THE DROVES
SOLAR FARM

The Droves Solar Farm

Preliminary Environmental Information Report

Volume 1: Technical Chapters

Prepared by: LDA Design
Date: May 2025
PINS Reference: EN0110013

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Volume I, Chapters 1-5: Introduction, EIA Process and Methodology, Site Context and Description, Reasonable Alternatives and Design Evolution, and Scheme Description

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Glossary

Term	Description
33kV Sub-distribution Switch Rooms	Switch rooms within the Solar PV Site that collect the generated power from the Solar PV Arrays and convert it to 33kV.
Access Tracks	The tracks either existing or proposed, within the Site, which provide access around the Scheme.
Ancillary Buildings	The office, storage and plant buildings which may be located within the Solar PV Site.
Ancillary Infrastructure	Works that are ancillary to the Scheme, including enclosure and boundary treatment, security and monitoring infrastructure, landscaping and biodiversity measures including planting, drainage and irrigation works, signage, earthworks, and access including Permissive Paths.
Applicant	The Droves Solar Farm Limited.
Associated Development	Development associated with the Scheme including but not limited to the BESS, Customer Substation, National Grid Substation, Grid Connection Infrastructure and Ancillary Infrastructure, and any other works integral to the construction, operation, maintenance and decommissioning of the Scheme.
Battery Energy Storage System (BESS)	Battery Energy Storage System (BESS), is used to describe the battery storage installation to allow for the storage, importation, and exportation of energy to the National Grid. For the purposes of the Environmental Impact Assessment, it has been assumed battery technology will be adopted for the BESS.
Cable Circuit	An electrical conductor necessary to transmit electricity between two points within the Scheme and may include one or more auxiliary cables for the purpose of gathering monitoring data, earthing cables, cables for auxiliary supply, optical fibre and other types of communication cables, cables connecting to direct current boxes.
Cabling	The low or medium voltage cables within the Scheme, which transmit electricity between PV Panel to Conversion Units and from there to the Customer Substation and BESS. These cables consist of 33kV (kilovolt), and 400kV cables, as well as earthing cables and optical fibre cables.

Construction Hub	An area within the Site where deliveries will be set down, managed and redistributed throughout the Construction Phase.
Conversion Units	Conversion Units incorporate the inverters, transformers and switchgear and are required to manage the electricity generated by the PV Panels. These would either be standalone equipment, or they would be housed ('integrated') together within a container.
Customer Substation	The Scheme substation comprising electrical infrastructure such as the Transformers, Switchgear and metering equipment required to facilitate the export of electricity from the Scheme to the National Grid Substation. The Customer Substation will also provide Ancillary Buildings for staff welfare and storage facilities. The Customer Substation will convert the electricity transmitted along the Cable Route Corridor up to 400kV (kilovolt) for onward transmission to the National Grid Substation via the Grid Connection Cables.
Development Consent Order (DCO)	Development consent is required pursuant to the Planning Act 2008 for Nationally Significant Infrastructure Projects. A development consent order is a statutory instrument containing powers that enable the applicant to carry out the construction, operation, maintenance and decommissioning of the Nationally Significant Infrastructure Project. Applications for DCOs are made to, and decided by, the relevant Secretary of State.
Development Consent Order (DCO) Application	The application for a Development Consent Order (DCO) to be submitted by the Applicant for the Scheme.
Fixed South Facing PV Arrays	Solar photovoltaic (PV) tables that face south and are mounted to fixed Mounting Structures in an east/west configuration.
Grid Connection Cables	The 400kV (kilovolt) cables connecting the Customer Substation to the Point of Connection.
Grid Connection Infrastructure	Underground and/or overhead lines including new pylons between the National Grid Substation and the Point of Connection.
Ground Mounted PV Modules	Solar photovoltaic (PV) modules attached to structures that are fixed to the ground which include Single Axis Tracker PV Arrays or Fixed South Facing PV Arrays.

Highway Works	Any works associated with the temporary or permanent amendments to the highway and/or highway verges to facilitate the Construction Phase, Operational Phase and Decommissioning Phase of the Scheme.
Inverter	Inverters convert the Direct Current (DC) electricity generated by the PV Panels into Alternating Current (AC), which allows the electricity generated to be exported to the national grid.
Mounting Structures	The metal frames onto which the PV panels are attached.
National Grid Substation	The 400kV (kilovolt) substation operated by National Grid Electricity Transmission.
Nationally Significant Infrastructure Project (NSIP)	A NSIP is a large-scale development (as defined in sections 14-30A of the Planning Act 2008) such as certain new harbours, power generating stations (including solar and wind farms), highways developments and electricity transmission lines, which require a type of consent known as 'development consent' which is governed by the Planning Act 2008.
Point of Connection (POC)	The National Grid Substation and associated connection into the 400kV overhead lines located at The Droves Solar Farm, which the Scheme connects to, to transfer the energy generated to the national grid system.
PV panel	Solar photovoltaic panel designed to convert solar irradiance to electrical energy. The PV panel is attached to a Mounting Structure.
PV Tables	PV panels mounted onto the Mounting Structure, forming tables, which are set out in rows either in an east/west or a north/south configuration.
Scheme	A Nationally Significant Infrastructure Project (NSIP) comprising a Ground Mounted solar photovoltaic generating station with a gross electrical capacity of over 50 megawatts, with Associated Development which would allow the generation, storage and export of electricity. The Scheme is known as "The Droves Solar Farm".
Single Axis Trackers	Mounting Structures in a north/south configuration, that allow the PV Table to rotate and track the movement of the sun.
Site	Area consisting of the Solar PV Site, Associated Development, Ancillary Infrastructure and Highway Works and any other element or component that forms part of the Scheme.

Solar PV Arrays	Rows or groups of PV Tables that are connected to one another to form a Solar PV Array.
Solar PV Site	A term used to describe the land that accommodates the Solar PV Arrays, Conversion Units and 33kV Sub-distribution switch rooms.
Switchgear	A combination of electrical disconnect switches, fuses or circuit breakers used to control, protect, and isolate electrical equipment.
Temporary Construction Compounds	Temporary laydown areas used during construction, comprising areas of hardstanding, car parking, areas to store materials and equipment, waste management, security infrastructure including fencing, lighting and cameras.
Transformers	Transformers increase and decrease the voltage of the electricity. There would be 33kV Transformers and 400kV Transformers within the Scheme.

1 Introduction

1.1 Overview

1.1.1 This Preliminary Environmental Information Report (PEIR) has been prepared on behalf of The Droves Solar Farm Limited (the Applicant) for a Development Consent Order (DCO) for The Droves Solar Farm, (hereafter referred to as 'the Scheme').

1.1.2 The PEIR offers the preliminary findings of work undertaken to date as part of the Environmental Impact Assessment (EIA) and will be used to inform the statutory consultation process of the proposed application for a DCO to be submitted under sections 14(1)(a) and 15(2) of the Planning Act 2008 (PA2008) [Ref 1-1] to the Secretary of State for Energy Security and Net Zero.

The Scheme

1.1.3 The Scheme comprises the construction, operation, maintenance, and decommissioning of a solar photovoltaic (PV) electricity generating station and associated development, including a Battery Energy Storage System (BESS), a Customer Substation and Grid Connection Infrastructure including a new National Grid Substation. The Scheme would allow for the generation and export of over 50MW Alternating Current (AC) of renewable energy, connecting into the National Electricity Transmission System (NETS) overhead line that passes through the Site.

1.1.4 As the Scheme would have a generating capacity in excess of 50 megawatts (MW), it is a Nationally Significant Infrastructure Project (NSIP) under sections 14(1)(a) and 15(2) of the Planning Act 2008 (PA2008) and therefore must be consented by way of a Development Consent Order (DCO) under the Planning Act 2008.

1.1.5 The Scheme will contribute to the reduction of carbon emissions and reliance on fossil fuels by providing a renewable energy source to assist with the UK's energy transition. The Scheme also seeks to put Norfolk at the forefront of low carbon energy development, production and servicing, with the intention of bringing economic, community, and environmental benefits.

1.1.6 Further detail is provided in **Volume I, Chapter 5: Scheme Description.**

1.1.7 The Operational Phase of the Scheme will be up to 60 years, and the Scheme will be decommissioned after that period.

The Site

1.1.8 The Scheme is located in an area of countryside to the north of Swaffham and south-east of King's Lynn. The Site is described in more detail in **Volume I, Chapter 3: Site Context and Description**

1.1.9 The land for the Scheme is referred to as 'the Site'.

1.2 The EIA Regulations

1.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) [Ref 1-2] provide the legislative framework which specify which developments are required to undergo an EIA, and categorises development relevant to the NSIP planning process as either '*Schedule 1 development'* or '*Schedule 2 development'*. Those developments listed in Schedule 1 must be subject to EIA, while developments listed in Schedule 2 must only be subject to EIA if they are considered *"likely to have significant effects on the environment by virtue of factors such as its nature, size or location".* The criteria on which this judgement must be made are set out in Schedule 3 of the EIA Regulations.

1.2.2 The Scheme falls under paragraph 3(a) of Schedule 2 to the EIA Regulations as it constitutes *"industrial installations for the production of electricity, steam and hot water…".*

1.2.3 The Applicant considers that, due to the Scheme's nature, size and location, it has the potential to have significant effects on the environment and therefore constitutes EIA Development. In accordance with Regulation 8(1)(b) of the EIA Regulations, the Applicant gave notice at submission of the Scoping Opinion Request that an Environmental Statement (ES) would be submitted in support of the DCO Application.

Preliminary Environmental information Report (PEIR)

1.2.4 Under Regulation 12 of the EIA Regulations, the Applicant is required to set out in its Statement of Community Consultation (SoCC) how it intends to publicise and consult on the preliminary environmental information relating to the Scheme. Regulation 12(2) of the EIA Regulations states that the purpose of the PEIR is to provide sufficient information to enable stakeholders to develop an informed view of the likely significant effects of the development (and of any Associated Development).

1.2.5 The Ministry of Housing, Communities and Local Government guidance [Ref 1-3] on the pre-application stage for Nationally Significant Infrastructure Projects (April 2024) encourages the PEIR to be presented as an early draft of the Environmental Statement. Accordingly, the PEIR report does not constitute a complete assessment, but is a compilation of the environmental information available at the point in time the PEIR is produced.

1.3 Purpose and Structure of the PEIR

1.3.1 Regulation 12(2) of the EIA Regulations states that the purpose of the PEIR is to provide sufficient information that "*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)".*

1.3.2 This PEIR therefore presents the preliminary findings of the EIA undertaken for the Scheme so far for the purposes of statutory consultation in accordance with the Planning Act 2008. The information in this PEIR is preliminary and is based on the design of the Scheme as set out in **Volume I, Chapter 5: Scheme Description.** Further design and EIA work is being undertaken to refine the assessment of predicted likely environmental effects. The final findings of the EIA process will be reported within the ES, which will be submitted with the DCO Application.

1.3.3 The structure of the PEIR and the technical consultants who have contributed to the preparation of this PEIR is set out below in Table 1.1. A statement of competence will be provided within the ES for the authors of the various chapters.

Table 1.1 PEIR Structure and technical consultants

Document	Organisation
Chapter 1: Introduction	LDA Design
Chapter 2: Environmental Impact Assessment Process and Methodology	
Chapter 3: Site Context and Description	
Chapter 4: Reasonable Alternatives and Design Evolution	DWD and LDA Design
Chapter 5: Scheme Description	LDA Design
Chapter 6: Landscape and Visual	LDA Design
Chapter 7: Ecology and Biodiversity	Aspect Ecology
Chapter 8: Cultural Heritage and Archaeology	GHC Archaeology and Heritage and Headland Archaeology
Chapter 9: Traffic and Transport	Velocity Transport Planning
Chapter 10: Noise	Hoare Lea (Tetra Tech)
Chapter 11: Soils and Agriculture	Kernon Countryside Consulting
Chapter 12: Water Resources	Raincloud Consulting
Chapter 13: Climate Change	Bureau Veritas
Chapter 14: Socio-Economics and Human Health	Volterra Partners
Chapter 15: Other Environmental Matters – Air Quality, Glint and Glare, Electromagnetic Fields (EMF), Telecommunications, Utilities and Television Receptors and Waste	Hoare Lea (Tetra Tech), Pager Power and LDA Design
Chapter 16: In-Combination Effects	LDA Design
Chapter 17: Summary of Likely Significant Effects	LDA Design

1.4 The Applicant

1.4.1 The Scheme is being developed by The Droves Solar Farm Limited (the Applicant). The Droves Solar Farm is a 100% subsidiary of Island Green Power Limited, which is a leading developer of utility scale solar projects and battery storage systems, established in 2013.

1.4.2 IGP has successfully delivered 36 solar projects worldwide totaling more than 2.5GW of capacity. This includes 20 solar projects in the UK. These range in size from below 5MW to Nationally Significant Infrastructure Projects (NSIPs) such as Cottam Solar Project, currently the UK's largest consented solar farm, which will generate 600MW of clean, renewable and secure electricity including 600MW of Battery Storage.

1.4.3 Their mission is to deliver renewable energy solutions that create lasting value for the communities they serve, protecting the environment while fostering economic growth and energy independence.

1.5 Consultation

1.5.1 The importance of consultation is key to the Planning Act 2008 and Regulation 13 of the EIA Regulations and is a fundamental requirement that certain stakeholder groups and the local community are consulted as part of the pre-application process. The Applicant has sought to engage with key stakeholders from an early stage to brief them on the Scheme, focus the environmental studies and to identify specific issues.

1.5.2 Consultation alongside the EIA process is critical to the development of a comprehensive and proportionate ES. The views of statutory and non-statutory consultees are important to ensure that the EIA, from the outset, focuses on environmental studies and to identify specific issues where significant environmental effects are likely, and where further investigation is required. Consultation, as an ongoing process, enables mitigation measures to be incorporated into the Scheme to limit adverse environmental effects and optimise environmental benefits.

1.5.3 Ongoing engagement with consultees will be important to influence the design process of the Scheme by seeking an appropriate level of feedback from consultees, to ensure that comments are considered in Scheme design. There are a large number of stakeholders with different interests in the Scheme which require different levels and forms of consultation.

1.5.4 The types of stakeholders include landowners, local communities, statutory consultees and specialist interest groups. The consultation activities, therefore, have been tailored to be appropriate for the particular groups.

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

- Ensuring best practice in pre-consultation engagement and demonstrating this to local authorities, including through the development of the Statement of Community Consultation (SoCC)
- Undertaking statutory consultation in full compliance with the requirements of the Planning Act 2008, EIA Regulations, and associated guidance
- Clearly articulating the benefits of the Scheme and its importance in helping the region and the UK meet net-zero targets, while being open and transparent about the proposals

- Building trust with stakeholders by providing consistent information and messaging; and
- Listening to stakeholders, ensuring their views are valued, and demonstrating how their feedback has been taken into account.

1.5.6 This PEIR is published to accompany the statutory consultation under sections 42, 47 and 48 of the Planning Act 2008 and follows non-statutory consultation undertaken by the Applicant in 2024. The statutory consultation runs for a period of 7 weeks in accordance with the SoCC.

