FENWICK SOLAR FARM

Fenwick Solar Farm
EN010152

Environmental Statement

Volume III Appendix 1-1: EIA Scoping Report

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Prepared for:
Fenwick Solar Project Limited

Prepared by:
AECOM Limited

Fenwick Solar Farm

Environmental Impact Assessment Scoping Report

Fenwick Solar Project Limited

June 2023

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1. Introduction

1.1 Background

1.1.1 Fenwick Solar Project Limited (hereafter referred to as 'the Applicant') has commissioned this Environmental Impact Assessment (EIA) Scoping Report for Fenwick Solar Farm.

1.1.2 Fenwick Solar Farm would comprise the installation of solar photovoltaic (PV) generating panels, interconnecting cabling, associated Battery Energy Storage System(s) (BESS), one or more substation, a cable or line drop connecting the new substation to the Existing National Grid Thorpe Marsh substation, and other supporting infrastructure including fencing, access tracks, drainage, and biodiversity and landscaping enhancements at a proposed site near Doncaster (hereafter collectively referred to as the 'Scheme'). The Scheme would allow for the generation, storage and export of more than 50 megawatts (MW) electrical generation capacity.

1.1.3 Due to its proposed generating capacity, the Scheme is classified as a Nationally Significant Infrastructure Project (NSIP) and would therefore require a Development Consent Order (DCO) under the Planning Act 2008 (Ref 1) for its construction, operation and demolition.

1.1.4 The Scheme is located approximately 5 kilometres (km) north of Doncaster and is comprised of three main areas (refer to Figure 1-1):

- The land located east of Fenwick and immediately south of the River Went, hereafter referred to as the 'Solar PV Site' and denoted by a solid red line on Figure 1-1;
- The land between the Solar PV Site and the existing compound for Thorpe Marsh Substation, hereafter referred to as the 'Grid Connection Corridor Search Area' and denoted by the dashed red line on Figure 1-1; and
- The land located within the existing compound for Thorpe Marsh Substation, hereafter referred to as the 'Existing National Grid Thorpe Marsh Substation' and denoted by the brown area within the Grid Connection Corridor Search Area on Figure 1-1.

1.1.5 The Solar PV Site, Grid Connection Corridor Search Area and Existing National Grid Thorpe Marsh Substation (referred to collectively as the 'Site') are described in **Chapter 2: The Scheme** of this EIA Scoping Report.

1.1.6 The Site boundary is likely to be refined as the Scheme design progresses. However, Figure 1-1 shows the expected maximum extent of land that would be included within the DCO application, which includes all land being considered for the purposes of the Scheme and provides *"a plan sufficient to identify the land"* for the purposes of this EIA Scoping Report. Figure 1-1 represents the likely maximum extent of the Site boundary based on all the options for components of the Scheme that have been, and will be, the subject of consultation.

1.1.7 This EIA Scoping Report forms a formal request for a Scoping Opinion under Regulation 10(1) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended in 2018) (the 'EIA Regulations') (Ref 2).

1.2 Legislative Context and Need for Environmental Impact Assessment

1.2.1 This section lays out the legislative context and need for an Environmental Impact Assessment.

Legislation, National and Local Policies

1.2.2 The Scheme is defined as a NSIP under Sections 14(1)(a) and 15(2) of the Planning Act 2008 (Ref 1) as an onshore generating station in England with a capacity exceeding 50 MW.

1.2.3 The requirement to undertake an EIA for NSIP developments is transposed into law through the EIA Regulations (Ref 2). The EIA Regulations specify which developments are required to undergo EIA. Schemes relevant to the NSIP planning process are listed under either of 'Schedule 1' or 'Schedule 2'. Those developments listed in Schedule 1 must be subject to EIA, while developments listed in 'Schedule 2' must only be subjected to EIA if they are considered *"likely to have significant effects on the environment by virtue of factors such as its nature, size or location".* The criteria on which the judgement on EIA being required must be made are set out in Schedule 3.

1.2.4 The Scheme is a 'Schedule 2' development under paragraph 3(a) of Schedule 2 of the EIA Regulations (Ref 2), as it constitutes an "*Industrial installation for the production of electricity, steam and hot water*".

1.2.5 It is considered that due to its size, nature and location, the Scheme has the potential to have significant effects on the environment. The Applicant therefore wishes to confirm, under Regulation 8(1)(b) of the EIA Regulations, that an Environmental Statement (ES) will be provided in respect of the application for development consent for the Scheme, as it is considered there is the potential for the Scheme to meet the criteria set out in Schedule 3 of the EIA Regulations (Ref 2).

1.2.6 Following the completion of the surveys, assessments and consultation processes outlined in this EIA Scoping Report, and taking into account of the Scoping Opinion (refer to Section 1.3), an application for a DCO will be made to the Secretary of State (SoS) for determination in accordance with the Planning Act 2008 (Ref 1). The DCO application will be accompanied by an ES, in accordance with Regulation 5(2)(a) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 ('APFP Regulations') (Ref 3). The ES will set out the methods and findings of a comprehensive EIA undertaken in line with the EIA Regulations (Ref 2).

1.2.7 The Localism Act 2011 (Ref 4) appointed the Planning Inspectorate as the government agency responsible for operating the DCO process for NSIPs. The SoS will appoint an Examining Authority from the Planning Inspectorate, who will examine the DCO application for the Scheme and then make a

recommendation to the SoS, who will in turn make the decision on whether to grant or refuse the DCO for the Scheme.

1.2.8 In accordance with Section 104(2) of the Planning Act 2008 (Ref 1), the SoS is required to have regard to the relevant National Policy Statement (NPS), amongst other matters, when deciding whether or not to grant a DCO. However, currently, none of the relevant adopted technology-specific NPSs directly apply to solar PV and battery storage. Where this is the case, Section 105 of the Planning Act 2008 (Ref 1) applies and applications are tested against Part 2(c) "*any other matters which the Secretary of State thinks are both important and relevant to the Secretary of State's decision".*

1.2.9 In lieu of a technology-specific NPS for solar PV and battery storage, the following NPSs are still important and relevant considerations in assessing the Scheme's DCO application:

- Overarching NPS for Energy (EN-1) (Ref 5);
- NPS for Renewable Energy Infrastructure (EN-3) (Ref 6); and
- NPS for Electricity Networks Infrastructure (EN-5) (Ref 7).

1.2.10 These NPSs are currently being updated and revised Draft NPSs were published in March 2023 (Ref 8, Ref 9, Ref 10). The Draft NPS for Renewable Energy EN-3 (2023) (Ref 11) now includes Section 3.10 which sets out policy requirements specific to solar generation. However, the detail of these provisions is subject to consultation and thereafter implementation. The March 2023 Draft Energy NPSs follow and supersede previous draft versions published in 2021. Like the 2023 draft, the 2021 draft NPS EN-3 (Ref 11) also included a technology specific section on solar generation.

1.2.11 The Government's Nationally Significant Infrastructure: Action Plan for Reforms to the Planning Process (Ref 12), published 23 February 2023, sets out that the suite of updated Energy NPSs (including updated versions of NPS EN-1, NPS EN-3 and NPS EN-5) will be designated by quarter two of 2023. Once these have been designated, it is expected that technology-specific policy covering solar PV will be in place and that Section 104(2) of the Planning Act (2008) (Ref 1) will apply to the Scheme.

1.2.12 Given the importance of these NPSs, the EIA approach takes account of these new emerging documents and any subsequent formal adoption of new NPSs for energy infrastructure will be considered, where relevant, during the production of the ES. A summary of the relevant considerations for each technical assessment is provided for each environmental technical topic within this EIA Scoping Report (refer to **Chapter 6** to **14**).

1.2.13 The National Planning Policy Framework (NPPF), updated in July 2021 (Ref 13) sets out the Government's national planning policies for England. NPPF paragraph 5 confirms that the NPPF may be a matter that is both important and relevant for the purposes of assessing DCO applications. Relevant policies of the NPPF will therefore be considered in the EIA.

1.2.14 Policies in Local Plans are frequently considered important and relevant matters can influence the content of local impact reports (which the host local planning authorities (LPAs) produce following submission of DCO

applications), and which the SoS must have regard to in its decision making in accordance with the Planning Act 2008 (Ref 1).

1.2.15 The Scheme would lie within the administrative area of the City of Doncaster Council. The following documents form the Development Plan for the land within which the Scheme would be located:

- Doncaster Local Plan 2015-2035 adopted September 2021 (Ref 14); and
- Barnsley, Doncaster, and Rotherham Joint Waste Plan adopted 2012 (Ref 15).

1.2.16 The purpose of considering the abovementioned planning policies at the scoping stage of the EIA is twofold:

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

1.2.17 A summary of national and local planning policy relevant to each technical assessment is provided for each technical topic (refer to **Chapter 6** to **14** of this EIA Scoping Report).

Other Relevant Policy

1.2.18 Other policies which are likely to be important and relevant matters to the SoS's decision and are considerations for the EIA technical assessments include 'A Green Future: Our 25 Year Plan to Improve the Environment' (published in 2018 and updated in 2021) (Ref 16), 'Environmental Improvement Plan 2023' (2023) (Ref 17), and 'the Energy White Paper: Powering our Net Zero Future' (2020) (Ref 18).

1.2.19 The 25 Year Environment Plan, first published in 2018 and updated in October 2021, sets out the Government's 25 year plan to improve the environment within a generation. It aims to meet ten goals as follows: i) achieve clean air; ii) achieve clean and plentiful water; iii) achieve thriving plants and wildlife; iv) reduce risk of harm from environmental hazards like flooding and drought; v) use resources from nature more sustainably and efficiently; vi) enhance beauty, heritage and engagement with the natural environment; vii) mitigate and adapt to climate change; viii) minimise waste; ix) minimise exposure to chemicals; and x) enhance biosecurity. This plan therefore highlights the Government's support for the reduction in the UK's carbon footprint; protection and enhancement of the natural environment; and ensuring that land is managed with environmental gains.

1.2.20 The Environmental Improvement Plan 2023 acts as the first revision of the 25 Year Environment Plan. It builds upon the vision of the 25 Year Environment Plan with a new plan setting out how goals for improving the environment will be delivered, as well as interim targets to measure progress. It highlights ten goals to achieve: i) thriving plants and wildlife; ii) clean air; iii) clean and plentiful water; iv) managing exposure to chemicals and pesticides; v) maximise our resources, minimise our waste; vi) using

resources from nature sustainability; vii) mitigating and adapting to climate change; viii) reduced risk of harm from environmental hazards; ix) enhancing biosecurity; and x) enhancing beauty, heritage and engagement with the natural environment.

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

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

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

1.3 Purpose and Structure of this EIA Scoping Report

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

1.3.2 Regulation 10(3) of the EIA Regulations (Ref 2) sets out the requirements for requesting a Scoping Opinion stating that the request (EIA Scoping Report) must include:

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

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

- Provide a summary of the Scheme;

- Set out the proposed scope of work and methods to be applied in carrying out the EIA;
- Identify the likely significant environmental effects of the Scheme at an early stage of development to ensure they are considered and addressed throughout the design and consenting process;
- Provide a justification and rationale for scoping out certain topics from further assessment (for example where no likely significant effects are predicted); and
- Set out the proposed structure and coverage of the ES to be submitted with the DCO application.

1.3.4 This EIA Scoping Report is set out in accordance with guidance provided by the Planning Inspectorate's Advice Note 7 'Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements' (Ref 19).

1.3.5 Table 1-1 lists the suggested requirements identified in Advice Note 7 (Ref 19) and details where they are presented within this EIA Scoping Report.

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

Suggested Scoping Report Contents	Location in this Scoping Report
Transboundary Screening Matrix	Appendix A: Transboundary Effects Screening Matrix
The Proposed Development:	
An explanation of the approach to addressing uncertainty where it remains in relation to elements of the proposed development e.g. design parameters	Chapter 2: The Scheme
Referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the proposed development	Figure 1-1: Site Location Figure 1-2: Site Boundary and Land Use Figure 2-1: Environmental Constraints
EIA Approach and Topic Areas:	
An outline of the reasonable alternatives considered and the reasons for selecting the preferred option	Chapter 3: Alternatives Considered
A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues	Chapter 16: Summary and Conclusions
A detailed description of the aspects and matters proposed to be scoped out	Chapter 6 to 14 (technical topics)

Suggested Scoping Report Contents	Location in this Scoping Report
of further assessment with justification provided	
Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters	Chapter 6 to 14 (technical topics) Appendix B: Preliminary Ecological Appraisal Report (PEAR) Appendix C: Water Framework Directive (WFD) Screening Assessment
Aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect e.g. criteria for determining sensitivity and magnitude	Chapter 6 to 14 (technical topics) Appendix B: Preliminary Ecological Appraisal Report (PEAR) Appendix C: Water Framework Directive (WFD) Screening Assessment
Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects	Chapter 6 to 14 (technical topics) Appendix B: Preliminary Ecological Appraisal Report (PEAR) Appendix C: Water Framework Directive (WFD) Screening Assessment
Information Sources:	
References to any guidance and best practice to be relied upon	Chapter 6 to 14 (technical topics) Appendix B: Preliminary Ecological Appraisal Report (PEAR) Appendix C: Water Framework Directive (WFD) Screening Assessment
Evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local planning authorities)	Chapter 6 to 14 (technical topics) Appendix B: Preliminary Ecological Appraisal Report (PEAR) Appendix C: Water Framework Directive (WFD) Screening Assessment
An outline of the structure of the proposed ES	Chapter 15: Structure of the ES

1.3.6 A glossary and abbreviation list are presented at the back of this EIA Scoping Report (**Chapter 18** and **19**, respectively).

1.4 The Applicant

1.4.1 The Applicant (Fenwick Solar Project Limited) is a wholly owned subsidiary of BOOM Power Limited who specialise in non-subsidised solar and battery storage projects. BOOM Power Limited was founded in 2019, and the name BOOM is an acronym for Build Own Operate Maintain. This reflects the organisation's intentions to be involved in sustainable energy projects from day one right the way through to operation. The BOOM Power Limited Managing Director and team have been responsible for constructing more than 700 MW of solar developments in the UK between 2015 and 2017 and developing more than 850 MW of solar projects, including the UK's first NSIP solar PV project Cleeve Hill which was awarded a DCO in 2020 and the recently consented Kenley Solar Farm in Hull, Osgodby Solar Farm near Selby, and Low Farm Solar Farm in Wakefield. In 2021, the UK based BOOM Power Limited partnered with the Pelion Green Future group of companies based across Australia, America and the European mainland.

1.5 IEMA Quality Mark

1.5.1 Regulation 14 (4) of the EIA Regulations (Ref 2) requires that 'in order to ensure the completeness and quality of the environmental statement (a) the applicant must ensure that the environmental statement is prepared by competent experts; and (b) the environmental statement must be accompanied by a statement from the applicant outlining the relevant expertise or qualifications of such experts'. AECOM is an Institute of Environmental Management and Assessment (IEMA) Registered Impact Assessor and holds the IEMA Quality Mark as recognition of the quality of our EIA product and continuous training of our environmental consultants. A Statement of Competence will be included within the ES, outlining the relevant expertise and qualifications of the experts who prepared the ES.

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East Riding of Yorkshire Council

North Yorkshire Council

City of Doncaster Council

N

AECOM

PROJECT

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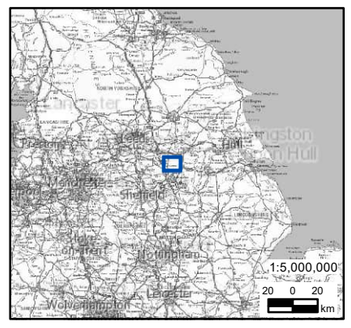
LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- Local Authority Boundary



NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Site Location

FIGURE NUMBER

Figure 1-1

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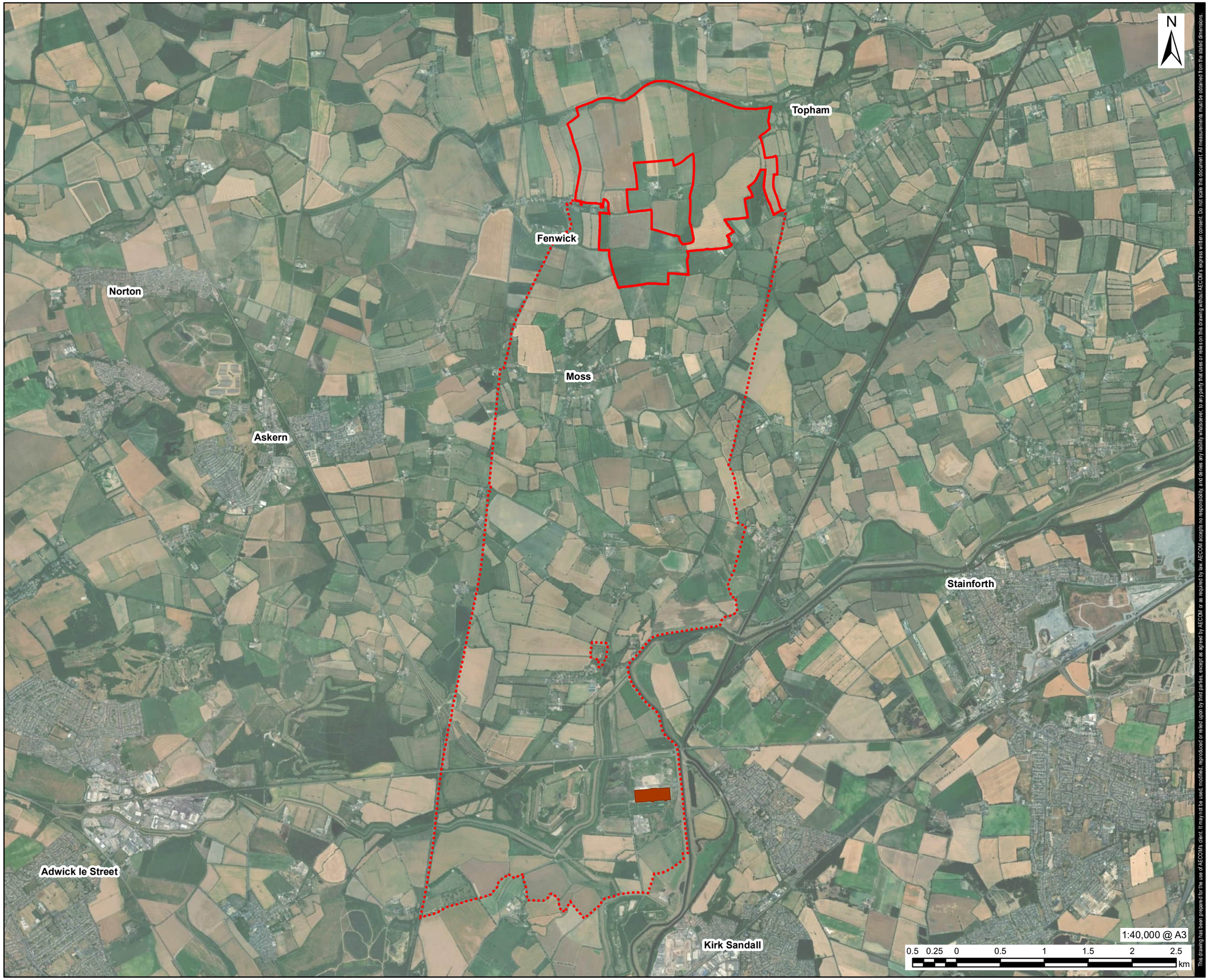

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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Site Boundary and Land Use

FIGURE NUMBER

Figure 1-2

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2. The Scheme

2.1 Introduction

2.1.1 As stated in paragraph 1.1.2, the Scheme comprises the installation of solar PV panels, interconnecting cabling, associated BESS, one or more substation, a cable or line drop connecting the new substation to the Existing National Grid Thorpe Marsh Substation, and other supporting infrastructure including fencing, access tracks, drainage, and biodiversity and landscaping enhancements.

2.1.2 Section 2.2 of this EIA Scoping Report presents a description of the Solar PV Site, the Grid Connection Corridor Search Area, and the Existing National Grid Thorpe Marsh Substation. Sections 2.3 to 2.6 present a description of the Scheme infrastructure in sufficient detail to inform the approach and scope of the EIA.

2.2 Site Description

2.2.1 This section describes the location and key environmental features of the Solar PV Site, Grid Connection Corridor Search Area, and Existing National Grid Thorpe Marsh Substation which are located within the administrative area of the City of Doncaster Council. The rationale for the location of the Scheme is described in **Chapter 3: Alternatives Considered** of this EIA Scoping Report. The maximum extent of land that is expected to be included within the DCO application for the Scheme is shown on Figure 1-1.

2.2.2 The Site boundary represents the current maximum extent of land being considered and will be further refined as the Scheme design is developed; some of this land would be used for landscaping and habitat enhancement rather than Scheme infrastructure.

Site Overview

2.2.3 The Solar PV Site, Grid Connection Corridor Search Area, and Existing National Grid Thorpe Marsh Substation are described in turn below and shown on Figure 1-1.

Solar PV Site

2.2.4 The Solar PV Site is approximately centred on National Grid Reference (NGR) SE 60658 16767. The total area of the Solar PV Site is approximately 323 hectares (ha) and it is located approximately 12 km north of Doncaster.

2.2.5 The solar PV panels and associated BESS would be located within the Solar PV Site, along with other supporting infrastructure. The arrangement of the Solar PV Site will be refined as the Scheme design progresses.

2.2.6 A typical view across the Solar PV Site is presented in Plate 2-1.

Plate 2-1: Typical View Across the Solar PV Site

Grid Connection Corridor Search Area

2.2.7 The Grid Connection Corridor Search Area is approximately centred on NGR SE 59891 12126. It shows a search area of up to approximately 2,010 ha and is up to approximately 3 km wide.

2.2.8 Several options are under consideration for the proposed connection to the National Grid. This may include some supporting infrastructure within the Grid Connection Corridor Search Area. Depending on the electricity export connection taken forward, a cable in the Grid Connection Corridor Search Area would connect the Solar PV Site to the Existing National Grid Thorpe Marsh Substation.

2.2.9 The current Grid Connection Corridor Search Area is for scoping purposes and, if required, will be refined further prior to statutory consultation based on the findings of detailed engineering works, EIA studies and other relevant investigations. The Thorpe in Balne moated site, chapel and fishpond scheduled monument is excluded from the Grid Connection Corridor Search Area to avoid direct impacts as far as possible (see Figure 7-1 and **Chapter 7: Cultural Heritage**). The Grid Connection Corridor Search Area will be refined for the Preliminary Environmental Information Report (PEIR) and ES, before the submission of the DCO application, and will be designed to avoid as far as possible sensitive receptors such as habitat designations, water features, residential and commercial properties and archaeology features.

Existing National Grid Thorpe Marsh Substation

2.2.10 The Existing National Grid Thorpe Marsh Substation is approximately centred on NGR SE 60526 09507. The total area of the Existing National Grid Thorpe Marsh Substation is 5.6 ha and is located approximately 6 km south of the Solar PV Site.

Key Environmental Features of the Site

2.2.11 Key environmental and planning features within and around the Site are shown on Figure 2-1.

2.2.12 The landscape features within the vicinity of the Site consist predominately of agricultural fields as can be seen on Figure 1-2. The field boundaries within the Solar PV Site are shown in Figure 2-2.

2.2.13 According to the provisional Agricultural Land Classification (ALC) mapping (Ref 20), the land within the Solar PV Site is mainly ALC Grade 4 agricultural land with some Grade 3 agricultural land. The land within the Grid Connection Corridor Search Area is ALC Grade 4 and Grade 3 agricultural land, whilst the land within the Existing National Grid Thorpe Marsh Substation is entirely ALC Grade 4 agricultural land (see **Section 12: Socio-economics and Land Use** and Figure 12-1).

2.2.14 The Solar PV Site, Grid Connection Corridor Search Area, and Existing National Grid Thorpe Marsh Substation do not contain any statutory nature conservation designations. The closest statutory designated site for nature conservation is Shirley Pool Site of Special Scientific Interest (SSSI), located approximately 1.7 km west of the Grid Connection Corridor Search Area. A list of statutory designated ecological sites located in the vicinity of the Site is included in Table 8-1 of **Chapter 8: Ecology** of this EIA Scoping Report and shown on Figure 8-1. A list of non-statutory ecological designated sites in the vicinity of the Site is included in Table 8-2 and Table 8-3 and shown on Figure 8-2 of **Chapter 8: Ecology**.

2.2.15 Nearby recreational and residential receptors include (but are not limited to) properties in the villages of Fenwick, Sykehouse and Moss, as well as farms and associated buildings in the surrounding area. The Baxter Arms and Sykehouse Arena commercial premises are located approximately 430 metres (m) west and 540 m east of the Solar PV Site, respectively.

2.2.16 There are no World Heritage Sites, Registered Parks and Gardens, or Registered Battlefields located within the Solar PV Site, Grid Connection Corridor Search Area, or Existing National Grid Thorpe Marsh Substation. While the Fenwick Hall moated site scheduled monument and six Grade II Listed Buildings are in close proximity to the Solar PV Site and the Thorpe in Balne moated site, chapel and fishpond scheduled monument is in close proximity to the Grid Connection Corridor Search Area, these designations and their immediate surrounding areas have been excluded from the Scheme to avoid direct impacts as far as possible. Six Grade II and one Grade II* Listed Buildings remain within the Grid Connection Corridor Search Area. Details of designated assets in the vicinity of the Site are included in paragraphs 7.5.2 to 7.5.13 of **Chapter 7: Cultural Heritage** of this EIA Scoping Report.

2.2.17 The majority of the Solar PV Site and Grid Connection Corridor Search Area is located within Flood Zone 2 (medium risk of flooding) and Flood Zone 3 (high risk). The Existing National Grid Thorpe Marsh Substation is located entirely within Flood Zone 2 and Flood Zone 3 (see Figure 9-3). The area surrounding the Existing National Grid Thorpe Marsh Substation, toward the southeast of the Grid Connection Corridor Search Area, is designated as a

water storage area with flood defences present along adjacent watercourses. These factors may influence the design elements of the Scheme such as locations of infrastructure or the height of equipment and panels.

2.2.18 The northern boundary of the Solar PV Site is bordered by the River Went which is designated as a Main River. There are smaller watercourses and drainage ditches across the Solar PV Site, including Fenwick Common Drain and Fleet Drain. Thorpe Marsh Drain is located within the southern half of the Grid Connection Corridor Search Area, which is also crossed by smaller watercourses and drainage ditches. Thorpe Marsh Drain is a Main River and discharges into the River Don. There are also a number of standing waterbodies and smaller watercourses and drainage ditches in proximity to the south and west of the Existing National Grid Thorpe Marsh Substation. More detailed information on watercourses and flood risk in relation to the Scheme is included in section 9.5 of **Chapter 9: Water Environment** of this EIA Scoping Report and shown on Figure 9-1 to Figure 9-4.

2.2.19 There are a number of Public Rights of Way (PRoW) which cross the Solar PV Site, particularly towards its southern extents, and one PRoW along the northern boundary. The Grid Connection Corridor Search Area is crossed and adjacent to a high number of PRoW. The closest PRoW to the Existing National Grid Thorpe Marsh Substation is Bridleway Barnby Dun with Kirk Sand 2, located approximately 380 m to the south. The PRoW that intersect or are adjacent to the Site are presented in Figure 2-3 and detailed in paragraph 12.5.25 of **Chapter 12: Socio-Economic and Land Use** of this EIA Scoping Report.

2.2.20 Further details regarding the Site and the surrounding areas is provided in the technical chapters (**Chapter 6** to **14**) of this EIA Scoping Report.

The DCO Site Boundary

2.2.21 At this scoping stage, the expected maximum area of land potentially required for the construction, operation and maintenance of the Scheme, which includes land required for temporary and permanent purposes, is shown on Figure 1-1. It is important to note that this may be subject to change as the Scheme design and EIA progress taking into account environmental and technical factors, and consultation responses.

2.2.22 Together with the description of the Scheme components set out in this section, Figure 1-1 represents the current maximum extent of land expected to be required for the full range of possible development options which could form part of the final Scheme. This allows consideration of potential environmental effects associated with the full range of options currently under consideration, and ensures that the likely significant effects of these component options are taken into account when scoping the assessment.

2.3 Description of the Scheme

The Rochdale Envelope

2.3.1 The Planning Inspectorate's Advice Note 9: Using the 'Rochdale Envelope' ('Advice Note 9') (Ref 21) provides guidance regarding the degree of

flexibility that may be considered appropriate within an application for development consent under the Planning Act 2008 (Ref 1). The advice note acknowledges that there may be aspects of the Scheme design that are not yet fixed, and therefore, it may be necessary for the EIA to assess likely worst case variations to ensure that all foreseeable significant environmental effects of the Scheme are assessed.

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

- The type of PV module mounting structure (panel orientation, fixed or tracker type);
- The arrangement of supporting infrastructure such as inverters, transformers and switchgear (decentralised or centralised options); and
- The inclusion and arrangement of the BESS and cable connecting to the Existing National Grid Thorpe Marsh Substation.

2.3.3 It is necessary that there will be some flexibility built into the design of the Scheme when submitting the DCO application, in order that the detailed design of the Scheme can be informed by environmental and technical considerations, post-consent work, and take advantage of innovation in technology. Where such flexibility or optionality is required, this is explained in paragraphs 2.3.5 to 2.3.50 below.

2.3.4 Given the above, it is necessary for the technical assessments to assess an ‘envelope’ within which the works would take place. As such, the DCO application and EIA will be based on maximum and, if relevant, minimum parameters. To remain in accordance with the EIA Regulations, it will be essential that the parameters are as ‘limited’ as possible to ensure that ‘likely significant effects’ are identified, rather than unrealistically amplified effects, which could be deemed to be unlikely. Where flexibility is sought, the ES will clearly set out the maximum design parameters applicable to each option assessed, with sufficient information to be considered in detail by the technical authors of the ES and to ensure the realistic worst case effects of the Scheme are assessed for each potential receptor. This is of particular importance to maintain flexibility due to the rapid pace of change in solar PV and battery storage technology, whilst maintaining a robust and comprehensive assessment of potential effects in the ES.

Overview of the Scheme Infrastructure

2.3.5 The principal Scheme infrastructure would be as follows:

- Solar PV modules;
- PV module mounting structures;
- Inverters (either string or central type);
- Transformers (Low Voltage (LV) to Medium Voltage (MV) or High Voltage (HV));
- LV, MV and HV switchgear, protection and control equipment;

- MV (33 kilovolt (kV)) field substations within the Solar PV Site;
- Interconnecting underground cabling;
- The BESS (expected to be formed of lithium ion batteries storing electrical energy);
- One or more new substations and modifications to the Existing National Grid Thorpe Marsh Substation (if required);
- Operations and maintenance hub with welfare facilities;
- Fencing and security measures;
- Access tracks; and
- Biodiversity and landscaping enhancements.

