities, and increased movement of vehicles and workers.
- The presence of construction machinery and activity to construct solar PV modules and associated structures.
- Temporary lighting of the works and construction compounds for safety and security, the nature of which is currently not determined.
- Temporary diversions to PRoW.

14.6.3 Operation

14.6.3.1 Sources of potentially significant temporary and permanent operational effects (e.g. the loss of, or changes to, existing landscape features or characteristics, or the addition of new infrastructure or features within the landscape or view) on landscape and visual receptors include:

- The presence and massing of the solar PV modules and associated structures.
- Changes to land cover and new planting across the draft Order Limits.
- Security lighting, the level and location of which is currently not determined.

14.6.4 Decommissioning

14.6.4.1 Landscape and visual impacts arising from decommissioning of the Proposed Development are considered to be no greater than those identified during the construction phase and are therefore assessed as construction effects as a reasonable worst-case scenario.

14.6.4.2 The Proposed Development is assumed to be substantially reversible leaving little sign of its existence once decommissioned, with the exception of the 400kV substation which will be left in situ.

14.7 Design, mitigation and enhancement measures

14.7.1 Design vision

14.7.1.1 The LVIA will be key to achieving the criteria for good design set out in section 4.7 of the NPS EN-1 and this has been a key consideration from the outset.

14.7.1.2 The most effective mitigation for adverse landscape and visual effects is to avoid impacts at source as part of the design process, for example through the siting of infrastructure. This will be considered as part of the optioneering process. Where effects cannot be avoided, the hierarchy is that impacts should be minimised, rectified, reduced or finally offset. All landscape mitigation is therefore considered embedded and primary. This will be supported by a comprehensive reinstatement strategy and appropriate management measures for landscape and ecology. Beneficial effects will be maximised wherever practicable, for example through the design of multi-functional green infrastructure which provides a range of ecosystem services to deliver environmental net gain.

14.7.1.3 Mitigation principles to avoid or minimise potential construction effects will focus on reducing the duration and footprint of construction activity, locating development in the least prominent positions and wherever practicable maximising the distance from nearby visual receptors. Other measures which will be considered include positioning the works to make use of existing natural features such as landform and vegetation to screen views.

14.7.1.4 The Proposed Development will be designed to avoid or minimise the loss of existing landscape features of value, such as trees, woodland, and hedgerows wherever practicable. Any loss will be mitigated with replacement planting as close to the location, type and character of the existing vegetation to reduce effects resulting from such losses. The design will also identify opportunities for landscape restoration and enhancement, by introducing planting which repairs or reinforces existing vegetation patterns and contributes to biodiversity net gain.

14.7.1.5 Loss of ancient woodland will be avoided, wherever practicable in line with section 5.4.32 of NPS EN-1, which states that *"the Secretary of State should not grant development consent for any development that would result in the loss or*

deterioration of irreplaceable habitats including ancient woodland and the loss of ancient or veteran trees found outside ancient woodland, unless there are wholly exceptional reasons for the development, and a suitable compensation strategy exists". There is no ancient woodland within the draft Order Limits and therefore loss of ancient woodland is not expected.

14.7.1.6 It will take time for the planting proposed to reinstate vegetation lost as a consequence of construction or provided to mitigate other effects of the Proposed Development to establish, for example for visual screening. Therefore, landscape and visual effects will be assessed at year 1 and year 15 of operation. Effects which persist at year 15 of operation will be considered residual effects. Opportunities for advanced planting will be sought where this is practicable as this would allow for early establishment of mitigation.

14.7.1.7 The LVIA will inform the iterative design process of the Proposed Development, specifically with regards to the siting, layout and colour tones of structures to reduce their visibility and perceived scale and mass within the landscape, as well as identifying mitigation to reduce landscape and visual effects. The LVIA will also explore the identification of opportunities for new green infrastructure such as new habitats and permissive recreational routes.

14.7.1.8 The Applicant will set out the design vision, objectives, functions, principles and inter-relationships between different environmental elements within the DCO application. Information will be included to explain how these elements will be designed to integrate with the wider nature network, through the detailed design and how they will be implemented, maintained and monitored. This will include consideration of siting relative to existing landscape character, land form and vegetation, as set out in paragraph 4.7.6 of NPS EN-1. The type, extent and functions of the proposed mitigation will be illustrated on Environmental Masterplans, which will accompany the statutory consultation and DCO application.

14.7.1.9 The relevant landscape and visual mitigation and enhancements, and how the LVIA has informed the design process to minimise negative effects, will be summarised in the ES.

14.7.2 Design principles

14.7.2.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

14.7.3 Embedded and Good practice measures

14.7.3.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements. All landscape mitigation is considered embedded and primary because it will form a fundamental and

intrinsic part of the design of the Proposed Development. Further detail will be provided in the PEIR and ES.

14.7.3.2 The Proposed Development will continue to evolve through an iterative design process, strongly informed by the LVIA. Measures for the Proposed Development relevant to LVIA are likely to include:

- The construction compounds will be located on low diversity habitat
- Careful consideration of cable routing will be given to avoid or minimise impacts on valued landscape features and habitats.
- 15m buffer from solar panels to ancient and veteran trees, informed by biodiversity requirements and arboricultural surveys.
- 15m buffer from solar panels to woodland, informed by biodiversity requirements and arboricultural surveys.
- Buffers for all other trees and hedgerows will be determined by the Root Protection Areas (RPA) informed by biodiversity and arboricultural surveys.
- Loss of woodland and hedgerow will be kept to a minimum and only to facilitate access points, cable routing and fencing. Where such loss is unavoidable, vegetation will be reinstated following construction wherever practicable.
- Access tracks and cable routing will be located to pass through existing gates and gaps in hedgerows where feasible
- The Proposed Development would generally not be lit. The only lighting required would be demand responsive motion sense lights at the substations using passive infra-red (PIR) technology. This would only be on intermittently for security and/or safety reasons, and it will be designed and installed in a manner which minimises impact.
- New planting to provide visual screening, to break-up of the extent of development and to link existing habitats will be provided.

14.7.3.3 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation will be secured by a Requirement of the DCO.

14.7.4 Further mitigation

14.7.4.1 For landscape and visual matters, all mitigation relating to construction effects is considered to be tertiary and for operation effects is considered primary (embedded). Section 14.7.1, 14.7.2 and 14.7.3 of this chapter explain this further and summarise how the design of the Proposed Development will continue to be informed by the LVIA as part of the iterative design process.

14.7.4.2 Opportunities will also be sought in the development of an environmental masterplan to:

- Connect and extend existing woodland and hedgerows to strengthen the landscape pattern and habitat connectivity as part of the green infrastructure and nature network.
- Achieve early establishment and maximise visual screening through advanced planting.
- Enhance existing PRoW and permissive paths.
- Enhance existing hedgerow in poor condition and reinforce with planting and management, where appropriate.
- Enhance habitats in consultation with landowners in the context of wider environmental net gain,
- Reinforce the existing landscape pattern, including enhancement of existing field boundaries where appropriate.

14.7.5 Management plans

14.7.5.1 A suite of management plans will be submitted with the DCO Application for the Proposed Development, those relevant to LVIA include:

- oCEMP
- oLEMP, including general operational measures alongside those specific to landscape and ecology.
- oDEMP
- oCTMP
- oSRMP
- oPRoWMP

14.7.5.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

14.7.5.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

14.8 Likely significant effects

14.8.1 Construction

14.8.1.1 Effects during construction would be temporary and adverse and these effects will be assessed at the national, district and local level.

Effects on the landscape

14.8.1.2 At the national scale these effects would be focused within NCA84: Mid Norfolk and effects on this receptor will be assessed in the ES.

14.8.1.3 A small part of the Proposed Development comprising the Western Panel Area and part of the Central Panel Area would also lie within NCA85: The Brecks. Due to the small proportion of the Proposed Development in relation to the large scale NCA, it is considered that significant effects are unlikely. Therefore, an assessment of construction effects on NCA85 has been **scoped out** of assessment.

14.8.1.4 NCA76: North West Norfolk is located within the study area but outside of the draft Order Limits. Due to there being no physical impacts to features of the landscape and the small proportion of the NCA which is located at the edge of the study area, it is considered that significant effects on NCA76 are unlikely and further assessment of effects of NCA76 has been **scoped out** of the assessment.

14.8.1.5 At the district scale, the following LCAs defined within the Breckland District Landscape Character Assessment have the potential to experience significant effects relating to the construction of the Proposed Development:

- LCA A4: River Wensum and Blackwater
- LCA B4: River Blackwater Tributary Farmland
- LCA B5: River Wissey Tributary Farmland
- LCA B6: River Wensum and Tud Tributary Farmland
- LCA D1: Swaffham Heath
- LCA D2: Stanta Heath
- LCA E5: Central Breckland Plateau
- LCA E6: North Pickenham Plateau
- LCA F1: River Nar Valley

14.8.1.6 At the local scale, it is anticipated that the following LLCAs, defined by the Applicant as part of this scoping exercise, have the potential to experience significant effects during construction:

- LLCA: Beachamwell
- LLCA: Castle Acre and River Nar Valley
- LLCA: Central Breckland Plateau
- LLCA: Dereham
- LLCA: Former RAF North pickenham
- LLCA: Little Dunham Parkland
- LLCA: Narborough
- LLCA: Necton
- LLCA: North Pickenham Plateau
- LLCA: Northern River Wissey Tributary Farmland

- LLCA: Pickenham Plateau
- LLCA: RAF Marham
- LLCA: River Blackwater Tributary Farmland
- LLCA: River Nar Tributary Farmland
- LLCA: River Wensum and Blackwater
- LLCA: River Wensum and Tud Tributary Farmland
- LLCA: Shipdham
- LLCA: Southern River Wissey Settled Tributary Farmland
- LLCA: Southern River Wissey Tributary Farmland
- LLCA: Sporle
- LLCA: Stanta Heath
- LLCA: Swaffham
- LLCA: Swaffham Heath Farmland
- LLCA: Swaffham Heath Planttion
- LLCA: Swaffham Heath Plantation Farmland
- LLCA: Watton
- LLCA: Western River Wissey Settled Tributary Farmland

Effects on views and visual amenity

14.8.1.7 Potential for significant effects on people's views and visual amenity due to the construction of the Proposed Development are anticipated for the following visual receptor groups. This is a preliminary list, based on an initial appraisal to support this Scoping Report and does account for mitigation measures which will be embedded in the design of the Proposed Development, which is in ongoing:

- People travelling along PRoW Beachamwell BR2
- People travelling along PRoW Sporle with Palgrave BR5
- People travelling along PRoW Swaffham RB55
- Visitors to Castle and Bailey Gate and Castle Priory
- Residents of Castle Acre
- People travelling along the Peddars Way and Norfolk Coast Path National Trail
- Residents along Priory Close, Sporle
- Residents of Home Farm
- Residents of properties on eastern side of Beeston Road
- Residents of properties on western side of Beeston Road
- Residents of Willow Farm and people travelling along Love Lane
- Residents of properties along Dereham Road
- Residents of properties along Hulver Street
- Residents of High Property Farm
- Residents of Little Flint

- Residents of High Property Farm
- Residents of properties along Brandenham Lane
- Residents of Park Farm
- Residents of properties on Park Lane
- People travelling along National Cycle Network Route 13
- Residents of properties along Shipdham Lane
- People travelling along PRoW Shipdham FP1
- Residents of properties along Herne Lane
- Residents of Leys Farm
- Residents of Comar Cottage
- Residents of properties along Comar Lane
- Residents of Grounds Cottage
- People travelling along the permissive footpath between Dunnets Close and Ashill RB11
- Users of Ashill Common
- Residents of Cutbush Farm
- Residents of property to east of Cutbush Farm
- People travelling along PRoW Ashill RB11
- Residents of properties along Hills Road
- People travelling along PRoW Sporle with Palgrave BR4
- Residents of properties along Palgrave Road
- People travelling along PRoW Swaffham RB38b

14.8.1.8 Further fieldwork and stakeholder engagement may result in the addition of further viewpoints and the micro-siting of identified viewpoints and this will be set out in the ES.

14.8.1.9 Residential and recreational receptors within the study area could experience extensive changes to the character and composition of the view as a result of construction activities. Some residential and recreational receptors would view the works close up, whilst other residential and recreational receptors would experience the works in the distance. However, for both distant and nearby receptors the construction works associated with the Proposed Development could change large parts of the landscape within the view with the works becoming a dominant feature. Therefore, the visual amenity of residential and recreational receptors has the potential to be significantly affected by these works. The assessment of effects on residential and recreational receptors as a result of the construction works are therefore **scoped in** and will be assessed and reported in the ES.

14.8.1.10 Transport receptors are generally less sensitive to changes in their view as their interest or appreciation of the view is secondary to the activity they are doing. Furthermore, their period of exposure to the view is limited due to the speed of travel. However, due to the rural nature of their view the visual amenity of

transport receptors has the potential to be significantly affected by the construction activities. The assessment of effects on transport receptors is therefore **scoped in** and will be assessed and reported in the ES.

14.8.2 Operation

14.8.2.1 Landscape effects during operation would be medium to long term, as defined in section 14.9.3 and 14.9.4 of this chapter and are likely to be largely adverse. They are likely to include effects on landscape features and patterns if any vegetation requires removal to accommodate access tracks or other development and potential beneficial effects resulting from new habitats within the draft Order Limits which could have wider benefits. The presence of solar PV modules and associated structures would also be likely to result in effects relating to landscape character.

Effects on the landscape

14.8.2.2 Landscape receptors at a national, district and local scale likely to experience significant effects as a result of the operational Proposed Development would be the same as those identified in section 14.8.1.

14.8.2.3 The significance of landscape effects would be likely to reduce between year 1 of operation, when the proposed planting would be young and low in height and year 15 of operation, when it would be fully established. It is possible that some beneficial effects may arise by applying the criteria for good design and the delivery of environment net gain. The assessment of operational effects on landscape character are therefore **scoped in** for further assessment in the ES.

Effects on views and visual amenity

14.8.2.4 Visual receptors likely to experience significant effects as a result of the operational Proposed Development would be the same as those identified in section 14.8.1.

14.8.2.5 The significance of visual effects would be likely to reduce between year 1 of operation, when the proposed planting would be young and low in height and year 15 of operation, when it would be fully established. It is possible that some beneficial effects may arise, for example where planting proposed as mitigation for the Proposed Development also screens views of existing infrastructure.

14.8.2.6 Residential and recreational receptors within the study area could experience extensive changes to the character and composition of the view as their view of rural countryside would become more industrialised. Some residential and recreational receptors would view the proposed solar panels close up, whilst other residential and recreational receptors would experience the panels in the distance. For both, the Proposed Development could change large parts of the landscape within the view with the panels becoming a dominant feature. Therefore, the visual amenity of residential and recreational receptors has the potential to be significantly affected. The assessment of effect on residential and recreational receptors are therefore **scoped in** for further assessment in the ES.

14.8.2.7 Transport receptors are generally less sensitive to changes in their view as their interest or appreciation of the view is secondary to the activity they are doing. Furthermore, their period of exposure to the view is limited due to the speed of travel. However, due to the rural nature of their view the visual amenity of transport receptors has the potential to be significantly affected. The assessment of effect on transport receptors is therefore **scoped in** for further assessment in the ES.

14.8.3 Decommissioning

14.8.3.1 The effects on the landscape from decommissioning of the Proposed Development are considered to be no greater than those identified during the construction phase which represent a likely worst case scenario. This is because the activities relating to decommissioning would be similar to construction, but carried out in the context of enhanced landscape mitigation. The significance of effects resulting from decommissioning would therefore be as reported for the construction effects. The assessment of effects from decommissioning are therefore **scoped in** for further assessment in the ES.

14.8.4 Lighting

14.8.4.1 Impacts on the landscape and on people's views and visual amenity resulting from the introduction of lighting during construction, operation and decommissioning which have the potential to result in significant effects will be assessed in the ES. Night time lighting effects are **scoped in** for further assessment for residential visual receptors only as it assumed that PRoW are not used during hours of darkness. A subjective assessment using GLVIA3 will be used to qualitatively assess the impacts from night time lighting on residential visual receptors.

14.9 Proposed assessment methodology

14.9.1 Overview

14.9.1.1 The methodology for the LVIA involves the following stages:

- Review published landscape character assessments, studies, relevant supporting evidence base documents, aerial photography and mapping, and undertake fieldwork to define the baseline and to define the extent of the study area within which there is potential for landscape and visual effects.
- Define the landscape and visual receptors and describe the landscape and visual baseline.
- Review the design to embed mitigation measures into the Proposed Development to avoid or minimise adverse landscape and visual effects and maximise opportunities for landscape integration and enhancement.
- Determine the sensitivity of landscape and visual receptors, by considering the value attached to the landscape or views and susceptibility to change of the receptor.

- Assess the magnitude of impact of the Proposed Development in relation to size or scale, geographical extent, duration and reversibility.
- Assess the significance of effect by considering the relationship between the sensitivity of the receptor and the magnitude of impact and determine which effects are significant in EIA terms.

14.9.2 Assessment scenarios

14.9.2.1 The assessment of the likely landscape and visual effects of the Proposed Development will be undertaken for the following scenarios:

- Current baseline (winter and summer) – reflective of the conditions which exist at the time of gathering baseline environmental data and undertaking the LVIA.
- Future baseline (winter and summer) – reflective of the conditions that will be experienced in the future, immediately prior to construction of the Proposed Development.
- The peak of construction activity, in winter.
- Year 1 of operation, in winter, to reflect a worst-case assessment scenario.
- Year 15 of operation, in summer, to reflect the entirety of the Proposed Development in operation, when proposed vegetation has matured or achieved its design intention.
- The peak of decommissioning activity, in winter.

14.9.3 Assessment of landscape effects

14.9.3.1 The assessment of landscape effects will address the effects of the Proposed Development on the landscape as a resource in its own right. Judging landscape effects requires consideration of the sensitivity of the receptor and the magnitude of impact.

Sensitivity of landscape receptors

14.9.3.2 Paragraph 5.39 of GLVIA3 [196] states that "*landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape*".

14.9.3.3 Judging landscape sensitivity will thus be a two-part process of:

- Value attached to the landscape – relates to the existing landscape and this will be determined at the baseline stage in line with paragraph 5.19 of GLVIA3, which states that "*as part of the baseline description the value of the potentially affected landscape should be established*"; and
- Susceptibility to change – which is considered in relation to the Proposed Development.

Value attached to the landscape

14.9.3.4 Landscape Institute Technical Guidance Note (TGN) 02/21: Assessing landscape value outside national designations [194] defines landscape value as "*the relative value or importance attached to different landscapes by society on account of their landscape qualities*".

14.9.3.5 For assessing landscape value outside national designations, TGN 02/21 is now the primary source of guidance. The approach to assessing the value attached to the landscape will follow a three-stage process:

- **Stage 1**: identify if the landscape is covered by any landscape designations;
- **Stage 2**: consider each of the factors listed in Table 14-8, which have been developed with reference to Table 1 of TGN 02/21 and are pertinent and most important to understanding its value; and
- **Stage 3**: make an assessment the value attached to the landscape and assign value based on a five-point scale, clearly articulating the reasons for these judgements.

14.9.3.6 An overall conclusion will be drawn on the value attached to the landscape for each landscape receptor considering the overall weight of evidence.

Table 14-8 Establishing the value attached to the landscape

Stage 1 – Landscape designations	Receptor or receptor group	Criteria	
Landscape with statutory status or national policy protection: National Park, National Landscape, or World Heritage Site.	**Natural heritage** - Landscape with clear evidence of ecological, geological, geomorphological or physiographic interest which contribute positively to the landscape.	Very high	A designated landscape with statutory status (National Park or AONB). Valued landscape in the context of NPPF paragraph 180 (a)
Local landscape designation, such as Special Landscape Area or Area of Great	**Cultural heritage** - Landscape with clear evidence of archaeological, historical or cultural interest which contribute positively to the landscape. **Landscape condition** - Landscape which is in a good physical state both with regard to individual elements and overall landscape structure.	High	A locally designated landscape supported by a detailed evidence base or with other strong indicators of value, which may include other relevant designations such as ancient woodland or conservation areas, with identified quality in the development plan or evidence base. May be considered valued landscape in the context of NPPF paragraph 180(a) with strong supporting evidence.

Stage 1 – Landscape designations	Receptor or receptor group	Criteria	
Landscape Value, supported by policy and a detailed evidence base.	**Associations** - Landscape which is connected with notable people, events and the arts. Distinctiveness - Landscape that has a strong sense of identity.	Medium	Unlikely to be a designated for landscape quality but may exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level.
	Recreational - Landscape offering recreational opportunities where experience of landscape is important.	Low	Not designated for landscape quality and likely to exhibit few indicators of value which are identified in the development plan or evidence base.
No relevant designations.	**Perceptual (Scenic)** - Landscape that appeals to the senses, primarily the visual sense.		
	Perceptual (wildness and tranquillity) - Landscape with a strong perceptual value notably wildness, tranquillity and/or dark skies	Very low	A landscape dominated by industry or infrastructure or which is damaged or degraded landscape, not designated for landscape quality and not likely to exhibit indicators of value which are identified in the development plan or evidence base.
	Functional - Landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape.		

Valued landscape

14.9.3.7 The principle of 'valued landscape' in England is supported by the NPPF 2023 (Chapter 15). Paragraph 180 requires that planning policies and decisions should contribute to and enhance the natural and local environment by, inter alia, (a) "*protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)*".

14.9.3.8 According to paragraph A4.2.11 of TGN 02/21, a 'valued landscape' is an area identified as having sufficient landscape qualities to elevate it above other more everyday landscapes. There is therefore a high bar for an area to be considered valued landscape in the context of the NPPF.

14.9.3.9 Paragraph A4.2.5 of TGN 02/21 states that, "*where a landscape has a statutory status, such as a National Park or AONB, it is self-evident that it is a valued landscape*". Therefore, where such landscapes are present within the study area,

these will be attributed very high value and are recognised as valued landscapes in the context of the NPPF.

14.9.3.10 A different approach will be taken to determine whether landscapes outside of nationally designated landscapes can be considered valued landscape in the context of the NPPF. Paragraph A4.2.6 of TGN 02/21 states that the interpretation of 'identified quality in the development plan' is not clear and that there are two fundamentally different interpretations that have been adopted by inspectors, which are considered below in more detail:

1) It means non-statutory, locally designated landscapes;
2) It means any landscape where there is evidence to justify the identification of a 'valued landscape'. Local designation alone may not be sufficient evidence.

14.9.3.11 For a landscape without statutory status to be considered valued landscape in the context of the NPPF it must be supported by strong evidence. The assessment will therefore consider each of the criteria set out in Table 14-8, references in Local Plan policy and evidence base, including whether there are existing local landscape designations in forming an overall judgement on value. Landscapes with high value may also be considered valued landscapes in the context of the NPPF.

Susceptibility of landscape receptors to change

14.9.3.12 GLVIA3 paragraph 5.40 defines the susceptibility to change of landscape receptors as:

14.9.3.13 "*the ability of the landscape receptor (whether it be overall character or condition of a particular landscape type or area, or an individual element and/or features, or a particular aesthetic and perceptual aspect) to accommodate the Proposed Development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*" (paragraph 5.40).

14.9.3.14 The features and characteristics which are more or less susceptible to the type of changes proposed will be set out for each LCA. The narrative will provide a clear explanation based upon analysis of the landscape receptor and the extent to which it is able to accommodate the type of change arising from the specific proposal.

14.9.3.15 Table 14-9 sets out examples of characteristics and features of landscapes which may indicate higher and lower susceptibility in respect of solar farm development.

Table 14-9 Considerations for landscape susceptibility

Landscape features or characteristics	Indicators of higher landscape susceptibility	Indicators of lower landscape susceptibility
Field pattern, scale and enclosure	• Small scale fields. • Complex or irregular field pattern. • Ancient field patterns.	• Large scale fields. • Simple, regular or rectilinear field pattern. • Uniform field pattern.

Landscape features or characteristics	Indicators of higher landscape susceptibility	Indicators of lower landscape susceptibility
	• Field boundaries formed by low fences or walls or hedges with few hedgerow trees.	• High field boundaries.
Landform	• Steep topography. • Exposed hillsides. • Irregular or complex landform. • Narrow valleys and ridges. • Distinctive landform features.	• Flat landscapes. • Expansive lowland landscapes. • Uniform landform. • Landscapes with no or minimal distinctive landform features.
Land cover	• Pastures, particularly where grazing forms key characteristic of the landscape. • Significant woodland cover. • Parkland or designed landscapes. • Natural or semi-natural land cover, particularly where conservation or restoration is a priority.	• Large-scale arable land, particularly monoculture or with evidence of intensive farming practices.
Tranquillity/ human influences	• Absence of human influences/natural landscapes. • Infrequent built form. • Overarching rural character. • Remote, tranquil, spiritual or peaceful landscape. • Sense of wilderness.	• Major infrastructure (transport, utilities, industry). • Large concentrations of residential, commercial, industrial development. • Character affected by urban development. • Noisy, settled landscapes. • Modern and developed landscapes with signs of human activity.
Condition / intactness	• Intact landscapes with natural or historic features in good condition.	• Degraded landscapes (likely to have evidence of human

Landscape features or characteristics	Indicators of higher landscape susceptibility	Indicators of lower landscape susceptibility
		influences/modern intensive farming practices). • Degraded / intermittent boundary treatments.
Historic features and cultural heritage	• Ancient / historic field patterns. • Important, distinctive or remnant features of the landscape. • Cultural associations with a particular landscape.	• Modern/developed landscape with limited historic features.
Scenic quality and character	• High scenic quality. • Strong sense of place.	• Low scenic quality. • Weak sense of place.
Intervisibility	• Open landscapes with exposed or far-reaching views. • Sparse woodland and vegetative cover. • Field systems defined by fences or managed low boundaries. • Strong intervisibility with sensitive landscapes.	• Confined or enclosed landscape with few inward or outward views. • Limited invisibility with sensitive landscapes, key views, or landmarks. • Intact, overgrown or tall vegetated boundaries with high proportion of hedgerow trees. • High proportion of woodland blocks, copses, connected woodlands and belts.

14.9.3.16 The susceptibility to change for each landscape receptor will be categorised with reference to the criteria in Table 14-10 below.

Table 14-10 Landscape susceptibility criteria

Landscape susceptibility	Typical description
Very high	The type of change arising from the specific proposal are very likely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
High	The type of change arising from the specific proposal are likely to lead to undue consequences for the maintenance of the baseline

Landscape susceptibility	Typical description
	situation and/or the achievement of landscape planning policies and strategies.
Medium	The type of change arising from the specific proposal may lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Low	The type of change arising from the specific proposal are unlikely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Very low	The type of change arising from the specific proposal are very unlikely to lead to undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

Combining judgements to define sensitivity

14.9.3.17 The sensitivity of each LCA will be defined by combining professional judgements on the value attached to the landscape and its susceptibility to change and will be supported by a clear narrative. Reference will be made to the criteria set out in Table 14-11 below.

Table 14-11 Sensitivity of landscape receptors criteria

Sensitivity	Typical description
Very high	Landscapes with statutory status or national policy protection with very limited ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
High	Landscapes which may be locally designated or otherwise supported by a detailed evidence base or landscape with other strong indicators of value with limited ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Medium	Landscapes which are unlikely to be a designated for landscape quality but may exhibit some indicators of value and which may have some ability to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

Sensitivity	Typical description
Low	Not designated for landscape quality and likely to exhibit few indicators of value and likely to accommodate the type of change no or limited undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.
Very low	Landscapes of very low value able to accommodate the type of change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies.

Magnitude of landscape impacts

14.9.3.18 Paragraph 3.28 of GLVIA3 notes that magnitude is informed by combining considerations relating to the "*scale, extent and duration*" of impacts. This includes the geographical extent of influence, the spatial extent of the impact, the level of integration of new features with existing elements, its duration and degree to which the impact is reversible.

14.9.3.19 In summarising the magnitude of landscape impacts, reference will be made to the following:

- Size or scale - the degree to which key characteristics or features identified in the baseline would change judgements on size or scale of change depend on the extent of existing landscape elements that would be lost, the proportion of the total extent that this represents and the contribution of that element to the character of the landscape. It is also influenced by the degree to which aesthetic or perceptual aspects of the landscape are altered through removal or addition of components such as solar panels, buildings, roads, paths and vegetation; and whether the effect changes the key characteristics of the landscape which are critical to its distinctive character;
- Geographical extent – the area over which the change would occur. For example, whether the effects of the Proposed Development are perceived over a large or very localised area;
- Duration – the time over which the change would occur, set out on the following scale: short term (0-5 years), medium term (5-15 years), or long term (over 15 years); and
- Reversibility - related to whether the change can be reversed and is reported as reversible, partially reversible or permanent, e.g. effects arising from presence of construction traffic will cease at the end of construction and therefore is considered to be reversible, whereas effects arising from presence of new built development could be partially reversible or permanent.

14.9.3.20 The criteria set out in Table 14-12 will be referred to in determining the magnitude of landscape impacts.

Table 14-12 Magnitude of landscape impacts criteria

Magnitude of change	Typical description
Very high	Substantial changes to key characteristics across most of the area or to unique and distinctive features at a local level. May be longer term impacts, permanent or reversible.
High	Changes to the character of the landscape across large parts of the area or to distinctive features at a local level. May be longer term impacts, permanent or reversible
Medium	Changes to the character of the landscape across parts of the area or to some existing features at a local level. May be medium term impacts, permanent or reversible.
Low	Slight change to landscape character or landscape features across a small area. May be short to medium term impacts, permanent or reversible.
Very low	Barely perceptible change to the landscape receptor or may impact a limited area or no key characteristics. May be short term impacts, permanent or reversible.

14.9.3.21 There may be cases where there will be no impacts on a receptor, for example where the design has been changed to avoid such impacts. In such cases this will be recorded as no change.

14.9.4 Assessment of visual effects

14.9.4.1 The assessment of visual effects considers the effects of the Proposed Development on the views available to people and their visual amenity. Judging visual effects requires consideration of the sensitivity of the receptor and the magnitude of the impact. The criteria against which judgements are made are provided below.

Sensitivity of visual receptors

14.9.4.2 Paragraph 6.31 of GLVIA3 states that "*each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, should be assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views.*" The sensitivity of visual receptors results from a combination of parameters, such as:

- The activity/occupation/ pastime of the receptors at particular locations;
- The extent to which their attention or interest may be focused on the views; and
- The visual amenity they experience.

14.9.4.3 Consideration will also be given to the:

- Location, focus and orientation;
- Features or characteristics of value within the view;

- Principal or secondary interests;
- Static or kinetic nature of views;
- Duration of the view.

Value attached to views

14.9.4.4 A three-stage process will be used to determine the value attached to views. This relates to the features and characteristics of the baseline landscape within the view and other indicators of value, for example reference in policy, guide books, literature or art.

- **Stage 1**: identify if the view or the landscape within the view is covered by any relevant policy or designations and note features and characteristics of value with reference to the landscape baseline;
- **Stage 2**: identify if the view is identified on maps, is likely to be from a popular visitor location or has historical or cultural importance or associations; and
- **Stage 3**: Determine the value attached to the view with reference to the criteria provided in Table 14-13 using the evidence from Stages 1 and 2.

Table 14-13 Value attached to views criteria

Value	Typical description
Very high	Views within or across a nationally or internationally designated landscapes and/or specific views designated in national or regional policy. Views are likely to have few or no detracting features and which may also have strong cultural associations supported by evidence, which could include links to historical events or people, representation in art or literature, for example.
High	Views within or across regionally or locally designated landscapes, other or landscapes with strong indicators of value, or views identified in the development plan or evidence base. Views are likely to have few or no detracting features and may also have some cultural associations supported by strong evidence.
Medium	Views across landscapes which are unlikely to be designated but may exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level. Views may have some detracting features and cultural associations supported by evidence.
Low	Views across landscapes which are not designated for landscape quality and likely to exhibit few indicators of value which are identified in the development plan or evidence base. Views are likely to have some detracting features and lack cultural associations supported by evidence.
Very low	View across landscapes which are neither designated, nor identified in the development plan or evidence base, and without cultural associations. The landscape in the view is in poor condition or notably detracts from the experience of the view.

Susceptibility of visual receptors to change

14.9.4.5 The sensitivity of visual receptors is also dependent upon their susceptibility to changes in views and the visual amenity they experience.

14.9.4.6 Paragraph 6.32 of GLVIA3 explains that "*the susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of:*

- *The occupation or activity of people experiencing the view at particular locations; and*
- *The extent to which their attention or interest may therefore be focussed on the views and the visual amenity they experience at particular locations*."

14.9.4.7 GLVIA3 notes that visual receptors "*most susceptible to change*", include residents and visitors engaged in outdoor recreation "*whose attention or interest is likely to be focused on the landscape and on particular views*" (para 6.33).

14.9.4.8 Table 14-14 sets out the criteria referred to in determining the susceptibility of visual receptors to the Proposed Development.

Table 14-14 Susceptibility of visual receptors criteria

Susceptibility	Typical description
Very high	Visitors to nationally or internationally designated landscapes, particularly at specific viewpoints or viewing places, where views of the landscape are fundamental to the experience. People engaged in specific activities for enjoyment of dark skies.
High	Residents at home. Visitors to tourist hotspots, heritage assets or other attractions outside of nationally or internationally designated landscapes, particularly at specific viewpoints or viewing places, where views of the landscape are important to the experience. People engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views, for example those using promoted walking and cycling routes. People travelling along promoted scenic routes.
Medium	People engaged in outdoor recreation or travelling along public rights of way or local roads, which are not promoted routes but where an appreciation of the surrounding landscape are relevant to the experience. People working outdoors.
Low	People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape People travelling on major road, rail or other transport routes which are not recognised as scenic routes.
Very low	People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape People travelling on major road, rail or other transport routes which are not recognised as scenic routes.

Summarising the sensitivity of visual receptors

14.9.4.9 The sensitivity of visual receptors is based on professional judgement and will be informed by the criteria in Table 14-15, considering the value attached to views and susceptibility of visual receptors to the changes proposed.

Table 14-15 Sensitivity of visual receptors criteria

Criteria	Description
Very high	Activity where views are fundamental to the experience and are related to landscapes with national or international designation and with few or no detracting features and which may also have strong cultural associations supported by evidence.
High	Activity resulting in a particular interest or appreciation of the view and/or views within or across regionally or locally designated landscapes, other or landscapes with strong indicators of value, or views identified in the development plan or evidence base with few or no detracting features and may also have some cultural associations supported by strong evidence.
Medium	Activity resulting in a general interest or appreciation of the and/or a view, likely to exhibit some indicators of value which are identified in the development plan or evidence base and are important at the community level.
Low	Activity where interest or appreciation of the view is secondary to the activity or the period of exposure to the view is limited, and/or views across landscapes which are not designated for landscape quality and likely to exhibit few indicators of value and likely to have some detracting features and lack cultural associations supported by evidence.
Very low	Activity where interest or appreciation of the view is inconsequential to their activity, and/or across landscapes which are neither designated, nor recognised in policy, and without cultural associations or is in poor condition or notably detracts from the experience of the view.

Magnitude of visual impacts

14.9.4.10 The magnitude of visual impacts relates to the extent to which the baseline view would change as a result of the Proposed Development. This assessment will be made with reference to fieldwork observations, photographs and photomontages where relevant from the representative viewpoints identified.

14.9.4.11 Paragraph 3.28 of GLVIA3 notes that magnitude is informed by combining considerations relating to the "*scale, extent and duration*" of impacts. This includes the geographical extent of influence, the spatial extent of the impact, the level of integration of new features with existing elements, its duration and degree to which the impact is reversible.

14.9.4.12 Reference will be made to the following in summarising the magnitude of visual impacts:

- Size and scale – loss of existing features or addition and integration of new features and the time over which it will be experienced and whether views will be full, partial or glimpsed.
- Geographical extent – the angle of view in relation to the main activity of the receptor, the distance of the viewpoint from the Proposed Development and the extent of the area over which the changes would be visible.
- Duration and reversibility – the time over which the change would occur, set out on the following scale: short term (0-5 years), medium term (5-15 years), or long term (over 15 years).

Combining judgements to define magnitude of change

14.9.4.13 The magnitude of change is defined by combining judgements on size or scale, geographical extent, duration and reversibility, with reference to Table 14-16, based on guidance from GLVIA3.

Table 14-16 Magnitude of visual impacts criteria

Criteria	Typical description
Very high	The Proposed Development will result in extensive changes to the character and composition and will become the dominant feature of the landscape within the view. There may be longer term impacts, permanent or reversible.
High	The Proposed Development will change the character and composition of large parts of the landscape within the view. There may be longer term impacts, permanent or reversible.
Medium	The Proposed Development will change the character and composition of discrete parts of the landscape within the view. There may be medium term impacts, permanent or reversible.
Low	The Proposed Development will cause small changes to the character and composition of the landscape within the view. There may be short to medium term impacts, permanent or reversible.
Very low	The development will cause barely perceptible changes in the character and composition of the landscape within view. May be short term impacts, permanent or reversible.

14.9.4.14 There may be cases where there will be no impacts on a receptor, for example where the design has been changed to avoid such impacts. In such cases this will be recorded as no change.

14.9.5 Significance of landscape and visual effects

14.9.5.1 The approach to determining the significance of landscape effects and visual effects and whether these effects are considered significant in EIA terms will be the same.

14.9.5.2 Judgements on the sensitivity of each receptor and the magnitude of impact will be combined to establish the significance of effect and whether effects are considered significant in EIA terms. There are important distinctions between these two terms:

- Significance of effect relates to the level recorded for any effect, with reference to the matrix set out in Table 14-17 below.
- An effect will be considered significant in EIA terms if it is of major or moderate significance. All other effects will be categorised as not significant.

14.9.5.3 Table 14-17 will be used to guide judgements on the relationship between the sensitivity of a visual receptor, the magnitude of impact, and the resulting significance of effect. Where there are two significance categories, a judgement will be made and this will be supported by a clear narrative to justify the choice. Where conclusions differ from this guide, a reasoned explanation will be provided in the assessment text.

Table 14-17 Significance of landscape and visual effects

		Magnitude of impact				
Sensitivity		Very high	High	Medium	Low	Very low
	Very high	Major	Major	Major or Moderate	Moderate	Moderate or Minor
	High	Major	Major or Moderate	Moderate	Moderate or Minor	Minor
	Medium	Major or Moderate	Moderate	Moderate or Minor	Minor	Minor or Negligible
	Low	Moderate	Moderate or Minor	Minor	Minor or Negligible	Negligible
	Very low	Moderate or Minor	Minor	Minor or Negligible	Negligible	Negligible

14.9.5.4 The identification of the likely significant effects on landscape and visual receptors will rely on detailed analysis and the professional judgement of competent experts, and consultation with stakeholders. Table 14-18 defines what the significance of effect terms mean.

Table 14-18 Typical descriptions of landscape and visual effects

Significance of effect	Landscape effects	Visual effects
Major beneficial	Effects that result in a considerable improvement of the existing landscape resource. Valued characteristic features would be restored or reintroduced as part of the development.	Effects that result in a substantial improvement in the existing view.

Significance of effect	Landscape effects	Visual effects
Moderate beneficial	Effects that result in a partial improvement of the existing landscape resource. Valued characteristic features would be largely restored or reintroduced.	Effects that result in a noticeable improvement in the existing view.
Minor beneficial	Effects that result in a slight improvement of the existing landscape resource. Characteristic features would be partially restored.	Effects that result in a limited improvement in the existing view.
Negligible beneficial	Effects that result in a very slight improvement to the existing landscape resource, not uncharacteristic within the receiving landscape.	Effects that result in a barely perceptible improvement in the existing view.
Neutral	Effects which are a balance between adverse and beneficial effects and are neutral in their consequences for the landscape.	Effects that are a balance between adverse and beneficial effects and are neutral in their consequences for the view of visual receptors.
Negligible adverse	Effects that result in a very slight deterioration to the existing landscape resource, not uncharacteristic within the receiving landscape.	Effects that result in a barely perceptible deterioration in the existing view.
Minor adverse	Effects that result in a slight deterioration of the existing landscape resource. Characteristic features would be partially lost.	Effects that result in a limited deterioration in the existing view.
Moderate adverse	Effects that result in a partial deterioration of the existing landscape resource. Valued characteristic features would be largely lost.	Effects that result in a noticeable deterioration in the existing view.
Major adverse	Effects that result in a considerable deterioration of the existing landscape resource. Valued characteristic features would be wholly lost.	Effects that result in a substantial deterioration in the existing view.

14.9.5.5 Whether effects are adverse, beneficial or neutral will be determined by considering the way in which the changes are likely to affect the baseline.

14.9.5.6 Adverse effects are likely to occur where the Proposed Development introduces new elements or changes which are discordant or intrusive resulting in a deterioration to existing character or valued features of the landscape or of views and visual amenity.

14.9.5.7 Beneficial effects are likely to occur where the proposed development enhances the character of the landscape or existing views.

14.9.5.8 Paragraphs 5.37 and 6.29 of GLVIA3 state that is possible for effects to be neutral in their consequences for landscape and for visual receptors. Where a judgement of neutral effects has been reached, reference will be made to the contribution of the Proposed Development to the baseline and acknowledging the positive and negative aspects which have been considered.

14.9.5.9 Where the assessment has concluded that there will be no change on a receptor, this will be reported as no effect. This may, for example, be a consequence of changes to the design which has avoided impacts on receptors identified at the scoping stage.

14.9.5.10 Residual effects are those which remain even with embedded or primary mitigation at construction and year 15 of existence and operation and which cannot be further mitigated by design or other measures in this time period.

14.10 Assumptions, limitations and uncertainties

14.10.1.1 This section sets out the assumptions which have been made and the limitations which inform the scope of the LVIA.

14.10.1.2 All fieldwork will be undertaken from publicly accessible locations. Professional judgement will be used to assess residents' views, aided by maps, aerial photography and fieldwork observations.

14.10.1.3 Agreement will be sought on viewpoints through consultation with relevant local planning authorities and verified views and photomontages will be prepared from a select number of the viewpoints proposed.

14.10.1.4 For the construction phase assessment, the assumptions are that construction activity will be undertaken across the draft Order Limits at the same time and during winter. This assumes that existing deciduous vegetation is not in leaf, thereby representing a worst-case assessment scenario.

14.10.1.5 For the assessment of effects at year 15 of operation, the assumption is that all new planting would have successfully established, having increased in height by 4.5 metres since year 1 of operation (i.e. 30cm of growth per year).

14.10.1.6 For decommissioning, the assumptions are that the Proposed Development is no longer operational, except for the 400kV substation which would remain in situ and will be the responsibility of National Grid. Should this change at a later stage of the EIA, this will be assessed appropriately for the operational and decommissioning stages.

14.10.1.7 .. The solar panels and associated structures and equipment would be removed in a manner similar to the construction phase, requiring machinery and localised excavation. The proposed green infrastructure would not be removed as part of decommissioning. Therefore, the effects on landscape and visual receptors would be the same as and not greater than the construction phase. The conclusions of the

construction assessment will stand for the decommissioning effects as a reasonable worst-case scenario and there will therefore be no separate decommissioning assessment. See section 14.8.3 for further information.

14.10.1.8 There are uncertainties at this stage regarding the final layout, siting and heights of the solar PV modules, associated structures, 132kV substations and a 400kV substation with accompanying transmission tower. The LVIA study area and landscape and visual receptors considered will be reviewed accordingly in relation to the heights of these features, informed by further ZTVs.

