Tween Bridge Solar Farm

5.6 Design Approach Document

Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

APFP Regulation 5(2)(q)

Document Reference: 5.6

August 2025

Revision 1

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Executive Summary

This Design Approach Document has been prepared in support of an application for a Development Consent Order for the construction, operation (including maintenance) and decommissioning of Tween Bridge Solar Farm (the 'Scheme').

The Scheme is a Nationally Significant Infrastructure Project under Section 14(1)(a) and Sections 15(1) and (2) of the Planning Act 2008 as it comprises a generating station in England with a capacity exceeding 50 megawatts. It therefore requires a Development Consent Order from the Secretary of State for the Department for Energy Security and Net Zero.

This Design Approach Document has been prepared on behalf of RWE Renewables UK Solar and Storage Ltd to support the Development Consent Order Application. The Design Approach Document sets out the vision, context and design response for the Scheme and should be read in conjunction with the other documents submitted with the Development Consent Order Application. The Design Approach Document details the consideration given to policy, the existing context and the necessary safety requirements when designing a solar farm.

1 Introduction

1.1. Introduction

1.1.1. This Design Approach Document (DAD) has been prepared on behalf of RWE Renewables UK Solar and Storage Ltd (the 'Applicant') in support of an application for a Development Consent Order (DCO) (the 'DCO Application') for the construction, operation and decommissioning of the proposed Tween Bridge Solar Farm (hereinafter referred to as the 'Scheme').

1.1.2. The document is prepared pursuant to Regulation 5(2)(q) of The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (APFP Regulations) **[Ref 1]** and forms part of a suite of supporting documents for the DCO Application.

1.2. Purpose of this document

1.2.1. The purpose of the DAD is to set out the vision, context and design response for the Scheme. The preparation of the DAD has been informed by the 'Nationally Significant Infrastructure Projects: Advice on Good Design' **[Ref. 2],** the relevant National Policy Statements (NPS) **[Ref. 3, 4 and 5]** and the National Infrastructure Commission (NIC) Principles of Good Design **[Ref. 6].**

1.3. Interaction with other application documents

1.3.1. The Applicant has prepared this document with the intended purpose of it to be read alongside and supplement other application documents, namely the **Design Approach Document Appendix A: Parameters Document (Document Reference 5.5.1];** the **Consultation Report (Document Reference 5.1**); **Environmental Statement (Document Reference Volume 6 documents)**; the **Outline Landscape and Ecology Management Plan (LEMP) (Document Reference 7.6**); the **Outline Construction Traffic Management Plan (Document Reference 7.7);** the **Landscape and Visual Mitigation Strategy (Document Reference 6.4.6.4)** and the **Planning Statement (Document Reference 5.5).**

1.4. Structure of this document

1.4.1. This DAD is organised into chapters detailing the consideration given to policy, the existing physical and environmental context and the necessary safety requirements when designing a solar farm.

1.4.2. A short summary of what can be found in each chapter is provided below:

- **Chapter 1: Introduction** - provides an introduction to the DAD, its purpose and how it interacts with the wider application.
- **Chapter 2: The Scheme Description** - provides a summary of the description and the components which make up the Scheme .
- **Chapter 3: The Design Context and Vision** – this chapter summarises the relevant national and local policy requirements for achieving 'good design'. It then moves on to outline the vision that the Applicant has developed in consultation with stakeholders as well as the resulting project design principles.
- **Chapter 4: Location Context** - provides a summarised description of the existing landscape, referring to landscape and visual, cultural heritage, biodiversity and land use.
- **Chapter 5: Evolution of the Design** - provides an account of how the design of the Scheme has evolved since conceptualisation until DCO submission.
- **Chapter 6: The Design Response** - provides an account of how the design of the Scheme has responded to the design context and the location context, detailing the remaining landscape and visual effects.
- **Chapter 7: Conclusion** - sets out the conclusions of this DAD, and how the Applicant has devised a design which is a positive response to the local landscape whilst minimising negative environmental impacts.

1.5. Pre-Application Engagement and Consultation

1.5.1. The development of the design of the Scheme has included extensive engagement and consultation with local landowners, business owners, residents and statutory stakeholders and regulators.

1.5.2. The PA 2008 **[Ref. 1]** requires applicants for DCOs to carry out formal (statutory) pre-application consultation on their proposals. To satisfy the requirements on consultation that must be undertaken as set out in the PA 2008 and related regulations, the Applicant has adopted a two-stage approach to pre-application consultation.

1.5.3. The non-statutory consultation was carried out between Wednesday 4th October 2023 to 23:59 on Wednesday 29th November 2023 and statutory consultation (Stage 2) in compliance with Sections 42 and 47 of the PA 2008 **[Ref 1]** was undertaken between Thursday 20th March 2025 to Thursday 8th May 2025 supported by a Preliminary Environmental Information Report (PEIR) and a number of other documents.

1.5.4. The Applicant has had regard to all feedback it has received through non-statutory and statutory consultation and engagement when refining the Scheme. For a detailed account of the consultation and engagement undertaken during the pre-application period, please see the **Consultation Report [Document Reference 5.1]**

2 Scheme Description

2.1. Scheme Description

2.1.1. This section provides an overview description of the Scheme, including the components of the Scheme, alongside the proposed construction, operation and decommissioning activities. The full description is contained within **ES Volume 1, Chapter 2: Scheme Description [Document Reference 6.1.2]**.

2.2. Overview

2.2.1. Key components of the Scheme are: -

- Ground-mounted solar PV generating station and associated mounting structures,
- On-site supporting equipment including inverters, transformers and switchgear,
- A BESS including batteries and associated enclosures, monitoring systems, air conditioning, electrical cable and fire safety infrastructure. The BESS is indicatively split into four separate 100MW compounds. Each 100MW compound would be located next to and connected to one of the seven on-site 132kV Substations,
- Seven on-site 132kV Substation compounds, including transformers, switchgear, circuit breakers, control equipment buildings, control functions, material storage, parking, as well as wider monitoring and maintenance equipment,
- Low voltage and 33kV interconnecting cabling to connect and transmit electricity from the solar PV modules and BESS to one of the seven on-site 132kV Substations,
- RWE on-site 400kV Substation,
- Underground 132kV interconnecting cabling to connect the seven on-site 132kV Substations to RWE on-site 400kV Substation,
- Underground 400kV interconnecting cabling from the RWE on-site 400kV substation to edge of Order Limits

- Associated infrastructure including access tracks, parking, CCTV, gates and fencing, lighting, drainage infrastructure, storage containers, earthworks, culverts, surface water management, maintenance and welfare facilities, security cabins and any other works identified as necessary to enable the development,
- Horizontal Directional Drilling for selected cable works where trenching or culvert is not possible or appropriate, including the canal, railway and the M180,
- Highways works to facilitate access for construction vehicles, comprising passing places where necessary to ensure that heavy goods vehicles (HGVs) can be safely accommodated amongst existing traffic, new or improved site accesses and visibility splays,
- Environmental mitigation and enhancement measures, including landscaping, habitat management and biodiversity enhancement,
- Permissive pathways and bird viewing gallery, and
- Temporary development during the construction phase of the Scheme including construction compounds, parking, temporary diversions of Public Rights of Way, and temporary access roadways to facilitate access to all parts of the Order Limits.

2.2.2. Subject to obtaining the necessary consents, construction of the Scheme is anticipated to commence in 2028, and to be completed and the Scheme fully operational in 2032, with phases of capacity coming online from 2029 onward in line with the Applicant's current Grid Connection Agreement (see **Grid Connection Statement [Document Reference 5.8]**). As with all electricity generation projects, this date is under review by NESO as part of the ongoing connections reform process.

2.2.3. The Applicant has a Bilateral Connection Agreement from National Electricity System Operator Limited (NESO) for the connection of the Scheme the Scheme to the transmission network. The Applicant originally received a grid connection offer from National Electricity System Operator Limited (NESO) on 13 December 2021, offering connection to a new National Grid Electricity Transmission (NGET) 400kV Substation with an export capacity of 340MW. That offer was accepted by the Applicant on 27 July 2022. Two subsequent grid connection offers to vary the

agreement were received by the Applicant on 27 January 2022 for an additional 250MW and 26 September 2024 for an additional 210MW and were accepted by the Applicant on 26 April 2023 and 25 November 2024, respectively.