2.3.6 The Scheme would also include circuits connecting the new substation(s) to the Existing National Grid Thorpe Marsh Substation. Each circuit may comprise up to three cables, as well as earth and fibre optic cables.

2.3.7 During the Scheme construction phase, one or more temporary construction compound(s) would be required within the Site as well as temporary roadways to facilitate access to all land within the Site. Further information on construction activities is provided in Section 2.4.

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

Solar PV Infrastructure

Solar PV Modules

2.3.9 Solar PV modules convert sunlight into electrical current (as direct current (DC)). Individual panels are typically up to 2.4 m long and up to 1.3 m wide and typically consist of a series of PV cells beneath a layer of toughened glass. Other PV technologies are developing rapidly and may be available at the time of construction. The PV frames are typically supported by galvanised steel poles.

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

Module Mounting Structures

2.3.11 There are various types of PV module mounting structures, which are typically built from anodised aluminium and galvanised steel. While fixed south facing mounts are historically the most common for solar PV facilities in the UK, the ongoing technological advances and economic considerations make other options increasingly more feasible. The type of the mounting

structures to be used for the Scheme is currently being evaluated. The options considered at this scoping stage are:

- Fixed south facing;
- Fixed east-west facing; and
- Single axis tracker.

2.3.12 Each string of modules would be mounted on a metal rack, known as a frame. The frames are usually supported by galvanised steel poles typically driven 1 m or up to 3 m into the ground depending on local geology, with tracker systems typically requiring deeper depth of pile between 3 m and 5 m.

2.3.13 Each of the currently considered mounting options is described in the paragraphs below. The dimensions presented below are indicative at this stage as the final elevations of the racks would be influenced by various design factors such as local topography, flood risk, inter-row shading and maintenance considerations. Where relevant, technical chapters (**Chapter 6** to **14**) of this EIA Scoping Report consider which option would represent the reasonable worst case scenario and the potential scoping implications associated with this option.

South Facing Fixed Tilt Option

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

- Fixed tilt: 15 to 35 degrees from horizontal;
- Height: up to 3.5 m;
- Clearance above ground: 0.8 m; and
- Spacing between rows: from 2 m to 12 m.

Plate 2-2: South-facing Fixed Tilt Modules, Finished Array

East-West Facing Fixed Tilt Option

2.3.15 The fixed east-west facing option is similar to the south facing option in terms of the panel mounting, but the panel strings would run in a north-south direction and aligned facing east and west (see Plate 2-3). The indicative fixed east-west facing system parameters (subject to detailed design) are as follows:

- Fixed tilt: 15 to 35 degrees from horizontal;
- Height: up to 3.5 m;
- Clearance above ground: 0.8 m; and
- Spacing between rows: from 2 m to 4 m.

Plate 2-3: East-West Facing Fixed Tilt Modules, Finished Array

East-West Tracker Option

2.3.16 A tracker system involves attaching the PV modules to a motorised table that can move in relation to the sun. This allows for optimal power generation

throughout the day. The panels are stored horizontally overnight. There are different types of tracking systems available and, if chosen, the Scheme would utilise a single-axis tracker system, which tilts the solar panel around a horizontal north-south axis thus tracking the sun's movement from east to west, as illustrated in Plate 2-4. It is noted that the images in Plate 2-4 show a solar PV scheme in Australia and are indicative as the Scheme may use two panels in landscape orientation as opposed to the one in portrait, as shown. The indicative tracker system parameters (subject to detailed design) are as follows:

- Tracker tilt range: + / -60 degrees from horizontal;
- Height at maximum tilt: up to 3.5 m;
- Clearance above ground at maximum tilt: 0.8 m; and
- Spacing between rows: from 4 m to 8 m.

Plate 2-4: East-West Single Axis Tracker System, Finished Array

Supporting Infrastructure: Inverters, Transformers and Switchgear

2.3.17 The supporting infrastructure comprises inverters, transformers and switchgear.

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

2.3.19 Transformers are required to step up the voltage of the electricity generated across the Solar PV Site from LV produced by the inverters to MV (33 kV) or HV (>66 kV), if required for transmission to the National Grid (see paragraphs 2.3.40 and 2.3.41).

2.3.20 Switchgears are the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate

electrical equipment. Switchgear is used both to protect and isolate / de-energise equipment to allow work to be done and to clear faults downstream.

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

String Inverters Option

2.3.22 String inverters are small enough to be mounted underneath the PV modules, as shown on Plate 2-5. One single string inverter unit could be utilised, for example, for every 10 to 12 strings. String inverters output is LV (<1 kV).

Plate 2-5: Typical String Inverter Installed under PV Modules

Central Inverters Option

2.3.23 Alternatively, central inverters may be used, and these could be sited at regular intervals amongst the PV modules. Centralised inverters are typically housed in containers with an approximate footprint of up to 14 m x 4 m and a height of up to 3.5 m. Plate 2-6 shows a typical outdoor (standalone) central inverter and combined field substation.

Plate 2-6: Typical Central Inverter and Combined Substation

Field Substations

2.3.24 LV electricity from the inverters is fed into field substations which consist of transformers and switchgear. LV electricity typically passes through the transformers and exits through switchgear into 33 kV cables.

2.3.25 Field substations are typically packaged in containers with an approximate footprint of up to 14 m x 4 m and a height of up to 3.5 m, as illustrated in Plate 2-7. Field substations would normally be mounted on concrete foundations, although other types of foundations may be used depending on the local geology.

2.3.26 Multiple field substations would be distributed throughout the Solar PV Site. An indicative 50 field substations are expected to be required, however, the exact number required will be determined through detailed design studies and confirmed in the ES.

Plate 2-7: Example Field Substation

2.3.27 Transformers and switchgear may also be packaged in standalone units. Standalone transformers have a footprint of up to 7 m x 4 m and with a height of up to 3.5 m. Transformer cabins are typically externally finished in keeping with the prevailing surrounding environment, often with a green painted finish. Standalone switchgears would be housed in a cabin of up to 2.5 m by 6.5 m in plan and up to 3.5 m in height.

Cabling

2.3.28 LV electrical cabling is required to connect the PV modules and BESS to inverters and the inverters to the transformers (typically via 0.6 / 1 kV cables). The dimensions of the trenches vary depending on the number of cables or ducts they contain but would typically be up to 0.8 m in width and 0.6 m to 0.8 m in depth.

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

2.3.30 MV cables (normally 33 kV) are required between the transformers / switchgears and the field substations. These cables would be buried underground. The dimensions of the trenches vary depending on the number of cables or ducts they contain but could be typically up to 1.2 m in width and up to 1.2 m in depth.

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

2.3.32 An example of underground cable installations is presented in Plate 2-8.

Plate 2-8: Example Underground Cable Installation

Battery Energy Storage System(s)

2.3.33 The Scheme would include an associated BESS at one or more locations within the Solar PV Site. There are a number of different designs for the BESS that will be explored as part of the iterative design process. Maximum parameters for the compound layouts will be defined in the DCO application in order to present and assess a worst case in the ES.

2.3.34 The precise number of individual battery storage enclosures depends upon the level of power capacity and duration of energy storage that the Scheme would require; investigations are ongoing to determine this and maximum parameters will be provided in the ES. There needs to be an element of flexibility in this aspect as both the technology and business models are evolving, as is relevant policy such as the provisions on the role of storage in the draft NPS EN-1 (Ref 8) which may affect the business case and support for the systems.

2.3.35 The location of the securely fenced BESS, transformers, and dedicated switchgear will be determined in part by whether the BESS are AC-coupled and / or DC-coupled. If the system(s) are AC-coupled they would be located together in one or more ‘centralised’ area, which can be installed, operated and maintained easily. If the system(s) are DC-coupled they would be spread around and located alongside the centralised inverters.

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

2.3.37 The Switchgear / Control Room operates, isolates and controls the exported power from the energy storage system. This would comprise a building of similar dimensions to the containers; either an adapted container or built

from glass reinforced plastic (GRP), located within the main BESS compound.

Grid Connection Substation(s)

2.3.38 One or more grid connection substations within the Solar PV Site or the Grid Connection Corridor Search Area would receive the electricity from the 33 kV field substations. The grid connection substation(s) would step up the voltage ready to be exported to the National Grid via underground cables. There may also be a requirement for modifications or upgrades to the Existing National Grid Thorpe Marsh Substation.

2.3.39 A typical grid connection substation is up to a maximum of approximately 40 m by 100 m in plan and up to 13 m high, securely fenced with a separate control building measuring 20 m by 20 m in plan and up to 6 m high.

Electricity Export Connection to National Grid

2.3.40 The electricity generated by the Scheme is expected to be imported and exported via interface cables to the National Grid at one or more grid connection substations within the Solar PV Site or Grid Connection Corridor Search Area.

2.3.41 There are four options for connection to the National Grid currently under consideration. Subject to further discussion within National Grid and assessment and consultation, these options and the respective connection routes will be refined prior to the PEIR. However, for the purpose of this EIA Scoping Report, the locations being considered are:

- 400 kV transmission line drop to a 400 kV / 33 kV substation within the Grid Connection Corridor Search Area, close to the Solar PV Site;
- 400 kV transmission line drop to a 400 kV / 33 kV substation within the Solar PV Site;
- A 400 kV / 132 kV substation within the Grid Connection Corridor Search Area, close to the Existing National Grid Thorpe Marsh Substation, with connecting underground cables; up to two underground 132 kV circuits; and a 132 kV / 33 kV substation within the Solar PV Site or the Grid Connection Corridor Search Area; and
- A 400 kV / 33 kV substation within the Solar PV Site with 400 kV underground cables connecting to the Existing National Grid Thorpe Marsh Substation.

2.3.42 The underground cables would be buried below ground, typically at approximately 1.2 m depth. Underground cables are typically installed using an open trench method requiring 20 m – 40 m working corridor, with trench widths approximately 2 m wide and 2 m deep. At certain locations, such as river/water feature, railway and road crossings, trenchless methods of cable installation may be required. Trenchless methods include horizontal directional drilling (HDD), micro-tunnelling and boring.

Operations and Maintenance Hub

2.3.43 An operations and maintenance storage area would be established within the Site, typically within a new welfare unit. The ES will confirm the location of the operations and maintenance hub, which is likely to be located within the Solar PV Site. The operations and maintenance storage area is expected to be in place during both the construction and the operation of the Scheme.

Fencing, Security and Lighting

2.3.44 A security fence would enclose the operational areas of the Solar PV Site. PRoW that cross the Solar PV Site would be preserved with the fence installed either side of them. The fence is likely to be a ‘stock deer fence’ approximately 2 m to 3 m in height, as shown in Plate 2-9.

2.3.45 Pole mounted internal facing closed circuit television (CCTV) systems are likely to be deployed around the perimeter of the operational areas of the Solar PV Site. It is anticipated that these would be up to 3 m high. CCTV cameras would have fixed, inward-facing viewsheds and would be aligned to capture only the Scheme fence and the area inside the fence.

2.3.46 Temporary artificial lighting is expected to be required during construction. Lighting would be directional with care to minimise potential for light spillage beyond the Site particularly towards houses, live traffic and habitats. As far as is possible, construction works would be limited to daylight hours only, with focussed task-specific lighting provided where this is not possible. Outside of core working hours Passive Infra-Red controlled lights (motion sensors) would be used. Minimal artificial lighting is anticipated once the Scheme is in operation, other than during temporary periods of maintenance or repair. All routine operation and maintenance activities, except panel cleaning, would be scheduled for daylight hours as far as is practicable, and therefore it is anticipated that focussed task specific lighting would only be required in the event of emergency works / equipment failure requiring night-time working or panel cleaning operations.

Plate 2-9: Metal CCTV Pole and 'Deer Fence'

Access Tracks

2.3.47 Access tracks would be constructed across the Solar PV Site. These would typically be 3.5 m to 5 m wide compacted stone tracks with 1:2 gradient slopes on either side (where required). An example access track within a solar PV facility during construction is shown on Plate 2-10.

Plate 2-10: Typical Crushed Stone Access Track Laid on Hardcore and Geotextile (Photo During Construction Phase and Prior to Landscaping)

Surface Water Drainage

2.3.48 The detailed operational drainage design would be carried out pre-construction with the objective of ensuring that drainage of the land to the present level is maintained. It would follow either the design of a new

drainage system taking into account the proposed new infrastructure (access tracks, cable trenches, structure foundations) to be constructed, or, if during the construction of any of the infrastructure there is any interruption to existing schemes of land drainage, then new sections of drainage would be constructed.

2.3.49 The design of new drainage systems would be based on the Flood Risk Assessment (FRA) and hydrological assessment to be undertaken and provided in the ES. Infiltration drainage design would be in accordance with Building Research Establishment (BRE) Digest 365: Soakaway Design and Sewers for Adoption (Ref 22) with infrastructure being placed at least 10 m away from watercourses.

Biodiversity and Landscaping

2.3.50 The Scheme would involve field boundary enhancement and planting of seed mixes within the Solar PV Site (see Plate 2-11 as an example). Planting would also be used to provide screening. The enhancements and planting would increase biodiversity within the Site and contribute to the Scheme achieving Biodiversity Net Gain (BNG) in line with the requirements of the Environment Act 2021 (Ref 23), the NPPF (Ref 13), draft NPS EN-1 (Ref 8) and local planning policy. Although the requirement for a minimum 10% gain in biodiversity will not become mandatory for NSIPs until 2025, in line with best practice the Scheme design will aim to achieve BNG levels greater than the minimum 10 % set out in the Environment Act 2021 (Ref 23). It is noted that similar solar schemes developed by the Applicant's parent company have typically delivered BNG well in excess of this figure.

Plate 2-11: Landscaped Solar PV Facility

2.4 Construction Programme and Activities

2.4.1 The current date of connection for the Scheme is 2032, with an aspiration for the Scheme to start operating sooner where possible. A request has been submitted to National Grid to bring forward the date of connection to late 2027, with discussions ongoing to confirm if an earlier date of connection is feasible. The final date of connection will be confirmed in the ES.

2.4.2 Subject to being granted consent, to National Grid's agreement to bringing forward the grid connection date and following a final investment decision, the earliest Scheme construction could start is in 2026. Construction would require an estimated 18 to 24 months, with peak construction activity anticipated during 2027. The ES will provide further details of construction activities including working hours, their anticipated duration and an indicative programme of each phase of construction work.

Indicative Construction Activities

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

- Site preparation to include:
  - Import of construction materials, plant and equipment to the Site;
  - The establishment of construction compound(s);
  - Upgrading of existing Site tracks / access roads and construction of new tracks;
  - The upgrade or construction of crossing points (bridges / culverts) over water features(the location, type and proposed dimensions for each crossing will be provided in the ES); and
  - Marking out the location of the infrastructure.

- Solar PV facility construction to include:
  - Import of components to the Site;
  - Erection of module mounting structures;
  - Mounting of modules;
  - Installation of electric cabling;
  - Installation of transformer cabins;
  - Installation of battery storage units; and
  - Construction of substation compound(s).
- Cable installation:
  - The establishment of mobilisation areas and running tracks;
  - Temporary construction compounds (to be located within the Site, yet to be determined);
  - Stripping of topsoil in sections;
  - Trenching in sections;
  - Appropriate storage and capping of soil;
  - Appropriate construction drainage with pumping where necessary;
  - Sectionalised approach of duct installation;
  - Excavation and installation of jointing pits;
  - Cable joint installation;
  - Cable pulling; and
  - Implementation of crossing methodologies for watercourses, infrastructure (including roads and rail), and sensitive habitats (e.g. HDD, cable bridging etc.).
- Testing and commissioning; and
- Site reinstatement (including topsoil reinstatement) and habitat creation.

2.4.4 It is anticipated that construction activities would be carried out in a sequential manner with construction teams responsible for specific types of works moving from one part of the Solar PV Site to the next. In this case the works would start with fencing, followed by frame installation, then panel installation, then cabling and connection.

2.4.5 Temporary construction compounds comprising parking, storage, staff welfare and waste management would be located within the Site.

Construction Staff

2.4.6 Based on AECOM's experience of other similar sized solar projects, it is currently estimated that up to 400 staff per day would be required to work on the Scheme during the peak construction period, which is likely to include construction of the substation(s), electricity export cable, modifications to the Existing National Grid Thorpe Marsh Substation (if required), and building of solar PV. This is expected to be a worst case based on the most rapid build out programme, noting that there would be noticeably fewer workers outside of peak activities.

Construction Traffic and Site Access

2.4.7 Based on the preliminary construction material and equipment requirements, it is anticipated that there could be up to a total 20 to 25 heavy goods vehicle (HGV) movements per day for a 52-week peak construction period, based

on the most rapid build out. This number is indicative, excludes construction staff transportation and ancillary construction traffic, and is subject to refinement. The 52-week peak construction period is when the highest number of daily movements would occur, however outside of this period within the longer 18-24 month construction period, daily vehicle movements would be expected to be significantly lower. A reasonable worst case scenario will be presented and assessed in the ES.

2.4.8 Construction access to the Site is yet to be determined. All construction access will be confirmed as the Scheme design progresses and in consultation with the relevant authorities.

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

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

Construction Environmental Management

2.4.11 A Framework Construction Environmental Management Plan (CEMP) will accompany the DCO application and describe the framework of mitigation measures identified in the ES to be followed and to be carried forward to a detailed CEMP prior to Scheme construction. The aim of the CEMP is to reduce nuisance impacts from:

- Use of land for temporary laydown areas, accommodation etc.;
- Construction traffic (including parking and access requirements) and changes to access and temporary road or footpath closure (if required);
- Noise and vibration;
- Construction lighting;
- Utilities diversion;
- Dust generation;
- Handling of soil resources;
- Run off and drainage; and
- Waste generation.

2.4.12 The detailed CEMP would be produced by the appointed construction contractor and agreed with the local planning authorities following grant of the DCO and prior to the start of construction (for example, as part of a requirement attached to the DCO). This would identify the procedures to be adhered to and managed by the Principal Contractor throughout construction, and would be based upon the Framework CEMP.

2.4.13 Contracts with companies involved in the construction works would incorporate environmental control, health and safety regulations, and current guidance and ensure that construction activities are appropriately controlled and that all appointed construction contractors involved with Scheme construction are committed to agreed best practice and meet all relevant environmental legislation including:

- Control of Pollution Act 1974 (COPA) (Ref 24);
- Environment Act 1995 (Ref 25);
- Hazardous Waste Regulations 2005 (as amended) (Ref 26); and
- Waste (England and Wales) Regulations 2011 (Ref 27).

2.4.14 The types of wastes generated during the construction, operation and maintenance and decommissioning of the Scheme are set out in Section 14.8. Records would be kept and updated regularly, ensuring that all waste transferred or disposed of has been correctly processed with evidence of signed Waste Transfer Notes (WTNs) kept on-site for inspection whenever requested. Furthermore, all construction works would adhere to the Construction (Design and Management) Regulations 2015 (CDM) (Ref 28).

Site Reinstatement and Habitat Creation

2.4.15 Following construction, a programme of Site reinstatement (including topsoil reinstatement) and habitat creation would commence. A Framework Biodiversity and Landscape Management Plan will be submitted as part of the DCO application and set out the principles for how the land would be managed throughout the operational and maintenance phase, following the completion of construction. The Framework Biodiversity and Landscape Management Plan will specify measures to mitigate significant effects of the Scheme and enhancement measures that support BNG. A detailed Biodiversity and Landscape Management Plan would be produced following grant of the DCO and prior to the start of construction (for example, as part of a requirement attached to the DCO), and would be based on the Framework Biodiversity and Landscape Management Plan.

2.5 Operational and Maintenance Activities

2.5.1 During the Scheme operational and maintenance phase, activity on the Site would be minimal and likely be restricted principally to sheep grazing (see Plate 2-12) (where relevant), vegetation management, equipment maintenance and servicing, replacement of any components that fail or reach the end of their lifespan, periodic fence inspection, and monitoring to ensure the continued effective operation of the Scheme.

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

2.5.3 It is anticipated that there would be one to three permanent staff at the Site at any one time during the operational phase. In addition, there would be up to 20 visitors per month (equating to around three visitors per day) for deliveries and servicing of equipment.

2.5.4 A Framework Operational Environmental Management Plan (OEMP) will set out the general principles to be followed during the operation and maintenance of the Scheme. The Framework OEMP will be prepared as part of the EIA and secured through a Requirement in the DCO. The Framework OEMP would be developed into a detailed OEMP following the grant of the DCO, based on the Framework OEMP.

2.5.5 The Applicant would explore the option of utilising the Solar PV Site for sheep grazing during Scheme operation and maintenance, subject to further investigation and confirmation of the absence any restrictive covenants that would prevent such use. Sheep grazing on solar PV facilities is successfully used in the UK and carries with it multiple benefits such as soil health improvement and biodiversity enhancement. Sheep are able to move safely between and under the PV modules, and shelter under the PV modules from sun or rain. The ES will demonstrate that this measure can be secured in respect of the operation and maintenance of the Scheme and consider the potential effects within each technical assessment, as appropriate.

Plate 2-12: Sheep Grazing on a Solar PV Facility

2.6 Decommissioning

2.6.1 The design life of the Scheme is expected to be at least 40 years, although the design life could be longer than this depending on the condition of equipment. It is expected that throughout this period faulty or damaged PV modules and other components would require replacement as part of the normal maintenance. The equipment would be reviewed at the end of the design life of the Scheme to determine whether it remains in a viable condition to continue operation after that time.

2.6.2 Additionally, standard lease agreements (for the land within the Solar PV Site) are for a 40-year operational period and these would require renegotiation and extension for the Scheme to continue operation beyond that time.

2.6.3 This EIA Scoping Report, and the subsequent PEIR and ES, therefore, assume a design / operational life of 40 years where relevant, although

consideration will also be given to the lifespan of the Scheme being extended beyond this. Should the design life of the Scheme be extended, the prescribed mitigation and management measures would continue to be in place ensuring that there would be no increased environmental risk. Therefore, it is not anticipated that an extension to the operational life of the Scheme would influence the outcomes of the assessments presented in the ES.

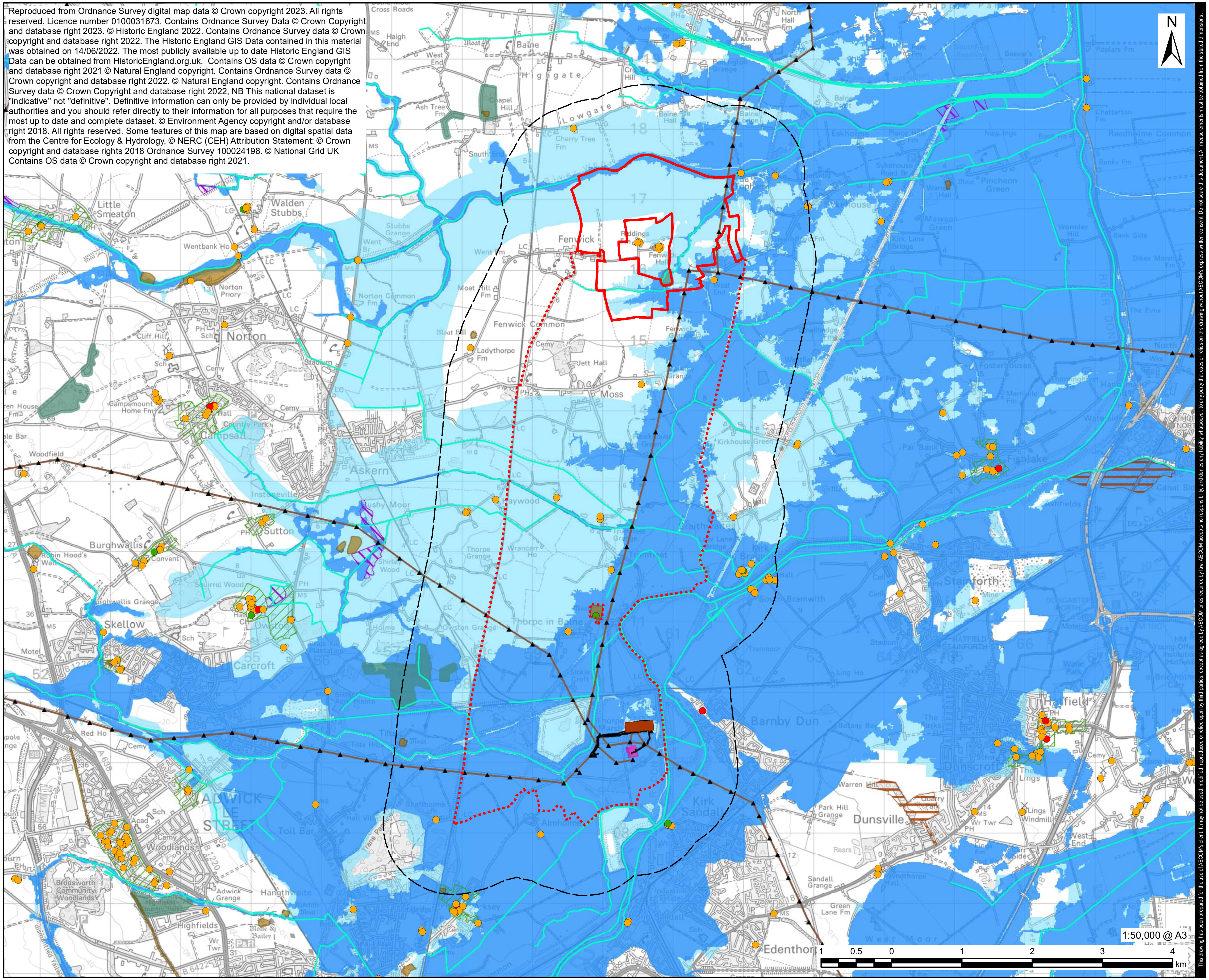
2.6.4 When the operational phase ends, the Site would require decommissioning. All PV modules, mounting structures, cabling, inverters, transformers and switchgear would be removed from the Site and recycled or disposed of in accordance with good practice and market conditions at that time. The Site would be returned to its original use prior to development. Any mature boundary vegetation installed as mitigation planting would be left in place, provided it does not act as a hinderance to the Site's future agricultural use. The future of the substations and associated control buildings would be agreed with National Grid Electricity Transmission (NGET) prior to commencement of decommissioning.

2.6.5 The mode of cable decommissioning for the electricity export connection to National Grid and interconnecting cables would be dependent upon government policy and best practice at that time. Currently, the most environmentally acceptable option is considered to be leaving the cables in situ, as this avoids disturbance to overlying land and habitats and to neighbouring communities. Alternatively, the cables can be removed by opening up the ground at regular intervals and pulling the cable through to the extraction point, avoiding the need to open up the entire length of the cable route. The impact assessment will be based on the worst case parameters for each technical ES chapter. A Framework Decommissioning Environmental Management Plan (DEMP) will be prepared as part of the EIA which will set out the general principles to be followed during the decommissioning of the Scheme. A detailed DEMP would be prepared and agreed with the relevant authorities at that time of decommissioning, in advance of the commencement of decommissioning works, and include timescales and transportation methods. The detailed DEMP would be based upon the Framework DEMP.