14.10.1.9 The assessment will be based on the maximum parameters of the Proposed Development, taking account of embedded mitigation and design principles, to represent a reasonable worst-case.

14.11 Summary

Table 14-19 Landscape and Visual scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Landscape	Scoped in	Scoped in	Scoped in	Fieldwork surveys required to inform understanding of landscape character and potential impacts. This will include capturing of photography to illustrate findings.
Visual	Scoped in	Scoped in	Scoped in	Winter and Summer fieldwork surveys required. This will include the capturing of fixed-point photography and measured surveys, where required for photomontages.

15 Major accidents and disasters

15.1 Introduction

15.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of potential significant environmental effects as a result of major accidents and disasters.

15.1.1.2 It sets out receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

15.1.1.3 The following aspects have been considered as part of the scope and methodology for major accidents and disasters:

- Potential for adverse environmental effects related to the vulnerability of the Proposed Development to risks of major accidents and/or disasters.

15.1.1.4 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 8 Climate change
- Chapter 12 Ground Conditions
- Chapter 18 Traffic and transport
- Chapter 19 Water Resources and Flood Risk

15.2 Relevant legislation, policy, standards and guidance

15.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for major accidents and disasters and have informed the scope of the assessment.

15.2.2 Legislation

Table 15-1 Legislation

Legislation	Relevance to assessment
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 [211]	Schedule 4, 8 *"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. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European*

Legislation	Relevance to assessment
	Parliament and of the Council(3) or Council Directive 2009/71/Euratom(4) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."

15.2.3 Policy

Table 15-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for energy (EN-1), 2024 [107]	Sets broad national policy approach. Section 4.12 addresses Safety, including that the Health and Safety Executive (HSE) is responsible for enforcing a range of occupational health and safety legislation some of which is relevant to the construction, operation and decommissioning of energy infrastructure. Applicants should consult with the HSE on matters relating to safety.
National Policy Statement for renewable energy infrastructure, 2024 (EN-3) [107]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects.
National Policy Statement for electricity networks infrastructure, 2024 (EN-5) [108]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for major accidents and disasters, beyond those general requirements for 'good design' for the routing of new overhead lines and design and siting of substations in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19).

15.2.4 Standards and guidance

Table 15-3 Standards and guidance

Standards and guidance	Relevance to assessment
Major Accidents and Disasters in EIA: A Primer, 2020. Institute of Environmental Management and Assessment [212]	Offers an assessment methodology based on known current practice within the UK to date and identifies key terminology that can be used.
The National Risk Register of Civil Emergencies, 2023. The Cabinet Office [213]	The National Risk Register outlines the most serious risks facing the United Kingdom.
Norfolk Community Risk Register, 2021 [214]	Provides information on the biggest emergencies that could happen in Norfolk, together with an assessment of how likely they are to happen and the impacts if they do. This includes the impacts to people, their houses, the environment and local businesses.

15.3 Consultation

15.3.1.1 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to major accidents and disasters.

15.3.1.2 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

15.4 Study area

15.4.1.1 There is no specific regulatory guidance or standardised methodology for defining a study area in relation to the assessment of major accidents and disasters. For scoping, the study area has been taken to cover the draft Order Limits and any immediately adjoining aspects that could be considered to give rise to, or be impacted by, a potential major accident and/or disaster which could impact the Proposed Development.

15.5 Baseline conditions

15.5.1 Desktop sources used

15.5.1.1 The following desktop sources have been used to inform the understanding of the existing baseline conditions of the study area:

- The National Risk Register of Civil Emergencies [213]
- Norfolk Community Risk Register [214]
- COMAH 2015 Public Information Search [215]
- Publicly available base mapping, such as Bing maps.

15.5.2 Surveys undertaken and proposed

15.5.2.1 No surveys are required in respect of major accidents and disasters.

15.5.3 Existing baseline

15.5.3.1 The baseline relevant to the major accidents and disasters topic comprises:

- Current existing (without the Proposed Development) major accident and disaster risks in the study area.
- Features external to the Proposed Development in question, within the study area, that contribute a potential source of hazard to the Proposed Development under consideration and may make it vulnerable to a major accident and/or disaster.
- Sensitive environmental receptors at increased risk of a significant effect if an external major accident and/or disaster occurred once the Proposed Development was present.

Existing major accident and disaster risks

15.5.3.2 The National Risk Register [213] is based on information from the National Security Risk Assessment, which is the government's assessment of the most serious risks facing the UK. The risks that meet the threshold for inclusion in the National Risk Register would have a substantial impact on the UK's safety, security and/or critical systems at a national level. The risk register classifies risks into categories including terrorism; cyber; state threats; geographic and diplomatic; accidents and systems failures; natural and environmental hazards; human, animal and plant health; societal; and conflict and instability.

15.5.3.3 The National Risk Register states that for risks that are most relevant to a local area, a review of the relevant Community Risk Register should be undertaken. The Norfolk Community Risk Register [214] covers local risks relevant to Norfolk and is considered relevant to the Proposed Development. Within the Norfolk Community Risk Register the following 'very high' level risks have been identified. These are those that Norfolk Community Risk Register have identified as the most likely to have an impact on the local community.

- *"Very high*
  - *Coastal flooding*
  - *Fluvial Flooding*
  - *Influenza-type Pandemic*
  - *Low temperatures and heavy snow"*

15.5.3.4 Major accident and disaster risks relevant to the baseline in the absence of the Proposed Development are, therefore, considered to include all of the above.

Potential sources of hazard

15.5.3.5 Features external to the Proposed Development that contribute a potential source of hazard include nearby Control of Major Accident Hazards (COMAH) sites. COMAH sites are establishments storing or otherwise handling large quantities of hazardous industrial chemicals. A review of sites listed by the COMAH 2015 Public Information Search [215] has been undertaken to identify any COMAH sites within the HSE land use planning distance of 3 miles of the draft Order Limits. One COMAH site has been identified 1.2 miles (1.9 km) south of the Northern Panel Area which is North Pickenham Airfield, PE37 8LL, a lower tier COMAH site classified for a major accident deriving from flammable liquids and gases from the former RAF airfield.

15.5.3.6 It is also considered that there are features external to the Proposed Development that could present a potential source of hazard. These include, but are not limited to:

- oil, gas and electricity transmission networks across the study area
- potential presence of unexploded ordnance, although noted low risk [216]
- below-ground hazards such as ceased mining and quarry pits [158]
- directly adjacent major highways, including the A47 and A1065
- Flood Zone 2/3 in the Northern Panel Area and Southern Panel Area associated with the River Wissey and Wendling Beck [217]

Sensitive environmental receptors

15.5.3.7 Sensitive environmental receptors are identified in each individual topic chapter in Chapters 5 – 19 of this EIA Scoping Report.

15.5.4 Future baseline

15.5.4.1 Future baseline changes relevant to major accidents and disasters may include a changing climate, change in COMAH status of nearby sites and changes to external features that present a hazard to the Proposed Development.

15.5.4.2 However, given that construction is expected to start in 2028 there is unlikely to be any notable change, therefore the future baseline is conceded to be the same as existing in this report.

15.6 Potential impacts

15.6.1.1 The Proposed Development is not considered to have high vulnerability to major accidents or disasters. Whilst the legislation is not explicit, the language of the EIA Regulations is aimed towards hazardous industries or operations (those with a 'high vulnerability' to major accidents).

15.6.1.2 Following a high-level screening exercise for the purposes of scoping, as suggested in the IEMA guidance [212], it has been determined that the Proposed Development has the following potential impacts:

- *"Is the development a source of hazard itself that could result in a major accident and/or disaster occurring?"*
  - The Proposed Development is a solar scheme using proven technology, with widespread use across the UK and beyond. The market is tightly regulated by design standards and operating procedures. There is the potential for on-site fires associated with technology such as batteries as a form of energy storage, inverters and the substations. However as standard the technology will have built in safety features including fire resistant construction, fire detection, suppression systems, emergency stop functions and isolation monitoring. Although rare, fires and associated explosions do have the potential to cause safety concerns to human health, including anyone working within the draft Order Limits, or within the area of fire spread/associated contamination fall out. Fires also have the potential to have an impact on the natural environment including the habitats and species in close proximity.
- *"Does the development interact with any sources of external hazards that may make it vulnerable to a major accident and/or disaster. If an external man-made or natural hazard occurred, would the existence of the Proposed Development increase the risk of a significant effect to an environmental receptor occurring?"*
  - There are no COMAH sites within the study area, with the nearest 1.2 miles south, considered to not give rise to a risk to the draft Order Limits owing to its closure as an RAF airfield in 1967. Existing uses are now agricultural and go karting.
  - The construction of the Proposed Development has the potential to interact with utilities during construction and decommissioning, with the potential to cause utility strike. Depending on the nature of the accident this could cause supply disruption to users, and/or present a risk of danger to people and the natural environment within the draft Order Limits and in the surrounding area via contamination or potential fire or explosion. As the Proposed Development design progresses discussions will be held with utility providers to ascertain the locations of all assets, and the provider's required offset distances will be implemented in the Proposed Development design to minimise this risk. Contractor best practice and working guidelines will also be implemented via a CEMP (guided by the principles set in the oCEMP) to minimise the risk of such accidents occurring, and to minimise the severity of an impact in the event an asset is struck.
  - It is possible that unexploded ordnance could be disturbed during construction, although the draft Order Limits are considered to have a low risk to unexploded ordnance. Should new evidence indicate that UXO may be an issue, specialist advice would be sought.

- There is potential for unstable ground conditions within the draft Order Limits associated with below ground hazards such as the historic unspecified pits in the area. Ground Investigation will be undertaken prior to construction of substations commencing in locations identified as a potential risk of contamination by desktop reports. Risks will be fully understood and mitigation will be embedded into the design of the Proposed Development where required and additional mitigation measures utilised where identified as required. This will minimise the risk to people working within the draft Order Limits, in terms of land collapse, throughout all phases of the Proposed Development. For further information, see Chapter 12 Ground Conditions.
- Road accidents could occur during the construction or decommissioning phases involving vehicles associated with the Proposed Development, leading to potential fatality/injury to members of the public. However, as stated within Chapter 18 Traffic and Transport, the change in traffic flows is expected to be within daily variation, meaning there should be no significant increase in the potential road accidents. In addition, an oCTMP will carefully manage access and routing to ensure any potential risks are managed appropriately. The potential for glint and glare from installed solar panels impacting aviation, roads and rail receptors during construction, operation and decommissioning will be assessed as part of the Glint and Glare ES chapter. Any identified mitigation proposals will be embedded into the design of the Proposed Development or applied in relation to the Proposed Development.
- The potential to be impacted by flooding or cause an increase in flood risk could occur during all phases of the Proposed Development. The risks associated with flooding are considered in Chapter 19 Water Resources and Flood Risk of the EIA Scoping Report. In addition, an Outline Drainage Strategy and Flood Risk Assessment (FRA) will be undertaken to accompany the DCO application for the Proposed Development. Final plans of the oCEMP, oLEMP and oDEMP will be secured through the DCO and be in place to manage risk.
- The potential for extreme weather events to be worsened due to the presence of the Proposed Development (e.g. impacts to flood risk) is assessed within Chapter 8 Climate Change, and is be considered as adequately addressed as part of design, through compliance with required design standards to ensure climate resilience. In addition, an FRA is to be completed to support the DCO application to ensure that the Proposed Development and drainage strategy do not increase the risk of flooding on- or off-site.
- Accidental spillage of contaminants, such as hydrocarbons, and their subsequent release into the drainage system are assessed within Chapter 19 Water Resources and Flood Risk and are considered to be low consequence events that do not meet the definition of a major accident or disaster, and

are expected to be able to be managed and mitigated via the suite of management plans that will be in place, outlined further in Section 15.7 below.

- The risk of an influenza-type pandemic and failure of the National Electricity Transmission Systems is not considered relevant to the vulnerability of major accidents and disasters associated with the Proposed Development.

15.7 Design, mitigation and enhancement measures

15.7.1 Design principles

15.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

15.7.2 Embedded and Good practice measures

15.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

15.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to major accidents and disasters are likely to include:

- Avoid locating critical infrastructure within Flood Zones 2 and 3, ensuring that solar PV modules are raised above the predicted maximum flood depth for the 100 year plus climate change scenario.
- SuDS will be provided at source, ensuring that surface water run-off is managed consistently with existing site conditions.
- Minimum 10m offset from all infrastructure (including fencing) from bank top of all riparian boundaries and watercourses.
- Access tracks will be permeable to allow water to filtrate through and maintain greenfield runoff rates.
- 2m offset from cabling to existing utilities

15.7.2.3 Good practice measures will also be included to protect against any interference with below ground utilities during construction and decommissioning.

15.7.2.4 Further measures are likely to include:

- The final design considering pit locations to minimise impacts.
- construction/decommissioning workers would be provided with appropriate Personal Protective Equipment (PPE) and required to follow best practice

measures with regards to limiting the risks associated with ground contamination and instability.

- For watercourse crossings where required, use of appropriate trenchless methodology.
- Where possible, underground cables would be installed using a cable plough or trenching. These are considered the most efficient and least impactful methods of cable installation, causing minimal disruption to the ground by cutting, installing and back-filling in one operation
- Use of piling methodology that minimises likelihood of creating pollution pathway to groundwater.

15.7.2.5 In general the design, construction and operation of the Proposed Development must comply with relevant health and safety legislation, regulations and industry guidance helping to control any risks that could arise from the Proposed Development at acceptable levels. A suite of management plans will be in place, as outlined further below, to incorporate standard industry best practice and identify specific controls to limit adverse impacts to the environment.

15.7.2.6 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

15.7.3 Further mitigation

15.7.3.1 Further mitigation is actions that require further activity in order to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for major accidents and disasters ,may be defined through the EIA process. Options for further mitigation for the Proposed Development relevant to major accidents and disasters may include:

- Appropriate construction methods and plans to be chosen to protect and minimise impacts to sensitive receptors.

15.7.4 Management plans

15.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to major accidents and disasters include:

- oCEMP
- oLEMP, including general operational measures alongside those specific to landscape and ecology
- oDEMP
- oCTMP
- oBSMP, this management plan will specifically describe measures to ensure that all safety concerns around battery energy storage system, including fire risk, are addressed as far as reasonably practicable. The relevant local fire and rescue service will be consulted in the preparation of the management plan.

15.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

15.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

15.8 Likely significant effects

15.8.1.1 The potential risks arising during all phases of the Proposed Development are already considered through other technical chapters, and are unlikely to result in significant effects relating to major accidents and disasters. The probability, likelihood and frequency of a major accident or disaster is very low with respect to the Proposed Development and would be managed under established legislative requirements or the design process. As such, further assessment of the vulnerability to major accidents and disasters is **scoped out** of the assessment.

15.9 Proposed assessment methodology

15.9.1.1 The major accident and disaster topic is scoped out from further assessment.

15.10 Assumptions, limitations and uncertainties

15.10.1.1 Scoping has been undertaken based on the information available on the Proposed Development available at the time of writing. The proposal is expected to be a type of development that has been successfully deployed previously and globally, and as such would have a proven technology with a good safety record, with a low risk of giving rise to a major accident and/or disaster.

15.10.1.2 In accordance with good safety management principles, it is assumed that all risks that have the potential to be major accidents and/or disasters, and as such could impact a local environmental receptor, will be managed through best practice in construction techniques, compliance with relevant legislation and through adherence to the oCEMP, oLEMP and oDEMP. An oBSMP will be in place to specifically manage risks related to battery fire safety.

15.11 Summary

Table 15-4 Major accidents and disasters scoping summary

Aspect	**Construction**	**Operation**	**Decommissioning**	**Any required surveys?**
Major accidents and disasters	Scoped out	Scoped out	Scoped out	None

16 Noise and Vibration

16.1 Introduction

16.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of noise and vibration.

16.1.1.2 It sets out noise and vibration receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

16.1.1.3 The following matters have been considered as part of the scope and methodology for noise and vibration:

- Noise and vibration from construction/decommissioning traffic
- Noise and vibration from construction/decommissioning activities
- Noise and vibration from operational traffic
- Noise and vibration from operational activities

16.1.1.4 This chapter is supported Figure 16.1 Noise Sensitive Receptors.

16.1.1.5 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 7 Biodiversity, including:
  - Figure 7.2 Designated Wildlife Sites within 10km
  - Figure 7.3 Local Wildlife Sites within 10km
  - Figure 7.4 Ancient Woodland within 2km
  - Figure 7.5 Priority Habitats within 2km

16.2 Relevant legislation, policy, standards and guidance

16.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for noise and vibration and have informed the scope of the assessment.

16.2.2 Legislation

Table 16-1 Legislation

Legislation	Relevance to assessment
The Environmental Protection Act 1990 [218] (as amended by the	The EPA sets out: the definition of statutory nuisance due to noise; the duty on local authorities to investigate and abate nuisance; and the defence against abatement because "best practicable means"

Legislation	Relevance to assessment
Noise and Statutory Nuisance Act 1993 [219]) (EPA)	has been employed to minimise noise (including vibration) for business premises. The EPA sets out the means for a person affected by noise nuisance to seek abatement through the courts. The Noise and Statutory Nuisance Act sets out an extension of powers to abate noise nuisance to a wider range of sources than the Environmental Protection Act 1990.
The Control of Pollution Act 1974 (CoPA) [220]	Sets out the Section 60 notice which a local authority can serve so as to impose requirements upon relevant construction activities with regard to the control of noise. Under Section 61 of the CoPA, the party that intends to carry out works to which Section 60 applies may apply to the local authority for consent and "an application under this section shall contain particulars of – The works, and method by which they are to be carried out; and The steps proposed to be taken to minimise noise resulting from the works."
Planning Act 2008 [221]	In respect of noise nuisance, the Act confers statutory authority unless there is a provision in a granted Development Consent Order (DCO) to the contrary.

16.2.3 Policy

Table 16-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement (NPS) for Energy (EN-1), 2024 [52])	Sets broad national policy approach. Section 5.12 addresses noise, outlining approach to assessment of impacts and determining requirement for mitigation (if required). EN-1 refers to the relevant British Standards for the assessment of operational noise and construction noise (where 'noise' is used as an umbrella term for noise and vibration) and refers to further information provided in the technology specific National Policy Statements e.g., EN-3 & EN-5. EN-1 refers to the following paragraphs of relevance: Paragraph 5.12.5 lists the factors that will determine the likely noise impact of a proposed development and where noise impacts are likely to arise, paragraph 5.12.6 details what should be included in the noise assessment. Paragraph 5.12.15 requires applicants to demonstrate good design through measures such as selection of the quietest cost-effective plant; containment of noise within buildings; optimisation of plant layout to minimise noise emissions; and the use of landscaping, bunds or noise barriers to reduce noise transmission. Paragraph 5.12.17 states that the Secretary of State (SoS) should not grant development consent unless it is satisfied that the proposals will meet the three aims of the Noise Policy Statement for England7 (NPSE)

Policy	Relevance to assessment
	Paragraph 5.12.14 sets out potential mitigation measures.
NPS for Renewable Energy Infrastructure (EN-3), 2024 [107]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3..Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects. Section 2.5.2 states "Proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for co-existence/co-location with other marine uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage" Section 2.7.40 states "Applicants should include in the ES a noise assessment of the impacts on amenity in case of excessive noise from the project in line with guidance set out in Section 5.12 in EN-1."
NPS for Renewable Electricity Networks Infrastructure (EN-5), 2024 [108]	NPS EN-5 addresses policy for energy transmission. Sections 2.9.26 – 2.9.37 provides guidance on factors affecting the noise produced from transmission lines. Section 2.9.37 states that noise effects can also arise from substation equipment such as transformers. Transformers generate low frequency hum and depends on transformer type and level of attenuation present (either engineered intentionally or provided by other structures. For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards are satisfactory.
National Planning Policy Framework(NPPF), 2023 [9]	Paragraph 180 states that the planning system should contribute to and enhance the natural and local environment by (amongst other considerations) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution. Paragraph 191 states that planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution. This involves, in particular, mitigating and reducing to a minimum, potential adverse impacts resulting from noise; avoiding noise that gives rise to significant adverse impacts on health and the quality of life In addition, tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value should be identified and protected. Paragraph 193 states that planning policies and decisions should ensure that new development can be integrated effectively with existing business and community facilities, with existing businesses

Policy	Relevance to assessment
	not having unreasonable restrictions placed on them as a result of new development permitted after the business was established. Where the operation of an existing business or community facility could have a significant adverse effect on a new development, the application should provide suitable mitigation before the development is complete. This should be taken into account when considering whether proposed development is an acceptable use of land.
Noise Policy Statement for England (NPSE, 2010) [222]	Paragraph 1.6 sets out the long-term vision of Government noise policy, i.e. to "promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development." Paragraph 1.7 states that the NPSE vision is supported by aims to effectively manage and control environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development by: • avoiding significant adverse impacts, • mitigating and minimising adverse impacts and • contributing to the improvement of health and quality of life. Paragraph 2.20 states that to identify "significant adverse" and "adverse" impact in line with the three aims of NPSE, there are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organization: No Observed Effect Level (NOEL): This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise. Lowest Observed Adverse Effect Level (LOAEL): This is the level above which adverse effects on health and quality of life can be detected. Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life occur. Paragraph 2.24 states that where an impact lies somewhere between LOAEL and SOAEL, all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur. Paragraph 2.22 notes that the NPSE states "it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."
Breckland Council Local Development Plan	The Breckland Council Local Development Plan (LDP), was adopted in 2023 and forms the local development strategy in the area. With

Policy	Relevance to assessment
	regards to energy developments, Policy ENV 10 Renewable Energy Development, states: "*The Council supports proposals for new renewable energy and low carbon development, subject to consideration of the impact of the development and whether this can be made acceptable. Proposals will be considered having regard to the extent to which there are:* *ii. adverse effects on residential amenity by virtue of outlook / overbearing impact, traffic generation, noise, vibration, overshadowing, glare or any other associated detrimental emissions, during construction, operation and decommissioning*;" Policy COM 03 Protection of Amenity states: "*For all new development consideration will need to be given to general amenity impact issues, especially residential amenity. Development will not be permitted which causes unacceptable effects on the residential amenity of neighbouring occupants, or does not provide for adequate levels of amenity for future occupants. In assessing the impact of development on the living conditions of occupants, regard will be had to the following amenity considerations:* *7. Odour, noise, vibration or other forms of nuisance such as artificial light pollution, insects and vermin*;"

16.2.4 Standards and guidance

Table 16-3 Standards and guidance

Standards and guidance	Relevance to assessment
Planning Practice Guidance – Noise, 2019 [223] (PPG-N)	The PPG-N provides guidance in the form of a noise exposure hierarchy, which details the levels of perception to noise exposure and the expected outcomes and required actions.
Institute of Environmental Management and Assessment (IEMA) (2014) Guidelines for Environmental Noise Impact Assessment [224]	Presents guidelines on how the assessment of noise effects should be presented within the Environmental Impact Assessment (EIA) process. The IEMA guidelines cover aspects such as: scoping, baseline, prediction and example definitions of significance criteria.
British Standard 4142:2014+A1:2019 Methods for rating and assessing Industrial and Commercial Sound [225] (BS 4142)	Used to rate and assess sound of an industrial nature including, but not limited to, assessing sound from proposed, new, modified, or additional sources of industrial sound, and sound at proposed new dwellings. It contains guidance on the monitoring and assessment of industrial and commercial sound sources (including fixed installations comprising mechanical and electrical plant and equipment) affecting sensitive receptors.
British Standard 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings [226] (BS 8233)	Presents methodology for noise ingress calculations and advice on acceptable internal noise levels.

Standards and guidance	Relevance to assessment
British Standard 5228-1:2009+A1:2014 "Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise" [227] (BS 5228-1)	Provides guidance on the assessment and control of noise from construction sites, along with suggestions for the derivation of guideline levels for impact assessment.
British Standard 5228-2:2009+A1:2014 "Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration" [228] (BS5228-2)	Provides guidance on the assessment and control of vibration from construction sites, along with suggestions for the derivation of guideline levels for impact assessment.
Department for Transport (1988) Calculation of Road Traffic Noise [229] (CRTN)	Describes procedures for calculating noise from road traffic.
Highways England (2018) Design Manual for Roads and Bridges (DMRB): LA111- Noise and Vibration [230]	Guidance document provides methodology for the assessment of noise from road traffic, particularly from new and altered roads. Also provides modifications to CRTN and a methodology for the assessment of noise and vibration from construction traffic.

16.3 Consultation

16.3.1.1 The following stakeholders will be consulted with regards to noise and vibration as part of the assessment process:

- The Environmental Health Officer (EHO) at Breckland Council – to inform assessment methodologies and design principles that need to be adhered to for compliance with relevant national and local planning policies, legal requirements, and best practice guidelines in relation to noise and vibration.

16.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to noise and vibration.

16.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

16.4 Study Area

16.4.1 Study area guidance

16.4.1.1 DMRB LA 111 [230] states that where the need for further assessment has been established, a noise/vibration study area shall be defined to include all:

1) Noise/vibration sensitive receptors that are potentially affected by construction noise/vibration.
2) Noise/vibration sensitive receptors in areas where there is a reasonable expectation that a construction noise/vibration assessment will be undertaken.

16.4.2 Construction noise study area

16.4.2.1 The study area for construction noise effects includes existing sensitive receptors (ESRs) within 300m of the draft Order Limits. This is based on guidance in BS 5228-1 and DMRB LA 111.

16.4.3 Construction vibration study area

16.4.3.1 The study area for construction vibration effects, based on guidance from BS 5228-2 and DMRB LA 111, comprises 100m in all directions from the closest construction activity with the potential to generate vibration effects at ESRs. For the purposes of Scoping, the draft Order Limits set the closest point an activity may take place.

16.4.4 Construction traffic noise study Area

16.4.4.1 The study area for construction traffic includes each applicable road understood to be affected, based on guidance in CRTN and DMRB LA 111. DRMB LA 111 [230] states that further assessment is required if changes in traffic volume on existing roads may cause either of the threshold values for noise to be exceeded. A change in noise level of 1 dB $L_{A10,18hr}$ is equivalent to a 25% increase in traffic flow.

16.4.5 Operational noise study area

16.4.5.1 Based on previous solar experience and professional judgement, the study area for operational noise would comprise ESRs within 500m of the draft Order Limits, with a particular focus on the nearest ESR.

16.5 Baseline conditions

16.5.1 Desktop sources used

16.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Google Earth satellite imagery

16.5.2 Surveys undertaken and proposed

16.5.2.1 No surveys have been completed at the time of writing.

16.5.2.2 The following surveys are planned to be undertaken, and will inform the PEIR / ES:

- Baseline noise survey to establish the existing noise climate at the existing sensitive receptors (ESRs). The locations of the baseline noise survey will be agreed with the EHO at Breckland Council.

16.5.3 Existing baseline

16.5.3.1 The draft Order Limits are located within the open countryside between Swaffham and Dereham in Norfolk in the East of England. The land use within the draft Order Limits is predominantly arable farming. The nearest identified ESRs within 500m to the Proposed Development are listed below and can be identified in Figure 16.1 of this EIA Scoping Report. Ecological receptors are listed below for information, and can be identified in Figures 7.2 to 7.5. However, the impacts of noise disturbance on relevant species is included in Chapter 7 Biodiversity.

Western Panel Area

Properties in towns and settlements

16.5.3.2 No existing sensitive receptors have been identified within the study areas for the Western Panel Area. However, Royal Airforce (RAF) Marham is located approximately 340m to the west of the Western Panel Area.

Local Farms

16.5.3.3 No existing local farms have been identified within the search buffer zone for the Western Panel Area.

Ecological Receptors

16.5.3.4 There are no designated ecological receptors within the Western Panel Area. However, this Panel Area is located adjacent to the Breckland Forest Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA), This Panel Area is over 4km outside of the SSSI impact risk zone for areas of the SPA identified as being used regularly by 1% or more of the UK breeding populations of Stone curlew, Nightjar *Caprimulgus europaeus* and Woodlark *Lullula arborea,* and well beyond the noise study areas; therefore, no significant noise effects are anticipated on this species.

Central Panel Area

Properties in towns and settlements

16.5.3.5 The town of Swaffham is located approximately 1km to the south of the Central Panel Area. The village of Sporle is located adjacent to the Central Panel Area, as shown on Figure 16.1 of this report.

Local Farms

16.5.3.6 Grange Farm is located approximately 100m to the east, and Bridge Farm is located adjacent to the east of the Central Panel Area

Ecological receptors

16.5.3.7 There are no designated ecological receptors, however, the River Nar SSSI lies approximately 2.2km to the north and Castle Acre SSSI lies approx. 3.4km to the north west. Sporle Wood Ancient Woodland is located immediately adjacent to the Central Panel Area.

Northern Panel Area

Properties in towns and settlements

16.5.3.8 The village of Wendling is located approx. 500m to the north and east of the Northern Panel Area.

Local Farms

16.5.3.9 Willow Farm is located within 50m to the south of, Lower Farm Home Farm within 300m to the north , High Green Farm within 90m to the north, Mistletoe Farm within approximately 70m to the west of the Northern Panel Area .

Ecological receptors

16.5.3.10 There are no onsite ecological receptors, however, there are designated sites within 1km, including Holly Farm Meadow SSSI lies approximately 1km to the east, Honeypot Wood SSSI and Ancient Woodland is located around 850m to the north east. Great Wood Ancient Woodland and Necton Wood Ancient Woodland are both located adjacent to the Northern Panel Area.

Eastern Panel Area

Properties in towns and settlements

16.5.3.11 The village of Scarning is located approx. 300m to the north of the Eastern Panel Area.

Local Farms

16.5.3.12 Park Farm is located within 80m to the north, New Church Farm within 20m to the east, and Lawrence Farm within 220m to the west, High House Farm 20m to the south, White House Farm within 130m to the east of the Eastern Panel Area.

Ecological receptors

16.5.3.13 No nearby ecological receptors have been identified, however Potter and Scarning Fens SSSI is located approximately 1.8km north east of the Eastern Panel Area

Southern Panel Area

Properties in towns and settlements

16.5.3.14 The village of Saham Hills is located approximately 100m to the east.

Local Farms

16.5.3.15 Park Farm is located within approximately 340m to the south, Quidney Farm within approx. 200m to the east, and Allotment Farm within approx. 20m of the Southern Panel Area.

Ecological receptors

16.5.3.16 Disused Railway County Wildlife Site (CWS) runs through the Southern Panel Area. High Grove Ancient Woodland and CWS is located adjacent to the Southern Panel Area.

16.5.4 Future baseline

16.5.4.1 There is potential for future development to affect the future baseline however, an initial desktop search of potential future development in the area has yielded no significant developments within the study areas in relation to noise and vibration. The future baseline for noise and vibration is expected to remain as the current existing baseline in the absence of the Proposed Development proceeding due to its largely rural and agricultural nature.

16.6 Potential impacts

16.6.1 Construction

16.6.1.1 The construction works are of a temporary nature as such impacts are temporary and reversible.

16.6.1.2 The potential impacts of the Proposed Development in relation to noise and vibration during construction are likely to include:

- Construction traffic, including Heavy Goods Vehicle (HGV) trips to and from the Proposed Development; and
- Construction activities, including preparatory works, and installation of solar PV modules and supporting equipment.

16.6.2 Operation

16.6.2.1 The potential impacts of the Proposed Development in relation to noise and vibration during operation are likely to result from:

- Operational road traffic to and from the Proposed Development; and

- Operational noise from supporting infrastructure including inverters and transformers, Battery Energy Storage System (BESS), the four on-site substations and one 400kV substation.

16.6.3 Decommissioning

16.6.3.1 The works involved in the decommissioning phase would be similar or of a lower magnitude/duration than for the construction phase. Therefore, it is considered that decommissioning would have similar impacts to that of construction.

16.7 Design, mitigation and enhancement measures

16.7.1 Design principles

16.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

16.7.2 Embedded and Good practice measures

16.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

16.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to noise and vibration are likely to include:

- An appropriate buffer will be maintained between properties and construction areas
- 132kV and 400kV substations will be located will be located as far as reasonably possible from existing sensitive receptors
- Other sources of operational noise will be located as afar as reasonably possible from existing sensitive receptors

16.7.2.3 Measures to control noise as defined in Annex B of BS 5228:2009+A1:2014 Part 1 and Section 8 of BS 5228:2009+A1:2014 Part 2 [228] will be adopted where reasonably practicable. These measures represent 'Best Practicable Means' (BPM) (as defined by Section 72 of the Control of Pollution Act 1974) to manage noise and vibration emissions from construction activities. An Environmental Clerk of Works will also be required to be appointed to advise and supervise the mitigation measures during construction and decommissioning.

16.7.2.4 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

16.7.3 Further mitigation

16.7.3.1 Further mitigation are actions that require further activity to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for noise and vibration will be defined, if required, through the EIA process once the level of significance of effects is known. Options for further mitigation for the Proposed Development relevant to noise and vibration may include:

- Plant selection, siting, screening and enclosures as appropriate.

16.7.4 Management plans

16.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to noise and vibration include:

- oCEMP
- oDEMP
- oCTMP

16.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

16.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

16.8 Likely significant effects

16.8.1 Construction

Noise effects from construction traffic

16.8.1.1 Adverse noise effects due to construction traffic, such as HGV trips to deliver materials and equipment to and from the Proposed Development, are not expected to be significant. Vehicle trips would be temporary, over a maximum 24 month period, and the nature of the Proposed Development would not require large scale material removal or delivery. There is no requirement to remove large amounts of demolition material, spoil, for earth from the draft Order Limits, nor is there a need for large amounts of construction materials such as concrete to be delivered.

16.8.1.2 Tt is anticipated that up to 60 HGV trips per day will be undertaken during the construction period.

16.8.1.3 Furthermore, 60 car sharing trips and 8 mini-bus trips are estimated to transport construction workers to and from the construction compounds.

16.8.1.4 Therefore, while there may be short term temporary noise impacts due to construction traffic, it is very unlikely that these would be sufficient to constitute a significant effect due to the temporary nature, relatively low volume and intensity of movements. An oCTMP will detail measures specific to travel planning and HGV movement to ensure impacts are controlled.

16.8.1.5 Noise from construction traffic is therefore **scoped out** of further assessment in the ES.

Noise effects from construction activities

16.8.1.6 Potentially significant noise effects during the construction could include noise from preparatory works, and the installation of solar PV modules, 132kV and 400kV substations, and supporting equipment. Although significant effects are anticipated to be unlikely, the proposed location and duration of specific construction activities within the draft Order Limits is not known and will be subject to development during design and assessment. Noise impacts will be considered during this design development, such as the design principles described in section 16.7.1 and likely avoid significant effects, however, due to the potential proximity of the nearest sensitive receptors, noise from construction activities is **scoped in** to further assessment and will be reported in the ES.

Vibration effects from construction traffic

16.8.1.7 Vibration from traffic on the public highway is caused by irregularities in the road surface. Where the road surface is free from irregularities, such as potholes, significant vibration effects would not be expected, even at relatively short distances (i.e. within a few metres); this is based on accepted guidance in DMRB LA 111.

16.8.1.8 Perceptible vibration due to construction traffic is also unlikely, except for situations where construction traffic passes very close (i.e. within a few metres) of residential properties, however, this would only occur for short periods. As such, significant vibration effects due to vibration caused by construction traffic is unlikely due to the low intensity of vehicle movements.

16.8.1.9 Vibration from construction traffic is proposed to be **scoped out** of further assessment the ES.

Vibration effects from construction activities

16.8.1.10 Sources of construction vibration include piling and vibratory compaction. Construction vibration would not be expected to cause damage to buildings or structures unless very high levels of vibration are generated. BS 7385-2:1993 *Evaluation and Measurement for Vibration in Buildings* provides guidance on acceptable values of transient vibration for avoidance of cosmetic damage to buildings. Peak particle velocity (PPV) values of 15mm/s are unlikely to result in any damage to buildings. Such levels would only be expected to occur where vibration generating activities occur very close to structures, within approximately 10m. Such distances between vibration generating activities and buildings or

structures are not expected during the Proposed Development as construction works would be a minimum of 300m from the nearest ESRs which is considerably further than the 100m study area outside of which vibration effects are not likely to be significant.

16.8.1.11 There is potential for effects on human receptors due to construction vibration at ESRs within the study area. The level of significance would depend on the nature and the duration of activities, the distance between the source of vibration and the ESR, the sensitivity of the ESR, and the standard measures employed to reduce vibration. However, the duration of such activities would be expected to be relatively short at any one location (a number of days and less than one month), and, together with the implementation of standard measures secured in oCEMP, significant effects from such works are not likely.

16.8.1.12 Construction vibration effects are proposed to be **scoped out** of further assessment the ES.

16.8.2 Operation

Noise effects from operational activities

16.8.2.1 During the operational phase, it is possible that noise could be generated by supporting infrastructure that would be installed as part of the Proposed Development.

16.8.2.2 The solar PV modules and connecting cables do not emit noise. However, there is the potential for the BESS and the supporting infrastructure, such as inverters, transformers, and the four on-site132kV substations and 400kV substation, to generate some noise during operation.

16.8.2.3 Typically, noise from electrical infrastructure associated with solar farms falls below approximately 30 dB at distances equivalent to 300m, however, this is dependent on the local topography, the number and noise rating of the electrical plant to be installed.

16.8.2.4 Any sources of operational noise (e.g. inverters) will be located as far as reasonably possible from existing sensitive receptors.

16.8.2.5 Full details of any noise generating supporting infrastructure would also be included as part of the Proposed Development description within the ES, along with further details as to how the design of the Proposed Development has been developed to minimise any adverse impacts on the residential amenity of surrounding occupiers. It is not anticipated that any noise impacts arising from plant and supporting infrastructure would be to levels deemed to be significant, particularly in consideration of the passive nature of solar farm development.

16.8.2.6 However, as the candidate electrical infrastructure is not known at this stage and precise locations of the items of plant are also unknown, it is not possible not assess the significance of effect at this stage, therefore, operational noise is **scoped in** to the EIA.

Noise from operational traffic

16.8.2.7 During the operational phase, it is possible that noise could be generated by road traffic to and from the Proposed Development.

16.8.2.8 It is anticipated that traffic trips to and from the Proposed Development during operation would be minimal involving very low frequency visits by maintenance and security staff, occasional deliveries for replacement of parts/equipment, and occasional visitors. Given the very low number of trips generated by the Proposed Development significant noise effects are unlikely.

16.8.2.9 Noise from operational traffic is therefore **scoped out** of further assessment in the ES.

Vibration effects from operational activities

16.8.2.10 There are no sources of operational vibration proposed as part of the Proposed Development as plant with moving parts, including cooling equipment and transformers, would be mounted on suitable anti-vibration mounts. Vibration would therefore not be expected to be perceptible even in very close proximity to plant.

16.8.2.11 Vibration from operational activities is proposed to be **scoped out** of the ES.

Vibration effects from operational traffic

16.8.2.12 As operational traffic would be minimal (see paragraphs 16.8.2.6 to 16.8.2.8) and for maintenance purposes only, it is considered that vibration from operational traffic is unlikely to result in significant effects.

16.8.2.13 Vibration from operational traffic is proposed to be **scoped out** of the ES.

16.8.3 Decommissioning

16.8.3.1 The works involved for the decommissioning phase would be similar or of a lower magnitude/duration than for the construction phase.

16.8.3.2 Noise from decommissioning activities is **scoped in**, however as the effects are anticipated to be similar to or less than construction no separate decommissioning assessment will be undertaken, and results will be as reported under construction.

16.9 Proposed assessment methodology

16.9.1.1 This section sets out the proposed assessment methodology for the assessment of noise effects from construction and operational activities.

16.9.1.2 Baseline noise monitoring will be undertaken to establish the noise environment around the Site and representative of surrounding ESRs. Monitoring will be undertaken at selected locations representative of ESRs around the draft Order

Limits. The survey methodology will be agreed with the relevant local authorities prior to undertaking.

16.9.1.3 The monitoring procedures will follow guidance from BS 7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedures' and BS 4142:2014+A1:2019 [225] 'Methods for rating and assessing industrial and commercial sound'. A weather station will also be installed for the duration of the noise surveys so any periods of adverse weather conditions could be identified and omitted from noise data.

16.9.1.4 The NPSE [222] introduced three concepts to the assessment of noise, as follows:

- NOEL – No Observed Effect Level
  - This is the level below which no effect can be detected and below which there is no detectable effect on the health and quality of life due to noise.
- LOAEL – Lowest Observed Adverse Effect Level
  - This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level
  - This is the level above which significant adverse effects on health and quality of life occur.

16.9.2 Construction noise

16.9.2.1 Construction noise levels would be calculated at the facades of ESRs within the study area in accordance with the methodology described in Annex F of BS 5228-1. The predicted construction noise levels at ESRs would be compared against the lower noise thresholds (Category A) as detailed in Section E.3.2 of BS 5228-1 (the 'ABC' method). The Category A construction noise thresholds represent the lowest assessment criteria, typically used to assess impacts in rural areas.

Magnitude of impact

16.9.2.2 The magnitude of impact has been considered as the change experienced from the current baseline conditions at a receptor, and has been considered on a scale of high, moderate, low or negligible.

16.9.2.3 The methodology used to determine the magnitude of change for construction noise is shown below in Table 16-4 and Table 16-5.

Table 16-4 Magnitude of construction noise impact

Magnitude of Change	Criteria
High	Noise levels is ≥10dB above the adopted Category A, B or C thresholds.
Moderate	Noise levels is 5-9dB above the adopted Category A, B or C thresholds.
Low	Noise levels is 1-4dB above the adopted Category A, B or C thresholds.

Magnitude of Change	Criteria
Negligible	Noise levels is ≤0dB above the adopted Category A, B or C thresholds.

Table 16-5 Thresholds of significant impact from construction noise at residential receptors in accordance with the ABC method of BS5228-1

Assessment Category Threshold Value Period (L_{Aeq})	Threshold Value in Decibels (dB)		
	Category A *1	Category B *2	Category C *3
Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours)	65	70	75
***1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.**			
***2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.**			
***3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.**			

16.9.3 Operational Noise

16.9.3.1 The assessment of operational noise effects will be undertaken according to the methodology set out in BS 4142:2014 [225].

16.9.3.2 The baseline noise measurements will be used to determine representative daytime and night-time background noise levels at the assessed receptors.

16.9.3.3 Noise from operational plant such as substations, inverters, transformers and battery storage units will be predicted using noise modelling software and plant emissions data provided by the applicant.

16.9.3.4 The assessment will consider the level by which the Proposed Development's BS 4142 Rating level exceeds the prevailing background noise levels, as well as the context in which the sound will occur. BS 4142 states that a difference of +5 dB is likely to be an indication of adverse impact.

16.9.3.5 Where background and rating levels are low, BS 4142:2014 [225] states that the absolute level might be as, or more relevant than the margin by which the Rating level exceeds the background noise level. As such, it is proposed that noise limits will be a combination of a margin of 5 dB above the representative background level, subject to a fixed lower threshold of 35 dB, which would apply in low background noise situations.