2.2.4. The agreement identifies that a new 400kV substation, which is to be consented and delivered separately by NGET, would be required to increase capacity on the network to facilitate delivery of the Scheme, and other potential projects which could be brought forward on the same network (the NGET 400kV substation).

2.2.5. NGET has commenced their siting process for the NGET 400kV substation, and the exact location of the NGET 400kV substation will not be confirmed until this process is concluded. The final location of the NGET 400kV substation will be dependent on many factors such as technical, design and environmental factors, as well as other factors outside the control of the Applicant. This includes the requirements of NGET, the owners of the national distribution network infrastructure, and their further appraisal and connection considerations.

2.2.6. Following the conclusion of the siting work, NGET would then progress a separate consenting process for the NGET 400kV substation and would own and operate the NGET 400kV substation following construction.

2.2.7. A 400kV export connection cable will be required to connect the Scheme to the new NGET 400kV substation ("the 400kV export connection cable"). As the location of the new NGET 400kV substation is not yet known, it is not possible at this stage for the Applicant to identify and assess the potential route options the 400kV export connection cable would take from the RWE on-site 400kV substation to the NGET 400kV substation. The 400kV export connection cable therefore does not form part of the Scheme nor its accompanying Environmental Impact Assessment, with the exception of the section of the 400kV export connection cable that would be laid underground between the RWE 400kV substation and the boundary of the Order Limits.

2.2.8. Due to the phased nature of the Applicant's Grid Connection Agreement, the DCO application includes the flexibility to construct the Scheme either in a single continuous phase or in multiple phases.

2.2.9. Following 40 years of a fully operational Scheme, it is proposed that the Scheme will be decommissioned. This decommissioning with take approximately 24 months and will be in a phased approach

2.2.10. Fully operational, the Scheme would have the potential to provide enough low-carbon energy to meet the equivalent annual needs of over 388,889 average UK homes[1].

2.3. Two Indicative Operational Layouts

2.3.1. Two design options for the ground-mounted solar PV generating station are assessed within the ES.

2.3.2. Option 1 is a mixed design with both fixed and tracker panels. In this design the majority of the Scheme will be fixed panels, with areas of tracker panels in the northern and western section of the Order Limits. Option 1 (mixed design) was assessed in the PEIR and considered in the statutory consultation process.

2.3.3. Option 2 is for the entirety of the Scheme to be a fixed panel layout. This option has been developed and assessed to ensure the Applicant has sufficient flexibility to deliver the most appropriate scheme following detailed design and having regard to ongoing technological advancements.

- Option 1 is shown on **Figure 2.2b Indicative Operational Layout Plan (Fixed and Tracker Solar Panel) [Document Reference 6.4.2.2]**
- Option 2 is shown on **Figure 2.2a Indicative Operational Plan (Fixed Solar Panel) [Document Reference 6.4.2.2]**

2.3.4. **ES Figure 2.2 Heights Parameters Zonal Plan [Document Reference 6.4.2.3]** provides the maximum height parameter within each field of the Land Parcels and this has been used to inform the assessment within this ES.

2.3.5. The following sections provide a description of the different elements of the Scheme along with the design parameters that have been assessed within this ES. Each environmental factor/topic has assessed the design considered to be the likely worst-case scenario for that discipline to determine the potential for significant effects and identify suitable mitigation measures.

[1] This is calculated based on the latest information published in January 2024, which contains 2022 generation data, and assuming an average (mean) annual household consumption of 3.24MWh, based on the 2022 statistics from the Department of Energy Security and Net Zero

3 The Design Vision

3.1. Introduction

3.1.1. As highlighted in Section 3 of the **Planning Statement [Document Reference 5.5**] and chapter 4 of this DAD, large scale solar generation is expected to make an important contribution to achieving the Government's objectives for the UKs energy supply. As summarised in the Overarching National Policy Statement for Energy (NPS EN-1) **[Ref. 3],** paragraph 3.2.1, these objectives include ensuring that the supply of energy always remains secure, reliable, affordable, and enables the UK to transition to a low carbon economy in order to meet its carbon emission reduction commitments. Paragraph 4.2.4 of NPS EN-1 is fundamental in highlighting the government's position on the criticality of the delivery of low carbon energy generation. It states that the government has "*concluded there is a critical national priority (CNP) for the provision of nationally significant low carbon infrastructure*".

3.1.2. To support this objective, the Applicant's vision for the Scheme, is to deliver a critical national priority project that will seek to maximise energy yield whilst seeking to minimise any adverse effects on the environment and at the same time taking opportunities to deliver significant local benefit.

3.1.3. Good design influenced every decision, and conservation and enhancement of the local environment sat at the core, of the design approach. Central to this is responding positively to the baseline landscape and the ecosystem. The Scheme design principles seek to preserve features of the landscape that contribute to the character and identity of the local area, giving particular consideration to the natural, historic and recreational environment.

3.2. Design Principles

3.2.1. Design should be considered as a process and an outcome, and the importance of good design for NSIPs is championed in National Policy, including NPS EN-1 and NPS EN-3, which set out criteria for achieving good design. Supporting consideration of good design for infrastructure projects, and referred to in the NPS EN-1.

National Infrastructure Commission's 'Design Principles for National Infrastructure' (published February 2020

3.2.2. The National Infrastructure Commission's 'Design Principles for National Infrastructure' (published February 2020) identifies how the purposes of the design process is to bring together engineering, environmental and creative expertise to shape and deliver a development project. The document notes[2]

> *design is as much about process as it is product. Imaginative thinking about design should be embedded at every step of planning and delivery. The principles ensure a good process leads to a good design outcome*

3.2.3. The NIC's Design Group has identified four thematic principles to shape the design and delivery of major infrastructure projects, these are seen in **Table 3-1:**

Table 3-1 – Design Principles

Theme	Design principles
Climate	Always look beyond the boundaries of the project when seeking opportunities to mitigate climate change; design the infrastructure with the flexibility and resilience to adapt to changes in its environment and take advantage of new technology. Use environmental expertise throughout the project to gain understanding of expected emissions; use that expertise to make sure the project takes every opportunity to mitigate emissions and increase resilience. The project must provide a method for measuring whole life emissions over the course of its full lifespan, make changes if it's not performing as it should do and ensure this knowledge is shared.

	And good design incorporates flexibility, allowing the project to adapt over time and build our resilience against climate change.
People	Find opportunities to improve the quality of life for people who live and work nearby and, acknowledging that it won't always be possible to please everyone affected by the project, take steps to mitigate negative impacts. Work with the people who use the infrastructure, the communities who live nearby and the workers who build, maintain and operate it , to ensure the design meets their diverse needs. Build into the project an approach to monitor people's requirements, including how they change throughout its lifespan; make alterations if the infrastructure is no longer able to meet those needs. The range of views of communities affected by the infrastructure must be taken into account and reflected in the design. While it won't always be possible to please everyone, engagement should be diverse, open and sincere, addressing inevitable tensions in good faith and finding the right balance. And it should not just be designed for people today. Good design will plan for future changes in demographics and population
Places	Look for opportunities to use infrastructure to benefit the natural and built environment, see how improvements can be made beyond the site boundary to sustain local

	ecosystems and support local plans for growth and investment. Talk to and learn from local people and organisations throughout the project to ensure its design complements the local character and culture and supports its ecology, creating places that people can be proud of and enjoy. Find out what makes places work well, ensuring there are methods and processes in place for the life of the project to underpin any changes required to achieve those outcomes. Good design supports local ecology, which is essential to protect and enhance biodiversity. Projects should make active interventions to enrich our ecosystems. They should seek to deliver a net biodiversity gain, contributing to the restoration of wildlife on a large scale while protecting irreplaceable natural assets and habitats.
Value	Bring different professions and skills together from the outset to enable a 'systems approach'; use a shared understanding between different disciplines to resolve multiple problems at once and provide multiple benefits. Speak to a diverse range of people to create a clear, well supported brief for the project's lifecycle; use this to set objectives, agree the benefits the project will deliver and check that the project is on course to achieve its aims. Create and use clear measures to find out whether the project is meeting its objectives and providing social,

	environmental and economic benefits; share lessons learned so future projects can benefit. Good design also finds opportunities to add value beyond the main purpose of the infrastructure. It looks beyond the site boundary to consider the wider benefits the project can bring. It seeks to solve multiple problems well with a single solution. It provides more for less with savings on cost, the environment, materials and space.