1.5.7 The SoCC outlines how the Applicant intends to consult with local communities affected by the Scheme or living in the vicinity of the Scheme, and has been developed in consultation with Breckland Council (BC), the Borough Council of King's Lynn and West Norfolk (BCKLWN), and Norfolk County Council (NCC).

1.5.8 The PEIR will be made available to the prescribed consultees, local authorities and landowners and to members of the public and the wider community. This will enable the consultees, including the local community, to understand the potential environmental effects and implications of the Scheme to inform their responses to consultation.

Consultation To Date

1.5.9 Several meetings have been carried out with the following statutory consultees to introduce the Scheme and commence discussions on detailed matters relating to the Scheme:

- Norfolk County Council, Breckland Council, Borough Council of King's Lynn & West Norfolk (Planning Officers and Members)
- Castle Acre, Holme Hale, Little Dunham, and Swaffham (Parish Councils)
- The Planning Inspectorate
- Local Member of Parliament – MP for Ely and East Cambridgeshire
- Local Member of Parliament – MP for West Norfolk
- Environment Agency
- Historic England
- Natural England
- Logistics UK
- Norfolk Wildlife Trust
- Norfolk Farming & Wildlife Advisory Group
- Norfolk Rivers Trust; and
- Norfolk Biodiversity Partnership.

1.5.10 Further details on stakeholders who have already been consulted can be found within the individual environmental chapters of the PEIR.

1.5.11 The Applicant will undertake on-going consultation with the host authorities, the stakeholders identified above and other relevant consultees and stakeholders, throughout the duration of the Scheme development and preparation of the ES. This will include complying with the consultation requirements set out in the PA2008 and associated regulations and guidance.

1.5.12 A Programme Document is available on the Scheme's website[1] setting out the timetable for the development of the Scheme, including key milestones and dates where formal consultation is planned, once this has been agreed with the Planning Inspectorate.

1.5.13 Consultation is on-going with local communities and individual property owners where appropriate. Responses to the consultations will be taken into account as part of the design process for the Scheme. The Applicant is continuing to consult local communities, stakeholders and individual property owners as the Scheme is developed. Responses to the consultation will be taken into account as part of the design process for the Scheme.

1.5.14 Within each technical chapter of the PEIR, there is further detail on any topic specific consultations that have taken place to date.

1.5.15 All of the pre-application consultation that is undertaken on the Scheme will be described in the Consultation Report, which will form part of the DCO Application.

References

Ref 1-1 Planning Act 2008, 2008

Ref 1-2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, 2017 No. 572. [as amended]

Ref 1-3 Ministry of Housing, Communities and Local Government, Planning Act 2008: Pre-application stage for Nationally Significant Infrastructure Projects, available at https://www.gov.uk/guidance/planning-act-2008-pre-application-stage-for-nationally-significant-infrastructure-projects

[1] The Droves Solar Farm - Programme Document (https://drovessolarfarm.co.uk/wp-content/uploads/2025/01/250116-DCO-Programme-Document-REVISED-FOR-WEBSITE.pdf)

2 Environmental Impact Assessment Process and Methodology

2.1 The EIA Process

2.1.1 Environmental Impact Assessment (EIA) is the process of compiling, evaluating and presenting the likely significant environmental effects of a project and identifying measures to mitigate or manage any significant negative effects.

2.1.2 It is born out of Directive 85/337/EC (as amended) [Ref 2-1] on the assessment of the effects of certain public and private projects on the environment. Following a series of amendments, a new Directive, EIA Directive 2014/52/EU [Ref 2-2] came into force on 15 May 2014. This Directive was transposed into English law, for the purposes of the Scheme, on 16 May 2017 through the The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations) [Ref 2-3].

2.1.3 To ensure that the EIA Regulations continue to operate following the UK's withdrawal from the European Union, the EIA Regulations were amended under the Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018 (SI 2018/1232) [Ref 2-4] to replace references to EU Directives and legislation and to uphold international obligations through domestic legislation.

2.1.4 The Environmental Statement (ES) must contain the information specified in Regulation 14(2) of the EIA Regulations and must meet the requirements of Regulation 14(3) of the EIA Regulations. It must also include any additional information specified in Schedule 4 of the EIA Regulations which is relevant to the specific characteristics of the particular development or type of development and the environmental features likely to be significantly affected.

2.1.5 In general terms, the main stages in the EIA process are as follows:

- Establish the baseline – collate and review available data and undertake baseline surveys
- Scoping – identify likely significant effects to determine the scope of the EIA
- Consultation – seek feedback from consultees and the public in relation to key environmental issues, methodology and design approaches
- Assessment and design response – finalise methodologies using topic specific guidance and best practice techniques and assess the likely significant effects of the Scheme, identify and evaluate alternatives, provide feedback to the project design team, incorporate any necessary mitigation measures and assess residual effects; and
- Preparation of the Preliminary Environmental Information Report (PEIR) and subsequent ES (following Statutory Consultation).

2.1.6 The EIA process is designed to produce an environmentally sensitive development by considering and assessing the effects of the Scheme against existing environmental baseline conditions. To date, the EIA team has undertaken a review of both the environmental sensitivities within and surrounding the Site, and the Study Areas of the respective environmental topic chapters (**Volume I, Chapters 6 to 15**), to identify any potential

environmental effects. Where the environmental baseline has been informed by site visits and environmental surveys, these are detailed in the relevant topic section of this PEIR.

2.1.7 The EIA should be informed by consultation with statutory consultees, other interested bodies and members of the public. The purpose of identifying likely significant effects is to ensure decision makers can make an informed judgement on the environmental impacts of a proposal.

2.1.8 The EIA process is undertaken in accordance with the EIA Regulations, guidance produced by the Planning Inspectorate (PINS) and the Institute of Environmental Management and Assessment (IEMA) and other environmental topic-specific guidance. It should be noted that some technical disciplines may utilise different criteria when undertaking assessments due to differences in industry accepted guidelines and specifications. Where this is the case, the relevant environmental topic chapter will discuss how the assessment methodology or classification of effects differs from the general EIA methodology as described in this section and provide justification. Further details of topic specific methodologies, such as survey methods, are provided in the relevant PEIR topic chapters.

2.1.9 Each of the technical assessments will apply the following approach:

- Description of the baseline conditions
- Identification and assessment of likely effects
- Identification of mitigation measures, including design changes
- Assessment of potential residual effects that remain following mitigation; and
- Assessment of 'cumulative' effects when considering the Scheme along with other planned developments in the area.

2.1.10 This PEIR sets out details on the methodology and approach, along with the overall conclusions of the EIA process. It also outlines the main parameters and detailed design aspects of the Scheme against which the assessment has been undertaken. Development parameters have been determined and fixed for the purposes of the PEIR assessment through an iterative approach taking into account baseline environmental information, the evolving design and any associated technical requirements.

2.2 Baseline Conditions

2.2.1 An important step in the EIA process is to establish a baseline against which to assess the effects of the Scheme. Information relating to the existing environmental baseline has been collected through field and desktop study, 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 of the Scheme.

2.2.2 For each environmental topic chapter, the methods of baseline data collection have been discussed with the relevant consultees, where relevant. Further data gathering, including

seasonal surveys, will continue to progress, with any limitations to assessment set out within each topic chapter.

2.3 EIA Scoping

2.3.1 EIA Scoping is the process of identifying the key expected environmental issues at an early stage, determining which elements of the Scheme are likely to result in significant effects on the environment and to establish the extent of survey and assessment requirements for the EIA. Although scoping is not a mandatory requirement under the EIA Regulations, it is recognised as a useful preliminary procedure which helps to identify the main effects that the Scheme is likely to have on the environment.

2.3.2 The EIA Scoping Opinion Request was issued to PINS on 8 November 2024 (included in **Volume III, Appendix 2.1**) who subsequently adopted the EIA Scoping Opinion on 18 December 2024 (included in **Volume III, Appendix 2.2**). In the preparation of the Scoping Report consultation was undertaken with key stakeholders where possible. The Planning Inspectorate consulted on the Scoping Report with the prescribed consultation bodies listed in Schedule 1 of The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended). Those responses were included with the Scoping Opinion issued by the Planning Inspectorate. Any key matters raised in those responses have been covered in the individual technical chapters where relevant.

2.3.3 **Volume III, Appendix 2.3** sets out the Scheme response to the Scoping Opinion presented in a tabular format demonstrating how the points raised have been considered and addressed. This table signposts where each of the issues is addressed in the PEIR. The Scoping Opinion confirmed which topics were scoped in and out of the EIA.

2.3.4 The overarching methodology set out in this Section and the technical topic methodologies set out in **Volume** I, **Chapters 6-15** are in accordance with the Scoping Opinion except where this is highlighted and justified in **Volume III, Appendix 2.3** and the environmental topic chapters themselves. In that case, standalone technical reports and assessments, or technical notes will be appended to this PEIR.

2.4 Rochdale Envelope

2.4.1 In order to maintain flexibility in the design and layout included in the DCO Application, address uncertainties in the Scheme design and allow for advancements in technology from now to the time of construction, the Scheme will adopt the Rochdale Envelope approach. The Scheme's approach to the Rochdale Envelope is described further in **Volume I, Chapter 5: Scheme Description** and involves specifying parameter ranges. These parameters will be considered in detail by technical authors in the ES to ensure the realistic worst-case effects of the Scheme are assessed for each potential receptor.

2.4.2 EIA is the iterative process in which the assessment of environmental impacts is undertaken in parallel with the design process of the Scheme. The design and layout of the Scheme will evolve in response to the identification of specific constraints and opportunities. The comments made in response to the Scoping Opinion Report and the statutory consultation process will also influence the final design and layout of the Scheme.

2.4.3 Advice Note Nine 'Rochdale Envelope' [**Ref 2-5**] was published by PINS in July 2018 to address the degree of flexibility that would be considered appropriate to deal with uncertainties associated with applications for development consent.

2.5 EIA Methodology

EIA Assessment Scenarios

2.5.1 The EIA will assess the effects of the following scenarios:

- Construction Phase
- Operational Phase; and
- Decommissioning Phase.

2.5.2 The Operational Phase is proposed to be 60 years. Details on the anticipated construction programme and the start of operation are provided in **Volume I, Chapter 5: Scheme Description** and form the basis of technical assessments.

2.5.3 The ES will include within each of the environmental topics a description of the current baseline and the future baseline.

2.5.4 The 'future baseline' scenario will describe the changes from the baseline scenario as far as natural changes can be established, in the absence of the Scheme coming forward.

2.5.5 The potential likely significant effects arising as a result of the Scheme will be assessed against these three baselines as follows:

- Construction Phase – Current and Future Baseline
- Operational Phase – Future Baseline; and
- Decommissioning Phase – Future Baseline.

Prediction of Likely Effects

2.5.6 When undertaking an EIA, environmental effects are classified as either permanent or temporary, as appropriate to the effect in question. Permanent effects are those which are irreversible (e.g., permanent land take). The duration of temporary or reversible effects differs for each environmental topic depending on their own methodologies but can broadly be defined as:

- Short Term
- Medium Term; and
- Long Term.

2.5.6.1 In assessing the significance of likely effects identified through the EIA process, account will be taken as to whether effects are direct or indirect, secondary, cumulative, transboundary, short, medium or long term, permanent or temporary and neutral, positive or negative.

Determining Significance

2.5.7 The EIA will identify the likely 'significance' of environmental effects (beneficial or adverse) arising from three phases (construction, operation and decommissioning) of the Scheme. The significance of residual effects will be determined by reference to the criteria set out for each environmental topic.

2.5.8 The approach to assessing and assigning significance to an environmental effect is derived from a variety of sources including, in particular, the National Policy Statements, National Planning Policy Framework, and relevant planning practice guidance, legislative requirements, topic specific guidelines, standards and codes of practice, the EIA Regulations, advice from statutory consultees and other stakeholders and the expert judgement of the team undertaking the EIA.

2.5.9 The likely effect that the Scheme may have on identified environmental receptors will be influenced by a combination of the sensitivity (or importance) of the receptor and the predicted magnitude of impact from the baseline conditions.

2.5.10 The assignment of environmental sensitivity of a receptor will generally depend on the vulnerability, recoverability and value/importance of the Receptor. The environmental sensitivity (or importance) will be determined using the following categories:

- 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; and
- Negligible – very low importance or rarity and local level.

2.5.11 Where other categories of sensitivity have been used, this will be set out in the individual environmental topic assessment.

2.5.12 The categorisation of the magnitude of impact will take into account the following factors:

- Extent
- Duration
- Frequency; and
- Reversibility.

2.5.13 Impacts will be defined as either beneficial or adverse. As a guide, magnitude of impact will generally be assigned using the categories below. Further details of the topic-specific methodologies adopted for the EIA will be defined within the methodology section of each of the topic chapters:

- High:
  - Adverse: Loss of a resource and/or quality and integrity of a receptor; severe damage to key characteristics, features or elements; and

- Beneficial: Large scale or major improvement of receptor quality; extensive restoration or enhancement, major improvement of attribute quality.

- Medium:
  - Adverse: Loss of resource, but not adversely affecting integrity; partial loss of and/or damage to key characteristics, features or elements; and
  - Beneficial: Benefit to or addition of key characteristics, features or elements. An improvement to attribute quality.
- Low:
  - Adverse: Some measurable change in attributes, quality or vulnerability, minor loss of or alteration to one (possibly more) key characteristics, features or elements; and
  - Beneficial: Minor benefit to or addition of one (possibly more) key characteristics, features or elements, some beneficial impact on attribute or reduced risk of a negative impact occurring.
- Negligible:
  - Adverse: Very minor loss or detrimental alteration to one or more characteristics, features or elements
  - Beneficial: Very minor benefit to or positive addition of one or more characteristics, features or elements; and
  - No change: No loss or alteration to characteristics, features or elements, no observable impact in either direction.

2.5.14 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.

2.5.15 Professional judgement will be used to assign the most appropriate option where the matrix offers more than one level of significance. The topic assessments will adopt this general approach to assigning significance, unless stated in the individual topic chapters.

Cumulative Effects Assessment

2.5.16 The Cumulative Effects Assessment (CEA) will be undertaken in accordance with PINS Advice on Cumulative Effects Assessment (September 2024) and will consider two types of cumulative effects:

- In-combination effects - the inter-relationship between individual development effects, for example, noise, dust and visual on one particular receptor; and
- Cumulative effects - multiple existing and/or approved developments generating additive effects which together have an increased effect on the same receptors.

In-combination effects

2.5.17 A summary of potential likely In-combination Effects is provided within **Volume I, Chapter 16: In-Combination Effects** of this PEIR to provide a preliminary summary of effect interactions

between topics, setting out the inter-relationship arising as a result of direct effects from other environmental topics.

2.5.18 The ES will set out a table demonstrating where multiple effects from the Scheme would combine to affect sensitive receptors, which will explain what mitigation measures are proposed and how such mitigation may have an in-combination effect across several topics.

2.5.19 In-combination effects occur when receptors are subject to residual effects under more than one environmental topic. As such, the residual effects presented in **Volume I, Chapters 6-15** (regardless of whether they are classed as significant or not significant) have been reviewed to identify receptors subject to one or more types of effect to ensure that the interrelationship between each of the aspects of the environment likely to be affected by the Scheme has been properly evaluated and considered.