16.9.3.6 Table 16-6 below presents the operational noise magnitude of impact.

Table 16-6 Method for Assessing the Magnitude of Impact

Magnitude of Impact	Effect Level	Noise Level Criteria	Justification for Effect Level-Action Required
Negligible	No Observed Adverse Effect Level (NOAEL)	Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background level $L_{A90,T}$ dB is	Justification for Effect Level: Below low impact threshold in BS4142:2014 Action Required:

Magnitude of Impact	Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
		less than or equal to 0dB depending on context	None
		Noise levels are below: Living Rooms: 35 $dBL_{Aeq,16hours}$ Kitchens, Dining Rooms, and Studies: 40 $dBL_{Aeq,16hours}$ Bedrooms Rooms: 35 $dBL_{Aeq,16hours}$ 30dB $L_{Aeq,8hr}$ $L_{AFmax,2min}$ noise levels do not exceed: 45dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Less than threshold values in Table 4 in BS8233:2014 and Table 1 in World Health Organisation (1999) Guidelines on Community Noise Action Required: None
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of ≤1dB.	Justification for Effect Level: Within negligible short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: None
Low	Lowest Observed Adverse Effect Level (LOAEL)	Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background sound level $L_{A90,T}$ dB is between 1-4dB, depending on context.	Justification for Effect Level: Within less likely for adverse or significant adverse impact to occur low impact threshold in BS4142:2014 Action Required: Mitigate and reduce to a minimum the exceedance over 0dB above background threshold
		Noise levels are between: Living Rooms: 35-40 $dBL_{Aeq,16hours}$ Kitchens, Dining Rooms, and Studies: 40-45 $dBL_{Aeq,16hours}$ Bedrooms Rooms: 35-40 $dBL_{Aeq,16hours}$ 30-35dB $L_{Aeq,8hr}$ LAFmax,2min noise levels do not exceed 45dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceed threshold guidelines in Table 4 of BS8233:2014 and World Health Organisation (1999) Guidelines on Community Noise by no greater than 5dB to achieve reasonable internal conditions as defined by Note 7 to Table 1 in BS8233:2014 Action Required: Mitigate and reduce to a minimum the exceedance over the threshold
		Increase in ambient LAeq,T due to contribution from	Justification for Effect Level: Within minor short-term impact classification range in Table

Magnitude of Impact	Effect Level	Noise Level Criteria	Justification for Effect Level- Action Required
		proposed development of 1.0-2.9dB.	7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
Moderate	Significant Observed Adverse Effect Level (SOAEL)	Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background sound level $L_{A90,T}$ dB is between 5-9dB, depending on context.	Justification for Effect Level: Within adverse impact threshold in BS4142:2014. Action Required Additional mitigation required to achieve effect of LOAEL or less.
		Noise levels are between: Living Rooms: 40-45 $dBL_{Aeq,16hours}$ Kitchens, Dining Rooms, and Studies: 45-50 $dBL_{Aeq,16hours}$ Bedrooms Rooms: 40-45 $dBL_{Aeq,16hours}$ 35-40dB $L_{Aeq,8hr}$ 45-55dB $L_{AFmax,2min}$ based on 10th highest $L_{AFmax,2min}$ sample)	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,T}$ reasonable criteria by 5dB or exceeds $L_{AFmax,2min}$ (10th highest sample) Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Increase in ambient $L_{Aeq,T}$ due to contribution from proposed development of 3.0-4.9dB.	Justification for Effect Level: Within moderate short-term impact classification range in Table 7.14 in IEMA 2014 guidance Guidelines for Environmental Noise Impact Assessment Action Required: Additional mitigation required to achieve effect of LOAEL or less.
High	Unacceptable Observed Adverse Effect Level (UOAEL)	Difference between Rating Level ($L_{Ar,Tr}$) dB and existing background sound level $L_{A90,T}$ dB is equal to or greater than 10dB, depending on context.	Justification for Effect Level: Within significant adverse impact threshold in BS4142:2014 Action Required: Additional mitigation required to achieve effect of LOAEL or less.
		Noise levels exceed: Living Rooms: 45 $dBL_{Aeq,16hours}$ Kitchens, Dining Rooms, and Studies: 50 $dBL_{Aeq,16hours}$	Justification for Effect Level: Exceeds BS8233:2014 $L_{Aeq,T}$ reasonable criteria by 10dB or exceeds $L_{AFmax,2min}$ (10th highest sample) by 10dB or more. Action Required:

Magnitude of Impact	Effect Level	Noise Level Criteria	Justification for Effect Level-Action Required
		Bedrooms Rooms: 45 dB$L_{Aeq,16hours}$ 40dB $L_{Aeq,8hr}$ $L_{AFmax,2min}$ noise levels exceeds 55dB L_{AFmax} based on 10th highest $L_{AFmax,2min}$ sample)	Additional mitigation required to achieve effect of LOAEL or less.

16.9.4 Sensitivity of receptors

16.9.4.1 The sensitivity of the receptors has been considered on a scale of high, moderate, low or negligible. The methodology used to determine the sensitivity is shown below in Table 16-7 below.

Table 16-7 Sensitivity of receptor

Sensitivity	Receptor Type
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character or is of international or national importance. For example, hospitals, residential care homes, and internationally and nationally designated nature conservation Sites which are also known to contain noise sensitive species (i.e., noise may change breeding habits or threaten species in some other way).
Moderate	Receptors/resource has moderate capacity to absorb change without significantly altering its present character. For example, residential dwellings, offices, schools, and play areas. Locally designated nature conservation Sites which are also known to contain noise sensitive species (i.e., noise may change breeding habits or threaten species in some other way).
Low	Receptor/resource is tolerant of change without detriment to its character or is of low or local importance. For example, industrial estates.
Negligible	Receptor/ resource is not sensitive to noise.

16.9.5 Significance of effect

16.9.5.1 The significance of effect will be informed by the magnitude of change due to the Proposed Development and the evaluation of the sensitivity of the affected receptor. The significance of effect will be determined using professional judgement and Table 16-8 will be a tool to assist this process.

16.9.5.2 Whilst Table 16-8 provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it will be concluded whether the effect is 'beneficial' or 'adverse'.

Table 16-8 Effect significance matrix

Magnitude of Change	Sensitivity			
	High	Moderate	Low	Negligible
High	Major	Moderate-Major	Moderate	Minor

Moderate	Moderate-Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

16.9.5.3 Where significance of effects of Major and Moderate-Major are recorded these effects will be categorised as significant in EIA terms.

16.9.5.4 Where significance of effects of Moderate are recorded these effects will be categorised as significant unless contextual factors can be taken into consideration to determine the effect as not significant in EIA terms.

16.9.5.5 Where significance of effects of Minor and Negligible are recorded these effects will be categorised as not significant in EIA terms.

16.10 Assumptions, limitations and uncertainties

16.10.1.1 The noise specifications for each piece of equipment installed on the Proposed Development will be taken from BS 5228-1.

16.11 Summary

Table 16-9 Noise and vibration scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Noise from traffic	Scoped Out	Scoped Out	Scoped Out	None required
Vibration from traffic	Scoped Out	Scoped Out	Scoped Out	None required
Noise from activities	Scoped In	Scoped In	Scoped In	Baseline noise survey locations to be agreed with Breckland Council
Vibration from activities	Scoped Out	Scoped Out	Scoped Out	None required

17 Socio-Economics

17.1 Introduction

17.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of socio-economics.

17.1.1.2 It sets out socio-economics receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

17.1.1.3 The following matters have been considered as part of the scope and methodology for socio-economics:

- Employment opportunities during construction, operation and decommissioning;
- Effects on the local economy;
- Recreational and community facilities;
- Public Rights of Way (ProW) and recreational routes;
- Development Land;
- Mineral Safeguarding areas.

17.1.1.4 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 5 Agricultural Land and Soils
- Chapter 14 Landscape and Visual
- Chapter 16 Noise and Vibration
- Chapter 18 Traffic and Transport

17.2 Relevant legislation, policy, standards and guidance

17.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for socio-economics and have informed the scope of the assessment.

17.2.2 Legislation

17.2.2.1 There is no legislation specific to the assessment of socio-economic effects arising as part of the Proposed Development. Where relevant, legislation specific to elements of the assessment such as the Countryside and Rights of Way Act (2000) [231] will be referenced

17.2.3 Policy

Table 17-1 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for Energy (EN-1), 2024 [52]	Sets broad national policy approach. Section 4.1 sets out the general policies for the submission and assessment of applications relating to energy infrastructure. Paragraph 4.1.5, considers the weighting of adverse impacts and benefits, including the contribution to job creation and any long-term or wide benefits. Section 5.11 addresses land use outlining approach to assessment of impacts and determining requirement for mitigation (if required), including the following paragraphs of relevance: Paragraph 5.11.28 and ensuring appropriate mitigation measures to safeguard mineral resources. With reference to paragraph 5.11.30 on PRoWs, National trails and are rights of access to land. Section 5.13 addresses socioeconomics, outlining approach to assessment of impacts and determining requirement for mitigation (if required), including the following paragraphs of relevance: Paragraph 5.13.4 which considers potential relevant socio-economic impacts such as the creation of jobs and training opportunities, the contribution to the development of low-carbon industries the provision of additional local services and improvements, local supply chains and effects on tourism. Paragraph 5.13.5 states that Applicants are encouraged to demonstrate that local suppliers have been considered in the supply chain and paragraph 5.13.7 that Applicants should consider developing accommodation strategies.
National Policy Statement for renewable Energy Infrastructure (EN-3), 2024, [107]	With reference to paragraphs 2.10.40 to 2.10.45, on PRoW, setting out an approach for keeping PRoW, as far as is practicable, open, for preventing, as far as possible, visual and amenity impacts, exploring opportunities for enhancement and utilising an outline Public Rights of Way Management Plan. Additionally, paragraph 2.10.69 on socio-economic benefits in retaining site infrastructure post operation.
National Policy Statement for Electricity Networks Infrastructure (EN-5), 2024, [108]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects.

Policy	Relevance to assessment
	Paragraph 2.2.7, which provides guidance on the factors influencing site selection and design including community considerations for determining a feasible route between initiating and terminating points of a proposed electricity line .
National Planning Policy Framework, 2023, Department for Levelling-up, Housing and Communities [232]	The National Planning Policy Framework (NPPF) sets out the government's planning policies for England how these should be applied. These policies may be relevant to the assessment but do not form part of the decision-making process for a Nationally Significant Infrastructure Project. The assessment would therefore look at key parts of the framework such as, paragraph 8 which outlines the three objectives (economic, social and environmental) that support achieving sustainable development, Building a strong, competitive economy (Section 6), paragraphs 80, 82 and 83, Achieving Well Designed Places, and Promoting healthy and safe communities, specifically paragraph 97, (Section 8).
Breckland District Local Plan, 2023, Breckland Council [233]	The Proposed Development is located within the administrative boundaries of Breckland Council. Policy ENV 10 Renewable Energy Development notes the council supports proposals for new renewable energy development subject to its impact. Policy COM 02 Healthy lifestyles sets out policy to ensure appropriate steps to "avoid/mitigate potential negative effects on the health of the population" including "safeguarding and enhancing green infrastructure". Policy EC01 Economic Development sets out that the distribution of new employment allocation, reflecting sustainability principles. COM 04 Community Facilities sets out that "The creation, enhancement and expansion of community facilities will be supported where this would enhance the existing offer, benefit the local economy and be of a suitable scale and type for its location and in locations in close proximity to the area that they will serve." Any supplementary or supporting documentation of relevance will also be considered.
Greater Norwich Local Plan, 2024, GNLP [234]	The Greater Norwich Local Plan covers the areas of Broadland District Council, Norwich City council and South Norfolk County Council. While the proposed development is not located with the administrative boundaries of these areas there is the potential for wider economic impacts. Policy 1 sets out the plan's objectives with relation to growth in the economy including improvements to green infrastructure. Paragraph 109 sets out that the plan should support further development of renewable and low carbon energy sources, such as solar farms.
Great Yarmouth Local Plan, 2021, Great Yarmouth Borough Council [235]	While the proposed development is not located with the administrative boundaries of Great Yarmouth Borough Council there is the potential for wider economic impacts. Policy S04 sets out the plan's objectives with regards to strengthening the competitiveness of the local economy on a local, national, European and international scale.
King's Lynn & West Norfolk Local Plan, 2011, King's Lynn & West Norfolk Borough Council [236]	While the proposed development is not located with the administrative boundaries of King's Lynn & West Norfolk Borough Council there is the potential for wider economic impacts. Policy CS10, which support the Core Strategy Objectives 1,2,3,4 and 5

Policy	Relevance to assessment
	Economy, outlines that the local economy should be developed sustainably to facilitate job growth in the local economy.

17.2.4 Standards and guidance

Table 17-2 Standards and guidance

Standards and guidance	Relevance to assessment
Planning Practice Guidance,(last updated 2023), Department for Levelling Up, Housing and Communities [237]	Paragraph 013 which sets out relevant planning considerations for solar farms Paragraph 155 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.
Green Book: Central Government Guidance on Appraisal and Evaluation, HM Treasury, 2022 [238]	Chapter 5 sets out an approach for Social Cost Benefit and Cost effectiveness Analysis for assessing the impact of different options on social welfare.
Breckland Design Guide, 2024, Breckland Council [239]	Provides design guidance for the integration of development with nature (Section 3) and for building a distinctive local identity, specifically paragraph 5.6 on utilising local materials and details.

17.2.4.1 Presently no specific guidance is available which establishes a methodology for the assessment of socio-economic effects of a Solar Farm and so, in addition to the above, previous professional experience will be utilised.

17.3 Consultation

17.3.1.1 The following stakeholders will be consulted with regards to socio-economics as part of the assessment process:

- Norfolk County Council in relation to PRoW
- Local access or recreation groups as identified in relation to PRoW and permissive trails;
- Breckland Council and Local Business Groups in respect of job creation and supply chain opportunities and/or mitigation measures

17.3.1.2 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to socio-economics.

17.3.1.3 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and

non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

17.4 Study area

17.4.1.1 The Proposed Development is situated entirely within the Breckland District Local Authority boundary. The scale and geographic distribution of the Proposed Development means that its effects have the potential to impact a significant geographic area and the associated population. As such the areas set out below will be assessed as the study area for Socio-economic impacts.

- Potential employment effects may be felt over a wide area given the somewhat specialist nature of some of the construction and operational tasks. The study area for consideration of economic effects would therefore be the districts within Norfolk County Council area, which are Breckland District, Broadland District, Great Yarmouth Borough, King's Lynn & West Norfolk Borough, and Norwich City.
- Potential effects on the PRoW network would focus on the draft Order Limits but extend beyond the draft Order Limits where indirect effects are identified.
- Potential effects on land uses such as community facilities would focus on areas within 500 meters of the Proposed Development.

17.5 Baseline conditions

17.5.1 Desktop sources used

17.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study areas:

- Review of aerial imagery and mapping of the draft Order Limits and surrounding areas
- Office for National Statistics data (including 2021 Census data) [240]
- PRoW data from Norfolk County Council [241]
- Breckland Council Local Plan [233]
- Norfolk County Council Safeguarded Mineral Resources [242]

17.5.1.2 The potential impacts arising from the Proposed Development are assessed relative to the baseline conditions and benchmarked against regional and national standards where appropriate. The key indicators and measures of the areas will be established for:

- Population and deprivation
- An overview of the local economies
- The local labour markets

17.5.2 Surveys undertaken and proposed

17.5.2.1 No surveys are required in respect of potential socio-economic effects.

17.5.3 Existing baseline

Population and employment

17.5.3.1 The study area of Breckland supports a resident population of 142,200 people with 64,000 defined as economically active [243]. Breckland has seen its population grow by 8.4% and nearby areas of South Norfolk and King's Lynn and West Norfolk have grown by around 14.4% and 6.2% respectively [240] [244].

17.5.3.2 According to Breckland District's employment study in 2013 the largest sectors were manufacturing (16%), retail (11.3%), healthcare (9.2%), construction (8.4%) and education (7.6%), with wholesale, transport and professional services also accounting for a significant share of employment, with the financial, IT, and business service sectors under-represented compared with regional or national averages [245]. Presently, key sectors include manufacturing, automotive repair, construction, human health and social work, administrative and accommodation and food services. [245]

17.5.3.3 Within the last year employment in Breckland has risen compared with the previous year as has economic inactivity, while unemployment has also increased. Without the Proposed Development it is anticipated that these employment trends will continue. [243]

17.5.3.4 Breckland is ranked 127 out of the 317 national boroughs in the English Indices of Deprivation. The Gross Value Added (GVA) per head in 2015 was £19,761, which is less than the GVA per head of the East of England Region and England as a whole. [243]

17.5.3.5 The wider Norfolk Region has a total population of 918,500 people with 449,800 defined as economically active. The region has a slightly higher proportion of people who are economically active compared to Great Britain as a whole. The main employment types by occupation across the region are automotive, human health and social work, accommodation and food service, manufacturing, construction and administration. [246]

17.5.3.6 The East of England region saw the largest population increase between 2011 and 2021 in England, growing by around 8.3% or 488,000 more residents [246].

Public Rights of Way

17.5.3.7 Listed below are the PRoW that may interact with the draft Order Limits.

Parish of Swaffham			
FP7	RB54	RB6	RB40
RN52	RB68	FP14	RB44
RB53	RB39a	RB67	RB2
RB60	FP8	RB15	
RB55	RB8	FP35	
Parish of Sporle with Palgrave			
FP10	BR5	BR4	
BR8	BR9		
Parish of Beachamwell			
FP4	BR2	BR1	BR5
Parish of Narborough			
RB7a	RB9	RB3	
Parish of South Acre			
RB6			
Parish of Ashill			
RB11	FP8	FP7	RB11

National Trails and National Cycle Routes
Peddars Way
Norfolk Coast Path
National Cycle Route 13

17.5.3.8 Within the last year employment in Breckland has risen compared with the previous year as has economic inactivity, while unemployment has also increased. Without the Proposed Development it is anticipated that these employment trends will continue.

Recreational and community facilities

17.5.3.9 The Proposed Development is predominantly set within agricultural land, which due to its existing use, is not in itself a key recreational attraction or destination. The land does, however, play a role in providing a landscape context to recreational use of waterways and walking and cycling routes.

17.5.3.10 Table 17-4 sets out the local community facilities in the built-up areas within 500 meters of the Proposed Development. These have been identified using Breckland Council Review of Local Service Centre Parishes and the Swaffham Town guide. [247] [248]

Table 17-3 Community Facilities

Settlement	Community Facility
Necton	1 Village Hall/Community Centre Primary School
Swaffham	Local Shops Secondary School

17.5.3.11 The Breckland Council Adopted Site Specific Policies and Proposals Development Plan Document allocates a number of site allocations, which are located near to the draft Order Limits. [233]

Table 17-4 Local Plan Site Allocations

Land	Allocation
Land to the east of Brandon Road and north of the Former Redland Tiles Site	Land amounting to approximately 10 hectares is allocated for a residential development of 250 dwellings. A minimum of 0.96 hectares of outdoor sport provision and 0.48 hectares of children's play space will be provided on site along with related landscaping and facilities.
Land to the North of the Eco-Tech Centre	Land amounting to approximately 3 hectares is allocated for employment development. The development will provide a mix of B class units only.

Land	Allocation
Land to the West of the Eco-Tech Employment Area	Land amounting to approximately 5.8 hectares is allocated for employment development. The development will provide a mix of B class units only.

17.5.3.12 The draft Order Limits also intersects with areas identified as Mineral Safeguarding Areas for Sand and Gravel, around the settlements of Ashill and Necton. Policy CS16 of the Norfolk County Council Adopted Minerals & Waste Core Strategy is set out below. [249]

Table 17-5 Mineral Safeguarding Policy

Policy	Description
Policy CS16 – Safeguarding minerals and waste sites and mineral resources.	The County Council will safeguard existing, permitted and allocated mineral extraction and associated development and waste management facilities, within the following categories: • Waste management facilities with a permitted input of over 20,000 tonnes per annum; • Key wastewater and sludge treatment facilities; • Waste water pumping stations; • All mineral extraction sites that are active, and sites with planning permission and allocated sites; and • Infrastructure located at railheads, wharves and quarries which can transport or handle minerals. Consultation areas will be delineated on the Proposals map and extend to 250 metres from each safeguarded site, apart from the key wastewater and sludge treatment facilities, for which the consultation distance will be 400 metres. In addition, any development proposed within 50 metres of a pumping station (as identified through the planning application) will be subject to consultation with the relevant wastewater management company by the planning authority responsible for determining the application. The County Council will oppose development proposals which would prevent or prejudice the use of safeguarded sites for those purposes unless suitable alternative provision is made. Carstone and sand & gravel resources are not as nationally important and scarce as silica sand, but MPS1 (paragraph 13)

Policy	Description
	cautions against proven mineral resources being "needlessly" sterilised by non-mineral development. The conservation benefits of carstone will be a consideration in safeguarding resources. The Mineral Planning Authority should be consulted on all development proposals within Mineral Consultation Areas, except for the 12 excluded development types set out in Appendix C. For other development types within Mineral Consultation Areas (i.e. non-minor development outside settlement boundaries), the Mineral Planning Authority will expect to see appropriate investigations carried out to assess whether any mineral resource there is of economic value, and if so, whether the material could be economically extracted prior to the development taking place.

17.5.4 Future baseline

17.5.4.1 Due to the short time period between assessment and probable construction if consent is granted there is unlikely to be a notable change in the baseline conditions. Other developments will be identified through the cumulative assessment, as set out in Chapter 20 of this EIA Scoping Report, and these will be reviewed and any relevant changes taken into account. Where new development is expected to be delivered in line with allocated and planned development sites as set out above

17.5.4.2 The Local Authority area of Breckland is anticipated to grow by about 21,000 people between 2020 and 2040. [250] Of the surrounding areas South Norfolk is projected to grow the most, with a forecasted increase of 14.8%. Broadland, North Norfolk and King's Lynn and West Norfolk's populations are all also projected to increase. [244]

17.6 Potential impacts

17.6.1 Construction

17.6.1.1 Given the baseline situation, design principles and embedded measures, it is considered that the following receptors may be impacted during the construction of the Proposed Development.

- Employment and Skills - construction related employment, training and apprenticeship opportunities.
- Supply Chain – indirect employment and supply chain opportunities.
- Potential temporary closure or diversions of PRoW and recreational routes.
- Potential temporary impacts on wider land uses including commercial and community receptors.

- Potential impacts on development land and land identified as a key resource (e.g. minerals).
- Potential temporary and/or permanent adverse amenity impacts.

17.6.2 Operation

17.6.2.1 Many of the impacts generated by the Proposed Development are not anticipated to be experienced during the operation phase. Impacts upon PRoW and recreational routes and provision of temporary worker accommodation as well as impacts on land use would be first felt during construction, and therefore are accounted for as such.

17.6.2.2 Operational phase impacts may include the following:

- Employment and Skills - Operation may provide some employment opportunity to the local and wider regional market.
- Maintenance visits to the Proposed Development during operation, impacting on local traffic and key routes.
- Local economic impacts stemming from changes in land use from intensive arable uses to potential low intensity agricultural, such as grazing, and solar use.

17.6.3 Decommissioning

17.6.3.1 It is anticipated that the potential impacts of the decommissioning of the Proposed Development would be similar to those identified for construction in relation to job creation and supply chain opportunities. This phase of the Proposed Development could alter any changes made to PRoW where this brings beneficial effects.

17.7 Design, mitigation and enhancement measures

17.7.1 Design principles

17.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

17.7.2 Embedded and Good practice measures

17.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

17.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to socio-economics are likely to include:

- An appropriate buffer will be maintained between properties and construction areas
- Existing access to community facilities/assets to be maintained at all times or a suitable equivalent provided

17.7.2.3 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

17.7.3 Further mitigation

17.7.3.1 Further mitigation is actions that require further activity in order to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for socio-economics will be defined through the EIA process and reported in the ES once the level of significance of effects is known.

17.7.4 Management plans

17.7.4.1 A suite of management plans will be submitted with the DCO application, for the Proposed Development, those relevant to socio-economics include:

- oCEMP
- oDEMP
- oCTMP
- oPRoWMP

17.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

17.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

17.8 Likely significant effects

17.8.1 Potential Receptors

17.8.1.1 Following review of baseline environment, design principles and embedded measures, it is considered that the following receptors may be impacted during the construction of the Proposed Development.

- Employment and Skills - construction related employment, training and apprenticeship opportunities.
- Local Economy – related to changes in use from agricultural land.
- Supply Chain – indirect employment and supply chain opportunities.
- Potential temporary closure or diversions of PRoW and recreational routes.
- Potential temporary impacts on wider land uses including commercial and community receptors.
- Potential impacts on development land and land identified as a key resource (e.g. minerals).
- Potential temporary and/or permanent adverse amenity impacts.

17.8.2 Construction

17.8.2.1 In relation to employment and skills and supply chain receptors, the construction of the Proposed Development has the potential to generate significant beneficial effects. It is therefore proposed that potential effects in relation to employment and supply chain are **scoped in**, for the construction stage, as part of the assessment.

17.8.2.2 Much of the Proposed Development extends across open and agricultural land. This has the potential to impact on farms as local businesses and could lead to a loss of agricultural income and production. It is therefore proposed that potential effects in relation to the local economy chain are **scoped in**, for the construction stage, as part of the assessment.

17.8.2.3 The network of PRoW and recreational routes in the draft Order Limits, as set out in section 17.5.3, could be impacted by the Proposed Development, with sections of PRoW and recreational routes diverted or severed. It is considered that potential effects on PRoW and recreational resources would occur during the construction phase with mitigation measures developed during construction designed in such a way that they provide the ongoing design solution (e.g. PRoW diversions implemented on their ongoing/operational alignment). It is therefore proposed that potential effects on the PRoW network are **scoped in** as part of the assessment during operation.

17.8.2.4 In relation to community facilities and commercial land uses, identified in 17.5.3, the Proposed Development has the potential to generate a temporary rise in use, during the construction phase, due to an increase in construction workers. However, the majority of this is anticipated to be centred around the town of Swaffham which, as a Market Town, will have the capacity to support the increase in use. It is therefore proposed that potential effects on the community facilities and wider land uses are **scoped out** as part of the assessment during construction.

17.8.2.5 The Development Land allocations are located near to the draft Order Limits centred around the built-up area of Swaffham. There will be no impacts outside of the Order Limits as a result of the Proposed Development however there may be indirect impacts, e.g. access, on the delivery of development allocations. It is considered, however, that these indirect impacts would be sufficiently dealt with

by other assessment chapters (e.g. transport) and mitigated through management plans. It is therefore not considered necessary to undertake a specific assessment as part of the socio-economic chapter and it is therefore proposed these are **scoped out** of the assessment during construction.

17.8.2.6 Parts of the Proposed Development are located within Norfolk County Council's Minerals Safeguarding Areas for Sand and Gravel. However, mineral deposits within Safeguarding Areas will not be permanently sterilised by the Proposed Development and the minerals and waste policies do not currently identify proposals for mineral extraction in the area. It is therefore proposed these are **scoped out** of the assessment during construction.

17.8.2.7 Any wider effects on the local population (amenity effects) would be indirect, following the employment of the design principles to avoid residential areas. These indirect amenity effects would be sufficiently dealt with by other assessment chapters (e.g. transport, noise and visual effects) and mitigated through management plans. It is therefore not considered necessary to undertake a specific amenity assessment as part of the socio-economic chapter and it is therefore proposed these are **scoped out** of the assessment, during construction.

17.8.3 Operation

17.8.3.1 The operation phase has the potential to generate a limited amount of additional employment opportunities, as well as some local supply chain requirements and as such, effects upon employment and skills and supply chain receptors is **scoped in** for further assessment during operation.

17.8.3.2 Any opportunities for enhancement of the PRoW network would be reported during construction and would not be considered further as part of the operational assessment. It is therefore proposed that potential effects in relation to the PRoW network are **scoped out** for the operation stage, as part of the assessment. There would be no direct or indirect effects during operation on wider land use receptors. No development land allocations are within the draft Order Limits and, while the Proposed Development's operation may lead to an increase in use of community and commercial receptors this is not anticipated to be significant. It is therefore proposed that these receptors are **scoped out** of the operational stage assessment.

17.8.3.3 Wider visual amenity effects on the local population during operation would be indirect and it is considered that such effects are sufficiently dealt with in Chapter 14 Landscape and Visual, as well as being managed through commitments to be set out within the committed management plans. It is therefore proposed that wider indirect visual amenity effects are **scoped out** of the operational stage assessment.

17.8.4 Decommissioning

17.8.4.1 It is anticipated that the potential effects of the decommissioning phase of the Proposed Development would be similar to those identified for construction in relation to employment and supply chain opportunities, as well as access to commercial and community receptors. This phase could also alter any changes

made to PRoW. Following decommissioning of the Proposed Development, the mineral resource could be extracted at any time. It is therefore proposed that potential effects on Mineral Safeguarding Areas are **scoped out** as part of the assessment during decommissioning.

17.9 Proposed assessment methodology

17.9.1.1 An assessment of potential impact would be undertaken against the established baseline environment to consider the potential resultant effects of the Proposed Development and whether they are considered significant

17.9.1.2 The assessment would use a methodology, consistent with wider industry best practice, and significance criteria, as well professional judgment to assess the scale and nature of the impacts of the Proposed Development against baseline conditions. It is however recognised that effects are categorised based upon the relationship between the scale (or magnitude) of impact and the sensitivity (or value) of the affected resource or receptor.

Socio-economics

17.9.1.3 It is proposed that the assessment of employment effects during construction, operation and decommissioning is informed by data provided by the Applicant and based on staffing requirements of similar UK base projects. Assumptions would be made in relation to the proportion of the workforce who may be sourced from the immediate region and the Homes and Communities Agency (HCA) Additionality Guide [251] would be used to calculate leakage and displacement effects, providing a net direct employment estimate for the Proposed Development.

17.9.1.4 Indirect and induced effects would also be considered using ready reckoner figures from the HCA Additionality Guide.

Land use receptors

17.9.1.5 It is proposed that the assessment of potential effects on wider land use receptors, including recreational and community facilities, development land and PRoW considers the potential direct and indirect effects during construction, operation and decommissioning.

17.9.1.6 Receptors would be identified using both published datasets, as well as through consultation activities. The sensitivity of each receptor would be defined based on the criteria presented in Table 17-6 below and consideration given to any direct or indirect effects.

17.9.1.7 Professional judgement would be used to consider the potential effects and mitigation requirements considered where necessary.

Assessment criteria

17.9.1.8 It is proposed that the following criteria set out in Tables 17-5 to 17-7 are used in the assessment of socio-economic effects to determine sensitivity of receptor,

magnitude of impact and overall significance of effect. Moderate and major effects are to be considered significant and minor and negligible not significant.

Table 17-6 Sensitivity or value of receptors

Sensitivity	Definition of sensitivity
High	• Businesses, individuals, groups of individuals, or other receptors possessing very significant economic, social and/or community value. • These receptors are considered very likely to incur a significant loss or gain as a result of potential changes in the environment, with little to no potential for substitution. For example: residential properties, a regional or national trail, directly affected business premises or community facilities.
Medium	• Businesses, individuals, groups of individuals, or other receptors possessing some significant economic, social and/or community value. • These receptors are considered likely to incur some loss or gain as a result of potential changes in the environment, with limited potential for substitution. For example: a footpath or bridleway or land associated with a residential or business receptor
Low	• Businesses, individuals, groups of individuals, or other receptors possessing some economic, social and/or community value. • These receptors are not considered likely to incur a loss or gain as a result of potential changes in the environment, with potential for substitution. For example: a permissive trail.
Negligible	• No change to business, individuals, groups of individuals or other receptors.

Table 17-7 Magnitude of impact

Sensitivity	Definition of sensitivity
High	• An adverse or beneficial change that would be likely to result in total loss of an individual receptor or permanent changes to baseline situation for a large number of businesses, individuals or groups of individuals.
Medium	• An adverse or beneficial change that would be very likely to result in partial changes to baseline situation for a moderate number of businesses, individuals or groups of individuals.
Low	• An adverse or beneficial effect that would be likely to result in minor changes to baseline situation for a small number of businesses, individuals or groups of individuals.
Negligible	• An adverse or beneficial effect that would be likely to result in little or no change to baseline situation for businesses, individuals or groups of individuals.

Table 17-8 Significance of effect

		Sensitivity of receptor			
		High	Medium	Low	Negligible
Magnitude of impact	High	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible

17.10 Assumptions, limitations and uncertainties

17.10.1.1 The socio-economic assessment would rely largely on secondary data which is published by various third party providers. The assessment is therefore based on data and a baseline situation at a point in time.

17.10.1.2 Decommissioning of the Proposed Development is likely to generate future effects on socio-economic and land use receptors, however, the scale of these impacts is not possible to quantitatively assess at this stage given uncertainties in relation to the exact nature of the activity given the timescales and potential evolution of decommissioning processes over the lifetime of the Proposed Development. Effects during the decommissioning phase are therefore assumed to be similar to those likely to be experienced during construction of the Proposed Development as a worst-case.

17.11 Summary

Table 17-9 Socio-economics scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Employment and Supply chain effects	Scoped in	Scoped in	Scoped in	None
Local economy	Scoped in	Scoped out	Scoped in	None
All other socio-economic effects related to the local population (amenity effects)	Scoped Out	Scoped Out	Scoped Out	None
Land Use – PRoW and recreational resources	Scoped In	Scoped Out	Scoped In	None
Land Use – potential indirect effects on commercial receptors, community facilities and development land.	Scoped Out	Scoped Out	Scoped Out	None
Land Use – Development land and allocations (including mineral resource)	Scoped Out	Scoped Out	Scoped Out	None

18 Traffic and Transport

18.1 Introduction

18.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of Traffic and Transport.

18.1.1.2 It sets out Traffic and Transport receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

18.1.1.3 The following matters have been considered as part of the scope and methodology for traffic and transport:

- Severance
- Motorised and Non-Motorised user delay
- Non-Motorised user amenity
- Fear and Intimidation
- Safety
- Road Safety Audits
- Hazardous Loads

18.1.1.4 Public Rights of Way (PRoW) are assessed in Chapter 17 'Socio-economics' of this Report.

18.1.1.5 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development
- Chapter 17 Socio-economics

18.2 Relevant legislation, policy, standards and guidance

18.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for Traffic and Transport and have informed the scope of the assessment.

18.2.2 Legislation

Table 18-1 Legislation

Legislation	Relevance to assessment
There is no legislation specifically relevant to the assessment of traffic and transport in relation to the Proposed Development	

18.2.3 Policy

Table 18-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement (NPS) for Energy (EN-1), 2024 [62]	Sets broad national policy approach. Section 5.14 addresses traffic and transport outlining approach to assessment of impacts and determining requirement for mitigation (if required). Paragraph 5.14.6 states: "*National Highways and Highways Authorities are statutory consultees on NSIP applications including energy infrastructure where it is expected to affect the strategic road network and / or have an impact on the local road network. Applicants should consult with National Highways and Highways Authorities as appropriate on the assessment and mitigation to inform the application to be submitted*." Paragraphs 5.14.7 – 5.14.9 provides detail of what should be included as part of this assessment, which includes; that Travel Plans are prepared; to provide good quality non-motorised user facilities as part of any new infrastructure proposed; assess any potential disruption to services and infrastructure; Paragraphs 5.14.11 – 5.14.12 provides a description of potential mitigation measures to be considered, including: implement demand management measures to reduce travel before new infrastructure is proposed; ensure satisfactory arrangements for reasonably foreseeable abnormal disruption; and encourage a modal shift of freight from road to more environmentally sustainable alternatives.
NPS for Renewable Energy Infrastructure (EN-3) ,2024 [63]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3. Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects. Section 2.7.8 to 2.7.12 details the transport infrastructure required to support renewable energy infrastructure which may influence site selection and designs. It is stated that government policy encourages multi-modal transport and it is expected that applications will transport materials by water or rail routes where possible, with road transport expected where this is not feasible or for shorted journeys. Section 2.10.120 to 2.10.127 is relevant to this chapter as details of construction traffic and transportation noise are discussed.
NPS for Electricity Networks Infrastructure (EN-5), 2024 [64]	NPS EN-5 addresses policy for energy transmission. EN-5 includes general requirements for 'good design' for the routing of new overhead lines and design and siting of substations in accordance with the Holford

Policy	Relevance to assessment
	and Horlock Rules (paragraphs 2.9.16 – 2.9.19). Paragraph 2.9.19 also states that the design of access roads should be an integral part of the site design, so as to fit in with the surroundings.
NPPF and associated Planning Policy Guidance on Travel Plans, Transport Assessments and Statements (2023) [9]	Section 14 gives detail of the ambition to decrease the impact of climate change. Solar farm developments, such as High Grove Solar will help achieve this. Section 9 is relevant to this chapter of the scoping report as details on promoting sustainable transport are outlined here. This section outlines that transport issues should be considered from the earliest stages of plan-making and development proposals to ensure that potential impacts of development on the transport network, opportunities form existing or proposed transport infrastructure can be realised, opportunities to promote sustainable modes of travel can be encouraged and that the environmental impacts of traffic and transport can be identified. This section also identifies that applications for development should: follow transport hierarchy, address the needs of people with disabilities, create safe secure and attractive places, allow for the efficient delivery of goods and access by service and emergency vehicles and be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations.
Breckland Local Plan (2023) [10]	Section 4, Transport, states that Development should; seek to minimise the need to travel; promote opportunities for sustainable transport modes; not adversely impact on the operation or safety of the strategic road network; support the transition to a low carbon future; mitigate impacts on the local or strategic highway networks; protect, and where possible enhance, access to public rights of way; and avoid inappropriate traffic generation and do not compromise highway safety.

18.2.4 Standards and guidance

Table 18-3 Standards and guidance

Standards and guidance	Relevance to assessment
Guidelines for the Environmental Assessment of Traffic and Movement, IEMA,2023 [252]	This guidance is the industry standard document for which traffic and transport related EIA assessments are undertaken.
Design Manual for Roads and Bridges (DMRB) [253]	Current national standards for road design, relevant for access points.
Department for Levelling Up, Housing and Communities (DLUHC) Guidance: Transport Evidence Bases in Plan Making and Decision Taking (2015) [254]	Guidance to help local planning authorities assess and reflect strategic transport needs in Local Plan making. The existing transport situation and likely generation of trips should be assessed alongside the impact on the locality in social, economic and environmental terms. Facilities that support sustainable modes of travel in proximity to the site and opportunities to reduce the need for travel should be promoted where appropriate. Considerations should also be made regarding the cumulative impacts of existing and proposed developments on the

Standards and guidance	Relevance to assessment
	transport network and the quality and capacity of transport infrastructure.
MHCLG Guidance: Travel Plans, Transport Assessments and Statements (2014) [255]	Provides advice on when Transport Assessments and Transport Statements are required, and what they should contain. Information regarding the proposed transport access and information on the existing functional classification of the nearby road network for the Proposed Development should be included in assessments and statements. Data about existing public transport provision, current traffic flows, proposed trip calculations for the Proposed Development and injury accident records on the nearby public highways should also be included in these documents. Measures and ways to improve the accessibility of the location and encourage environmental sustainability by reducing the need to travel alongside a parking strategy for the development are also important features in assessments and statements. Travel Plans should identify the specific required targets, measures and outcomes as well as set out clear future monitoring and management arrangements. Benchmark travel data, relevant information on existing travel habits in the area and proposals to reduce the need for travel are three key aspects of Travel Plans. Travel Plans should set out explicit outcomes rather than solely identifying processes to be followed. All journeys results from a proposed development should be included in these plans.

18.3 Consultation

18.3.1.1 The following stakeholders will be consulted with regards to Traffic and Transport as part of the assessment process:

- Norfolk County Council (NCC) – Local Highway Authority for the area responsible for all local roads.
- National Highways (NH) – Strategic Highway Authority responsible for the A47 only.

18.3.1.2 A meeting was held with NCC on 22 August 2024 to discuss traffic and transport matters. The peak construction traffic numbers as presented in this chapter were not a cause of concern to NCC. Subject to final construction traffic management measures and compound locations being identified, it was agreed that a Transport Assessment and detailed junction modelling was not likely to be required. A Transport Statement was agreed to be more appropriate, which would mainly outline the transport strategy and management measures proposed. It was agreed that an EIA chapter may not be required for Traffic and Transport i.e. it could be scoped out of further assessment, subject to additional baseline information being provided, and final construction traffic management measures and compound locations being confirmed.

18.3.1.3 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to air quality.

18.3.1.4 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

18.4 Study area

18.4.1.1 An initial view of the highway network in relation to the Proposed Development, and where potential impacts might occur has been undertaken.

18.4.1.2 The 'Guidelines for the Environmental Assessment of Traffic and Movement', IEMA,2023 (hereby referred to as 'IEMA, 2023') sets out some useful criteria for determining a study area in paragraph 2.16 which has been used for context:

- *"Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%);*
- *Rule 2: Include highway links of high sensitivity where traffic flows have increased by 10% or more."*

18.4.1.3 These criteria can similarly be applied to changes in other modes of transport as useful context to inform an assessor's judgement.

18.4.1.4 Paragraph 2.17 goes on to state:

*"*It should be noted that the Rule 1 and Rule 2 'criteria' process may not be appropriate for some impacts, and it is generally accepted by regulators and practitioners that it should not be applied to assessments of air quality, noise, road safety and driver delay. For these impacts, a separate study area and assessment criteria should be agreed with the relevant stakeholders*."*

18.4.1.5 At the time of writing the volume of construction traffic during peak construction is expected to be as follows:

- Up to **60 HGV** deliveries per day (120 two-way movements)
- Up to 240 construction workers per day, travelling in the following ways:
  - 120 car sharing (average two workers per vehicle = **60 vehicles** (120 two-way movements)
  - 120 by 15-seater mini-bus shuttles to/from sites and nearby towns/villages = **8 vehicles** (two-way movements).
- The total number of vehicles expected, during peak construction, is therefore **128 per day** (256 two-way movements).

18.4.1.6 The distribution of the above traffic over the highway network in the vicinity of the Proposed Development was not known at the time of writing, however it is unlikely that the increase in traffic will be more than 10% over an average day at any point on the A47, A1065 or A1075 during construction due to high existing baseline flows (see 18.5.3.1 for more details).

18.4.1.7 Traffic flows during operation will be substantially lower than construction, and traffic flows during decommissioning are estimated to equal or lower than construction.

18.4.1.8 Due to the nature of the Proposed Development and proposed access strategy, consideration will be given to a number of locations within the surrounding highway network which could potentially be impacted. Therefore, the proposed study area is as follows, which is subject to consultation and agreement with NCC and NH and further refinement once more information is known on traffic distribution:

- A47 from Narborough to Dereham (road safety and driver delay only)
- A1065 at the interchange with the A47 at Swaffham (road safety and driver delay only)
- A1075 from junction with A47 to Crowshill (road safety and driver delay only)
- A1122 between the junctions with the A37 and Chalk Lane
- Swaffham Road/Dereham Road at Wendling

18.5 Baseline conditions

18.5.1 Desktop sources used

18.5.1.1 The following desktop sources have been used to inform the existing baseline conditions of the study area:

- Google Maps for identification of study area [256]
- Department for Transport traffic count data [257]

18.5.2 Surveys undertaken and proposed

18.5.2.1 The following surveys are likely to be required, subject to further information becoming available on the Proposed Development access points, and consultation with NCC and NH, and will inform the EIA reported in the ES:

- Automatic Traffic Count (ATC) and/or Classified Traffic Count (CTC) surveys at select locations within the study area,.
- Any surveys that deemed necessary are likely to commence in September 2024, with results reported within the ES.
- ATCs would involve count strips being installed across the road surface for 7 days.