2.6.6 Decommissioning is expected to take between 12 and 24 months to complete and may be undertaken in phases.

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

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



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AECOM

PROJECT

Fenwick Solar Farm

CLIENT

Fenwick Solar Project Limited

CONSULTANT

AECOM Limited
Midpoint,
Alencon Link
Basingstoke, RG21 7PP
www.aecom.com

LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 1 km Buffer of Solar PV Site and Grid Connection Corridor
- Listed Building - Grade I
- Listed Building - Grade II*
- Listed Building - Grade II
- Watercourse
- Ancient Woodland
- Conservation Area
- Flood Zone 2
- Flood Zone 3
- Local Nature Reserve (LNR)
- Scheduled Monument
- Site of Special Scientific Interest (SSSI)

National Grid

- Tower
- Overhead Line
- Cable
- Substation

NOTES

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60698207

FIGURE TITLE

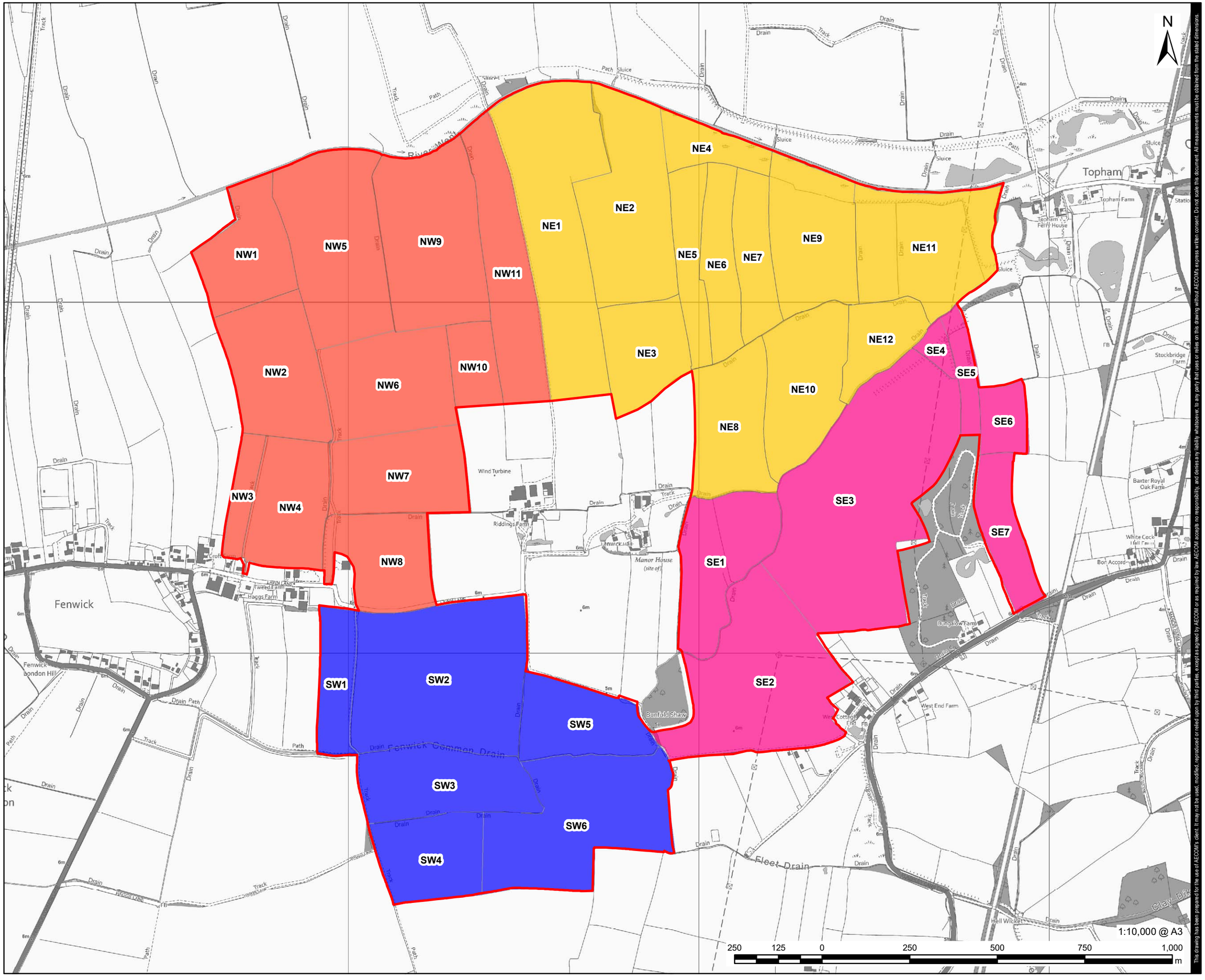
Environmental Constraints

FIGURE NUMBER

Figure 2-1

Revision: 01 Drawn: LP Checked: OB Approved: TN Date: 2023-05-25

Filename: I:\60698207_Fenwick_Solar_Farm\02_Maps\Scoping Report\GEN_SCO_Fig2_2_SolarPVSiteFieldBoundaries_A3L_20230525_R0.mxd



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LEGEND

- Solar PV Site

Field Boundary

- North East
- North West
- South East
- South West

NOTES

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60698207

FIGURE TITLE

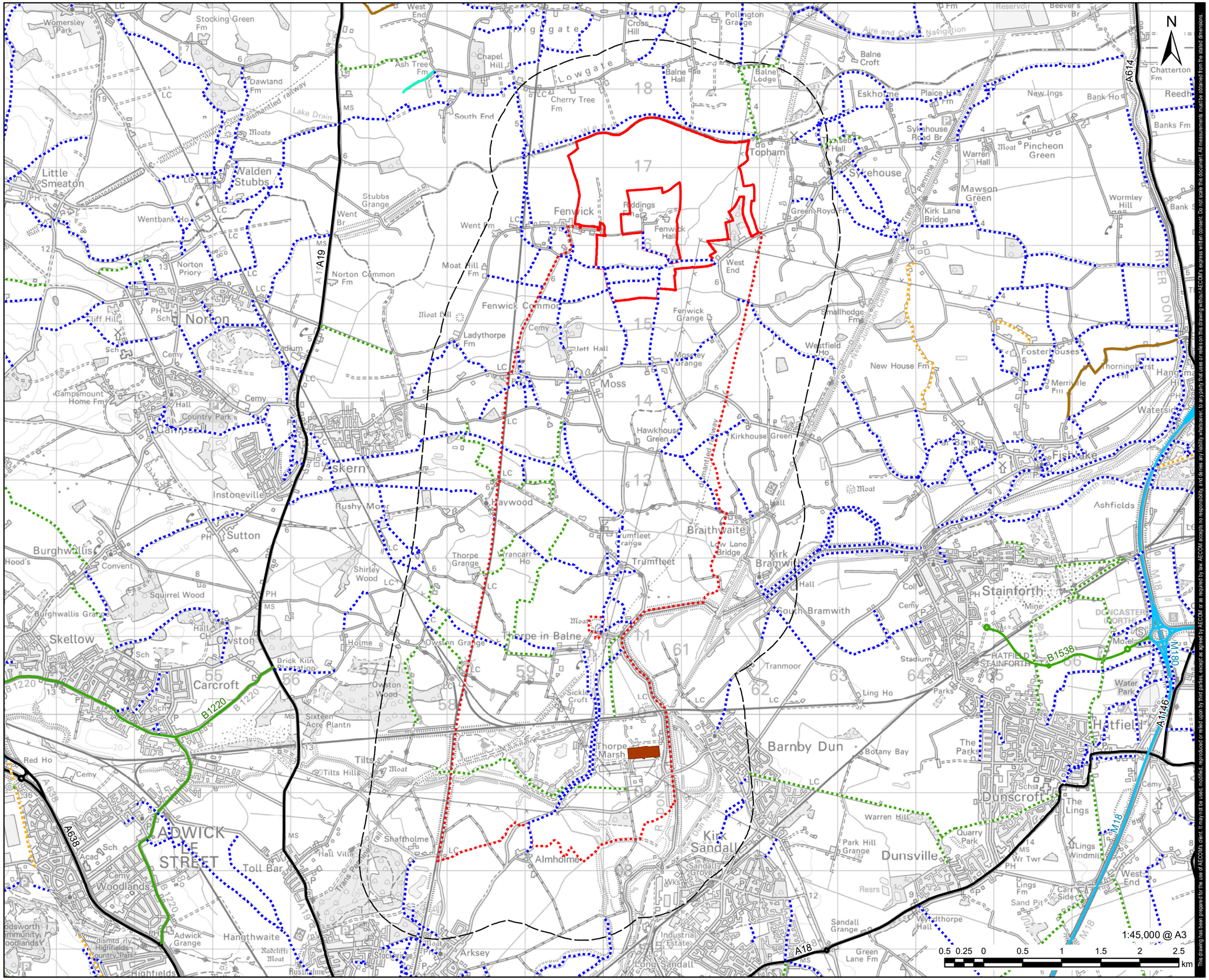
Solar PV Site Field Boundaries

FIGURE NUMBER

Figure 2-2

Revision: 0 Drawn: VC Checked: OB Approved: TN Date: 2023-05-15

Filename: I:\60698207_Fenwick_Solar_Farm\02_Maps\Scoping Report\GEN_SCO_Fig2_3_PRoW_A3L_20230515_R0.mxd



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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 1 km Buffer of Solar PV Area and Grid Connection Corridor
- A Road
- B Road
- Motorway

Public Right of Way

- Bridleway
- Byway Open to All Traffic (BOAT)
- Footpath
- Restricted Byways
- Unsurfaced Unclassified Road

NOTES

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ISSUE PURPOSE

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PROJECT NUMBER

60698207

FIGURE TITLE

Public Rights of Way

FIGURE NUMBER

Figure 2-3

3. Alternatives Considered

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

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

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

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

3.1.5 Further refinements will be made as the Scheme design progresses. The ES will confirm the DCO application boundaries and the layout for the Site submitted with the DCO application.

4. Consultation

4.1 Context

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

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

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

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

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

4.2 DCO Consultation Requirements

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

4.2.2 In accordance with Sections 42, 47 and 48 of the Planning Act 2008 (Ref 1), the Applicant will hold a non-statutory consultation part way through the undertaking of the EIA to inform the community of the plans for the Scheme and seek their feedback. Feedback from the non-statutory consultation will be recorded and used to help inform the Scheme design. Statutory consultation will be held once the PEIR is complete, whilst the Consultation Report will be produced and will form part of the DCO application.

4.3 Stakeholder Engagement to Date

4.3.1 Initial consultation with PINS, Historic England (HE), South Yorkshire Archaeology Service (SYAS) and the Environment Agency (EA) has taken place to date, along with the City of Doncaster Council where the Site is located.

4.3.2 Consultation with statutory consultees will continue to take place following submission of this EIA Scoping Report to provide an introduction to and seek input on the Scheme. This will include North Yorkshire Council, which borders the northern boundary of the Site, and East Riding of Yorkshire Council, located approximately 1 km north-east of the Site. Information will also be sent to the local Balne, Fenwick, Norton, Sykehouse and Walden Parish Councils, Askern Town Council, local Councillors and the Member of Parliament (MP) for the Doncaster North Constituency.

4.4 Scoping Consultation

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

4.4.2 Under Regulation 10(6) of the EIA Regulations (Ref 2), the SoS must undertake consultation with statutory consultation bodies, including environmental bodies (such as Natural England, the EA and Historic England) and relevant LPAs (such as the City of Doncaster Council and local Parish and Town Councils) before adopting a Scoping Opinion.

4.5 Non-Statutory Consultation

4.5.1 Non-statutory consultation will run for four weeks between 27 June and 24 July 2023 to introduce stakeholders to the Scheme and give them an opportunity to share their views.

4.6 Public Statutory Consultation

4.6.1 In accordance with Section 47(1) of the Planning Act 2008 (Ref 1) for an NSIP, the Applicant will prepare a SoCC. This will outline how the Applicant intends to consult with the local community about the Scheme, including, in accordance with Regulation 12 of the EIA Regulations (Ref 2), and how it intends to publicise and consult on the PEIR. The Applicant is required to consult LPAs identified pursuant to Section 43 of the Planning Act 2008 (Ref 1) on the draft SoCC, whilst LPAs will have a period of at least 28 days

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

5. Environmental Impact Assessment Methodology

5.1 Introduction

5.1.1 The ES will be based on a number of related activities, as follows:

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

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

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

5.1.4 Impacts will be considered on the basis of their magnitude, duration and reversibility. Cumulative and combined effects will also be considered where appropriate. Effect significance will be evaluated on the basis of the scale of the impact and the importance or sensitivity of the receptors/ resources being impacted, in accordance with standard assessment methodologies. More information on the assessment methodology is provided in **Section 5.6**.

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

5.2 Determining the Baseline Conditions

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

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

- Online/ digital resources;
- Data searches, for example GroundSure, EnviroCheck, Historic Environment Record (HER), Doncaster Local Records Centre; and
- Baseline surveys of the Site and its surrounds.

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

5.3 Mitigation

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

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

- **Avoid or prevent:** In the first instance, mitigation should seek to avoid or prevent the adverse effect at source, for example, by routeing the cable (which may or may not be required) within the Grid Connection Corridor or siting PV panels away from sensitive receptors/ resources;
- **Reduce:** If an effect is unavoidable, mitigation measures should be implemented which seek to reduce the significance of the effect. For example, the use of a noise barriers to reduce construction noise at nearby noise sensitive receptors; and
- **Offset:** If the effect can neither be avoided nor reduced, mitigation should seek to offset the effect through the implementation of compensatory mitigation, for example habitat creation to replace any habitat losses.

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

Embedded Mitigation Measures

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

5.3.5 Once these measures are incorporated into the Scheme design, they are termed 'embedded mitigation measures'. Embedded mitigation measures relevant to the construction phase will be described within each technical chapter of the ES, and those relevant to the operational phase will be represented primarily in the Scheme design. Therefore, embedded mitigation measures will be either incorporated into the Scheme design from the outset or identified through the iterative EIA and design process.

5.3.6 The ES will also describe industry standard control measures which are common practice on construction sites as embedded mitigation measures. These will be described in each technical chapter of the ES and included in a Framework CEMP which will be prepared as part of the DCO application. The Framework CEMP will provide a structure within which the appointed construction Contractor (including any sub-contractors or suppliers involved in the works) would plan, implement and deliver environmental management, mitigation and monitoring requirements (ensuring the results of such monitoring are used to inform and implement any remedial action required) during the construction phase of the Scheme as committed to within the ES. The Framework CEMP would be developed into a detailed (or construction issue) CEMP by the appointed construction Contractor prior to the start of construction. It is intended that the detailed CEMP would be a 'live' document and updated as and when there are changes to the construction team or additional information becomes available.

Additional Mitigation Measures

5.3.7 The ES will assess the environmental effects of the Scheme with embedded mitigation measures in place. Where significant adverse environmental effects are identified to remain after considering these embedded measures, 'additional mitigation measures' will be proposed to further avoid or reduce the identified adverse environmental effects. These additional measures will be presented within each of the technical chapters of the ES, where required, and may include measures beyond industry standard controls such as bespoke/ site-specific measures, including temporary fencing to prevent glint and glare until the vegetation planting has properly established. These additional mitigation measures will also be detailed within the Framework CEMP.

5.4 Timescales and Assessment Years

Construction Phase Effects

5.4.1 For the assessment, construction effects will be taken to be those for which the impact source begins and ends during the Scheme construction stage, and do not endure beyond the completion of construction. This covers

sources such as construction traffic, noise and vibration from construction activities, dust generation, site runoff, mud on roads, risks of fuel/ oil spillages, and the visual intrusion of plant and machinery. Some construction-related effects may last longer than others, for example, impacts related to the establishment of construction compounds are likely to be relatively short in duration in respect of the whole construction period, whereas the construction of energy infrastructure and landscaping activities are likely to persist throughout the entire construction period. By their nature, most construction impacts will be temporary and reversible.

Operational Phase Effects

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

- Short term – endures for up to 12 months after construction or decommissioning;
- Medium term – endures for 1 to 5 years;
- Long term – endures for more than 5 years;
- Reversible long-term effects – long-term effects which endure throughout the lifetime of the Scheme, but which cease once the Scheme has been decommissioned (operational effects will all fall into this category); and
- Permanent effects – effects which cannot be reversed following decommissioning (e.g. where buried archaeology is permanently removed during construction).

5.4.3 Environmental management and mitigation measures for the operational phase of the Scheme would be planned, implemented and delivered through an OEMP secured through a Requirement in the DCO. A Framework OEMP will be prepared as part of the DCO application which will set out the general principles to be followed during the operation of the Scheme. The Framework OEMP would be developed into a detailed OEMP following the grant of the DCO.

Decommissioning Period Effects

5.4.4 The design life of the Scheme is expected to be at least 40 years; however, the design life could be longer than this depending on the condition of the equipment. This EIA Scoping Report, and the subsequent PEIR and ES, therefore assume a design/ operational life of 40 years, although consideration will also be given to the lifespan of the Scheme being extended beyond this, where relevant. Should the design life of the Scheme be extended, the prescribed mitigation and management measures would continue to be in place ensuring that there would be no increased environmental risk. Therefore, it is not anticipated that an extension to the operational life of the Scheme would influence the outcomes of the

assessments presented in the ES. This is discussed further in each of the technical chapters (**Chapter 6** to **14**) of this EIA Scoping Report, where relevant.

5.4.5 For the assessment, decommissioning effects will be taken to be those for which the source begins and ends during the decommissioning stage, and do not endure beyond the completion of the decommissioning phase. For example, this covers sources of effects such as decommissioning traffic, noise and vibration from decommissioning activities, dust generation, site runoff, mud on roads, risks of fuel/ oil spillage, and the visual intrusion of plant and machinery. Typically, decommissioning phase effects are similar in nature to those experienced during the construction phase, although they may be of shorter duration and of slightly less intensity. As with construction phase effects, some aspects of decommissioning would endure for longer than others.

Assessment Years

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

5.4.7 The peak construction year for the purpose of the EIA is anticipated to be during 2027. This is based on the assumption that the Scheme would be built out rapidly (over approximately 18 to 24 months) which is a worst case from a traffic generation point of view as the trip numbers would be compressed into a shorter duration. This would therefore also be the worst-case in terms of potential effects on drivers, pedestrians and cyclists, and traffic-related air quality and noise effects.

5.4.8 The peak construction assessment year will be reviewed as the anticipated construction programme is considered in more detail during the Scheme design development. A detailed justification for the reasonable worst-case scenario that is assessed will be provided in the ES.

5.4.9 The current date of connection for the Scheme is 2032, with an aspiration for the Scheme to start operating sooner where possible. A request has been submitted to National Grid to bring forward the date of connection to late 2027, with discussions ongoing to confirm if an earlier date of connection is feasible. The proposed operational assessment year for the purpose of the EIA is 2027. This will be confirmed in the ES and is expected to be the earliest that the Scheme would be fully built out and operational.

5.4.10 A future year of 2042 will also be considered for specific technical topics, including landscape and visual amenity, to take account of the maturation of landscape mitigation planting (i.e. 15 years after the operational assessment year). This is a requirement of the Landscape Institute guidelines (Ref 29), which are discussed further in **Chapter 10: Landscape and Visual Amenity** of this EIA Scoping Report.

5.4.11 The decommissioning assessment year for the purpose of the EIA is 2067, based on the design life of the Scheme, recognising that the operational life may extend beyond this date.

5.5 Assessment of Impacts and Significance of Effects

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

5.5.2 The significance of residual effects will be determined by reference to criteria developed for each technical assessment. Specific effect significance criteria for each technical assessment are presented in **Chapter 6** to **14** of this EIA Scoping Report, giving due regard to the following:

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

5.5.3 Further guidance specifically relating to the magnitude of impacts, the sensitivity of receptors/ resources, and the significance of any resultant effects is provided in the following sections.

Magnitude of Change (or Impact)

5.5.4 General criteria for defining the magnitude of change (or impact) are set out in Table 5-1. Key factors that influence this include:

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

Table 5-1: Magnitude of Change (Impact) Criteria

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

Sensitivity of the Receptor/ Resource

5.5.5 The sensitivity (or value) of a receptor or resource is characterised by the vulnerability to change, recoverability and importance of the receptor or resource (see Table 5-2). Characterisation of the receptor or resource is achieved by balancing out three considerations to determine the receptor/ resource's sensitivity as follows:

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

Table 5-2: Sensitivity Criteria

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

Evaluating the Significance of Effects

5.5.6 Once the magnitude of change (impact) and the sensitivity of the receptor or resource has been established, the significance of an effect can be assessed. The significance of residual effects (effects that remain after the implementation of defined mitigation measures) will be evaluated with reference to available definitive standards, accepted criteria and applicable legislation. For issues where definitive quality standards do not exist, significance will be based on the following:

- Local, district, regional or national scale or value of the receptor or resource affected;
- Number of receptors/ resources affected;

- Sensitivity of these receptors/ resources; and
- Duration of the effect.

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

- **Adverse**: Detrimental or negative effects to an environmental/ socio-economic receptor or resource;
- **Negligible** (also referred to as 'neutral' for some technical topics): Imperceptible effects to an environmental/ socio-economic receptor or resource; or
- **Beneficial**: Advantageous or positive effect to an environmental/ socio-economic receptor or resource.

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

- **Minor**: Slight, very short or highly localised effect of no significant consequence;
- **Moderate**: Limited effect (by extent, duration or magnitude) which is likely to be considered significant (to be confirmed in the technical chapters of the ES); and
- **Major**: Considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards. Such effects are considered significant.

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

Table 5-3: Example Matrix to Classify Environmental Effects

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

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

Table 5-4: Generic Effect Descriptions

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

5.5.11 Where mitigation measures are identified to eliminate, mitigate or reduce adverse impacts, these have either been incorporated into the design of the Scheme; translated into construction commitments; or operational or managerial standards/ procedures. The ES will highlight ‘residual’ effects,

which remain following the implementation of suitable mitigation measures, and classify these in accordance with the effect classification terminology as given above.

5.5.12 It should be noted some technical chapters of the ES may use different criteria when undertaking assessments due to differences in industry accepted guidelines and specifications. Where this is the case, the technical chapters (**Chapter 6** to **14**) of this EIA Scoping Report) discuss how the assessment methodology or classification of effects differs from the general EIA methodology (as described in this section) and provide justification.

Assessment of Construction and Decommissioning Effects

5.5.13 The identification of construction and decommissioning effects will be made on the basis of existing knowledge, techniques and equipment. A 'reasonable worst-case' scenario will be used with respect to the envisaged construction and decommissioning methods, location (proximity to sensitive receptors/ resources), phasing and timing of construction and decommissioning activities. A Framework DEMP will be prepared as part of the EIA and will set out the general principles to be followed during the decommissioning of the Scheme. Where specific information relating to decommissioning is not known, it is anticipated that, as they are expected to be very similar, construction information will be used. A detailed DEMP will be prepared and agreed with the relevant authorities at that time of decommissioning.

5.5.14 The assessment of construction and decommissioning effects will assume the implementation of standard good practice measures, for example, the use of temporary noise barriers to reduce noise levels as appropriate and, where practicable, control of dust on haul roads etc (embedded mitigation measures as detailed in Section 5.3). The purpose of this is to focus on the Scheme specific effects, rather than generic construction effects that can be easily addressed using generic best practice mitigation measures. Construction and decommissioning assumptions, including good practice measures, will be set out within the ES and Framework CEMP. The ES will identify and assess construction and decommissioning effects that are likely to remain after these mitigation measures are in place.

5.6 Cumulative Effects

5.6.1 In accordance with the EIA Regulations (Ref 2), 'cumulative effects' will be considered. These are effects that result from incremental changes caused by other past, present or reasonably foreseeable actions together (i.e. cumulatively) with the Scheme. A range of public sector and industry-led guidance is available on the approach to assessing cumulative effects but, at present, there is no single agreed industry standard method. As the Scheme is classified as an NSIP, the approach to the assessment of cumulative effects follows the guidance set out in the Planning Inspectorate's Advice Note 17 (Ref 30).

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

- The combined effect of individual impacts from the Scheme, for example, where a single receptor is affected by noise and traffic disruption during

the construction of the Scheme (these are referred to as 'effect interactions'); and

- The combined effects of several development schemes which, on an individual basis may be insignificant, but cumulatively with the Scheme, have a new or different potentially significant effect.

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

5.6.4 Where there are specific limitations associated with data, these will be highlighted in the ES.

Effect Interactions

5.6.5 There is no established EIA methodology for assessing and quantifying effect interactions that lead to combined effects on sensitive receptors/ resources. However, the European Commission has produced guidelines for assessing effect interactions *"which are not intended to be formal or prescriptive, but are designed to assist EIA practitioners in developing an approach which is appropriate to a project…"* (Ref 28).

5.6.6 AECOM has reviewed these guidelines and will develop an approach which uses the defined residual effects of the Scheme to determine the potential for effect interactions that lead to combined effects. This approach was followed on the Sunnica Energy Farm, the Longfield Solar Farm and the Gate Burton Energy Park projects, all of which are solar NSIPs that have been accepted for or have completed DCO examination.

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

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

Cumulative Effects with Other Developments

5.6.9 The Planning Inspectorate's Advice Note 17 on the assessment of cumulative effects (Ref 30) identifies a four-stage approach, as detailed below.

Stage 1 – Establish the NSIP's Zone of Influence and Identify a Long List of 'Other Development'

5.6.10 A review of other developments will be undertaken, initially encompassing a 'zone of influence' (ZoI) defined by the technical topic specialists to prepare a long list of 'other development'. At this stage, it is anticipated that the long list will be based on up to a 5 km area of search which aligns with the Study Area for landscape and visual amenity and the likely maximum range of any potential significant effects.

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

5.6.12 Developments will be included in the initial long list, based on the following criteria:

- Development currently under construction;
- Approved planning applications which have not yet been implemented (covering the past five years and taking account of those that received planning consent over three years ago and are still valid, but have not yet been completed);
- Submitted planning applications not yet determined;
- Refused planning applications, subject to appeal procedures not yet determined;
- Development listed on the National Infrastructure Planning Programme of Projects;
- Development identified in the relevant Development Plan (and emerging Development Plans); and
- Development identified in other plans and programmes which set the framework for future development consents/ approvals, where such development is reasonably likely to come forward.

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

Stage 2 – Identify shortlist of 'Other Development' for Cumulative Effects Assessment

5.6.14 At Stage 2, to ensure a proportionate approach to the assessment, a detailed review of the long list of other developments will be undertaken. Any developments of a nature or scale without the potential to result in cumulative impacts will be excluded, following discussion with the local planning authorities and consideration of the likely ZoI for each technical topic. The justification for including or excluding developments from the long list will be provided in a matrix, modelled on the example given within Matrix 1 (Appendix 1) of the Planning Inspectorate's Advice Note 17 (Ref 30). For example, this will include whether the 'other developments' are within the ZoI

and whether there is likely to be an overlap in the timing of the construction phases.

Stage 3 – Information Gathering

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

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

Stage 4 – Assessment

5.6.16 The assessment will include a list of those developments considered to have the potential to generate a cumulative effect together with the Scheme –this will be documented in a matrix, in line with Matrix 2 (Appendix 2) of the Planning Inspectorate's Advice Note 17 (Ref 30) which includes the following:

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

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

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

5.6.18 In reporting the overall significance of cumulative effects, it is appropriate to also acknowledge the relative contributions different projects make to a cumulative effect and carefully consider whether the cumulative effect is significant. For example, where a large-scale project is predicted to result in significant effects and a smaller proposed development would not have significant effects, the cumulative assessment should only conclude there is a significant cumulative effect if effects from both projects together are of greater significance than the larger project in isolation. Consequently, care will be taken to not simply define such effects as being cumulative, but rather

to focus on the nature and scale to which genuine cumulative effects might result.

5.7 Proposed Topics to be Included in the ES

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

- Climate Change (Chapter 6);
- Cultural Heritage (Chapter 7);
- Ecology (Chapter 8);
- Water Environment (Chapter 9);
- Landscape and Visual Amenity (Chapter 10);
- Noise and Vibration (Chapter 11);
- Socio-Economics and Land Use (Chapter 12);
- Transport and Access (Chapter 13); and
- Other Environmental Topics (Chapter 14).

5.7.2 **Chapter 14: Other Environmental Topics** of this EIA Scoping Report provides a summary of environmental topics which have been considered during the preparation of this EIA Scoping Report, but for which standalone chapters are not expected to be required in the ES. For these topics, it is considered that, from previous experience, the demonstration of no likely significant effects being expected can be quickly established without the need for detailed information on legislation and policy and baseline conditions being provided. Therefore, technical appendices will be provided for these topics with a short summary in a single chapter of the ES. In the unlikely event that a likely significant effect is identified for a particular topic, a standalone chapter will be produced in accordance with the chapter structure set out in Section 5.9.

5.7.3 This methodology has been used for previous NSIP solar projects and ensures a proportionate approach to assessment can be undertaken. For clarity, these topics are not scoped out of the EIA and an impact assessment will be undertaken, but the format within the ES will be different to the topics listed above. These topics comprise:

- Air Quality (Section 14.2);
- Glint and Glare (Section 14.3);
- Ground Conditions (Section 14.4);
- Major Accidents or Disasters (Section 14.5);
- Telecommunications, Television Reception and Utilities (Section 14.6);
- Electromagnetic Fields (Section 14.7); and

- Materials and Waste (Section 14.8).

5.7.4 **Chapter 6** to **14** of this EIA Scoping Report provide an outline of the proposed scope of works for the technical topics identified above, including details of consultations undertaken to date in relation to the definition of the scope for that topic.

5.8 Proposed Topics Scoped Out of the ES

5.8.1 Based upon the work presented in this EIA Scoping Report, each of the technical chapters (**Chapter 6** to **14**) set out the technical elements to be scoped out of the EIA for that topic. **Chapter 14: Other Environmental Topics** of this EIA Scoping Report also describes the elements to be scoped out for each of the technical topics discussed. This information is summarised in Table 16-1 and Table 16-2.

5.8.2 It is considered that human health as a result of the Scheme will be covered through the assessment findings undertaken for other technical chapters of the EIA, namely:

- Landscape and visual amenity;
- Noise and vibration;
- Transport and access; and
- Air quality.

5.8.3 A standalone assessment of human health is proposed to be scoped out of the EIA. The technical chapters of the PEIR and ES will consider the potential effects of human health within their own assessments and there are not expected to be any significant human health effects beyond those identified for these assessments. A standalone assessment is therefore not proposed.

5.9 Technical Chapter Structure

5.9.1 Each of the technical chapters (**Chapter 6** to **14**) of this EIA Scoping Report is set out as follows:

- Introduction to the topic;
- Description of the Study Area for the topic;
- Planning policy context and guidance in relation to the topic;
- Consultation;
- Baseline conditions;
- Potential effects and mitigation;
- Assessment methodology;
- Assumptions, limitations and uncertainties; and
- Summary of elements scoped in and scoped out.

5.9.2 For **Chapter 14: Other Environmental Topics** of this EIA Scoping Report, a general discussion of each topic is provided, including the elements as listed above where relevant, but the text is not confined to the structure above.

6. Climate Change

6.1 Introduction

6.1.1 This chapter sets out the approach to the assessment of the impact of the Scheme on the climate and the impact of climate change on the Scheme. The purpose of the proposed assessment will be to identify and characterise any relevant climate change factors, to consider the nature and scale of potential impacts arising from and on the Scheme, and to assess the significance of any likely effects.

6.1.2 To align with the requirements of the EIA Regulations (Ref 2) and IEMA guidance for assessing climate mitigation (Ref 31) and adaptation (Ref 32) in EIAs, consideration has been given within this chapter to the following aspects of climate change assessment:

- **Lifecycle greenhouse gas (GHG) impact assessment**: the impact of GHG emissions arising from the Scheme on the climate over its lifetime;
- **In-combination climate change impact (ICCI) assessment**: the combined impact of the Scheme and future climate change on the receiving environment[1]; and
- **Climate change resilience (CCR) review**: the resilience of the Scheme to future climate change impacts.

6.2 Study Area

Lifecycle GHG Impact Assessment

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

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

6.2.3 The environmental impacts associated with GHG emissions is a national and global issue. Consequently, the potential significance of the proposed Scheme's lifecycle GHG emissions will be assessed by comparing the estimated GHG emissions from the Scheme against the reduction targets defined in the Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref 33) and associated five year, legally binding carbon budgets. The Scheme's lifecycle GHG emissions will also be assessed by identifying whether the Scheme is aligned with the UK's trajectory to net zero, either

[1] In line with IEMA guidance, the combined effect of the impacts of the Scheme and potential climate change impacts on the receiving environment are referred to as 'in-combination impacts' and 'in-combination effects'.

directly or indirectly when compared to the baseline, as identified as best practice in IEMA guidance (Ref 31).

In-Combination Climate Change Impact Assessment

6.2.4 The Study Area for the ICCI assessment will be defined taking into account the environmental assessments reported within the ES. This will include all environmental receptors identified within the assessments undertaken and reported within the ES.

Climate Change Resilience Review

6.2.5 The Study Area for the CCR review is the area within the Site boundary i.e. it covers the construction, operation and decommissioning of all assets and infrastructure which constitute the Scheme.

6.3 Legislation, Planning Policy Context and Guidance

6.3.1 The legislation, planning policy and guidance relating to climate change that is pertinent to the Scheme is set out in the sections below.

International Legislation

6.3.2 Relevant international legislation includes:

- United Nations Framework Convention on Climate Change Paris Agreement (UNFCCC, 2016) (Ref 34). The Paris Agreement is an agreement within the UNFCCC requiring all signatories to strengthen their climate change mitigation efforts to keep global warming to below 2°C this century and to pursue efforts to limit global warming to 1.5°C; and
- UK Nationally Determined Contribution (NDC) to the UNFCCC (Ref 35). In 2020 the UK communicated its new NDC to the UNFCCC. Within this, the UK has committed to reducing GHG emissions by at least 68% by 2030 compared to 1990 levels.

National Legislation

6.3.3 Relevant national legislation includes:

- The Climate Change Act (2008) (Ref 36) and Climate Change Act (2050 Target Amendment Order 2019) (Ref 37). The Climate Change Act 2008 set a legally binding target for the UK to reduce its GHG emissions from 1990 levels by at least 80% by 2050. This target is supported by a system of legally binding five-year ‘carbon budgets’ and an independent body to monitor progress, the Climate Change Committee (CCC). The UK carbon budgets restrict the amount of GHG emissions the UK can legally emit in a defined five-year period. The Act was amended in 2019 to revise the existing 80% reduction target and legislate for Net Zero emissions by 2050 (through the Climate Change Act 2008 (2050 Target Amendment) Order 2019);

- The Carbon Budgets Order 2009 (Ref 38). This sets the carbon budget totals for the First (2008-2012), Second (2013-2017) and Third (2018-2022) Carbon Budget periods;
- Carbon Budget Order 2011 (Ref 39). This Order sets the carbon budget total for the Fourth (2023-2027) Carbon Budget period;
- Carbon Budget Order 2016 (Ref 40). This Order sets the carbon budget total for the Fifth (2028-2032) Carbon Budget period; and
- The Carbon Budget Order 2021 (Ref 41). This sets the carbon budget total for the Sixth (2033-2037) Carbon Budget period.