2.5.20 In-combination effects have been considered during the construction, operation and maintenance, and decommissioning phases of the Scheme. In light of the comprehensive range of embedded design measures effect interactions have only been considered where residual adverse or beneficial effects of at least slight or minor in at least one receptor group have been identified.

2.5.21 Likely In-combination effects have been identified and qualitatively assessed using the findings of all technical assessments reported within this PEIR, together with professional judgement.

2.5.22 The approach to assessing In-combination effects has followed a four-stage process, as outlined in the following paragraphs.

Stage 1: Topic-specific Assessments

2.5.23 The first stage of the assessment is presented in each of the individual environmental topic chapters and comprises the individual assessments of residual effects on receptors across the construction, operation and decommissioning phases of the Scheme. The embedded mitigation is assumed to be implemented before consideration of the effects.

Stage 2: Identification of Receptors

2.5.24 Stage 2 involves a review of the assessments undertaken in the topic-specific chapters to identify ‘receptor groups’ requiring assessment within the In-combination effects assessment. The term ‘receptor group’ is used to highlight that the approach taken for the In-combination effects assessment does not assess every individual receptor assessed at the EIA stage, but rather potentially sensitive groups of receptors identified through the EIA process. Only receptors that are expected to incur more than one potential effect have been included in the assessment (e.g. noise and dust).

2.5.25 Receptors predicted to be affected by only a single effect (e.g. only noise) are excluded because there is considered to be no potential for In-combination effects to take place. It should be noted that uncertainty in the assessment of effects, for most of the technical chapters in this PEIR, is dealt with by making conservative, or worst-case, assumptions.

2.5.26 The receptor groups identified within this PEIR can be broadly categorised as follows:

- Landscape and visual resources: landscape character; visual receptors (residents; users of public rights of way; other visual receptors)

- Ecology and biodiversity: ecological nationally designated sites
- Historic environment: settings of nationally designated heritage assets
- Access and highways: road users, residents; pedestrians/cyclists; sensitive local uses (e.g. schools, hospitals, local facilities)
- Noise and vibration: residents, users of public rights of way; users of other land uses (e.g. places of work)
- Air quality: local residents; ecological designated sites
- Water resources and Ground conditions: land at risk of flooding land quality/soils
- Agriculture: agricultural land; farm businesses; and
- Socio-economics: employment levels and tourism.

Stage 3: Assessment of potential In-combination effects on receptor groups

2.5.27 Consideration is given to the potential for multiple In-combination effects to arise for each of the identified receptor groups across the construction, operation and decommissioning of the Scheme.

2.5.28 This involves the assessment of the scope for all effects to interact, spatially and temporally, to create In-combination effects on a receptor or receptor group. As an example, all effects on a given receptor such as local residents – construction dust and noise, increased traffic and visual change etc. may combine to produce a greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

Stage 4: In-combination effects Assessment

2.5.29 The following receptor groups that have the potential to be subject to In-combination effects have been identified:

- Landscape character
- Visual receptors
- Ecologically designated sites
- Road users, pedestrians and cyclists, users of public rights of way, railway operations, train drivers, aviation operations
- Residents and users of other land uses (e.g. places of work, heritage-based visitor attractions)
- Land at risk of flooding
- Land quality/soils; and
- Employment and tourism.

2.5.30 In-combination effects have been identified in **Volume I, Chapter 16: In-Combination Effects** of this PEIR.

Cumulative effects

2.5.31 Each topic chapter within the ES will set out how the particular topic area has considered and assessed the cumulative effects arising as a result of other existing or proposed development that will be set out in the long and short lists for the EIA.

2.5.32 The Cumulative Effects Assessment will adopt a four-staged approach, as set out in Table 2.1 below.

Table 2.1 Cumulative Effects Assessment Approach

CEA Stage	Key Activities
Stage 1: Establish the long list of other existing and / or approved development	Define and document the Zone of Influence (ZoI) for each environmental aspect considered in the ES Identify a long list of developments in the vicinity of the Scheme utilising Matrix 1 of Annex 1 of the PINS advice on Cumulative Effects Assessment Undertake a desk-based review of available environmental information for the identified cumulative developments to inform the baseline, and keep this under review
Stage 2: Establish a short list of other existing and / or approved development	Develop and apply threshold criteria to the long list to establish the short list of projects to be included in the CEA, utilising Matrix 1 of Annex 1 of the PINS advice on Cumulative Effects Assessment Discuss and agree thresholds with Norfolk County Council
Stage 3: Information gathering	Information relating to each of the existing or approved developments on the short list is compiled (where available), including, but not limited to: • Proposed design and location • Proposed programme of construction, operation and decommissioning • Environmental assessments that set out baseline data, and effects arising from other existing and / or approved development Information will be summarised and presented in tabular format, utilising Matrix 2 of Annex 2 of the PINS advice on Cumulative Effects Assessment
Stage 4: Assessment	A proportionate assessment of the cumulative effects of the Scheme with the other existing and / or proposed developments identified in Stage 1 to 3

CEA Stage	Key Activities
	Identify any additional mitigation measures and set out the means of securing delivery of such measures, utilising Matrix 2 of Annex 2 of the PINS advice on Cumulative Effects Assessment

Stage 1: Establish the long list of other existing and / or approved development

2.5.33 PINS Advice on Cumulative Effects Assessment (September 2024) sets out the types of development that should be considered:

Tier 1 (Other existing and, or approved development)

- Under construction
- Permitted applications under the Planning Act or other regimes but not yet implemented
- Submitted applications under the Planning Acting or other regimes but not yet determined; and
- All refusals subject to appeal procedures not yet determined.

Tier 2 (Other existing and, or approved development)

- Projects on the Planning Inspectorate's programme of projects

Tier 3 (Other existing and, or approved development)

- Projects on the Planning Inspectorate's programme of projects where a scoping report has not been submitted
- Identified in the relevant Development Plan and emerging Development Plans, with appropriate weight given as they near adoption, recognising that there will be limited information available on the relevant proposals; and
- Identified in other plans and programmes, as appropriate, which set the framework for future development consents or approvals, where such development is reasonably likely to come forward.

2.5.34 A decreasing level of detail is likely to be available from Tier 1 to Tier 3.

2.5.35 A preliminary long list of cumulative schemes for the PEIR assessment is presented in **Volume III, Appendix 2.4.**

Stage 2: Establish a short list of other existing and / or approved development

2.5.36 Stage 2 of the CEA will be to review and apply a threshold criteria to the long list, in order to establish a short list of other existing and/or approved development to ensure that the cumulative assessment is proportionate, utilising Matrix 1 of Annex 1 of the PINS advice on Cumulative Effects Assessment. The criteria will ensure that only other existing and/or approved development which is likely to result in significant cumulative effects is taken forward to the assessment stage. The shortlist of existing and/or approved development will be consulted upon with statutory and non-statutory consultees during the EIA process.

2.5.37 The threshold criteria to be used will consider the following factors:

- Temporal Scope
- Scale and Nature of the Development; and
- Other factors such as, nature and capacity of the receiving environment, source-pathway-receptor approach, and professional judgment.

2.5.38 A preliminary short list of cumulative schemes for the PEIR assessment is presented in **Volume III, Appendix 2.4.**

Stage 3: Information gathering

2.5.39 Environmental information will be gathered for short-listed existing and/or approved development, where available, utilising Matrix 2 of Annex 2 of the PINS advice on Cumulative Effects Assessment, and including details of:

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

Stage 4: Assessment

2.5.40 Technical disciplines will assess the cumulative effects of the Scheme with the other existing and / or approved development identified in Stage 1 to 3. The assessments will explain and record any time gaps in information, consider all tiers of developments where possible, and be documented in ES.

2.5.41 Some assessments may inherently be cumulative in which case no additional cumulative assessment of these aspects is required. However, separate consideration regarding the inter-relationship of effects on an individual Receptor may be needed.

2.5.42 In cases where significant cumulative effects between the Scheme and other existing and / or approved developments are identified, it may be necessary to propose additional mitigation measures to be delivered either by the Applicant, or in collaboration with another developer, in which case collaboration and agreement will be sought, where possible.

2.5.43 No transboundary effects have been identified as arising from the Scheme, but if any are identified at the ES stage, they will be considered in accordance with PINS Advice '*Nationally Significant Infrastructure Projects: Advice on Transboundary Impacts and Process*' (20 September 2024).

2.6 Mitigation Measures

2.6.1 Regulation 14(2) of the EIA Regulations requires that where significant effects are identified, *"a description of any features of the proposed development, or measure envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects in the environment"* should be included in the ES.

2.6.2 Environmental effects remaining after mitigation measures have been incorporated are termed residual effects and these have been fully described in this PEIR.

2.6.3 Mitigation measures are developed as part of an iterative process and therefore will be developed throughout the EIA process in response to the findings of the initial assessments.

Embedded Mitigation

2.6.4 Measures will be identified in order to avoid, reduce and, if possible, offset significant adverse effects identified during the EIA process. Where possible, these measures will be incorporated into the form or design of the Scheme. Once these measures are incorporated into the design, they are termed 'embedded measures'.

2.6.5 Embedded measures relevant to the Construction, Operation and maintenance and Decommissioning Phases will be described within outline management plans, and within each technical chapter in the ES, which will be submitted to support the DCO Application.

2.6.6 For the Operational Phase, such embedded measures will be represented in the design of the Scheme, and through control measures as part of the DCO, such as an outline Operational Environmental Management Plan (oOEMP). Embedded measures are either incorporated into the design from the outset or identified through the assessment process.

2.6.7 This PEIR assesses potential effects with embedded measures in place. Where significant adverse effects are identified after considering these embedded measures, additional mitigation measures will be proposed. These will be taken into account in the assessment of residual effects.

2.6.8 A summary of all mitigation measures and how they will be secured, either inherently through the Scheme design, or through control documents, or requirements within the DCO, are set out in the Commitments Register, which will be kept under review as the DCO Application progresses.

Monitoring

2.6.9 Regulation 21(3)(a) of the EIA Regulations requires the Secretary of State to consider whether it is appropriate to impose a 'monitoring measure' which is a *"provision requiring the monitoring of any significant adverse effects on the environment".* The ES will specify which effects, if any, will require monitoring, and the mechanism by which they will be monitored.

Consideration of Alternatives

2.6.10 It is necessary to consider reasonable alternatives for the Scheme, the reasons for selecting the chosen design and location, and to set these out clearly within the ES in accordance with paragraph 2 of Schedule 4 to the EIA Regulations:

"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."

2.6.11 Regulation 14(2)(d) of the EIA Regulations also requires that the ES should 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".

2.6.12 Planning Inspectorate Advice Note 7 [Ref 2-8] states that a good ES is one that "*explains the reasonable alternatives considered and the reasons for the chosen option taking into account the effects of the Proposed Development on the environment".*

2.6.13 The consideration of alternatives has involved the analysis of different layouts for the Scheme, scales, technologies adopted, design parameters, the location of supporting infrastructure and Site selection process. **Volume I, Chapter 4: Reasonable Alternatives and Design Evolution** includes a summary of the approach to Site selection and alternatives relevant to the Scheme that have been considered, as well as the justification for selecting the chosen option. Further details will be set out in the ES.

References

Ref 2-1 European Union (1985) Directive 85/337/EC.

Ref 2-2 European Union (2014) Directive 2014/52/EU

Ref 2-3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, 2017 No. 572. [as amended]

Ref 2-4 HM Government (2018) The Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018.

Ref 2-5 The Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope.

Ref 2-6 The Planning Inspectorate (2020) Advice Note Twelve: Transboundary Impacts and Process.

Ref 2-7 Institute of Environmental Management and Assessment (2015) Shaping Quality Development Guidance.

Ref 2-8 Planning Inspectorate Advice Note 7, Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements

3 Site Context and Description

3.1 Introduction

3.1.1 This chapter provides a description of the Site and the surrounding area within which the Scheme is located.

3.1.2 This chapter is supported by figures contained in **Volume II**.

3.2 The Site

3.2.1 The Site comprises approximately 825 hectares (ha) and is located on land to the north of Swaffham in Norfolk, England. The Site is wholly located within the administrative boundary of Breckland Council (BC) and Norfolk County Council (NCC), who are the host authorities.

3.2.2 The Site also comprises Highways Works, as shown in the insert on the Site boundary figure **(Volume II, Figure 3.2 Site Boundary).** This area consists of land that has been identified as potential areas for highways/junction improvement works (e.g. road widening) at the A47/A1065 junction to the south of the Site.

3.2.3 The Scheme location is shown in **Volume II, Figure 3.1.**

3.2.4 The Site boundary is shown in **Volume II, Figure 3.2**.

3.2.5 The field numbers are shown in **Volume II, Figure 3.3.**

Land Use and Site features

3.2.6 The land within the Site is predominately in agricultural use, being utilised in part for pig farming, chickens and other livestock, and in part for arable crop production across agricultural fields. Fields within the Site boundary are bounded by grassland margins, hedgerows, tree belts and agricultural tracks. Single tree, woodlands and Marl Pits (former pits for clay extraction) are located within the Site boundary.

3.2.7 Existing agricultural tracks and a series of three Droves, namely Fincham Drove, Petticoat Drove and Washpit Drove, (former routes for movement and driving of agricultural livestock) extend within the Site boundary.

3.2.8 The residential dwelling of Keeper's Cottage is located within the centre of the Site but wholly without the Site boundary and not part of the Scheme. There are several agricultural buildings within the Site, utilised for storage, which will be retained in situ and will continue to be utilised for storage.

3.2.9 An existing 400kV overhead line (OHL) and associated transmission pylons passes through the north-eastern part of the Site. Further existing overhead utilities and existing underground utilities exist within the Site.

Surrounding Settlements

3.2.10 The Site's immediate surrounds are characterised by a settlement pattern of rural villages and scattered properties linked by rural lanes. Nearby settlements include; South Acre (approximately 562m north), West Acre (approximately 1.7km north), and Castle Acre (approximately 1.6km north). The market town of Swaffham is located to the south of the Site.

3.2.11 Residential dwellings of Finger Hill Cabin, twin dwellings along South Acre Road, along Narford Lane, and Hall Farm and Nar Valley Farm are located (at the closest dwelling) approximately 120m from the Site.

3.2.12 The area identified for Highways Works, as shown in the insert on the Site boundary figure (**Volume II, Figure 3.2, insert map to Site boundary**), lies directly adjacent to a Managed Traveller site, and in nearby proximity but separated from the Site, residential dwellings off New Sporle Road and Castle Acre Road primarily associated with Swaffham.

Road Network

3.2.13 The Site is accessible across existing agricultural accesses taken from the Strategic Highway Network (SHN).

3.2.14 River Road bisects the Site, routing in a general south-northwest direction.

3.2.15 West Acre Road and Narford Lane border the Site along the southern and south-western boundary. The Site's far north-eastern boundary routes parallel to the south of South Acre Road to the junction to the A1065, whereby the Site boundary crosses the A-road and routes parallel to the north of South Acre Road.

3.2.16 Castle Acre Road (merging into the A1065) runs in a general north-south direction routing parallel along the eastern boundary of the Site, as shown at **Volume II, Figure 2.2**. The A1065 is a major road connection in the west and north of Norfolk, routing from near Mildenhall north to the outskirts of Fakenham. The A1065 connects at major junctions to the A11, A1101, A134, A47 and A148, with the southern most kilometers being in Suffolk.