- CTCs would involve most likely cameras installed over 24 hours on a neutral weekday.
- Any surveys undertaken would avoid any periods of roadworks or local events which could skew results.

18.5.3 Existing baseline

18.5.3.1 The Proposed Development is located in a rural area close to villages and towns including Swaffham, Dereham, and Shipdham.

Highways

18.5.3.2 The following roads are included in the study area at this stage and information has been gathered from existing sources, namely Department for Transport traffic count data:

- A47 is the main strategic route through the draft Order Limits. This carries an estimated 12,000-22,000 vehicles per day (AADT) based on the latest DfT estimates [257].
- A1065 at the interchange with the A47 at Swaffham. This carries an estimated 6,700 vehicles per day (AADT) based on latest DfT estimates.
- A1075 from junction with A47 to Shipdham carries an estimated 9,000 vehicles per day (AADT) based on latest DfT estimates.
- A1122 between the junctions with the A37 and Chalk Lane. It is unknown at this stage how many vehicles use this stretch of highway.
- Swaffham Road/Dereham Road in Wendling. It is unknown at this stage how many vehicles use this stretch of highway.
- Access points to the various Panel Areas are not yet known. It is envisaged that construction traffic would utilise the A47 as much as practicable to minimise impacts on local roads. Once further information is available on proposed access points, this will be discussed with NCC and NH and set out in the EIA.

Public Transport

18.5.3.3 Public transport is limited in the study area and includes:

- **Rail**: No National Rail stations or lines exist in the vicinity of the Proposed Development. The closest National Rail stations are 'Harling Road' which is c.18km south of the southernmost point of the Order Limits, and 'Downham Market', which is c.18km west of the westernmost point of the Order Limits. The Mid Norfolk Heritage Railway passes through Yaxham, some 2.5km to the east of the easterly Order Limits, however this is unlikely to be affected by any traffic and transport related effects of the Proposed Development.

- **Bus**: Various bus services exist in within the study area including routes; 6, 10, 11A, 13, 31, 32, 52, 60, 111, 113 and A, B, and C "Excel" services. Destinations served include Swaffham, Dereham, Shipdham, and Kings Lynn.

Walking/Cycling

- PRoW exist across the study area including within the draft Order Limits. For further information on PRoW, see Chapter 17 'Socio-economics' of this report.
- Peddars Way and Norfolk Coast Path National Trail passes through the study area.
- National Cycle Route 13 passes through the study area, and the Proposed Development in the Southern and Eastern Panel Areas.

18.5.3.4 Other baseline data sources that will inform the EIA will be:

- Personal injury accident data
- Highway boundary information
- OS Mapping
- Topographical data.

18.5.4 Future baseline

18.5.4.1 The future baseline will comprise the same study area and receptors as the existing (once confirmed) with baseline traffic flows factored up to the peak construction year using growth factors agreed in advance with the NCC and NH. We propose at this stage to use the industry standard TEMPro software, or calculating additional traffic from agreed committed development traffic flows, or an appropriate combination of the two.

18.5.4.2 Any committed developments which change or upgrade roads in the study area in the future will be identified through engagement with NCC and NH and considered in the EIA where appropriate.

18.6 Potential impacts

18.6.1 Construction

18.6.1.1 The construction works are of a temporary nature, however, during this temporary period the traffic generated by the Proposed Development could have the following impacts:

- severance of communities (change in traffic flows)
- road vehicle driver and passenger delay
- non-motorised user delay
- non-motorised user amenity (change in traffic flows on routes used by pedestrians and cyclists)
- fear and intimidation
- road user and pedestrian safety
- road safety audits

18.6.1.2 The Proposed Development is not expected to generate or attract hazardous loads at any stage.

18.6.1.3 Non-motorised user amenity and Fear and Intimidation can be considered together as they are strongly interrelated.

18.6.2 Operation

18.6.2.1 It is highly unlikely that any impacts will arise from the operation of the Proposed Development due to low anticipated traffic volumes. The operation of the Proposed Development is likely to involve very low frequency visits by maintenance and security staff, occasional deliveries for replacement of parts/equipment, and occasional visitors. The movements of any/all of the above are unlikely to be noticeable on the local or strategic highway network and made mostly by Light Goods Vehicles. it is expected that any operational impacts on traffic and transport will be minimal and similar to the baseline environment.

18.6.3 Decommissioning

18.6.3.1 The Proposed Development has an anticipated design life of 40 years, and the 400kV substation would not be decommissioned as it would become part of National Grid's infrastructure. The anticipated number of vehicles associated with the decommissioning phase is not likely to exceed that set out for the construction phase, and impact will be short term and temporary. Therefore, it is envisaged that the effects of the decommissioning phase will be the same or less than the construction phase.

18.7 Design, mitigation and enhancement measures

18.7.1 Design principles

18.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

18.7.2 Embedded and Good practice measures

18.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

18.7.2.2 The Proposed Development is currently evolving through an iterative design process.

18.7.2.3 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

18.7.3 Further mitigation

18.7.3.1 Further mitigation are actions that require further activity to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for Traffic and Transport will be defined through the EIA process once the level of significance of effects is known.

18.7.4 Management plans

18.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to Traffic and Transport include:

- oCEMP
- oDEMP
- oCTMP

18.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

18.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

18.8 Likely significant effects

18.8.1.1 This section sets out whether each of the potential effects set out above are scoped in or scoped out and the basis for that judgement, noting that all construction related impacts would be short-term and temporary (c.24 months).

18.8.2 Construction

Severance

18.8.2.1 As set out in paragraph 3.16 of the 'IEMA, 2023' guidance, [252] changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes in severance, respectively. The Proposed Development has potential to generate increased traffic flows within the study area. Traffic flow increases owing to construction on each link within the proposed study area are not yet known, therefore this is **scoped in** to further assessment in the ES at this stage.

Delay

18.8.2.2 The 'IEMA, 2023' guidance [252] makes reference to potential delays to drivers and to pedestrians. Users of other modes can also experience delays, such as cyclists and those travelling by bus.

Road vehicle driver and passenger delay

18.8.2.3 The Proposed Development could result in changes which could significantly affect perceptions of driver delay during construction because of increased vehicle travel demand on the local network. This will be reviewed once traffic flow forecasts and further assessment is undertaken. Driver delay is therefore **scoped in** for the assessment of the Proposed Development in during construction and will be reported in the ES.

Non-Motorised User Delay

18.8.2.4 Drawing upon the 'IEMA, 2023' guidance, the assessment of pedestrian delay serves as a proxy for the delay that other modes of non-motorised users may experience when crossing roads. Delays will be assessed qualitatively based on the nature of the Proposed Development and construction proposals using assessor judgment.

18.8.2.5 The Proposed Development may result in changes which could significantly affect perceptions of pedestrian and other non-motorised user delay during construction because of increased vehicle travel demand on the local network. This is therefore **scoped in** for the assessment of the Proposed Development during construction, however this will be reviewed once traffic flow forecasts are finalised, and reported in the ES.

Non-Motorised User Amenity

18.8.2.6 Drawing upon the 'IEMA, 2023' guidance, with regard to amenity, there are no set thresholds, but this following is stated,

> *"a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or HGV component) is halved or doubled" and that "thresholds… should be used cautiously in any assessment. The assessment of amenity should pay full regard to specific local conditions."*

18.8.2.7 Traffic flow increases owing to the construction on specific road links are not yet known, therefore this is **scoped in** for further assessment at this stage and will be reported in the ES.

Fear and Intimidation

18.8.2.8 Drawing upon the 'IEMA,2023' guidance, with regard to fear and intimidation, the following is stated:

"previous work that put forward thresholds for fear and intimidation based on an earlier study (Crompton and Gilbert, 1976) can be useful."

And;

"The extent of fear and intimidation is dependent on:

- *The total volume of traffic*
- *The heavy vehicle composition*
- *The speed these vehicles are passing*
- *The proximity of traffic to people – and/or the feeling of the inherent lack of protection created by factors such as a narrow pavement median, a narrow path or a constraint (such as a wall or fence) preventing people stepping further away from moving vehicles."*

18.8.2.9 Thresholds have been set that seek to categorise fear and intimidation depending existing road conditions and likely additional flow of traffic resultant from the development. Traffic flow increases owing to the construction on specific road links are not yet known, therefore this is **scoped in** for further assessment at this stage and will be reported in the ES.

Road User Safety

18.8.2.10 The key issue in assessing accidents and safety is in understanding the potential for change. There can be some small changes in prevailing road safety conditions arising simply as a result of having a greater number of journeys being made on a network; very simply, the more people that are travelling, the more people that are liable to become involved in an accident. By far the more important issue to consider is how travel and the design of the transport networks interrelate to affect prevailing road safety.

18.8.2.11 The Proposed Development is not expected to result in changes which could significantly affect accidents and safety during construction because it is an explicit requirement of the highway authorities that any planning application proposals do not unacceptably increase safety risks. Accidents and safety is therefore **scoped out** of further assessment and will not be considered in the ES. Road Safety will however be considered in the Transport Statement as appropriate and reported in that separate document.

Road Safety Audits

18.8.2.12 Any new or amended access points required to serve the development to/from the public highway will be subject to Road Safety Audit at the appropriate stage, to be agreed with NCC and NH. This will be considered as part of the Transport Statement and reported in that separate document, and is therefore **scoped out** of the ES.

Hazardous Loads

18.8.2.13 The Proposed Development is not expected to generate or attract hazardous loads at any stage. It is anticipated that Abnormal Indivisible Loads (AILs) would be required to enable construction of the Proposed Development and the Transport Statement would confirm the number and suggested routing of these movements via A11, A47 and A1065.

18.8.2.14

18.8.3 Operation

18.8.3.1 Operational traffic is expected to be minimal, with occasional visits taking place by a handful of operatives. The majority of these trips will be by cars or vans, rather than HGVs. Therefore, it is expected that any operational impacts on traffic and transport will be minimal, and the topic is **scoped out** of the operational assessment.

18.8.4 Decommissioning

18.8.4.1 Decommissioning of the Proposed Development could give rise to the same or lower levels of forecast trip generation as the construction phase; therefore, the construction assessment provides a worst-case scenario for potential effects.

18.8.4.2 Management and mitigation measures will be incorporated into the oDEMP, which will set out the general principles to be followed in the decommissioning of the Proposed Development.

18.8.4.3 The oDEMP will set out how vehicle access to and from the Proposed Development will be managed, and it is expected that the principles agreed to minimise disruption during construction will be reviewed and applied during decommissioning.

18.8.4.4 Effects during decommissioning are not expected to be significant and are therefore **scoped out** of further assessment.

18.9 Proposed assessment methodology

18.9.1 Introduction

18.9.1.1 The assessment will follow the assessment guidelines contained within 'IEMA, 2023' guidelines..

18.9.1.2 A separate Transport Statement will be prepared in relation to the Proposed Development which sets out the overarching transport strategy, and considers impacts on the operation of local and strategic transport networks, and any key junctions identified through scoping discussions with NCC and NH during the AM and PM peak hours. The EIA chapter will assess the impact of traffic and movement on people and the environment.

18.9.1.3 The EIA will be consistent with the Transport Statement, but the EIA will provide sufficient information to enable the reader to understand the likely significant effects of the Proposed Development in relation to traffic and transport on the environment. The methodology to be applied in the TS is subject to separate but parallel scoping discussions with NCC and NH.

18.9.2 Sensitivity of Receptors

18.9.2.1 The potential receptors are those people making journeys on networks within the relevant study area by all modes of transport.

18.9.2.2 Vulnerable road users are non-motorised users, and in those groups particularly sensitive groups include includes children, older people, people on low incomes, those at a social disadvantage, and disabled people are all identified as being susceptible to changes in traffic conditions.

18.9.2.3 The sensitivity of receptors within the study area will be defined with regard to Table 18-4 which lists example sensitive locations where receptors (people) may travel to/from.

18.9.2.4 Table 18-5 outlines receptors which could be relevant for each potential effect identified.

Table 18-4 Example Sensitive Locations

Example Sensitive Locations	Sensitivity
Schools, colleges, playgrounds, accident black spots, retirement homes, urban/residential roads without footways that are used by pedestrians.	**High**
Congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, un-segregated cycleways, community centres, parks and recreation facilities.	**Medium**
Sites of tourist/visitor attraction, places of worship, residential areas set back from the highway with screening.	**Low**
Public open spaces, nature conservation areas and residential areas with adequate footway provision.	**Negligible**

Table 18-5 Example Effects and Receptors

Effect	Receptor
Severance	Non-motorised users, People at Home, People at Work
Road vehicle driver and passenger delay	Vehicle Drivers/ Passengers, Public Transport users
Non-motorised user delay	Non-motorised users
Non-motorised user amenity	Non-motorised users

Effect	Receptor
Fear and intimidation	Non-motorised users, People at Home, People at Work
Road user and pedestrian safety	Vehicle Drivers/Passengers, Public Transport users, Non-motorised users
Road Safety Audits	Vehicle Drivers/Passengers, Public Transport users, Non-motorised users
Hazardous/large loads	Vehicle Drivers/Passengers, Public Transport users, Non-motorised users

18.9.3 Magnitude of Impact

18.9.3.1 For each effect to be assessed, criteria for assessing Magnitude of Impact are defined in this section. Broadly, the Magnitude of Impact will be defined as follows:

Table 18-6 Magnitude of impact

Impact	Description
Large	Changes which are likely to be perceptible and which would substantially change conditions which would otherwise prevail to the extent that it would significantly affect travel behaviour (such as the night time closure of a road or the introduction of a new controlled pedestrian crossing on a busy road).
Medium	changes which are likely to be perceptible and which would materially change conditions which would otherwise prevail to the extent that it may affect travel behaviour to some degree (such as a change in road network capacity which may lead to some rerouting or retiming of journeys, or creation of a secondary supplementary route servicing a similar function as an existing route)
Small	Changes which are likely to be perceptible but not the extent that it would materially change conditions which would otherwise prevail (such as the introduction of a new site access junction or resurfacing of a footway)
Negligible	Changes which are unlikely to be perceptible (such as a low change in traffic or pedestrian volumes)

18.9.4 Significance of Effect

18.9.4.1 The Significance of Effect is determined through the combination of Sensitivity of Receptor and Magnitude of Impact. Table 18-6 below sets out how these categorisations will be combined, where more than one conclusion is provided professional judgment will be used to select the single conclusion on effect.

Table 18-7 Significance of Effects

	Magnitude of Impact (Degree of Change)				
Sensitivity	**No change**	**Negligible**	**Small**	**Medium**	**Large**
High	Neutral	Slight	Slight or Moderate	Moderate or Major	Large or Major
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Major
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

18.9.4.2 Generally, a significant effect in EIA terms is one which is moderate beneficial/adverse or above. An effect which is neutral or slight beneficial adverse is generally considered to be 'not significant' in EIA terms; however, professional judgment can be employed with appropriate justification to be provided in the ES.

18.9.5 Assessment Scenarios

18.9.5.1 The assessment scenarios will be consistent with those considered in the Transport Statement which is subject to separate parallel scoping discussions. At this time, the following scenarios are envisaged:

- A baseline/no nothing scenario (at peak construction year)
- With development scenario (at peak construction year)

18.10 Assumptions, limitations and uncertainties

18.10.1.1 The assessment is limited to the analysis of data readily available through the sources listed above and any information that is provided by stakeholders as a result of this scoping exercise. The scope of the EIA for traffic and transport is subject to change and refinement once more data becomes available and scoping discussions commence with relevant Stakeholders.

18.10.1.2 The scope and nature of the assessment and the extent of survey collection will be proportionate to the scale of the transport effects anticipated to arise from the Proposed Development.

18.10.1.3 All future traffic flow forecasts include a degree of uncertainty. The assessors will take appropriate account of the reasonably conceivable uncertainty when assessing potential likely significant effects.

18.11 Summary

Table 18-8 Traffic and Transport scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Severance	**Scoped-In**	Scoped-Out	Scoped-Out	ATC surveys
Road vehicle driver and passenger delay	**Scoped-In**	Scoped-Out	Scoped-Out	CTC surveys
Non-motorised user delay	**Scoped-In**	Scoped-Out	Scoped-Out	CTC surveys
Non-motorised user amenity	**Scoped-In**	Scoped-Out	Scoped-Out	ATC surveys
Fear and Intimidation	**Scoped-In**	Scoped-Out	Scoped-Out	ATC surveys
Road user and pedestrian safety	Scoped-Out	Scoped-Out	Scoped-Out	None
Road Safety Audits	Scoped-Out	Scoped-Out	Scoped-Out	None
Hazardous/large loads	Scoped-Out	Scoped-Out	Scoped-Out	None

19 Water Resources and Flood Risk

19.1 Introduction

19.1.1.1 This chapter outlines the scope and methodology for the assessment of the likely significant effects arising from the Proposed Development, as described in Chapter 2, in respect of Water Resources and Flood Risk.

19.1.1.2 It sets out Water Resources and Flood Risk receptors of relevance, and the approach to the assessment of the Proposed Development's impacts during construction, operation and decommissioning.

19.1.1.3 The following matters have been considered as part of the scope and methodology for Water Resources and Flood Risk:

- Surface water
- Groundwater
- Compliance with Water Environment Regulations (WER)/Water Framework Directive (WFD)
- Water resources
- Flood risk

19.1.1.4 This chapter is supported by the following figures:

- Figure 19.1 Surface Water features
- Figure 19.2 Bedrock Geology
- Figure 19.3 Superficial Geology
- Figure 19.4 WER/WFD Surface Water Bodies
- Figure 19.5 WER/WFD Groundwater Bodies
- Figure 19.6 Groundwater Designations
- Figure 19.7 Licenced abstractions and discharges
- Figure 19.8 Risk of flooding from Surface Water
- Figure 19.9 Risk of flooding from rivers and seas
- Figure 19.10 Risk of Flooding from Reservoirs
- Figure 19.11 Susceptibility to groundwater flooding

19.1.1.5 This chapter should be read in conjunction with:

- Chapter 2 The Proposed Development, including:
  - Figure 2.7 Environmental Designations

- Chapter 7 Biodiversity: Designated protected sites that may be dependent on surface water or groundwater, or could be impacted by changes to the water environment from the Proposed Development;
- Chapter 12 Ground Conditions: Land contamination that may be mobilised by the Proposed Development and subsequently impact the water environment.

19.2 Relevant legislation, policy, standards and guidance

19.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for Water Resources and Flood Risk and have informed the scope of the assessment.

19.2.2 Legislation

Table 19-1 Legislation

Legislation	Relevance to assessment
Environment Act, 2021 [258]	The Environment Act 2021 includes binding targets on water quality.
The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2017 [259]	The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2017, transpose into English and Welsh law the Water Framework Directive 2000/60/EC and contain provisions to protect rivers, lakes, estuaries, coastal waters and groundwater. The regulations remain in force following the UK's withdrawal from the European Union. These regulations provide for protection of all types of water bodies and include environmental objectives, compliance parameters to be assessed and bring in the protection of areas with specific requirements such as shellfish waters for example. These requirements underpin the impact assessment for the water environment.
Conservation of Habitats and Species Regulations, 2017, as amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, 2019 [260]	The regulations provide for the designation and protection of important habitats and species as part of the National Site Network (NSN). The protection of water dependent NSN sites also forms part of the requirements established under the Water Environment (Water Framework Directive) (England and Wales) Regulations, 2017. The regulations remain in force following the UK's withdrawal from the European Union. The 'Dutch Nitrogen Case' ruled that where an internationally important site (i.e. Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar Sites) is failing to achieve the required condition due to nutrient pollution, the potential for a new development to add to the nutrient load is 'necessarily limited'. This has informed the way in which the regulations apply to pollution related pressures and incidents, and informs the assessment regarding sensitivity of water environment receptors.

Legislation	Relevance to assessment
Environmental Permitting (England and Wales) Regulations, 2016 [261]	These regulations are intended to manage and reduce pollution from certain industrial activities through permitting. These regulations are relevant as they set out the requirements in relation to environmental permits, including for discharges into the water environment.
Flood and Water Management Act, 2010 [262]	The Flood and Water Management Act relates to the management of risks related to flooding and coastal erosion. The aim is to re-duce the risk of flooding due to extreme weather events, which are likely to increase as a result of cli-mate change. These regulations are relevant because they require design to con-sider changes to flood risk.
The Flood Risk Regulations, 2009 [263]	Outlines requirements for the assessment of existing flood risk and the need to design new developments to ensure that they are safe from flooding and do not increase flood risk for surrounding receptors and transposes the Floods Directive 2007/EC/60 into law in England and Wales.
Water Resources Act, 1991 [264]	The Water Resources Act makes it an offence to cause or know-ingly permit polluting, noxious, poisonous or any solid waste mat-ter to enter controlled waters. It also establishes regulatory con-trols for water abstraction, water impoundment and protection of water resources.
Land Drainage Act, 1991 [265]	The Land Drainage Act, 1991, identifies the responsible parties for the management and maintenance of land drainage including maintaining flows in watercourses. It provides relevant authori-ties with the powers to ensure landowners carry out works to maintain flows within watercourses and obtain the relevant con-sent(s) as required. This is relevant to design that could affect flows in Ordinary Wa-tercourses.

19.2.3 Policy

Table 19-2 Policy

Policy	Relevance to assessment
Overarching National Policy State-ment for Energy (EN-1), 2024 [266]	Sets broad national policy approach. Section 4.10 of EN-1 sets out generic considerations that applicants and the Secretary of State should take into account to help ensure that renewable energy infrastructure is safe and resilient to climate change, and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime. Section 4.10 of EN-1 advises that the resilience of the project to climate change should be assessed in the Environmental

Policy	Relevance to assessment
	Statement (ES) accompanying an application. For example, the impact of increased risk of drought as a result of higher temperatures should be covered in the water quality and resources section of the ES. Sections 5.8 and 5.16 addresses flood risk and water quality and resources , outlining approach to assessment of impacts and determining requirement for mitigation (if required).
National Policy Statement for Renewable Energy Infrastructure (EN-3), 2024 [267]	Establishes policy specific to renewable energy schemes, including solar in Section 2.10. EN-3 aims to streamline the consenting process for large-scale solar developments by allowing decisions on solar applications to be made under section 104 of the Planning Act 2008. Solar energy is considered low carbon infrastructure and crucial for achieving net-zero goals, therefore designated Critical National Priority infrastructure under 2.17, 2.18, and Section 3..Therefore, provided assessment principles and legal requirements are met, and the mitigation hierarchy has been applied to avoid, reduce and mitigate significant adverse effects, the benefits [of the infrastructure] will generally be considered to outweigh residual effects. Sets out requirements for solar farms: • 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. • Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended. • Sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses. • Culverting existing watercourses/drainage ditches should be avoided. Where culverting for access is unavoidable, applicants should demonstrate that no reasonable alternatives exist and where necessary it will only be in place temporarily for the construction period.
National Policy Statement for electricity networks infrastructure (EN-5), 2024 [268]	NPS EN-5 addresses policy for energy transmission. EN-5 does not include further requirements for water resources and flood risk, beyond those general requirements for 'good design' in accordance with the Holford and Horlock Rules (paragraphs 2.9.16 – 2.9.19).
National Planning Policy Framework (NPPF) [268]	The NPPF sets out the UK Government planning policies for England and seeks to ensure that flood risk is considered at all stages of the planning and development process. The NPPF states that new and existing development should not pose an unacceptable risk of water pollution, and that it should

Policy	Relevance to assessment
	help to improve local environmental conditions, including water quality and actions set out in the River Basin Management Plans (RBMP).
Anglian River Basin Management Plan (RBMP) [269]	The Anglian RBMP was updated in 2022. It provides a baseline classification of the water environment in the Anglian Basin District and highlights statutory objectives for protected areas such as waters used for drinking water, bathing, and designated sites. It lays out the actions needed to improve the water environment and achieve the objectives of the WER.
Norfolk Local Flood Risk Management Strategy [270]	The Local Flood Risk Management Strategy aims to inform all groups and individuals who may have an interest in, or an ability to influence or manage flood risk, including householders, businesses, landowners, developers and risk authorities
Breckland Council Local Plan [271]	The council's planning policy documents set the strategic context for development in the District. These include governing the decisions made on planning applications and which types of development are suitable for each area. It is a key document that guides development in the District over the next 20 years. Policies of particular relevance to Water Resources and Flood Risk include: • ENV 01 – Green Infrastructure – sets out expectations on incorporating green infrastructure and enhance existing connectivity; recognising the intrinsic value and functionality of the network, design, and regard to green infrastructure strategies. • ENV 09 – Flood Risk & Surface Water Drainage – describes policy on location, SuDs, run-off rates, mitigation, flood risk assessment, and Lead Local Flood Authority (LLFA) guidance.

19.2.4 Standards and guidance

Table 19-3 Standards and guidance

Standards and guidance	Relevance to assessment
AECOM (2017) Breckland Council Water Cycle Study Update [272]	A detailed water cycle study undertaken for Breckland Council, outlining implications on water environment and water infrastructure from growth.
Construction Industry Research and Information Association (CIRIA) (2023) Environmental good practice on site (5th edition) (C811) [273]	Provides practical advice about managing construction on site to minimise environmental impacts.

Standards and guidance	Relevance to assessment
CIRIA (2015) The SuDS (sustainable drainage systems) Manual (C753) [274]	Outlines the planning, design, construction and maintenance of SuDS to assist with their effective implementation within both new and existing developments. It looks at how to maximise amenity and biodiversity benefits, and deliver the key objectives of managing flood risk and water quality.
Environment Agency (2022) Flood risk assessments: climate change allowances [275]	When and how local planning authorities, developers and their agents should use climate change allowances in flood risk assessments.
Environment Agency (EA) Pollution Prevention Guidance (PPG) notes (PPG1, PPG5, PPG8 and PPG21) [276]	Although EA PPG notes were withdrawn in England on 17 December 2015, they still provide a good information source for pollution prevention measures, and to inform the Construction Environmental Management Plan (CEMP) and embedded mitigation.
Environment Agency (2017) Protect groundwater and prevent groundwater pollution [277]	Understand when activities affect groundwater, what permissions may be needed and how to prevent pollution
Environment Agency (2017) Groundwater protection technical guidance [278]	If carrying out an activity that could lead to the input of substances to ground which could affect the quality or quantity of groundwater, need to understand: • what type of input you can make • how to assess the discernibility of hazardous substances when geological formations can be determined as permanently unsuitable for other purposes
Flood Risk and Coastal Change: National Planning Practice Guidance (NPPG) [279]	Advises how to take account of and address the risks associated with flooding and coastal change in the planning process.
Highways England (2020) Design Manual for Roads and Bridges (DMRB) LA113 Road Drainage and the Water Environment [280]	Sets out the requirements for the assessment and management potential impacts on the water environment for highway projects. This methodology is the standard for assessing risks from increases in traffic movements (routine runoff and spillage) associated with all construction projects, not just highways projects.
Norfolk County Council Flood Risk Management Strategy (2015) [281]	Under the Flood and Water Management Act 2010, county and unitary authorities are the Lead Local Flood Authorities (LLFAs) with an overview role for local flooding in their area. Norfolk County Council (NCC) is the LLFA in the study area. A Local Flood Risk Management Strategy (LFRMS) is a requirement for all LLFAs to set out how local flood risks will be managed in the county, who will deliver them and how they will be funded. The aim of the Norfolk LFRMS is to work with organisations, businesses and communities to manage flood risk and, where it is practicable, affordable and sustainable to do so, to reduce risk to life, property and livelihoods that may arise from local surface runoff, ordinary watercourse and groundwater flooding.

Standards and guidance	Relevance to assessment
UK Government (2022) Flood risk and coastal change [282]	Advises how to take account of and address the risks associated with flooding and coastal change in the planning process.

19.3 Consultation

19.3.1.1 The following key stakeholders will be consulted with regards to Water Resources and Flood Risk as part of the assessment process:

- Environment Agency, regarding impact on the water environment receptors, WER/WFD and flood risk.
- Breckland Council and King's Lynn & West Norfolk District Council, regarding location of private water supplies within 1km of the draft Order Limits.
- Norfolk County Council, the LLFA, regarding comments on Flood Risk.
- East of the Ouse Polver and Nar Internal Drainage Board (IDB) and Norfolk Rivers IDB, regarding details of IDB assets.

19.3.1.2 A meeting with Breckland Council, and Norfolk County Council as the LLFA, was held on 20 August 2024 to discuss the approach outlined in this report. Broad agreement that all relevant matters related to water would be assessed as proposed with ongoing engagement with the LLFA. The LLFA advised that information was available and further flood investigation report would be available later in 2024 which should be considered. It was also recommended that the IDB be engaged early in the application process to g

19.3.1.3 in further local insight.

19.3.1.4 Statutory consultees will be formally requested by PINS to comment upon this scoping report. Views from statutory consultees will be considered to inform the Scoping Opinion. Comments received will be considered and addressed through the EIA process and reported in the ES, where relevant to water resources and flood risk.

19.3.1.5 A non-statutory consultation is planned from Autumn 2024, this will publicly introduce the Proposed Development and invite feedback from both statutory and non-statutory consultees on the proposals. Feedback will be considered through the ongoing development of the design, and via the EIA process.

19.4 Study area

19.4.1.1 The Water Resources and Flood Risk scoping study area is defined by the draft Order Limits plus a 1km buffer, as shown on Figure 19-1. The study area will be reviewed and, as appropriate, refined for the assessment and reported in the ES. The final study area will ensure that all receptors that are potentially in hydraulic continuity with the Proposed Development are included (such as downstream receptors).

19.5 Baseline conditions

19.5.1 Desktop sources used

19.5.1.1 The following publicly available desktop sources have been used to inform the existing baseline conditions of the study area:

- British Geological Survey (BGS) geological mapping available via the online GeoIndex viewer [283]
- BGS Lexicon of Named Rock Units [284]
- Norfolk County Council Flood Risk Management Strategy [281]
- Department for Environment, Food and Rural Affairs (Defra) Magic Map available online [285]
- Defra Hydrology Data Explorer [286]
- Flood Risk Maps [287] [288]
- WER/WFD Status classification data for surface water and groundwater water bodies [289]

19.5.1.2 The following additional information has been requested, though not all have been received at the time of writing, and will inform the ES:

- Abstraction licences from groundwater and surface water within 1km of the draft Order Limits (Environment Agency).
- Discharge consents to ground or surface water within 1km of the draft Order Limits (Environment Agency).
- A list of any hydraulic models in this area, along with the cover sheets or model reports (Environment Agency).
- The BGS susceptibility to groundwater flooding data.
- List of private water supplies within 1km of the draft Order Limits (Breckland Council and King's Lynn & West Norfolk District Council).

19.5.1.3 The following additional information will be requested to inform the ES:

- Hydrometric monitoring data including groundwater level, groundwater quality, surface water stage and flow, surface water quality and climate records (Environment Agency).
- Additional information held locally by the EA Area team, regarding the WER/WFD classification of water bodies, including, but not limited to:
  - Extended Waterbody Summary Reports
  - Programme of Measures
  - Waterbody Level Measure Actions
  - Any further information available regarding RBMP Cycle 2 and/or Cycle 3.

19.5.2 Surveys undertaken and proposed

19.5.2.1 The following surveys are planned to be undertaken, and will inform the ES:

- A site visit will be carried out to ground-truth and expand on the data received during the desk study and to gain a complete understanding of the existing topography, hydrological and hydrogeological conditions of the study area, and, where possible, address data deficiencies.

  This will involve completing a proforma to record receptor type (stream, field drain, pond, spring, well, wetland etc), in situ measurements/ observations of water levels, flow, dimensions and water quality etc., proximity to proposed works and photographs.

19.5.3 Existing baseline

Site topography and land use

19.5.3.1 The draft Order Limits currently consists predominantly of arable farmland, with some highways passing through the draft Order Limit including the A1122 and the A47. Within the study area, there are several small villages and towards the west of the study area is Swaffham, a market town. The west of the study area also covers areas of the Marham Royal Air Force (RAF) base.

19.5.3.2 The topography of the draft Order Limit is undulating, varying by approximately 70m across the area, topographic highs of 80-90mAOD towards the east of the draft Order Limits around the Eastern and Southern Panel Areas and lows of 10-20mAOD at the Western Panel Area. Topography is also undulating across the wider study area, between 10mAOD to 100mAOD.

Surface water

19.5.3.3 Watercourses within the study area are shown in Figure 19.1.

19.5.3.4 There is one designated Main River within the study area, Wendling Beck, which runs through the north of the study area. The river runs just outside draft Order Limits, along the boundary of the two Northern Panel Area sections, there are also several unnamed tributaries to Wendling Beck in the northern study area, some of which are within the draft Order Limits. Wendling Beck flows north-east to join Black Water[4], north of Dereham.

19.5.3.5 Several ordinary watercourses flow within the central and eastern parts of the 1km study area and within the draft Order Limits. There are also several field drains present. There are no designated ordinary watercourses west of Sporle within the study area.

[4] Note: "Black Water" and "Blackwater River" refer to two distinct/separate rivers in the local area.

19.5.3.6 The River Wissey flows in the Southern Panel Area, within the draft Order Limits. Watercourses located towards the Southern and Central Panel Areas flow into the River Wissey, which flows to the south-west.

19.5.3.7 The River Tud is located towards the eastern edge of the study area, outside of the draft Order Limits, and flows east to join the River Wensum in Norwich.

19.5.3.8 In the south-east of the 1km study area tributaries flow into the River Yare or Blackwater River, (a tributary to the River Yare). River Yare is a designated Main River and located outside the study area.

19.5.3.9 There are no river flow or level gauging stations within the draft Order Limits or study area. The nearest gauging stations are noted below:

- Wendling Beck river level gauging station is located 1.3km to the north-east of the draft Order Limits.
- Low Street river level gauging station on Blackwater River is located 8.3km east of the draft Order Limits.
- Marham river level gauging station is located 3.5km to the north-west of the draft Order Limits.

19.5.3.10 OS Mapping shows several small waterbodies within the study area, including several small ponds within the draft Order Limits.

Groundwater

19.5.3.11 The White Chalk Subgroup (Upper and Middle Chalk) dominates the regional geology in the area and is present at outcrop throughout much of East Anglia, including across the entire study area. The BGS describe the white chalk subgroup as chalk with flints, with discrete marl seams, nodular chalk, sponge-rich and flint seams throughout [284]. The Grey Chalk Subgroup (Lower Chalk) underlies the White Chalk and is at outcrop at the western boundary of the study area.

19.5.3.12 The Chalk is of late Cretaceous age and dips very gently to the south-east, as do the Neogene and Quaternary Rocks (gravel, sand, silt and clay) which overlie the Chalk [290], approximately 18km east of the study area.

19.5.3.13 Bedrock geology for the study area is presented in Figure 19.2. The 1:50,000 scale bedrock geology mapping [283] shows the Middle Chalk (mapped as the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated)) at outcrop to the west of the study area. Approximately 4km east of the western boundary of the study area, the Middle Chalk dips under the Upper Chalk (mapped as the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation And Culver Chalk Formation (undifferentiated)), which is then present at outcrop across the study area. There are no mapped faults within the study area.

19.5.3.14 Superficial geology mapping for the study area is presented in Figure 19.3. The 1:50,000 scale superficial geology mapping [283] shows most of the study area is overlain by diamicton of the Lowestoft Formation, which the BGS describe as an extensive sheet of chalky till, together with outwash sands and gravels, silts and

clays [284]. There are also small areas of sand and gravel of the Lowestoft Formation and clay and silt of the Lowestoft formation around the Central Panel Area. Areas of alluvial deposits and River Terrace Deposits (clay, sand and gravel) are present along watercourses, including Wendling Beck and the River Wissey. Superficial cover becomes more limited to the west of the study area and to west of the Central Panel Area, superficial cover is mostly absent, with the chalk bedrock is at outcrop.

19.5.3.15 Hydrometric monitoring data available on Hydrology Data Explorer was consulted [286], this showed that within the study area, there are seven EA groundwater level monitoring stations (of which one is logged data) and no groundwater quality monitoring stations. A data request will be submitted to the EA for any hydrometric monitoring data within the study area and will be included in the ES once received. Groundwater monitoring stations within 1km of the draft Order Limits are shown in Figure 19.6. Data from the groundwater monitoring stations within the study area show groundwater levels in the study area are generally between 30 – 50 mAOD (approximately 5 – 30 mbgl), and tend to fluctuate seasonally.

19.5.3.16 The EA aquifer designations [277] [285] within the study area are listed within Table 19-4.

Table 19-4 Aquifer designations

Geology	Formation/ Member	Aquifer Classification
Bedrock	White Chalk Subgroup	Principal
Superficial	Lowestoft Formation - Diamicton	Secondary (undifferentiated)
	Lowestoft Formation - Clay And Silt	Secondary B
	Lowestoft Formation - Sand And Gravel	Secondary A
	River Terrace Deposits (Undifferentiated) - Sand And Gravel	Secondary A
	Alluvium - Clay, Silt, Sand And Gravel	Secondary A

Aquifer classification definitions:

- Principal aquifers: provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands.
- Secondary A aquifers: comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.
- Secondary B aquifers: mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers.
- Secondary (undifferentiated): aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value.
- Unproductive strata: largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.

19.5.3.17 Ordnance Survey (OS) mapping shows two springs within the study area. One is located in Sadham Toney, approximately 400m south east of the Southern Panel Area, the other is located just north of Wendling, approximately 900m from the Northern panel Area. There are no mapped springs inside the draft Order Limits.

Water Environment Regulations (WER)/ Water Framework Directive (WFD)

19.5.3.18 The EU WFD was introduced in 2000 and was transposed into UK law by The Water Environment (Water Framework Directive) (England and Wales) Regulations (amended 2017). The EA is the competent authority responsible for delivering the Directive in England. The WER/WFD aims to protect and enhance the quality of the water environment. It takes a holistic approach to the sustainable management of water by considering the interactions between surface water, groundwater and water-dependent ecosystems. Under the WER/WFD, 'water bodies' are the basic management units and are defined as all or part of a river system or aquifer. These water bodies form part of a larger River Basin District (RBD), for which River Basin Management Plans (RBMPs) are developed and environmental objectives are set. These RBMPs are produced every six years, in accordance with the river basin management planning cycle. The WER/WFD requires the status classification of the condition of all surface water and groundwater bodies and the setting of objectives for maintaining or improving conditions so that water bodies reach and/or maintain 'good' status or higher (unless exceptions are identified).

19.5.3.19 The draft Order Limits and study area fall within the Anglian RBD as defined under the WER/WFD. The status classifications, objectives and programme of measures derived by the EA for water bodies located within the study area are outlined within the Cycle 3 Anglian RBMP [269].

19.5.3.20 Ten surface water body catchments fall within the study area (all of which are river water bodies), eight fall within the draft Order Limits. There are no transitional water bodies or artificial water bodies within the study area. The surface water bodies within the study area and their status are shown in Table 19-5 and their extents are shown in Figure 19.4.

19.5.3.21 Three groundwater body catchments fall within the draft Order Limits and study area. The groundwater bodies within the study area and their status are shown in Table 19-6 and their extents are shown in Figure 19.5.

19.5.3.22 Additional information including the data behind these classifications will be requested from the EA and included in the ES. The status classifications and objective, Reasons for Not Achieving Good (RNAG), and programme of measures for these water bodies will be reviewed during the EIA and reported in the ES.

Table 19-5 WER/WFD surface water bodies

Water Body	Management catchment	Ecological status (2019)	Chemical Status (2019)	Ecological Status (2022)
Nar upstream of Abbey Farm (ID: GB105033047791)	North West Norfolk	Moderate	Fail	Data not available[5]
Old Carr Stream (ID: GB105033047820)	Cam and Ely Ouse	Moderate	Fail	Good
Gadder (ID: GB105033047880)	Cam and Ely Ouse	Moderate	Fail	Moderate
Wissey – Upper (ID: GB105033047890)	Cam and Ely Ouse	Moderate	Fail	Moderate
Watton Brook (ID: GB105033047870)	Cam and Ely Ouse	Moderate	Fail	Moderate
Stringside Stream (ID: GB105033047810)	Cam and Ely Ouse	Poor	Fail	Poor
Wendling Beck (ID: GB105034051020)	Broadland Rivers	Moderate	Fail	Moderate
Tud (ID: GB105034051000)	Broadland Rivers	Moderate	Fail	Moderate
Blackwater (Yare) (ID: GB105034051260)	Broadland Rivers	Poor	Fail	Poor
Yare (u/s confluence with Tiffey - Upper) (ID: GB105034051270)	Broadland Rivers	Moderate	Fail	Moderate

Table 19-6 WER/WFD groundwater bodies

Water Body	Overall Status (2019)	Quantitative Status (2019)	Chemical Status (2019)
Cam and Ely Ouse Chalk (ID: GB40501G400500)	Poor	Poor	Poor
North West Norfolk Chalk (ID: GB40501G400200)	Poor	Poor	Poor
Broadland Rivers Chalk & Crag (ID: GB40501G400300)	Poor	Poor	Poor

Environmental Designations

19.5.3.23 Within the 1km study area there are four environmentally designated sites, with potential dependence on water. All are listed as Sites of Special Scientific Interests (SSSI) and one is also listed as a Special Protection Area (SPA). One of the sites is identified as a Groundwater Dependent Terrestrial Ecosystem (GWDTE). Environmentally designated sites are shown in Table 19-7 and Figure 19.6. There are no Ramsar sites, Special Areas of Conservation (SAC), Local Nature Reserves (LNR), or National Nature Reserves (NNR) within the 1km study area.

[5] Data not available in Catchment Data Explorer. Query has been issued to the Environment Agency.

19.5.3.24 The closest environmentally designated site is Breckland SPA and Breckland Forest SSSI, which lies on the boundary of the draft Order Limits near the Western Panel Area and Cable Corridors. The SSSI/SPA provide suitable breeding habitat for woodlark and nightjar, which occur in internationally important numbers. The site is also listed for supporting five vascular plants listed on Schedule 8 of the Wildlife and Countryside Act and exceptionally rich invertebrate fauna [291].

19.5.3.25 Holly Farm Meadow, Wendling, is located in the north east of the study area, approximately 575m from the draft Order Limits of the Northern Panel Area. The SSSI/GWDTE is a calcareous spring-line meadow with gradations between wet and dry conditions. It supports an area of species-rich unimproved fen grassland which is maintained by seasonal grazing [291].

19.5.3.26 Narborough Railway Embankment (SSSI) is located at the western edge of the study area and listed for its diverse chalk grassland. Honeypot Wood SSSI is located at the northern boundary on the study area and listed for ancient, coppiced, ash-maple woodland [291].

Table 19-7 Environmentally designated sites within 1km

Name	Designation	Distance from the draft Order Limits (m)
Breckland Forest	SSSI, SPA	0 (immediately southwest of the draft Order Limits)
Holly Farm Meadow, Wendling	SSSI, GWDTE	500 northeast
Narborough Railway Embankment	SSSI	650 north
Honeypot Wood, Wendling	SSSI	820 northeast

Water Resources

19.5.3.27 Surface water Drinking Water Safeguard Zones (DWSgZs) are catchment areas that influence the water quality for their respective water supplies (surface water), which are at risk of failing the drinking water protection objectives these are designated by the EA. Surface water DWSgZs are shown in Figure 19.1. Three surface water DWSgZs cover most of the study area. These are for the River Wissey, River Nar and River Wensum catchments.