International Policy

6.3.4 The Paris Agreement (Ref 34) is a legally binding agreement within the UNFCCC dealing with GHG emissions mitigation, adaptation and finance starting in the year 2020. It requires all signatories to set a target, known as a NDC and to strengthen their climate change mitigation efforts to keep global warming to well below 2°C this century and to pursue efforts to limit global warming to 1.5°C. The agreement contains a 'ratchet' mechanism by which NDCs must be strengthened every five years. The UK updated its NDC in the first half of 2021. Under Article 7, the agreement requires all signatories to engage in adaptation planning and implementation.

National Planning Policy

6.3.5 Relevant national planning policy includes:

- National Planning Statement for Energy (NPS EN-1) (Ref 5), with particular reference to paragraphs 2.2.6, 2.2.9 and 4.8.2 in relation to climate impacts and adaptation; paragraphs 4.1.3 to 4.1.4 in relation to adverse effects and benefits; paragraphs 4.2.1, 4.2.3, 4.2.4, 4.2.8 to 4.2.10 and 5.1.2 in relation to European Union (EU) Directive and ES requirements; paragraphs 4.5.3 and 4.8.1 to 4.8.12 in relation to adaptation measures in response to climate projections; and paragraphs 5.7.1 to 5.7.2 in relation to climate projections, flood risk and the importance of relevant mitigation. The draft overarching National Policy Statement for Energy (EN-1) (Ref 8) includes guidance for the appraisal of sustainability in paragraph 1.7, climate change adaptation in paragraphs 4.9, net zero in paragraph 2.2 and generic impacts on the climate in Part 5;
- National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (Ref 7) – paragraph 2.4.1 regarding NPS EN-1 and the importance of CCR, and paragraph 2.4.2 in relation to ES requirements regarding CCR. The draft overarching National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref 10) includes considerations for climate change adaptation and resilience in paragraph 2.3 and
- Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (Ref 9) – section 3.10 regarding Solar PV Generation.
- NPPF (Ref 13) – paragraphs 8, 20 and 149 in relation to adaptation, mitigation and CCR; paragraphs 148 and 157 in relation to flood risk and

damage to property and people; paragraphs 150 and 153 in relation to reduction of carbon dioxide (CO_2) emissions through design and reduced energy consumption; and paragraphs 155 to 165 in relation to climate projections, associated flood risk and adaptation.

6.3.6 National planning policies identify the requirement for consideration of CCR. Climate projections should be analysed, and appropriate climate change adaptation measures considered throughout the design process. Specific climate change risks identified within these policies include flooding, drought, coastal change, rising temperatures and associated damage to property and people.

Local Planning Policy

6.3.7 Relevant local planning policy includes:

- Doncaster Local Plan 2015-2035 (2021) (Ref 14) with reference to Policy 26 (Green Infrastructure Policy), Policy 57 (Flood Risk Management), Policy 58 (Low Carbon and Renewable Energy, Strategic Policy) and Policy 60 (Protecting and Enhancing Doncaster's Soil and Water Resources). Supporting documents include Doncaster Renewable and Low Carbon Energy Study (2012) (Ref 42).

6.3.8 Local planning policies identify the need to consider and, where appropriate, mitigate GHG emissions associated with new development. New development should aim for reduced or zero-carbon development by incorporating renewable or low-carbon energy sources and maximising energy efficiency where practicable and should build in resilience to projected climate change impacts.

6.3.9 Where required, relevant Neighbourhood Plans and Supplementary Planning Documents (SPDs)/Guidance (SPGs) will be considered.

International Guidance

6.3.10 Relevant international guidance includes:

- The World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines (Ref 43) set out internationally accepted GHG accounting and reporting standards.

National Guidance

6.3.11 Relevant national guidance includes:

- Planning Practice Guidance, Climate Change (Ref 44). This guidance describes how to identify suitable mitigation and climate adaptation measures to incorporate into the planning process, stating that: *"Effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases… Planning can also help increase resilience to climate change impact through the location, mix and design of development"*;
- Net Zero Strategy (2021) (Ref 45). This strategy sets out policies and proposals for decarbonising all sectors of the UK economy to meet a net zero target by 2050. One of the key policies is for the UK to be entirely

powered by clean energy sources (predominantly solar and wind) by 2035;

- IEMA (2022) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (Ref 31); and
- IEMA (2020) Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (Ref 32).

6.4 Consultation

6.4.1 To date there has been no formal consultation on the scope of the climate change assessment. Consultation will be undertaken with statutory parties, including the EA and the relevant Local Planning Authorities on climate change targets, aims, commitments, other projects, plans and policy that affect climate and baseline data, as well as any known future developments in close proximity to the Scheme.

6.5 Baseline Conditions

Lifecycle GHG Impact Assessment

6.5.1 The receptor for the GHG impact assessment is the global climate. The landscape features within the vicinity of the Site consist predominately of agricultural fields, whilst the current land use within the Site is predominately arable. The presence of vegetation within the Site suggests a relatively high carbon sink potential. Current land use within the Site has relatively low levels of associated GHG emissions as the land use is largely agricultural. Baseline agricultural GHG emissions are dependent on the soil and vegetation types present, as well as fuel use for the operation of vehicles and machinery.

6.5.2 For the GHG assessment, the baseline is a ‘no-development’ scenario whereby the Scheme is not implemented. The baseline comprises existing carbon stock and sources of GHG emissions within the boundary of the existing activities on the Site, as well as the emissions that may be avoided as a result of the Scheme i.e. existing emissions from the generation of grid electricity if the Scheme does not go ahead. A full assessment of the baseline ’no-development’ scenario will be undertaken and reported within the ES.

In-Combination Climate Change Impact Assessment

6.5.3 The receptors for the ICCI are receptors within the surrounding environment that would be impacted by the Scheme in combination with future climatic conditions. The receptors will be those as identified by each environmental discipline within the assessments reported within the ES. Baseline conditions for the ICCI will be determined using climate change projections data.

6.5.4 An initial review of United Kingdom (UK) Climate Projections 2018 (UKCP18) data (Ref 46) for the 25 km grid square within which the Scheme is located suggests that by the 2050s time period (2040–2069), the region could experience an increase of around 2.3°C in summer mean air temperature at

1.5 m, and an increase of 1.6°C in winter mean air temperature at 1.5 m, compared to a 1981–2010 baseline period. For the same time period, summer mean precipitation could decrease by around 14%, whilst in winter it could increase by 6%. This is based on 50% probability levels of the Representative Concentration Pathway (RCP) high baseline emissions scenario, RCP 8.5 scenario, which is considered to be the high-emissions global scenario with the greatest concentration of GHGs in the atmosphere.

Climate Change Resilience Review

6.5.5 The receptor for CCR is the Scheme itself, including its construction, operation and decommissioning. The CCR review will provide a description of how the Scheme has been designed to be more resilient to the climate change impacts identified during the review of the UKCP18 data (Ref 46). A more detailed assessment of climate change projections will be conducted for the land within the Site and reported in the ES.

6.6 Potential Effects and Mitigation

GHG Impact Assessment

6.6.1 For the purposes of the assessment, it will be considered that any increase in GHG emissions compared to the baseline has the potential to have an impact, due to the high sensitivity of the receptor (i.e. the global climate) to increases in GHG emissions. This is in line with the IEMA guidance (Ref 31) which states that all GHG emissions have the potential to be significant. The application of the standard EIA significance criteria is not considered to be appropriate for climate change mitigation assessments. As such, GHG impacts will be put into context in terms of their impact on the UK's five-year carbon budgets, which set legally binding targets for GHG emissions. GHG impacts will also be put into context for the sub-sectoral budgets for energy generation. Table 6-1 provides the lifecycle stages, related activities and primary emission sources that will be considered by the GHG assessment.

Table 6-1: Potential Sources of GHG Emissions

Lifecycle phase	Activity	Primary emission sources
Product phase	Raw material extraction and manufacturing of products required to build the equipment for the Scheme. Due to the complexity of the equipment, this phase is expected to make a significant contribution to overall GHG emissions. Transportation of materials for manufacturing.	Embodied GHG emissions from energy use in extraction of materials and manufacture of components and equipment. Emissions of GHG from transportation of products and materials.

Lifecycle phase	Activity	Primary emission sources
Construction process phase	On-site construction activity including emissions from construction compounds. Transportation of construction materials (where these are not included in product phase. Travel of construction workers.	Consumption of energy (electricity; other fuels) from plant, vehicles, generators and worker travel. Fuel consumption from transportation of materials to site, where these are not included in product phase embodied emissions. Due to the nature of the equipment, this could require shipment of certain aspects over significant distances.
	Disposal of waste materials generated by the construction process. Land use change. Water use.	GHG emissions from transportation and disposal of waste. GHG emissions from net loss of carbon sink. Provision of clean water, and treatment of wastewater.
Operation and maintenance phase	Operation and maintenance of the Scheme.	GHG emissions from energy consumption. These operational emissions are expected to be negligible in the context of the overall GHG impact. Leakage of potent GHGs, such as sulphur hexafluoride (SF6) during operation. GHG emissions from material use and waste generation resulting from ongoing site maintenance. Emissions from routine maintenance are expected to be negligible, but the periodic replacement of components has the potential to have significant impacts given

Lifecycle phase	Activity	Primary emission sources
		the complexity of the equipment involved.
Decommissioning phase	On-site decommissioning activity. Transportation and disposal of waste materials. Worker travel.	Consumption of energy (electricity and other fuels) from plant, vehicles and generators on site. Emissions from the disposal and transportation of waste. This has the potential to be significant give the complexity of the equipment. GHG emissions from transportation of workers to site.

6.6.2 GHG emissions from the Scheme will be put into context by comparing them with other likely alternative sources of electricity generation. The assessment will, therefore, measure any savings in emissions due to the generation of the electricity via solar PV as compared to other electricity generation methods such as natural gas.

6.6.3 Carbon sequestration as a result of the additional carbon capture by vegetation and soils as a result of land use change from arable to permanent grassland will also be discussed.

6.6.4 As discussed in paragraphs 5.3.6, 5.4.3, and 5.5.13, a Framework CEMP, a Framework OEMP and a Framework DEMP will be prepared as part of the DCO application which will set out the requirements for environmental management, mitigation and monitoring for the Scheme. These documents would be developed into a detailed CEMP, OEMP, and DEMP and are expected to be secured through a Requirement in the DCO.

6.6.5 The detailed CEMP, OEMP, and DEMP will include a range of best practice measures (as appropriate), such as:

- Specification of alternative materials with lower embodied GHG emissions; and
- Low carbon design specifications, such as energy-efficient lighting and durable construction materials to reduce maintenance and replacement cycles.

6.6.6 The final selection of any mitigation measures, if required, will be detailed as part of the lifecycle GHG impact assessment reported in the ES. This may include GHG emission mitigation measures concerning construction, operation and decommissioning of the Scheme.

In-Combination Climate Change Impact Assessment

6.6.7 ICCI assessment identifies how the resilience of various receptors in the surrounding environment are affected by a combination of future climate conditions and the Scheme. The climate parameters relevant to the Scheme are detailed in Table 6-2 together with the rationale for scoping parameters in or out of the assessment. On the basis of the information presented in Table 6-2, an ICCI assessment is proposed to be scoped into the ES.

Table 6-2: Climate Parameters for the In-Combination Climate Change Impact Assessment of the Scheme

Parameter	Scoped in/ out	Rationale for scoping conclusion
Temperature change	In	Temperature increases in combination with the Scheme are expected to have a significant impact upon receptors identified by other environmental disciplines.
Sea level rise	Out	The Scheme is located inland more than 40 km from the sea in an area not susceptible to sea level rise. The risk of flooding from rivers and the sea is discussed in more detail in Section 9.5 of **Chapter 9: Water Environment**.
Precipitation change[2]	In	Anticipated increases in heavy rainfall events may lead to flash flooding or changes to groundwater levels. The Scheme, in combination with projected changes in precipitation, has the potential to have an impact upon receptors identified by other environmental disciplines.
Wind	In	Anticipated changes in wind patterns, in combination with projected changes in wind patterns, has the potential to impact upon receptors identified by other environmental disciplines.
Biodiversity	In	The Scheme in combination with climate change has the potential to have an impact on the prevailing biodiversity in the surrounding area.

Climate Change Resilience Review

6.6.8 Climate parameters relevant to the CCR review are detailed in Table 6-3.

[2] Frequency and magnitude of precipitation events and droughts.

Table 6-3: Parameters Scoped Into the Climate Change Resilience Review

Parameter	Scoped in/ out	Rationale for scoping conclusion
Extreme weather events	In	The Scheme may be vulnerable to extreme weather events, such as storm damage to structures and assets.
Temperature	In	Extremes in temperatures may result in heat stress of materials and structures. It is not expected that projected temperature increases would have impacts on the panels themselves as solar PV schemes operate all over the world in climates which are already much warmer than the predicted future climate of the UK.
Precipitation	In	The Scheme may be vulnerable to changes in precipitation, for example, land subsidence and damage to structures and drainage systems during periods of heavy rainfall.
Wind	In	The Scheme may be vulnerable to changing wind patterns, for example, high winds and falling trees could damage structures and assets.
Sea level rise	Out	The Scheme is located inland more than 40 km from the sea in an area not susceptible to sea level rise. The risk of flooding from rivers and the sea is discussed in more detail in Section 9.5 of **Chapter 9: Water Environment**.

6.6.9 The CCR review will qualitatively assess the Scheme's resilience to climate change. This will be completed in liaison with the Scheme's design team and the other EIA technical disciplines by considering the climate projections for the geographical location and timeframe of the Scheme.

6.6.10 A statement will be provided within the ES to describe how the Scheme would be adapted to improve its resilience to future climate conditions.

6.7 Assessment Methodology

Lifecycle GHG Impact Assessment

6.7.1 The GHG assessment will follow a project lifecycle approach to calculate estimated GHG emissions arising from the construction, operation and decommissioning of the Scheme and to identify GHG 'hot spots' (i.e. emissions sources likely to generate the largest amount of GHG emissions). This will enable the identification of priority areas for mitigation in line with the principles set out in IEMA guidance (Ref 31).

6.7.2 In line with the World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines (Ref 43), the GHG

assessment will be reported as tonnes of carbon dioxide equivalent (tCO_2e) and will consider the seven Kyoto Protocol gases:

- CO_2;
- Methane (CH_4);
- Nitrous oxide (N_2O);
- SF_6;
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

6.7.3 Expected GHG emissions arising from construction and decommissioning activities, embodied carbon in materials and operational emissions of the Scheme, as well as baseline emissions, will be quantified using a calculation-based methodology as per the following equation, and aligned with the GHG Protocol (Ref 43):

6.7.4 Activity data x GHG emissions factor = GHG emissions

6.7.5 Department for Environment, Food and Rural Affairs (Defra) 2021 emissions factors (Ref 47) and embodied carbon data from the University of Bath Inventory of Carbon and Energy (ICE) (Ref 48) are among those that will be used as the primary data sources for calculating GHG emissions.

6.7.6 The sensitivity of the receptor (i.e. the global climate) to increases in GHG emissions is always defined as high as any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore meet its future 5-year carbon budgets. Also, the extreme importance of limiting global warming to below 2°C this century is broadly asserted by the International Paris Agreement (Ref 49) and the climate science community.

6.7.7 When evaluating significance of the GHG emissions, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible (Ref 33). The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050.

6.7.8 The following significance criteria in Table 6-4 will be used to determine the Scheme's whole life GHG emissions and how these align with the UK's net zero compatible trajectory. Major or moderate adverse effects and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

Table 6-4: Significance Criteria

Level of significance	Description
Major adverse	The Scheme's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate adverse	The Scheme's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Minor adverse	The Scheme's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	The Scheme's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Beneficial	The Scheme's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

6.7.9 The UK carbon budgets (Ref 38, Ref 39) are currently only available to 2037 (6th carbon budget). Where further carbon budgets are not available (7th, 8th and 9th carbon budget periods), these will be projected based on data published by the CCC. Totals for these periods have not been approved or ratified and are not legally binding, but indicative figures can provide valuable context at this stage.

Climate Change Resilience Review

6.7.10 The Scheme's resilience to climate change will be considered qualitatively during construction, operation and decommissioning. This will be completed in liaison with the Scheme's design team and the other ES technical specialists by considering the climate projections for the geographical location and timeframe of the Scheme. The assessment will be undertaken in line with IEMA guidance (Ref 32) on CCR.

6.7.11 In line with standard methodology, the significance of climate resilience will not be assessed, rather a statement will be provided to describe how the Scheme has been designed to be as resilient as is reasonably practicable to future climate change.

6.8 Assumptions, Limitations and Uncertainties

6.8.1 Where detailed information is not available regarding energy use, types and quantities of materials used, or the embodied carbon of key features of the assets, precautionary assumptions will be made based on industry approximations and professional best practice.

6.8.2 All assumptions and limitations, including any exclusions, together with assumptions for choices and criteria leading to exclusion of input and output data will be documented as part of the assessment reported in the ES.

6.9 Summary of Elements Scoped In and Scoped Out

6.9.1 A summary of the elements scoped into and out of the assessment of climate change is presented in Table 6-5.

Table 6-5: Elements Scoped In and Out of the Assessment of Climate Change

Element	Scoped In/ Scoped Out
GHG impact assessment (construction, operation and decommissioning).	Scoped in – an assessment of all aspects of the Scheme's development from raw products and manufacture of materials, through to construction, operation and decommissioning.
In-combination climate impact assessment (construction, operation and decommissioning).	Scoped in – an assessment of impacts of temperature change, precipitation change and changing wind patterns on receptors in the surrounding environment including biodiversity. They are predicted to have a potential impact upon receptors identified by other environmental disciplines. Scoped out – an assessment of sea level rise as the Scheme is located inland more than 40 km from the sea, in an area not susceptible to sea level rise (see Section 9.5 of **Chapter 9: Water Environment**).

Element	Scoped In/ Scoped Out
CCR review (construction, operation and decommissioning).	Scoped in – an assessment of vulnerability of the Scheme to extreme weather events and changes in temperature, precipitation and wind patterns. Scoped out – an assessment of sea level rise as the Scheme is located inland more than 40 km from the sea, in an area not susceptible to sea level rise (see Section 9.5 of **Chapter 9: Water Environment**).

7. Cultural Heritage

7.1 Introduction

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

7.1.2 This chapter is supported by Figure 7-1 and Figure 7-2 which present the location of designated and non-designated heritage assets, respectively, included at the end of this chapter.

7.2 Study Area

7.2.1 The following Study Areas have been defined to include all designated and non-designated heritage assets with the potential to be affected by the Scheme, and to ensure comprehensive data capture. The Study Areas encompass all heritage assets, both designated and non-designated, including archaeological sites, historic buildings, Conservation Areas and Registered Parks and Gardens, together with the relevant historic landscape characterisation. The size of the Study Areas proposed is based on a standard assessment methodology considered appropriate and acceptable in relation to developments of this type. The methodology responds, through the graded size of the proposed Study Areas, to the variation in the relative significance of the heritage assets considered, and the likely nature of potential impacts as a result of the Scheme. The Study Areas will be further defined in the ES.

Designated Heritage Assets

3 km Study Area

7.2.2 A Study Area of 3 km from the Solar PV Site boundary has been defined to provide historical and archaeological context and to identify designated heritage assets with the potential to be affected by the Scheme (refer to Figure 7-1). The 3 km Study Area also includes the Grid Connection Search Area where it falls within the Study Area. This Study Area will allow for designated heritage assets to be set within their wider context and allow for the assessment of archaeological potential within the Site boundary, and assessment of the setting of designated heritage assets within the surrounding landscape.

1 km Study Area

7.2.3 Where the Grid Connection Search Area is located beyond the 3 km Study Area as detailed above, a 1 km Study Area has been applied (refer to Figure 7-1). This Study Area is considered proportionate to the level of impact as the proposed works within the Grid Connection Search Area would be largely underground. Once operational, these components would not be visible and would not change the setting of heritage assets. The Grid Connection Search Area may also contain above ground components of the Scheme,

such as substation(s). A wider Study Area may be proposed once the locations and extent of any above ground components are confirmed. The Study Area will provide data relating to heritage assets in proximity to the Scheme whose setting may change temporarily during construction, operation and decommissioning, but would not experience any long-term effects as a result of the Scheme.

Wider Study Area (up to 5 km)

7.2.4 A flexible approach will be taken to the identification of designated heritage assets of the highest value (i.e., World Heritage Sites, scheduled monuments, Grade I and II* listed buildings, Registered Parks and Gardens and Conservation Areas containing a number of assets of the highest value) located outside of the defined Study Areas, where there may be an impact through change to their setting, up to 5 km beyond the Solar PV Site boundary.

7.2.5 High value assets up to this distance may be considered where identified as necessary by the EIA technical discipline team or through consultation. This will be guided by modelling the Scheme's Zone of Theoretical Visibility (ZTV) (to be prepared as part of the landscape and visual amenity assessment, see **Chapter 10: Landscape and Visual Amenity**), but will also consider physical and historical connectivity and relationships with other assets and the wider landscape.

Non-designated Heritage Assets

1 km Study Area

7.2.6 The Study Area for non-designated heritage assets extends to a distance of 1 km from the Site (refer to Figure 7-2). This Study Area is considered appropriate to provide historical and archaeological context and to assess the potential for the survival of archaeological remains within the Site.

7.3 Legislation, Planning Policy Context and Guidance

7.3.1 Legislation, planning policy and guidance relating to cultural heritage and pertinent to the Scheme is set out below.

Legislation

7.3.2 Relevant legislation includes:

- Infrastructure Planning (Decisions) Regulations 2010 (Ref 50);
- Planning (Listed Buildings and Conservation Areas) Act 1990 (Ref 51); and
- Ancient Monuments and Archaeological Areas Act 1979 (Ref 52) (amended by the National Heritage Act 1983 (Ref 53) and 2002 (Ref 54).

National Planning Policy

7.3.3 Relevant national planning policy includes:

- NPS EN-1 (Ref 5) with particular reference to Section 5.8 in relation to the significance, impact and recording of the historic environment;
- NPS EN-3 (Ref 6), which provides specific guidance relating to renewable energy infrastructure;
- NPS EN-5 (Ref 7) which provides specific guidance relating to electricity networks infrastructure, specifically with reference to paragraph 2.2.6 and the desirability of preserving sites, buildings and objects of architectural, historic or archaeological interest, and also paragraph 2.8.9 which highlights the potential impacts to archaeological sites from underground cables;
- Draft NPS EN-1 (Ref 8) with reference to Section 5.9 Historic Environment;
- Draft NPS EN-3 (Ref 9) with reference to Section 3.10 Solar PV Generation (including the impacts identified in paragraphs 3.10.98 to 3.10.110 and 3.10.151 and the mitigation considerations in paragraphs 3.10.128 to 3.10.129);
- Draft NPS EN-5 (Ref 10) with reference to Paragraph 2.2.5 and the desirability of preserving sites, buildings and objects of architectural, historic or archaeological interest, and also Paragraph 2.11.14 which highlights the potential impacts to archaeological sites from underground cables; and
- NPPF (Ref 13) with particular reference to Section 16: Conserving and Enhancing the Historic Environment.

National Guidance

7.3.4 The following guidance is of relevance for cultural heritage:

- Planning Practice Guidance, Historic Environment (Ref 55);
- Historic Environment Good Practice Advice in Planning Note 2. Managing Significance in Decision Taking in the Historic Environment. Historic England (Ref 56);
- Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets. Historic England (2nd edition, 2017) (Ref 57);
- Historic Environment Statement of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12. Historic England (2019) (Ref 58);
- Commercial Renewable Energy Development and the Historic Environment. Historic England Advice Note 15 (2021) (Ref 59);
- Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (DBA) (Ref 60);
- CIfA Code of Conduct: professional ethics in archaeology (Ref 61); and

- IEMA, the Institute of Historic Building Conservation (IHBC) and the CIfA, Principles of Cultural Heritage Impact Assessment in the UK (Ref 62).

Local Planning Policy

7.3.5 The following local policies from the Doncaster Local Plan 2015–2035, Adopted 2021 (Ref 14) are of relevance to the historic environment:

- Policy 33 – Landscape;
- Policy 34 – Valuing our Historic Environment;
- Policy 35 – Understanding and Recording the Historic Environment;
- Policy 36 – Listed Buildings;
- Policy 37 – Conservation Areas;
- Policy 38 – Historic Parks and Gardens;
- Policy 39 – Development Affecting Archaeology;
- Policy 40 – Buildings or Structures of Local Historic Interest; and
- Policy 41 – Character and Local Distinctiveness.

7.4 Consultation

7.4.1 A process of ongoing consultation has begun with the Archaeologist at South Yorkshire Archaeology Service and the Inspector of Ancient Monuments at Historic England, to ensure, as far as practicable, that heritage issues are identified and potential impacts to heritage assets are included in the assessment. Consultation will also be carried out with the relevant Conservation Officer for the City of Doncaster Council (and other Local Authorities as relevant), to identify and assess any potential impacts to the historic built resource.

7.4.2 So far, agreement has been reached with the Inspector of Ancient Monuments at Historic England with regard to the likely nature and scale of impacts to the scheduled moated site of Fenwick Hall (1012459). Historic England's proposed mitigation measure of a 20 m buffer strip free of solar arrays, located to the east of the monument and within the Solar PV Site, has been agreed and included within the design of the Scheme. The Inspector's written advice to this effect was received in a letter dated 10/05/23 (Historic England Ref. PA01198438).

7.5 Baseline Conditions

7.5.1 To assist with the scoping assessment, data has been considered from the National Heritage List for England (NHLE) (Ref 63), the South Yorkshire HER and the North Yorkshire HER, and an initial site walkover of the Solar PV Site has been undertaken, to gain an understanding of the designated and non-designated heritage assets located within the Site and defined Study Areas. All heritage assets identified within the Site and Study Areas are illustrated on Figure 7-1 and Figure 7-2. They are referred to in the text

by a unique identity code in brackets assigned by the HER and NHLE (e.g. MNY9794 or 1008685).

Designated Assets

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

7.5.3 There are seven designated heritage assets located within the Grid Connection Search Area, comprising:

- Barn approximately 20 m to the south-west of Manor Farmhouse (Grade II; 1192377);
- Poplar Farmhouse (Grade II; 1151439);
- Glebe Farmhouse (Grade II; 1192743);
- Barn approximately 30 m to the north of Glebe Farmhouse (Grade II; 1314794);
- Wrancarr Mill (Grade II; 1151596);
- Barn approximately 30 m to the west of Ponderosa Farmhouse (Grade II; 1151595); and
- Dovecote and outbuilding immediately to the west of West End Cottage (Grade II; 1192918).

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

3 km Study Area

7.5.5 Within the 3 km Study Area from the Solar PV Site boundary, there are 32 designated heritage assets comprising five scheduled monuments and 27 listed buildings.

7.5.6 The scheduled monuments comprise the following assets:

- Moat Hill moated site (1011920);
- Fenwick Hall moated site (1012459);
- Cross in the churchyard of Holy Trinity Church (1012933);
- Parkshaw moated site, 170m north-west of Wood Farm (1016025); and
- Warren Hall moated site (1017581).

7.5.7 The 27 listed buildings are all Grade II listed and comprise farmhouses and associated buildings, churches, a mill and dovecotes, all dating to the post-medieval period.

1 km Study Area

7.5.8 Within the 1 km Study Area from the Grid Connection Search Area, there are 10 designated heritage assets, comprising three scheduled monuments, six listed buildings and the Arksey Conservation Area. Where assets within this 1 km Study Area also lie within the 3 km Study Area from the Solar PV Site,

they will be assessed in relation to potential impacts from both elements of the Scheme.

7.5.9 The scheduled monuments comprise the following assets:

- Tilts moated site (1012303);
- Cross in the churchyard of St Oswald's Church (1012938); and
- Round About Moat, Arksey (1013656).

7.5.10 The listed buildings comprise the following assets:

- The Church of St Peter and St Paul (Grade I; 1151488);
- The Church of St Oswald (Grade II*; 128619),
- Barn and attached cartshed approximately 50 metres to south-east of Church of St Oswald (Grade II; 1191819);
- Shaftholme House Farmhouse (Grade II; 1191993);
- Low Farmhouse (Grade II; 1286876) and
- The remains of a medieval cross approximately 8 metres to south of porch to Church of St Oswald (Grade II; 1151489).

Wider Study Area (up to 5 km)

7.5.11 Within the Wider Study Area (up to 5 km) there are 13 designated heritage assets of the highest value, comprising eight scheduled monuments, four listed buildings and the Fishlake Conservation Area.

7.5.12 The scheduled monuments comprise the following assets:

- Earthworks on Sutton Common (1004816);
- Sutton Common bowl barrow (1010768);
- Thorpe in Balne moated site, chapel and fishpond (1012111);
- Wayside cross on Pinfold Lane (1012932);
- Wayside cross on Trundle Lane (1014146);
- Kings Manor moated site, 450m south of Little London (1015307);
- Manorial complex including the site of Norton Manor House, chapel, dovecote, moat, fishponds, field system and mill, 600m southwest of Wentbank House (1016945); and
- Medieval standing cross on Tanpit Lane, 150m west of Wentbank House (1017825).

7.5.13 The listed buildings comprise:

- The Church of St Cuthbert (Grade I; 1314801);
- Stubbs Hall (Grade II*; 1174475);
- The Church of St Mary (Grade II*; 1286522); and
- The remains of chapel at Manor House Farm (Grade II*; 1286641).

Non-designated Assets

7.5.14 There are four non-designated heritage assets located within the Solar PV Site boundary, comprising:

- Unclassified cropmark (02791/01);
- Undated probable enclosure or ditch intersection (05633);
- Undated ring ditch and linear ditches (05632); and
- Undated possible ring ditch (05631).

7.5.15 In addition, an initial site walkover has identified multiple areas of ridge and furrow within the Solar PV Site which are not recorded on the HER.