3.2.17 The A47 Strategic Road Network (SRN), a strategic all purpose highway linking Leicester to Lowestoft, routes between the Highways Works area, as shown in **Volume II, Figure 3.2 insert map,** in a general east-west direction.

Public Rights of Way (PRoW) and Trails

3.2.18 There are public rights of way (PRoW), national trails, promoted routes and local routes passing through the Site. PRoW largely but not exclusively track along the routes of the Droves on the Site, Restricted Byways and Footpaths on Site include:

- Swaffham RB1 (tracks along Fincham Drove)
- South Acre RB6 (tracks along Fincham Drove)
- South Acre RB1 (tracks along Petticoat Drove)
- South Acre RB2 (tracks along Washpit Drove)
- South Acre RB5

- Swaffham FP64b (within the Highways Works area, as shown in **Volume II, Figure 3.2**.); and
- South Acre RB7.

3.2.19 Castle Acre Circular Walk is a 10km local circular route that partially routes through the north of the Site and in general incorporates local PRoW, Washpit Drove, Petticoat Drove and Peddars Way and Norfolk Coast Path National Trail.

3.2.20 The Peddars Way and Norfolk Coast Path National Trail routes off-Site along South Acre Road at Bartholomew's Hills, parallel to the northeastern Site boundary, continuing north through South Acre.

3.2.21 The Nar Valley Way Long Distance Trail routes off-Site in a general east-west direction beyond to the north of the Site.

3.2.22 The Rebellion Way, a 373km cycling adventure route, routes through the center of the Site incorporating Fincham Drove, existing agricultural track and along River Road, passing through surrounding settlements including Swaffham, South Acre and Castle Acre.

Airfields

3.2.23 No airfields border the Site. Great Friars Thornes Farm Airstrip is located approximately 1.3km southwest of the Site and Royal Air Force (RAF) Marham is located approximately 8km southwest of the Site.

Rivers

3.2.24 There are no Environmental Agency (EA) Main Rivers within the Site. The nearest EA Main Rivers are the River Nar and the River Wissey located approximately 3.2km west and approximately 5.4km south-east respectively of the Site. The River Nar, a tributary of the River Great Ouse, is also located to the north of the Site routing in a general west – east alignment from the Site. The River Nar rises near the village of Mileham before flowing approximately 41km through Castle Acre and Narborough, joining the Ouse at King's Lynn. The River Wissey rises near Bradenham, flowing to meet the River Great Ouse at Fordham.

Historic Designations

3.2.25 There are no statutory designated heritage assets located within the Site.

3.2.26 There is one Registered Historic Park and Garden; Narford Hall (Ref:1000337), located approximately 380m west of the Site.

Conservation Areas

3.2.27 There are no Conservation Areas within the Site.

3.2.28 South Acre Conservation Area is located approximately 146m north of the Site. Beyond, there are four Conservation areas within approximately 3km of the Site, these being; Swaffham Conservation Area located approximately 648m south, Castle Acre Conservation Area approximately 767m north, Narborough Conservation Area approximately 2.5km west, and Pentney/Narborough Conservation Area approximately 2.6km west.

Listed Buildings

3.2.29 Listed Buildings are generally clustered around the settlements of Swaffham (nearest Listed Building being the Grade II Baptist Chapel And Hall (Reference:1269549) 686m south), Castle Acre (nearest Listed Building being the Grade I Remains Of Cluniac Benedictine Priory Of St Mary And St Peter And St Paul (Reference:1342389) approximately 945m north), South Acre and West Acre (nearest Listed Building being the Grade II St Thomas A Becket's Chapel (Reference:1077663) approximately 1km north) and Narford Hall (nearest Listed Building being the Grade II Sundial Approximately 5 Metres South Of South East Quoin Of Narford Hall (Refence:1077307) approximately 1.6km west).

3.2.30 The nearest Listed Building to the Site is the Grade I Church of St George (Reference: 1306357) located approximately 316m north of the Site.

Archaeological Features

3.2.31 The Double moated site of Old Hall, 250m north west of Church Farm Scheduled Monument (Reference: 1015269) is located approximately 576m north of the Site, Castle Acre Priory Scheduled Monument (Reference:1015870) is located approximately 756m north of the Site, Castle Acre Castle, town defences and Bailey Gate Scheduled Monument (Reference: 1017909) is located approximately 1.2km north-east of the Site and Deserted medieval village, Great Palgrave Scheduled Monument (Reference: 1002894) is located approximately 643m southeast of the Site.

Landscape Designations

3.2.32 There are no Registered Parks and Gardens within the Site.

3.2.33 Narford Hall (Ref:1000337) is the nearest Registered Historic Park and Garden; located approximately 380m west of the Site.

3.2.34 The Site is not within an Area of Outstanding Natural Beauty or within The Broads National Park.

3.2.35 No Ancient Woodland is present within the Site. The nearest block of Ancient Woodland is Sporle Wood (Ancient Replanted Woodland), located approximately 3.4km east of the Site.

3.2.36 The Site is located within the National Character Area (NCAs) as defined by Natural England as NCA Profile: 85 The Brecks (NCA85).

3.2.37 At the regional level, the Norfolk and Suffolk Brecks Landscape Character Assessment (2013) describes the region of The Brecks as "*a unique landscape of heaths, conifer plantations and farmland on part of the chalk plateau in south-west Norfolk and north-west Suffolk*". The Site is situated within an area characterised as 'Rolling Clay Farmland', which encompasses land to the north, northeast and south of Swaffham.

3.2.38 The Site is situated across two Landscape Character Type (LCT): (D) The Brecks – Heathland with Plantation and (E) Plateau Farmland as defined by Breckland Landscape Character Assessment (2007).

3.2.39 The aforementioned LCTs are divided into more area specific Landscape Character Areas (LCA) to which the Site is largely situated within parts of both (D1) Swaffham Heath and (E6) North Pickenham Plateau. A very small part of the north-eastern site area is situated within the (B7) River Nar Tributary Farmland.

3.2.40 There is existing renewable energy generating infrastructure near the Site, including existing solar development approximately 608m to the southwest (named on Ordnance Survey mapping as Burnstalks Solar Farm) and an Anaerobic Digestion (AD) biogas plant (Future Biogas) approximately 1.3km south from the Site. Singular wind turbines are located south-east of the Site north of Swaffham. Existing utilities cross the Site, further details of utilities identified at this stage are detailed in **Chapter 15: Other Environmental Matters**, specifically subsection **15.6 Telecommunications, Utilities and Television Receptors**.

Ecology

3.2.41 The Site comprises predominantly mixed arable agricultural land, being utilised in part for pig farming, chickens and other livestock, and in part for arable crop production across agricultural fields. Field boundary features include hedgerows, tree lines and scattered trees, along with a number of additional habitats.

Ecological Designations

International and National Statutory Designated Sites

3.2.42 The Site does not contain, nor is located immediately adjacent to, any statutory ecological designations. The closest statutory designation is the River Nar Site of Special Scientific Interest (SSSI), which is located approximately 0.5km north of the Site.

3.2.43 There are 14, including that listed above, statutory ecological designations located within 25km of the Site.

Locally Designated Sites

3.2.44 The Site itself does not contain any non-statutory ecological designations, however a single Roadside Nature Reserve (RNR, Reference: U33086) is located along River Road adjacent to the Site boundary along River Road. A further RNR is located offsite along River Road, approximately 0.05km north of the Site boundary, whilst all other identified non-statutory ecological designations are situated over 0.5km from the Site boundary.

3.2.45 There are 15, including those listed above, non-statutory ecological designations located within 2km of the Site.

Flood Risk and Watercourses

3.2.46 The entirety of Site is located in Flood Zone 1.

3.2.47 There are no natural watercourses within the Site.

Air Quality

3.2.48 The Site is not located within a Local Authority with designated Air Quality Management Areas (AQMAs) or an AQMA boundary.

Ground Conditions

3.2.49 Soilscapes dataset indicates that superficial cover across the majority of the Site is classed as 'freely draining sandy Breckland soils' (Soilscapes Reference 11). The minority of the remaining Site to the north and southwest is classed as a mix of shallow lime-rich soils over

chalk or limestone (Soilscapes Reference 3) freely draining slightly acid sandy soils (Soilscapes Reference 10) either exclusively or inclusive of both types.

3.2.50 The majority of the Site is underlain by chalk of the Lewes Nodular Chalk Formation, with the western extent of the Site underlain by chalk of the Holywell Nodular Chalk Formation and New Pit Chalk Formation.

3.2.51 Superficial deposits, including sensitive receptors (e.g. peatland), are mapped largely absent across the Site, with the exception of minor extents of till (Diamicton) and sand and gravels from the Lowestoft Formation in the northern and southern extents of the Site.

3.2.52 The majority of the Site is located within a Drinking Water Protected Areas (Surface Water). The Site is also located within a Drinking Water Safeguard Zones (Surface Water).

3.2.53 The Site is underlain by a Principal Aquifer (Bedrock). The Site in areas is underlain by Secondary (undifferentiated) and Secondary A Superficial Aquifers.

3.2.54 The majority of the Site is located within Source Protection ('SPZ') Zone II (Outer Protection) with the far western extent of the Site located within Zone I (Inner Protection Zone). The Site is surrounded by SPZ in all directions.

3.2.55 The Site is located within the Norfolk Bradenham Water Resource Zone ('WRZ') where water is supplied from groundwater abstractions from the Norfolk Chalk aquifer.

4 Reasonable Alternatives and Design Evolution

4.1 Introduction

4.1.1 This chapter provides a summary of the reasonable alternative options that the Applicant has considered for the Scheme to date, including the initial selection of the Site and throughout the development of the design.

4.1.2 This chapter also details how the assessment of sites and design alternatives has been undertaken, detailing the factors that have been considered and the main reasons for discounting alternative design options.

4.2 Legislation, Policy and Advice Notes

4.2.1 National Policy Statement (NPS) EN-1 [Ref 4-1] paragraph 4.3.9 confirms that from a policy perspective, there is no general requirement to consider alternatives or to establish whether a development represents the best option. 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.

4.2.2 However, paragraphs 4.3.15 to 4.3.17 of NPS EN-1 go on to set out the circumstances where there is a requirement to consider alternatives, as noted:

- Applicants must include in their ES information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the Applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility
- In some circumstances, the NPSs may impose a policy requirement to consider alternatives; and
- Where there is a policy or legal requirement to consider alternatives, the Applicant should describe the alternatives considered in compliance with these requirements.

4.2.3 NPS EN-3 [Ref 4-2] paragraphs 2.10.18-2.10.48 set out the key considerations involved in the siting of a solar farm and factors influencing site design, including:

- Irradiance and site topography
- Network connection
- Proximity of a site to dwellings
- Agriculture land classification and land type
- Accessibility
- Public rights of ways; and
- Security and lighting.

4.2.4 Regulation 14(2)(d) of the EIA Regulations [Ref 4-3] requires "*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*" to be presented in the ES. Therefore, a description of the alternatives considered to date is presented in this Preliminary Environmental Information Report (PEIR), and a full description of the alternatives will be provided in the ES.

4.2.5 The Planning Inspectorate's Advice Note 7 [Ref 4-4] sets out that a good Environmental Statement (ES) is one that, amongst numerous things: "*explains the reasonable alternatives considered and the reasons for the chosen option taking into account the effects of the Proposed Development on the environment*".

4.2.6 All relevant policies included in the NPS EN-1, NPS EN-3 and local planning policy have been taken into account in the assessment, which are listed in **Volume III, Appendix 4.1: Planning Policy for Reasonable Alternatives**.

4.3 Approach to Assessment

4.3.1 Taking into consideration the policy and legal requirements as well as the iterative approach to the design, the following alternatives have been considered for the Scheme and are discussed in this chapter:

- Site Evaluation
- Alternative generation technologies; and
- Alternative design/layouts, including solar PV development, Battery Energy Storage System (BESS), National Grid Substation and Customer Substation.

4.3.2 A 'no development' scenario as an alternative to the Scheme has not been considered further in line with EN-1 paragraph 4.3.23. This is because 'no development' is not considered to be a reasonable alternative to the Scheme as it would have no prospect, realistic or otherwise, of delivering the additional electricity generation and energy storage proposed.

4.3.3 The overarching need for the Scheme is set out in brief in **Volume I, Chapter 1: Introduction** of this PEIR. The DCO Application will include a Statement of Need addressing the need for large-scale solar assets.

Site Evaluation

4.3.4 There is no standard methodology for selecting sites for solar energy generating stations. However, as NPS EN-3 paragraphs 2.10.21- 2.10.26 recognise, a viable grid connection is an essential material consideration for proceeding with development and is instrumental in defining the search area.

4.3.5 During ongoing engagement, the Applicant and National Grid came to an agreement for a connection offer for 500MW into the existing overhead line between Walpole and Necton. At the same time as National Grid's offer for a 500MW connection, a land agent indicated to the Applicant that the landowner was willing to put forward the proposed Site for a solar farm development.

4.3.6 A review of planning constraints along and near the overhead line identified the land where The Droves is proposed to be located as particularly good from a desktop planning constraints review, notably appearing to be a small area of predominantly grade 4 land surrounded by the more typical higher grade land in the area. The Applicant then engaged with the landowner to agree on the most appropriate land within their estate on which to propose the development.

4.3.7 The Site fits the factors explored by the Applicant and set out in NPS EN-3, being without many constraints and with the benefit of potential viable connection point to be included in the Site. The Applicant typically considers factors including, but not limited to, a large enough site area, topography, access and the lack of designations. Having experience and understanding of the surrounding area and requirements for utility scale solar, it was clear to the Applicant that the Site met their environmental site selection criteria. The Applicant, therefore, had identified a suitable site and concluded their site evaluation process.

4.3.8 A Site Evaluation Report will be submitted with the DCO Application. The Site's suitability for solar development is due to the lack of landscape and environmental statutory designations, limited residential receptors and accessibility from a major highway network.

4.3.9 Section 2.10 of NPS EN-3 relates specifically to Solar Photovoltaic generation, and paragraphs 2.10.19 to 2.10.48 list factors influencing site selection. The proposed Site's initial evaluation was in accordance with these key site selection factors outlined in section 2.10 of NPS EN-3. The site evaluation involved a balance of these factors, including:

- Network connection - Proximity to the point of connection
- Irradiance and site topography - Preference for south-facing aspect and/or flatter topography
- Proximity of site to dwellings - Avoidance of close proximity to residential dwellings or where it would not be possible to mitigate visual amenity and glint and glare appropriately
- Environmental considerations - Avoidance of environmental constraints, such as those containing Site of Special Scientific Interest (SSSIs), Nature Reserves, Ramsar Sites, Special Area of Conservation (SAC), and Special Protection Areas (SPA)
- Agricultural land classification and land type - Minimise the impact on the best and most versatile agricultural land; and
- Accessibility - Suitability of the access routes both during construction and operation.

Network Connection

4.3.10 The availability of a grid connection point with capacity is recognised as being an important consideration in terms of project viability and site selection in paragraphs 2.10.21 – 2.10.26 of NPS EN-3 as follows:

"*Many solar farms are connected into the local distribution network. The capacity of the local grid network to accept the likely output from a proposed solar farm is critical to the technical and commercial feasibility of a development proposal. Larger developments may seek connection to the transmission network if there is available network capacity and/or supportive infrastructure. In either case the connection voltage, availability of network capacity, and the distance from the solar farm to the existing network can have a significant effect on the commercial feasibility of a development proposal*."