19.5.3.28 Groundwater DWSgZs are established around public groundwater supplies where additional pollution control measures are needed, these are designated by the EA. Groundwater DWSgZs are shown in Figure 19.6. A small area to the west of the study area is located within a groundwater DWSgZ.

19.5.3.29 Source Protection Zones (SPZs) are defined by the EA around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction. The following subdivisions are defined within SPZs:

- Zone 1: This zone is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table. Additionally, the zone has as a minimum a 50m radius.
- Zone 2: This zone is defined by the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 or 500m, depending on the size of the abstraction.
- Zone 3: This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

19.5.3.30 SPZs are presented in Figure 19.6, which shows that the majority of the Order Limits and the 1km study area fall within an SPZ. Within the 1km study area there are three SPZ1s and two SPZ2s with the remainder falling within SPZ3. The study area to the west of the Central Panel Area is largely within an SPZ2, the Western Panel Area and nearby cable corridor falls within an SPZ1. There are two further SPZ1s located near Bradenham within the study area. The SPZ1 located east of Bradenham, extends into the cable corridor just north of the Southern Panel Area. There is one SPZ2 associated with both groundwater supplies near Bradenham which extends into the nearby cable corridor and part of the Southern Panel Area.

19.5.3.31 Nitrate Vulnerable Zones (NVZs) are areas designated by Defra as being at risk from agricultural nitrate pollution. The entire study area falls within an NVZ.

19.5.3.32 Data on discharges to water and groundwater is available from the Environment Agency [292]. There are 50 consented discharges within the study area none of which fall within the draft Order Limits. Consented discharges are presented in Figure 19.7.

19.5.3.33 Data on licensed water abstractions from surface water and groundwater within 1km of the draft Order Limits has been received from the EA and are shown in Figure 19.7. There are 30 licenced groundwater abstractions within the study area and no surface water abstractions. Two of these licenced abstractions are located within the draft Order Limits, one located within the western panel area and another in the western cable corridor.

19.5.3.34 Additional data on private water supplies has been requested from Breckland Council and King's Lynn & West Norfolk District Council. At the time of writing, no data has been received on the location of licensed private water supplies. This information will be reviewed and inform the ES.

Flood Risk

19.5.3.35 Flood risk from all sources (fluvial, surface water, groundwater, reservoirs and surrounding properties/infrastructure) in the study area is considered during the scoping stage. This includes sources where there may be potential to impact flood risk to the Proposed Development (as a receptor itself), as well as the potential for the Proposed Development to impact flood risk to surrounding receptors such as property, infrastructure and land.

19.5.3.36 The risk of flooding from rivers and seas is shown in Figure 19.8. Aside from the surface water flooding associated with the positions of smaller watercourses not

included in the fluvial flood maps, surface water flooding is also associated with overland flow pathways and ponding in depressions within the study area.

19.5.3.37 The risk of flooding from rivers and seas is shown in Figure 19.9. Within the study area, sources of fluvial flood risk within the draft Order Limits are primarily from the River Wissey, near the Southern Panel Area, and Wendling Beck near the Northern Panel Area. Most of the tributary watercourses are not explicitly represented in the fluvial flood mapping, but are implicitly represented in the surface water flood risk mapping. For the ES, information on available hydraulic models for these river systems will be requested from the EA to inform the flood risk assessment.

19.5.3.38 Risk of flooding from reservoirs is shown in Figure 19.10. EA data on flood extents for all large, raised reservoirs, indicate that a small area on the boundary of the Western Panel Area is at risk of flooding in the event that a reservoir failure occurred and released the water held on a "wet day" when local rivers had already overflowed their banks.

19.5.3.39 The BGS susceptibility to groundwater flooding data is shown in Figure 19.11. Within the draft Order Limits there is generally a limited potential for groundwater flooding to occur. Small areas within the Northern and Southern panel areas have potential for groundwater flooding to occur at surface.

19.5.4 Future baseline

19.5.4.1 The UK Climate Impact Programme 2018 (UKCP18) [293] predicts the following changes over the next several decades (up to 2099):

- Temperatures will continue to increase, with larger temperature increases estimated in summers.
- The average summer rainfall rate is estimated to decrease, whereas the average winter rainfall rate is estimated to increase.
- An overall increase in extreme weather events.

19.5.4.2 To this end, the UK Groundwater Forum concluded the following, as the potential impacts of climate change on groundwater [294]

- A long-term decline in groundwater storage
- Increased frequency and severity of groundwater droughts
- Increased frequency and severity of groundwater-related floods

19.5.4.3 This will lead to greater variability in groundwater levels, with prolonged periods of high and low groundwater levels relating to the variability of rainfall and recharge.

19.5.4.4 The UK Centre for Ecology and Hydrology (UKCEH) have run predictive models to simulate the impacts of climate change, across England, Scotland and Wales, using predictions from UKCP09 [295]. This report analysed 22 individual surface water stations across the East Anglia, however none are within the study area. The closest stations are:

- Stringside at Whitebridge (ID: 33029), 8km south-west of the draft Order Limits
- Wensum at Fakenham (ID: 34011), 14km north of the draft Order Limits
- Thet at Bridgham (ID: 33044), 18km south of the draft Order Limits

19.5.4.5 At these locations, by the 2050s mean flow is predicted to increase by up to 60% in the winter, and decrease by up to 40% in the summer, however projections for both summer and winter are variable.

19.5.4.6 This report also predicts the impact on groundwater stations, for which one station was within the close vicinity of the study area. Washpit Farm groundwater monitoring station is approximately 10km north of Swaffham and 8km north of the draft Order Limits, monitoring the Chalk. The change between mean monthly groundwater levels simulated from Future Flows Climate at Washpit Farm for the period 2040-2069 and 1961-1990 varies between 1 to -5 m. The 11 future climate projections show differing changes, although most projections show an overall decrease in groundwater levels, particularly in the winter.

19.5.4.7 For flood risk, future climate change will increase the likelihood of extreme storm events. Planning Policy Guidance for flood risk and climate change outlines the required climate allowances to be applied to either peak river flows or to peak rainfall in-tensity (depending on the nature of the analysis) [296]. The allowances that will need to be applied are determined by the location, the flood zone the development is in, and the vulnerability classification of the Proposed Development.

19.6 Potential impacts

19.6.1 Construction

19.6.1.1 Specific construction activities with the potential to harm the water environment are:

- Earthworks and site clearance activities such as stripping of topsoil, trenching, storage and capping of soil
- Underground cable installation (cable plough or trenching) and reinstatement works
- Piling and erection of solar PV module support structures, with foundations to a depth of circa 1m
- Excavation and construction of foundations and piling for the substations, if required
- Construction of laydown areas and construction compounds
- Construction of concrete pad foundation for inverters, transformers and BESS
- Horizontal directional drilling (HDD) (or other trenchless methods) under or in close proximity to watercourses, where utilised
- Construction vehicles travelling to and from the Proposed Development

19.6.1.2 During the construction phase, the following potential risks to the water environment have been identified:

- Physical loss of land drains present within the draft Order Limits and associated impacts to hydromorphological condition and aquatic habitat quality, as a result of construction activities.
- Changes to surface runoff patterns and land drainage as a result of construction activities, resulting in altered surface water flows and water levels within the draft Order Limits and downstream, including flood risk.
- Reductions in water quality and aquatic habitat quality of surface water bodies present within the draft Order Limits, or downstream waterbodies, as a result of ground disturbance and associated sediment releases during construction activities.
- Reductions in water quality and aquatic habitat quality of surface water bodies as a result of sediment release and disturbance from the construction.
- Subsoil compaction and reduced infiltration, resulting in increases in localised overland flooding and reduced recharge to groundwater.
- Impacts on local hydrogeology and groundwater resources including any private water supplies and abstractions. Changes to groundwater levels, flows and quality arising from construction activities.
- Reductions in water quality and increased turbidity of groundwater, resulting from the groundwork and associated sediment releases during construction activities.
- Reductions in water quality of surface water bodies or groundwater bodies present within the draft Order Limit, as a result of accidental release of contaminants (such as fuel oils and lubricants from construction plant, vehicles and traffic movements – accidental spillage during refuelling and/or leakage from storage; spillage of cement, concrete material and alkaline wash waters, wheel washing, waste storage).
- Increased risk of flooding within the draft Order Limits and to neighbouring sites due to potential changes in nature and extent of the floodplain, including displacement or changes in floodplain storage.
- Potential increased exposure to flood risk during the construction phase by introducing new receptors in areas potentially at risk of flooding, namely construction infrastructure and personnel.
- Potential changes to water balance as a result of construction water demand.

19.6.2 Operation

19.6.2.1 During the operation phase, the following potential risks to the water environment have been identified:

- Changes to surface runoff patterns and land drainage, resulting in altered surface water body flows and water levels within the draft Order Limits and downstream.
- Physical degradation or loss of surface water bodies present within the draft Order Limits and associated impacts to hydromorphological condition and aquatic habitat quality due to changes to drainage network.
- Placement of impermeable structures and surfaces and reduced infiltration, resulting in increases in localised overland flooding and reduced recharge to groundwater.
- Deterioration of water quality of surface water bodies and groundwater bodies present within the draft Order Limits as a result of accidental release of contaminants during proposed operation, and traffic accidents/spillages on new access roads and transmission corridors. This includes deterioration of water quality as a result of potentially contaminated water runoff in the unlikely event of a fire.
- Alteration of groundwater levels and flow paths and consequently to flood risk due to reduced recharge resulting from rainfall captured by solar PV modules and hardstanding drainage.
- Increased risk of flooding within the draft Order Limits and to property elsewhere due to changes in nature and extent of the floodplain.
- Potential changes to water balance as a result of operational water demand

19.6.3 Decommissioning

19.6.3.1 During the decommissioning phase, the following potential risks to the water environment have been identified:

- Changes to surface runoff patterns and land drainage as a result of decommissioning activities, resulting in altered surface water flows and water levels within the draft Order Limits and downstream, including flood risk. Assume return to similar to baseline conditions.
- Reductions in water quality and aquatic habitat quality of surface water bodies present within the draft Order Limits, or downstream waterbodies, as a result of ground disturbance and associated sediment releases during decommissioning activities.
- Subsoil compaction and reduced infiltration, resulting in increases in localised overland flooding and reduced recharge to groundwater.
- Impacts on local hydrogeology and groundwater resources including any private water supplies and abstractions. Changes to groundwater levels, flows and quality arising from decommissioning activities.
- Reductions in water quality and increased turbidity of groundwater, resulting from the groundwork and associated sediment releases during decommissioning activities.

- Reductions in water quality of surface water bodies or groundwater bodies present within the draft Order Limits, as a result of accidental release of contaminants (fuel oils and lubricants from construction plant and vehicles – accidental spillage during refuelling and/or leakage from storage; waste removal and storage, wheel washing).
- Other flooding related impacts may potentially arise from the decommissioning of any flood risk infrastructure introduced in the design or mitigation, such as culverts for access routes or compensation floodplain storage.

19.7 Design, mitigation and enhancement measures

19.7.1 Design principles

19.7.1.1 The Proposed Development is being designed with regard to a set of design principles as described in Chapter 2, paragraph 2.4.9.3 of this report.

19.7.2 Embedded and Good practice measures

19.7.2.1 Embedded measures are modifications to the design of a scheme, made during the pre-application phase, that are an inherent part of the design and do not require additional action to be taken. Good practice measures are standard approaches and actions undertaken to avoid or reduce environmental impacts in line with best practice guidance and legislative requirements.

19.7.2.2 The Proposed Development is currently evolving through an iterative design process. Measures for the Proposed Development relevant to Water Resources and Flood Risk are likely to include:

- Minimum 10m offset from all infrastructure (including fencing) from bank top of all riparian boundaries and watercourses
- Avoid locating critical infrastructure within Flood Zones 2 and 3, ensuring that solar PV modules are raised above the predicted maximum flood depth for the 100 year plus climate change scenario.
- SuDS will be provided at source, ensuring that surface water run-off is managed consistently with existing site conditions.
- Access tracks will be permeable to allow water to filtrate through and maintain greenfield runoff rates.

19.7.2.3 Further measures are likely to include:

- Where development must take place in Flood Zone 2/3, compensation will be provided.
- Suitable stand offs from springs, spring catchments or boreholes.
- For watercourse crossings where required, use of appropriate trenchless methodology.

- Use of underground cabling methodology that minimises disruption to the ground (e.g. such as a cable plough which cuts, installs and backfills in one operation).
- Use of piling methodology that minimises likelihood of creating pollution pathway to groundwater.
- Minimising area of hardstanding required for laydown and construction compounds.
- Application of a sequential approach (and where appropriate a sequential test) to site selection, layout and design, to avoid or reduce the potential for flood risk to the proposed development, or to other receptors as a result of the Proposed Development. Thereafter embedded design measures will seek to mitigate the flood risk, by, for example, designing any bridges or culverts to pass flood flows up to and including the 1 in 100 annual probability flood with an allowance for climate change, provision of compensation floodplain storage, locating construction phase equipment and temporary works outside flood risk areas, where reasonably practicable.
- Scheduling of temporary/ construction works excavations and storage to not increase flood risk.

19.7.2.4 The measures confirmed as part of the EIA process, will be described in the outline management plans and their implementation secured by a Requirement of the DCO.

19.7.3 Further mitigation

19.7.3.1 Further mitigation is actions that require further activity in order to achieve a reduction in significance of effect, and/or anticipated outcome. Further mitigation for Water Resources and Flood Risk will be defined through the EIA process once the level of significance of effects is known. Options for further mitigation for the Proposed Development relevant to Water Resources and Flood Risk may include:

- Appropriate construction methods and plans to be chosen to protect and minimise impacts to sensitive receptors. Site specific mitigation may be required to comply with the WER/WFD objectives and mitigate any potential impacts on WER/WFD status.

19.7.4 Management plans

19.7.4.1 A suite of management plans will be submitted with the DCO application for the Proposed Development, those relevant to Water Resources and Flood Risk include:

- oCEMP
- oLEMP, including general operational measures alongside those specific to landscape and ecology
- oBSMP, in relation to firewater runoff
- oDEMP

19.7.4.2 These management plans will incorporate standard industry best practice, considered as embedded measures, as well as any further mitigation that is deemed required as a result of the EIA process.

19.7.4.3 Outline versions of these management plans will be submitted with the DCO application to secure the commitments contained within. It will be a Requirement of the DCO for the Applicant to develop the outline management plans into final management plans to be submitted to the relevant planning authority for approval in advance of the relevant phase of development.

19.8 Likely significant effects

19.8.1 Construction

19.8.1.1 Table 19-8 below summarises the likely aspects of the water environment that have the potential to be significantly affected during the construction phase, and whether they are scoped in or out of further assessment

Table 19-8 Construction phase likely significant effects

Aspect	Scoped in/ Scoped out	Justification
Surface water quality	Scoped in	Potential for the introduction of contamination and sediment into surface water during construction, and potential impacts to hydraulically connected habitats (e.g. from road drainage or spillages and/or sediment release).
Surface water quantity	Scoped in	Potential changes to surface water flow and levels within the draft Order Limits and downstream and to hydraulically connected habitats (e.g. due to new land drains and construction drainage).
Groundwater quality	Scoped in	Potential for the introduction of contamination and sediment into groundwater during construction, and potential impacts to hydraulically connected habitats (e.g. from road drainage or spillages and/or sediment release).
Groundwater quantity	Scoped in	Potential changes to shallow groundwater flow and levels at the site and downstream and to hydraulically connected habitats (e.g. from trenching and pile installation).
Water Dependent Terrestrial Ecosystems (WDTEs)	Scoped in	Potential impacts to WDTEs from changes to hydraulically connected surface water and groundwater as a result of construction activities.
Flood Risk and Drainage	Scoped in	Potential increased flood risk impacts due to possible changes in nature and extent of the floodplain and activities in areas of flood risk during construction.

19.8.2 Operation

19.8.2.1 Table 19-9 below summarises the likely aspect of the water environment have the potential to be significantly affected during the operation phase, and whether they are scoped in or out of further assessment.

Table 19-9 Operation phase likely significant effects

Aspect	Scoped in/ Scoped out	Justification
Surface water quality	Scoped in	Potential for the introduction of contamination and sediment into surface water during operational use and potential impacts to hydraulically connected habitats (e.g. from road drainage or spillages from general maintenance).
Surface water quantity	Scoped in	Potential changes to surface water flow and levels at the draft Order Limits and downstream and to hydraulically connected habitats (e.g. due to new land drains and increased hardstanding).
Groundwater quality	Scoped in	Potential for the introduction of contamination and sediment into groundwater during operational use, and potential impacts to hydraulically connected habitats (e.g. from road drainage or spillages).
Groundwater quantity	Scoped in	Potential changes to shallow groundwater flow and levels at the site and downstream and to hydraulically connected habitats as a result of permanent below ground structures (e.g. piling) and surface structures intercepting recharge (e.g. hardstanding and solar panels).
WDTEs	Scoped in	Potential impacts to WDTEs from changes to hydraulically connected surface water and groundwater during operational use.
Flood Risk and Drainage	Scoped in	Potential increased flood risk impacts due to possible changes in nature and extent of the flood plain, or alterations to the watercourse(s) during operation.

19.8.3 Decommissioning

19.8.3.1 Table 19-10 below summarises the likely aspect of the water environment have the potential to be significantly affected during the decommissioning phase, and whether they are scoped in or out of further assessment.

Table 19-10 Decommissioning phase likely significant effects

Aspect	Scoped in/ Scoped out	Justification
Surface water quality	Scoped in	Potential for the introduction of contamination and sediment into surface water during decommissioning, and

Aspect	Scoped in/ Scoped out	Justification
		potential impacts to hydraulically connected habitats (e.g. from road drainage or spillages).
Surface water quantity	Scoped in	Potential changes to surface water flow and levels within the draft Order Limits and downstream and to hydraulically connected habitats (e.g. due to changes in surface runoff).
Groundwater quality	Scoped in	Potential for the introduction of contamination and sediment into groundwater during construction, and potential impacts to hydraulically connected habitats (e.g. from road drainage or spillages).
Groundwater quantity	Scoped in	Potential changes to shallow groundwater flow and levels at the site and downstream and to hydraulically connected habitats.
WDTEs	Scoped in	Potential impacts to WDTEs from changes to hydraulically connected surface water and groundwater as a result of decommissioning activities.
Flood Risk and Drainage	Scoped in	Potential increased flood risk due to decommissioning and removal or reversal of any changes introduced to the flood-plain or watercourses for the design or mitigation of the scheme.

19.9 Proposed assessment methodology

19.9.1.1 The study area is defined by the draft Order Limits plus a 1km buffer, as shown on Figure 19.1, and is based on the 'source-pathway-receptor' pollutant linkage principle. The 1km study area was selected based on professional judgement of the potential impacts and pathways related to the project. The study area will be reviewed as the design develops to take into account any activities which have the potential to impact water resources at greater distance (such as dewatering or discharges).

19.9.1.2 A comprehensive desk-based study will be completed using publicly available data and data received from stakeholders through consultation. Building on the analysis undertaken at scoping stage, the desk study will identify and confirm potential water receptors and sensitive areas within the study area, which may include groundwater and surface water dependent features.

19.9.1.3 A site visit will be carried out to ground-truth and expand on the data received during the desk study and to gain a complete understanding of the existing topography, hydrological and hydrogeological conditions of the study area, and, where possible, address data deficiencies. The site visit will include a photographic survey of each of the key hydrological features/receptors identified during the desk study.

19.9.1.4 Following the site visit, the baseline condition and conceptual understanding of the geology, hydrogeology and hydrology within the draft Order Limits will be refined before completing the risk assessment.

19.9.1.5 The risk assessment methodology will involve:

- Identification of all key receptors and their sensitivity.
- Identification of the potential impacts of the Proposed Development (during both construction, operational and decommissioning phases).
- Assessment of the significance of the identified impacts (based on receptor sensitivity and magnitude of effect).
- Identification of proposed mitigation (design and construction).
- Identification of residual impacts.
- Identification of cumulative impacts.

19.9.1.6 A WER/WFD Compliance Assessment will be undertaken to assess the potential impacts of the Proposed Development on the immediate water bodies present within the draft Order Limits and any linked water bodies. This will initially comprise a screening assessment (baseline) and scoping assessment (preliminary).

19.9.1.7 Flood risk will be assessed using existing data and information wherever possible, requested from the EA. Initially, a preliminary Flood Risk Assessment will be undertaken to qualitatively identify flood risks from all sources, both to the Proposed Development, and from the Proposed Development to other receptors. Where the scoping Flood Risk Assessment identifies the potential for flood risk impacts, a more detailed Flood Risk Assessment may be subsequently undertaken using hydraulic calculations or models to be agreed with the EA, to calculate the precise impacts on receptors in order to determine the mitigation design.

19.9.1.8 It is considered that a separate Hydrogeological Impact Assessment document will not be required, beyond the assessment described within this report which will be reported in the ES. This is due to the nature of the development which is primarily above ground, with any temporary below ground construction works mitigatable through best practice measures and management plans which will be outlined in the oCEMP. In addition, hydrogeological impacts related to drainage, flooding and WER will be covered by the relevant appendices.

Receptors

19.9.1.9 Receptors relevant to the assessment are summarised below:

- Surface water bodies including watercourses within the study area, shown in Figure 19.1
- Bedrock aquifers within the study area, shown in Figure 19.2
- Superficial aquifers within the study area, shown in Figure 19.3
- WER/WFD surface water bodies within the study area, shown in Figure 19.4

- WER/WFD groundwater bodies within the study area, shown in Figure 19.5
- GWDTEs within the study area, shown in Figure 19.6
- Water dependent environmentally designated sites within the study area, shown in Figure 2.7
- Abstractions (both licensed and private water supplies) and discharges within the study area, shown in Figure 19.7
- Other water features identified from OS mapping, including springs, lakes and ponds.

Sensitivity of receptors

19.9.1.10 The sensitivity value of each receptor within the study area will be determined according to the Design Manual for Roads and Bridges (DMRB) [280] criteria set out in Table 19-11.

19.9.1.11 Flood receptors such as property, land or infrastructure, at risk or potential risk of flooding that may be impacted by the Proposed Development (including the Proposed Development itself) will be reviewed against the National Receptors Database and associated Ordnance Survey MasterMap products. A vulnerability classification will be identified for each receptor in line with the NPPF.

Table 19-11 Receptors

Sensitivity Value of Receptor	Receptors
Very High (e.g. International)	**Surface water:** Watercourse having a WFD classification and Q95 ≥1.0 m^3/s. Site protected/designated under European Commission (EC) (Ramsar site, salmonid water)/Species protected by EC legislation Ecology and Nature Conservation. **Groundwater:** Principal aquifer providing a regionally important resource and/or supporting a site protected under EC legislation. Ecology and Nature Conservation. Groundwater locally supports designated GWDTE. **Flood risk:** Essential Civil infrastructure.
High (e.g. National)	**Surface water:** Watercourse having a WFD classification and Q95 <1.0 m^3/s. Species protected under UK legislation (SSSI). Ecology and Nature Conservation. **Groundwater:** Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE. **Flood risk:** Highly vulnerable development.
Medium (e.g. Regional / County)	**Surface water:** Watercourses not having a WFD classification and Q95 >0.001m^3/s. **Groundwater:** Aquifer providing water for agricultural or industrial use with limited connection to surface water. **Flood risk:** Less vulnerable development.
Low (e.g. Local)	**Surface water:** Watercourses not having an WFD classification and Q95 ≤0.001m^3/s. **Groundwater:** Unproductive strata.

Sensitivity Value of Receptor	Receptors
	Flood risk: Water compatible development.

Magnitude of impact

19.9.1.12 Table 19-12 summarises the potential magnitude of any construction or operation impact on the receptor, based on the DMRB LA113 guidance [280].

Table 19-12 Magnitude of impact

Magnitude of Impact	Environmental Impact	Examples
Major	**Negative:** Loss of an attribute and / or quality and integrity of an attribute **Positive:** Creation of new attribute or major improvement in quality of an attribute	**Negative:** Increase in peak flood level* (> 100mm); deterioration in surface water ecological or chemical WFD element status or groundwater qualitative or quantitative WFD element status. **Positive:** Creation of additional flood storage and decrease in peak flood level* (> 100mm); increase in productivity or size of fishery; improvement in surface water ecological or chemical WFD element status; improvement in groundwater qualitative or quantitative WFD element status.
Moderate	**Negative:** Loss of part of an attribute or decrease in integrity of an attribute **Positive:** Moderate improvement in quality of an attribute	**Negative:** Increase in peak flood level* (> 50mm); measurable decrease in surface water ecological or chemical quality or flow with potential for deterioration in WFD element status. Reversible change in the yield or quality of an aquifer, such that existing users are affected, with potential for deterioration in WFD element status. **Positive:** Creation of flood storage and decrease in peak flood level* (> 50mm); measurable increase in surface water ecological or chemical quality or flow with potential for WFD element status to be improved. Measurable increase in the yield or quality of an aquifer, benefiting existing users, with potential for WFD element status to be improved.
Minor	**Negative:** Measurable change to the integrity of an attribute **Positive:** Measurable increase, or reduced risk of negative effect to an attribute	**Negative:** Increase in peak flood level* (> 10mm); measurable decrease in surface water ecological or chemical quality or flow; decrease in yield or quality of aquifer, not affecting existing users or changing any WFD element status. **Positive:** Creation of flood storage and decrease in peak flood level* (> 10mm);

Magnitude of Impact	Environmental Impact	Examples
		measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting existing users or changing any WFD element status.
Negligible	Impacts which are beneath the level of perception, within normal bounds of variation or within the margin of forecasting error.	Negligible change to peak flood level* (< +/- 10mm); discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity.
Neutral	Neutral effects are predicted where the proposal is unlikely to alter the present or future baseline situation.	No change to peak flood level*, discharges to watercourse or changes to an aquifer which have no appreciable effect.

*Peak flood level for floods up to and including a 1% annual probability event, including climate change. Where access or egress routes are affected, the magnitude of the impact will be defined by the change in the Flood Hazard Rating as defined in Defra/EA report FD2320 [297]

Significance of effect

19.9.1.13 By combining the magnitude of impact (or change) and the sensitivity (value) of each receptor, an assessment will be made of the significance of effect, considering the possibility and nature of mitigation. The resultant effects may be either negative (adverse), positive (beneficial) or neutral, depending on the nature of the impact. The significance of effect upon the receptor is assessed using the significance matrix in Table 19-13.

Table 19-13 Environmental effects matrix

		Magnitude of Impact				
		Major	**Moderate**	**Minor**	**Negligible**	**Neutral**
Sensitivity of resource	**Very High**	Major	Major	Major	Moderate	Neutral
	High	Major	Major	Moderate	Minor	Neutral
	Medium	Major	Moderate	Minor	Negligible	Neutral
	Low	Moderate	Minor	Negligible	Negligible	Neutral
	Negligible	Minor	Negligible	Negligible	Negligible	Neutral

19.9.1.14 Moderate or Major effect are generally considered significant in EIA terms, and Negligible or Minor not significant. Significance conclusions for each residual effect will seek to incorporate, as far as practicable, confirmed design and mitigation measures.

19.10 Assumptions, limitations and uncertainties

19.10.1.1 The current baseline understanding of the draft Order Limits water environment has been summarised in the baseline section above. This understanding has been collated based on a range of publicly available data and information. The accuracy of the baseline condition assessment is reliant upon the accuracy of the data available from the sources.

19.10.1.2 The data will be supplemented with additional data as part of the EIA process. This will include outstanding information from the EA and local authority data requests, including location of water abstractions (Section 19.3), and information gathered during a site visit to identify the nature and sensitivity of water receptors (Section 19.5.2).

19.10.1.3 The environmental value and sensitivity of water environmental receptors, the magnitude of potential impacts and the significance level may change during later phases when more information and data becomes available.

19.10.1.4 Any third-party information, including the readily available data sources and input from external consultations is to be assumed to be accurate at the time of writing.

19.11 Summary

Table 19-14 Water Resources and Flood Risk scoping summary

Aspect	Construction	Operation	Decommissioning	Any required surveys?
Surface water quality	Scoped in	Scoped in	Scoped in	Site walkover to establish receptor sensitivity
Surface water quantity	Scoped in	Scoped in	Scoped in	Site walkover to establish receptor sensitivity
Groundwater quality	Scoped in	Scoped in	Scoped in	Site walkover to establish receptor sensitivity
Groundwater quantity	Scoped in	Scoped in	Scoped in	Site walkover to establish receptor sensitivity
WDTEs	Scoped in	Scoped in	Scoped in	Site walkover to establish receptor sensitivity
Flood Risk and Drainage	Scoped in	Scoped in	Scoped in	Where targeted hydraulic modelling or calculations are required, these will make best use of available information supplied by the Environment Agency, including existing models and surveys before

Aspect	Construction	Operation	Decommissioning	Any required surveys?
				identifying if further surveys are required.

19.11.1.1 The Water Resource and Flood Risk chapter of the ES will be supported by the additional assessments outlined below. The scope of these assessments will be agreed with the relevant stakeholders.

WFD/WER Compliance Assessment

19.11.1.2 The WFD/WER Compliance Assessment will be undertaken to assess the potential impacts of the Proposed Development on the immediate water bodies present at the site and any linked water bodies.

19.11.1.3 The WFD/WER Compliance Assessment comprises an iterative process involving the following key stages: screening (baseline) assessment, scoping (preliminary) assessment; detailed impact assessment (where required); and the application of regulation 19 derogation assessments (where/if deemed applicable).

19.11.1.4 A WFD/WER screening and scoping assessment will be undertaken to:

- collate the latest WFD/WER baseline status and status objectives information available for the relevant WFD/WER water bodies that may be affected by the Proposed Development;
- identify the relevant construction activities, decommissioning activities and permanent components of the Proposed Development that have the potential to affect the WFD/WER water bodies at the sites and any latest associated embedded design and construction/decommissioning phase mitigation measures;
- undertake a high-level preliminary scoping assessment to identify the likely effects of the Proposed Development on the current status and status objectives of the relevant water bodies and any associated risks of non-compliance with WFD/WER objectives;
- identify any additional construction/decommissioning and design measures deemed necessary to mitigate the risk of non-compliance, as well as any additional mitigation and potential enhancement opportunities; and
- provide recommendations for any further detailed baseline and impact assessments that are deemed required in parallel with the forward detailed design stage of the Proposed Development.

Flood Risk Assessment (FRA) and Drainage Strategy

19.11.1.5 Given the extent of the Proposed Development and potential interaction with areas of flood risk, a flood risk mitigation process is proposed to identify the design and mitigation measures that should be considered to avoid, reduce or mitigate any flood risk where reasonably practicable.

19.11.1.6 The production of an FRA for planning will follow the process set out in the NPPF and associated Flood Risk and Coastal Change guidance [297]. This is both to ensure the Proposed Development itself is designed to be safe and resilient to flood risk, as well as ensuring that the Proposed Development does not increase flood risk to neighbouring receptors.

19.11.1.7 The FRA will also need to demonstrate the application of the Sequential Test, which steers development into areas of lowest flood risk. Once the Sequential Test is satisfied it will be necessary to consider if the Exception Test is satisfied. At this stage it is expected that the Proposed Development would be classed as 'Essential Infrastructure' under the vulnerability classification, and therefore if critical infrastructure is to be located in Flood Zone 3 the Exception Test will need to be met. Currently, the study area includes small areas of Flood Zone 3 (around 0.3% of the area within the draft Order Limits), and it is anticipated that critical infrastructure such as the substation and inverters can be located to avoid these areas; it is also likely that other infrastructure such as the solar panels could avoid these flood zones and this will be confirmed during design development.

19.11.1.8 If an Exception Test is required, the Proposed Development will need to demonstrate that the sustainability benefits to the community will outweigh the flood risk, that the development will be safe for its lifetime taking into account the vulnerability of users, without increasing flood risk elsewhere and, where possible, will reduce flood risk overall.

19.11.1.9 The FRA scope will be agreed with key stakeholders (such as the EA and the LLFA) as the flood risk from surface water, fluvial and groundwater sources, together with the infrastructure design of the Proposed Development components, is further developed and better understood.

19.11.1.10 An Outline drainage strategy will be prepared that demonstrates the appropriate management of runoff from the Proposed Development.

Highways England Water Risk Assessment Tool (HEWRAT)

19.11.1.11 HEWRAT is designed to be used to assess the impacts of road runoff where Annual Average Daily Traffic (AADT) volumes are greater than 10,000 vehicles.

19.11.1.12 The estimated AADT during both the construction and operational works is significantly below 10,000 vehicles and as such a HEWRAT assessment will not be required.

19.11.1.13 However, the oCEMP will identify appropriate mitigation measures to reduce potential impacts from routine runoff.

20 Cumulative and in-combination effects

20.1 Introduction

20.1.1.1 This chapter outlines the proposed methodology for the assessment of cumulative and in-combination effects arising from the construction and operation of the Proposed Development.

20.1.1.2 Cumulative effects are the result of multiple actions on environmental receptors or resources over time and are generally additive or interactive (synergistic) in nature. Two categories of cumulative effects are typically considered within the cumulative effects chapter of an ES:

- In-combination effects from the interrelationship between different environmental effects of the Proposed Development (intra-project)
- Cumulative effects from the interrelationship between different projects along with the Proposed Development (inter-project)

20.1.1.3 In-combination effects, or intra-project effects, occur when a resource, receptor or group of receptors are potentially affected by more than one source of direct environmental impact resulting from the same development. For example, a community may be affected by noise and dust effects resulting from the construction phase activities of a single development. In-combination effects will be assessed within the technical topic chapters.

20.1.1.4 Cumulative effects, or inter-project effects, occur when a resource, receptor or group of receptors are potentially affected by more than one development at the same time. For example, the construction traffic effects of a development in isolation may not be significant, but when combined with the construction traffic effects of another development (using the same geographical area at the same time) may result in significant cumulative effects on the surrounding highway network.

20.2 Relevant legislation, policy, standards and guidance

20.2.1.1 The following section identifies the relevant legislation, planning policy, standards and guidelines which underpin the assessment methodology for cumulative and in-combination effects and have informed the scope of the assessment.

20.2.2 Legislation

Table 20-1 Legislation

Legislation	Relevance to assessment
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations) [298]	Sets out the information required for an ES, in relation to the assessment of cumulative effects, Schedule 4 paragraph 5 requires: *"A description of the likely significant effects of the development on the environment resulting from, inter alia: (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources".*

20.2.3 Policy

Table 20-2 Policy

Policy	Relevance to assessment
Overarching National Policy Statement for energy (EN-1), 2024 [266]	4.1.5 *"In considering any proposed development, in particular when weighing its adverse impacts against its benefits, the Secretary of State should take into account:* • *its potential adverse impacts, including on the environment, and including any long-term and cumulative adverse impacts, as well as any measures to avoid, reduce, mitigate or compensate for any adverse impacts, following the mitigation hierarchy"* 4.2.12 *The cumulative impacts of multiple developments with residual impacts should also be considered.*
National Policy Statement for renewable energy infrastructure, 2024 (EN-3) [267]	In relation to network connection, in 2.10.25 – 26 *"To maximise existing grid infrastructure, minimise disruption to existing local community infrastructure or biodiversity and reduce overall costs, applicants may choose a site based on nearby available grid export capacity. Where this is the case, applicants should consider the cumulative impacts of situating a solar farm in proximity to other energy generating stations and infrastructure."*
National Policy Statement for electricity networks infrastructure (EN-5) [8]	NPS EN-5 addresses policy for energy transmission. Paragraph 2.7.1 states: "*EN-1 explains in Section 4.10 that the Planning Act 2008 aims to create a holistic planning regime, such that the cumulative effects of the same project can be considered together. Co-ordinated applications typically bring economic efficiencies and reduced environmental impact*"

20.2.4 Standards and guidance

Table 20-3 Standards and guidance

Standards and guidance	Relevance to assessment
Nationally Significant Infrastructure Projects - Advice Note Seventeen: cumulative effects assessment relevant to nationally significant infrastructure projects, 2015 [299]	Sets out a staged approach to cumulative effects assessment for Nationally Significant Infrastructure Projects and provides template formats for documenting the cumulative effects assessment within the ES.

20.3 Proposed Methodology

20.3.1.1 This section is split into two parts, as outlined in Section 20.1:

- In-combination effects assessment: comprising an assessment of the combined effects resulting from a number of different effects from the Proposed Development upon a single resource/receptor; and
- Cumulative effects assessment: comprising an assessment of cumulative effects of a number of different projects within the vicinity, in combination with the environmental impact of the Proposed Development on a range of different resources/receptors.

20.3.2 In-combination effects assessment

20.3.2.1 The Planning Inspectorate (PINS) Advice Note Seventeen notes that the assessment of interrelationships between environmental topics of a proposed NSIP, such as between ecology and hydrology, are typically assessed as part of the specialist environmental chapters of an ES. In accordance with this guidance, in-combination effects will be considered within each environmental topic's chapter of the ES and will not form part of the scope within the cumulative effects assessment (CEA) chapter.

20.3.3 Cumulative effects assessment

20.3.3.1 PINS Advice Note Seventeen [299] provides a systematic approach to CEA which can be split into four distinct phases, refer to Table 20-4, which will be applied to the Proposed Development.

20.3.3.2 Paragraph 2.5 of PINS Advice Note Seventeen states that the recommended process focuses cumulative effects with 'other existing development and/or approved development'. This assessment will be iterative and may need to be repeated a number of times during the preparation of a DCO application.

Table 20-4 Stages of cumulative assessment

CEA stage	Key activities
Stage 1: Establish the Zone of Influence (ZoI) and establish the long list of 'other existing development and/or approved development'	• identify the ZoI (study area) for each environmental aspect considered within the ES • identify a long list of other developments in the vicinity of the Proposed Development which may have cumulative effects in consultation with the relevant local authority • undertake desktop review of available environmental information for identified cumulative developments
Stage 2: Establish the short list of 'other existing development and/or approved development'	• identify which of the identified other developments from Stage 1 has the potential to give rise to significant cumulative effects by virtue of overlaps in temporal scope, due to the scale and nature of the other development/receiving environment; or any other relevant factors.
Stage 3: Information gathering	• information relating to each of the other developments is gathered and reviewed.
Stage 4: Assessment	• an assessment of the cumulative effects is undertaken. Each individual other development is reviewed in turn to identify whether here is potential for significant cumulative effects; and • additional mitigation measures are identified.

Stage 1 - Establishing the long list of 'other existing and/or approved development'

20.3.3.3 PINS Advice Note Seventeen [299] highlights the 'other existing development and/or approved development' types that should be established for the CEA as:

- Tier 1
  - under construction[6];
  - permitted application(s), whether under the Act or other regimes, but not yet implemented;
  - submitted application(s) whether under the Act or other regimes but not yet determined.
- Tier 2
  - projects on PINS' Programme of Projects where a scoping report has been submitted.
- Tier 3
  - projects on PINS' Programme of Projects where a scoping report has not been submitted.

[6] Where other projects are expected to be completed before construction of the proposed NSIP and the effects of those projects are fully determined, effects arising from them should be considered as part of the baseline and may be considered as part of both the construction and operational assessment. The ES should clearly distinguish between projects forming part of the dynamic baseline and those in the CEA [6]

- identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the relevant proposals;
- identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

20.3.3.4 The level of detail that is likely to be available to support the CEA will decrease along with the tiers, i.e. tier 1 developments likely having the most detail available and tier 3 developments having likely having the least detail available.

20.3.3.5 For the Proposed Development relevant other existing developments and/or approved developments will be identified through a desk-based review of the following sources:

- Nationally Significant Infrastructure Projects from National Infrastructure Planning [300]
- Transport and Works Act Orders (TWAO) from Department for Transport [301]
- Applications for planning permission under the Town and Country Planning Act (TCPA) 1990, allocations and Mineral and Waste EIA applications from Norfolk County Council [302] and Breckland Council [303].

20.3.3.6 Searches will be conducted online and from consultation with Norfolk Conty Council and Breckland Council, using the criteria set out in Table 20-5 to establish the long list of 'other existing and/or approved development'. A cut off date will be agreed to enable a robust cumulative assessment for the PEIR and ES.

Table 20-5 Long list search criteria

Development		Housing unit (no)	Housing land (ha)	Non-residential (ha)	Distance from Order Limits
Nationally Significant Infrastructure Projects		All	All	All	10km
Transport and Works Act Orders (TWAO)		All	All	All	10km
Mineral and Waste EIA applications		All	All	All	10km
Applications or allocations	Large scale	200+	4+	2+	10km
	Medium scale	10-199	0.5-4	1-2	2km
	Small scale	1-9	Less than 0.5	Less than 1	200m

Early identification of projects for CEA

20.3.3.7 The following notable 'other existing developments and/or approved developments' have been identified during the optioneering process for areas of potential available land for the Proposed Development. These developments will

be considered and assessed within the CEA to be undertaken at later stages of the EIA, but are presented here to demonstrate awareness ands ensure that they are addressed appropriately in the proposed scope for the CEA.

Nationally Significant Infrastructure Projects

20.3.3.8 Within the 10km search area, Norfolk Vanguard and Norfolk Boreas proposed onshore project substation and extension to National Grid's Necton substation is located within the cable corridor between the Central Panel Area and the Northern Panel Area. Both projects are proposed offshore wind farms with an approximate capacity of 1800MW off the coast of Norfolk. The two applications include a grid connection agreement which connects into an extended existing substation at Necton, granted planning permission under a separate Town and Country Planning Act application, and 400kV cabling.

20.3.3.9 These projects are currently under construction however they are anticipated to be finished and operational in Q4 2024, before work commences for the Proposed Development if development consent is granted as per publicly available information. Therefore, these projects would be considered in the future baseline. The Applicant will review progress on these applications and confirm how these projects will be considered in the ES.

Stage 2 - Short list of 'other existing development and/or approved development

20.3.3.10 The long list will be filtered to develop a short list of 'other existing and/or approved development' to be included in the CEA. This will ensure that the assessment is proportionate in that it includes only 'other existing and/or approved development' with the potential to result in significant cumulative effects. The criteria to be used for short-listing will be:

- Temporal scope: considering the potential for the ZOI's and programme for the construction, operation and decommissioning of the 'other existing and/or approved development' to overlap and interact with the Proposed Development.
- Scale and nature of development: considering if the 'other existing and/or approved development' is likely to be defined as an EIA project due to its potential to lead to significant environmental effects.
- Other factors: These will include consideration of potential impact pathways to identified sensitive receptors and their nature and capacity as the receiving environment.

20.3.3.11 Professional judgement will be applied where necessary to ensure that only 'other existing and/or approved development' likely to lead to significant cumulative effects are included. The conclusions of this short listing exercise will be documented using a table similar to that provided in Advice Note 17, recording the reasons for excluding any development from further consideration. This will provide decision makers, consultation bodies and members of the public with a clear record of 'other existing development and/or approved development' considered and the decision making process with respect to the scope of the CEA.

20.3.3.12 Breckland Council, Norfolk County Council and any other relevant consultation bodies will be consulted on the shortlisted 'other existing developments and/or approved developments' proposed to be included in the CEA to agree the final list for assessment.

Stage 3 - Information gathering

20.3.3.13 Information will be gathered for each of the short-listed 'other existing developments and/or approved developments', relevant to their environmental effects. This information will include:

- proposed design and location information
- proposed programme of construction, operation and decommissioning, and
- environmental assessment reports.