7.5.16 There are 17 non-designated heritage assets located within the Grid Connection Search Area, comprising:

- Possible Iron Age or Romano-British Unclassified Cropmark, Moss (02529/01);
- Post-Medieval Farmhouse, Moss Farm (04049/01);
- Gill Lane, Medieval road, Moss (04293/01);
- Undated probable pit and ditch, Moss, Doncaster (05630);
- Possible Saxon Bronze Strip Find, Thorpe-in-Balne (02731/01);
- Possible Iron Age or Romano-British Unclassified Cropmarks, Moss (02530/01);
- Unclassified Cropmark and Earthwork, Moss (02531/01);
- Medieval Fishpond, Thorpe-in-Balne (02806/01);
- Thorpe In Balne Shrunken Medieval Settlement (02904/01);
- Post-Medieval Barn, Winteringham Farm, Thorpe-in-Balne (03730/01);
- Thorpe in Balne Medieval Chapel (00492/01);
- Possible Iron Age to Romano-British enclosure, Thorpe in Balne (05629);
- Thorpe in Balne Manor House (00309/01);
- Post-Medieval Cruck barn, Ughill Manor, Bradfield (01352/01);
- 19th-Century Dovecote, Moss (03514/01); and
- Medieval Ridge and Furrow associated with the Deserted Village of Moss (02559/01).

1 km Study Area

7.5.17 There are 28 non-designated heritage assets recorded within the 1 km Study Area. Some of this number represent duplicate entries for designated heritage assets.

7.5.18 The non-designated heritage assets recorded within the 1 km Study Area comprise multi-period archaeological remains, landscape features and individual findspots including a Late Iron Age and Romano-British settlement

site at Topham Farm (04831), a possible undated enclosure at Balne (MNY23562), the site of a former medieval chapel at Sykehouse (00476/01), multiple areas of ridge and furrow (02072/01; 02559/01; 02561/01; 05770; 02562/01) which is indicative of medieval and post-medieval farming practices, as well as a number of individual find spots of Roman pottery sherds (01064/01; MNY9794; MNY9795; MNY17448), medieval pottery sherds (00461/02), a possible medieval quern (01135/01) and a human skull (02076/02) and antler (02076/01) dredged from the River Went.

7.5.19 In addition to the known non-designated heritage assets located within the Site and Study Area, there is also the potential for previously unrecorded archaeological remains to survive within the Site boundary.

7.6 Potential Effects and Mitigation

7.6.1 The Scheme has the potential to affect designated and non-designated heritage assets during the construction, operation and decommissioning phases of the Scheme. Such effects could consist of:

- Physical effects on a heritage asset; and
- Effects upon the value of a heritage asset due to changes to its setting.

7.6.2 There is the potential for physical effects on non-designated heritage assets and previously unrecorded archaeological remains located within the Site boundary. These remains could potentially be affected during excavation works required during construction and decommissioning including, but not limited to, power control infrastructure and on-site cabling, the laying and removal of the required connector cables and the establishment and removal of construction compounds and access tracks.

7.6.3 There is also the potential for impacts on designated and non-designated heritage assets located within the Site and Study Areas through change to their setting during Scheme construction, operation and/or decommissioning.

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

7.6.5 As noted in paragraph 7.4.2, a 20 m buffer strip free of solar arrays, located to the east of the scheduled moated site of Fenwick Hall (1012459) and within the Solar PV Site, has been agreed with Historic England and included within the design of the Scheme.

7.6.6 Mitigation measures will be set out in the Framework CEMP, OEMP and DEMP prepared as part of the DCO application for the construction, operation and decommissioning phases, respectively. The plans will form the basis of the detailed CEMP, OEMP, and DEMP and are expected to be secured through a Requirement in the DCO.

7.7 Assessment Methodology

7.7.1 The assessment of potential effects as a result of the Scheme on heritage assets will be undertaken using the methodology set out below.

7.7.2 The value of a heritage asset (its heritage significance) is guided by its designated status, but is derived also from its heritage interest which may be archaeological, architectural, artistic or historic (NPPF Annex 2, Glossary) (Ref 13). Each identified heritage asset will be assigned a value in accordance with the criteria set out in Table 7-1. Using professional judgement and the results of consultation carried out as part of the assessment, heritage assets will be assessed on an individual basis and regional variations and individual qualities taken into account where applicable to assign the value.

Table 7-1: Criteria for Assessing the Value of Heritage Assets

Asset value	Description
High	• World Heritage Sites; • Scheduled monuments; • Grade I and II* listed buildings; • Registered battlefields; • Grade I and II* registered parks and gardens; • Conservation areas of demonstrable high value; • Non-designated heritage assets (archaeological sites, historic buildings, monuments, parks, gardens or landscapes) that can be shown to have demonstrable national or international importance; and • Well preserved historic landscape character areas (LCAs), exhibiting considerable coherence, time-depth or other critical factor(s).
Medium	• Grade II listed buildings; • Conservation areas; • Grade II registered parks and gardens; • Non-designated heritage assets (archaeological sites, historic buildings, monuments, park, gardens or landscapes) that can be shown to have demonstrable regional importance; • Averagely preserved historic LCAs, exhibiting reasonable coherence, time-depth or other critical factor(s); and • Historic townscapes with historic integrity in that the assets that constitute their make-up are clearly legible.
Low	• Locally listed buildings; • Non-designated heritage assets (archaeological sites, historic buildings, monuments, park, gardens or landscapes) that can be shown to have demonstrable local importance;

Asset value	Description
	• Assets whose heritage interests are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade; and • Historic LCAs whose value is limited by poor preservation and/ or poor survival of contextual associations.
Very Low	• Assets identified on national or regional databases, but which have no archaeological, architectural, artistic or historic interest; and • Landscape with no or little significant historical merit.

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

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

Table 7-2: Factors Influencing the Assessment of Magnitude of Impacts

Magnitude of Impact	Description of impact
High	• Changes to most or all key components of the asset, such that it is totally altered or destroyed, resulting in a comprehensive impact upon its overall value; and/or • Comprehensive alteration, including the total loss or complete restoration, of elements of an asset's setting that cause a fundamental change in our ability to understand and appreciate its heritage interests; thereby resulting in a comprehensive impact upon its overall value.
Medium	• Changes to many key components of the asset, such that it is significantly altered or modified, resulting in a noticeable impact upon its overall value; and/or • Changes to the setting of an asset which noticeably affect our ability to understand and appreciate its heritage interests, resulting in a noticeable impact upon its overall value.

Magnitude of Impact	Description of impact
Low	• Changes to some key components of the asset, such that it is slightly altered, resulting in a slight impact on its overall value; and/or • Changes to the setting of an asset that slightly alter our ability to understand and appreciate its heritage interests, resulting in a slight impact upon its overall value.
Very Low	• Very minor changes to key components of an asset, resulting in no real change upon its overall value; and/or • Changes to the setting of an asset that have little effect on our ability to understand and appreciate its heritage interests, resulting in no real change upon its overall value.

7.7.5 An assessment to classify the effect, having taken into consideration any embedded mitigation, will be determined using the matrix in **Chapter 5: Environmental Impact Assessment Methodology** of this EIA Scoping Report (Table 5-3).

7.7.6 Major and moderate effects will be considered significant. Within NPS EN-1, Section 5.8 paragraphs 5.8.14 to 5.8.15 (Ref 5), Draft NPS EN-1 Section 5.9 paragraphs 5.9.27 to 5.9.32 (Ref 8) and NPPF Section 16 paragraphs 199 to 204 (Ref 13), impacts affecting the value of heritage assets are considered in terms of harm, and there is a requirement to determine whether the level of harm amounts to 'substantial harm' or 'less than substantial harm'. There is no direct correlation between the classification of effect as reported in the ES and the level of harm caused to heritage significance in accordance with the NPS, Draft NPS and NPPF.

7.7.7 Pursuant to NPS EN-1, paragraph 5.8.15 (Ref 5), and Draft NPS EN-1 paragraph 5.9.25 (Ref 8), any harmful impact to the significance of a designated heritage asset should be weighed against the public benefit of the Scheme, whilst Regulation 3 of the Infrastructure Planning (Decisions) Regulations 2010 (Ref 50) requires the SoS to have regard to the desirability of preserving a listed building, conservation area, or scheduled monument, or its setting. In all cases, the determination of the level of harm to the significance of the asset arising from development impact is one of professional judgement and will be undertaken adopting a precautionary approach.

7.7.8 The baseline assessment will be undertaken in accordance with guidance set out by the CIfA and Historic England, in particular the Standard and Guidance for Historic Environment DBA (Ref 60) and the Code of Conduct (Ref 61).

7.7.9 Principles of Cultural Heritage Impact Assessment in the UK (Ref 62) is a guide to good practice in cultural heritage impact assessment published jointly by the IEMA, the IHBC and the CIfA. The document provides guidance on understanding cultural heritage assets and evaluating the consequences of change and will be considered when undertaking the assessment.

Desk-Based Assessment

7.7.10 A cultural heritage DBA will be prepared in accordance with industry standards and best practice guidelines (Ref 60), and with reference to any statutory consultation responses received as part of the Scoping Opinion. The DBA will inform the cultural heritage chapter of the PEIR and ES and will form an appendix to the ES.

Desk-Based Sources

7.7.11 Sources of information that will be consulted include:

- NHLE database (Ref 63);
- Formal searches of the South Yorkshire HER and North Yorkshire HER for information on non-designated heritage assets, previous archaeological investigations and the Historic Landscape Characterisation data;
- Portable Antiquities Scheme online database for data relating to archaeological finds (Ref 64);
- The British Geological Survey (BGS) Geology of Britain Viewer (Ref 65), for information on geology and topography, including historic borehole data;
- Published and unpublished literature (including a detailed review of reports for previous fieldwork carried out within close proximity to the Site boundary);
- Available geotechnical data;
- Available LiDAR and aerial photography;
- Documentary, cartographic and other resources as deposited within the Local Archives and Local Studies Library; and
- Local Planning Authority plans, guidance and lists.

Surveys

Walkover Survey

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

7.7.13 A site visit will also be undertaken to all of the Study Areas – as defined in Section 7.2 above – to assess the setting of assets which could potentially be affected by the Scheme. This visit will establish the key features of the asset's setting, alongside any intervisibility with the Site.

Additional Survey

7.7.14 The desk-based research will be supported by a programme of archaeological evaluation surveys, the scope of which will be informed by the DBA, and through consultation with the Archaeology Officer for South

Yorkshire Archaeology Service. These additional surveys (if required) may include, but not be limited to:

- Geophysical survey to identify the presence/absence of previously unrecorded archaeological remains within the Site boundary; and
- Archaeological trial trench evaluation to confirm the results of the geophysical survey, characterise the nature, extent and preservation level of archaeological remains in order to understand their heritage value, and to inform a suitable mitigation response.

7.8 Assumptions, Limitations and Uncertainties

7.8.1 It is assumed there will be access to all required land to undertake the walkover survey and any additional surveys that may be required to support the cultural heritage assessment. If access is not available, professional judgement will be used, based on available research and data, and reasonable, realistic, worst-case assumptions, to assess the archaeological potential of the area.

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

7.9 Summary of Elements Scoped In and Scoped Out

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

Table 7-3: Elements Scoped In and Out of the Assessment of Cultural Heritage

Element	Scoped In / Scoped Out
Built heritage (construction, operation and decommissioning)	Scoped in – an assessment of impact on built heritage assets including impacts arising from changes to their setting.
Archaeology (construction, operation and decommissioning)	Scoped in – an assessment of impact on archaeological assets including impacts arising from changes to their setting and physical impacts to below ground archaeological remains.
Historic landscape (construction, operation and decommissioning)	Scoped in – an assessment of impact on the historic landscape, including impacts arising from changes to their setting.

Revision: 0 Drawn: VC Checked: JW Approved: TN Date: 2023-05-15

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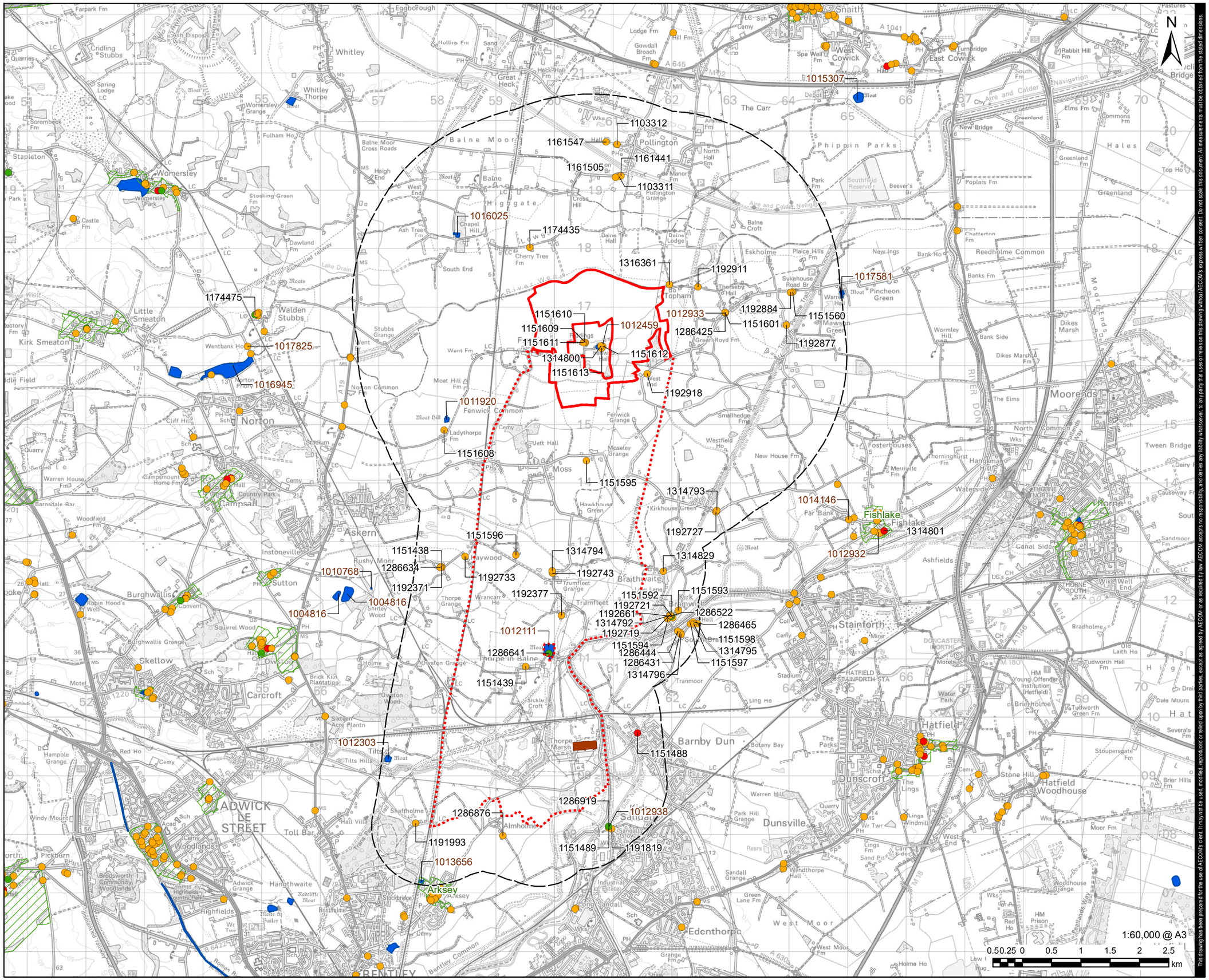

AECOM

PROJECT

Fenwick Solar Farm

CLIENT

Fenwick Solar Project Limited

CONSULTANT

AECOM Limited
Midpoint,
Alencon Link
Basingstoke, RG21 7PP
www.aecom.com

LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- Study Area*
- Listed Building - Grade I
- Listed Building - Grade II*
- Listed Building - Grade II
- Conservation Area
- Scheduled Monument

NOTES

*Study Area consists of 3km from Solar PV Site and 1km from Grid Connection Corridor Search Area.

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Designated Heritage Assets

FIGURE NUMBER

Figure 7-1

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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 1km Buffer of Solar PV Site and Grid Connection Corridor Search Area
- Heritage Asset

NOTES

ISSUE PURPOSE

Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Non-Designated Heritage Assets

FIGURE NUMBER

Figure 7-2

8. Ecology

8.1 Introduction

8.1.1 This chapter presents an initial baseline for ecology and biodiversity relevant to the Scheme, identifies the need for additional surveys to ensure there is appropriate information to accurately characterise the baseline, and sets out the Study Area for the assessment of the Scheme's impacts on ecology and biodiversity. In addition, the chapter provides an overview of the proposed methodology for the ecological assessment and sets out the potential effects provisionally identified.

8.1.2 Where appropriate, reference is made to the initial findings of the investigations conducted to date. Ecological surveys at the Site commenced in January 2023 and will continue during 2023 to 2024 to gather detailed baseline ecological information. The requirement and extent of these surveys have been informed by desk study data and a Preliminary Ecological Appraisal Report (PEAR) which is included in Appendix B. The PEAR includes data from a Phase 1 habitat survey of accessible land within the Solar PV Site, together with AECOM's professional judgement and local knowledge of the geographical area and the range of Important Ecological Features[3] (IEFs) it supports. Additional field surveys will be undertaken for the Grid Connection Corridor Search Area. The requirement and extent of these surveys have been informed by a high level desk study and are detailed in Section 8.7.

8.1.3 The ecology chapter of the ES will identify and evaluate relevant ecological features i.e. receptors (including nature conservation designations, priority habitats and protected/notable species) within the Study Area. It will consider the effects that the Scheme is likely to have on their conservation status, inter-relationships, and contribution to local, regional and (if appropriate) national biodiversity.

8.1.4 Avoidance, reduction, mitigation and, if necessary, compensation measures that may be required to enable the Scheme to proceed will be identified in the ES, in compliance with relevant nature conservation legislation and planning policy. The works for the Scheme will be planned accordingly, to demonstrate that due consideration has been given to ecological features, including recommendations for biodiversity enhancements, where appropriate.

8.2 Study Area

8.2.1 The ecology assessment will consider all the activities being conducted to facilitate the construction, operational and decommissioning phases of the Scheme, and the designated sites, habitats or species present that may be affected by those activities. The study and survey areas proposed vary according to the spatial characteristics of each species or habitat potentially impacted. A ZoI representing the areas within which effects could occur due

[3] Important Ecological Features are habitats, species, ecosystems and their functions and processes that are of conservation importance and could potentially be affected by the Scheme.

to the Scheme and associated activities will be identified and detailed in the ES.

8.2.2 The Study Areas defined herein are based on published guidance (Ref 66), professional judgement, experience of other similar scaled projects and local knowledge of the geographical area. Together, these capture all protected nature conservation sites, significant habitats and protected and / or notable species which could be affected by the Scheme and will be sufficient to assess all possible effects of the Scheme on ecology and biodiversity.

8.2.3 The desk study search will be undertaken for areas within the Site boundary and will include:

- Statutory sites of international nature conservation value (e.g. Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites, as well as proposed or potential sites) within 10 km of the Site (see Figure 8-1), as well as any SACs, SPAs or Ramsar sites that have potential links via watercourses or other hydrological links to the Site and SACs within 30 km of the Site where bats are noted as the reason for designation, or one of the qualifying features (due to their highly mobile nature and extensive foraging / sustenance areas);
- Statutory designated national nature conservation sites (e.g. SSSIs, Local Nature Reserves (LNRs)) and non-statutorily designated sites of nature conservation value (Local Wildlife Sites (LWSs)) within 2 km of the Site;
- Ancient woodland and other notable habitats[4] within 2 km of the Site; and
- Records of protected or notable species[5] within 2 km of the Site.

8.2.4 The desk study will enable determination of an appropriate Study Area, within which all IEFs requiring assessment, as well as identify ecological features that could be directly or indirectly affected by the Scheme. The Study Area will be subject to field survey and will be confirmed in the ES.

8.2.5 To date, the desk study and some field survey work (a Phase 1 habitat survey) has been completed for the Solar PV Site, as reported in the PEAR provided in Appendix B: Preliminary Ecological Appraisal Report (PEAR).

8.2.6 For the Grid Connection Corridor Search Area, a high level desk study has been completed using online information only (where available). The desk study includes information on statutory designated sites and high level information on non-statutory designated sites. This preliminary review was considered proportionate for the Grid Connection Corridor Search Area given the early stage of the design process. A detailed assessment will be undertaken as part of the PEIR (and subsequent ES), once the Grid Connection Corridor Search Area has been refined. Information pertaining to

[4] Notable habitats are taken as principal habitats for the conservation of biodiversity listed under Section 41 of the Natural Environment and Rural Communities Act 2006; habitats listed under the Doncaster Local Biodiversity Action Plan and the East Riding of Yorkshire Local Biodiversity Action Plan; hedgerows identified as being 'important' under the wildlife criteria of the Hedgerow Regulations 1997, ancient woodlands and veteran trees.
[5] Notable species are taken as principal species for the conservation of biodiversity listed under Section 41 of the Natural Environment and Rural Communities Act 2006; any species listed in an IUCN Red Data Book; and any other species listed under the Doncaster Local Biodiversity Action Plan and the East Riding of Yorkshire Local Biodiversity Action Plan.

notable habitats and species will be gathered and presented in the PEIR and ES. The Study Areas for the Grid Connection Corridor Search Area will be the same as for the Solar PV Site.

8.3 Legislation, Planning Policy Context and Guidance

8.3.1 Legislation, planning policy and guidance relating to protected nature conservation sites, significant habitats and protected and / or notable species pertinent to the Scheme are outlined below.

Legislation

8.3.2 The applicable legislation of relevance to the ecology and biodiversity assessment includes:

- The Invasive Alien Species (Enforcement and Permitting) Order 2019 (as amended) (Ref 67) and the Invasive Non-Native Species (Amendment etc.) (EU Exit) Regulations 2019 (Ref 68);
- The Environment Act 2021 (Ref 23);
- The Wildlife and Countryside Act (WCA) 1981 (as amended) (Ref 69);
- The Countryside and Rights of Way Act 2000 (Ref 70);
- The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 71);
- The Natural Environment and Rural Communities (NERC) Act 2006 (Ref 72);
- The Protection of Badgers Act 1992 (Ref 73);
- The Hedgerows Regulations 1997 (Ref 74);
- Animal Welfare Act 2006 (Ref 75);
- Salmon and Freshwater Fisheries Act 1975 (Ref 76);
- Eels (England and Wales) Regulations 2009 (Ref 77) ; and
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 78).

8.3.3 The above legislation will be considered when identifying potential ecological constraints to the Scheme, design options and mitigation measures. Compliance with the above legislation may require the need to obtain relevant protected species licences prior to Scheme construction.

National Planning Policy

8.3.4 The following NPSs are considered important and relevant to the ecology and biodiversity assessment:

- Overarching NPS for Energy (NPS EN-1) (2011) (Ref 5), with particular reference to Section 5.3 which relates to impacts on biodiversity and geological conservation;
- Draft NPS EN-1 (2023) (Ref 8). Generic environmental, biodiversity, ecology and geological impacts are covered in Section 4.2

(Environmental Principles), Section 4.5 (Environmental and Biodiversity Net Gain) and Section 5.4 (Biodiversity and Geological Conservation);

- There is no relevant policy contained within NPS for Renewable Energy Infrastructure EN-3 (Ref 6), however Draft NPS-EN3 (Ref 9) sets out guidance for impacts relating to solar PV sites in Section 3.10, with specific reference to biodiversity and ecological conservation in paragraphs 3.10.64 to 3.10.81;
- National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref 7), section 2.7 provides guidance on the siting and design of overhead power lines to minimise the risks posed to large species of birds;
- Draft NPS EN-5 (Ref 10) covers (in Section 2.5) the need to supplement the generic guidance given in NPS EN-1 with the recognition that the linear nature of electricity networks infrastructure can allow for excellent opportunities to incorporate BNG into schemes; and
- The NPPF (Ref 13), with particular reference to Section 15 and paragraphs 174, 175, 179, 180 to 182 and 185, which state that the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity. The NPPF is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieving net gains for nature, and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution. The NPPF also specifies the obligations that the local authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation and how this is to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impact is unavoidable, compensation may be required.

Local Planning Policy

8.3.5 Local planning policies included in the Doncaster Local Plan (Ref 14) that are relevant to the Scheme and ecology and biodiversity are detailed in Appendix B: Preliminary Ecological Appraisal Report (PEAR) and include:

- Policy 29: Ecological Networks (strategic policy);
- Policy 30: Valuing Biodiversity and Geodiversity (strategic policy); and
- Policy 32: Woodlands, Trees and Hedgerows.

Other Guidance

8.3.6 Other guidance documents relevant to the ecology and biodiversity assessment include:

- The 25-year Environment Plan (Ref 16);
- Defra Standing Advice (protected species) (Ref 79);
- UK Post 2010 Biodiversity Framework (Ref 80);
- Natural England Technical Information Note TIN101 Solar parks: Maximising Environmental Benefits (Ref 81);
- Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for ecological impact assessment (EcIA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2. CIEEM, Winchester (Ref 66); and
- Biodiversity Net Gain: Good Practice Principles for Development (Ref 82).

8.3.7 For further details on any of the above policies and legislation, please refer to the source document.

8.4 Consultation

8.4.1 Consultation will be carried out as necessary with (but not limited to) Natural England, local council biodiversity officers, the EA and other interested parties such as the Yorkshire Wildlife Trust. This consultation aims to make sure that a robust approach is adopted to scope and methodology of surveys necessary to inform the ecology and biodiversity assessment.

8.4.2 Agreement will be sought from consultees on the potential ZoI for each species or habitat potentially impacted by the Scheme as defined by CIEEM guidance (Ref 66), the valued features to be considered as part of the assessment, and any proposed mitigation measures.

8.5 Baseline Conditions

8.5.1 The known or predicted ecological baseline conditions in the Solar PV Site, Grid Connection Corridor Search Area and defined Study Areas are summarised in the following sections. The Existing National Grid Thorpe Marsh Substation is located within the Grid Connection Corridor Search Area.

Designated Sites

International Designated Sites

8.5.2 Statutory sites that are designated for nature conservation have been identified for the Site and Study Areas through a review of the Multi-Agency Geographic Information for the Countryside (MAGIC) (Ref 83) website.

8.5.3 There are no SAC sites that list bats as a designated feature within 30 km of the Site.

8.5.4 There are three International statutory sites of nature conservation designation within 10 km of the Site. These are Thorne and Hatfield Moors SPA, Thorne Moor SAC and Hatfield Moor SAC.

8.5.5 The River Went is connected to the Humber Estuary SAC / Ramsar approximately 16 km downstream of the Solar PV Site via the River Don and Dutch River. The Humber Estuary SAC / Ramsar is partly designated for the migratory fish species river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*), which have the potential to be present in the River Went and connected watercourses.

8.5.6 These sites are shown on Figure 8-1 and are summarised in Table 8-1.

Table 8-1: European Designated Sites within the Study Area

Site Name	Description	Approximate distance (km) and direction from closest point of the Site
Thorne and Hatfield Moors SPA	The site is used regularly by 1% or more of the Great Britain population of Nightjar (*Caprimulgus europaeus).*	8 km east of the Solar PV Site and Grid Connection Corridor Search Area. The M18 acts as a barrier to the Site.
Thorne Moor SAC	The Annex I habitat that is a primary reason for selection of this site is degraded raised bogs still capable of natural regeneration.	8 km east of the Solar PV Site and Grid Connection Corridor Search Area. The M18 acts as a barrier to the Site.
Hatfield Moor SAC	The Annex I habitat that is a primary reason for selection of this site is degraded raised bogs still capable of natural regeneration.	8.7 km east of the Grid Connection Corridor Search Area.
Humber Estuary SAC	Annex I habitats that are a primary reason for selection of this site: • Estuaries; and • Mudflats and sandflats not covered by seawater at low tide. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Sandbanks which are slightly covered by sea water all the time; • Coastal lagoons; • Salicornia and other annuals colonizing mud and sand; • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); • Embryonic shifting dunes; • Shifting dunes along the shoreline with *Ammophila arenaria* (‘white dunes’); • Fixed coastal dunes with herbaceous vegetation (‘grey dunes’); and • Dunes with *Hippopha rhamnoides*.	16 km downstream of the River Went (adjacent to the northern boundary of the Solar PV Site), connected via the River Don and Dutch River. 14.6 km east of the Grid Connection Corridor Search Area. The M18 acts as a barrier to this part of the Site.

Site Name	Description	Approximate distance (km) and direction from closest point of the Site
	Annex II species present as a qualifying feature, but not a primary reason for site selection: • Sea lamprey; • River lamprey; and • Grey seal (*Halichoerus grypus*).	
Humber Estuary Ramsar	The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. The site supports a breeding colony of grey seals and bird species/ populations occurring at levels of international importance. The site supports an internationally important assemblage of overwintering birds and internationally important populations of individual over-wintering species. The Humber Estuary acts as an important migration route for both river lamprey and sea lamprey between coastal waters and their spawning areas.	16 km downstream of the River Went (adjacent to the northern boundary of the Solar PV Site), connected via the River Don and Dutch River. 14.6 km east of the Grid Connection Corridor Search Area.

National Statutory Designated Sites

8.5.7 There are no national statutory designated sites for nature conservation (SSSI, National Nature Reserve (NNR) or LNR) within 2 km of the Solar PV Site.

8.5.8 Shirley Pool SSSI is located approximately 1.7 km to the west of the Grid Connection Corridor Search Area; the SSSI is designated for wetland habitats including open water, reed swamp, tall fen, wet neutral grassland, and carr which grades into birch-oak woodland on drier ground. There are no direct habitat links between the Grid Connection Corridor Search Area and Shirley Pool SSSI.

Non-statutory Designated Sites

8.5.9 There are eleven non-statutory sites designated for nature conservation identified within the 2 km of the Solar PV Site and a further 51 non-statutory sites within 2 km of the Grid Connection Corridor Search Area. These sites have all been designated as LWS and Candidate Local Wildlife Sites (cLWS) for their biodiversity value at a local level and are known to have supporting value to a wide variety of protected and ecologically important species and / or habitats. These sites are shown on Figure 8-2 and summarised in Table 8-2.

Table 8-2: Non-Statutory Designated Sites within 2 km of the Solar PV Site

Designated Site	Reason for Designation	Approximate distance of designated site[6]
Went Valley (Part) LWS	This extensive site comprises a series of semi-improved and cattle-grazed neutral grasslands, which are located immediately south of the River Went.	Within the northern part of the Solar PV Site (adjacent to and south of the River Went).
Bunfold Shaw LWS	This small, irregularly shaped site is predominantly pedunculate oak (*Quercus robur*) dominated woodland in the eastern and central sectors, while the western and south-western edge is an open clearing, which supports mainly tall ruderal vegetation, with one or two scattered oaks and several young, planted Scot's pine (*Pinus sylvestris*). This area of woodland is also listed as 'Ancient and semi-natural woodland'.	Approximately 15 m from the Solar PV Site boundary, within the central area.
Riddings Farm Pond cLWS	This is a small pond and wetland feature containing small populations	0.1 km from the Solar PV Site boundary,

[6] Where designated sites are situated outside of the Site boundary, the approximately distance and direction is given at the closest point of the designated site from the Site.