4.3.11 During discussions with National Grid in 2022, the Applicant discussed grid capacity within the East Anglia region via a connection directly into the National Electricity Transmission System (NETS) that would require a new National Grid Substation. A suitable grid connection at King's Lynn B was not viable due to insufficient physical space to connect any project of any size at that location; however, there was capacity along the overhead line (OHL). Connecting into the OHL allowed for the least constrained land to be used for the Scheme. Due to the availability of a new Point of Connection (PoC) into the existing overhead line between Walpole and Necton, the Applicant made a grid connection application to National Grid (now NESO) for a connection. National Grid (now NESO) made an offer for 500MW at Swaffham.

4.3.12 The Site is located immediately adjacent to and underneath the existing overhead line between Walpole and Necton. The Applicant is proposing to include the PoC within the Site.

Irradiance and Site Topography

4.3.13 Paragraph 2.10.19 of NPS EN-3 notes that site topography and irradiance levels are a key input to the site selection process.

4.3.14 Norfolk represents a good location within the UK to construct a solar farm, as detailed below in paragraphs 7.2.17-7.2.19. The area benefits from higher levels of photovoltaic power and irradiance compared to other parts of the UK.

4.3.15 Flat or gently south-facing slopes are most suitable and beneficial for solar. Topography, which is generally flat or gently undulating, is most suitable for solar from both a constructability and operational perspective to ensure that the Site can produce a large amount of electricity.

4.3.16 Therefore, this factor has influenced the focus on the Norfolk area as the preferred location of the Scheme. The general topography surrounding the Site is flat or has limited gradients, making it particularly suitable for solar energy.

4.3.17 In addition, Norfolk benefits from large areas of land characterised by a generally sparse settlement pattern. Such characteristics provide the opportunity for utility-scale solar development, which can contribute to delivering net zero.

Proximity of the Site Boundary to Dwellings

4.3.18 NPS EN-3, paragraph 2.10.27, sets out the need for the Applicant to consider the proximity of a site to dwellings. The two main impact issues that determine the necessary distances to sensitive receptors are, therefore, likely to be visual amenity and glint and glare. In line with this, consideration was given to the proximity of nearby sensitive human receptors, including residential dwellings and workplaces, to assess potential impacts. This ensures that any adverse effects, such as visual intrusion or safety concerns related to glint and glare, are appropriately mitigated to protect these sensitive receptors

4.3.19 There are limited individual dwellings near the Site. The visual impact on residential receptors will be considered throughout the design evolution. For example, strategic setbacks from receptors to the above-ground infrastructure are being proposed to limit visual impacts and the impact of glint and glare on residential receptors.

Environmental Considerations

4.3.20 A key principle in selecting a site is to avoid areas of particular environmental and landscape sensitivity to minimise potential impacts. This is true from a natural and built environment

perspective, including ecology and biodiversity, landscape, water resources, and cultural heritage.

4.3.21 Once the proposed Site was identified, a desktop site evaluation considered the following environmental factors, which are also illustrated in **Volume II, Figure 4.1 and Figure 4.2.**

- Designated international and national ecological and geological sites - To avoid direct impacts on these sites, any international and nationally designated sites
- Nationally Designated Landscapes - To avoid any nationally designated landscapes
- Flooding - The location of Flood Zones in the area was also considered
- Heritage - Any historic designations, such as listed buildings and scheduled monuments

4.3.22 The proposed Site performed well against these criteria, as detailed below.

Agricultural Land Classification (ALC) and Land Type

4.3.23 NPS EN-3 indicates that Agricultural Land Classification (ALC) should not be a "*predominating factor in determining the suitability of the site location*" (Paragraph 2.10.29). However, paragraph 2.10.29 of NPE also states that where "*the proposed 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 "Best and Most Versatile" agricultural land where possible*."

4.3.24 ALC was therefore an important factor for the Applicant when evaluating the proposed Site.

4.3.25 Consistent with national policy, the Applicant considered the best and most versatile land based on the available data at the time of the initial Site evaluation, which was the Natural England Agricultural Land Classification (ALC) maps. These maps help identify the predicted agricultural land classification category and include the best and most versatile land: ALC grades 1, 2, and 3a. The Natural England ALC maps do not differentiate between grades 3a and 3b.

4.3.26 A desk-based assessment using provisional ALC data from Natural England identified the Site as a mixture of Grade 3 and 4 agricultural land.

4.3.27 As stated above, NPS EN-3 states that previously developed, brownfield, contaminated, and industrial land should be preferred for solar projects. Where agricultural land is necessary, poorer quality land should be preferred, avoiding the use of the best and most versatile land where possible.

4.3.28 The use of previously developed (brownfield) land and commercial roof-tops was considered. The Applicant conducted a review of the brownfield registers maintained by Borough Council of King's Lynn and West Norfolk Council and Breckland Council. It was determined that within the brownfield registers of King's Lynn and West Norfolk Council and Breckland Council, no brownfield land meets the provision of the 2 - 4 acres per MW, as stated within the NPS EN3 (at paragraph 2.10.17), for a 500 MW utility-scale solar farm in proximity of the Site.

4.3.29 No commercial rooftops or combined premises of an adequate area to facilitate a 500MW ac utility-scale solar project or provide a viable network of sites in proximity to the PoC were identified.

4.3.30 The number of commercial rooftops required to deliver a utility scale solar farm would require multiple land ownerships, and the legal complexities and costs involved in combining multiple

sites of this nature are not viable. The government has promoted financial incentives to encourage homeowners and landlords to install solar PV systems, and rooftop solar is recognised as being clearly desirable, both on residential and commercial premises. However, rooftop solar energy is not considered an alternative to the Scheme. Commercial, industrial and residential premises are all consumers and generators of electricity, which limits the contribution they provide as low-carbon and renewable alternatives to conventional sources of electricity production. Therefore, rooftop solar energy is not an alternative to electricity production on a grid scale. Roof-mounted solar panels should be deployed in addition to large-scale solar farms rather than instead of them.

4.3.31 The Applicant regularly engages with land agents regarding potentially willing landowners for solar developments. The availability of willing landowners is an important consideration because it is typical for the land to be leased rather than permanently acquired due to solar farms consisting of temporary structures. Without willing landowners, acquiring land through compulsory acquisition powers would be necessary, which the Applicant has sought to avoid as far as practicable while still delivering a suitable site. Compiling a site with as few land ownerships as possible is desirable to minimise project complexities (including engineering, design, and mitigation measures), legal complexities, and project costs, which were considered in evaluating the Site. The Site is under the ownership of two estates, but the control of a single landowner; therefore, satisfying this criteria. Additionally, the Site includes land needed temporarily for grid connection, which is under the control of a third landowner.

Accessibility

4.3.32 The Site is directly accessible from the A1065 which is an important factor when considering the siting of solar farms in rural areas. The close proximity to the A1065 and the A46 will help to minimise potential effects on rural communities and villages during construction. The A Roads, when compared with B Roads and rural roads also provide better suitability to accommodate HGVs and potential Abnormal Indivisible Loads (AILs), minimising the need for and extent of highway improvements. Being directly adjacent to the A1065 also provides direct access to the Site, avoiding the need for onsite access rights across tracks of land in order to provide access to the Solar PV Arrays.

4.4 Alternatives Considered

Alternative Generation Technologies

4.4.1 The Applicant is a leading developer of utility-scale solar projects and battery storage systems. Alternative types of low-carbon forms of power generation such as onshore wind have been discounted as the Applicant is a developer of renewable energy projects, with a focus and expertise on utility-scale solar projects and battery storage systems. Notwithstanding this, it is not considered that the Site would be suitable for other forms of renewable generation at the same scale as the Scheme.

4.4.2 Tidal power and offshore wind were not considered viable options due to the terrestrial location of the Site. It is understood there are no and/or limited local opportunities to source hydroelectric power from rivers.

4.4.3 In line with NPS-EN-3, the Applicant has sought to achieve co-location with battery energy storage as part of the Scheme.

4.4.4 The Scheme will consist of the infrastructure as described above in Chapter 5: Scheme Description and in further detail below.

4.5 The Development Area and Alternative Layouts

Introduction

4.5.1 The design and layout, including extent, of the Scheme for the purpose of the PEIR has evolved iteratively since initial site selection in response to the ongoing environmental assessment process, the Project Level Draft Design Principles (**Volume III, Appendix 5.3**), engagement with stakeholders and consultants and feedback from the initial non-statutory consultation (Co:Design process) for the Scheme. The continuous site analysis, both contextual and on-site, has directly informed the design and layout.

4.5.2 The layout of the Scheme will continue to be refined as the Applicant progresses the ES and DCO Application, incorporating ongoing consultation feedback and engagement with stakeholders to ensure a well-integrated and sustainable design. Initial engagement included workshops, discussions with landowners and nearby properties, and discussions with statutory bodies.

4.5.3 With the location of the Site identified, the layout presented within the PEIR has been informed by Co:Design, EIA Scoping, and an understanding of local environmental sensitivities, through ongoing baseline and assessment work, as presented within the PEIR.

4.5.4 The ongoing baseline and assessment work has been undertaken by the Applicant's professional environmental specialists, and has informed the extents of the 'potential area for solar and associated development' that is being consulted upon as part of the Statutory Consultation and forms the basis of the assessments within the PEIR.

4.5.5 **Volume II, Figure 4.3 and Figure 4.4** illustrates the changes to the Scheme between the Co:Design and Statutory Consultation Stages respectively.

4.5.6 The following section describes the evolution of the Scheme, and how the Design Principles have informed those changes.

Alterations to the Site Extents

4.5.7 Through ongoing engagement (Design Principle 5.3) with the landowner and NGET, there have been two alterations to the Scheme:

- The area of potential mitigation and enhancement has been removed within the northern extents of the Site. Whilst this area had been identified for potential mitigation and enhancement measures at the Co:Design and EIA Scoping Stage, discussions are still ongoing with the landowners regarding the availability of the land
- An additional 26.3 ha of land, as shown hatched on Volume II, Figure 4.5, was added to the Site extents following further engagement with NGET. The proposed use of this additional land is to provide optionality at this stage in the process for the Grid Connection Infrastructure options (Design Principle 4.2). Further detail on the potential Grid Connection Infrastructure can be found in Chapter 5: Scheme Description of the PEIR

- The A34 / A1066 Junction has been included within the Site extents to allow for the provision of localised road improvements (widening) to facilitate the movement of abnormal indivisible loads.

Alternatives for National Grid Substation, Customer Substation and BESS

4.5.8 The location for the National Grid Substation, Customer Substation and BESS had not been defined at the Co:Design nor EIA Scoping Stage. Following further design and environmental considerations, drawing upon those set out within National Grid's Horlock Rules [Ref 4-5]. Fields 27 and 33 have been identified as potential locations for the National Grid Substation. These fields have been identified as potential locations considering the combination of the following factors:

- Land - the potential to use land within the control of the Applicant and reduce any reliance on compulsory purchase powers
- Size - the potential to accommodate the footprint of the substation, avoiding the removal of existing vegetation, and allow for the potential for screening of views by mounding or planting
- Proximity to the existing overhead line - the potential to reduce the need for additional electrical infrastructure to connect into and / or divert the existing overhead lines
- Proximity to the A1065 - the potential to avoid the use of rural roads and minimise the length of new access roads required to construct and operate the substation
- Environmental Constraints - the potential to avoid and minimise direct impacts to environmental and cultural designations and flood risk zones
- Topography - the potential to construct a level development platform whilst reducing the need for cut and fill
- Residential Receptors - the potential to minimise visual and noise effects on residential receptors; and
- Agricultural Land Classification - the potential to minimise loss of BMV.

4.5.9 The combination of these considerations has led to the selection of Fields 27 and 33 as preferred locations for the National Grid Substation.

4.5.10 At this stage, flexibility is sought on the location of the Customer Substation and BESS albeit the intention is to co-locate these elements with the National Grid Substation as far as practicable. Co-location of these elements has the benefit of minimizing transmission losses, maximizing storage efficiency, providing effective grid balancing and supporting a faster and more reliable reaction to power outages and disruptions. It also co-locates the taller electrical infrastructure elements of the Scheme with the existing overhead lines, and minimizes the spatial distribution of these taller elements across the Site.

4.5.11 The preferred location for these elements within the area identified on the Concept Masterplan will be determined following further technical design and environmental assessment work and will be set out within the Environmental Statement.

Infrastructure Layout Iterations

4.5.12 Following the non-statutory consultation (Co:Design) and EIA Scoping, there have been a number of design changes to the spatial layout and the design of elements within the Scheme.

4.5.13 Table 4.1 below summarises the main infrastructure layout iterations for the Scheme following the Co:Design stage.

Table 4.1 Summary of Design Changes

Land Parcels / Field Reference	Topic / Discipline	Relevant Project Level Design Principle	Summary of design Change / Commitment	Explanation of the main reason for the design change / commitment
36	Agricultural Land	P5.3	Removal of Field 36 from accommodating Solar PV, BESS and / or Substations	As a result of further ongoing engagement with the Landowner, field 36 was removed at the landowners request so that it could be retained in agricultural use to support the ongoing commercial farming enterprise.
32	Agricultural Land	P2.10	Removal of Field 32 from accommodating Solar PV, BESS and / or Substations	Field 32 consists entirely of Grade 1 & Grade 2 agricultural land and was therefore removed.
Field 21 and 26	Transport	P2.2; P2.8; P2.9; P5.9	Two potential points of access into the Site have been identified from the A1065	The potential points of access from the A1065 have been chosen to avoid routing traffic along Fincham Drove into the Site. Early swept path analysis identified that vegetation clearance would have been required at the junction of Fincham Drove, South Acre Road and A1065 to facilitate AILs. By accessing the Site from the A1065, impacts arising from routing traffic along Fincham Drove, River Road, Narford Lane, and through local villages has been avoided along with minimal vegetation clearance.

Land Parcels / Field Reference	Topic / Discipline	Relevant Project Level Design Principle	Summary of design Change / Commitment	Explanation of the main reason for the design change / commitment
33, 27	Engineering	P1.1; P2.2; P4.2; P6.1; P7.1	The Concept Masterplan for the purposes of the PEIR includes two potential locations for National Grid and Customer Substation.	The Applicant is continually engaging with NGET regarding the preferred location of the National Grid Substation. The proximity of the two potential locations to the existing National Grid infrastructure have been a key consideration and allow for co-location of electrical infrastructure which aids the integration of the Scheme into its context. Flexibility on its location is retained at this stage to allow further consideration and evaluation of engineering and environmental matters. As a result of the flexibility of the National Grid and Customer Substation, the Applicant has retained flexibility for the location of the BESS. The potential locations for the BESS are within close proximity to the Customer Substation to minimize the amount of materials, carbon emissions as well ground and hedgerow disturbance required to connect the BESS with the Customer Substation.
Eastern parcels	Amenity & Recreation	P2.3; P5.4; P5.8; P5.11	Inclusion of potential permissive paths within the Site.	Following feedback from the non-statutory consultation and a review of the Norfolk Green Infrastructure Strategy, the concept masterplan illustrates potential permissive routes through the Site, which would deliver improved connectivity between Swaffham and the Nar Valley. The potential routes provide connectivity between West Acre Road and Fincham Drove. The Applicant has also collaborated with the promoter ofHigh Grove Solar to provide a potential route to the south through the High Grove Solar Scheme that connects into Footpath 'Swaffham FP13'.