20.3.3.14 The information will be obtained primarily from the websites of Breckland Council [303], Norfolk County Council [302], Department for Transport [301] and PINS [300]. This may be supplemented with information from liaison with other stakeholders and developers.

Stage 4 - Assessment

20.3.3.15 Environmental topic specialists will review the information gathered and will carry out a proportionate assessment of significant cumulative effects. They will consider how the reported effects of the 'other existing developments and/or approved developments' would be likely to interact with the reported effects of the Proposed Development, to reach conclusions on the nature and significance of cumulative effects.

20.3.3.16 The significance of the cumulative effects will be determined using the same criteria as are used in the relevant individual topic assessments for the Proposed Development. Where there are limitations on the assessment due to the availability of information relating to the effects of the 'other existing developments and/or approved developments', those limitations will be noted.

20.3.3.17 In cases where significant cumulative effects are identified, it may be necessary to propose additional mitigation measures specifically for cumulative effects. These additional measures will be set out in the CEA. These measures may be delivered solely by the Applicant or may, in some cases, be subject to agreement with another developer, which would be sought.

20.3.3.18 Appendix 2 (Matrix 1 - Assessment matrix) from the Planning Inspectorate's Advice Note 17 [299] on cumulative effects will be used to guide the development of and reporting of the assessment.

21 Structure and content of the PEIR

21.1.1.1 An outline structure of the PEIR is provided within this chapter, in accordance with the guidance for the content of scoping requests contained within PINS Advice Note Seven [304].

21.1.1.2 A PEIR is defined in (Regulation 12(2)(b) of the EIA Regulations [298] 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)'

21.1.1.3 There is no prescribed format as to what PEIR should comprise, however applicants are encouraged to prepare this as an early draft to the ES "*…to enable consultees to develop an informed view of the likely significant environmental effects of the proposed development*." [305]

21.1.1.4 The information presented in the PEIR is 'preliminary' with a purpose to actively seek consultee comments, with an opportunity for both the design of the Proposed Development and the EIA to take into consideration any comments received through this consultation.

21.1.1.5 The PEIR will be arranged as set out below and topic chapters included will be those scoped in for further assessment, as described in this EIA Scoping Report.

21.1.1.6 The PEIR will be structured as follows:

- Non-technical summary (NTS)
  - The NTS will summarise the findings of the PEIR, written in non-technical language.
- Main report
  - This will be a series of documents which together comprise the main body of the PEIR and it will describe the preliminary findings of the environmental assessment and any identified additional mitigation measures to avoid, reduce or minimise any potentially significant adverse environmental effects.
- Figures
  - These will comprise a set of figures which support the preliminary assessments undertaken.
- Technical appendices

- These will comprise the preliminary supporting technical appendices to the topic chapters including background data, technical reports and survey data.

21.1.1.7 It is also intended that a draft of the outline management plans that will support the DCO application will be prepared and made available, where possible to do so, enabling consultee feedback on management measures to be proposed.

21.1.1.8 The PEIR will outline what the structure and content of the ES will be, which will follow a similar format to the PEIR.

22 Conclusion

22.1 Summary of the proposed EIA approach

22.1.1.1 In accordance with Regulation 8(1)(b) of the EIA Regulations [298], this EIA Scoping Report provides notification to the SoS that the Applicant will produce an ES which will accompany the DCO application for the Proposed Development. This EIA Scoping Report has been produced to support an application for a Scoping Opinion with regards to the scope and level of detail of information to be provided in the ES, in accordance with Regulation 10 of the EIA Regulations [298].

22.1.1.2 This EIA Scoping Report has identified the likely significant effects of the Proposed Development with respect to each environmental topic and set out the proposed approach and methodology for further assessment in the EIA. Table 22-1 provides a summary of the proposed scope of the topics to be included in the ES.

Table 22-1 Summary of proposed scope of the EIA

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
Agricultural land and soils	Agricultural land (C, D) Soil resource (Damage to soil) (C, D) Soil resource (Loss of soil) (C, D) Soil Organic Matter and Soil Carbon (C, O, D)	Agricultural holdings / farm businesses Operational impacts upon agricultural land, soil resource (damage to soil), and soil resource (loss of soil).	The landowners involved in the Proposed Development have signed up by voluntary agreement and have therefore considered the potential effects on the overall viability of the farm holdings. This includes the potential impacts on agricultural tenants who utilise the land at present and agreement is in place that these tenancies would end should the application for development consent be successful. It is therefore proposed that potential effects on the wider farm holdings / farm businesses is scoped out of the assessment. It is considered that providing that best practice soil management measures are implemented through the preparation of the oSRMP and oLEMP, during the operational phase there would be no significant negative impacts on the soil resource onsite. Further, impacts upon agricultural land, soil resource (damage to soil), and soil resource (loss of soil) would be first felt during construction phase, and as such the impacts are assessed at this point.
Air quality	No assessment proposed	Dust and particulate matter	A standalone construction dust assessment will be undertaken to identify

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
		Vehicle emissions	relevant mitigation measures. It is anticipated that with the implementation of suitable site-specific mitigation measures, aligned with IAQM guidance and secured through the oCEMP and oDEMP, the residual effects of dust and particulates on existing sensitive receptors will not be significant. Anticipated traffic generation will be below the applicable IAQM thresholds for detailed assessment.
Biodiversity	Statutory Designated Sites (C, D) Non-statutory Designated Sites (C, D) Priority Habitats (C, D) Bats (C, O, D) Great crested newts (C, D) Otter and water vole (C, D) Reptiles (C, D) Invertebrates (C, O, D) Badger (C, D) Breeding birds (C, O, D) Wintering birds (C, O, D)	Operational impacts on statutory designated sites, non-statutory designated sites, priority habitats, great crested newts, otter and water vole, reptiles and badger	The operational phase of the Proposed Development will involve no additional habitat loss. Security fencing will be designed to incorporate appropriate gates to allow mammal access. The final landscape design will provide habitat enhancements and connectivity across the Proposed Development. As a result, no direct impacts are anticipated. Any indirect impacts will be adequately mitigated through embedded design measures and the oLEMP.
Climate change	Greenhouse gas emissions (C, O , D) Climate resilience (C, O, D)	In-combination climate impacts	The combined effect of the impacts of the Proposed Development and potential climate change impacts on the receiving environment during construction, operation and decommissioning are unlikely to give rise to significant effects.

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
Cultural heritage and archaeology	Direct impacts to buried archaeological remains within the draft Order Limits (C) Direct impacts to designated and non-designated heritage assets within the draft Order Limits (C, O) Indirect impacts to the setting of designated and assets (O)	Operational and decommissioning impacts to buried archaeological remains within the draft Order Limits. Decommissioning impacts to designated and non-designated heritage assets within the draft Order Limits Construction, operation and decommissioning impacts to the setting of non-designated heritage assets within 1km.	Any potential impacts to buried archaeological remains will occur during construction. The Proposed Development has the potential to impact designated and non-designated assets within the draft Order Limits during construction and operation. Any impacts during decommissioning would be adequately mitigated through embedded design measures in the oDEMP. The Proposed Development has the potential to impact on the setting of designated assets within 2km through the finished built form during operation, however impacts during construction and decommissioning are unlikely to give rise to significant effects. Indirect effects to non-designated heritage assets outside the draft Order Limits may occur as a result of temporary changes within their setting, but significant effects are unlikely due to the short-term and reversible nature of these changes.
Electric, magnetic and electromagnetic fields	No assessment proposed	Electric, magnetic and electromagnetic fields	The Proposed Development is not anticipated to exceed the ICNIRP exposure guidelines, and the design of the Proposed Development will consider any infrastructure constraints. In light of this there are not expected to be any potential

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
			impacts related to electromagnetic fields to human receptors both within and immediately adjacent to the Proposed Development. Mitigation measures will be included in the oCEMP, oLEMP and oDEMP to ensure the protection of infrastructure.
Glint and Glare	Residential properties, Commercial properties, Motorists on local roads, railway receptors, aviation receptors (airfields) (C, O, D)	No aspects scoped out	Not applicable
Ground conditions	No assessment proposed	Human health Historic mining legacy Controlled waters Ecological Receptors / grazing livestock	A desktop study has been undertaken as documented within Chapter 12 Ground Conditions, and the results and recommended mitigation measures will be incorporated into the design to mitigate any identified potential effects. These mitigation measures will be subsequently recorded in the oCEMP, oLEMP and oDEMP where required. Therefore, a separate chapter on ground conditions within the ES is not considered to be required.
Human health	No assessment proposed	Human health	The construction, operation and decommissioning of the Proposed Development has the potential for limited impacts on human health. Assessment of potential impacts however, and inclusion of appropriate mitigation measures will

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
			be covered elsewhere in the PEIR/ES and within supporting documentation, including: • Noise, landscape and visual, and socio-economics chapters of the PEIR/ES. • Construction dust assessment • Suite of management plans, in-cluding the oCEMP, oDEMP, oCTMP and oBSMP. • In addition, the design of the Pro-posed Development, and its sup-porting infrastructure, would be maintained to operate safely so as not to present a risk to human health.
Landscape and visual	Landscape (C, O, D) Visual (C, O, D)	Impacts to statutory designations Impacts to Landscape receptors: National Character Area (NCA)85: The Brecks and NCA76: North West Norfolk	There are no statutory landscape designations (i.e. National Parks or National Landscapes) within the draft Order Limits or study area. Owing to the small proportion of the Proposed Development in relation to the large scale NCA 85, significant effects are considered unlikely. In addition, there will be no physical impacts to NCA76 and it is therefore also considered that significant effects are unlikely.
Major accidents and disasters	No assessment proposed	Major accidents and disasters	The effects arising during all phases of the Proposed Development are unlikely to

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
			result in significant effects relating to major accidents and disasters. The probability, likelihood and frequency of a major accident or disaster is very low in the instance of the Proposed Development and would be managed under established legislative requirements or the design process. Appropriate mitigation measures will be included within the oBSMP to be submitted with the DCO Application. As such, further assessment of the vulnerability to major accidents and disasters is scoped out of the assessment.
Noise and vibration	Noise from activities (C, O, D)	Noise from traffic Vibration from traffic Vibration from activities	The number of vehicle trips during construction, operation and decommissioning would be at a level unlikely to trigger a significant effect. An oCTMP will detail measures specific to travel planning and HGV movement during construction to ensure impacts are controlled. During decommissioning a similar document would be produced. Operational maintenance movements are anticipated to be 1 / month. Perceptible vibration due to traffic is unlikely - limited movements, the temporary nature of these movements, and the fact that vibration will usually

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
			dissipate within a few meters would mean effects are unlikely to be significant. Distances of less than 10m between vibration generating activities and buildings or structures are not expected during construction or decommissioning of the Proposed Development and, therefore effects are unlikely to be significant. There would be no vibration generating activities during operation.
Socio-economics	Employment and Supply chain effects (C, O, D) Local economy (C, D) Land Use – PRoW and recreational resources (C, D)	Local economy (O) All other socio-economic effects related to the local population (amenity effects) Land Use – PRoW and recreational resources (O) Land Use – potential indirect effects on commercial receptors, community facilities and development land. Land Use – Development land and allocations (including mineral resource)	Potential effects on the local population would focus on employment opportunities. Indirect effects such as visual amenity and other amenity impacts would be dealt with by other assessment. There are a limited number of wider land uses, including commercial and community receptors, within the study area. Any effects on these receptors would be indirect only, with proposed works not directly affecting the resource. Given the limited number of receptors and the indirect nature of any potential effects it is considered that this can be managed and mitigated through the suite of management plans, including the oCEMP, oDEMP, oCTMP and oPRoWMP.

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
			There are no development land allocations within the draft Order Limits. The Proposed Development is not anticipated to impact on other allocations within the locality. The mineral deposits within Safeguarding Areas identified would not be permanently sterilised by the Proposed Development due to its non-intrusive nature and the minerals and waste policies do not currently identify proposals for mineral extraction in the area. Any wider effects on the local population (amenity effects) would be indirect and design principles committed to would avoid impacts on residential areas. These indirect amenity effects would be sufficiently dealt with by other assessment chapters (e.g. noise and visual effects) and mitigated through the suite of management plans.
Traffic and transport	Severance (C) Road vehicle driver and passenger delay (C) Non-motorised user delay (C) Non-motorised user amenity (C) Fear and Intimidation (C)	Operation and decommissioning impacts from severance, road vehicle driver and passenger delay, non-motorised user delay, non-motorised user amenity, fear and intimidation. Road user and pedestrian safety Road Safety Audits	It is not anticipated that the operation or demolition of the Proposed Development would result in significant effects on traffic and transport. Mitigation measures, including travel planning, HGV management and pedestrian and cyclist management will be incorporated into an oCTMP, oCEMP

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
		Hazardous/large loads	and oDEMP. A Transport Statement would also be undertaken and support the DCO application. It is an explicit requirement of the highway authorities that any planning application proposals do not unacceptably increase safety risks, this will be ensured through appropriate design standards therefore accidents, road user and pedestrian safety is scoped out of further assessment. Road Safety will be considered in the Transport Statement as appropriate. The Proposed Development is not expected to generate or attract hazardous loads at any stage. Road Safety Audits will be considered at the appropriate stage, as outlined in the Transport Statement and is therefore not assessed within the ES.
Water resources and flood risk	Surface water quality (C, O, D) Surface water quantity (C, O, D) Groundwater quality (C, O, D) Groundwater quantity (C, O, D) Water Dependent Terrestrial Ecosystems (C, O, D) Flood Risk and Drainage (C, O, D)	No aspects scoped out	Not applicable

Topic	Proposed scope of assessment (C – Construction, O = Operation, D = De-commissioning)	Aspects proposed to be scoped out	Rationale for aspects proposed to be scoped out
Cumulative effects	In-combination effects will be considered within each environmental topic's chapter of the PEIR/ES and will not form part of the scope within the Cumulative Effects Assessment chapter. A Cumulative Effects Assessment will be undertaken comprising an assessment of cumulative effects of a number of other existing developments and/or approved developments within the vicinity, in combination with the environmental impact of the Proposed Development on a range of different resources/receptors	No aspects scoped out	Not applicable

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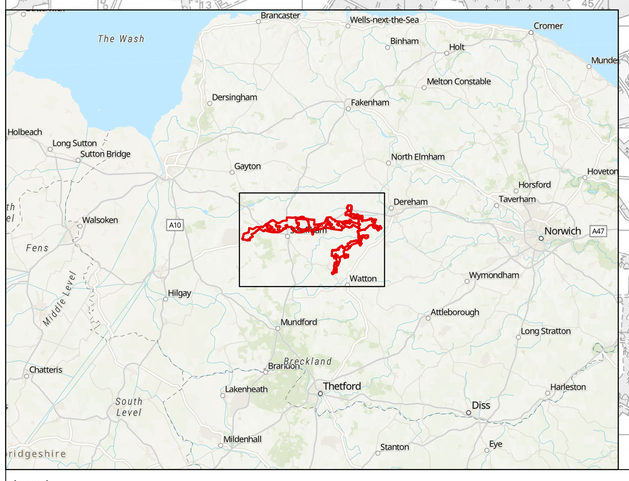
RWE Renewables UK Solar and Storage Limited

Windmill Hill Business Park
Whitehill Way
Swindon SN5 6PB
United Kingdom

High Grove Solar Environmental Impact Assessment Scoping Report Figures Part 1

September 2024

A1



Legend

draft Order Limits

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

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Rev	Date	By	Chkd	Appd	Authd
P01	04/09/2024	JEP	HJ	HJ	CS

Client

RWE

Project Name

High Grove Solar

Drawing Title

Figure 1.1 Site Location Plan

Scale at A1

1:30,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR01-00001

A1

Legend

- draft Order Limits
- Cable Corridors

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

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Client

RWE

Project Name

High Grove Solar

Drawing Title

Figure 2.1 draft Order Limits

Scale at A1

1:30,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR02-00001

A1

Eastgate Farm
Tittleshall Lane
The Manor
Marham Road
Hill House
Marham Road
Gayth Lane
Wood View
Chalk Farm
A47
Fincham Grove
Silver Drift
Great Friars'
Thorns
A47
A1122
Brockland Edge
Heath Farm
Tumble Weed
A47
Charter House
Limekiln
Swaffham Road
Marham Road
(course of)
Swaffham Road
Marham Road
Shouldham Lane
Gayth Lane
Tumulus
Swaffham Road
Devil's Dyke
Swaffham Road
Fen Road
Burnthouse Drove
Marham Airfield
PW
Cherry Tree Academy Marham Infant
Ladywood Road
RAF Marham
Warren Barn
Lodge Farm
Cottages
Swaffham Road
ROMAN ROAD
Swaffham Road
Smooth Farm
Warren Farm
Globe Farm
Walter's
Drymere Lodge

Legend
- draft Order Limits
- Western Panel Area
- Cable Corridors

Metres
0 250 500 1,000

Coordinate System: British National Grid

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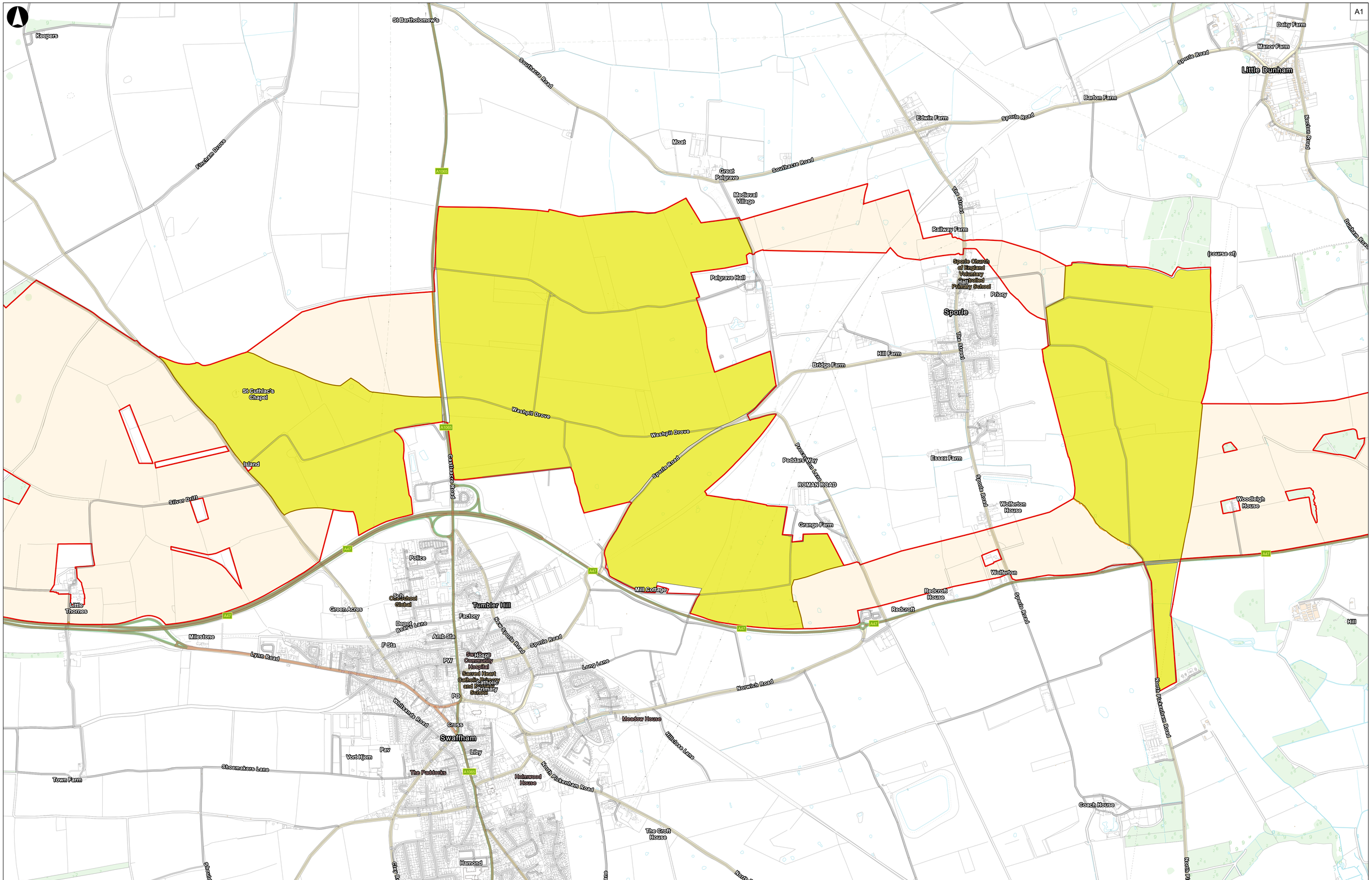
Rev	Date	By	Chkd	Appd	Authd
P01	04/09/2024	JEP	HJ	HJ	CS

Client
RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.2 General Arrangement - Western Panel Area

Scale at A1
1:10,000
Role
Scoping Report
Suitability
Issue
Project Number
300883-00
Rev
P01
Drawing Name
HGS-SR02-00002



Legend

- draft Order Limits
- Central Panel Area
- Cable Corridor

Metres

0 250 500 1,000

Coordinate System: British National Grid

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Client

RWE

Project Name

High Grove Solar

Drawing Title

Figure 2.3 General Arrangement - Central Panel Area

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR02-00003

A1

Tucks Farm
Boston Road
Mill House
Budleigh
Beeston
Croft Farm
Kennels Farm
Little Farm
Church Farm
Station Road
Dereham Lane
Hall
PW
House Farm
Pinsapple Farm
Crowe's Hall
Curds Hall
Stiffkey Road
Ridestar
(rems of)
Moat
Oakfield
Moor Lane
Turnpike Farm
Little Fransham
Old
The Old
Indigo House
Fieldview House
Swedish Barn
Corbetts Lodge
Top Farm
Redgates
The Grove
Lodge Farm
Saint Andrew's Lane
Coach House
Norton Voluntary Aided Primary School
School Road
Ivy House
Chapel Road
Ivy Todd Road
Nutts Barn
Ivy Todd Farm
Ivy Todd
Crown Lane
Lower Farm
Lyon's Green
Little Flint
Cottages
Wood Farm
Hall Farm
(site of)
Hall Lodge
Bradenham Hall
Bokenham Farm
Bokenham
Bradenham Lane
Twizzel Barn
High Green Farm
Old Chequers
Home Farm
The Bungalow
Rose Cottages
Hyde Hall
Willow Farm
Hotel
Swangey
Fen Road
Old Toll House
Strebor House
Lord's
Field Cottage
Wendling
Howard Lane
Honeypot
Honeypot Farm
Long View
High Street
Grange Lodge
The Grange
Holly Farm
Holly House
Carr Lane
St Mary's Abbey
Abbey Farm
Gate House Farm
The Lodge
Spring Cottage
Mistletoe Farm
Kulnura
Stanfield Road
High House Farm
Cottage
Dale Farm
Acres Farm
Oaktree
Hillcrest Farm
The Woodlands
Podmore Farm
Chapel Lane
The Chapel
Hye Vue
Longacres
Scarning
Parv
Dereham Road
Foresters Lodge
White House
Oakleigh
Serendipity
White
Park Farm
New Church Farm
Juby's Farm
Laye Farm
Farm Cottages
Boundary Lodge
A47

Legend

- draft Order Limits
- Northern Panel Area
- Other areas of proposed development
- Cable Corridor

Metres
0 250 500 1,000

Coordinate System: British National Grid

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.4 General Arrangement - Northern Panel Area

Scale at A1
1:10,000
Role
Scoping Report
Suitability
Issue
Project Number
300883-00
Rev
P01
Drawing Name
HGS-SR02-00004

A1

Legend

- draft Order Limits
- Eastern Panel Area
- Other areas of proposed development
- Cable Corridor

Metres

0 250 500 1,000

Coordinate System: British National Grid

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P01	04/09/2024	JEP	HJ	HJ	CS

Client

RWE

Project Name

High Grove Solar

Drawing Title

Figure 2.5 General Arrangement - Eastern Panel Area

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number

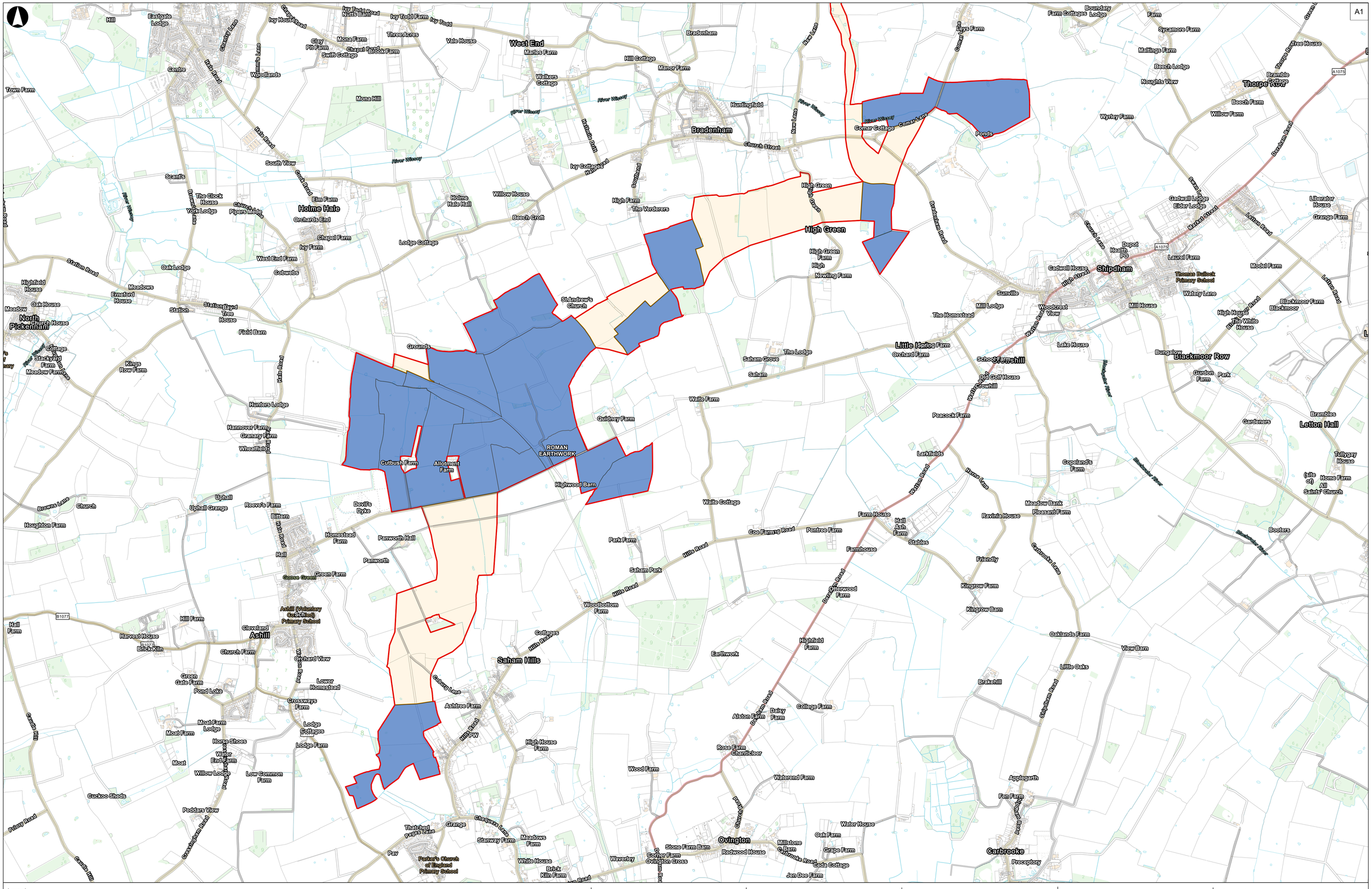
300883-00

Rev

P01

Drawing Name

HGS-SR02-00005


A1
West End
Bradenham
Bradenham
High Green
High Green
Holme Hale
Shipdham
Blackmoor Row
Letton Hall
Saham Hills
Ovington
Carbrooke
North Pickenham
Little Ispring
Furnshill
Thorpe Abbotts
Ashill
Ashill (Voluntary Controlled) Primary School
Thomas Bullock Primary School
Parker's Church of England Primary School
All Saints' Church
Hall Farm
Manor Farm
Hill Cottage
Walkers Cottage
Huntingfield
Church Street
Ponds
Comar Cottage
Eays Farm
Boundary Farm Cottages
Lodge
Sycamore Farm
Maltings Farm
Beech Lodge
Noughts View
Wyrley Farm
Brambles
Cottage
Beech Farm
Willow Farm
Thorpe Abbotts House
Gadwall Lodge
Elder Lodge
Liberator House
Grange Farm
Laurel Farm
Modal Farm
Watery Lane
Blackmoor Farm
Blackmoor
Lake House
Bungalow
Gurdon Park
Gardeners
Brambles
Tullyesy House
Homn Farm
Booters
Marlee Farm
Mona Farm
Mona Hill
Three Acres
Vale House
Ivy Todd Farm
Ivy Todd
Ivy Todd Road
Nutts Barn
Clay Pit Farm
Swift Cottage
Brook Farm
Chapel Road
Woodlands
Centre
Town Farm
Hale Road
Gooch Road
South View
Scants
The Clock House
York Lodge
Church
Pipers Hedge
Elm Farm
Orchards End
Chapel Farm
Ivy Farm
West End Farm
Cobwebs
Oak Lodge
Highfield House
Meadows
Emeford House
Station Road
Station
Station Yard
Tree House
Church House
Field Barn
Meadow
Oak House
Cottage
Stackyard Farm
Meadow Farm
Kings Row Farm
Hunters Lodge
Hannover Farm
Granary Farm
Wheatfield
Uphall
Uphall Grange
Church
Houghton Farm
Brown Lane
Reeve's Farm
Bittern
Bittern Road
Homestead Farm
Hall
Penworth Hall
Penworth
Goose Green
Green Farm
Devil's Dyke
Hill Farm
Harvest House
Brickkiln
Cleveland
Church Farm
Orchard View
Green Gate Farm
Pond Loke
Lower Homestead
Crossways Farm
Meat Farm Lodge
Meat Farm
Lodge Cottages
Lodge Farm
Horse Shoes
Water End Farm
Meat
Willow Lodge
Low Common Farm
Cuckoo Shods
Paddars View
Gooch Hill
Pilney Road
Grimston Road
Thatched Peaks Lane
Grange
Chequers Lane
Stanway Farm
Meadows Farm
Pav
White House
Brick Kiln Farm
Wavorley
Park Farm
Saham Park
Hills Road
Woodbottom Farm
Cottages
Hills Road
Ashtree Farm
Hills Road
High House Farm
Wood Farm
Earthwork
Highfield Farm
Alston Farm
Daisy Farm
College Farm
Rose Farm
Chanticleor
Watered Farm
Oakfields Farm
View Barn
Little Oaks
Brakehill
Applegarth
Fen Farm
Fen Road
Water House
Oak Farm
Grape Farm
Coda Cottage
Jon Doe Farm
Preceptory
Millstone Barn
Carbrooke Road
Redwood House
Stone Farm Barn
Corner Farm
Ovington Cross
Farm House
Hall Ash Farm
Stables
Farmhouse
Pentree Farm
Con Farms Road
Ravinia House
Meadow Bank
Pleasant Farm
Friendly
Kingrow Farm
Kingrow Barn
Larkfields
Copelands Farm
Peacock Farm
Old Golf House
Orchard Farm
The Lodge
Saham Grove
Saham
Waite Farm
Waite Cottage
Quidney Farm
Grounds
St Andrew's Church
Curbush Farm
Allotment Farm
ROMAN EARTHWORK
Highwood Barn
Devil's Dyke
Sunville
Mill Lodge
The Homestead
Mill House
Woodcrest
View
Cadwell House
High Street
Shipdham
Depot
Health
PO
A1075
Watton Road
Shipdham Road
Dereham Road
Church Lane
Cadwell Lane
Kerrah Street
Ashton Road
Letton Road
Blackmoor River
Bridge Street
Swan Lane
Thorpe Abbotts Road
Green
Ivy Cottages
Scantlands
Bradenham Road
New Lane
River Wissey
Comar Lane
Gooch Hill
Pilney Road
Grimston Road
Chequers Lane
Hills Road
Dereham Road
Watton Road
Shipdham Road
Blackmoor River
Bridge Street
Fen Road
Carbrooke Road
Church Lane
Brown Lane
Bittern Road
Gooch Road
Scants
Brandon Lane
Lodge Road
Water End Road
Meat Farm Lodge
Lodge Cottages
Lodge Farm
Orchard View
Lower Homestead
Crossways Farm
Pond Loke
Green Gate Farm
Hill Farm
Harvest House
Brickkiln
Cleveland
Church Farm
Ashill (Voluntary Controlled) Primary School
Hall Farm
Gooch Hill
Pilney Road
Grimston Road
Thatched Peaks Lane
Grange
Chequers Lane
Stanway Farm
Meadows Farm
Pav
White House
Brick Kiln Farm
Wavorley
Park Farm
Saham Park
Hills Road
Woodbottom Farm
Cottages
Hills Road
Ashtree Farm
Hills Road
High House Farm
Wood Farm
Earthwork
Highfield Farm
Alston Farm
Daisy Farm
College Farm
Rose Farm
Chanticleor
Watered Farm
Oakfields Farm
View Barn
Little Oaks
Brakehill
Applegarth
Fen Farm
Fen Road
Water House
Oak Farm
Grape Farm
Coda Cottage
Jon Doe Farm
Preceptory
Millstone Barn
Carbrooke Road
Redwood House
Stone Farm Barn
Corner Farm
Ovington Cross
Farm House
Hall Ash Farm
Stables
Farmhouse
Pentree Farm
Con Farms Road
Ravinia House
Meadow Bank
Pleasant Farm
Friendly
Kingrow Farm
Kingrow Barn
Larkfields
Copelands Farm
Peacock Farm
Old Golf House
Orchard Farm
The Lodge
Saham Grove
Saham
Waite Farm
Waite Cottage
Quidney Farm
Grounds
St Andrew's Church
Curbush Farm
Allotment Farm
ROMAN EARTHWORK
Highwood Barn
Devil's Dyke
Sunville
Mill Lodge
The Homestead
Mill House
Woodcrest
View
Cadwell House
High Street
Shipdham
Depot
Health
PO
A1075
Watton Road
Shipdham Road
Dereham Road
Church Lane
Cadwell Lane
Kerrah Street
Ashton Road
Letton Road
Blackmoor River
Bridge Street
Swan Lane
Thorpe Abbotts Road
Green
Ivy Cottages
Scantlands
Bradenham Road
New Lane
River Wissey
Comar Lane
Gooch Hill
Pilney Road
Grimston Road
Chequers Lane
Hills Road
Dereham Road
Watton Road
Shipdham Road
Blackmoor River
Bridge Street
Fen Road
Carbrooke Road
Church Lane
Brown Lane
Bittern Road
Gooch Road
Scants
Brandon Lane
Lodge Road
Water End Road
Meat Farm Lodge
Lodge Cottages
Lodge Farm
Orchard View
Lower Homestead
Crossways Farm
Pond Loke
Green Gate Farm
Hill Farm
Harvest House
Brickkiln
Cleveland
Church Farm
Ashill (Voluntary Controlled) Primary School
Hall Farm
B1077
A1075
Legend
draft Order Limits
Southern Panel Area
Cable Corridor
Metres
0
250
500
1,000
Coordinate System: British National Grid
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P01 | 04/09/2024 | JEP | HJ | HJ | CS
Rev | Date | By | Chkd | Appd | Authd
Client
RWE
Project Name
High Grove Solar
Drawing Title
Figure 2.6 General Arrangement - Southern Panel Area
Scale at A1
1:15,000
Role
Scoping Report
Suitability
Issue
Project Number
300883-00
Rev
P01
Drawing Name
HGS-SR02-00006

A1

Legend

- draft Order Limits
- draft Order Limits 2km Buffer

PRoW
- Footpath
- Bridleway
- Byway Open to All Traffic
- Restricted Byway
- National Cycle Network
- National Trails

Heritage Assets

Listed Buildings (Grade)
- I
- II*
- II
- Conservation Areas
- Registered Parks and Gardens
- Scheduled Monuments

Biodiversity Sites
- Ancient & Semi-Natural Woodland
- Ancient Replanted Woodland
- Country Parks
- CRoW Access Land
- Local Nature Reserves (LNR)
- Sites Of Special Scientific Interest (SSSI)
- Special Areas Of Conservation (SAC)
- Special Protection Areas

Water Environment
- Watercourses
- Rivers and Sea Flood Zone 2
- Rivers and Sea Flood Zone 3

Source Protection Zone
- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment
- Zone of Special Interest

Metres
0 500 1,000 2,000

Coordinate System: British National Grid

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RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.7 Environmental Designations

Scale at A1
1:35,000
Role
Scoping Report
Suitability
Issue
Project Number
300883-00
Rev
P01
Drawing Name
HGS-SR02-00007

A3

Table back view – cable suspension system

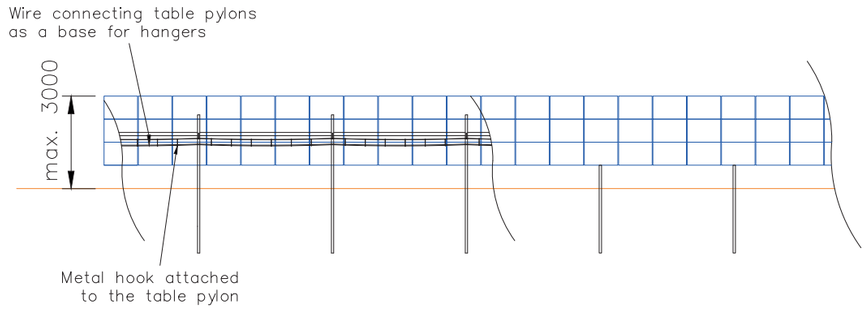
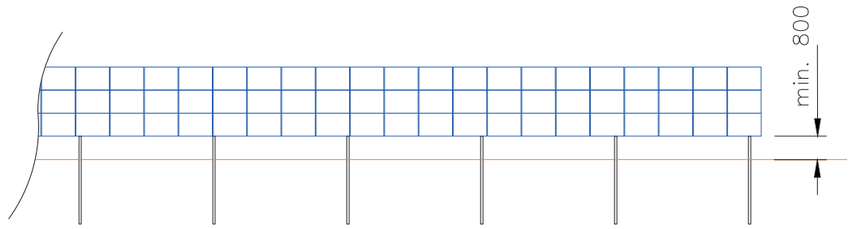


Table front view – 3 modules in portrait
scale 1:200



Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres
0 250 500 1,000

Coordinate System: British National Grid

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.8
Sheet 1 of 4
Cross-section of a typical fixed solar panel (normal and ballasted)

Scale at A3
1:20,000

Role
Scoping Report

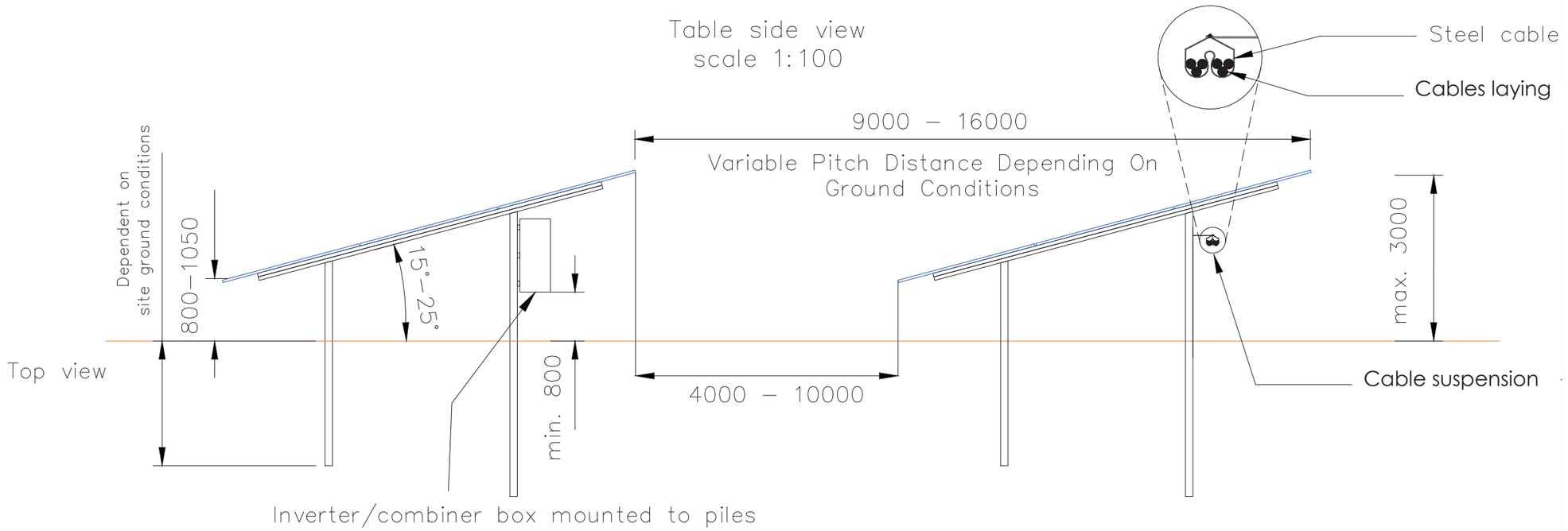
Suitability
Issued

Project Number
300883-00

Rev
P01

Drawing Number
HGS-SR02-00008

A3



Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.8
Sheet 2 of 4
Cross-section of a typical fixed solar panel (normal and ballasted)

Scale at A3
1:20,000

Role
Scoping Report

Suitability
Issued

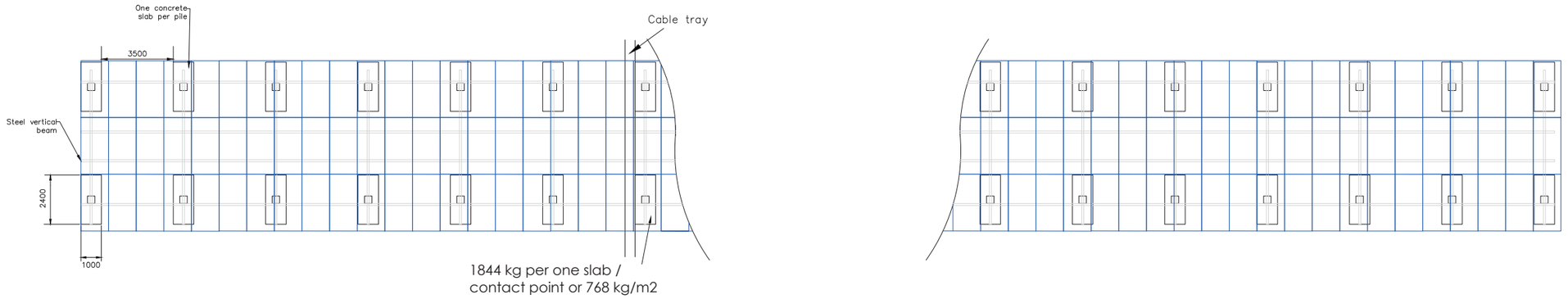
Project Number
300883-00

Rev
P01

Drawing Number
HGS-SR02-00008

A3

Birdseye view – 3 modules in portrait
scale 1:200 @A1



Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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RWE