Designated Site	Reason for Designation	Approximate distance of designated site[6]
	of fine-leaved water dropwort (*Oenanthe aquatica*) (which is locally scarce) and good numbers of submerged plant species.	within the central area at Riddings Farm.
Fenwick Hall Moat LWS	The moat edges support some very large mature trees including ash (*Fraxinus excelsior*) and white willow (*Salix alba*). The deepest area of standing open water is located at the north-eastern corner of the moat where the pond has been deepened in recent years. The wet mud of the moat supports a dense stand of reed sweet-grass (*Glyceria maxima*) with great willowherb (*Epilobium hirsutum*), plicate sweet-grass (*Glyceria notata*), marsh bedstraw (*Galium palustre)* and hard rush (*Juncus inflexus*).	0.1 km from the Solar PV Site boundary, within the central area surrounding Fenwick Hall.
Went Valley (near Sykehouse) LWS	This site supports a mosaic of habitats spread over a series of fields. The site is bounded to the north by a small young plantation and the River Went. The southern and eastern boundary is formed by a grassy embankment and established hedge lines.	Located 0.9 km east of the Solar PV Site. Topham Ferry Lane separates the Solar PV Site and the LWS, but there is direct habitat connectivity between the two via the River Went.
Fenwick Churchyard LWS	This site comprises a small graveyard and contains an area of mildly calcareous to neutral unimproved grassland with scattered planted trees mainly in a line opposite to the site entrance.	Located 1.1 km southwest of the Solar PV Site. Fenwick Common Lane separates the Solar PV Site and the LWS. There is no direct habitat connectivity.
Went Valley (Eskholme) LWS	The riverbank supports an abundance of reed sweet-grass (*Glyceria maxima*), fool's-watercress (*Apium nodiflorum*), amphibious bistort (*Persicaria amphibia*), reed canary-grass (*Phalaris arundinacea*), branched bur-reed (*Sparganium erectum*), bulrush (*Typha latifolia*)	Located 1.5 km northeast of the Solar PV Site. Topham Ferry Lane separates the Solar PV Site and the LWS, but there is direct habitat connectivity via the River Went.

Designated Site	Reason for Designation	Approximate distance of designated site[6]
	and locally-frequent pink water speedwell (*Veronica catenata*).	
Moss Brick Pond LWS	Disused claypit, surrounded by dense scrub. Now used as a fishing lake, the open water area contains locally-abundant curly pondweed (*Lagarosiphon major*). Both southern marsh (*Dactylorhiza praetermissa*) and common spotted orchid (D. *fuchsii*) are present.	Located 1.8 km southwest of the Solar PV Site. Moss Road separates the Solar PV Site and the LWS. There is no direct habitat connectivity.
Clay Bridge Field LWS	The site is a small damp meadow enclosed by dense hedgerows on all sides except the south, which has a slightly raised bank along a dry ditch, supporting an old defunct hedgerow comprising a line of mature oak pedunculate and Turkey oaks (*Quercus robur* and Q *cerris*). A deep water-filled drain runs along the northern side of the site.	Located 1.9 km east of the Solar PV Site. New Junction Canal separates the Solar PV Site and the LWS. There is no direct habitat connectivity.
Westfield Ings LWS	The site is formerly a marsh within which ponds had been dug and trees planted. The southern part has recently been cleared of scrub and the ponds filled in but the area still contains marsh plants and could, with suitable management, redevelop as a marsh habitat.	Located 1.9 km southeast of the Solar PV Site. New Junction Canal separates the Solar PV Site and the LWS. There is no direct habitat connectivity.
River Went Oxbow cLWS	The old course of the River Went now forms a loop south of the present canalised river. Between one-third to almost a half of this old course is now a dry, or only seasonally wet, depression choked by tall ruderal and scattered wetland vegetation and is shaded throughout much of this western half by dense to scattered scrub and tree cover.	Located 2 km west of the Solar PV Site. Linked to the Solar PV Site via the River Went.

Table 8-3: Non-Statutory Designated Sites within 2 km of the Grid Connection Corridor Search Area

* indicates sites that are also within the Solar PV Site Search Area, as detailed in Table 8-2 above.

Designated Site	Location of Designated Site [7]
Bentley Tilts and Course of Old Ea Beck LWS	Within the Grid Connection Corridor Search Area.
Thorpe Marsh Area LWS	Within the Grid Connection Corridor Search Area.
Joan Croft Pond cLWS	Within the Grid Connection Corridor Search Area.
Trumfleet Pit LWS	Within the Grid Connection Corridor Search Area.
Trumfleet Pond LWS	Within the Grid Connection Corridor Search Area.
Wrancarr Drain and Braithwaite Delves LWS	Within the Grid Connection Corridor Search Area.
*Fenwick Churchyard LWS	Within the Grid Connection Corridor Search Area.
Old Ings and Chequer Lane LWS	Within the Grid Connection Corridor Search Area.
Barnby Dun Borrow Pits LWS	Within the Grid Connection Corridor Search Area.
Fox Covert LWS	Within the Grid Connection Corridor Search Area.
Marsh Lane LWS	Within the Grid Connection Corridor Search Area.
Bentley Bank LWS	Within the Grid Connection Corridor Search Area.
Pilkington's Burgy Banks LWS	Within the Grid Connection Corridor Search Area.
Old River Don Oxbow LWS	0.1 km southeast of the Grid Connection Corridor Search Area.
*Bunfold Shaw LWS	0.1 km north of the Grid Connection Corridor Search Area and approximately 15 m from the Solar PV Site.
Bentley Community Woodland cLWS	0.1 west of the Grid Connection Corridor Search Area.
Copley Spring Wood LWS	The closest location is 0.1 northwest of the Grid Connection Corridor Search Area.
*Moss Brick Pond LWS	0.1 km northwest of the Grid Connection Corridor Search Area.

[7]Where designated sites are situated outside of the Site boundary, the distance and direction is given at the closest point of the designated site from the Site.

Designated Site	Location of Designated Site [7]
Broad Ings Oxbow LWS	0.1 km south of the Grid Connection Corridor Search Area.
Thorpe in Balne / Kirk Bramwith Area LWS	0.1 km east of the Grid Connection Corridor Search Area.
Barnby Dun Old Don Oxbow LWS	The closest location is 0.1km east of the Grid Connection Corridor Search Area.
Owston Wood LWS	0.2 northwest of the Grid Connection Corridor Search Area.
Ruskholme LWS	0.2 southeast of the Grid Connection Corridor Search Area.
Bramwith Lock Woods LWS	0.3 km southeast of the Grid Connection Corridor Search Area.
Croft Ings LWS	0.3 km southeast of the Grid Connection Corridor Search Area.
Long Sandall Ings LWS	0.4 km south of the Grid Connection Corridor Search Area.
*Went Valley (Part) LWS	0.4 km north east of the Grid Connection Corridor Search Area.
Northfield Pond LWS	0.5 km northeast of the Grid Connection Corridor Search Area.
Shaftholme cLWS	0.5 km southwest of the Grid Connection Corridor Search Area.
Willow Garth Fish Ponds LWS	0.5 km south of the Grid Connection Corridor Search Area.
*Riddings Farm Pond cLWS	0.5 km east of the Grid Connection Corridor Search Area.
*Fenwick Hall Moat LWS	0.5 km northwest of the Grid Connection Corridor Search Area.
The Grove, Kirk Sandall LWS	0.6 km southeast of the Grid Connection Corridor Search Area.
Bramwith Hall LWS	0.8 km east of the Grid Connection Corridor Search Area.
Kirk Sandall Gorse cLWS	0.9 km southeast of the Grid Connection Corridor Search Area.
Bramwith Lane Wood cLWS	0.9 km southeast of the Grid Connection Corridor Search Area.
Arksey Round About Moat cLWS	0.9 km southwest of the Grid Connection Corridor Search Area.

Designated Site	Location of Designated Site [7]
Thornhurst Golf Course cLWS	0.9 km northwest of the Grid Connection Corridor Search Area.
*Went Valley (near Skyehouse) LWS	1 km northeast of the Grid Connection Corridor Search Area.
Hobbledehoy Wood LWS	The closest location is 1 km southeast of the Grid Connection Corridor Search Area.
Daw Lane Plantation LWS	1.2 km southwest of the Grid Connection Corridor Search Area.
Arksey Ings LWS	1.2 km south of the Grid Connection Corridor Search Area.
Lodge Lane Pond LWS	The closest location is 1.3 km east of the Grid Connection Corridor Search Area.
West Ings LWS	1.3 km southeast of the Grid Connection Corridor Search Area.
Barnby Dun Station Wood LWS	1.3 km southeast of the Grid Connection Corridor Search Area.
Bentley Common LWS	1.4 km southwest of the Grid Connection Corridor Search Area.
Shirley Pool and Rushy Moor Area LWS	1.4 km northwest of the Grid Connection Corridor Search Area.
*Westfield Ings LWS	1.4 km southeast of the Grid Connection Corridor Search Area.
*River Went Oxbow cLWS	1.5 northwest of the Grid Connection Corridor Search Area.
Arksey Pond LWS	1.6 km southwest of the Grid Connection Corridor Search Area.
Bentley Ings LWS	1.6 south west of the Grid Connection Corridor Search Area.
Sixteen Acre Plantation LWS	1.6 km northwest of the Grid Connection Corridor Search Area.
Brecks Plantation cLWS	1.6 km southeast of the Grid Connection Corridor Search Area.
Wheatley Park and Old Don Oxbows LWS	1.7 km south of the Grid Connection Corridor Search Area.
Bentley Railway Embankments and Ponds LWS	1.7 km southwest of the Grid Connection Corridor Search Area.
*Clay Bridge Field LWS	1.8 km southeast of the Grid Connection Corridor Search Area.

Designated Site	Location of Designated Site [7]
Thornhurst Pond LWS	1.9 km northwest of the Grid Connection Corridor Search Area.
Brecks Pond cLWS	1.9 km southeast of the Grid Connection Corridor Search Area.
Duck Holt LWS	1.9 km northwest of the Grid Connection Corridor Search Area.
Duck Holt Plantation LWS	2 km northwest of the Grid Connection Corridor Search Area.
Brick Kiln Plantation LWS	2 km northwest of the Grid Connection Corridor Search Area.
*Went Valley (Eskholme) LWS	2 km northeast of the Grid Connection Corridor Search Area.

Habitats

8.5.10 There is one area of ancient woodland within the Study Area of the Solar PV Site; namely Bunfold Shaw which is located approximately 15 m from the south-eastern part of the Solar PV Site. Bunfold Shaw is also designated as a LWS.

8.5.11 The PEAR (Appendix B) identifies the following priority habitats under Section 41 of the NERC Act 2006 (Ref 72) as being present or likely to be present (where determination by further survey is required) within the Solar PV Site or associated survey area:

- Coastal and floodplain grazing marsh;
- Hedgerows;
- Rivers;
- Standing water/ponds;
- Reedbeds;
- Arable field margins; and
- Lowland mixed deciduous woodland.

8.5.12 These habitats have potential to support a range of protected and notable species.

8.5.13 Additional priority habitats identified during the desk study within the 2 km Study Area of the Solar PV Site, outside of the Site boundary include traditional orchards and lowland meadows.

8.5.14 Further survey of the Grid Connection Corridor Search Area is required to identify the presence of any priority habitats. The results of these surveys will be presented in the ES.

Species

8.5.15 The desk study identifies records of protected and notable species of flora and fauna within 2 km of the Solar PV Site. These include:

- Four amphibian species; great crested newt (GCN) (*Triturus cristatus*), smooth newt (*Lissotriton vulgaris*), common frog (*Rana temporaria*) and common toad (*Bufo bufo*);
- Thirty-four recent records of notable bird species (nine species on the Royal Society for the Protection of Birds (RSPB) 'Birds of Conservation Concern 5 (BoCC5) Red list (Ref 84), and 16 species listed on the BoCC5 Amber list). Skylarks (*Alauda arvensis*) and lapwing (*Vanellus vanellus*) (both red listed species) have been recorded in flight at the Site during surveys undertaken at the Solar PV Site in spring 2023. There are also records of birds protected under Schedule 1 of the WCA 1981, including barn owl (*Tyto alba*). [redacted] an individual hen harrier (*Circus cyaneus*) (another Schedule 1 species) has been observed in flight at the Solar PV Site;
- One protected and notable mammal species; water vole. Other notable mammal species or signs of their presence have been noted during field surveys undertaken at the Solar PV Site to date; these include badger (*Meles meles*) and brown hare (*Lepus europaeus*) and there are habitats present on the Solar PV Site that are suitable for supporting other notable mammal species such as hedgehog (*Erinaceus europaeus*) and polecat (*Mustela putorius*);
- At least four bat species; common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*) and noctule (*Nyctalus noctula*) and an unidentified pipistrelle species (*Pipistrellus* sp.);
- Notable fish species; European bullhead (*Cottus gobio*), and European eel (*Anguilla anguilla*) have been recorded approximately 2 km upstream of the Study Area for the Solar PV Site, on the River Went. Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) records exist within the Borough of Doncaster at various unconfirmed locations and sea lamprey (*Petromyzon marinus*) have been recorded within the New Junction Canal, which is connected to the River Went approximately 6 km downstream of the Solar PV Site Study Area; and
- Non-native aquatic species, listed on Schedule 9 of the WCA 1981 (as amended); Nuttall's waterweed (*Elodea nuttallii*) and curly waterweed (*Lagarosiphon major*). There are no records of non-native terrestrial species, although muntjac deer (*Muntiacus muntjak*) have been sighted at the Solar PV Site on a number of occasions during field surveys.

8.5.16 Species records will be obtained for the ES, although the majority of records at or to the south of the Solar PV Site fall within the Grid Connection Corridor Search Area or within the northern end of the 2 km Study Area.

8.5.17 Several of these species are offered full or part protection under the WCA 1981 (as amended) (Ref 69) and the Habitats and Species Regulations 2017

(as amended) (Ref 71). Several species recorded within the Study Area are also listed on Section 41 of the NERC Act 2006 (Ref 72) as being of priority conservation concern. Full details of these species and their legal status and conservation value will be provided in the ecology and biodiversity ES chapter.

8.5.18 The non-native plant species listed under Schedule 9 of the WCA 1981 (as amended) are considered to continue to pose a conservation threat to native biodiversity and habitats, as such it is illegal to plant or to otherwise encourage or cause these plants to grow in the wild.

8.6 Potential Effects and Mitigation

8.6.1 Compliance with planning policy in the NPPF (Ref 13) requires that the Scheme considers and engages a mitigation hierarchy, requiring the highest level to be applied, where possible. The mitigation hierarchy is also fundamental to BNG. There are four sequential steps that must be taken throughout the lifecycle of a project where there is potential for impacts on relevant ecological receptors:

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

8.6.2 Schedule 15 of the Environment Act 2021 (Ref 23) makes provision for BNG in relation to development consent for NSIPs. Although the requirement for a minimum 10% gain in biodiversity for NSIPs will not become mandatory until 2025, in line with best practice the Scheme design will aim to achieve BNG levels greater than the minimum 10 % set out in the Environment Act 2021 (Ref 23). CIEEM's Biodiversity Net Gain: Good Practice Principles for Development (Ref 82) defines BNG as *"development that leaves biodiversity in a better state than before"* and involves *"an approach where developers work with local governments, wildlife groups, landowners and other stakeholders in order to support their priorities for nature conservation"*. BNG is achieved when measurable improvements for biodiversity are delivered in association with a development through the creation of new habitats or enhancement and management of existing habitats. Although BNG allows for these measures to be provided on-site, off-site or in combination, as set out in **Chapter 2: The Scheme** of this EIA Scoping Report, the Scheme will deliver BNG on-site through the implementation of measures such as field boundary enhancements and planting seed mixes within the Solar PV Site.

Opportunities will be explored for the enhancement of biodiversity at both on and off-site locations associated with the Scheme, as appropriate.

8.6.3 A BNG assessment will be undertaken (using Defra Metric 4.0 or the most up to date metric at the time) to identify opportunities for contributing to BNG. These opportunities will be identified and set out within the ES, in line with the requirements of the Environment Act (Ref 23), the NPPF (Ref 13), CIEEM's good practice guidance (Ref 66) and local planning policy, as set out in Section 8.3. As detailed in Section 2.4.15, the Framework Biodiversity and Landscape Management Plan to be submitted with the DCO application will specify measures proposed to mitigate any significant ecological and biodiversity effects of the Scheme and enhancement measures that would support BNG. The future management, monitoring and mechanisms by which such measures will be secured will also be included within the Framework Biodiversity and Landscape Management Plan, which is expected to be secured through a Requirement in the DCO.

Construction and Decommissioning

8.6.4 There is the potential for the following construction and decommissioning impacts on IEFs:

- Habitat loss or gain – direct impacts associated with changes in land use resulting from the Scheme, for example temporary works associated with site clearance, and permanent land-take (mainly arable land) associated with the installation of the Scheme;
- Fragmentation of populations or habitats – indirect impacts due to the Scheme dividing a habitat, group of related habitats, site or ecological network, or the creation of partial or complete barriers to the movement of species, with a consequent impairment of ecological function;
- Disturbance – indirect impacts resulting from a change in normal conditions (e.g. light, noise, vibration and human activity) that result in individuals or populations of species changing behaviour or range;
- Invasive and non-native species – direct impact from spread of invasive and non-native species either from or onto the land within the Site;
- Indirect impacts, such as watercourse pollution, sedimentation and dust deposition, lighting of sensitive habitats and increased human disturbance; and
- Species mortality – direct impacts on species populations associated with mortalities due to construction or decommissioning activities, for example site clearance.

8.6.5 Ecological mitigation measures applicable to the Scheme construction phase will be included in a Framework CEMP which will be prepared as part of the DCO application. The Framework CEMP would be developed into a detailed (or construction issue) CEMP by the appointed construction Contractor prior to the start of construction. Similarly, a Framework DEMP will be prepared as part of the EIA and will set out the general principles to be followed during the decommissioning of the Scheme. A detailed DEMP would be prepared and agreed with the relevant authorities at that time of Scheme decommissioning.

Operation and Maintenance

8.6.6 The operation of the Scheme may result in potential significant effects on IEFs including:

- Disturbance or displacement of species during operational maintenance; and
- Management and maintenance of on-site and adjacent habitats.

8.6.7 Whilst it is considered unlikely, the potential for the solar PV panels (during operation) to attract congregations of birds, which may lead to displacement of populations and increase the risk of collision, will be considered in the assessment. Due to the distance of the Solar PV Site from the Thorne and Hatfield Moors SPA and a lack of evidence from surveys undertaken to date suggesting regular use of the Solar PV Site by overwintering species of birds, functionally linked land to the SPA is unlikely to be present at the Solar PV Site or affected by the Scheme.

8.6.8 Attraction of aquatic invertebrates to the solar panels is considered unlikely. Although there is limited evidence suggesting, in certain conditions, the attraction of some species of aquatic invertebrates to solar panels, there are no designated sites with aquatic invertebrate species or assemblages as qualifying features within the Study Area and this potential impact pathway is scoped out of further assessment. Notwithstanding this, aquatic surveys will be undertaken as appropriate to assess potential impacts to watercourses (see Table 8-4).

8.6.9 Ecological mitigation measures applicable to the Scheme's operation will be included in a Framework OEMP prepared as part of the DCO application. The Framework OEMP will form the basis of the detailed OEMP which is expected to be secured as a Requirement of the DCO.

8.7 Assessment Methodology

Value of Ecological Resources and Receptors

8.7.1 To support focussed EcIA, there is a need to determine the scale at which the relevant ecological features identified through the desk studies and field surveys undertaken for the Scheme are of value. A hierarchical geographical approach will be used to assign nature conservation resource importance (or value) based upon those within the CIEEM Guidelines for EcIA in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Ref 66) (hereafter referred to as the CIEEM guidelines) and professional judgement.

8.7.2 It is not necessary in the assessment to address all habitats and species with potential to occur in the Study Area and instead the focus should be on those that are 'relevant' i.e. ecological features considered important and potentially affected by the Scheme. In its guidance, CIEEM makes clear that there is no need to *"carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable"* (Ref 66). This does not mean that efforts should not be made to safeguard wider biodiversity, and requirements for this will be considered. National policy documents emphasise the need to

achieve net gains for nature and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution.

8.7.3 The frames of reference used for the assessment, based on Section 4.7 in the CIEEM guidelines (Ref 66) will be:

- International (generally this is within a European context, reflecting the general availability of good data to allow cross-comparison);
- National (Great Britain, but considering the potential for certain ecological features to be more notable (of higher value) in England, with context relative to Great Britain as a whole);
- Regional (Yorkshire and the Humber);
- County (South Yorkshire (metropolitan and ceremonial county));
- District (Doncaster); and
- Local (has value at the 'Site' level).

8.7.4 Habitats and species populations are valued on the basis of their recognised status (such as through published lists of species of conservation concern or designation of Biodiversity Action Plan (BAP) status) their legal protection and, respectively, their extent or size.

8.7.5 In assigning values to species populations, it is important to consider the status of the species in terms of any legal protection. However, it is also important to consider other factors such as its distribution, rarity, population trends and the size of the population which would be affected. For example, whilst GCN is protected under European law, and therefore conservation of the species is of significance at an international level, this does not mean that every population of GCN is internationally important. It is important to consider the particular population in its context. Therefore, in assigning values to species, the geographic scale at which they are important will be considered. The assessments of value rely on the professional opinion and judgment of experienced ecologists.

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

8.7.7 Due regard will also be paid to the legal protection afforded to species during the development of mitigation and compensation measures to be implemented as part of the Scheme. For European Protected Species, there is a requirement that the Scheme should not be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status in their natural range.

8.7.8 Assessing the value of features requires consideration of both existing and future predicted baseline conditions. Therefore, the description and valuation of ecological features will take account of any likely changes, such as trends in the population size or distribution of species, likely changes to the extent of habitats and the effects of other schemes or land use changes.

Assessment Approach

8.7.9 The EcIA will be undertaken in accordance with best practice guidance, as published in the CIEEM guidelines (Ref 66) and summarised below.

8.7.10 The principal steps involved in the EcIA can be summarised as follows:

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

8.7.11 The ecological surveys to be conducted between 2023 and 2024 (as described below) will confirm or identify the presence or probable absence of any species and habitats and will be undertaken in the appropriate season for each species group.

8.7.12 The ZoI for the Scheme is the area over which ecological features may be affected by changes as a result of the Scheme and associated activities. The ZoI will be different for each ecological receptor identified, dependent on each receptor's sensitivity to change and will be determined using the maximum extents for Study Areas of each identified receptor. Where necessary, these will be appropriately revised as the Scheme design evolves.

8.7.13 The ES will include consideration of options to avoid, reduce, mitigate, or, if necessary, compensate for any identified potential significant adverse effects to the point where any residual effects are not considered to be significant. In addition, opportunities will be sought for the enhancement of biodiversity at

both on and off-site locations as associated with the Scheme, as appropriate. Cross-references to other ES chapters will be included, as appropriate.

8.7.14 In line with Section 1.21 in the CIEEM guidelines (Ref 66), the terminology used within the EcIA will draw a clear distinction between the terms 'impact' and 'effect'. For the purposes of this EcIA these terms are defined as follows:

- Impact – actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow; and
- Effect – outcome to an ecological feature from an impact. For example, the effects on commuting bats from loss of a hedgerow.

8.7.15 When describing potential impacts (and where relevant the resultant effects) consideration will be given to the following characteristics likely to influence this (Sections 5.11 to 5.18 in the CIEEM guidelines (Ref 66):

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

8.7.16 Cumulative effects will be assessed and are those occurring from several sources (also known as interrelationships) and/or the combined effects of other developments in the area.

8.7.17 For each ecological feature only those characteristics relevant to understanding the ecological effect and determining the significance will be described.

8.7.18 Sections 5.24 to 5.28 in the CIEEM guidelines (Ref 66) states that effects should be determined as being significant when:

"an effect either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g., for a designated site) or broad (e.g., national/local nature conservation policy) or more wide ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local. A significant effect is an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project"; and

"In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)".

8.7.19 Using this information and judgment, it is determined whether the effects will be significant or not on the integrity (of site/ecosystems) or conservation status (of habitats/species) of each ecological feature and the impact significance is determined at the appropriate geographical scale.

8.7.20 There are a number of approaches for determining the significance of effects on ecological features. Whilst the CIEEM guidelines recommend the avoidance of the use of the matrix approach for categorisation (major, moderate and minor), in order to provide consistency of terminology, the CIEEM assessment will be translated into the classification of effects scale, as outlined in Table 8-4 and detailed in **Chapter 5: EIA Methodology** of this EIA Scoping Report.

Table 8-4: Relating CIEEM Assessment Terms to Those Used in Other EIA chapters

Effect classification terminology used in other EIA chapters	Typical Equivalent CIEEM assessment
Major beneficial (positive)	1) Permanent addition of, improvement to, or restoration of a biodiversity resource; and 2) The extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Moderate beneficial (positive)	1) Temporary addition of, improvement to, or restoration of a biodiversity resource; and 2) The extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource.
Minor beneficial (positive)	1) Permanent addition of, improvement to, or restoration of a biodiversity resource; and

Effect classification terminology used in other EIA chapters	Typical Equivalent CIEEM assessment
	2) The extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible beneficial (positive)	1) Temporary addition of, improvement to, or restoration of a biodiversity resource; and 2) the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible adverse (negative)	1) Temporary/reversible damage to a biodiversity resource; and 2) The extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Minor adverse (negative)	1) Permanent/irreversible damage to a biodiversity resource; and 2) The extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Moderate adverse (negative)	1) Temporary/reversible damage to a biodiversity resource; and 2) The extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.
Major adverse (negative)	1) Permanent/irreversible damage to a biodiversity resource; and 2) The extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource.

Habitats Regulations Assessment

8.7.21 As part of the assessment, it is necessary to consider whether the Scheme is likely to have a significant effect on areas that have been internationally designated for nature conservation purposes (i.e. National Network sites). National Network sites are protected under the Conservation of Habitats and Species Regulations 2017 (as amended; relevant to England and Wales) (Ref 71). The UK left the EU on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 (‘the Withdrawal Act’). However, the most recent amendments to the Habitats Regulations – the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ref 71) make it clear that the need for Habitats Regulations Assessment (HRA) continues to apply. This includes through the creation of a national site network within the UK comprising the protected sites already designated under the EUs Natura 2000 ecological network, establishing management objectives of the national site network, imposing a duty for

appropriate authorities to manage and adopt the network objectives, and arranging for reporting on the implementation of the Regulations given the UK no longer reports these to the EU.

8.7.22 Although the UK has departed the EU, an HRA will be undertaken and will take a precautionary approach and take account of relevant EU case law (for instance the Holohan (Ref 86) and People over Wind (Ref 87) cases).

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

8.7.24 Stage 1 of the HRA process (Test of Likely Significant Effects) will consider the potential pathways of effect between the Scheme and international designated sites within 30 km of the Site boundary where bats are a qualifying feature, within 10 km of the Site boundary for other Sites and further afield where there is potential for hydrological links. The Test of Likely Significant Effects will consider whether there is potential to have a significant adverse effect on the integrity of the European designated sites, either alone or in combination with other plans or projects. Potential pathways of effect currently include noise, light and visual disturbance during construction or decommissioning, pollution (via hydrological links to the designated sites) and dust emissions and loss/disturbance of functionally linked land used by qualifying species. Information used to support the HRA process will include desk study data and appropriate field surveys. Stage 1 will result in the preparation of a HRA Screening Report.

8.7.25 Where there is potential for the Scheme to have a likely significant effect upon the qualifying features of the European designated sites, the pathway will be taken forward to Stage 2 – Appropriate Assessment. At Appropriate Assessment, the measures that will be implemented to either avoid the impact in the first place, or to mitigate the ecological effect to such an extent that it is no longer significant, will be set out.

8.7.26 If required, a shadow HRA will be prepared in line with Planning Inspectorate Advice Note 10 (Habitats Regulations Assessment (HRA)) (Ref 88) including completion of the necessary matrices. The HRA process will be in line with the EIA process. There would be a ‘Test of Likely Significant Effects Report’ at the PEIR stage, and this will be updated as necessary for the DCO application including a report to inform Appropriate Assessment, if required.

Planned Surveys

8.7.27 Habitats within the Site will be confirmed by undertaking an extended Phase 1 habitat survey (following the established Joint Nature Conservation Committee (JNCC) methodology) (Ref 89). The survey will also include a condition assessment, undertaken with reference to UKHab classifications to inform the BNG assessment (refer to Section 8.6.2 for further information). Habitat condition assessments will be conducted within the appropriate seasonal period to make sure the condition can be effectively determined,

using the most recent iteration of Defra's Biodiversity Metric 4.0. The baseline information gathered from this, and other surveys, will be used to develop an appropriate strategy in line with the policies identified in Section 8.3 above.

8.7.28 It is anticipated that some of the habitats within the Site will have suitability to support protected or notable species including GCN, reptiles, breeding birds, roosting, foraging and commuting bats, badger, otter and water vole, notable fish species and certain invasive, non-native species of plants. The scope of the planned (and ongoing) ecology surveys are set out in Table 8-5.

8.7.29 The current survey scope and requirements may change, and additional surveys may be required following consultation with local authorities and Natural England, and due to Scheme design evolutions.

8.7.30 The surveys undertaken will inform any European Protected Species (EPS) mitigation licences (where required). As part of the DCO application for the Scheme, these will be prepared in draft for advisory comment from Natural England.

Table 8-5: Scope of Proposed Ecology Surveys

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
Habitats: Phase 1 Habitat Survey and Habitat Condition Assessment to inform the BNG assessment	Phase 1 Habitat Survey in accordance with the published method (Ref 89). The Phase 1 habitat survey will be supplemented by UK Habitat Classification and condition assessment in accordance with Defra's Biodiversity Metric 4.0 (or the most up-to-date version of the metric at the time) Technical Supplement. Assessment of possible presence of protected, priority or otherwise notable species and, where relevant, the likely importance of habitat features for such species. Record of invasive or non-native species of plants. Incidental records of protected or priority species or their field signs.	Optimal time – April to October but can be carried out at any time of year. For the Solar PV Site, these surveys commenced in March 2023 and informed the requirement for further, more detailed botanical surveys, where necessary.	The Site boundary plus 50 m, that may be extended further based on professional judgement. It is expected that a more refined survey corridor for the Grid Connection Corridor Search Area will be identified from preliminary desktop and feasibility studies soon after the scoping stage.	50 m beyond the Site boundary is an appropriate survey area, acknowledging that habitats that are likely to be directly impacted by the Scheme are within the Site boundary. The information will form the basis of the calculation of potential permanent and temporary habitat effects within the EcIA. Habitat condition assessments are required to inform the BNG assessment for the Scheme.
Hedgerows	Hedgerows that are identified as potentially important and crossed by the Scheme will be surveyed against the wildlife	Optimal time –April to September inclusive.	Hedgerows that are impacted within the PV Solar Site and Grid Connection Corridor	Dedicated hedgerow surveys considered to only be warranted where hedgerows are directly impacted by the

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
	and landscape criteria of the Hedgerow Regulations 1997 (Ref 74) and (Ref 90) and also the UK Habitat Classification and condition assessment in accordance with Defra's Biodiversity Metric 4.0 (or the most up-to-date version of the metric at the time) Technical Supplement.		Search Area (once refined).	Scheme. The information collated will also be used to inform the condition and distinctiveness assessment within the BNG calculation. The Site boundary is an appropriate survey area, acknowledging that the majority of hedgerows will be retained or avoided.
Breeding Birds	The bird surveys will be based upon the Common Bird Census (CBC) methodology (Ref 91, Ref 92), with five individual survey visits. Bird territories within the Site Boundary will be determined using standard territory mapping techniques to identify and isolate areas within which birds displayed consistent breeding behaviours (following Ref 93). Birds observed only flying over the Site will also be recorded, but will be discounted from territory analysis.	March to July inclusive.	Five monthly survey visits will be completed on the Solar PV Site supplemented by additional surveys visits on land parcels of interest (i.e. potential to support Schedule 1 birds) if required. A habitat appraisal of the Grid Connection Corridor Search Area (once refined) and desk study of records within 2 km will be used to evaluate the use of the Grid Connection Corridor Search Area (once	To confirm the assemblage of bird species within the Solar PV Site and within the Grid Connection Corridor Search Area and to inform any mitigation required. Due to the temporary nature and limited extent of potential impacts from works, a desk study and habitat appraisal of the Grid Connection Corridor Search Area (once refined), is considered to be sufficient to inform the impact assessment and therefore, no survey for breeding birds is considered necessary.