3.3. Overarching National Policy Statement for Energy (NPS EN-1)

3.3.1. The Scheme has been designed in accordance with NPS EN-1 **[Ref 3]** and the requirements set out regarding good design. NPS EN-1 was published in November 2023 and designated in January 2024, as an update to the previous suite of energy NPSs designated in 2011.

3.3.2. NPS EN-1 introduces the critical national priority (CNP) for low carbon infrastructure. Set out in section 4.2 of NPS EN-1, the CNP explicitly identifies the need for nationally significant low carbon infrastructure to meet Government decarbonisation targets and achieve net zero ambitions. Paragraph 4.2.5 of NPS EN-1 confirms that solar photovoltaic generation is a form of CNP infrastructure.

3.3.3. Paragraph 4.2.6 of NPS EN-1 goes on to state that substantial weight should be given to the overarching need case for CNP infrastructure, as a starting point for determination of energy infrastructure applications. It is clarified in paragraphs 4.2.7 to 4.2.9 of NPS EN-that the needs case is to be considered taking into account the impacts of the Scheme and the application of the mitigation hierarchy, however the CNP policy will influence how residual impacts are considered in the overall planning balance. NPS EN-1 is referring here to the policy position that for CNP infrastructure, residual impacts remaining after application of the mitigation hierarchy are unlikely to outweigh the urgent need for the Scheme. Exceptions to this relate to a limited, specified set of unacceptable risks presented by residual

impacts. An assessment of the overall planning balance of the Scheme is provided in section 7 of the **Planning Statement [Document Ref 5.5].**

3.3.4. Paragraph 4.1.5 of NPS EN-1 defines the 'mitigation hierarchy' as measures to "avoid, reduce, mitigate or compensate for any adverse impacts", and clarifies at 4.3.8 of NPS EN-1 that references to 'impacts' within the NPS should be taken to mean 'likely significant impacts'. Paragraph 4.2.11 of NPS EN-1 indicates that the mitigation hierarchy must be applied to projects and that residual impacts should only be those which "cannot be avoided, reduced or mitigated".

3.3.5. Section 4.7 of NPS EN-1 establishes the need for "good design" in energy infrastructure, identifying in paragraphs 4.7.1 to 4.7.4 of NPS EN-1 that implementing good design can:

- The visual appearance of a building, structure, or piece of infrastructure, and how it relates to the landscape it sits within, is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object – be it a building or other type of infrastructure – including fitness for purpose and sustainability, is equally important.

- Applying good design to energy projects should produce sustainable infrastructure sensitive to place, including impacts on heritage, efficient in the use of natural resources, including land-use, and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area.

- Good design is also a means by which many policy objectives in the NPSs can be met, for example the impact sections show how good design, in terms of siting and use of appropriate technologies, can help mitigate adverse impacts such as noise. Projects should look to use modern methods of construction and sustainable design practices such as use of sustainable timber and low carbon concrete. Where possible, projects should include the reuse of material.

- Given the benefits of good design in mitigating the adverse impacts of a project, applicants should consider how good design can be applied to a project during the early stages of the project lifecycle

- Mitigate adverse effects of a project.

3.3.6. Applicants are encouraged to embed good design within a project from the outset, with paragraph 4.7.5 of NPS EN-1 referring to the use of "design principles" to be established to guide the project from conception to operation. Paragraph 4.7.7 of NPS EN-1 requires that applicants demonstrate in their DCO Application how the design process was conducted and evolved, and why a favoured choice was selected where different designs were considered.

3.3.7. Paragraphs 4.7.6 and 4.7.10 to 4.7.12 of NPS EN-1 recognise the role of functionality and operational requirements in designing new energy infrastructure, whereby applicants may not have any or very limited choice in the physical appearance of the energy scheme.

3.3.8. Paragraph 5.10.19 of NPS EN-1 outlines that applicants should consider landscape and visual matters in the early stages of siting and design, where site choices and design principles are being established. By considering landscape and visual matters early in the process, the applicant can demonstrate in the ES how negative effects have been minimised and opportunities for creating positive benefits or enhancement have been recognised and incorporated into the design, delivery and operation of the scheme.

3.3.9. Paragraph 5.11.23 of NPS EN-1 goes on to state that although in the case of most energy infrastructure there may be little that can be done to mitigate the direct effects of an energy project on the existing use of the proposed site applicants should nevertheless seek to minimise these effects and the effects on existing or planned uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction.

National Policy Statement for Renewable Energy EN-3 (November 2023)

3.3.10. NPS EN-3 specifically deals with renewable energy and taken together with the Overarching National Policy Statement for Energy (EN-1), provides the primary policy for decisions by the SoS on applications they receive for nationally significant renewable energy infrastructure.

3.3.11. Section 2.10 of NPS EN-3 specifically relates to solar photovoltaic generation. Paragraphs 2.10.18 to 2.10.28 sets out factors influencing site selection and design. These are considered further in **ES Chapter 3 Site Description, Site Selection and**

Iterative Design Process [Document Reference 6.1.3] of ES as to how they have informed the location and design of the Scheme and the factors and technical considerations influencing site selection.

Table 3-2 – Factors and Technical Considerations

Technical Consideration	Commentary
Capacity of a site	For the purposes of Section 15 of the Planning Act 2008, the maximum combined capacity of the installed inverters (measured in alternating current (AC)) should be used for the purposes of determining solar site capacity. AC installed export capacity should not be seen as an appropriate tool to constrain the impacts of a solar farm. Applicants should use other measurements, such as panel size, total area and percentage of ground cover to set the maximum extent of development when determining the planning impacts of an application. The installed generating capacity of a solar farm will decline over time in correlation with the reduction in panel array efficiency. There is a range of sources of degradation that developers need to consider when deciding on a solar panel technology to be used. Applicants may account for this by overplanting solar panel arrays.
Site layout design, and appearance	Applicants will consider several factors when considering the design and layout of sites, including proximity to available grid capacity to accommodate the scale of generation, orientation, topography, previous land–use, and ability to mitigate environmental impacts and flood risk. For a solar farm to generate electricity efficiently the panel array spacing should seek to maximise the potential power output of the site. The type, spacing and aspect of panel arrays will depend on the

	physical characteristics of the site such as site elevation. In terms of design and layout, applicants may favour a south-facing arrangement of panels to maximise output although other orientations may be chosen. For example, an east-west layout, whilst likely to result in reduced output compared to south-facing panels on a panel-by-panel basis, may allow for a greater density of panels to compensate and therefore for generation to be spread more evenly throughout the day. It is likely that underground and overhead cabling will be required to connect the electrical assets of the site, such as from the substation to the panel arrays or storage facilities. In the case of underground cabling, applicants are expected to provide a method statement describing cable trench design, installation methodology, as well as details of the operation and maintenance regime.
Project lifetime	Applicants should consider the design life of solar panel efficiency over time when determining the period for which consent is required. An upper limit of 40 years is typical, although applicants may seek consent without a time-period or for differing time-periods of operation. Time limited consent, where granted, is described as temporary because there is a finite period for which it exists, after which the project would cease to have consent and therefore must seek to extend the period of consent or be decommissioned and removed.
Decommissioning	Solar panels can be decommissioned relatively easily and cheaply. The nature and extent of decommissioning of a site can vary. Generally, it is expected that the panel arrays and mounting

	structures will be decommissioned, and underground cabling dug out to ensure that prior use of the site can continue. Applicants should set out what would be decommissioned and removed from the site at the end of the operational life of the generating station, considering instances where it may be less harmful for the ecology of the site to keep or retain certain types of infrastructure, for example underground cabling, and where there may be socio-economic benefits in retaining site infrastructure after the operational life, such as retaining pathways through the site or a site substation.
Flexibility in the project detail	In many cases, not all aspects of the proposal may have been settled in precise detail at the point of application. Such aspects may include: the type, number and dimensions of the panels; layout and spacing; the type of inverter or transformer; and, whether storage will be installed (with the option to install further panels as a substitute). Applicants should set out a range of options based on different panel numbers, types and layout, with and without storage.