Land Parcels / Field Reference	Topic / Discipline	Relevant Project Level Design Principle	Summary of design Change / Commitment	Explanation of the main reason for the design change / commitment
				The Applicant considered including a permissive path between Fincham Drove and South Arce Road, along an existing agricultural track, which was highlighted at the Non-Statutory Consultation as a potential opportunity. Since the non-statutory consultation and through engagement with the Landowner and Norfolk County Council the Applicant is aware that this route is to be dedicated as a PRoW, which the Applicant will consider as part of the baseline.
All fields	Ecology, Landscape and Heritage	P2.1; P2.2; P2.9; P3.1; P3.4	Development of a hedgerow management and enhancement strategy.	A hedgerow strategy has been developed to retain and enhance the existing hedgerow network within the Site to aid the integration of the Scheme into its context and respond to the Breckland LCA. Minimum buffers to all existing and/or proposed hedgerows, woodland, ponds, Marl pits have been incorporated into the Scheme and are set in in **Volume I, Chapter 5: Scheme Description,** subsection 5.2 Proposed Components of the Scheme, Table 5.1. Hedgerows between woodland blocks will be strengthened with hedgerow trees to provide greater ecological connectivity. The Applicant has considered the experience of users of PRoWs and the landscape character of the Site to identify appropriate places to plant new hedgerows throughout the Site. Through the analysis of historic maps, The Applicant has identified opportunities to reinstate historic field boundaries between Fields 14 and 31 and Fields 18 and 19.

Land Parcels / Field Reference	Topic / Discipline	Relevant Project Level Design Principle	Summary of design Change / Commitment	Explanation of the main reason for the design change / commitment
Field 11	Heritage	P2.6	Provision of buffer to heritage asset.	A WWII bunker/decoy post to the south of Keepers Cottage has been incorporated into the hedgerow buffer in order to avoid potential direct impacts on this asset.
Fincham Drove	Heritage, Transport & Amenity and Recreation	P2.1, P2.2, P2.5, P2.6; P2.9; P5.10	Identification of internal access routes	Recognising the local importance of Fincham Drove and the user experience along it, the Applicant has avoided routing construction and decommissioning traffic along the Drove and sought to minimise vehicular crossings over the Drove to locations where there are existing gaps or agricultural access points.
All fields	Ecology; Amenity & Recreation, Waste & Materials	P1.1; P2.2; P3.1; P5.10; P7.1; P7.2	Identification of internal fencing strategy	The Applicant has developed a proposed fencing strategy that seeks to balance sustainable resource management by reducing the amount of fencing infrastructure whilst allowing for unimpeded ecological and PRoW movement through the Site. The fencing strategy allows at least 2 points of access to the woodland block which allow for continued ecological movement between these habitats. The proposed fencing strategy has also sought to align with offsite hedgerows and woodland to ensure there is continued connectivity through and across the Site, to minimise the funnelling of larger mammals along the local roads. Marl Pits and/or ponds that are located in close proximity to the existing hedgerows have been integrated into green infrastructure corridors to support the ecological connectivity throughout the Site.

Land Parcels / Field Reference	Topic / Discipline	Relevant Project Level Design Principle	Summary of design Change / Commitment	Explanation of the main reason for the design change / commitment
Field 11	Residential Amenity	P2.1; P2.2; P2.7	Removal of Solar PV Arrays in close proximity to a Residential Property	Following Site visits, the Applicant has pulled back the extent of Solar PV Arrays in Field 11 to minimise any residential amenity impacts on the residential property that is located in the north of the field. A new hedgerow will be planted along the northern extents of the Solar PV Arrays in Field 11 to integrate the Scheme into its context. The hedge alignment has been designed to reflect the existing field and hedgerow pattern within the Site's landscape character.
Field 4	Heritage, Landscape, Amenity and recreation	P2.1; P2.5; P2.6; P2.9; P3.4; P5.4; P5.10;	Inclusion of a potential area for publicly accessible amenity space	An area for potential publicly accessible amenity space has been identified in Field 4, resulting from the retention of the PRoW on its existing alignment. The area is located approximately halfway along the Castle Arce circular walk, providing an opportunity for users of this PRoW to pause and appreciate the landscape and heritage setting of the Nar Valley. The set back of Solar PV Arrays from River Road, where the landscape character starts to transition from plateau into the valley, responds to the Site landscape character and aids the Schemes integration into its context.

4.6 Summary

4.6.1 In summary, the Applicant has considered alternatives in line with the requirements of the EIA Regulations and the specific provisions of the NPS EN-1 and NPS EN-3. The Applicant has also demonstrated through the information set out in this chapter and in **Volume III, Appendix 5.3** how 'good design' is being delivered throughout the course of the project and how IGP's Design Principles and the Draft Project Level Design Principles have informed and will continue to inform the design evolution of the Scheme.

4.6.2 This chapter of PEIR has described the consideration of reasonable alternatives and design evolution in relation to the Scheme so far. The site evaluation process has been considered, followed by a Stage 1 Design Appraisal and feedback from stakeholders received during the Non-Statutory consultation (Co:Design) and the EIA Scoping exercise as set out above.

4.6.3 The design evolution of the Scheme is an iterative process and will continue to evolve through the EIA process to take into account further analysis of environmental effects and further feedback from stakeholders as part of the statutory consultation process. The result of that further analysis will be presented in the ES and DCO Application documents upon submission of the DCO Application.

References

Ref 4-1 Overarching National Policy Statement for energy (EN-1), Department for Energy Security and Net Zero, November 2023 (as updated 2024). Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1

Ref 4-2 National Policy Statement for renewable energy infrastructure (EN-3), Department for Energy Security and Net Zero, November 2023 (as updated 2024). Available at:https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3

Ref 4-3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, 2017 No. 572. [as amended]

Ref 4-4 Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements, June 2020, Available at: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-an/nationally-significant-infrastructure-projects-advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-an

Ref 4-5 The National Grid Company, Substations and the Environment: Guidelines of Siting and Design, Available at: https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf

5 Scheme Description

5.1 Overview

5.1.1 This chapter of the Preliminary Environmental information Report (PEIR) is supported by the following plans and documents:

- Concept Masterplan (**Volume III, Appendix 5.1**)
- Masterplan Strategies (**Volume III, Appendix 5.2**); and
- Draft Design Principles (**Volume III, Appendix 5.3**).

5.1.2 The Scheme comprises the construction, operation, maintenance, and decommissioning of a solar photovoltaic (PV) electricity generating station and associated development including a Battery Energy Storage System (BESS), a Customer Substation and Grid Connection Infrastructure including a new National Grid Substation. The Scheme would allow for the generation and export of over 50MW Alternating Current (AC) of renewable energy, connecting into the National Electricity Transmission System (NETS) overhead line that passes through the Site.

5.1.3 As the Scheme would have a generating capacity in excess of 50MW, it is considered to be a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008.

5.1.4 The Scheme comprises the following components as the NSIP and Associated Development:

- PV panels fixed to Mounting structures (including both Single Axis Trackers and Fixed South Facing orientation) forming Solar PV Arrays
- Conversion Units (incorporating Inverters, Transformers and Switchgear)
- Customer Substation
- National Grid Substation, and associated electrical infrastructure and other Ancillary Infrastructure and Associated Development required to facilitate the export of electricity from the Scheme to the National Grid
- Battery Energy Storage System (BESS)
- Ancillary Infrastructure including enclosure, security, drainage, earthworks and access, as required
- Access Tracks
- Highway Works
- Cabling – underground cabling within the Scheme, which transmit electricity between PV Panel to Conversion Units and from there to the Customer Substation and BESS
- Grid Connection Corridor - cabling connecting the Customer Substation to the Point of Connection, which may be underground or overhead lines
- Grid Connection Infrastructure - Underground and/or overhead lines, including new pylons between the National Grid Substation and the Point of Connection

- Green Infrastructure
- Proposed Mitigation and Enhancement Areas
- Construction Hub; and
- Temporary Construction compounds.

5.1.5 The Scheme components could fall within part or wholly within each field (**Volume II, Figure Field Numbers**), the parameters for which are deliberately broad at this preliminary stage to allow for further evolution as the Scheme design develops. Further details for each of the key components are set out below:

- Indicative area for Solar PV Site – fields 1 to 31 and 33 to 35
- Indicative areas for mitigation, enhancement, and/or retained agricultural land/buildings – as shown on Concept Masterplan (**Volume III, Appendix 5.1**)
- Indicative zone to house the Customer Substation and Battery Energy Storage System (BESS) – fields 24, 26, 27, 33 and 35; and
- Indicative zone for National Grid Substation – fields 27 and 33.

5.1.6 The point of connection (the PoC) for the Scheme to connect to the National Electricity Transmission System (NETS) would be at the new National Grid Substation, which is proposed to be located within fields 27-33. The National Grid Substation will be connected to the existing NETS overhead line that passes through the Site via either underground or overhead cables within the Grid Connection Corridor. The proposed location of the Grid Connection Corridor within the Site is under consideration and will be refined through ongoing environmental assessments, discussions with National Grid, landowner negotiations and consultation input.

5.1.7 Cables, ranging in voltages from 11kV to 400kV, will be necessary to facilitate the Scheme within the Site. Cable trenches, with widths typically varying between 1m to 7m, will accommodate these cable circuits, and there will be instances where multiple cables run along the same route and separation distances between them are required. The width and spacing of the cable trenches may differ depending on environmental constraints, engineering requirements, or if crossing third-party apparatus (e.g., utilities) so a working width of 50m has been allowed for at this stage in the design and assessment.

5.2 Proposed Components of the Scheme

5.2.1 The Concept Masterplan (**Volume III, Appendix 5.1**) shows the indicative layout of the Scheme. It has been based on various environmental assessments and consultation with non-statutory and statutory consultees undertaken to date. **Volume I, Chapter 4: Reasonable Alternatives and Design Evolution** of this PEIR outlines the iterative design process for the Scheme.

5.2.2 The Scheme will comprise the following principal components as described above and in further detail below.

PV panels

5.2.3 Photovoltaic (PV) panels, are made up of cells which convert the solar irradiance to electrical energy. The PV panels will be attached to Mounting Structures, which form PV Tables and are arranged in rows.

5.2.4 Each PV Panel will have a direct current (DC) generating capacity which will be converted to alternating current (AC). As detailed below, the Inverters are required to convert the DC electricity generated by the PV panels to AC. There are currently two options for the PV panels which are being considered. The use and distribution of these across the Site will be subject to further consideration as the design of the Scheme progresses.

- Fixed South Facing PV Arrays (Image 5.1); and
- Single Axis Trackers (Image 5.2).

Fixed South Facing PV Arrays

5.2.5 PV Tables that face south and are mounted to fixed Mounting Structures in an east/west configuration and would be installed between 15 and 35 degrees to the horizontal facing south to optimise daylight absorption. The PV Panel would have a maximum height of 3.5m.

Image 5.1 Typical Fixed PV Arrays (with Conversion Unit)

Single Axis Trackers

5.2.6 PV panels which are mounted to Mounting Structures to form PV Tables will be orientated north/south and would operate between 60 degrees from the horizontal (facing east in the morning) moving toward 0 degrees (horizontal) at midday, and up to 60 degrees from the

horizontal (facing west in the evening). The modules would track from east to west throughout the day and would return to their resting position 60 degrees (facing east) over night. The PV Panel would have a maximum height of 4.5m.

Image 5.2 Typical Single Axis Trackers

Mounting Structures

5.2.7 The metal frames upon which the PV panels will be mounted will be pile driven or screw mounted into the ground to a maximum depth of 4m, subject to ground conditions and further environmental assessment. The option to install concrete blocks as ballast or other non-ground penetrative techniques may also be considered, avoiding the need for driven and screw anchored installation, therefore minimising ground disturbance. The mounting frames would likely be made of either anodised aluminium alloy or galvanised steel and would have a rough matt finish.

Conversion Unit / Inverters

5.2.8 Conversion Unit is a collective term used for the combination of electrical components including inverters, transformers and switchgear, which are required to manage the electricity generated by the PV panels. These components may be housed ('integrated') together within a container. A container would measure approximately 3.5m (H) x 5m (W) and 15m (L). An alternative option is for the individual electrical components to be housed in standalone cabinets, which are described below.

5.2.9 If the Conversion Unit is configured as standalone cabinets, the Conversion Unit compound would be surrounded by 3m high palisade fencing, with integrated gates for access. The compound will be levelled and covered in a layer of gravel, with the equipment mounted on a concrete slab or footings, with a depth of 1m.

5.2.10 The containers and / or cabinets are typically externally finished in keeping with the prevailing surrounding environment, often utilising a green or grey painted finish. The containers or cabinets would typically be mounted on adjustable legs on a concrete foundation surrounded by an area of hardstanding.

5.2.11 The configuration of equipment within the Conversion Unit compounds will depend on the iterative design process as influenced by technical and environmental factors as well as technology available at the time of procurement.

5.2.12 Inverters are required to convert the Direct Current (DC) electricity collected by the PV panels into Alternating Current (AC) which allows the electricity generated to be exported to the National Grid.

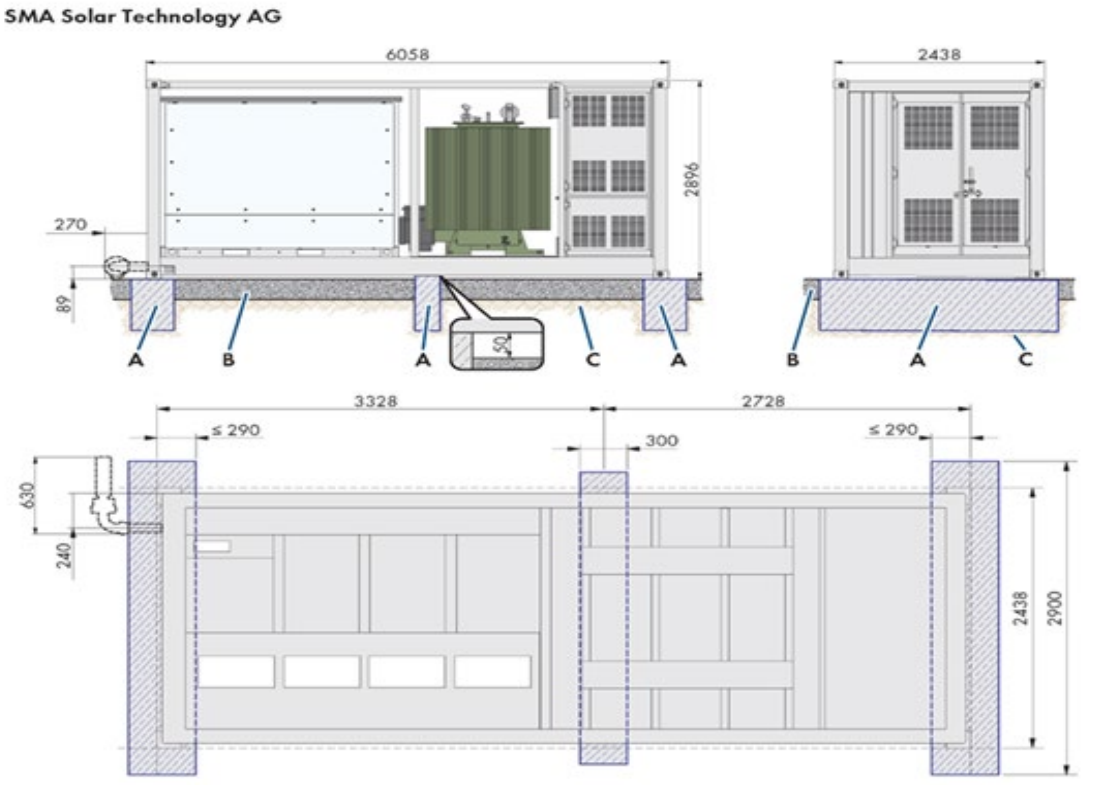
5.2.13 Inverters are sized to deal with the level of voltage and intensity, which is output from the PV panels. There are two options for inverters:

- String inverters which are small enough to be mounted underneath or behind the PV panels on the Mounting Structures; or
- Inverters located within the Conversion Unit which would either be standalone cabinets, or housed ('integrated') within a container.