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
			refined) by breeding birds.	
Wintering and Passage Birds	Wintering bird surveys will be completed with reference to Ref 92 and will comprise walked transects within the Solar PV Site to confirm the assemblage of wintering and passage bird species present during November to February.	November to February inclusive. Surveys in January and February have already been completed for the Solar PV Site, with the remainder to be completed in November and December 2023 and will be reported in the ES.	Four monthly surveys between November and February using a general walkover survey methodology within the Solar PV Site. A habitat appraisal of the Grid Connection Corridor Search Area (once refined) and desk study of records within 2 km will be used to evaluate the use of the Grid Connection Corridor Search Area (once refined) by wintering birds.	To confirm the assemblage of wintering and passage bird species within the Site and to inform any mitigation required. Due to the temporary nature and limited extent of potential impacts from works a desk study and habitat appraisal of the Grid Connection Corridor Search Area (once refined), is considered to be sufficient to inform the impact assessment and therefore, no survey for wintering and passage birds is considered necessary.
GCN Habitat Assessment	Habitat Suitability Index (HSI) of ponds in accordance with Oldham et al., 2000 (Ref 94).	Optimal time is May to September.	Within and up to 250 m from the Solar PV Site and Grid Connection Corridor Search Area (once refined) – where accessible.	Data will be used to inform a District Level Licence (DLL) Application, which may result in GCN being scoped out of the detailed assessment in the ES. If the DLL route is not pursued, a detailed assessment will be provided in the ES.

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
				GCN can utilise terrestrial habitat up to 500 m from their breeding ponds (Ref 95). However, it is recognised that there is a notable decrease in abundance of GCN beyond a distance of 250 m from a breeding pond (Ref 96). When submitting baseline information as part of a DLL application, Natural England request survey data up to 250 m from the Site boundary, which will form the focus of the survey area.
GCN Presence/ Likely Absence	Environmental DNA (eDNA) surveys (using approved GCN eDNA kit suppliers), will be undertaken in accordance with the protocols as set out by Biggs *et al*. (Ref 97) on suitable waterbodies.	April 15th to June 30th.	Within and up to 250 m from the Solar PV Site and Grid Connection Corridor Search Area (once refined) – where accessible. One survey visit to each waterbody. Number of waterbodies and locations to be confirmed following the HSI survey.	Based upon the avoidance of loss or direct effects upon GCN breeding waterbodies and the Solar PV Site being dominated by arable land and grazed pasture (of low suitability for amphibians), it is proposed that there is an appropriately robust and precedented approach to mitigation and legal compliance based on presence/absence baseline data only. These data will be sufficient to support an application under a DLL Scheme, which may result in

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
				GCN being scoped out of the detailed assessment in the ES. If the DLL route is not pursued, a detailed assessment will be provided in the ES.
Bats – Preliminary Roost Features (PRF) assessment	Permanent impacts on trees will be avoided where possible. Trees to be impacted or subject to disturbance will be subject to a PRF assessment survey in accordance with The Bat Conservation Trust guidance (Ref 98). Should a structure or building be impacted this will also be subject to PRF assessment in accordance with The Bat Conservation Trust guidance (Ref 98).	Any time of year.	Trees and structures / buildings within and up to 50 m from the Solar PV Site and Grid Connection Corridor Search Area (once refined) where potential loss or disturbance impacts are identified.	Information collated on the location of trees, structures or buildings that are suitable for roosting bats will inform design and offset buffers to avoid direct effects upon potential roost sites. Furthermore, the PRF assessment information will form the basis of the scope for roost surveys (as detailed below).
Bats – Foraging/ Commuting	The Solar PV Site is predominantly open arable land, of low suitability for foraging/ commuting bats as defined in Collins 2016 (Ref 98). Permanent impacts on trees/ woodland and hedgerows will be avoided as far as possible. As a consequence, a	April/May to September inclusive subject to suitable weather conditions.	Transect routes, to cover the most suitable areas of affected habitats within the Solar PV Site.	For the PV solar Site, the seasonal bat activity surveys are considered proportionate to the likely impacts and sufficient to determine appropriate mitigation. It is not considered warranted that detailed bat activity surveys will be required along the Grid

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
	proportionate level of survey to the likely impacts of the Scheme will include 'seasonal' (spring, summer and autumn) transect surveys and remote static detector deployment to provide baseline survey data of use of the Site by bats. The survey methodology will be based upon published guidance (Ref 98) and will be tailored as necessary to suit the Site.			Connection Corridor Search Area given the nature of habitat affected, the low suitability of the majority of habitats, that limited changes in lighting are anticipated, and the avoidance of the removal of mature trees or other structures which may support roosting bats. This is in line with published guidance (Ref 98) which states that surveys should be proportionate. Where linear habitat features e.g. watercourses / hedgerows are affected by the Scheme, but which may provide commuting routes or a foraging resource for bats, appropriate robust and precedented mitigation measures can be secured via adoption of construction methods that seek to avoid these features and reduce the temporary effects to a level that would not be significant.
Bats – Roosting	Wherever possible the Scheme will be designed to avoid trees that have potential to support a	If required: between April / May and September.	Features with bat roost suitability identified during the PRF assessments	To determine appropriate mitigation and licensing requirements. Mitigation will be

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
	bat roost. However, where this is not possible, trees will be subject to climbing and assessment of the identified PRF features where safe to do so, to confirm if the tree could be used as a roost and / or if there are signs of bats. Where tree climbing confirms that the PRF does have potential to support a roost and/or where it is not possible to safely climb a tree, bat emergence / re-entry surveys will be undertaken in accordance with standard survey guidance (Ref 98). Bat emergence / re-entry surveys will also be undertaken on any buildings with bat roost suitability that will be impacted by the Scheme.		that are within and up to 50 m from the Solar PV Site and Grid Connection Corridor Search Area (once refined).	required where roosts are lost within the Site and may also be required where roosts could be disturbed up to a distance of 50 m from the Site. There is no formal guidance on the distance from works that may result in disturbance to bats, but 50 m is considered a likely worst case based on other similar schemes.
Badger	Presence / absence survey for setts and field signs in combination with Phase 1 habitat survey. The survey will focus on habitat suitable to support setts.	Any time of year, although late autumn to early spring is optimal when ground-cover	Within and up to 50 m from the Solar PV Site and Grid Connection Corridor Search Area (once refined).	To determine appropriate mitigation either through avoidance of impacts on setts, or Natural England licensing for sett closures where direct impacts cannot be avoided. 50 m is considered to exceed the

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
	Incidental records obtained through desk study data in combination with the completion of other surveys will also supplement the baseline assessment.	vegetation is thinner).		likely disturbance distance of any works associated with a solar scheme. Pre-construction surveys for badger in areas where records of badger activity are identified will be committed to via the EcIA and embedded with mechanisms such as the Framework CEMP and Framework DEMP that will be submitted with the DCO application.
Otter	The Scheme will be designed to avoid effects upon watercourses as far as possible. A 10 m buffer is expected to be implemented to avoid disturbance of riparian habitats where possible. It is assumed that the River Went will not be crossed by the Scheme, although other watercourses, such as the Fenwick Common Drain, Fleet Drain and Thorpe Marsh Drain may be crossed. Presence/absence surveys will be required, looking for field	Otter: April to September inclusive.	Watercourses within and up to 200 m of the PV Solar Site and up to 200 m up and down stream of any crossing point along the Grid Connection Corridor Search Area (once refined). Access will be required to both banks and up to 10 m from the bank edge. Survey area will be extended where suitable terrestrial habitat greater than 1 ha in size is	To determine appropriate mitigation either through avoidance of impacts on otter habitat, or Natural England licensing where direct impacts cannot be avoided.

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
	signs along watercourses and ditches, where open cut crossing techniques are required, or appropriately sized stand-off buffers cannot be applied. A search for otter holts will be extended to up to 250 m from watercourses, where required. Surveys will be undertaken in accordance with standard guidance (Ref 99, Ref 100 and Ref 101).		located within 200 m of watercourse.	
Water Vole	The Scheme will be designed to avoid effects upon watercourses as far as possible. A 10 m buffer is expected to be implemented to avoid disturbance of riparian habitats where possible. It is assumed that the River Went will not be crossed by the Scheme and any other watercourses, such as the Thorpe Marsh Drain, Fenwick Common Drain and Fleet Drain are likely to be crossed through non-open cut techniques.	Water Vole: One or two surveys as required, one in the first half of the breeding season (April to June) and one in the second half of the breeding season (July to September).	Watercourses within and up to 200 m of the PV Solar Site and up to 200 m up and down stream of any crossing point along the Grid Connection Corridor Search Area (once refined). Access will be required to both banks and up to 10 m from the bank edge.	To determine appropriate mitigation either through avoidance of impacts on water vole habitat, or Natural England licensing where direct impacts cannot be avoided. 200 m is an appropriate distance, which is in line with best practice guidance (Ref 99).

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
	Presence/absence surveys will be required, looking for field signs along watercourses and ditches, where open cut crossing techniques are required, or appropriately sized stand-off buffers cannot be applied.			
Reptiles	The Solar PV Site is predominantly open arable and grazing land, of low suitability for reptiles. Permanent impacts on trees/woodland and hedgerows will be avoided as far as possible. Where habitats appear suitable for reptile populations (as identified during the Phase 1 habitat survey) and are to be permanently affected by the Scheme, presence/absence surveys will be undertaken following guidance provided by in Froglife Advice Sheet 10: Reptile Surveys (Ref 102). Survey involves laying artificial refugia (carpet tiles / roof felts) and leaving them *in situ* for	If required: April to September in suitable weather conditions (optimal months are April, May & September).	Selected areas of the most suitable habitat within the Solar PV Site and along the Grid Connection Corridor Search Area (once refined).	Presence / absence reptile surveys will only be considered warranted to be completed where areas of the most suitable reptile habitat could not be avoided by the Scheme. These data will inform the EcIA and mitigation strategy. Temporary construction effects upon small areas of suitable reptile habitat will be able to be mitigated through appropriate pre-construction measures where habitats / features of interest for reptiles are identified e.g., supervised vegetation clearance at an appropriate time of year.

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
	between one and three months. They will be checked seven times and then removed after the last survey.			
Terrestrial Invertebrates	Terrestrial invertebrate surveys are not anticipated to be required due to the limited suitability of the habitats to be affected.	Not anticipated to be required.	Not anticipated to be required.	Due to the predominantly arable nature of the Solar PV Site, it should be possible to avoid areas of likely high habitat suitability for terrestrial invertebrates; therefore, it is not proposed at this stage to undertake detailed terrestrial invertebrate surveys. Potential effects on likely invertebrate species may still be included within the assessment, based on desk study and habitat types.
Aquatic Ecology	A habitat condition assessment (Modular River Physical) survey of watercourses and drains / ditches crossed by the Scheme will be undertaken, where non-open cut techniques are not possible. This survey will include recording of aquatic macrophytes present.	Any time of year	Up to 10 m from a crossing point at a Main River or watercourse within the Solar PV Site or along the Grid Connection Corridor Search Area (once refined).	It is assumed that the River Went will not be crossed, although other watercourses may be. Where this occurs non-open cut techniques will be used; however, habitat condition assessments will be undertaken to inform BNG calculations. 10 m is a suitable

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
				distance and is in line with best practice guidance. Aquatic macrophyte surveys will identify protected, notable and invasive species, and will inform the WFD assessment.
Aquatic Invertebrates	Where Main Rivers, watercourses or ditches may be directly or indirectly impacted by the Scheme then further survey for aquatic invertebrates may be required.	Two surveys; one in spring (March-May inclusive) and one autumn (September to November inclusive)	Any Main River, watercourse or ditch crossing points within the Solar PV Site or along the Grid Connection Corridor Search Area (once refined).	Aquatic invertebrates surveys will identify protected, notable and invasive species, and to inform the WFD assessment. Surveys are only considered necessary where there will be direct impacts to suitable habitat. Any indirect impacts will be addressed through standard mitigation measures.
Fish	Survey of River Went, Fleet Drain, and Fenwick Common Drain, to assess habitat suitability for river and sea lamprey, and to carry out electric fishing surveys for these and other fish species.	One survey in summer (mid-June to Sept inclusive)	Any Main River or watercourse crossing points within the Solar PV Site or along the Grid Connection Corridor Search Area (once refined).	Given the potential for sea lamprey to be affected and their importance in the context of the Humber Estuary SAC / Ramsar, further fish surveys are recommended. Surveys will be completed of the River Went, Fleet Drain, and Fenwick Common Drain, to assess habitat suitability for river and sea lamprey, and to carry out

Survey	Scope of Survey	Survey Timing – Months	Survey Area Extent	Justification
				electric fishing surveys for these and other fish species.

8.8 Assumptions, Limitations and Uncertainties

8.8.1 The following paragraphs state the assumptions and limitations that have been noted during the ecology and biodiversity scoping process.

8.8.2 Baseline ecological surveys of the Solar PV Site commenced in January 2023 and will continue into 2024 to determine the baseline ecological conditions. The surveys may highlight new IEFs with potential to be significantly affected that have not yet been identified (or considered not to be significant) at this stage of the assessment. These would be discussed on a case-by-case basis with the local authorities and Natural England as appropriate.

8.8.3 An assumption has been made based on AECOM's experience of other similar solar projects that the following habitats will be retained as part of the Scheme: any habitat that falls within the boundary of a designated site, woodlands, ponds / ditches, watercourses (assuming watercourses are not lost as a whole and small crossings of minor watercourses could be required but Main Rivers would be crossed using trenchless techniques) and the majority of hedgerows (assuming hedgerows are not lost as a whole, but could require either a temporary or permanent gap through occasionally, which would be minimised to the smallest necessary).

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

8.8.5 An assumption has been made that any compound and material storage areas would be contained within the Site boundary.

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

8.9 Summary of Elements Scoped In and Scoped Out

8.9.1 A summary of the elements scoped into and out of the ecology assessment is presented in Table 8-6.

Table 8-6: Elements Scoped In and Out of the Ecology Assessment

Element	Scoped in / Scoped Out
Statutory designated sites (without mobile qualifying criteria) located greater than 2 km from the Site (construction, operation and decommissioning).	Scoped in – effects considered include indirect impacts such as watercourse pollution that could occur during construction, from maintenance activities during operation or during decommissioning.
Statutory designated sites (within 2 km of the Site) (construction, operation and decommissioning).	Scoped in – effects considered include indirect impacts such as watercourse pollution that could occur during construction, from maintenance activities during operation or during decommissioning.

Element	Scoped in / Scoped Out
Statutory designated sites (with mobile qualifying criteria) located up to 10 km from the Site (construction, operation and decommissioning).	Scoped in – effects considered include indirect impacts such as watercourse pollution that could occur during construction, from maintenance activities during operation or during decommissioning.
Non-statutory designated sites (within 2 km of the Site) (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss, disturbance and indirect impacts such as watercourse pollution during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Impacts to Priority Habitats or otherwise of biodiversity importance / value (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss, disturbance and indirect impacts such as watercourse pollution during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Impacts to common and widespread habitats of low sensitivity and / or conservation interest (construction, operation and decommissioning)	Scoped in – effects considered include habitat loss, disturbance and indirect impacts such as watercourse pollution during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Breeding birds (construction, operation and decommissioning)	Scoped in – effects considered include habitat loss and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Wintering birds (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Bats (roosting) (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss, fragmentation and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.

Element	Scoped in / Scoped Out
Bats (foraging / commuting) (construction and decommissioning).	Scoped in – effects considered include habitat loss, fragmentation and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Otter (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss, fragmentation and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Water vole (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss, fragmentation and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Badger (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss, fragmentation and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
GCN (construction, operation and decommissioning).	Scoped in – but as likely to be using a DLL it would be scoped out of the detailed impact assessment in the ES as the effects would be not significant at the population level. This would be assessed by Natural England using their risk zone modelling as part of the DLL which would inform the findings in the ES.
Other amphibians (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.
Reptiles (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance and management of on-site and adjacent habitats.

Element	Scoped in / Scoped Out
Other mammals (including brown hare, which is known to be present on Site and other species that could be present such as hedgehog, polecat) (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss, fragmentation and disturbance during construction or decommissioning. Operational effects include disturbance during maintenance, security lighting and management of on-site and adjacent habitats.
Aquatic invertebrates / fish (construction, operation and decommissioning).	Scoped in – Main Rivers, watercourses or ditches may be directly or indirectly impacted by the Scheme. Effects considered include habitat loss, disturbance and indirect impacts such as watercourse pollution during construction, decommissioning and during maintenance and management of on-site and adjacent habitats. Attraction of aquatic invertebrates to the solar panels is considered unlikely and so this operational impact is scoped out from further assessment.
Terrestrial invertebrates (construction, operation and decommissioning).	Scoped in – effects considered include habitat loss and disturbance during construction, decommissioning and during the operation and maintenance of on-site and adjacent habitats. However, the Scheme will avoid the most suitable areas of terrestrial invertebrate habitat and as such, they will likely be scoped out from detailed survey following further desk study, Scheme refinement and consultation.

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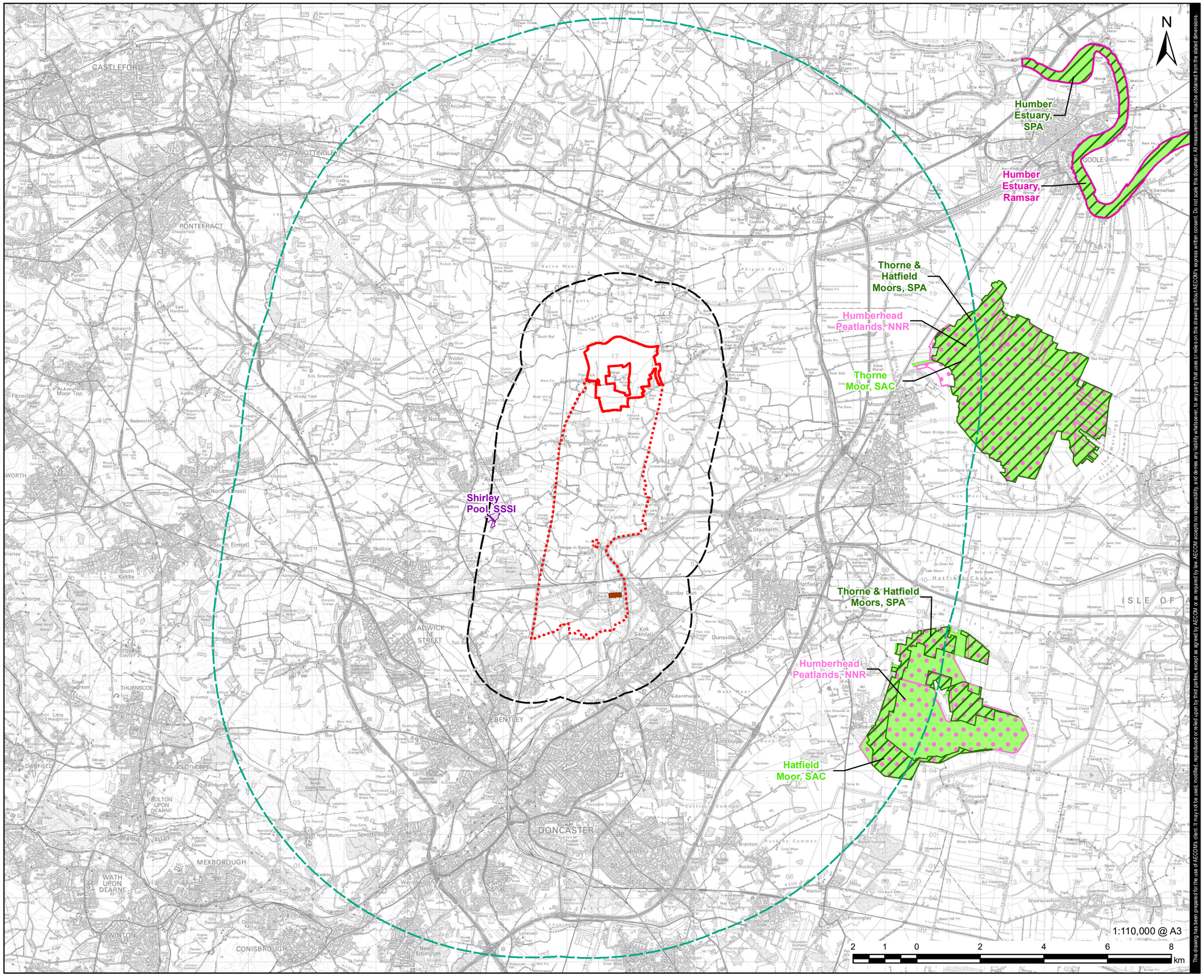

AECOM

PROJECT

Fenwick Solar Farm

CLIENT

Fenwick Solar Project Limited

CONSULTANT

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Midpoint,
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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 10km International Nature Conservation Sites Study Area
- National Nature Conservation Sites Study Area
- Ramsar
- Special Protection Area
- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)

NOTES

Note: Contraints are only labelled up to 10km.

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

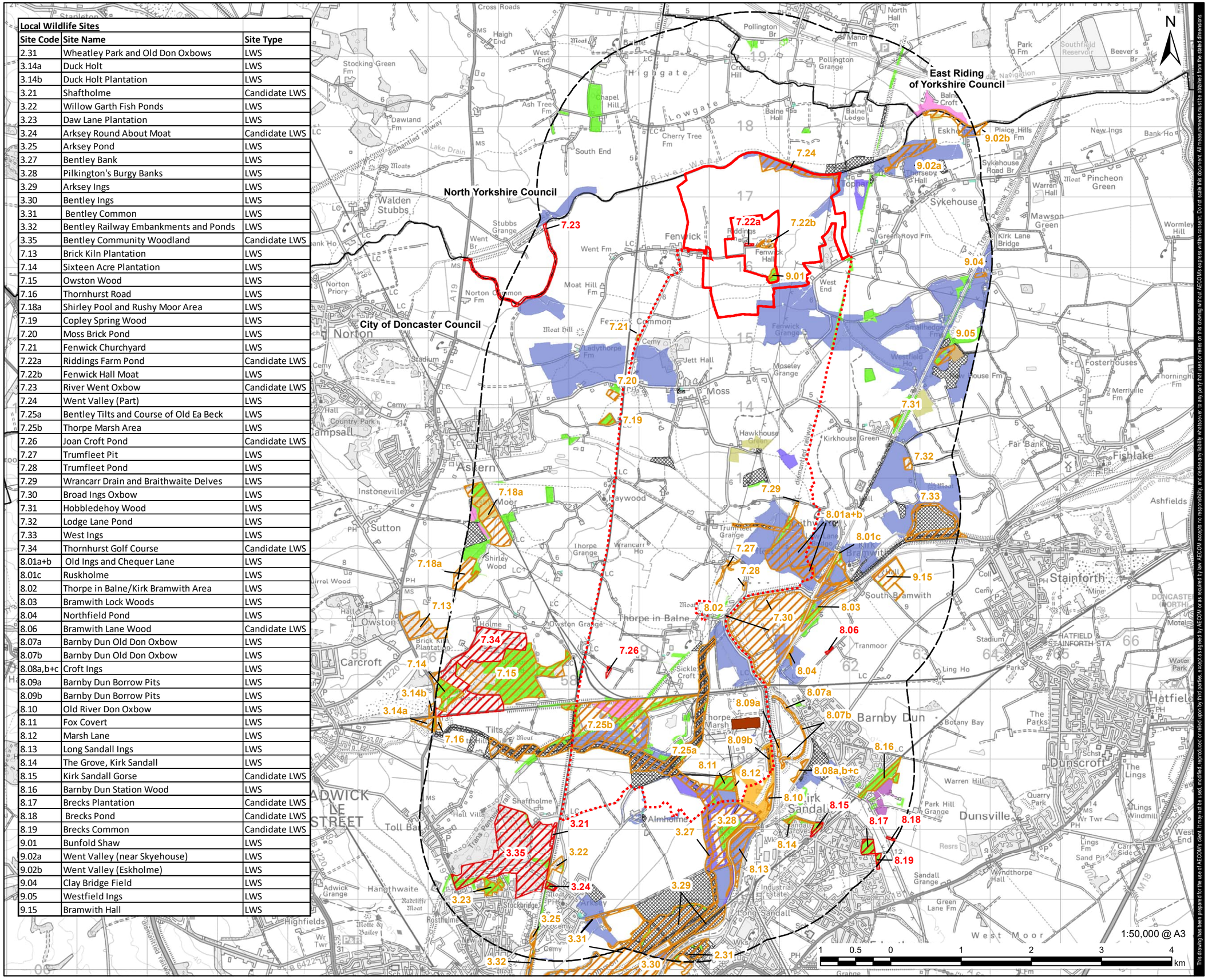
International Sites Designated for Nature Conservation and Other Statutory Designated Sites

FIGURE NUMBER

Figure 8-1

Revision: 01 Drawn: LP Checked: MWH Approved: TN Date: 2023-05-26

Local Wildlife Sites		
Site Code	**Site Name**	**Site Type**
2.31	Wheatley Park and Old Don Oxbows	LWS
3.14a	Duck Holt	LWS
3.14b	Duck Holt Plantation	LWS
3.21	Shafthолme	Candidate LWS
3.22	Willow Garth Fish Ponds	LWS
3.23	Daw Lane Plantation	LWS
3.24	Arksey Round About Moat	Candidate LWS
3.25	Arksey Pond	LWS
3.27	Bentley Bank	LWS
3.28	Pilkington's Burgy Banks	LWS
3.29	Arksey Ings	LWS
3.30	Bentley Ings	LWS
3.31	Bentley Common	LWS
3.32	Bentley Railway Embankments and Ponds	LWS
3.35	Bentley Community Woodland	Candidate LWS
7.13	Brick Kiln Plantation	LWS
7.14	Sixteen Acre Plantation	LWS
7.15	Owston Wood	LWS
7.16	Thornhurst Road	LWS
7.18a	Shirley Pool and Rushy Moor Area	LWS
7.19	Copley Spring Wood	LWS
7.20	Moss Brick Pond	LWS
7.21	Fenwick Churchyard	LWS
7.22a	Riddings Farm Pond	Candidate LWS
7.22b	Fenwick Hall Moat	LWS
7.23	River Went Oxbow	Candidate LWS
7.24	Went Valley (Part)	LWS
7.25a	Bentley Tilts and Course of Old Ea Beck	LWS
7.25b	Thorpe Marsh Area	LWS
7.26	Joan Croft Pond	Candidate LWS
7.27	Trumfleet Pit	LWS
7.28	Trumfleet Pond	LWS
7.29	Wrancarr Drain and Braithwaite Delves	LWS
7.30	Broad Ings Oxbow	LWS
7.31	Hobbledehoy Wood	LWS
7.32	Lodge Lane Pond	LWS
7.33	West Ings	LWS
7.34	Thornhurst Golf Course	Candidate LWS
8.01a+b	Old Ings and Chequer Lane	LWS
8.01c	Ruskholme	LWS
8.02	Thorpe in Balne/Kirk Bramwith Area	LWS
8.03	Bramwith Lock Woods	LWS
8.04	Northfield Pond	LWS
8.06	Bramwith Lane Wood	Candidate LWS
8.07a	Barnby Dun Old Don Oxbow	LWS
8.07b	Barnby Dun Old Don Oxbow	LWS
8.08a,b+c	Croft Ings	LWS
8.09a	Barnby Dun Borrow Pits	LWS
8.09b	Barnby Dun Borrow Pits	LWS
8.10	Old River Don Oxbow	LWS
8.11	Fox Covert	LWS
8.12	Marsh Lane	LWS
8.13	Long Sandall Ings	LWS
8.14	The Grove, Kirk Sandall	LWS
8.15	Kirk Sandall Gorse	Candidate LWS
8.16	Barnby Dun Station Wood	LWS
8.17	Brecks Plantation	Candidate LWS
8.18	Brecks Pond	Candidate LWS
8.19	Brecks Common	Candidate LWS
9.01	Bunfold Shaw	LWS
9.02a	Went Valley (near Skyehouse)	LWS
9.02b	Went Valley (Eskholme)	LWS
9.04	Clay Bridge Field	LWS
9.05	Westfield Ings	LWS
9.15	Bramwith Hall	LWS



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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- 2 km Buffer of the Solar PV Site and Cable Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- Local Authority Boundary

Local Wildlife Sites* (City of Doncaster Council Only)

- Local Wildlife Site (LWS)
- Candidate Local Wildlife Site (LWS)

Priority Habitats

- Coastal and Floodplain Grazing Marsh
- Deciduous Woodland
- Good Quality Semi-improved Grassland
- Lowland Dry Acid Grassland
- Lowland Fens
- Lowland Heathland
- Lowland Meadows
- No Main Habitat But Additional Habitats Present
- Reedbeds
- Traditional Orchard

NOTES

*LWS boundaries are indicative only based upon information available on the City of Doncaster Council public facing Biodiversity Map on 26/04/2023.
NB. Only records within 2km of the Solar PV Site and Grid Connection Corridor Search Area have been captured.

ISSUE PURPOSE

Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Non-Statutory Sites Designated for Nature Conservation

FIGURE NUMBER

Figure 8-2

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9. Water Environment

9.1 Introduction

9.1.1 This chapter relates to the potential effects of the Scheme on the water environment, which includes surface water bodies (e.g. rivers, streams, ditches and canals) and groundwater bodies. Impacts considered cover water quality, water resources, physical changes to hydromorphology and the function of water environment systems, flood risk and drainage. Any impacts on isolated ponds as receptors are included within **Chapter 8: Ecology** of this EIA Scoping Report. This scoping chapter considers the scope for mitigation, and how it is proposed to assess the significance of any identified potential effects.