3.3.12. Paragraph 2.10.59 to 2.10.64 of NPS EN-3 outlines technical considerations for the layout design and appearance of solar farms. Paragraph 2.10.59 of NPS EN-3 states that applicants should consider the criteria for good design set out in EN1 Section 4.7 at an early stage when developing projects. Paragraph 2.10.61 of NPS EN-3 outlines that for a solar farm to generate electricity efficiently the panel array spacing should seek to maximise the potential power output of the site. The type, spacing and aspect of panel arrays will depend on the physical characteristics of the site such as site elevation. Paragraph 2.10.62 of NPS EN-3 goes on to state that applicants may favour a south facing arrangement of panels to maximise output although other orientations may be chosen. Paragraphs 2.10.63 and 2.10.64 of NPS EN-3 also consider the cabling required for solar farms to connect the electrical

assets of the site, such as from the substation to the panel arrays or storage facilities.

National Policy Statement for electrical networks infrastructure (November 2023)

3.3.13. Paragraph 2.2.7 of NPS EN-5 notes that it is not necessarily always the case that the cable route should be the most direct, as there will be other factors including engineering and environmental aspects that would be important in determining a feasible route. Paragraph 2.2.1 to 2.2.6 of NPS EN-5 states that siting is not always within the control of the applicant and is determined by the location of new generating stations and system capacity, but that applicants do have control over the routing and site selection. Locational constraints do not exempt candidates from balancing site selection or good design considerations. Paragraphs 2.2.8 to 2.2.9 of NPS EN-5 state that the flexibility of locating substations should allow the Applicant to consider local characteristics and screening and other mitigation options.

3.3.14. These thematic principles have informed Applicant's Design Principles and Design Vision developed for the Scheme. The NIC define the role of principles as *"reminders to the delivery organisation, a steer in the right direction, and a means of restoring focus to the big picture… Design Principles should be a point of departure, setting out a common understanding of the issues to be addressed"* **[Ref. 6].**

3.3.15. The Scheme has adopted the NIC Design Principles of climate, people, place and value to guide the design of the Scheme. These NIC Design Principles have been used to frame a set of specific project design principles which ensure the Scheme fits sensitively into the local context, mitigates environmental effects, respects local communities and conserves the environment where possible.

3.4. Project Design Principles

3.4.1. A set of tailored project design principles have been developed based on the project experience of the design team, and with reference to the Design **Parameters Document [Document Reference 5.6.1]**. These principles have been established to, avoid reduce, and then mitigate potential and identified environmental impacts where possible. The project design principes also seek to,

where appropriate, look at wider ranging enhancements or improvements for local stakeholders.

3.4.2. The project design principles at the core of the design for the Scheme are set out in **Table 3-3** below, and these were presented within the Preliminary Environmental Information Report (Chapter 2 – scheme description) that accompanied the pre-application consultation.

Table 3-3: Scheme design principles

Theme	Project design principle
1. Climate	1.1 Designed to be climate resilient by incorporating, where reasonably practicable, mitigation measures and adaptations that respond to the impacts of climate change.
	1.2 Demonstrating low carbon approaches to design, construction and long-term maintenance.
	1.3 Designed to optimise sustainability in regard to design, construction and long-term maintenance.
2. People	2.1 Designed to respect the amenity of local residents and communities (giving consideration to environmental impacts including visual, transport, glint and glare and noise).
	2.2 Designed to optimise use and enjoyment of the site and surroundings, promoting active living for existing and future communities and be inclusive.
	2.3 Designed to ensure effective, appropriate and ongoing communication with the local community.
3. Place	3.1 Designed to consider the efficient use and multifunctionality of the land.

	3.2 Designed to champion a context driven approach, which positively responds to the local context, including social, economic and environmental priorities.
	3.3 Designed to respond to local character and distinctiveness.
	3.4 Designed to secure effective place-keeping, by being subject to management arrangements that demonstrate a commitment to effectively implementing, establishing and maintaining features at all stages of the development process.
4. Environment	4.1 Designed to maximise environmental net gains.
	4.2 Designed with the intention to avoid any harmful environmental impacts as far as possible.
	4.3 Designed to deliver climate resilient/sustainable water management, using above ground features to manage flood risk, maintain the natural water cycle and improve water quality within the boundary of the project and at a catchment scale.
	4.4 Designed to deliver wildlife/biodiversity enhancement.
	4.5 Designed to create effective links with existing and planned for ecological features and networks beyond the boundary of the project.

3.4.3. The design development of the Scheme , and how the project design principles have influenced the design response are set out in chapters 5 & 6 of this DAD.

3.5. The Mitigation Hierarchy

3.5.1. The design process has incorporated a practical hierarchy of mitigation with the purpose of identifying how potential impacts can be avoided, reduced or mitigated where possible. The first option would be to avoid the impacts at source, which

would involve removing the feature or re-siting it to an area where it would have no or reduced effects. In some instances, where it is not possible to avoid impacts altogether the potential to reduce impacts has been explored.

3.5.2. It is acknowledged that not all impacts will be able to be avoided and in some cases even reduced. The Scheme has therefore also considered mitigation to offset adverse effects on the environment. Where the Applicant considers that opportunities for environmental enhancement exist, these are detailed within **ES Volume 2, Chapters 6 to 18 [Document Reference 6.2.6 to 6.2.18]** and section 6 of this document.

3.5.3. Mitigation measures proposed to prevent, reduce or offset likely adverse effects have been identified and developed as part of the iterative design process. The primary mitigation measures have been embedded into the Scheme design and are referred to as embedded mitigation. Where avoidance of an impact through embedded mitigation is not possible, or is only partly effective, further 'essential mitigation' is considered. Further details of embedded mitigation measures are provided in **ES Volume 1, Chapter 3: Scheme Description [Document Reference 6.1..3].**

3.6. Applying 'good design'

3.6.1. An appraisal of how the Scheme is in compliance with relevant planning policy relating to good design is provided in the **Planning Statement [Document Reference 7.1]**.

3.6.2. The remainder of this DAD demonstrates how the Scheme has taken into account the criteria of NPS EN-1, NPS EN-3 and NPS EN-5 in relation to good design. It sets out the local context in which the Scheme is situated and outlines the design response to that context in seeking to mitigate adverse impacts and integrate good design principles. Recognising the constraints presented by some infrastructure, it also identifies how technical considerations have in some instances limited design choices. The iterative approach to design has feedback in order to better fit the proposals into the existing context, avoid or reduce adverse effects and deliver enhancement where feasible

3.6.3. Throughout the design process, changes have been made and implemented into the design of the Scheme to avoid or reduce adverse environmental effects and to make the Scheme fit better into the wider landscape. To secure the delivery of

good design, should development consent be granted, a list of design parameters which underpin the Scheme is contained within the **Design Approach Document Appendix A: Parameters Document [Document Reference 5.6.1]**. These parameters would be required to be retained in the future detailed design and would be secured pursuant to a requirement of the **Draft DCO [Document Reference 7.2.1].**

3.6.4. Taking into account the points summarised above, it is concluded in the **Planning Statement [Document Reference 7.1]** that the Scheme is in compliance with policy relating to good design. Please refer to the Planning Statement for further detail on the policy appraisal.

4 Site Context

4.1. Site Location

4.1.1. The Scheme is located within the Yorkshire and Humber regions. The Scheme straddles the administrative boundaries of Doncaster Council and North Lincolnshire Council. At a local level, the Scheme is located on land east of Thorne; south of Tween Bridge Moors; west of Crowle; north and northwest of Sandtoft & Sandtoft Industrial Estate; north of Hatfield Moors; and northeast of Hatfield. The Scheme is located on land either side of the M180, High Level Banks (the A18) and the Stainforth and Keadby Canal.

4.1.2. The Order Limits extends to approximately 1831 hectares (ha) (4571 acres) of land, presented in **ES Figure 1.1 Order Limits [Document Reference 6.4.1.1].**

4.1.3. The Order Limits is made up of five Land Parcels (described as Land Parcels A to E) as shown on **ES Figure 1.2 Land Parcel Plan [Document Reference 6.4.1.2**]. Each parcel is further described in **Table 4-1.**

Table 4-1: Land Parcels

Land Parcels	Location of Parcel	Area (hectares)
Land Parcel A	Land to the east of Thorne and north of the Stainforth & Keadby Canal.	570.5
Land Parcel B	Land to the west of Crowle and north of the Stainforth & Keadby Canal.	129.5
Land Parcel C	Land south of the Stainforth & Keadby Canal and north of the High Levels Bank (A18).	352.2
Land Parcel D	Land south of the High Levels Bank (A18) and north of the Hatfield Moors Nature Reserve.	336.0
Land Parcel E	Land south of the High Levels Bank (A18) and north of Sandtoft and the M180.	442.44

4.1.4. A breakdown of the Land Parcels into field development parcels within the Order Limits is shown on **ES Figure 1.3 Development Parcel Plan [Document Reference 6.4.1.3]** to assist with the identification of particular fields with Scheme in relation to the EIA findings.