Image 5.3 Typical Conversion Unit

(Image source:https://www.sma-altenso.com/references/battery-storage-groitzsch/)

Image 5.4 Typical Inverter Unit



Position	Designation
A	Strip foundation
B	Pea gravel ground
C	Solid ground, e.g., gravel

33kV Sub-distribution Switch Rooms

5.2.14 Throughout the Solar PV Site there would be a need to locate 33kV Sub-distribution Switch Rooms to collect the generated power from the Solar PV Arrays, and deliver it to the Customer Substation at the required voltage. The 33kV Sub-distribution Switch Rooms collect the smaller voltage cables and convert to a larger 33kV cable.

5.2.15 The 33kV Sub-distribution Switch Rooms would be 11m by 3.5m with a height of 4m. The number and location of which will be set out within the ES following further design evolution.

Substations

5.2.16 There are two different types of substations required across the Scheme. These comprise the Customer Substation, and the National Grid Substation. Further details of which are set out in the sub headings below.

Customer Substation and Ancillary Buildings

5.2.17 There will be one Customer Substation located near the Point of Connection which for the purposes of this PEIR could be located anywhere within fields 24, 26, 27, 33 or 35, as shown

on the Concept Masterplan (**Volume III, Appendix 5.1**). The location of the Customer Substation within these fields will be determined through further assessment and consultation.

5.2.18 The Customer Substation will comprise electrical infrastructure such as the transformers, switchgear and metering equipment required to facilitate the export of electricity from the Scheme to the National Grid. The Customer Substation is also expected to include Ancillary Buildings which will include office space and welfare facilities as well as operational monitoring and maintenance equipment. The switchgear within the Customer Substation will either be air insulated switchgear or gas insulated switchgear substations. An example of an air insulated substation is shown in **Image 5.5** .

5.2.19 The indicative size of the Customer Substation compound is approximately 4ha, with an approximate height of 13m that allows for the associated electrical infrastructure, control buildings and office/storage buildings.

Image 5.5 Air Insulated Substation

National Grid Substation and Grid Connection Infrastructure

5.2.20 A new National Grid Substation will be required to connect the Customer Substation to the National Grid. The National Grid Substation will monitor and manage the export and import of electricity between the National Grid and the Scheme and will be operated by National Grid Electricity Transmission plc (NGET).

5.2.21 The indicative zone for the National Grid Substation is shown as fields 27 – 33 on the Concept Masterplan (**Volume III, Appendix 5.1**).

5.2.22 The National Grid Substation is assumed to have a maximum height of 13m and a footprint of approximately 4ha. The National Grid Substation is expected to include Ancillary Buildings and car parking. The National Grid Substation would be enclosed by a palisade fence in line with National Grid standards.

5.2.23 Grid Connection Infrastructure will be required between the National Grid Substation and the existing 400kV overhead lines. The Grid Connection Infrastructure could include underground and/or overhead lines including construction of new pylons and works to existing pylons between the National Grid Substation and the Point of Connection.

5.2.24 The Applicant is currently engaging with NGET regarding the Grid Connection Infrastructure. For the purposes of this PEIR, two options are currently being considered:

- A Single Turn In; or
- A Double Turn In

5.2.25 The details of the National Grid Substation and Grid Connection Infrastructure will be refined throughout the development of the Scheme through ongoing engagement with NGET and will be set out within the ES.

A Single Turn In

5.2.26 A Single Turn in would involve one of the existing OHLs (Norwich Main – Walpole 1) to be diverted from its existing alignment and into the new National Grid Substation. To facilitate the diversion of the existing 400kV OHL, it is assumed that up to 5 new pylons would need to be constructed to carry the diverted Norwich Main – Walpole 1 OHL.

5.2.27 For the purposes of this PEIR, the new pylons are assumed to be of a similar scale and design as the existing pylons.

5.2.28 The other existing OHL (Norwich Main – Walpole 2) would continue to be carried by the existing pylons.

A Double Turn In

5.2.29 A Double Turn in would involve both of the existing OHLs (Norwich Main – Walpole 1 and Norwich Main – Walpole 2) to be diverted from their existing alignment. To facilitate the diversion of both existing 400kV OHLs, it is assumed that up to 5 new pylons would need to be constructed to carry both the Norwich Main – Walpole 1 and Norwich Main – Walpole 2 OHLs. For the purposes of the PEIR, it is assumed that the Norwich Main – Walpole 2 OHL could either sail over the new National Grid Substation or be connected to the new National Grid Substation Infrastructure.

5.2.30 For the purposes of this PEIR, the new pylons are assumed to be of a similar scale and design as the existing pylons.

5.2.31 The diversion of both existing 400kV OHLs would allow for the possibility of up to 5 of the existing pylons, and OHLs between the pylons where the OHL's are to be diverted, to be decommissioned and dismantled.

Electricity Export and Point of Connection to National Grid

5.2.32 The electricity generated by the Scheme is expected to be exported via a 400kV connection between the Customer Substation and the Point of Connection via the National Grid Substation. The Grid Connection Corridor will include Grid Connection Infrastructure. The alignment and route of the Grid Connection Corridor will be dependent on the location of the Customer Substation and National Grid Substation. The route will be refined through ongoing engagement with NGET.

Cable Circuits

5.2.33 Low voltage distribution cabling between Solar PV panels and the Conversion Units will typically be fixed to the Mounting Structure (above ground), and then underground between Mounting Structures and the Conversion Units. High Voltage cables are required between the Conversion Units, 33kV Sub-distribution Switch Rooms, BESS and the Customer Substation. The high voltage cables will be routed alongside the Access Tracks and / or use existing gaps in hedgerows where practicable to minimize hedgerow loss.

5.2.34 The dimensions of trenching will vary subject to underground cabling and the associated number of ducts they contain and will be dependent on the method of installation and ground conditions. There may be a requirement for trenchless technology such as horizontal directional drilling (HDD) within the Site, for example to cross beneath existing underground utilities.

5.2.35 Communication cables will be required throughout the Solar PV Site to allow for monitoring during operation, such as the collection of data on solar irradiance from pyranometers. The communication cables would typically be installed within the same trench and alongside the electrical cables.

The Battery Energy Storage System (BESS)

5.2.36 For the purposes of this PEIR the BESS could be located anywhere within fields 24, 26, 27, 33 or 35, as shown on the Concept Masterplan (**Volume III, Appendix 5.1**). The location of the BESS within these fields will be determined through further assessment and consultation.

5.2.37 The BESS compound is anticipated to be up to 10.5ha, the precise size and number of individual battery storage containers will depend upon the level of power capacity and duration of energy storage which will be refined for the ES.

5.2.38 The BESS is designed to provide peak generation and grid balancing services to the National Grid. It will allow excess electricity generated from the PV panels to be stored in the batteries and exported to the grid when required. Excess energy from the grid can also be imported to the batteries. The BESS will therefore provide flexibility and enhance grid reliability.

5.2.39 The BESS is likely to comprise batteries which would be housed in containers, with each container typically measuring 16 x 3m and 3.2m in height. The containers would be mounted on a reinforced concrete foundation slab or concrete piling, with a minimum clearance of 0.1m beneath the container and the hard standing. The battery containers will be separated from each other and surrounding infrastructure by a minimum distance that complies with any relevant National Fire Chief's Council (NFCC) and / or the National Fire Protection Association (NFPA) guidelines at the time of detailed design.

5.2.40 The containers are typically externally finished in keeping with the prevailing surrounding environment, often utilising a green or grey painted finish. The BESS compound would be surrounded by 3m high palisade fencing, with integrated gates for access.

5.2.41 The BESS will require heating, ventilation and cooling systems to ensure the efficiency of the technology. These features are integrated into the units within which they are housed. The battery system will comprise bi-directional AC/DC inverters to control the charge of the batteries from the solar PV energy output or the charge of the batteries when drawing energy from the grid.

5.2.42 The BESS Compound would also include other apparatus such as water storage and / or fire suppression systems, Access Tracks and hard standing areas.

5.2.43 The preferred locations for the BESS for the purposes of this PEIR are shown on the Concept Masterplan (**Volume III, Appendix 5.1**). Ongoing technical studies will determine which location within the Site is most appropriate for the BESS. Image 5.7 shows an example of a BESS arrangement with associated infrastructure.

Image 5.6 Typical BESS Units

Fencing and Security

5.2.44 During operation, a perimeter fence will enclose the operational area of the Scheme. A Deer fence will enclose the Solar PV Arrays, whilst a Palisade fence will enclose the Conversion Units, 33kV Sub-distribution Switch Rooms, BESS, Customer Substation and National Grid Substation. The deer fence will be wooden or metal posts with a wire mesh up to 2.5m in height, as shown on **Image 5.8.** Palisade fencing would be up to 3m in height. The proposed perimeter fencing strategy is shown in the Masterplan Strategies (**Volume III, Appendix 5.3**).

5.2.45 Clearances above ground or mammal gates will be included within the deer fence to permit the passage of wildlife. Vehicular access gates will be of similar construction and height as

the perimeter fencing. Fencing during the construction phase will also be required, the details of which will be confirmed as part of the detailed design post consent.

5.2.46 Pole mounted internal facing closed circuit television (CCTV) systems installed at a height of up to 3m will be deployed around the perimeter of the Site. The CCTV cameras would use night-vision technology, which would be monitored remotely and avoid the need for night-time lighting of the Solar PV Site.

Image 5.7 Typical Deer Fencing

Image 5.8 Typical Palisade fencing

Lighting

5.2.47 Lighting is not required within the Solar PV Site for the Operational Phase.

5.2.48 The lighting of the Customer Substation and National Grid Substation and BESS compound would be in accordance with health and safety requirements, particularly around any emergency exits where there would be lighting, similar to street lighting that operates from dusk. All lighting would seek to limit any impact on sensitive receptors through the implementation of standard good practice measures during construction, operation and decommissioning.

5.2.49 Motion sensing lighting will be implemented around the Customer Substation and National Grid Substation and BESS and other critical electrical infrastructure to be used only for maintenance and security purposes.

Site Access

5.2.50 Two points of access from the A1065 are currently being considered as shown on the Concept Masterplan (**Volume III, Appendix 5.1**). The proposed access points utilise existing agricultural access points. The width of the site access from the A1065 will likely to be up to 6.5m wide to facilitate two-way HGV traffic and Abnormal Indivisible Loads.

5.2.51 A secondary point of access is required to facilitate the crossing of Narford Lane along with internal crossing points over the Scheme. The potential location of the secondary access points are shown on the Concept Masterplan (**Volume III, Appendix 5.1**). The location of the

crossings will be confirmed once the general arrangement and layout of the Scheme is further developed.

5.2.52 The proposed point of access into the Site will incorporate a security gate, which will be set back from the highway to allow sufficient room for an articulated HGV to leave the highway before entering the Site. Vegetation works to the existing hedgerows may be required to vary the existing visibility splays.

Access Tracks

5.2.53 A network of internal access tracks will be provided to allow access to the Conversion Units33kV Sub-distribution Switch Rooms. It is anticipated that internal Access Tracks will follow the alignment of the existing agricultural tracks, where practicable with the exception of the Droves, which will not be used for routing construction traffic apart from crossing points. The potential crossing points are shown on the Concept Masterplan (**Volume III, Appendix 5.1**).

5.2.54 New internal Access Tracks are likely to be up to 6m wide, where passing bays are provided along the internal Access Tracks. The internal Access Tracks will likely be constructed of compacted stone with excavation kept to a minimum. Where drainage is required a ditch or a swale may be located downhill of the internal access track to control any potential for surface water run-off.

Green Infrastructure

5.2.55 The existing hedgerows, vegetation, woodland, trees, ditches, ponds, Marl pits and field margins will be retained within the layout of the Scheme where practicable, with the exception of removals and/or crossings required for new Access Tracks, perimeter fencing and Cable Circuits. Access points from the highway and Access Tracks will be designed to use existing agricultural gateways/tracks between the fields where practicable and the width of any new accesses will be kept to a minimum where practicable.

5.2.56 The following minimum offsets/buffers from existing landscape features have been embedded within the design of the Scheme, see Table 5.1, with the exception of where Access Tracks, perimeter fencing and/or cable routes are required to cross an existing feature.

Table 5.1 Minimum offsets/buffers from existing landscape features

Landscape feature	Buffer/Offset
Hedgerows Hedgerows – with trees	8m 10m
Woodland (Non-ancient)	15m
Ditches	6m
Badger setts (Badger sett – outlier)	30m 20m
Individual trees and groups of trees	10m
Ponds	10m
Non-Statutory Designated sites and Local Wildlife sites	10m
Veteran and Ancient trees	15x width of tree stem diameter
Curtilage of residential properties	Bespoke Design Response based on Residential Visual Amenity Assessment
Public Rights of Way (PRoWs)	15m

5.2.57 These offsets/buffers will be used to deliver a combination of embedded mitigation and enhancement in the form of hedgerow planting and/or grass/wildflower planting. The buffers/offsets will be a minimum and for example may be increased to deliver further mitigation or enhancements and/or respond to root protection areas where required.

5.3 Scheme Parameters and Rochdale Envelope

5.3.1 In order to maintain flexibility in the design and layout at this stage in the process, the assessment of the Scheme in this PEIR has adopted the Rochdale Envelope approach, as described in Advice Note Nine 'Rochdale Envelope' as published by the Planning Inspectorate (PINS) in July 2018. This involves specifying parameter ranges, including details of the maximum, and where relevant the minimum, size (footprint, width, and height relative to Above Ground Level (AGL)), technology, and locations of the different elements of the Scheme, where flexibility needs to be retained.

5.3.2 The use of the Rochdale Envelope approach has therefore been adopted to present a likely worst-case assessment of the potential environmental effects of the Scheme. Table 5.2 sets out the parameters that have been used by each of the technical topics to inform their

assessment within the PEIR. Each technical assessment will explain the likely significant effects of the Scheme on the environment and set out the proposed approach and methodology for further assessment.