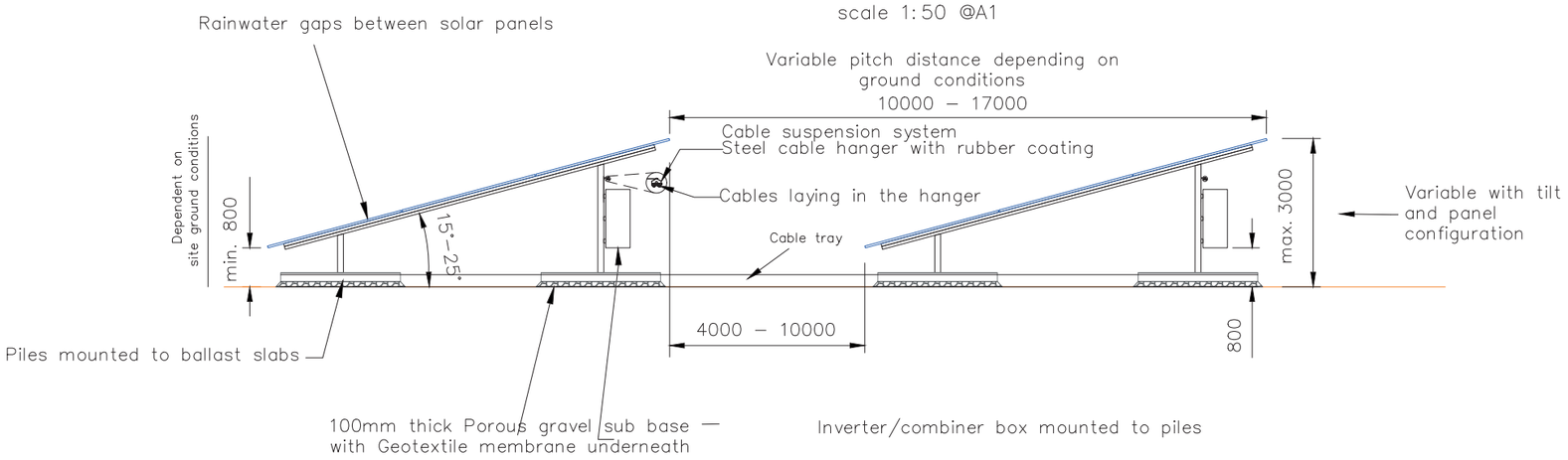
Project Name
High Grove Solar

Drawing Title
Figure 2.8
Sheet 3 of 4
Cross-section of a typical fixed solar panel (normal and ballasted)

Scale at A3
1:20,000
Role
Scoping Report
Suitability
Issued
Project Number
300883-00
Rev
P01
Drawing Number
HGS-SR02-00008

A3

Table side view
scale 1:50 @A1



Ground cross–section side view (not to scale)

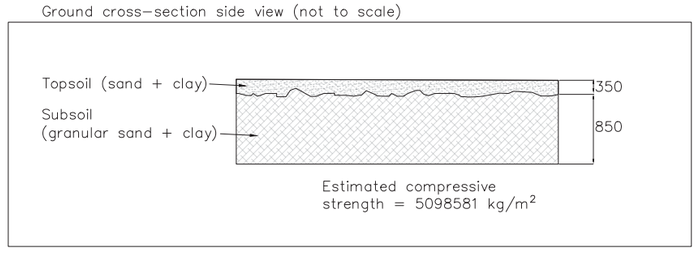


Table 1: Constituents of a contact point

Item name	Weight [kg]
15 PV Panels	420
PV frame for 15 panels	45
Solar inverter for 15 Panels	90
Shingle layer	379
Concrete slab	1000
TOTAL weight	1844

Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.8
Sheet 4 of 4
Cross-section of a typical fixed solar panel (normal and ballasted)

Scale at A3
1:20,000

Role
Scoping Report

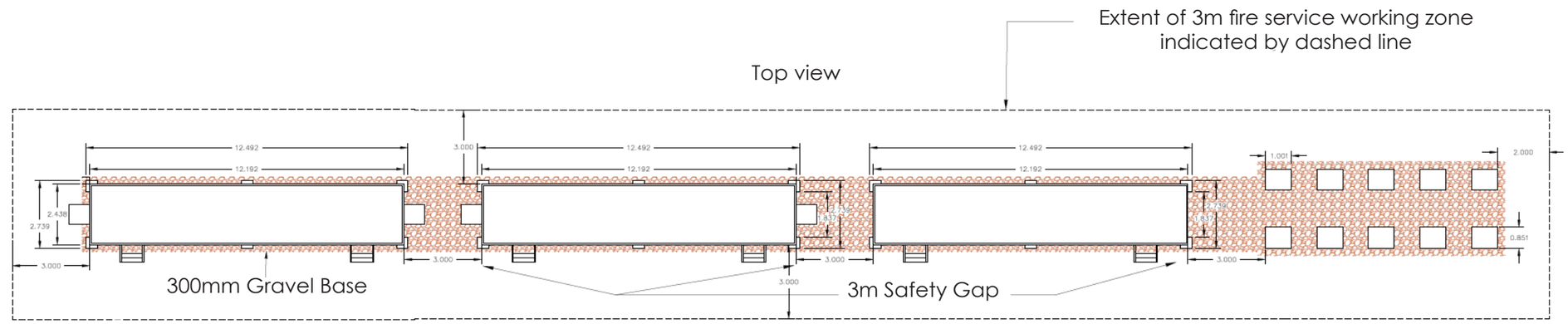
Suitability
Issued

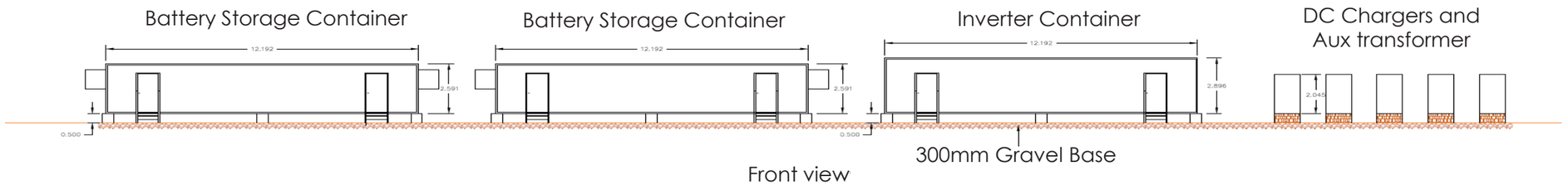
Project Number
300883-00

Rev
P01

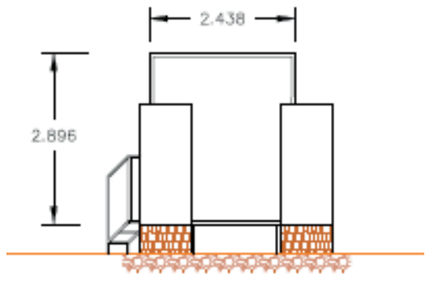
Drawing Number
HGS-SR02-00008

A3





Front view



Side view

Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres

0 250 500 1,000

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Client

RWE

Project Name

High Grove Solar

Drawing Title

Figure 2.9
Typical transformer, inverter and BESS arrangement

Scale at A3

1:20,000

Role

Scoping Report

Suitability

Issued

Project Number

300883-00

Rev

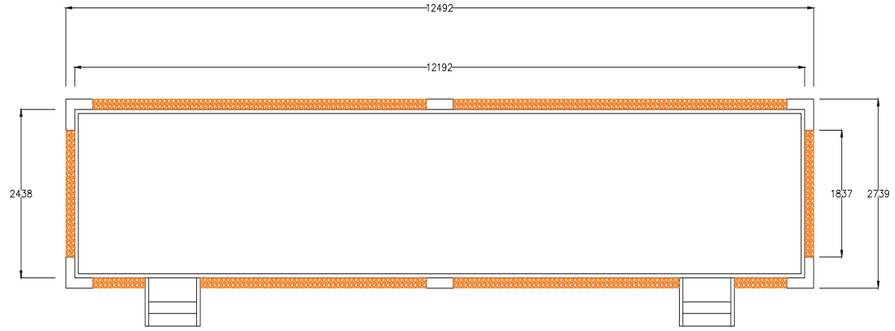
P01

Drawing Number

HGS-SR02-00009

A3

Customer switchgear
Top view



Customer switchgear
Front view

Customer switchgear
Side view

Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.10
Typical switchgear

Scale at A3
1:20,000

Role
Scoping Report

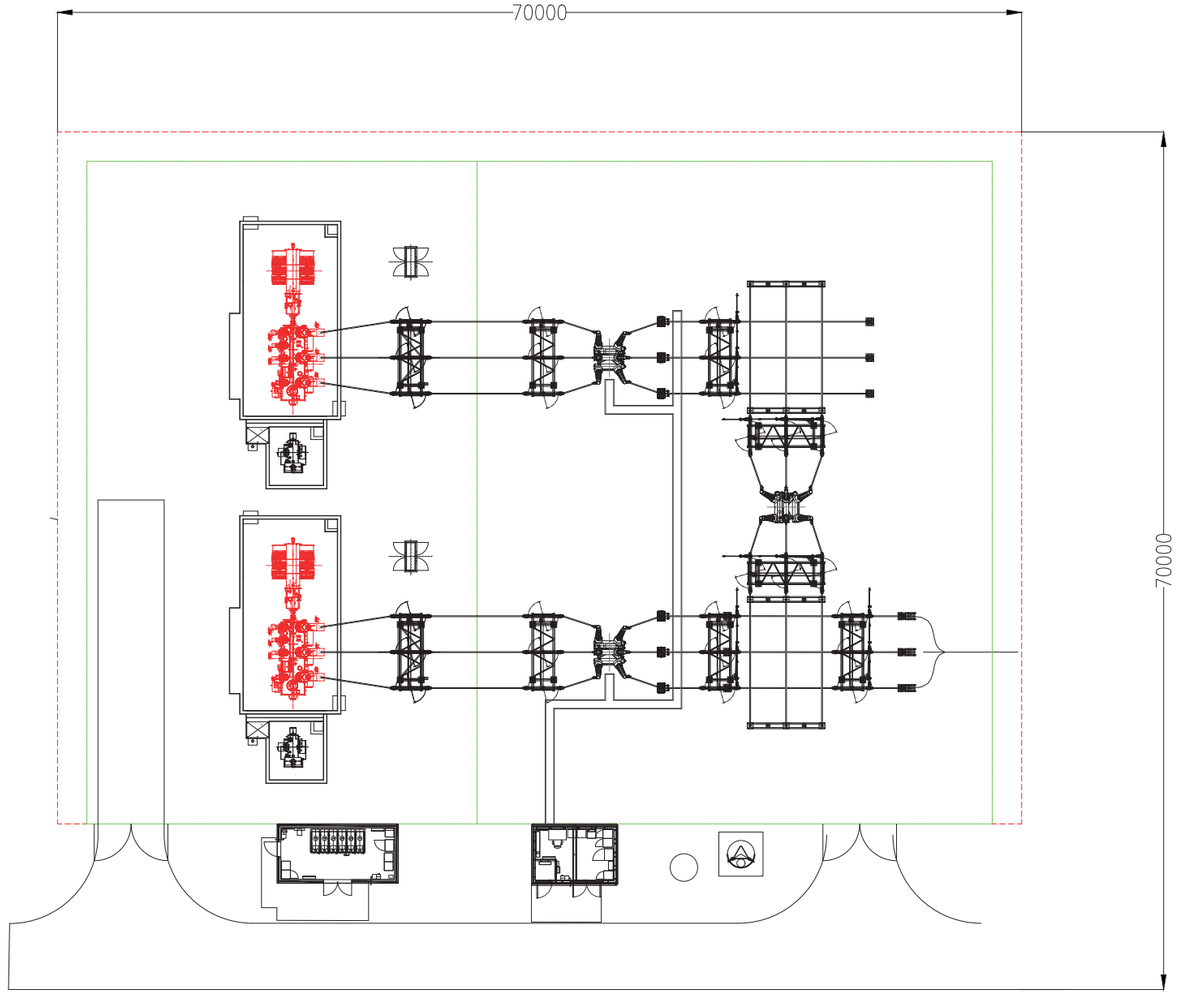
Suitability
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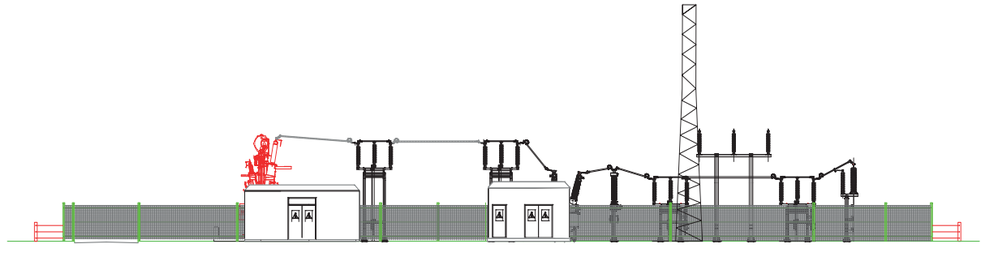
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Drawing Number
HGS-SR02-00010

A3





Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres
0 250 500 1,000

Coordinate System: British National Grid

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RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.11
Typical substation

Scale at A3
1:20,000

Role
Scoping Report

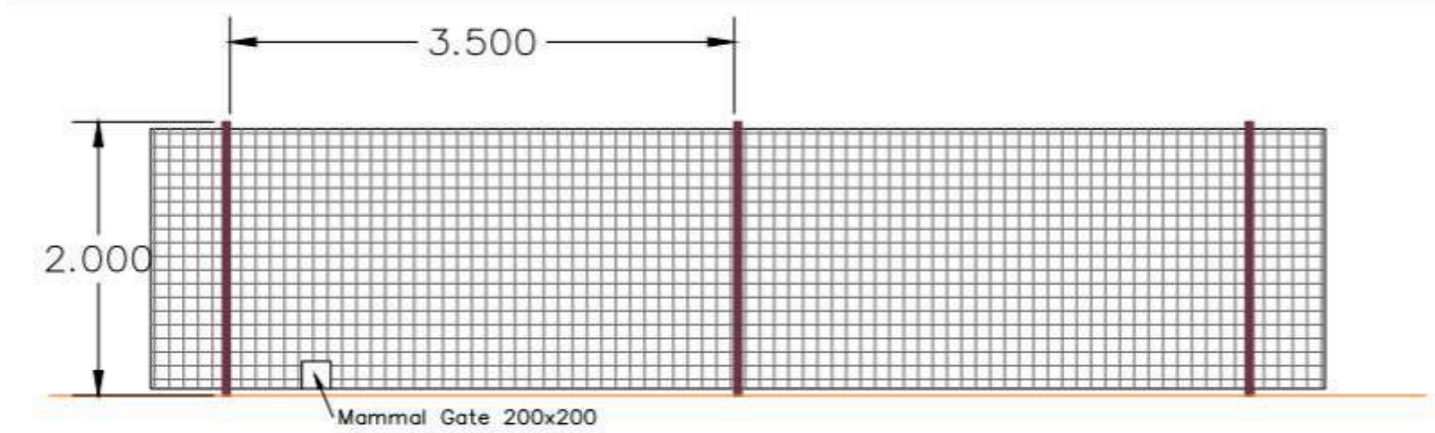
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Issued

Project Number
300883-00

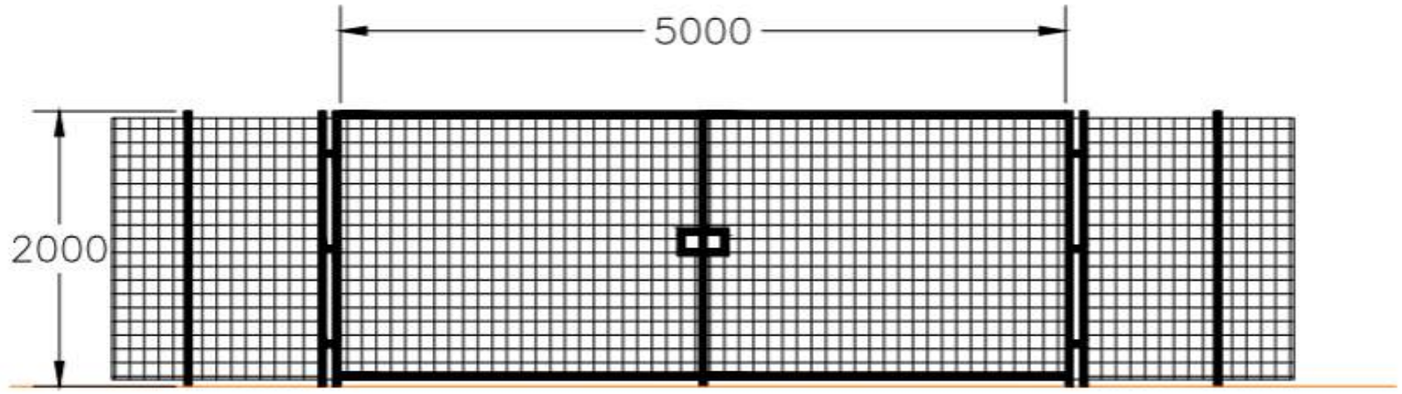
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Drawing Number
HGS-SR02-00011

A3



Timber post & wire fence



Timber post & wire gate

Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name

High Grove Solar

Drawing Title

Figure 2.12
Typical fence and gate

Scale at A3

1:20,000

Role

Scoping Report

Suitability

Issued

Project Number

300883-00

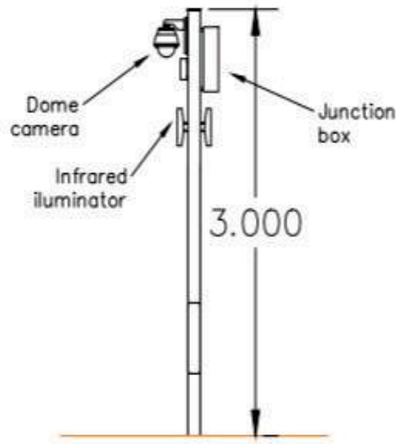
Rev

P01

Drawing Number

HGS-SR02-00012

A3



CCTV pole

Notes

1. **All details are indicative only.**
2. **Dimensions are in metres unless stated otherwise.**

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.13
Typical CCTV pole

Scale at A3
1:20,000
Role
Scoping Report
Suitability
Issued
Project Number
300883-00
Rev
P01
Drawing Number
HGS-SR02-00013

A1

Protect Bird Population: Provide planting that respects the needs of the local bird population.

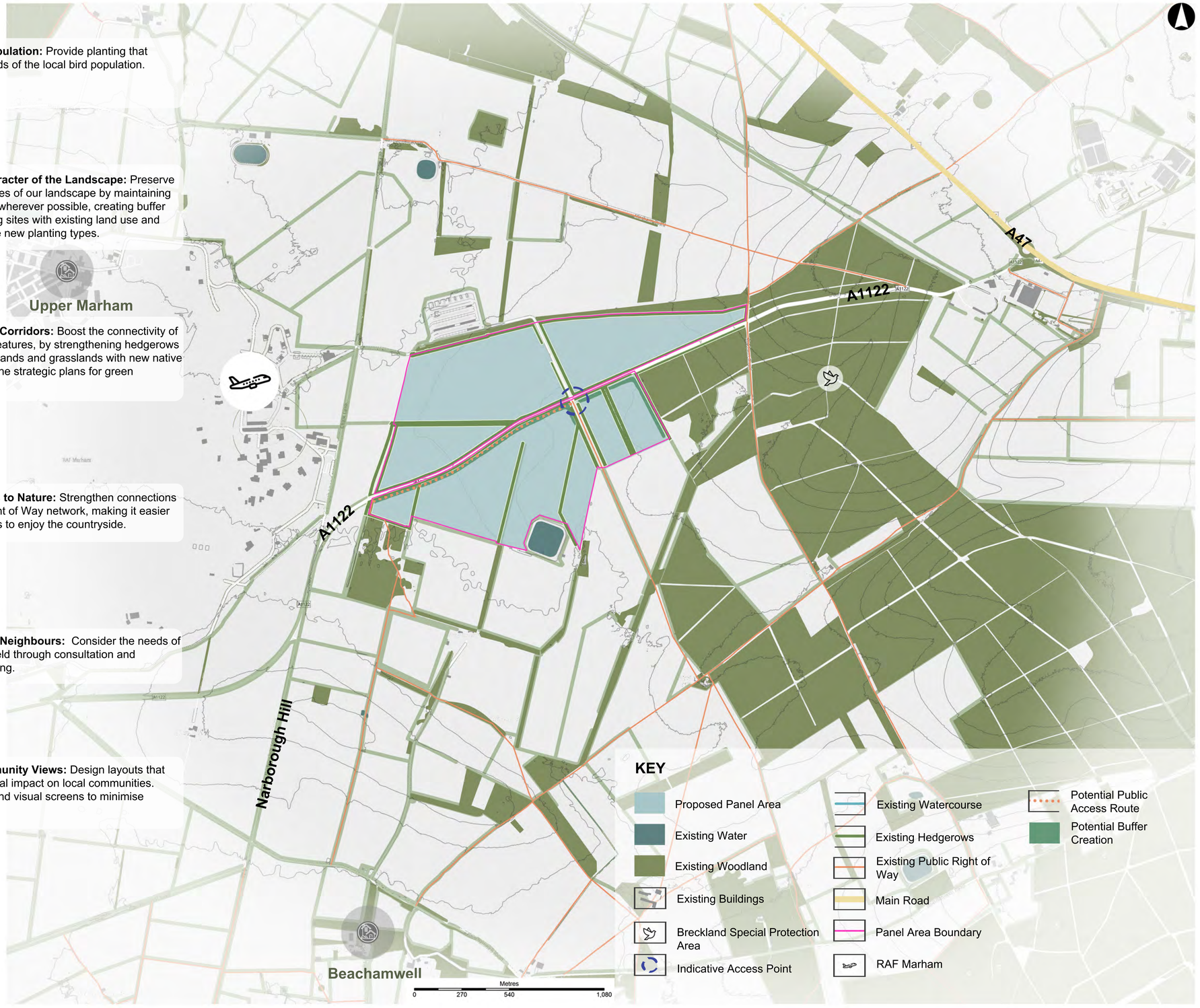
Protect the Character of the Landscape: Preserve the unique features of our landscape by maintaining existing planting wherever possible, creating buffer zones, integrating sites with existing land use and using appropriate new planting types.

Enhance Green Corridors: Boost the connectivity of existing natural features, by strengthening hedgerows and linking woodlands and grasslands with new native planting. Follow the strategic plans for green infrastructure.

Improve Access to Nature: Strengthen connections to the Public Right of Way network, making it easier for local residents to enjoy the countryside.

Understand our Neighbours: Consider the needs of the adjacent airfield through consultation and appropriate planting.

Prioritise Community Views: Design layouts that consider the visual impact on local communities. Include buffers and visual screens to minimise disturbance.



Legend
See figure

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.14
Landscape Concept Plan

Sheet 1 of 5

Scale at A1
1:30,000
Role
Scoping Report
Suitability
Issued
Project Number
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Rev
P01
Drawing Number
HGS-SR02-00014

A1

Tackle the Climate Crisis: Introduce wetlands to manage surface water flooding, helping the local environment adapt to the climate crisis.

Improve Access to Nature: Explore opportunities to strengthen connections to the Peddars Way National Trail, making it easier for local residents to enjoy the countryside.

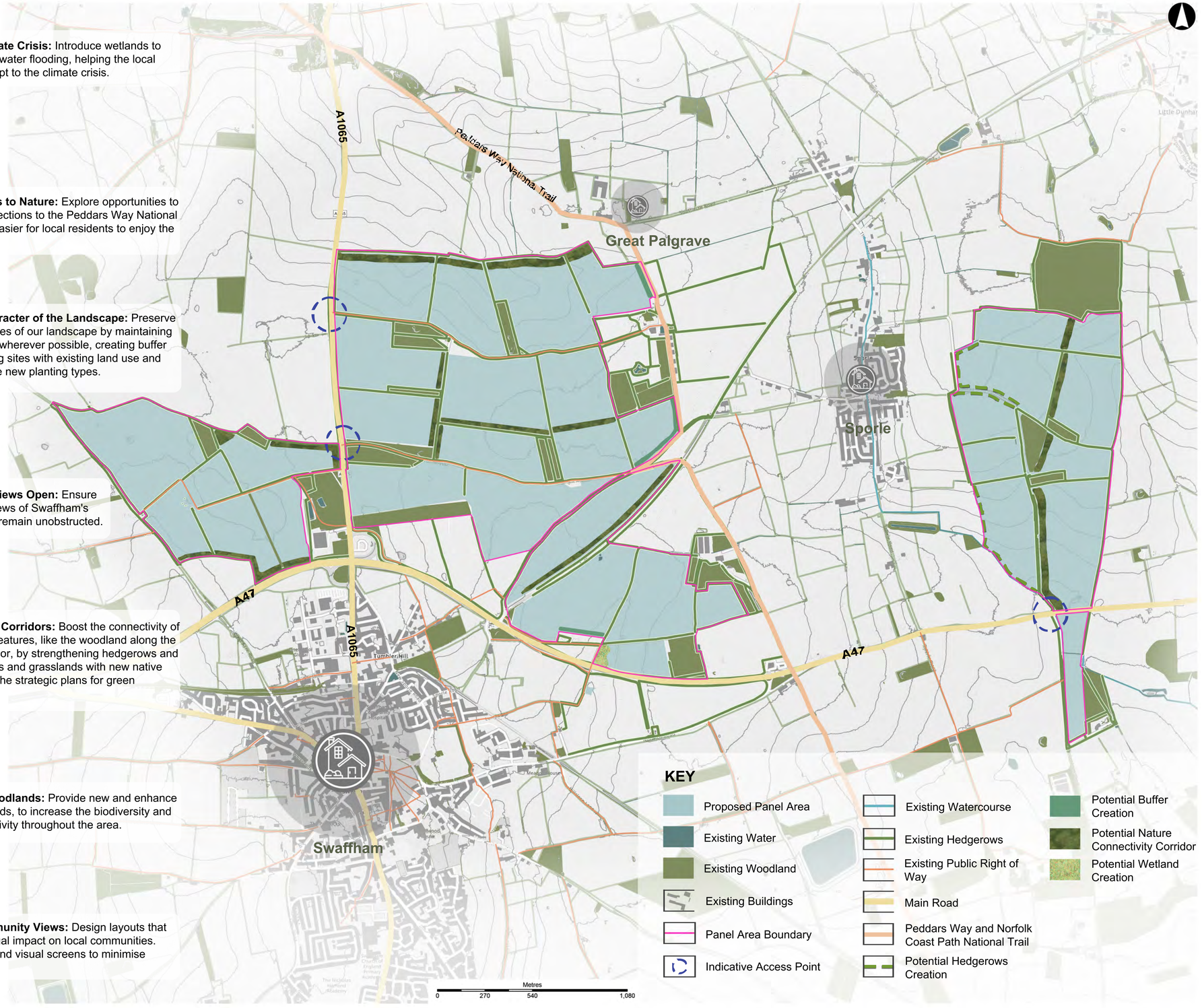
Protect the Character of the Landscape: Preserve the unique features of our landscape by maintaining existing planting wherever possible, creating buffer zones, integrating sites with existing land use and using appropriate new planting types.

Keep Historic Views Open: Ensure that important views of Swaffham's historic features remain unobstructed.

Enhance Green Corridors: Boost the connectivity of existing natural features, like the woodland along the historic rail corridor, by strengthening hedgerows and linking woodlands and grasslands with new native planting. Follow the strategic plans for green infrastructure.

Create New Woodlands: Provide new and enhance existing woodlands, to increase the biodiversity and improve connectivity throughout the area.

Prioritise Community Views: Design layouts that consider the visual impact on local communities. Include buffers and visual screens to minimise disturbance.



Legend
See figure

Coordinate System: British National Grid

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.14
Landscape Concept Plan

Sheet 2 of 5

Scale at A1
1:30,000
Role
Scoping Report
Suitability
Issued
Project Number
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P01
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A1

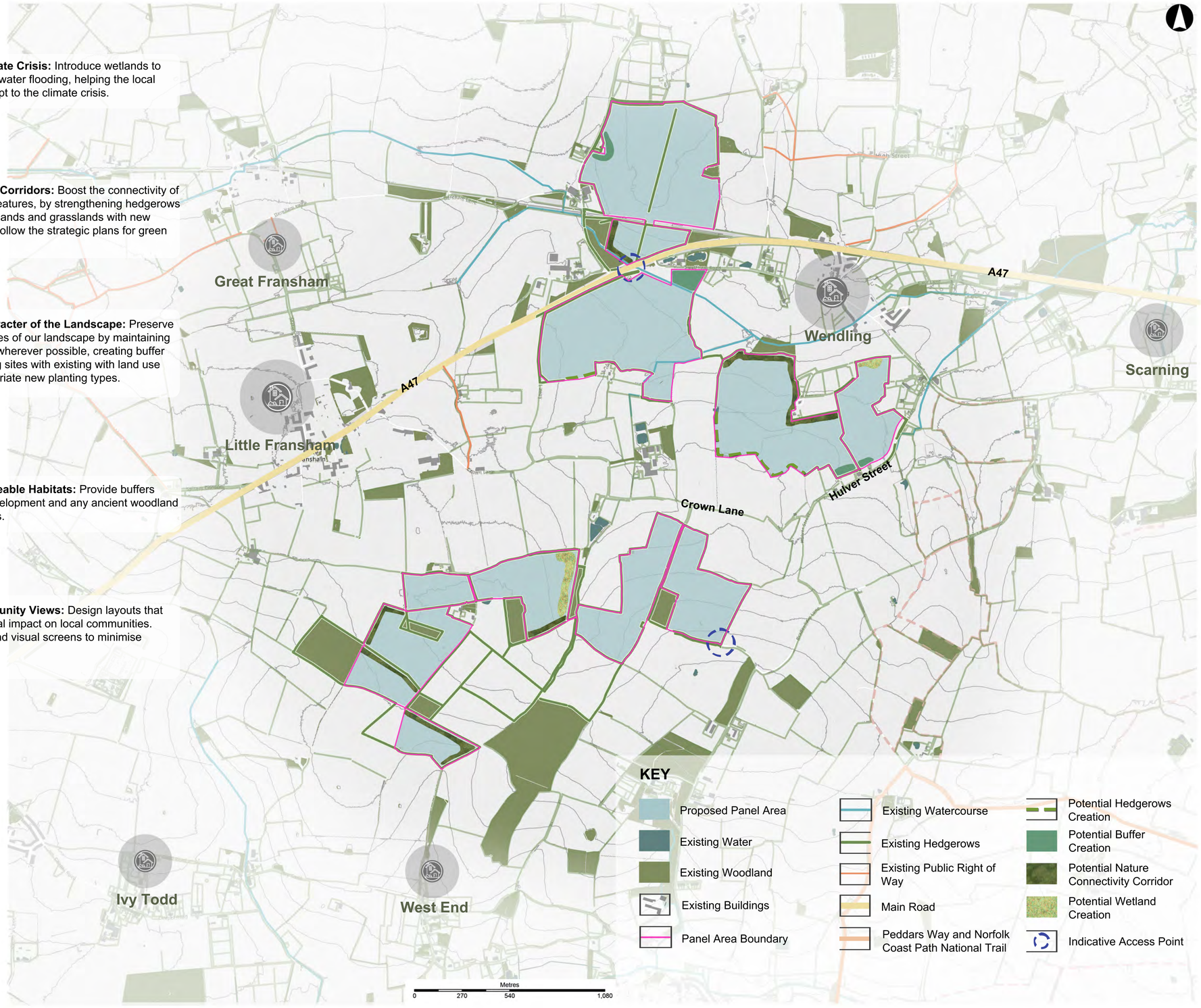
Tackle the Climate Crisis: Introduce wetlands to manage surface water flooding, helping the local environment adapt to the climate crisis.

Enhance Green Corridors: Boost the connectivity of existing natural features, by strengthening hedgerows and linking woodlands and grasslands with new native planting. Follow the strategic plans for green infrastructure.

Protect the Character of the Landscape: Preserve the unique features of our landscape by maintaining existing planting wherever possible, creating buffer zones, integrating sites with existing with land use and using appropriate new planting types.

Protect Irreplaceable Habitats: Provide buffers between any development and any ancient woodland and veteran trees.

Prioritise Community Views: Design layouts that consider the visual impact on local communities. Include buffers and visual screens to minimise disturbance.



Legend
See figure

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.14
Landscape Concept Plan

Sheet 3 of 5

Scale at A1
1:30,000
Role
Scoping Report
Suitability
Issued
Project Number
300883-00
Rev
P01
Drawing Number
HGS-SR02-00014

A1

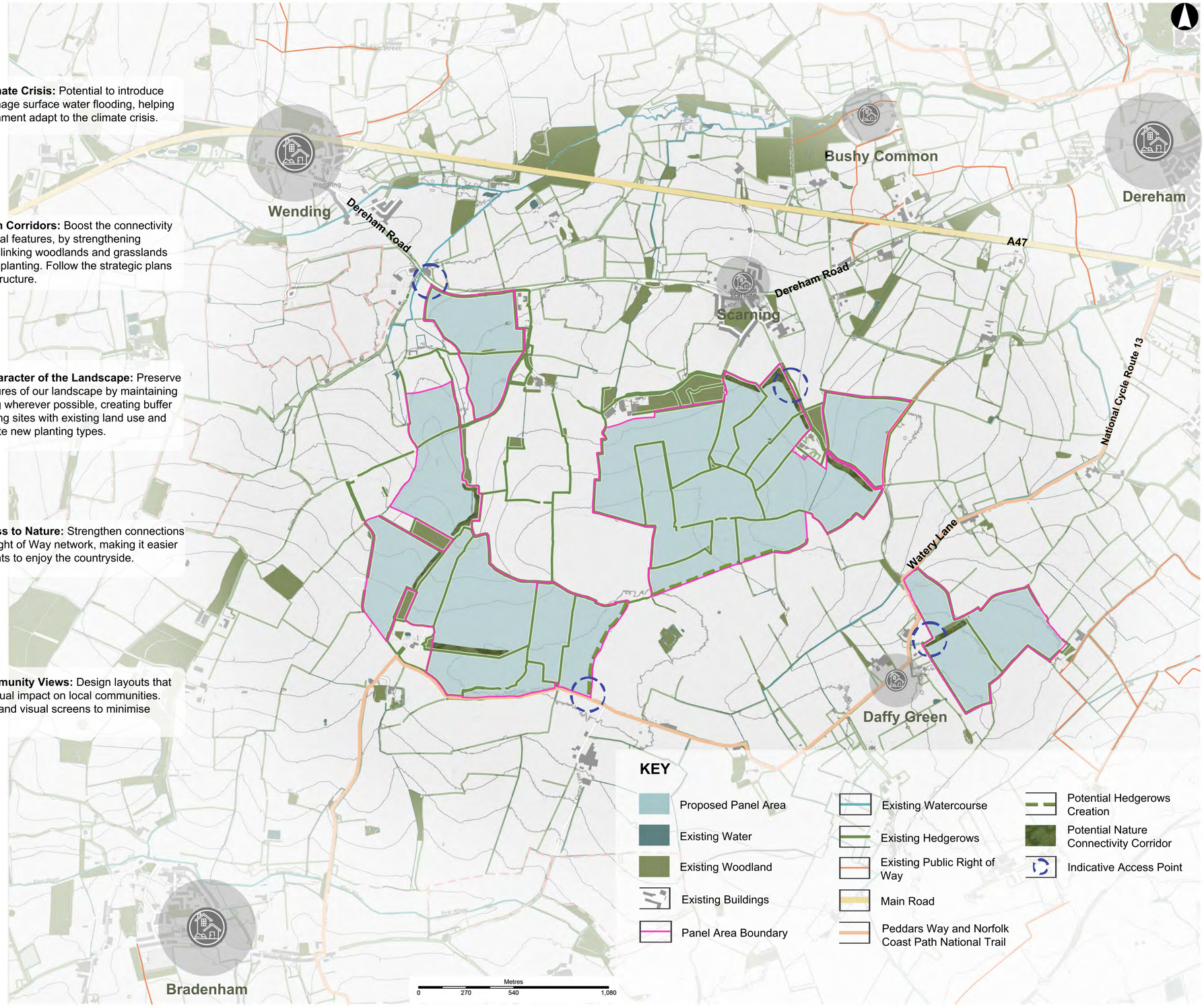
Tackle the Climate Crisis: Potential to introduce wetlands to manage surface water flooding, helping the local environment adapt to the climate crisis.

Enhance Green Corridors: Boost the connectivity of existing natural features, by strengthening hedgerows and linking woodlands and grasslands with new native planting. Follow the strategic plans for green infrastructure.

Protect the Character of the Landscape: Preserve the unique features of our landscape by maintaining existing planting wherever possible, creating buffer zones, integrating sites with existing land use and using appropriate new planting types.

Improve Access to Nature: Strengthen connections to the Public Right of Way network, making it easier for local residents to enjoy the countryside.

Prioritise Community Views: Design layouts that consider the visual impact on local communities. Include buffers and visual screens to minimise disturbance.



Legend
See figure

Coordinate System: British National Grid

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.14
Landscape Concept Plan

Sheet 4 of 5

Scale at A1
1:30,000
Role
Scoping Report
Suitability
Issued
Project Number
300883-00
Rev
P01
Drawing Number
HGS-SR02-00014

A1

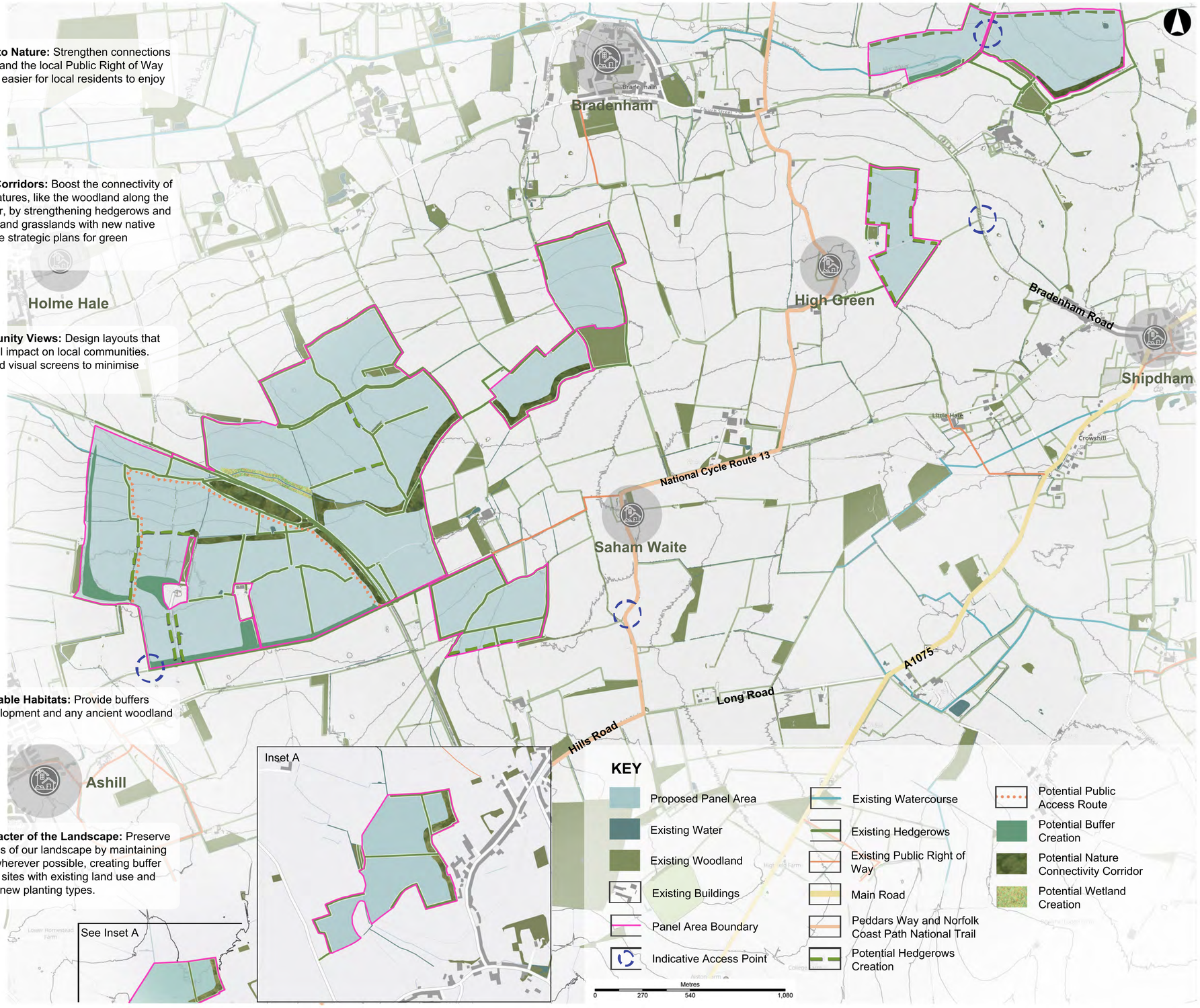
Improve Access to Nature: Strengthen connections to Ashill Common and the local Public Right of Way network, making it easier for local residents to enjoy the countryside.

Enhance Green Corridors: Boost the connectivity of existing natural features, like the woodland along the historic rail corridor, by strengthening hedgerows and linking woodlands and grasslands with new native planting. Follow the strategic plans for green infrastructure.

Prioritise Community Views: Design layouts that consider the visual impact on local communities. Include buffers and visual screens to minimise disturbance.

Protect Irreplaceable Habitats: Provide buffers between any development and any ancient woodland and veteran trees.

Protect the Character of the Landscape: Preserve the unique features of our landscape by maintaining existing planting wherever possible, creating buffer zones, integrating sites with existing land use and using appropriate new planting types.