4.1.5. A description of the order limits and its environs is discussed within the **ES Chapter 3 Site Description (Document Reference 6.1.3**].

5 Location Context

5.1. Initial Site Selection

5.1.1. The initial step in the evolution of the design of the Scheme was the selection of the land plots within Order Limits. There is no standard methodology for the selection of sites for renewable energy generation projects, however, assessing the environmental impacts of an NSIP requires consideration of how a 'site' was selected for development and how any alternatives to the Scheme were reviewed.

5.1.2. In choosing the location of the Scheme, the Applicant took into account the following factors:

- In order for the Scheme to be feasible, it requires a connection to the national grid through which the energy it generates would be delivered and would contribute to the national energy supply. The grid connection capacity has informed both the site location and the overall size of the Scheme, as it has been sized for the availability of this connection capacity
- Connections to Northern Power Grid for projects below 50MW would not be available in the area, so the proposals would need to be of sufficient scale to justify the cost of a connection to the National Electricity Transmission System (NETS)
- It was not possible to extend the existing Tween Bridge Wind Farm due to the effects this would have on the operational needs of Doncaster Sheffield Airport.
- A solar farm would be capable of utilizing the existing land between the wind turbines most efficiently in order to generate the required amount of electricity
- Previous knowledge and experience of the Order Limits demonstrated that a solar farm could be developed while avoiding sensitive landscapes and environments
- Access for construction and operation would be readily available
- Existing landowner relationships meant that land could be acquired voluntarily

- Regard to environmental and spatial considerations, including Ecological, Landscape and Cultural Heritage Designations as outlined in the respective ES chapters
- Proximity of site to dwellings – the site selection sought to avoid sites in close proximity to residential dwellings or where it would not be possible to appropriately mitigate visual amenity and glint and glare
- Agricultural land classification and land type – the site selection sought to minimise the impact on best and most versatile agricultural land (land classified as Grade 3a and above)
- Accessibility – the site selection considered the suitability of the access routes to the proposed sites, during construction, operation (including maintenance) and decommissioning
- Existence of sufficient land to deliver the project and meet the scale of the Schemes aims

5.1.3. The Applicant undertook a four-stage site selection process to identify a location for of the Scheme. This is set out within the **ES Chapter 3 Site Description, Site Selection and Iterative Design Process [Document Reference 6.1.3**]. The key stages for site selection are summarised below in **Table 5-1:**

Table 5-1: Site Selection Process

Stage	Description
Stage 1: Identifying available grid connection capacity	In order for the Scheme to be feasible, it requires a connection to the national grid through which the energy it generates would be delivered and would contribute to the national energy supply. The grid connection capacity has informed both the site location and the overall size of the Scheme, as it has been sized for the availability of this connection capacity. In doing so, it seeks to ensure that the delivery of solar energy can be provided to the national grid when the construction of the solar farm is complete.

	The Applicant received a Grid Connection Offer in 2022 for a 340MW connection and land assembly began on this basis. In 2023, a second Grid Connection Offer increased the connection capacity to 590MW. In 2024, a third Grid Connection Offer increased the connection capacity to 800MW At the time of the first Grid Connection Offer in 2022, the point of connection (POC) was assumed to be available on or close to the Site adjacent to the exiting 400KV overhead line. During 2024, the Applicant was informed that the POC location would be moved from its anticipated location due to other projects applying for grid capacity at the same location. At the end of 2024 it was confirmed likely that the POC is to be moved to the East of Area E. The likely POC and the associated 10km search area is shown on **[ES Figure 1.4 Site Selection Buffer Plan [Document Reference 6.4.1.4].** In all cases, the POC is within close proximity of the Scheme and the Wind Farm. The approach to land assembly focussed on proximity to the anticipated POC and co-location with the existing Wind Farm. This approach minimised as far as possible the length of the cable corridor to the POC.
Stage 2: Land assembly.	The Applicant began engagement with relevant landowners to receive expressions of interest. From the outset, the Applicant has sought to deliver the Scheme via landowner agreement rather than relying on executing compulsory acquisition rights. The Applicant approached landowners with a sufficient area of land for panel areas, mitigation and enhancement to enter into an option agreement. At the point of submission of the Scoping Report, approximately 1500

	hectares (Ha) was sought for the generation of 600MW of electricity. Following the increase in the available grid capacity, this requirement increased to approximately 1830Ha. The Applicant had existing relationships with landowners at the location of the existing POC due to its development and ownership of the Wind Farm. Given the anticipated location of the POC, The Applicant engaged with these landowners first to establish whether it would be feasible to use land around the Wind Farm for the Scheme
Stage 3: Consideration of environmental and planning constraints.	A search corridor of 10km was reviewed around the anticipated POC in order to identify potential alternatives to the land identified. This corridor was defined by the extent to which a solar farm of the proposed scale could be viable when taking into account the distance from the anticipated POC and the cost of underground cabling. It was reviewed to confirm that the proposed location represented the most suitable alternative. The analysis reviewed the following constraints within the search corridor: - • Proximity to dwellings • Topography • Accessibility • Brownfield land register (previously developed land) • Agricultural Land Classification • Ecological designations • Biosphere Reserves

	• Environmentally Sensitive Areas (ESAs) • Local Nature Reserves (LNRs) • Nature Improvement Areas (NIAs) • Proposed Ramsar sites • Ramsar sites • Royal Society for Protection of Birds (RSPB) reserves • Sites of Special Scientific Interest (SSSI) • Special Areas of Conservation (SAC) • Special Protection Area (SPA) • National and Community Forest • Flood Zones • Cultural Heritage • Registered Battlefields • Conservation Areas • Country Parks • Heritage at Risk • Listed Buildings

	• Registered Parks and Gardens • Roman Roads and Antiquity Lines • Scheduled Monuments • World Heritage Sites • Landscape designations • Greenbelt • National Landscapes • Countryside and Rights of Way Act 2000 Designations • National Parks • Public Rights of Way (PRoW)
Stage 4: Initial identification of panel areas.	Stage 2 and Stage 3 of the site selection process established that within the search corridor, there was sufficient available land, secured via agreement, located outside of major environmental and planning constraints. This was considered to fulfil the requirement to deliver a viable solar farm and the process progressed to developing an initial layout design for the Scheme. The panel areas changed in response to the increased grid connection capacity. Sufficient land was identified for a grid connection capacity of 590MW, which formed the basis for the submission of the Scoping Report and non-statutory consultation. Following this, further land was added to accommodate the increase in the grid connection capacity to 800MW. In tandem

	with the progressing the Scheme, the Applicant sought to extend the order limits to include an area of search for the export cable to connect to the NGET 400kV Substation. Through the Applicant's confidential engagement with National Grid, several potential locations were identified as potentially suitable for the NGET 400kV Substation and this influenced the Applicant's approach to the statutory consultation whereby the draft order limits include land to include the envisaged NGET Grid Connection Route. However, the PEIR that accompanied the statutory consultation identified that this was only an envisaged route and that it was dependant on a number of factors outside the applicant control. At the time of submission, the exact location of the NGET 400kV Substation is not yet known to the Applicant and will not be known until NGET have completed their siting process assessment. Accordingly, this element does not form part of the Scheme. Land was also removed following the non-statutory consultation in response to matters raised at consultation and ongoing environmental assessment. This version of the scheme was consulted on at statutory consultation.

6 Design Response

6.1. Introduction

6.1.1. The design principles for the individual and specific elements of the components which make up the Scheme are outlined in, and controlled by, the detailed design principles and parameters.

6.2. Design Parameters

6.2.1. The Design Parameters presented within **Design Approach Document Appendix A: Parameters Document [Document Reference 5.5.1**] will become a certified document through the DCO should it be granted consent. Requirement No 3 of the **draft DCO [Document Reference 3.1]** places a duty on the Applicant to ensure that the detailed design and associated infrastructure is delivered in accordance with the parameters outlined in the **Design Approach Document Appendix A: Parameters Document [Document Reference 5.5.1**].