5.3.3 The tabular form of Scheme Parameters can be read alongside the Concept Masterplan, which sets out the spatial extent of the Scheme components.

5.3.3.1 To assist with the assessment and to ensure Good Design, Draft Scheme Outcomes and Design Principles have been developed that will guide (within the parameters) the size, type and colour of elements of the Scheme. The Draft Design Principles will help secure design mitigation that has been identified through the EIA process. This is an iterative process and will be ongoing throughout the course of the pre-application stage of the Scheme. The Draft Design Principles are set out at **Volume III, Appendix 5.3.**

Table 5.2 Scheme Design Parameters for PEIR

Scheme Component	Parameter Type	Maximum Design Parameter
PV Panels		
Single Axis Trackers	Maximum height of solar panels above ground level	4.5m at greatest inclination. 2.5m when horizontal.
	Minimum height of the lowest part of the solar panel above the ground level	0.4m.
	Indicative orientation and slope	The tracking solar modules will be aligned in north-south rows, and incline to the east or west up to a maximum inclination of 60 degrees from horizontal.
	Solar panel mounting structure	Metal frames that hold solar panels in rows, either secured via metal posts driven into ground to a depth of up to 4m or, subject to ground conditions and further environmental assessment, weighed down using concrete feet.
	Solar panel type	Bifacial panels.
	Separation distance between rows	Separation distance between rows of tracking panels will be a minimum of 2.5m at the closest point, and there will be a maximum distance of 15.0m between solar module centrelines.
Fixed South Facing PV Arrays	Maximum height of solar panels above ground level	3.5m.

Scheme Component	Parameter Type	Maximum Design Parameter
	Minimum height of the lowest part of the solar panel above the ground level	0.4m.
	Indicative orientation and slope	The fixed solar modules will be aligned in east-west rows, and slope towards the south at a fixed slope of 10 to 35 degrees from horizontal.
	Solar panel mounting structure	Metal frames that hold solar panels in rows, either secured via metal posts driven into ground to a depth of up to 4m or, subject to ground conditions and further environmental assessment, anchored using concrete feet.
	Solar panel type	Bifacial panels.
	Separation distance between rows	Separation distance between rows of tracking panels will be a minimum of 2.5m at the closest point, and there will be a maximum distance of 14.0m between solar module centrelines.
Conversion Units	Maximum dimensions	15m by 5m with a maximum height of 3.5m.
	Materials	Conversion Units are sited on a concrete slab, strips or footings.
33kV sub-distribution Switch Rooms	Maximum dimensions	Switch rooms within the Solar PV Arrays that collect generated power and deliver to the Customer Substation. 4m (h) x 11m (l) x 3.5m (w).

Scheme Component	Parameter Type	Maximum Design Parameter
Fencing and Security	Conversion Units, 33kV Sub-distribution Switch Rooms, BESS, Customer Substation and National Grid Substation fencing	Metal palisade security fencing around Conversion Units, BESS and substations which will be 3m height.
	Solar PV Arrays and Conversion Units	Deer fence wire mesh and wooden post fencing with a maximum height of fencing will be 2.5m around individual fields or groups of fields.
	Security Surveillance	CCTV camera poles with a maximum height of 3m.
Substations		
Customer Substation	Maximum compound area	4ha.
	Maximum height	13m to the top of the busbars.
	Compound perimeter fencing	3m high metal palisade fencing around the compound.
	Access track	Maximum 6m wide constructed of hardcore or gravel over a levelling layer of substrate.
	Relay and control Rooms – maximum dimensions	Maximum dimensions of 7m by 19m and maximum height of 4m.
	33kV switch room	Maximum dimensions of 7m by 19m and max height of 4m.

Scheme Component	Parameter Type	Maximum Design Parameter
	Housing	Maximum height 6m.
	Foundations	Onsite infrastructure will be mounted on a concrete base or monolith plinth to a maximum depth of 1m. If a piling solution is required, piles to a maximum depth of 12m would be used.
National Grid Substation	Maximum compound area	4ha.
	Maximum height	13m to the top of busbars.
	Compound perimeter	3m high metal palisade fencing around the compound.
	Access track	Maximum 6m wide constructed of hardcore or gravel over a levelling layer of substrate.
	Relay and control Rooms – maximum dimensions	Maximum dimensions of 7m by 19m and maximum height of 4m.
	Foundations	Onsite infrastructure will be mounted on a concrete base or monolith plinth to a maximum depth of 1m. If a piling solution is required, piles to a maximum depth of 12m would be used.
New Electricity Pylons	Number	Up to 5.
	Height	Same height as existing pylons.

Scheme Component	Parameter Type	Maximum Design Parameter
The BESS	BESS units	16m (L) x 3m (W) x 3.2m (H).
	Single BESS compound	Up to 10.5ha.
	Compound perimeter	3m high metal palisade fencing around the compound.
	Access	Accesses required for permanent operation and maintenance access will be a minimum of 3.5m in width up to a maximum of 6.0m in width constructed of hardcore or gravel over a levelling layer of substrate. Parking bays will be provided (number to be confirmed).
	Foundations	The foundations for the BESS containers will either be a reinforced concrete base to a maximum depth of 1m, or, if a piling solution is required, piles to a maximum depth of 12m would be used.
	Surfacing	The BESS compound surfacing will include a levelled platform where the BESS equipment will be placed on. Each unit will sit on a concrete base.
Cable Corridor	Maximum width	7m width. This includes separation distances where multiple cables are running in parallel within the same trench or within multiple trenches.
	Working width	50m.
	Minimum width	1m width.

Scheme Component	Parameter Type	Maximum Design Parameter
	Maximum depth (trench)	2m depth.
	Horizontal Directional Drilling (HDD)	Assumed depth of 12 metres. Laydown areas – 25m x 25m.

5.4 Development Capacity

5.4.1 PV panels generate electricity in DC form. PV panels feed into Inverters which convert electricity to AC. Because the Inverter is separate from the PV panels, the total capacity of a solar farm can be measured either in terms of the combined capacity of installed PV panels (measured in DC) or in terms of combined capacity of installed Inverters (measured in AC).

5.4.2 Paragraph 2.10.51 of NPS EN-3 [Ref 5-1] confirms that for the purposes of determining the capacity thresholds in Section 15 of the PA2008, all forms of generation other than solar are currently assessed on an AC basis, while solar farms are assessed on their DC capacity. EN-3 states that for the purpose of Section 15 of the PA 2008, the maximum combined capacity of the installed inverters (measured in AC) should be used for determining the solar capacity of a site. The capacity threshold for a NSIP is 50MW (AC) in England.

5.5 Construction, Operation and Decommissioning Phases

Construction Phase

5.5.1 The Construction Phase is anticipated to take place up to 24 months. The final programme will be dependent on the detailed layout design and potential environmental constraints on the timing of construction activities, and will be detailed in the ES. However, the Scheme is anticipated to energise in Q4 2033 or as early as National Grid are able to offer. Based on Q3 2033 energisation, it is anticipated that the earliest the Construction Phase would commence would be Q3 2031. There is likely to be a pre-construction period preceding the Construction Phase of approximately six months (Q1 and Q2 2031) to allow site preparation works.

5.5.2 There will be Temporary Construction compounds required across the Site. The Temporary Construction compounds will comprise:

- Temporary portacabins for construction workers (the dimension of the portacabins would vary and the maximum size for individual units is expected to be 10m by 3m with a typical maximum height of 3m)
- Perimeter security fencing with a typical maximum height of 3m
- Parking area for construction and workers vehicles
- Secure compound for storage
- Temporary hard standing
- Wheel washing facilities
- Storage bins for recyclables and other waste; and
- Lighting will be required during construction periods but will be temporary in nature and normal working hours will be adhered to except in specified circumstances.

5.5.3 There will be Abnormal Indivisible Loads (AIL), Heavy Goods Vehicles (HGV) and Light Goods Vehicle (LGV) movements associated with deliveries and construction worker arrivals and departures. Typical construction vehicles will include excavators, ramming machines, cable layers, low loaders, crane and waste vehicles, trenchers, telehandlers, forklift trucks and

tractors/trailers. HGV and LGV movements have been assessed as part of this PEIR and will be further assessed to inform the ES.

5.5.4 Construction activities are likely to be carried out Monday to Friday 07:00-18:00 and between 08:00 and 13:30 on Saturdays. However, some activities may be required outside of these times (such as the delivery of abnormal loads, concrete pours for foundations, nighttime working for cable construction works in public highways or HDD activities).

5.5.5 Where practicable, construction deliveries will be coordinated to avoid HGV movements during the traditional AM peak hour (08:00-09:00) and PM peak hour (17:00-18:00).

Construction Management

5.5.6 An outline Construction Environmental Management Plan (oCEMP) will be prepared in support of the ES, which will set out the mitigation measures identified through the preliminary EIA assessments that form this PEIR. The oCEMP will be submitted as part of the DCO Application.

5.5.7 Prior to the commencement of any phase of development a Construction Environmental Management Plan (CEMP) will be submitted to and approved by the relevant planning authority, and this will be secured by a requirement in the DCO. The CEMP for each phase will be in accordance with the Outline CEMP. This will ensure the potential construction impacts are minimised.

5.5.8 The CEMP will outline the allocated responsibilities, procedures and requirements for site environmental management. It will include relevant site-specific method statements, operating practices, and arrangements for monitoring and liaison with local authorities and stakeholders.

5.5.9 The main contractor(s) undertaking the construction of the Scheme will need to adopt and comply with the CEMP, allocate environmental management responsibilities to a site manager and ensure that all sub-contractors' activities are effectively managed in accordance with the CEMP.

5.5.10 An outline Construction Traffic Management Plan (oCTMP) including details on construction logistics and construction worker travel, will be prepared in support of the ES. The oCTMP will include information to guide the delivery of materials, plant, equipment and staff during the Construction Phase. The oCTMP will be submitted as part of the DCO Application. The oCTMP will form a 'live' document, being updated as necessary with contractor input to set out the strategy to manage construction vehicle access to the Scheme.

5.5.11 Prior to the commencement of any phase of development a Construction Traffic Management Plan (CTMP) will be submitted to and approved by the relevant planning authority, and this will be secured by a requirement in the DCO. The CTMP for each phase will be in accordance with the Outline CTMP. This will ensure the potential construction impacts are minimised.

Operational Phase (including Maintenance and Replacement)

5.5.12 The Operational Phase of the Scheme is proposed to be 60 years. During the Operational Phase of the Scheme, onsite activities would include routine servicing, maintenance activities, and the replacement of equipment such as PV panels and BESS as and when required, as well as management of vegetation.

Operational Management

5.5.13 Following construction, traffic associated with the operation and maintenance of the Scheme will be infrequent and result in limited vehicle movements as no on-site staff will be required to operate the Scheme on a day-to-day basis. Movement within the Site will be by way of quad bike or small, farm utility vehicle. Those arriving to undertake maintenance would generally be expected to travel by car, appropriate 4x4 type vehicle or light van. Suitable access will be retained from the highway to enable ongoing maintenance to take place.

5.5.14 The land underneath and around the PV Tables would be sown and managed through a combination of sheep grazing, hay/silage production and wildflower grassland, in order to manage vegetation during the Operational Phase of the Scheme.

5.5.15 An outline Landscape and Ecological Management Plan (oLEMP) will be prepared in support of the ES. The management of the landscape and ecological features will be undertaken in accordance with a detailed Landscape and Ecological Management Plan (LEMP) will be secured by a requirement in the DCO Application.

5.5.16 At times during operation, additional staff will be required to attend the Site when necessary for replacement of solar and BESS infrastructure. An outline Operational Traffic Management Plan (oOTMP) will be prepared in support of the ES, which will confirm the likely operational traffic flows.

5.5.17 An outline Operational Environmental Management Plan (oOEMP) will be prepared in support of the ES, which will include control measures to ensure no significant impacts will arise during the maintenance and replacement activities.

Replacement Activities

5.5.18 The replacement programme for the Scheme is expected to be as follows:

- That the operational life of PV panels is 40 years. The operational replacement of panels is anticipated to comprise:
  - Replacement of individual defective and broken PV panels on an ad hoc basis.
  - Planned replacement of all PV panels once during the Operational Phase. The PV panels are anticipated to be replaced over a 12 to 24 month period.
- It is expected that the BESS could be replaced up to five times during the Operational Phase. The operational replacement of BESS will be assessed in the ES; however the effects are not anticipated to be greater than those associated with PV Panel replacement.

5.5.19 Further, the programme for maintenance and the replacement of components across the Scheme should naturally be staged such that this is not concurrent across all the Site.

5.5.20 The ES will include further details of the maintenance and replacement activities, and appropriate controls will be developed as part of the DCO. An Operational Environmental Management Plan (OEMP) would include control measures to ensure no significant impacts would arise during the maintenance and replacement activities.

Decommissioning Phase

5.5.21 Decommissioning is anticipated to take approximately 12 to 24 months.

5.5.22 During the Decommissioning Phase, all the solar infrastructure including PV panels, Mounting Structures, above ground cabling, Conversion Units, 33kV Sub-distribution Switch Rooms, fencing, Ancillary Infrastructure, BESS and the Customer Substation would be removed and recycled or disposed of in accordance with good practice following the waste hierarchy, with materials being reused or recycled whenever practicable. All waste will be disposed of in accordance with the legislation at the time of decommissioning.

5.5.23 It is assumed that the National Grid Substation, the Sealing End Compound, underground cables, and the pylons and overhead lines would remain in situ.

5.5.24 Any requirement to leave the Access Tracks in situ would be discussed and agreed with the landowner at the time of decommissioning and consented separately.

Decommissioning Management

5.5.25 An outline Decommissioning Environmental Management Plan (oDEMP) will be prepared in support of the ES, which will set out the mitigation measures identified through the preliminary EIA assessments that form this PEIR. The oDEMP will be submitted as part of the DCO Application. An outline Decommissioning Traffic Management Plan (oDTMP) will also be prepared in support of the ES and submitted with the DCO Application.

5.5.26 Prior to the commencement of any phase of decommissioning a Decommissioning Environmental Management Plan (DEMP) and a Decommissioning Traffic Management Plan will be submitted to and approved by the relevant planning authority, and this will be secured by a requirement in the DCO. The DEMP and DTMP for each phase will be in accordance with the oDEMP and oCTMP. This will ensure the potential construction impacts are minimised.

5.5.27 Following removal of the PV panels, Customer Substation, Conversion Units, 33kV Sub-distribution Switch Rooms, fencing, BESS and other Ancillary Infrastructure, the Site would be reinstated to its original use as far as practicable and in accordance with a Decommissioning Environmental Management Plan (DEMP).

Waste

5.5.28 Waste will be generated during all phases of the Scheme. Solid waste materials generated during construction and decommissioning will be segregated and stored on the Site prior to transport to an approved, licensed third party recycling facility or, if it cannot be recycled, an authorised facility for recovery or disposal. Management of waste will be addressed further within the outline Site Waste Management Plan (oSWMP) to be submitted with the DCO Application. Waste arisings will be assessed as appropriate within the relevant chapters of the ES.

References

Ref 5-1 Department for Energy Security & Net Zero, Overarching National Policy Statement for energy (EN-1), November 2023