Legend
See figure

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name
High Grove Solar

Drawing Title
Figure 2.14
Landscape Concept Plan

Sheet 5 of 5

Scale at A1
1:30,000
Role
Scoping Report
Suitability
Issued
Project Number
300883-00
Rev
P01
Drawing Number
HGS-SR02-00014

High Grove Solar Environmental Impact Assessment Scoping Report Figures Part 2

September 2024

A1

Page 2

Page 3

Page 4

Page 5

Page 6

Page 7

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Legend

- draft Order Limits
- draft Order Limits 100m Buffer
- Cable Corridor

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

Service or layer credits:

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Project Name

High Grove Solar

Drawing Title

Figure 7.1 -Waterbody Location Plan

Overview - Page 1 of 7

Scale at A1

1:35,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR07-00001

A1

X1

X18

A17

X84

X83

Legend

draft Order Limits

draft Order Limits 100m Buffer

Cable Corridors

Waterbody Locations

Panel Area

Central

Eastern

Northern

Southern

Western

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Client

RWE

Project Name

High Grove Solar

Drawing Title

Figure 7.1 Waterbody Location Plan

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

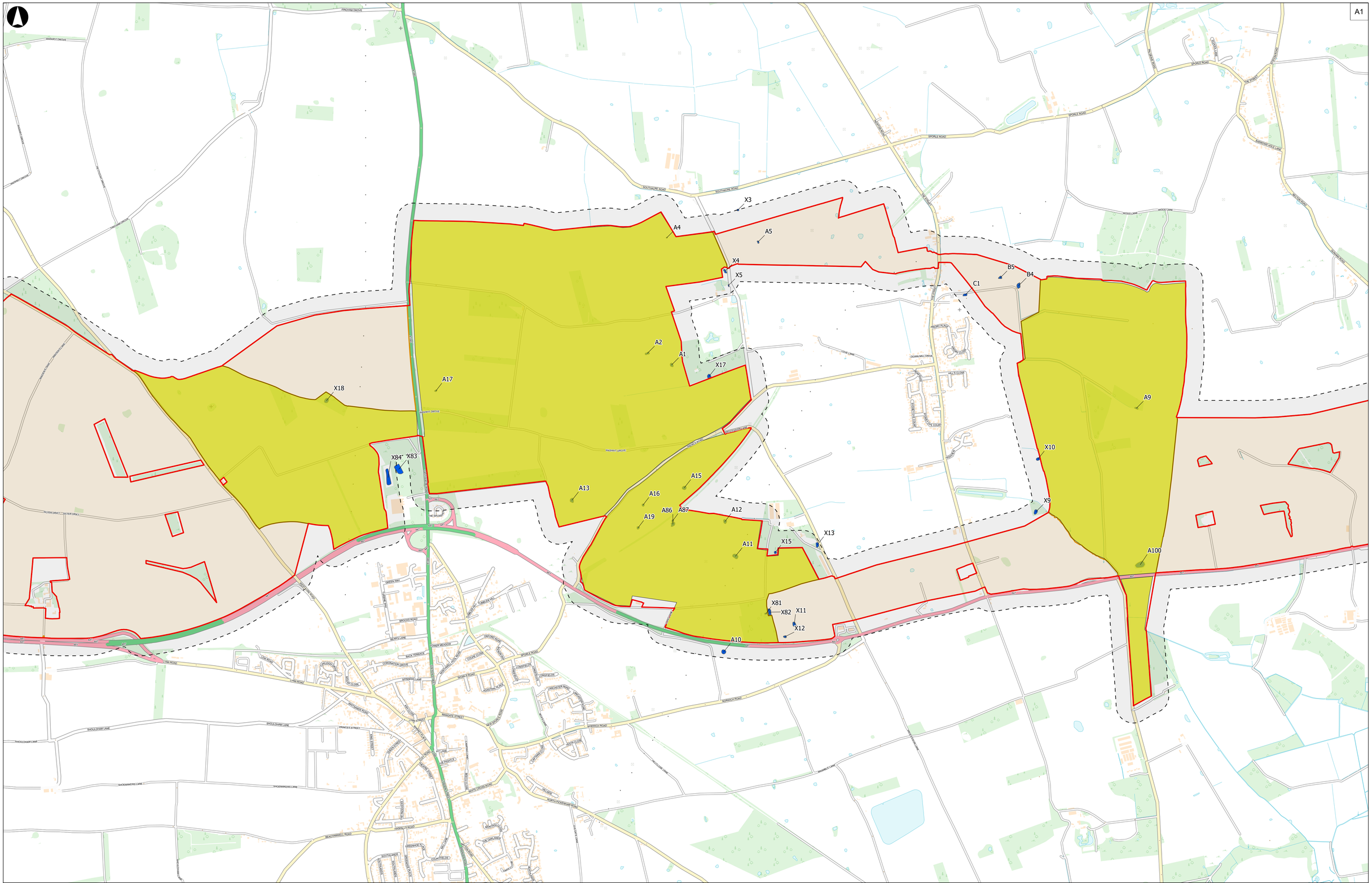
Rev

P01

Drawing Name

HGS-SR07-00001

A1



Legend

- draft Order Limits
- l draft Order Limits 100m Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Waterbody Locations

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Project Name

High Grove Solar

Drawing Title

Figure 7.1 Waterbody Location Plan

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number

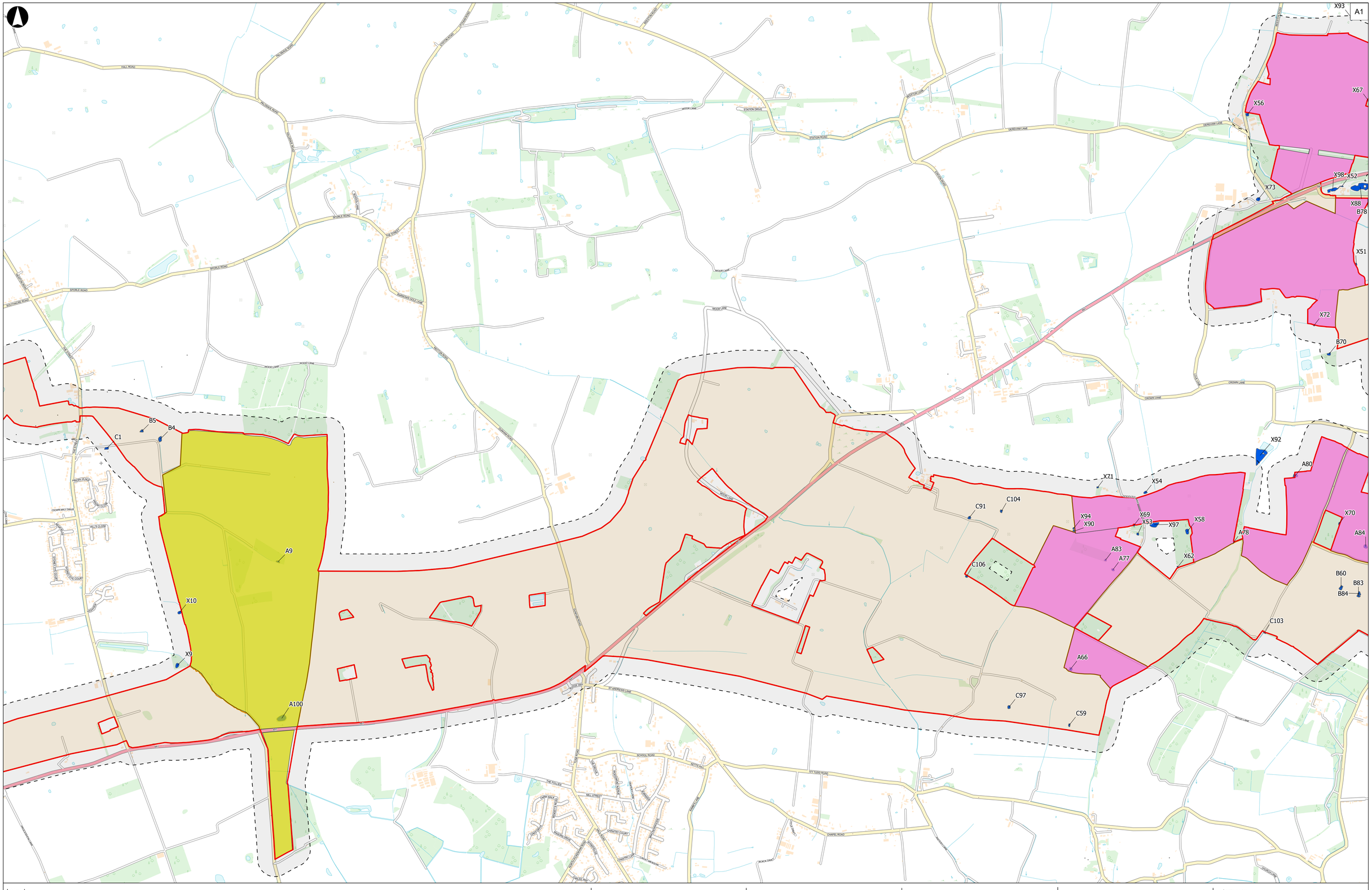
300883-00

Rev

P01

Drawing Name

HGS-SR07-00001



Legend

- draft Order Limits
- draft Order Limits 100m Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Waterbody Locations

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Project Name
High Grove Solar

Drawing Title
Figure 7.1 Waterbody Location Plan

Scale at A1
1:10,000

Role
Scoping Report

Suitability
Issue

Project Number
300883-00

Rev
P01

Drawing Name
HGS-SR07-00001

A1

Legend

- draft Order Limits
- draft Order Limits 100m Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Waterbody Locations

Metres

0 250 500 1,000

Coordinate System: British National Grid

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Figure 7.1 Waterbody Location Plan

Page 5 of 7

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

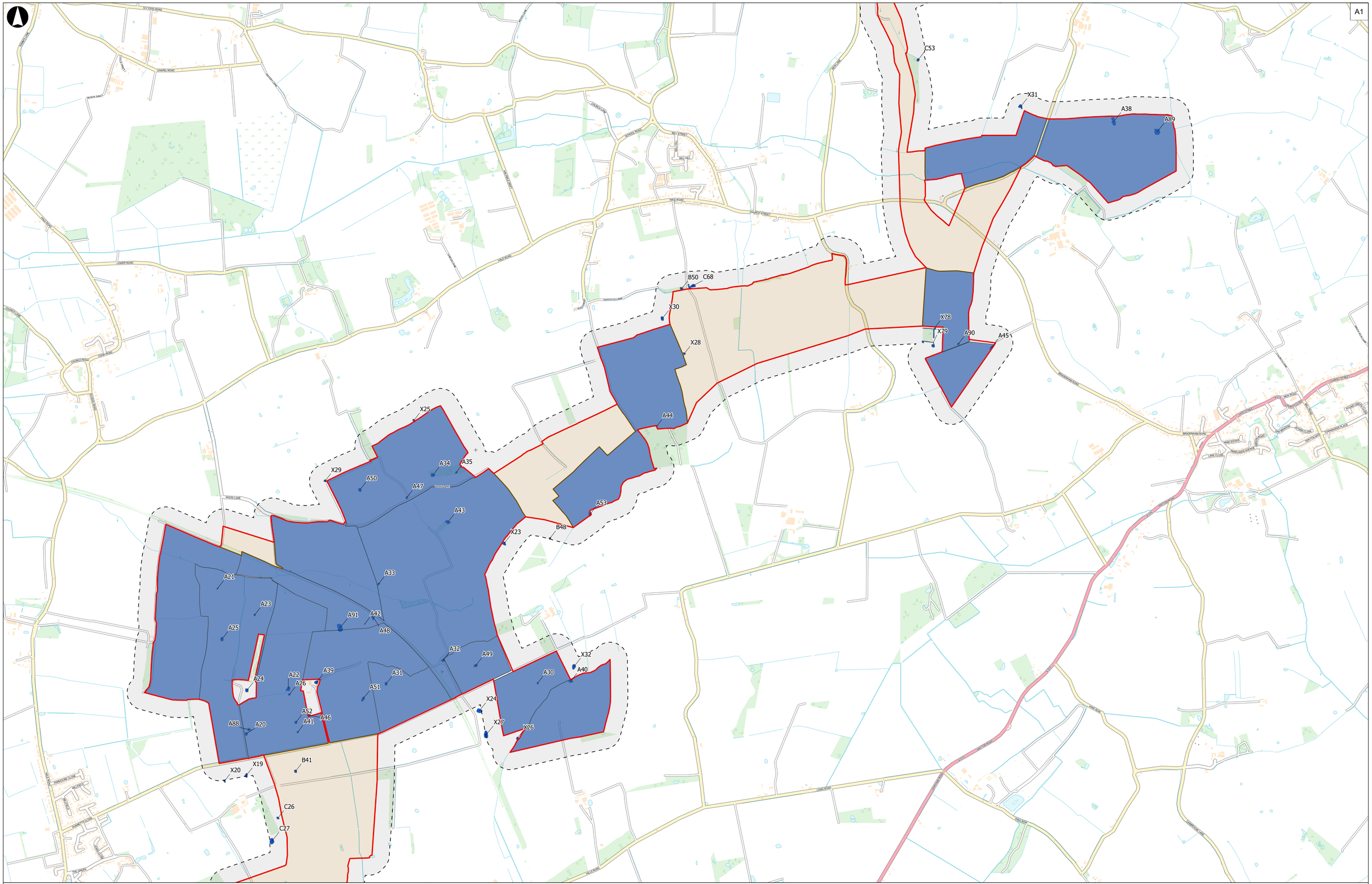
Rev

P01

Drawing Name

HGS-SR07-00001

A1



Legend

- draft Order Limits
- draft Order Limits 100m Buffer
- Cable Corridors
- Waterbody Locations

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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RWE

Project Name

High Grove Solar

Drawing Title

Figure 7.1 Waterbody Location Plan

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number

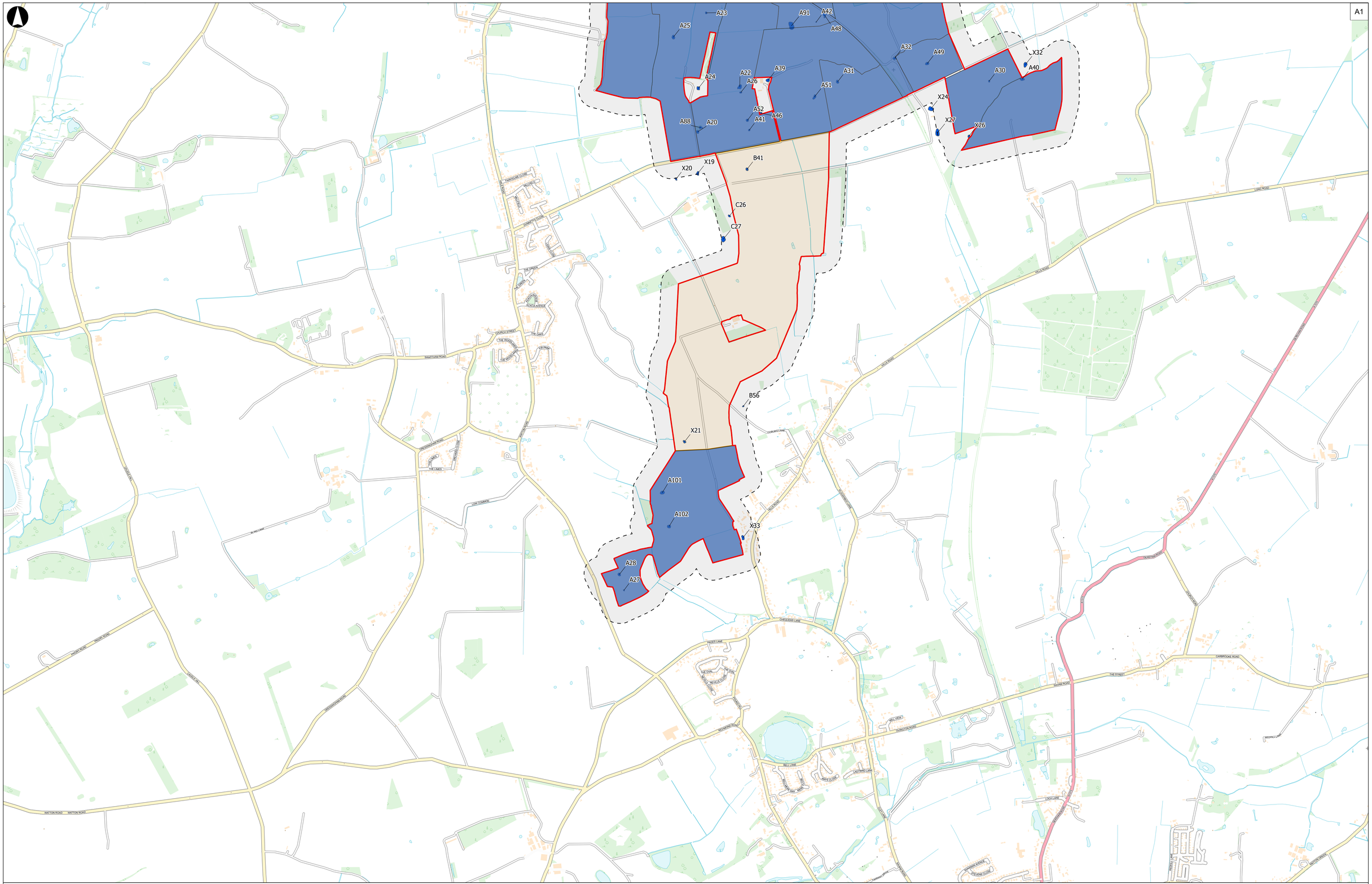
300883-00

Rev

P01

Drawing Name

HGS-SR07-00001



Legend

- draft Order Limits
- draft Order Limits 100m Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Waterbody Locations

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

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Project Name

High Grove Solar

Drawing Title

Figure 7.1 Waterbody Location Plan

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR07-00001

A1

River Wensum
Horse Wood, Wilenham
Litcham Common
River Nar
East Walton and Adcock's Common
Norfolk Valley Fens
East Winch Common
Blackborough End Pit
Castle Acre Common
Beetley & Hoe Meadows
Dillington Carr & Gressenhall
Honeypot Wood, Wendling
Dereham Rush Meadow
Holly Farm Meadow, Wendling
Norfolk Valley Fens
Potter & Scarning Fens, East Dereham
Rosie Curston's Meadow, Mattishall
Mattishall Moor
Badley Moor
Norfolk Valley Fens
Narborough Railway Embankment
Breckland Forest
Coston Fen, Runhall
Norfolk Valley Fens
Potter's Carr, Cranworth
Boughton Fen
Great Cressingham Fen
Norfolk Valley Fens
Scoulton Mere
Wayland Wood, Watton
Old Bodney Camp
Great Eastern Pingo Trail
Norfolk Valley Fens
Thompson Water, Carr and Common
Cranberry Rough, Hockham
KING'S LYNN
DOWNHAM MARKET
SWAFFHAM
DEREHAM
ATTLEBOROUGH
WYMONDHAM
BRECKLAND DISTRICT

Legend

- draft Order Limits
- draft Order Limits 10km Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Sites of Special Scientific Interest (SSSI)
- Local Nature Reserves (LNR)
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)

Metres
0 1,000 2,000 4,000

Coordinate System: British National Grid

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Project Name
High Grove Solar

Drawing Title
Figure 7.2 Statutory Designated Wildlife Sites within 10km

Scale at A1
1:70,000
Role
Scoping Report
Suitability
Issue
Project Number
300883-00
Rev
P01
Drawing Name
HGS-ES07-00002

A1

Baker's Wood
Wendling Carr
Church Farm Meadow
Land near Podmore Farm
Potters Fen Meadow
Disused Railway Line
Osier Plantation
Sporle Wood
Contract Wood
Contract Plantation
Old Bridge Narborough
Adjacent Limekiln Cottage
Disused Railway
Smeeth Wood & Devil's Dyke
Necton Wood
North Grove
Great Wood
Lolly Moor
Ash Wood
Land adjacent to River Wissey
Gravel Pit
Fox Covert
Necton Old Common
Wissey Meadow
Cant's Corner Meadow
Church Lane Meadow
High Grove
Land west of Crowshill
Disused Railway
Land north-east of Woodbottom
Saham Park Cottages
Saham Wood
Land east of Saham Toney
Saham Mere
The Grove

Legend

- draft Order Limits
- draft Order Limits 2km Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western
- Panel Area 500m Buffer

- Local Wildlife Sites

Metres
0 500 1,000 2,000

Coordinate System: British National Grid
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High Grove Solar

Drawing Title
Figure 7.3 Local Wildlife Sites Within 2km

Scale at A1
1:35,000
Role
Scoping Report
Suitability
Issue
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Rev
P01
Drawing Name
HGS-SR07-00003

A1

SPORLE WOOD

NECTON WOOD

GREAT WOOD

NORTH GROVE

HONEYPOT WOOD

HIGH GROVE

PARK FARM WOOD

SAHAM WOOD

BRECKLAND DISTRICT

Legend

- draft Order Limits
- draft Order Limits 2km Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Ancient & Semi-Natural Woodland
- Ancient Replanted Woodland

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

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Drawing Title

Figure 7.4 - Ancient Woodlands with 2km

Scale at A1

1:35,000

Role

Scoping Report

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Issue

Project Number

300883-00

Rev

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Drawing Name

HGS-SR07-00004

A1

Legend

- draft Order Limits
- draft Order Limit 2km Buffer
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Coastal and floodplain grazing marsh
- Deciduous woodland
- Good quality semi improved grassland
- Lowland calcareous grassland
- Lowland dry acid grassland
- Lowland fens
- Lowland fens,Reedbeds
- Lowland heathland
- Lowland meadows
- No main habitat but additional habitats present
- Reedbeds
- Traditional orchard

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

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Drawing Title

Figure 7.5 Priority Habitats within 2km

Scale at A1

1:35,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR07-00005

A1

Legend

- draft Order Limits
- Draft Order Limits 2km Buffer

Listed Buildings (Grade)

- I
- II*
- II

- Registered Parks and Gardens
- Scheduled Monuments

Historical Environment Record

- Building
- Cropmark and Earthwork
- Find Spot
- Monument
- Negative evidence
- Structure

- Find Spot
- Monument
- Negative evidence
- Structure

- Building
- Cropmark and Earthwork
- Designed Landscape
- Find Spot
- Monument
- Negative evidence
- Structure

Metres
0 500 1,000 2,000

Coordinate System: British National Grid

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High Grove Solar

Drawing Title
9.1 Heritage Assets within 2 km of the draft Order Limits

Scale at A1
1:40,000
Role
Scoping Report
Suitability
Issue
Project Number
300883-00
Rev
P01
Drawing Name
HGS-SR09-00001

RWE Aktiengesellschaft
RWE Platz 1
45141 Essen, Germany
Germany
www.rwe.com

High Grove Solar Environmental Impact Assessment Scoping Report Figures Part 3

September 2024

A1

Legend

- draft Order Limits

Study Area

- draft Order Limits 3km Buffer
- draft Order Limits Castle Acre 3.5km Buffer

Metres

0 500 1,000 2,000

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High Grove Solar

Drawing Title

Figure 14.1 Site Location and study area

Scale at A1

1:40,000

Role

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Suitability

Issue

Project Number

300883-00

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P01

Drawing Number

HGS-SR14-00001

A1

Legend

- draft Order Limits
- Study Area
- draft Order Limits 3km Buffer
- draft Order Limits Castle Acre 3.5km Buffer

Listed Buildings
- Grade I
- Grade II*
- Grade II
- Conservation Areas
- Registered Parks and Gardens
- Scheduled Monuments

- National Trails
- National Cycle Network

PRoWs
- Footpath
- Bridleway
- Byway Open to All Traffic
- Restricted Byway

- Ancient & Semi-Natural Woodland
- Ancient Replanted Woodland
- Country Parks
- CRoW Access Land
- Local Nature Reserves (LNR)
- Sites Of Special Scientific Interest (SSSI)

Metres
0 500 1,000 2,000

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Project Name
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Drawing Title
Figure 14.2 Designations

Scale at A1
1:40,000

Role
Scoping Report

Suitability
Issue

Project Number
300883-00

Rev
P01

Drawing Number
HGS-SR14-00002

A1

B7 - River Nar Tributary Farmland

F1 - River Nar Valley

A4 - River Wensum and Blackwater

B6 - River Wensum and Tud Tributary Farmland

E8 - Dereham Plateau

B7 - River Nar Tributary Farmland

F1 - River Nar Valley

F1 - River Nar Valley

E6 - North Pickenham Plateau

B6 - River Wensum and Tud Tributary Farmland

URBAN - Urban

A5 - Upper Tud

URBAN - Urban

B5 - River Wissey Tributary Farmland

B5 - River Wissey Tributary Farmland

D1 - Swaffham Heath

E5 - Central Breckland Plateau

B4 - River Blackwater Tributary Farmland

A2 - Upper Yare

B4 - River Blackwater Tributary Farmland

B5 - River Wissey Tributary Farmland

B8 - Gooderstone to Oxborough Tributary Farmland

A3 - River Wissey

URBAN - Urban

D2 - Stanta Heath

E4 - Wayland Plateau

B3 - River Thet Tributary Farmland

Legend

- draft Order Limits
- Study Area
- draft Order Limits 3km Buffer
- draft Order Limits Castle Acre 3.5km Buffer

National Character Areas

- Mid Norfolk
- North West Norfolk
- South Norfolk and High Suffolk Claylands
- The Brecks
- The Fens
- Central Breckland Plateau
- Dereham Plateau
- Gooderstone to Oxborough Tributary Farmland
- North Pickenham Plateau
- River Blackwater Tributary Farmland
- River Nar Tributary Farmland
- River Nar Valley
- River Thet Tributary Farmland
- River Wensum and Blackwater
- River Wensum and Tud Tributary Farmland
- River Wissey
- River Wissey Tributary Farmland
- Stanta Heath
- Swaffham Heath
- Upper Tud
- Upper Yare
- Urban
- Wayland Plateau

Metres: 0 500 1,000 2,000

Coordinate System: British National Grid

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Project Name: **High Grove Solar**

Drawing Title: **Figure 14.3 Published Landscape Character Areas**

Scale at A1: **1:40,000**

Role: **Scoping Report**

Suitability: **Issue**

Project Number: **300883-00**

Rev: **P01**

Drawing Number: **HGS-SR14-00003**

A1

Castle Acre and River Nar Valley

River Nar Tributary Farmland

North Pickenham Plateau

River Wensum and Blackwater

Little Dunham Parkland

Dereham

River Wensum and Tud Tributary Farmland

Narborough

Pickenham Plateau

Sporle

Swaffham Heath Farmland

Northern River Wissey Tributary Farmland

Necton

RAF Marham

Swaffham Heath Plantation Farmlands

Swaffham

Southern River Wissey Settled Tributary Farmland

Western River Wissey Settled Tributary Farmland

Former RAF North Pickenham

Swaffham Heath Plantation

Southern River Wissey Tributary Farmland

Central Breckland Plateau

Shipdham

River Blackwater Tributary Farmland

Beachamwell

Southern River Wissey Settled Tributary Farmland

Stanta Heath

Watton

Legend

- draft Order Limits

Study Area

- draft Order Limits 3km Buffer
- draft Order Limits Castle Acre 3.5km Buffer

Local Landscape Character Areas

- Beachamwell
- Castle Acre and River Nar Valley
- Central Breckland Plateau
- Dereham
- Former RAF North Pickenham
- Little Dunham Parkland
- Narborough
- Necton
- North Pickenham Plateau
- Northern River Wissey Tributary Farmland
- Pickenham Plateau
- RAF Marham
- River Blackwater Tributary Farmland
- River Nar Tributary Farmland
- River Wensum and Blackwater
- River Wensum and Tud Tributary Farmland
- Shipdham
- Southern River Wissey Settled Tributary Farmland
- Southern River Wissey Tributary Farmland
- Sporle
- Stanta Heath
- Swaffham
- Swaffham Heath Farmland
- Swaffham Heath Plantation
- Swaffham Heath Plantation Farmlands
- Watton
- Western River Wissey Settled Tributary Farmland

Metres
0 500 1,000 2,000

Coordinate System: British National Grid

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Drawing Title
Figure 14.4 Local Landscape Character Areas

Scale at A1
1:40,000
Role
Scoping Report
Suitability
Issue
Project Number
300883-00
Rev
P01
Drawing Number
HGS-SR14-00004

A1

Legend

- draft Order Limits
- I draft Order Limits 8km Buffer
- Representative Viewpoints
- Viewshed 2m DTM

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

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Drawing Title

Figure 14.5 Zone of Theoretical Visibility (bare earth), and proposed Representative Viewpoints

Scale at A1

1:55,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR14-00005

A1

Legend

- draft Order Limits
- l draft Order Limits 8km Buffer
- Representative Viewpoints
- Viewshed 2m DSM

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

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Project Name

High Grove Solar

Drawing Title

Figure 14.6 Zone of Theoretical Visibility (screening), and proposed Representative Viewpoints

Scale at A1

1:55,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

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Drawing Name

HGS-SR14-00006

A1

Page 2

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Page 7

Gressenhall
Longham
Beeston
West Acre
Castle Acre
Great Dunham
Pentney
Narborough
Little Dunham
Great Fransham
Wendling
Dereham
Moorgate
South Green
Little Fransham
Scarning
Sporle
Toftwood
Tumbler Hill
Swaffham
Necton
Westfield
RAF Marham
Bradenham
Holme Hale
Shipdham
Shipdham Airfield
North Pickenham
Beachamwell
Cockley Cley
Ashill
Cranworth
South Pickenham
Saham Hills
Ovington
Carbrooke
Gooderstone
Saham Toney
Oxborough
Great Cressingham
Neaton
Watton
Watton Green
Scoulton
Hilborough
Little Cressingham

Legend

- draft Order Limits
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

Metres
0 500 1,000 2,000

Coordinate System: British National Grid

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High Grove Solar

Drawing Title
Figure 16.1 - Noise Sensitive Receptors

Page 1 of 7

Scale at A1
1:35,000
Role
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Drawing Name
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Legend

draft Order Limits

Cable Corridors

Panel Area

Central

Eastern

Northern

Southern

Western

Noise Sensitive Receptors

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

Sensitive receptors identified from aerial imagery.

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Project Name

High Grove Solar

Drawing Title

Figure 16.1 - Noise Sensitive Receptors

Page 2 of 7

Scale at A1

1:10,000

Role

Scoping Report

Suitability

Issue

Project Number


300883-00

Rev

P01

Drawing Name

HGS-SR16-00001



Legend

- draft Order Limits
- Cable Corridors
- Noise Sensitive Receptors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

Metres: 0, 250, 500, 1,000

Coordinate System: British National Grid

Service or layer credits:

Sensitive receptors identified from aerial imagery.

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High Grove Solar

Drawing Title
Figure 16.1 - Noise Sensitive Receptors

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Scale at A1: **1:10,000**

Role: **Scoping Report**

Suitability: **Issue**

Project Number: **300883-00**

Rev: **P01**

Drawing Name: **HGS-SR16-00001**

A1

ESR42
ESR41
ESR40
ESR38
ESR37
ESR35
ESR36
ESR34
ESR33
ESR32
ESR31
ESR94
ESR91
ESR93
ESR88
ESR89
ESR92
ESR90
ESR87
ESR6
ESR7
ESR8
ESR29
ESR28
ESR27
ESR30
ESR25

HALL ROAD
PILGRIMS WAY
PILGRIMS ROAD
SPORLE ROAD
THE STREET
WOOD LANE
BARROWS HOLE LANE
NORTON ROAD
DURHAM ROAD
MOOR LANE
STATION DRIVE
STATION ROAD
BEESTON LANE
DEREHAM LANE
A47
CROWN LANE
LOVE LANE
ST ANDREWS LANE
SCHOOL ROAD
KETTS HILL
IVY TODD ROAD
CHAPEL ROAD
BLACK DIKE
MILL STREET
CHANTRY COURT
CHANTRY LANE
CIRCUT MEADOW
THE FOLLIES
FARM WALK
MAGNA DRIVE
OAKS DRIVE
NORTH HOUSHAM ROAD
PRIORY PLACE
DOWN MILL DRIVE
HILL'S CLOSE
PHEASANTS COURT
ROOKERY CLOSE
PHOENIX CLOSE
PHOENIX WAY
PRIORY CLOSE
SOLTHORNE ROAD
NORTHWAY
PEDDARS WAY
WESTERN LANE
CHURCH LANE

Legend

- draft Order Limits
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Noise Sensitive Receptors

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

Sensitive receptors identified from aerial imagery.

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Drawing Title
Figure 16.1 - Noise Sensitive Receptors

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Scale at A1
1:10,000
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A1

ESR42
ESR43
ESR41
ESR40
ESR44
ESR38
ESR39
ESR37
ESR45
ESR45
ESR46
ESR35
ESR36
ESR47
ESR54
ESR53
ESR48
ESR49
ESR55
ESR56
ESR34
ESR51
ESR50
ESR52
ESR57
ESR93
ESR33
ESR61
ESR92
ESR32
ESR64
ESR31
ESR65
ESR66
ESR95
ESR67
ESR58
ESR69
ESR68
ESR94
ESR70
ESR59
ESR60

BEESTON LANE
DEREHAM LANE
STATION ROAD
A47
DEREHAM ROAD
DICKYDOOL'S LANE
GRANGE ROAD
BEESTON ROAD
DUNTON ROAD
CARR LANE
ABBEY LANE
DALE ROAD
CHAPEL LANE
SCHOOL LANE
THE RIDGWAY
BIRCH CLOSE
HIGH ROAD
FEN ROAD
COACH LANE
GREEN LANE
PARK LANE
CROWN LANE
LOWE LANE
SILVER STREET
BRADENHAM LANE
WATERY LANE
HOME LANE
WOOD LANE
IVY TODD ROAD
CHURCH LANE

Legend

- draft Order Limits
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Noise Sensitive Receptors

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

Sensitive receptors identified from aerial imagery.

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Figure 16.1 - Noise Sensitive Receptors

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ESR71
ESR72
ESR73
ESR74
ESR75
ESR76
ESR78
ESR79
ESR80
RSR77

Legend

- draft Order Limits
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Noise Sensitive Receptors

Metres
0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

Sensitive receptors identified from aerial imagery.

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RSR77

ESR80

ESR79

ESR78

ESR96

ESR85

ESR84

ESR83

ESR82

ESR81

ESR86

Legend

- draft Order Limits
- Cable Corridors

Panel Area

- Central
- Eastern
- Northern
- Southern
- Western

- Noise Sensitive Receptors

Metres

0 250 500 1,000

Coordinate System: British National Grid

Service or layer credits:

Sensitive receptors identified from aerial imagery.

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Figure 16.1 - Noise Sensitive Receptors

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45141 Essen, Germany
Germany
www.rwe.com

High Grove Solar Environmental Impact Assessment Scoping Report Figures Part 4

September 2024

A1

Legend

- draft Order Limits
- l draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Watercourses

- Inland River
- Lake
- Internal Drainage Board (IDB) Catchments
- Drinking Water Safeguard Zones (Surface Water)

Metres

0 500 1,000 2,000

Coordinate System: British National Grid

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Figure 19.1 Surface Water Features

Scale at A1

1:35,000

Role

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Suitability

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A1

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas
- Central
- Eastern
- Northern
- Southern
- Western

Watercourses
- Inland River
- Lake

Bedrock Geology
- Carstone Formation
- Gault Formation
- Holywell Nodular Chalk Formation And New Pit Chalk Formation (Undifferentiated)
- Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation And Culver Chalk Formation (Undifferentiated)
- Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation And Portsdown Chalk Formation (Undifferentiated)
- Melbourn Rock Member
- West Melbury Marly Chalk Formation
- West Melbury Marly Chalk Formation And Zig Zag Chalk Formation (Undifferentiated)

Metres
0 500 1,000 2,000

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Drawing Title
Figure 19.2 Bedrock Geology

Scale at A1
1:35,000
Role
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HGS-SR19-00002

A1

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas
- Central
- Eastern
- Northern
- Southern
- Western

Watercourses
- Inland River
- Lake

Superficial Geology
- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- ALLUVIUM - SILT AND CLAY
- BRITON'S LANE SAND AND GRAVEL MEMBER - SAND AND GRAVEL
- GLACIOFLUVIAL DEPOSITS - SAND AND GRAVEL
- HEAD - CLAY, SILT, SAND AND GRAVEL
- LOWESTOFT FORMATION - DIAMICTON
- LOWESTOFT FORMATION - CLAY AND SILT
- LOWESTOFT FORMATION - SAND AND GRAVEL
- NAR VALLEY FORMATION - CLAY AND SILT
- PEAT - PEAT
- RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL
- RIVER TERRACE DEPOSITS (UNDIFFERENTIATED) - SAND AND GRAVEL
- SHERINGHAM CLIFFS FORMATION - SAND
- SHERINGHAM CLIFFS FORMATION - SAND AND GRAVEL
- WEYBOURNE TOWN TILL MEMBER - DIAMICTON

Metres
0 500 1,000 2,000

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Figure 19.3 Superficial Geology

Scale at A1
1:35,000
Role
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A1

Nar upstream of Abbey Farm

Wendling Beck

Tud

Yare (u/s confluence with Tiffey - Upper)

Stringside Stream

Old Carr Stream

Wissey - Upper

Blackwater (Yare)

Gadder

Watton Brook

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Watercourses

- Inland River
- Lake

WFD Surface Water River Catchments

- Blackwater (Yare)
- Gadder
- Nar upstream of Abbey Farm
- Old Carr Stream
- Stringside Stream
- Tud
- Watton Brook
- Wendling Beck
- Wissey - Upper
- Yare (u/s confluence with Tiffey - Upper)

Metres

0 500 1,000 2,000

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Drawing Title

Figure 19.4 WER/WFD Surface Water Bodies

Scale at A1

1:35,000

Role

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Issue

Project Number

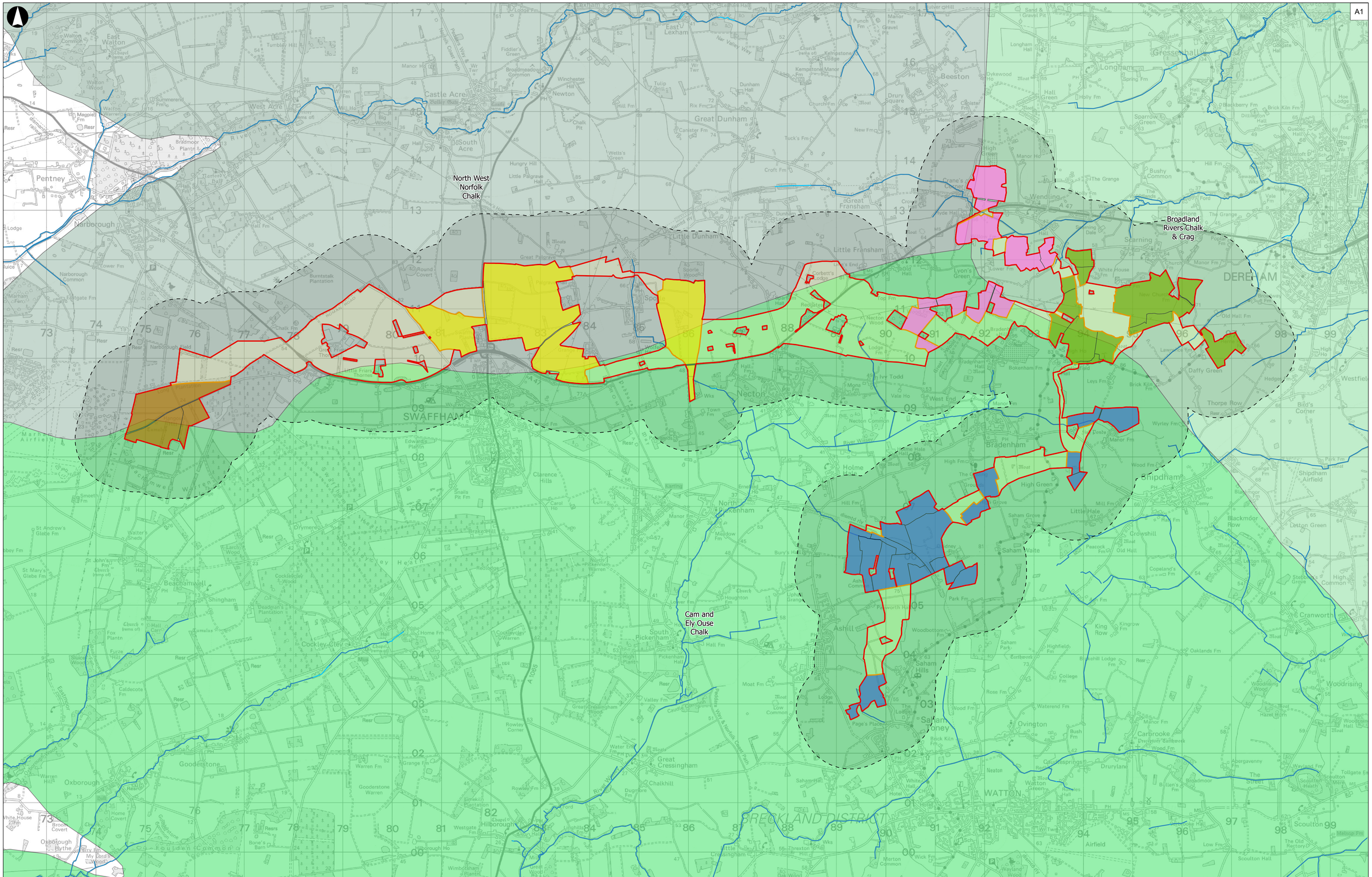
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P01

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Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas
- Central
- Eastern
- Northern
- Southern
- Western

Watercourses
- Inland River
- Lake

WFD Ground Water Bodies
- Broadland Rivers Chalk & Crag
- Cam and Ely Ouse Chalk
- North West Norfolk Chalk

Metres
0 500 1,000 2,000

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Drawing Title
Figure 19.5 WER/WFD Groundwater Bodies

Scale at A1
1:35,000

Role
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HGS-SR19-00005

A1

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas
- Central
- Eastern
- Northern
- Southern
- Western

Watercourses
- inland River
- lake

Source Protection Zone
- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment
- Groundwater Monitoring Boreholes

- Groundwater Drinking Water Safeguard Zones
- Groundwater Dependent Terrestrial Ecosystems (GWDTEs)
- Groundwater Nitrate Vulnerable Zones (NVZs)

Metres
0 500 1,000 2,000

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Drawing Title
Figure 19.6 Groundwater Designations

Scale at A1
1:35,000

Role
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Suitability
Issue

Project Number
300883-00

Rev
P01

Drawing Name
HGS-SR19-00006

A1

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas
- Central
- Eastern
- Northern
- Southern
- Western

Watercourses
- Inland River
- Lake

- Discharges within 1km of the draft Order Limits
- Abstractions

Metres
0 500 1,000 2,000

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Drawing Title
Figure 19.7 Licenced abstractions and discharges

Scale at A1
1:35,000
Role
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Issue
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300883-00
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Drawing Name
HGS-SR19-00008

A1

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Watercourses

- inland River
- lake

Extent of flooding from surface water

- High (1in30)
- Medium (1in100)
- Low (1in1000)

Metres

0 500 1,000 2,000

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Drawing Title

Figure 19.8 Risk of flooding from surface water

Scale at A1

1:35,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

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Drawing Name

HGS-SR19-00009

A1

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Watercourses

- Inland River
- Lake
- Rivers and Sea Flood Zone 2
- Rivers and Sea Flood Zone 3

Metres

0 500 1,000 2,000

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Drawing Title

Figure 19.9 Risk of flooding from rivers and seas

Scale at A1

1:35,000

Role

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Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR19-00010

A1

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Watercourses

- inland River
- lake

Reservoir Flood Extents

Fluvial Contribution

- High-risk
- Not high-risk
- Not yet determined

Wet Day

- High-risk
- Not high-risk
- Not yet determined

Metres

0 500 1,000 2,000

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Drawing Title

Figure 19.10 Risk of Flooding from Reservoirs

Scale at A1

1:35,000

Role

Scoping Report

Suitability

Issue

Project Number

300883-00

Rev

P01

Drawing Name

HGS-SR19-00011

A1

River Nar
Swan River
Kettam Drain
River Tud
River Wissey
River Gadder
Blackwater River
Okborough Drain

Legend

- draft Order Limits
- draft Order Limits 1km Buffer
- Cable Corridors

Panel Areas

- Central
- Eastern
- Northern
- Southern
- Western

Watercourses

- inland River
- lake

- Limited potential for groundwater flooding to occur
- Potential for groundwater flooding of property situated below ground level
- Potential for groundwater flooding to occur at surface

Metres
0 500 1,000 2,000

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Project Name: **High Grove Solar**

Drawing Title: **Figure 19.11 Susceptibility to groundwater flooding**

Scale at A1: **1:35,000**
Role: **Scoping Report**
Suitability: **Issue**
Project Number: **300883-00**
Rev: **P01**
Drawing Name: **HGS-SR19-00012**

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