6.3. Design Iteration

6.3.1. The location, design and layout of the Scheme has been developed taking into account a range of technical and environmental factors, as well as feedback from ongoing engagement and consultation with stakeholders, landowners and representatives of the local community.

6.3.2. Central to the design principles is a commitment to apply the mitigation hierarchy, seeking to avoid negative effects and harm as a result of the Scheme; or, where effects cannot be avoided entirely, seeking to mitigate them as far as reasonably practicable. This is achieved by putting environmental considerations through the design principles at the heart of decision making and design progression.

6.3.3. The Applicant has also sought to go beyond mitigating negative effects and harm by looking for opportunities to deliver environmental enhancement wherever possible. This approach is fundamental to the application of the design principles.

6.3.4. On an aspect specific basis, the design principles have been taken into account as follows:

- Landscape and visual - The primary mitigation adopted in relation to landscape and visual matters is that which has been embedded within the design of the Scheme and comprises the consideration given to avoiding and reducing landscape and visual effects during the evolution of the Scheme layout. This has included the location and offsetting of key elements of the Scheme in response to the identification of potential visual receptors and the protection of existing landscape elements such as existing trees and hedgerows during the construction period, further details on which are set out in the **ES Chapter 6 Landscape and Visual [Document Reference 6.12.6]**, **ES Appendix 6.6 - Arboricultural Impact Assessment [Document Reference 6.3.6.6], and ES Appendix 6.7 Residential Visual Amenity Assessment [Document 6.3.6.7]**

- Ecology and Nature Conservation - The design of the Scheme includes a range of inherent embedded elements, which avoid or reduce the potential for adverse ecological impacts, including retaining identified higher value statutory designated sites as well as habitat features such as, hedgerows, ditches, and woodlands, and focusing the built development proposals within lower ecological value agricultural and pastoral farmland. This is in line with both the Mitigation Hierarchy and the Biodiversity Net Gain Hierarchy. Buffer distances between development areas and potentially sensitive features have been included to avoid and minimise effects, such as the substation locations being 'set-back' from the Thorne and Hatfield Moors SPA to avoid noise disturbance in operation. Additionally, sensitive, or high value ecological features outside the Order Limits have been protected as part of the design which sets in place buffer zones and other safeguarding measures, all of which has been built-in to as part of the iterative design process.

- Cultural Heritage – Designed in mitigation in relation to built heritage assets has been agreed and will entail a combination of screening through appropriate boundary treatments and offsets to retain suitable margins around/or views from the assets to minimise the adverse effects upon their settings. Opportunities to minimise adverse effects upon the buried archaeological resource have also been considered. Site investigation work has determined that some areas of the Site, such as the Romano-British settlement (MLS901) within Land Parcel E, will have no intrusive construction to enable *in situ* preservation of the archaeological remains in this area. It is envisaged that buried remains may be able to be preserved in situ in some

parts of the Order Limits through the use of ballast foundations. A proportionate programme of archaeological survey and mitigation, by means of field investigation and recording, will be followed by an appropriate and proportionate mitigation strategy that will ensure that they are subject to preservation by record at an appropriate stage in the development process. The appropriate and proportionate additional mitigation, to be determined in consultation with the archaeological advisors, is secured as requirement 12 to the approved **Development Consent Order [Document Reference 3.1]**. This will partially offset their loss through the knowledge gained through the investigations. For the archaeological remains the mitigation may include, as appropriate, excavation, strip map and sample investigation, or archaeological monitoring of ground works during construction (known as a watching brief), with appropriate post-excavation analysis and dissemination of results.

- Ground Conditions - Environmental effects on ground conditions are mitigated within the embedded design measures and secured through implementation of the Detailed CEMP, broadly in line with the general principles set out in the **Outline Construction Environmental Management Plan [Document Reference 7.1]**. Peat stability will be assessed during detailed design at any specific locations where existing geological data or intrusive investigation indicates a sufficient peat thickness would be intersected by the proposed construction, such as at new accesses, tracks or where structures are proposed. Critical areas will be identified and protocols for groundworks activities in these areas developed. Selection of appropriate plant and best practice working methods would be adopted to control or reduce creation of new pathways during penetrative foundations i.e. piling. Appropriate buffer or non-working zones would be integral to the construction layout alongside surface water courses to prevent fines run-off, or mobilisation of chemicals entering the water courses. For crossing points requiring horizontal directional drilling, specific risk assessments, method statements and environmental management plans, based on location specific topography, ground and groundwater conditions, will be undertaken and agreed with consultees, stakeholders and regulators prior to commencement.

- Water Resource – Design measures to reduce the effects on water resources and flood risk and drainage during the operation phase include surface water runoff from proposed equipment and access tracks being directed towards SuDS features that would provide water quality treatment to mitigate the risk

of water pollution on site. Contributions could be made from permeable surfacing, wildflower planting and linear infiltration trenches; Future maintenance of any proposed SuDS on Site will be privately managed by the Applicant; and Solar PV modules will have their lowest edge raised above the ground (above the 1 in 1000 year tidal Trent flood level plus an allowance for 100mm of freeboard), to ensure surface water across the vast majority of the site will continue to drain as per the existing conditions.

- Socio Economic - At an early stage of the design, the Applicant proposed the provision of an EV Charging Point that would be available to use for the local community. However, this proposal was removed following the statutory consultation in response to matters raised in consultation from the local residents.

- Traffic and Transport - as set out in the **Outline Construction Environmental Management Plan [Document Reference 7.1]** standard measures and the adoption of construction best practice methods are to be incorporated and embedded into the design of the Scheme and the methods of its construction, in order to avoid, reduce or manage adverse environmental effects.

- Noise and Vibration – the principle design consideration that have been developed with regards to noise and vibration relate to the separation distances between the order limits and nearest receptors. While the distance between the receptors and the Order Limits is, in some instances around 15m, the distance to the actual construction activities is greater. Some levels of groundborne vibration may be generated by activities such as installing frame supports using impact driven methods however, the measures detailed in the **Outline CEMP [Document Reference 7.1]** specifically the mitigation buffers, would attenuate the levels of vibration to imperceptible levels at the receptors, resulting in no significant impacts.

- Air quality - The environmental impact assessment has demonstrated that the Scheme would not cause any exceedances of the air quality objectives. It is, therefore, not considered appropriate to propose mitigation measures beyond those included by design. Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). Detailed measures to minimise GHG emissions through

all stages of the Scheme from construction to operation and eventually decommissioning will be developed during detailed design as part of continued evolution of the **Outline CEMP [Document Reference 7.1]**, **Outline Operational Environmental Management Plan (OEMP) [Document Reference 7.2]** and **Outline Decommissioning Environmental Management Plan (DEMP) [Document Reference 7.3]** documents.

- Agriculture - For the areas where there will be solar PV modules and mounting structures, access tracks, temporary construction compounds and cabling, plus small on-site supporting equipment items there is minimal disturbance to soils and therefore minimal potential to adversely affect land quality. In areas proposed for RWE on-site substation and the four separate BESS areas where soil movement is required and accordingly there is the potential to affect land quality, the applicant has sought, where practical, to locate these within areas of lower grade agriculture land. According, of the BESS areas, three are located on land of Subgrade 3b. One is located on a complex mix of Grades 1, 2 and 3a land. Of the 132kV substations, four are located on Subgrade 3b land, one is on Subgrade 3a land and one is on Grade 2 land. The soil survey has identified the soil type, texture, characteristics, depth etc and this has been used to inform the **Outline Soil Management Plan [Document Reference 7.9.8],** which sets out the principles of soil assessment, to determine whether soils are suitable for being handled. It sets out the principles of handling soils for the construction and decommissioning work

6.3.5. A summary of the principal design changes made following the statutory consultation are provided within the **Consultation Report [Document Reference 5.1]**

6.4. Status of Current Design

6.4.1. The indicative layouts **(Document Reference 2.9)** submitted with the DCO Application, whilst preliminary in nature, is reasonably mature.

6.4.2. Following the presentation of and consultation on an early-stage design at the draft PEIR and formal PEIR during the non-statutory and statutory consultation stages, the Applicant has since refined the design of the Scheme to have regard to the comments and concerns raised by statutory bodies, Planning Inspectorate, landowners and members of the local community, as evidenced in the **Consultation Report (Document Reference 5.1).**

6.4.3. In presenting the design submitted with the DCO Application, the Applicant has reflected the commitments and assurances made within the **Works Plans (Document Reference 2.3**) to the smallest reasonable fixed areas of land to deliver the different components of the Scheme.

6.4.4. Additionally, the Applicant recognises that there are still refinements and matters of detailed design that will be subject to further engagement and consultation with statutory bodies and local authorities. This commitment to detailed design is secured via Requirement 6 of the **draft DCO (Document Reference 3.1**).

7 Conclusion

7.1.1. This DAD provides a rationale and explanation for the Applicant's design process for the Scheme, including how it has taken into account and considered the surrounding landscape and site context, and the requirements for 'good design' as outlined in the relevant NPSs.

7.1.2. By necessity, elements of the Scheme have been designed in such a way to ensure that safety and viability are at the forefront. The Applicant has committed to developing a design which not only provides a safe and reliable source of renewable energy generation, but one that is in keeping with the local landscape and ensures that local communities and visitors alike can continue to access and enjoy the natural landscape and environment around them.

7.1.3. Mitigation and enhancement have been at the heart of the design process for the Scheme, by placing embedded mitigation at the forefront. This means that rather than simply providing mitigation for the effects arising from the proposals, the Applicant has ensured that their design has sought to avoid, reduce and mitigate effects where possible to do so and include the measures as part of the Applicant's standard design.

7.1.4. The delivery of the Scheme would align with legislation, policy and strategic priorities relating to decarbonisation, energy security, and energy affordability. In doing so, it establishes the evidenced need for the principle of the Scheme which is outlined within Section 3 of the **Planning Statement [Document Ref 5.5].**

7.1.5. The Scheme would have the capacity to generate circa 800 MW of electricity thereby responding to the urgent need for new renewable energy infrastructure that is established through:

- national legislative commitments;
- national policy;
- local planning policy and climate emergency declarations;
- national energy strategy; and,
- energy market demand and security concerns.

7.1.6. Alongside an established needs case, the Scheme would provide a series of wider benefits, both locally and nationally, as identified within the **Planning Statement (Document Ref 5.5).**

8 Glossary & Acronyms

Term / Acronym	Description
132 kV Substation	The seven onsite substations that step up the voltage from 33kV to 132kV. They form part of the Scheme and will be delivered by RWE.
Access Tracks	The tracks within the Order limits constructed to provide access around the Scheme.
AOD (Above Ordnance Datum)	Baseline standard for measuring height usually measured in metres AOD (mAOD)
Applicant	RWE Renewables UK Solar and Storage Limited
Application	The Application for a Development Consent Order made to the Secretary of State under Section 37 of the 2008 Act in respect of the Authorised Development, required pursuant to Section 31 of the 2008 Act because the Authorised Development comprises an NSIP under Section 14(1)(a) and Section 15 of the 2008 Act by virtue of it comprising a generating station in England of 50 Megawatts electrical capacity or more. Application may be referred to as the 'DCO Application', and the terms are interchangeable.
Associated Development	Defined under s.115(2) of the 2008 Act as development which is associated with the principal development and that has a direct relationship with it. Associated Development should either support the construction or operation of the principal development or help address its impacts. It should not be an aim in itself but should be subordinate to the principal development. In regard to this Application, 'Associated Development' in summary includes: enclosure and boundary treatment, site preparation and clearance works, security and monitoring infrastructure, landscaping and biodiversity measures including planting, drainage and irrigation works, utilities connection works, works to maintain and repair streets and access roads, signage and earthworks, works for the provision of security and monitoring measures, temporary footpath diversions, temporary storage of materials, drilling works, laying down and

Term / Acronym	Description
	maintenance of internal access tracks, fencing, and construction of laydown areas. (this list is not exhaustive)
Baseline Conditions	Existing environmental conditions which are described in the Environmental Statement
Battery Energy Storage Systems (BESS)	This comprises battery energy storage units, transformers, inverters, switchgear, power conversion systems, monitoring and control system, heating ventilation and air conditioning, electric cables and fire infrastructure to assist in providing peak generation and grid balancing services to the National Grid.
CCTV	Closed Circuit Television system, used as a security measure.
Construction Compound	A compound including offices, welfare facilities, accommodation facilities, storage and parking for construction of the authorised development and other associated facilities.
Construction Phase	A period of up to 54 months in either a single, consecutive approach or through multiple stages to construct the Scheme. The construction programme is likely to begin in 2028.
Cumulative Effects	The cumulation of effects with other existing and, or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.
Decommissioning Phase	A period of approximately 24 months within when the Scheme will be decommissioned, post the Operational Phase.
Design Parameters	The design parameters and principles and assessments set out in **Design Approach Document Appendix A: Parameters Document [Document Reference 5.6.1]**

Term / Acronym	Description
Development Consent Order (DCO)	A Development Consent Order made by the relevant Secretary of State pursuant to the 2008 Act to authorise an NSIP. A DCO does or can incorporate or remove the need for a range of consents which would otherwise be required for a development.
EIA (Environmental Impact Assessment)	Process for identifying the likely significance of environmental effects (beneficial or adverse) arising from a development, by comparing the existing environmental conditions prior to development (the baseline) with the environmental conditions during/following the construction, operational and decommissioning phases of a development should it proceed.
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended)
Environmental Statement	Document setting out the findings of an Environmental Impact Assessment
Field Number	Each Land Parcel is made up of a number of referenced fields e.g. A1, B1 etc.
Fixed Solar PV Modules	Solar PV Tables that are mounted to fixed Mounting Structures that face south.
Geographical Information System (GIS)	A system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data.
Green Infrastructure (GI)	Network of green spaces and watercourses and water bodies that connect rural areas, villages, towns and cities.
Ground-mounted solar PV generating station	This comprises the solar PV modules and mounting structures.
Hectare (ha)	unit of measurement 100m x 100m, or 10,000m2

Term / Acronym	Description
Hard Standing	Ground surfaced with a hard material suitable for supporting vehicular movement (e.g. tarmac, compacted gravel, concrete).
Heavy Goods Vehicle (HGV)	A commercial vehicle designed to transport goods and materials. In the UK, it's defined as any vehicle with a gross vehicle weight (GVW) exceeding 3,500 kg (3.5 tonnes). This includes a wide range of vehicles like lorries, articulated trucks, and specialized vehicles like fire engines and mobile cranes.
Horizontal Directional Drilling (HDD)	A construction technique whereby a tunnel is drilled under a waterway or other designated area, and a pipeline or other utility is pulled through the drilled underground tunnel.
In-combination effects	The cumulative effect of multiple environmental impacts arising from the Scheme on a specific location or resource that together give rise to greater impacts than the effects in isolation.
Indirect Effects	Effects that result indirectly from the Scheme as a consequence of the direct effects, often occurring away from the site, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects.
Inverter	Electrical equipment required to convert direct current power generated by the solar panels to alternating current power
Iterative Design Process	The process by which the Scheme's design is amended and improved by successive stages of refinement which respond to growing understanding of environmental issues.
Land Parcels A to E	The Solar PV module areas and all associated infrastructure. The Land Parcels will be connected by a series of underground cables. Land Parcel are identified as follows: • Land Parcel A: Land to the east of Thorne and north of the Stainforth & Keadby Canal. • Land Parcel B: Land to the west of Crowle and north of the Stainforth & Keadby Canal

Term / Acronym	Description
	• Land Parcel C: Land south of the Stainforth & Keadby Canal and north of the High Levels Bank (A18). • Land Parcel D: Land south of the High Levels Bank (A18) and north of the Hatfield Moors Nature Reserve. • Land Parcel E: Land south of the High Levels Bank (A18) and north of Sandtoft and the M180.
Magnitude (of effect)	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.
Mitigation	Measures including any process, activity, or design to avoid, reduce, or remedy for negative environmental impacts or effects of a development.
Module Mounting Structure	The structure that is fixed to the ground and onto which the Solar PV Modules are attached.
Monitoring	In EIA, 'monitoring' refers to the systematic and ongoing collection of data on the environmental and social effects of a project throughout its various phases (construction, operation and decommissioning).
National Planning Policy Framework	Document setting out the UK Government's planning policies for England and instruction on how they are expected to be applied. It serves as a framework for local plans to ensure sustainable development and provides guidance for planning decision-making. Latest version published in December 2024.
National Planning Practice Guidance	Online resource to support the implementation of the NPPF. The NPPG provides context and practical details and is intended to be read alongside the NPPF, offering further explanation and guidance on how to apply the framework's principles in everyday planning practice. It replaces a large volume of previous planning guidance documents and is designed to be easily updated and readily accessible online.

Term / Acronym	Description
National Policy Statement	National Policy Statements are produced by government. They give reasons for the policy set out in the statement and must include an explanation of how the policy takes account of government policy relating to the mitigation of, and adaptation to, climate change. They comprise the government's objectives for the development of nationally significant infrastructure in a particular sector and state.
NGET 400kV Substation	The NGET 400kV substation that will facilitate the export and import of electricity from the Scheme.
Non-Technical Summary	A document that sets out an overview, in non-technical language, of the main findings of the ES.
NSIP	A Nationally Significant Infrastructure Project (NSIP) is a separate consenting route for major infrastructure projects in the fields of energy, transport, water, wastewater, and waste. NSIPs require development consent from the relevant Secretary of State rather than planning permission from the local planning authority.
Onsite Cabling	33-400kV cabling, which transmits electricity from the Solar PV Modules to the 132 kv Substation(s) and RWE on-site 400kV Substation located within the Order Limits.
Order Limits	The limits of the land to which the Application for the DCO relates, within which the development must be carried out and which is required for its construction and operation. Order Limits may be referred to as the 'Site', and the terms are interchangeable.
Ordnance Survey	National mapping agency in the United Kingdom which covers the island of Great Britain.
Operational Phase	The period within which the Scheme is operational, following the Construction Phase and following connection and first export to the National Grid, no earlier than 2032.

Term / Acronym	Description
Outline Battery Safety Management Plan (oBSMP)	A site or project specific plan identifying the measures required to avoid and reduce the risk of fire from battery energy storage systems within the Scheme, as well as how to effectively manage a fire should the event occur.
Outline Construction Environmental Management Plan (oCEMP)	A site or project specific plan designed to ensure best practice and/or appropriate environmental management practices are applied throughout the construction, operation and/or demolition phases of the Scheme.
Outline Construction Traffic Management Plan (oCTMP)	A site or project specific plan detailing construction logistics, construction worker travel that includes information to guide the delivery of material, plant, equipment and staff during the construction phase.
Outline Decommissioning Environmental Management Plan (oDEMP)	A site or project specific plan developed to ensure that appropriate environmental management practices are followed during the decommissioning phase of the Scheme.
Outline Landscape and Ecology Management Plan (oLEMP)	A site or project specific plan setting out the landscape and ecological management actions for the Scheme, outlining how mitigation measures, identified within the Environmental Statement, will be delivered through future landscape works and management.
Outline Operational Environmental Management Plan (oOEMP)	A site or project specific plan setting out specific environmental management and monitoring during the operational phase of the Scheme.
Outline Soil Management Plan (oSMP)	A site or project specific plan identifying the importance and sensitivity of the soil resource at the Scheme and to provide specific guidance to ensure that there is no significant adverse effect on the soil resource as a result of the Scheme. Measures proposed will be considered prior to the commencement of construction works

Term / Acronym	Description
Outline Supply Chain, Employment and Skills Plan (oSCESP)	A site or project specific plan detailing the supply chain, employment, training and learning opportunities available during the construction and operational phase of the Scheme.
Planning Act 2008 (PA 2008)	A UK law that established a new regime for granting planning permission for major infrastructure projects (NSIPs).
Panel Areas	This comprises ground mounted solar photovoltaic (PV) generating station (solar PV modules and mounting structure), inverters, transformers and switchgear, and low voltage distribution cables, access tracks and ancillary infrastructure works.
Permissive Path	New recreational informal path that the landowner allows the public to use for the operational life of the Scheme.
Planning Inspectorate	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England. DCO applications are handled by the Planning Inspectorate on behalf of the Secretary of State.
Preliminary Environmental Information Report (PEIR)	Preliminary Environmental Information is defined in the EIA Regulations as: 'information referred to in regulation 14(2) which – (a) has been compiled by the applicant; and (b) is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development). A Preliminary Environmental Information Report (PEIR) for the Scheme was produced in March 2025.
Public Right of Way (PRoW)	Footpath, bridleway or byways over which members of the public have a right to use.

Term / Acronym	Description
PV String	A row of Solar PV Modules mounted onto the Mounted Structure that are connected to one another to form a PV string which is either connected to a string inverter or a central inverter.
PV Tables	Solar PV Modules mounted onto the Mounting Structure, forming tables, which are then set out in rows.
Receptor	A location, feature (ground, watercourse) or individual (person, plant, bird, animal etc) upon which the effects of a proposed development is assessed, i.e. the receiving environment.
Rochdale Envelope	An approach used in EIA that allows applicants to define a range of parameters within which the development can be built, allowing for flexibility while still ensuring a comprehensive assessment of potential environmental impacts. This is done by assessing the development as if it were operating at its maximum possible parameters, effectively creating a "worst-case scenario" for the EIA.
Residual effect	Those impacts that remain following the implementation of mitigation measures
RWE onsite 400kV Substation	The 400kV substation that is proposed as part of the Scheme and will be built and operated by the Applicant, RWE.
Scheme	A NSIP for areas within the Order Limits that are proposed for the construction, operation, and decommissioning of a ground mounted solar photovoltaic (PV) electricity generation station with a capacity of over 50 Megawatts (MW) and associated development comprising of energy storage and grid connection infrastructure on land approximately 10 kilometres to the northeast of Doncaster and 14 kilometres to the west of Scunthorpe. The Scheme encompasses all areas within the Order Limits. Scheme may be referred to as the 'Tween Bridge Solar Farm', and the terms are interchangeable.
Scoping	The process of identifying the issues to be addressed by an EIA. It is a method of ensuring that an EIA focuses on the important issues and avoids those that are considered to be less significant.

Term / Acronym	Description
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.
Significance	A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.
Solar PV Modules	A panel comprising a grouping of photovoltaic cells connected to each other and set within a single physical frame. The PV Panel is attached to a Mounting Structure. Solar PV Modules may be referred to as 'PV Module' or 'Solar Panels', and the terms are interchangeable.
Stakeholder	Stakeholders are individuals, groups, or organisations that have an interest or influence in, or are affected by, a proposed project or activity.
Study Area	The area in which a particular assessment or survey targets. The study area will vary depending on the nature of the technical assessment work and individual ES Environmental Aspect Chapters will determine their methodologies the study area spatial extents.
Switchgears	Switchgears are the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment.
Temporal Scope	In EIA, 'temporal scope' refers to the timeframe during which potential environmental impacts of a project are assessed during the various phases (construction, operation and decommissioning).
Tracker Solar PV Modules	Rotates Solar PV Tables on a single axis to follow the sun's path across the sky, typically from east to west, throughout the day.
Transformers	Transformers control the voltage of the electricity generated across the Scheme before it reaches the primary onsite substations

Term / Acronym	Description
Works Plan	The plans submitted with the Application known as the **Works Plans [Document Reference 2.3]** and which delineate the work areas for the Scheme.
Zone of Influence (ZoI)	The area for the assessment of combined effects. Zones of Influence (ZoIs) are variable depending on the environmental factor being discussed.

9 References

- Ref 1. The Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 (APFP Regulations)
- Ref 2. Planning Inspectorate. Nationally Significant Infrastructure Projects: Advice on Good Design' (October 2024, updated April 2025). Available online https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design.
- Ref 3. Department for Energy Security and Net Zero (2025). Overarching National Policy Statement for Energy (EN-1). Available online: https://www.gov.uk/government/publications/overarching-national-policy-statement-forenergy-en-1
- Ref 4. Department for Energy Security & Net Zero (2025). National Policy Statement for Renewable Energy Infrastructure (EN-3). Available online: https://www.gov.uk/government/publications/national-policy-statement-for-renewableenergy-infrastructure-en-3
- Ref 5. Department for Energy Security & Net Zero (2025). National Policy Statement for Electricity Networks Infrastructure (EN-5). Available online: https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5
- Ref 6. National Infrastructure Commission (2018). Design Principles for National Infrastructure. Online: https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/