9.1.2 Where designated ecological sites are sensitive to changes in hydrology or water quality (i.e. where they are 'water dependent') an assessment of the risks to them is considered in this chapter. However, potential impacts from contaminated land on any controlled water (surface or groundwater) is covered in **Chapter 14: Other Environmental Topics** of this EIA Scoping Report. This chapter also includes Appendix C: Water Framework Directive (WFD) Screening Assessment.

9.2 Study Area

9.2.1 A Study Area of 1 km from the Site boundary has been considered in order to identify water features that could reasonably be affected by the Scheme. The 1 km Study Area is based on professional judgement and is an accepted distance for a water environment Study Area. However, given that water quality impacts may propagate downstream, where relevant the assessment also considers a wider Study Area to as far downstream as a potential impact may influence the quality or quantity of the water body (which in this case is typically for a few km). Professional judgement has been applied to identify the extent to which such features are considered. The catchment area drains to the River Don, which is considered the ultimate downstream surface water receptor for the area. This is located approximately 5.5 km downstream to the east of the Study Area.

9.3 Legislation, Planning Policy Context and Guidance

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

Legislation

9.3.2 The main legislation relevant to the water environment assessment includes:

- Environment Act 2021 (Ref 23): enables better environmental protection to be included into law, includes new binding targets for water, which when set will need to be considered by new development that may affect the water environment;

- Water Act 2014 (Ref 103): mainly deals with regulating the impact of water supply on the water environment and the price of water;;
- Floods and Water Management Act 2010 (Ref 104): requires flood management authorities to manage risks in connection with flooding and to prepare Strategic Flood Risk Assessments (SFRAs), which new development must take into account;
- Marine and Coastal Access Act 2009 (Ref 105): introduces a revised system of marine management. Includes requirements for new development to obtain a Marine Licence from the Marine Management Organisation for works below Mean High Water Spring Tide;
- Land Drainage Act 1991 (as amended) (Ref 106) sets out the functions of internal drainage boards (IDBs) and local authorities (as Lead Local Flood Authority (LLFA)) in relation to land drainage of ordinary watercourses. New development wanting to do works that may affect the flow in ordinary watercourse may require a consent from the relevant authority);
- Environmental Protection Act 1990 (Ref 107): brings together pollution prevention and disposal regulations, imposes a duty of care on those involved with any waste stream;
- Water Resources Act 1991 (as amended) (Ref 108): regulates water resources, water quality and pollution and flood defences, which new developments may need to take into account;
- Salmon and Freshwater Fisheries Act 1975 (as amended) (Ref 76): sets out protection for migration routes of salmon and trout;
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 78): implements the EU Water Framework Directive (WFD) in England and Wales requiring new development to not cause deterioration or prevent the improvement of WFD water bodies;
- Environmental Damage (Prevention and Remediation) (England) (Amendment) Regulations 2015 (as amended) (Ref 109): aims to prevent and remediate damage to the environment;
- Environmental Permitting (England and Wales) Regulations 2016, (as amended) (Ref 110): aims to streamline the legislative system for activities in England and Wales including those for construction activities which may pose an alteration of flood risk. New developments that may need to undertake works to a Main River or discharge unclean water, trade or process effluent into a controlled water may need to apply for a permit;
- Building Regulations 2010 (Ref 111), Document Part H: Drainage and Waste Disposal (2010): includes details of foul water drainage requirements both above and below ground;
- Groundwater (England and Wales) Regulations 2009 (Ref 112): aims to prevent the entry into groundwater of any hazardous substances as might be released by, among other things, new developments;

- Flood Risk Regulations 2009 (Ref 113): outlines tasks and responsibilities that regulators are required to follow to implement the EU Flood Directive in England;
- Eels (England and Wales) Regulation 2009 (Ref 77): gives powers to the regulators to implement recovery measures in all freshwater and estuarine waters in England and Wales and for which new developments that could impact eels should take into account;
- Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref 114): sets out the requirements for the storage of oil for quantities over 200 litres, which is relevant to any development that may involve the storage of oil during construction or operation;
- The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 (Ref 115): regulates water resources, water quality and pollution and flood defence and should be taken into account where necessary by any new development;
- The Control of Substances Hazardous to Health (Amendment) Regulations 2004 (Ref 116): requirements to control and manage risks from hazardous substances, such as may be used on construction sites or as part of the operation of new developments;
- The Anti-Pollution Works Regulations 1999 (Ref 117): outlines the contents of any-pollution works notices served under the Water Resources Act 1991; and
- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (Ref 118): includes directions for classification of surface water and groundwater bodies for which new developments must consider as part of any WFD Assessment.

National Planning and Other Policy

9.3.3 The following planning policies have been taken into account as part of defining the water environment assessment methodology, receptor selection, receptor importance and sensitivity, potential significant environmental effects, and scope for mitigation:

- NPS EN-1 (Ref 5) with particular reference to Section 5.15 Water Quality and Resources, paragraph 5.15.5 and paragraph 5.15.6. The SoS needs to satisfy themselves that a development proposal has regard to the River Basin Management Plans (RBMPs) and meets the requirement of the WFD (including Article 4.7 of the Directive as transposed in England). Also, there is particular reference to Section 5.7 Flood Risk. The draft EN-1 (Ref 8) reiterates the points raised in NPS EN-1 relating to surface water and flood risk;
- Paragraph 5.7.4 of NPS EN-1 (Ref 5) states that a site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3. For Flood Zone 1, an assessment is required where the site is greater than 1 ha, as is the case with regard to the Scheme. Details of the contents required within the flood risk assessment are detailed in paragraph 5.7.5. The use of mitigation for surface water runoff should include the use of Sustainable Drainage Systems (SuDS) as detailed in

paragraph 5.7.10. NPS EN-1 (Ref 5) also includes a section on water quality and resources, namely Section 5.15. This states that applications need to undertake assessment of the existing status of water quality/ resources/ physical characteristics of the water environment. The draft EN-1 (Ref 8) reiterates the assessment requirements including how this might change due to the impact of climate change on rainfall patterns and consequent water availability. Applicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging;

- NPS EN-3 (Ref 6) highlights the importance of considering potential impacts on water quality, water resources and flood risk, taking into account climate change;
- The draft EN-3 (Ref 9) includes a specific section on solar developments. Of particular note is paragraph 3.10.76 which contains the requirement that where access tracks are needed, permeable tracks should be used, and localised SuDS should be used to control runoff. Paragraph 3.10.78 states that culverting existing watercourses/ drainage ditches should be avoided. When this is unavoidable, it should be demonstrated that no reasonable alternatives exist and where necessary it will only be for the construction period;
- NPS EN-5 (Ref 7), with particular reference to Section 2.3: Climate Change Adaptation;
- Draft NPS EN-5 (Ref 10) includes sections on climate change adaptation and the resilience of infrastructure to climate change; and
- NPPF (Ref 13). Within the NPPF, particular reference is given to paragraphs 8 (a and b), 20(b), 149, 155-165 in relation to flood risk and paragraphs 8(c), 20(d), 149, and 174 (e) regarding water quality.

9.3.4 Consideration will also be given to:

- UK Government Environmental Improvement Plan 2023 (Ref 17);
- UK Government's Plan for Water: Our Integrated Approach to Delivery Clean and Plentiful Water 2023 (Ref. 248);
- UK Government's 25 Year Environment Plan (Ref 16);
- The UK Government's Future Water Strategy (2011) (Ref 119); and
- Non-statutory technical standards for SuDS (Ref 120);
- BRE Digest 365: Soakaway Design and Sewers for Adoption (7th Edition, 2012) (Ref 22).

National Guidance

9.3.5 The National Planning Policy Guidance (NPPG) (Ref 121) provides guidance for local planning authorities on assessing the significance of water environment effects of proposed developments.

9.3.6 The NPPF (Ref 13) and the Flood Risk and Coastal Change NPPG (Ref 121) recommends that Local Plans should be supported by a SFRA and should develop policies to manage flood risk from all sources taking account

of advice from the EA and other relevant flood risk management bodies, such as LLFAs and IDBs.

9.3.7 The EA provides their current guidance/ position statements on the approach to protection of groundwater. This includes: Position Statement A (Risk Based Approach); Position Statement B (Protection of Water Intended for Human Consumption), Position Statement G (Discharge of Liquid Effluents into the Ground); and Position Statement N (Groundwater Resources and Abstraction) (Ref 122).

Regional Policy

9.3.8 At a regional level, water management is coordinated through 10 RBMPs. Each RBMP is prepared by the EA for six-year cycles and set out how organisations, stakeholders and communities will work together to improve the water environment. The water bodies within the Study Area fall under the Humber RBMP (Ref 124). The most recent plan was published in 2022, and will remain in place until 2027. These set legally binding locally specific environmental objectives, and contain the current WFD status of the water bodies in the area. More information on these is included in the baseline technical assessment of this chapter.

Local Planning Policy

9.3.9 The following local planning policies are of relevance to the water environment.

City of Doncaster Council

9.3.10 The following policies from the Doncaster Local Plan 2015-2035 (Ref 14), adopted in September 2021 are of relevance to the water environment assessment:

- Policy 1: Settlement Hierarchy (Strategic Policy), Part E, paragraph 7 Flood Risk states the need to consider the current and future challenges arising from having large areas at risk of flooding, and the need to apply national policy and guidance, including the flood risk Sequential Test and (where necessary) Exception Tests;
- Policy 33: Landscape (Strategic Policy), Part E highlights that development will be permitted provided that it conserves, enhances and, where possible, restores the special qualities of rivers, waterways, wetlands and their surroundings;
- Policy 54: Pollution, Part D states that during planning applications particular consideration will be given to any adverse effects on the quantity, quality and ecology features of water bodies and groundwater resources, including contamination to Source Protection Zones (SPZs);
- Policy 55: Contamination and Unstable Land, Part A states that development on land that is unstable, currently contaminated or suspected of being contaminated due to its previous history or geology, or that will potentially become contaminated as a result of the development, require a Preliminary Risk Assessment (PRA) to demonstrate the development does not cause significant harm, or risk of

significant harm, to human health, or land, natural environment, pollution of soil or any watercourse or groundwater;

- Policy 56: Drainage states that development sites must incorporate satisfactory measures for dealing with their drainage impacts to ensure wastewater and surface water run-off are managed appropriately and to reduce flood risk to existing communities;
- Policy 57: Flood Risk Management Parts A-D relate to flood risk and sets out the planning policies that applications for planning permission will be tested against;
- Policy 60: Protecting and Enhancing Doncaster's Soil and Water Resources, Parts E and F state that proposals will be expected to comply with making positive progress towards achieving 'good' status or potential under the WFD in surface and groundwater bodies, and also promote water efficiency measures which take account of current water availability and future demand. Proposals will not be supported which would have an adverse impact on the ecological status or recreational value of rivers and other water bodies such as flood storage areas; and/or lead to the deterioration in the quality of surface and groundwaters; and/or lead to a reduction in groundwater levels (or reduced flows in watercourses).

Guidance Documents

9.3.11 The following guidance is relevant to the water environment assessment.

Connected by Water Action Plan (Ref 125)

9.3.12 The Study Area is located within the boundary of the City of Doncaster metropolitan borough. The City of Doncaster Council and various stakeholders published the Connected by Water Action Plan in January 2023 (Ref 125), which proposes actions covering flood risk such as the Doncaster Borough Wide Surface Water Alleviation Scheme.

Yorkshire and Humber Business Plan 2020/2021 (Ref 126)

9.3.13 The City of Doncaster Council is a member of the Yorkshire Leaders Board, and the Study Area is located within land included in the Yorkshire and Humber Business Plan 2020/21. The Yorkshire Leaders Board has identified flooding as a priority area in the Yorkshire and Humber Business Plan 2020/21, and published the Yorkshire and Humber Flood Resilience Forum 2022, which aims to support the integration of flood resilience into wider strategy and policy (Ref 127).

9.3.14 The Don Catchment Flood Management Plan (Ref 128) that covers the Study Area considers all types of inland flooding and sets policies for managing flood risk within the catchment. The policy that covers the Study Area is: *"Areas of moderate to high flood risk where we can generally take further action to reduce flood risk"*.

Strategic Flood Risk Assessment

9.3.15 A SFRA is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the

future, taking account of the impacts of climate change, and to assess the impact that land use changes and development in the area will have on flood risk.

9.3.16 The following Doncaster Metropolitan Borough Council Level 1 SFRA (November 2015) (Ref 129) is available for the Study Area, which is located in the administrative area of the City of Doncaster Council and will be reviewed in full in the ES.

9.3.17 The Doncaster Metropolitan Borough Council SFRA (Ref 129) states that the majority of fluvial flood risk in the Council area comes from River Don and its tributaries to the north of Doncaster. The south-east section of the Grid Connection Corridor Search Area is at risk of flooding from the River Don.

9.3.18 The Flood Zone mapping in the SFRA differentiates between Flood Zone 3a and Flood Zone 3b, which is functional floodplain. The sections of the Site in Flood Zone 3b are located within the northern section of the PV Solar Site (functional floodplain of the River Went), and the south-eastern section of the Grid Connection Corridor Search Area (functional floodplain of River Don).

9.4 Consultation

9.4.1 No formal consultation has been carried out at this stage in the assessment process. A Freedom of Information Request has been submitted to the EA to obtain baseline information to inform the water environment assessment. The request included water quality, resources (pollution incidents), licenced and unlicenced (private) water abstractions, and water activity permits (i.e. consented discharges), hydrogeology (e.g. groundwater levels), WFD data and flooding data. This information has not yet been received at the time of writing.

9.4.2 Consultation will be held with the local IDBs, LLFAs and the EA as the Scheme design progresses to ensure the ongoing water environment assessment has a robust scope and methodology. The Local Planning Authority, City of Doncaster Council, will also be contacted for details of any private water supplies (PWS).

9.5 Baseline Conditions

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

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

- Online Ordnance Survey (OS) maps viewed to identify any surface water features within 1 km of the Scheme (Ref 130);
- Online aerial photography (Ref 131);
- Part 1: Humber River Basin District RBMP (Ref 124);
- EA Catchment Data Explorer website (Ref 132);

- National Soil Resources Institute Soilscapes website (Ref 133);
- MAGIC map website (Ref 83);
- BGS Geoindex website (Ref 65);
- Met Office website (Ref 134);
- BGS Borehole and Geology Mapping (Ref 135);
- EA Public Registers website – Environmental Permitting Regulations – Discharges to water and groundwater (Ref 136); and
- EA Online Interactive Maps:
  - Flood map for planning (rivers and sea)(Ref 137);
  - Risk of flooding from surface water (Ref 138);
  - Risk of flooding from reservoirs (Ref 138); and
  - Flood warning areas and risk (Ref 138).

9.5.3 Where relevant, water features and their attributes have been presented in a series of figures that support this chapter. Figure 9-1 presents details of the surface water environment, Figure 9-2 the groundwater environment, Figure 9-3 shows EA flood zones (including the location of flood defences and areas benefitting from flood defences), whilst Figure 9-4 shows surface water flood risk.

9.5.4 Further review of existing geological plans, hydrogeological data and site investigation data will be carried out to provide an assessment of local ground and groundwater conditions. Summarised data will be recorded and provided within a FRA and will be used to inform the Surface Water Drainage Strategy. The FRA and Surface Water Drainage Strategy will form a technical appendix to the ES and comply with the requirements set out in Section 9.3.

9.5.5 In addition, further information and data will be obtained from the EA and local councils (as identified within Section 9.4), whilst a general walkover and hydromorphological survey of the Site will be undertaken.

Topography, Land Use, Climate and Geology

9.5.6 This section sets out the topography, land use, climate and geology for the Solar PV Site and Grid Connection Corridor Search Area. The Existing National Grid Thorpe Marsh Substation is located within the Grid Connection Corridor Search Area.

Solar PV Site

9.5.7 The topography of the area is relatively flat, with existing ground levels under 10 m Above Ordnance Datum (AOD) according to online OS mapping (Ref 130). There are flood plains associated with:

- The River Went, a Main River, flowing from west to the east, discharging into the River Don; and
- Fenwick Common Drain, transforming into Fleet Drain, which discharges into the River Went at the north-eastern border of the Site.

9.5.8 In addition, there are numerous other Ordinary Watercourses within the Study Area that fall under the jurisdiction of the LLFA, the City of Doncaster Council, or Danwm IDB. These watercourses drain surface water from the surrounding agricultural areas.

9.5.9 The area is currently used mainly for agriculture, with a mosaic of agricultural fields. There are several small villages, hamlets and farms located throughout the Study Area.

9.5.10 Based on the Meteorological Office website (Ref 134), the nearest weather station is located in Robin Hood Doncaster Sheffield Airport, approximately 17 km southeast of Fenwick. Using data from this weather station, for the period 1991 to 2020, it is estimated that the Study Area experiences approximately 582 mm of rainfall per year, with it raining more than 1 mm on approximately 113 days per year, which are both low in the UK context. This is relevant to the whole Study Area.

9.5.11 The bedrock and superficial geology for the Study Area is identified by the BGS GeoIndex online mapping (Ref 65). The Solar PV Site is wholly underlain by the Sherwood Sandstone Group. The Sherwood Sandstone Group comprises of sandstones and pebbly sandstones deposited in the Triassic Era. Overlying the bedrock geology, there are several superficial strata identified. The majority of the Solar PV Site is underlain by the Hemingbrough Glaciolacustrine Formation comprising laminated clays, silts and sands. Pockets of Breighton Sand Formation are present across the Solar PV Site. Alluvium deposits associated with the watercourses, in particular, along the alignment of the River Went along the northern boundary of the Solar PV Site. The Solar PV Site (and the Grid Connection Corridor Search Area) are within the Nottingham Coal Mining Report Area (Ref 139).

9.5.12 The Study Area is mostly underlain by slowly permeable seasonally wet, loamy and clayey soils with naturally high groundwater and poor drainage characteristics (Ref 65).

Grid Connection Corridor Search Area

9.5.13 The topography of the Grid Connection Corridor Search Area is mostly similar as the Solar PV Site as detailed above; existing ground levels are under 10 m AOD according to online OS mapping (Ref 130). There are areas of slightly higher elevation at Bentley Community Woodland (31 m AOD) to the southwest of the Grid Connection Corridor Search Area, and at Thorpe Marsh Nature Reserve (11 to 14 m AOD). There are floodplains and flood storage areas associated with The River Don, flowing southwest to northeast, adjacent to the Grid Connection Corridor Search Area boundary.

9.5.14 The climate and land use within the Grid Connection Corridor Search Area are the same as for the Solar PV Site as described above.

9.5.15 Within the Grid Connection Corridor Search Area there are floodplains associated with numerous ordinary watercourses and two Main Rivers:

- The River Don, which joins the River Ouse at Goole; and

- Smallholm and Tilts Drains, which becomes Thorpe Marsh Drain and discharges into the River Don on the southern part of the Study Area.

9.5.16 Ordinary watercourses include Clay Dike, a tributary which rises within the Study Area and flows east. This is part of the Don from Mill Dyke to River Ouse waterbody.

9.5.17 The northern part of the Grid Connection Corridor Search Area is underlain by the Sherwood Sandstone Group, while the southern section is underlain by the Chester Formation. The Chester Formation is composed of sandstone and pebbly gravel. The BGS map indicates that the Roxby Formation comprising calcareous mudstone underlies a small part of the southern end of the Grid Connection Corridor Search Area. Similar to the Solar PV Site, the bedrock is overlain by superficial deposits comprising the Hemingbrough Glaciolacustrine Formation with pockets of Breighton Sand Formation. There is a large deposit of peat to the west of the Grid Connection Corridor Search Area. Alluvium deposits are present along the River Don valley in the eastern part of the Grid Connection Corridor Search Area. River Terrace Deposits are mapped to the south and east of the Grid Connection Corridor Search Area. To the immediate east of the River Don, pockets of Glaciofluvial, River Terrace, Till and Head deposits composed of clay, silt, sand and gravel are mapped.

9.5.18 Similar to the Solar PV Site, the Grid Connection Corridor Search Area is mostly underlain by slowly permeable seasonally wet, loamy and clayey soils with naturally high groundwater and poor drainage characteristics. There are also layers of freely draining slightly acidic sandy soils that are located to the east of the River Don (Ref 65).

Flood Risk from all Sources

9.5.19 Section 14 of the NPPF (Ref 13) and the 2022 Flood Risk and Coastal Change NPPG (Ref 121) both advise how the planning process can take account of the risks associated with flooding. The main sources of flooding that are used to steer development at the planning stage are Main Rivers and the sea. The predicted flood risk from these sources are shown on the EA's Fluvial and Coastal Flood Map, also known as the Flood Map for Planning which outlines three main zones of risk as follows:

- **Flood Zone 1 'low probability of flooding':** This zone comprises land assessed as having a less than 1 in 1,000 chance of river or sea flooding in any year (<0.1% annual exceedance probability (AEP));
- **Flood Zone 2 'medium probability of flooding':** This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 chance of river flooding in any year (1% - 0.1% AEP), or between a 1 in 200 and 1 in 1,000 chance of sea flooding in any year (0.5% - 0.1% AEP);
- **Flood Zone 3a 'high probability of flooding':** This zone comprises land assessed as having a 1 in 100 year or greater chance of river flooding in any year (>1% AEP), or a 1 in 200 year or greater chance of flooding from the sea in any year (0.5% AEP); and
- **Flood Zone 3b 'functional floodplain':** A sub-part of Zone 3, this zone comprises of land having an annual probability of 1 in 30 (greater than

3.3% AEP) of flooding, with existing flood risk management features and structures operating effectively, or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). This zone is not usually included within the EA Flood Map for Planning (Ref 137) and is calculated where necessary during detailed hydraulic modelling.

9.5.20 The NPPF outlines what development is suitable within each Flood Zone based upon the level of vulnerability of the development which is shown in Table 9-1. The vulnerability classifications suggest the Scheme is considered to be 'Essential Infrastructure'.

Table 9-1: Flood Risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception Test Required	✓	✓
Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
Zone 3b	Exception Test Required	✓	✗	✗	✗

9.5.21 In accordance with Table 9-1, the construction of Essential Infrastructure is permitted in Flood Zones 1, 2 and an Exception Test is required for Flood Zones 3a and 3b and will be undertaken as part of the FRA. As well as fluvial and tidal flooding, it is also necessary to consider flood risk from all other sources, including surface water, groundwater, Ordinary Watercourses, artificial drainage systems and infrastructure failure.

9.5.22 The flood risk for the Scheme from all sources is summarised in Table 9-2 and shown in Figure 9-3 and Figure 9-4.

Table 9-2: Solar PV Site – Flood Risk from All Sources

Flood Risk Sources	Comments
Tidal/ Fluvial	The Solar PV Site is located inland a considerable distance from the sea or tidally influenced rivers, such that the risk of tidal flooding is considered to be low. For fluvial flooding, all four field boundaries (North West, North East, South West and South East, see Figure 2-2) are located partially within Flood Zones 1, 2 and 3. The flood risk extent for field boundary North West is associated with River Went (Main River). The flood risk extent for the field boundary North East is associated with River Went and Fleet Drain (Ordinary Watercourse), whilst the flood risk extent for South West and South East are associated with Fleet Drain only. The four field boundaries are located in areas that benefit from flood defences, namely: the southern part of North East, the northern part of North West and North East, the southern part of South West and across the South East. The following plots are located entirely within Flood Zone 1: Plots NW3, NW4, NW7 and NW8, and plot SW1. The following plots are located partially within Flood Zone 1 and partially within Flood Zone 2: Plots NW2, NW6, NW10, plots NE3, NE6, NE7, plot SE6 and plots SW2 and SW4.
Surface Water	The risk of surface water flooding within the Solar PV Site is generally very low to low. There are isolated areas at low, medium and high risk of flooding, however, these areas are likely associated with areas of low topography where surface water sits and pools rather than draining away, or show areas at risk of flooding from smaller ordinary watercourses and/or local land drains. High risk means that the area has a chance of flooding of greater than 3.3% each year, and medium risk means that the area has a chance of flooding of between 1% and 3.3% each year. Low risk means that the area has a chance of flooding of between 0.1% and 1% each year, and very low risk means that the area has a chance of flooding of less than 0.1% each year.
Groundwater	Based on the Areas Susceptible to Groundwater Flooding Map in the Doncaster Metropolitan Borough Council SFRA (Ref 129) the Solar PV Site is located in an area shown not to be at risk of groundwater flooding.
Sewers	The Solar PV Site is located in predominantly rural areas, however where a plot is located adjacent to a highway/ settlement there is potential for flooding from sewer sources.

Flood Risk Sources	Comments
Reservoirs	At risk: the field sections North West and South West are partially located in an area at risk of flooding should a reservoir failure occur when river levels are high. The field sections North East and South East are entirely located in an area at risk of flooding should a reservoir failure occur when river levels are high.

Table 9-3: Grid Connection Corridor Search Area – Flood Risk from All Sources

Flood Risk Source	Comments
Tidal/Fluvial	The Grid Connection Corridor Search Area is located inland a considerable distance from the sea, such that the risk of tidal flooding is considered to be low. For fluvial flooding, the northern section of the Grid Connection Corridor Search Area is predominantly located within the Flood Zone 2 and Flood Zone 3, associated with River Don. The area in Flood Zone 3 at the northern section of the Grid Connection Corridor Search Area predominantly benefits from flood defences. The southern section of the Grid Connection Corridor Search Area is predominantly located within the Flood Zone 3 extents associated with the River Don.
Surface Water	There are isolated areas at low, medium and high risk of surface water flooding, however, these areas are likely to be associated with areas of low topography where surface water sits and pools rather than draining away, or show areas at risk of flooding from smaller ordinary watercourses and/or local land drains.
Groundwater	The Grid Connection Corridor Search Area is predominantly located in an area shown not to be at risk of groundwater flooding. There is an area to the south of the Grid Connection Corridor Search Area shown on the Areas Susceptible to Groundwater Flooding Map in the Doncaster Metropolitan Borough Council SFRA (Ref 129) to be more susceptible to groundwater flooding (less than 75% susceptible to groundwater flooding).
Sewers	The Grid Connection Corridor Search Area is located in a predominantly rural location, however, where the route crosses a highway or in proximity to a settlement there is potential for flooding from sewer sources.
Reservoirs	The Grid Connection Corridor Search Area is located in an area at risk of flooding should failure of a reservoir occur when river levels are high.

Surface Water Features

9.5.23 Main Rivers are defined according to criteria set under the Water Resources Act 1991 (Ref 108) as usually larger rivers and streams with a potentially significant flood risk associated with them. There are three Main Rivers within the Study Areas of the Solar PV site and the Grid Connection Corridor Search Area, for which the EA is the regulating authority. These are the River Went, River Don and Smallholme and Tilts Drain (which leads to Thorpe Marsh Drain). The River Went (which discharges to the River Don at Selby Road outside of the Solar PV Site and Study Area) flows adjacent to the Solar PV Site boundary in the north. The River Don and Smallholme and Title Drain (which leads to Thorpe Marsh Drain) are located in the Study Area of the Grid Connection Corridor Search Area, to the south. Further commentary on these watercourses is presented below under the Solar PV Site and Grid Connection Corridor Search Area headings.

9.5.24 In addition, there are numerous Ordinary Watercourses within the Study Area. The LLFA (the City of Doncaster Council) is the regulating authority for these, other than those that are IDB drains (under the jurisdiction of the Danwm IDB).

Solar PV Site

9.5.25 The Solar PV Site boundary runs adjacent to the River Went (Main River) at the northern end of the Solar PV Site. The River Went flows in an easterly direction, towards the confluence with the River Don (Main River) at Selby Road, outside of the Study Area. Multiple agricultural ditches drain into the River Went from the north and south, within the Solar PV Site and the 1 km Study Area. The nearest gauging station is located upstream of the Study Area (approximately 3.5 km) at Walden Stubbs - this is shown on Figure 9-1. The daily mean flow is 0.576 cubic metres per second (m^3/sec), with a flow that is exceeded 95% of the time (Q95) of 0.164 m^3/sec (Ref 140). Therefore, the flow in the area of the Site would be expected to be higher than the gauged flow. Sections of the River Went, particularly where it interacts with the Solar PV Site and downstream of the 1 km Study Area appear to be overly straight and have likely been modified. Information on the WFD designation of River Went is given the WFD section below.

9.5.26 Fenwick Common Drain (Ordinary Watercourse) flows through the Solar PV Site, in an east and northeast direction, as shown on Figure 9-1. It crosses the Solar PV Site boundary between Haggs Lane and Lawn Lane and flows east for approximately 1 km before flowing north, around Bunfold Shaw towards Fleet Drain. Much of the Fenwick Common Drain banks within the Solar PV Site appears, from aerial photography, to be made up of dense trees and hedgerows until after Bunfold Shaw where the banks appear much sparser and homogenous. Fenwick Common Drain is overly straight (following agricultural field boundaries) and heavily modified with a trapezoidal channel, although, past Bunfold Shaw and until it becomes Fleet Drain, the watercourse meanders and appears less modified. There are no gauging stations on Fenwick Common Drain.

9.5.27 Fleet Drain (Ordinary Watercourse) is located within the Solar PV Site boundary, and flows northeast until flowing directly north towards its

confluence with the River Went (west of Topham Ferry Lane). An unnamed drainage ditch flows east past Riddings Farm and Fenwick Hall, and flows into Fleet Drain at NGR SE 61224 16460. Similarly, further downstream, another unnamed drainage ditch flows into Fleet Drain at NGR SE 61661 16938. Fleet Drain is an overly straight and heavily modified drain. There are no gauging stations on Fleet Drain.

9.5.28 There are multiple other smaller unnamed agricultural ditches and drains located within the Solar PV Site boundary, which are likely to drain to the surface water features. Further detail on their characteristic and hydrological connectivity will be determined during a site visit and reported in the ES.

9.5.29 Clay Dike (Ordinary Watercourse) is located within the 1 km Study Area of the Solar PV Site, and is located to the southeast corner of the Solar PV Site boundary. Clay Dike appears to flow east, away from the Solar PV Site towards Blackshaw Dike before eventually draining to the River Don.

9.5.30 Ell Wood and Fenwick Grange Drain (Ordinary Watercourse) flows in an easterly direction, beginning north of Moss at the southwest corner of the Solar PV Site 1 km Study Area, as shown on Figure 9-1. This drain continues to flow east, north of Moseley House Farm towards Flashley Carr Lane. It is not clear where this drain flows to outside of the 1 km Study Area for the Solar PV Site, although it is possible that it flows south, into Flashley Carr Drain, leading to Braithwaite Town Drain and Bramwith Drain. The flow direction and connectivity of water features will be determined and reported in the ES through walkover surveys of the area.

9.5.31 There are multiple ponds located both within the Solar PV Site Study Area, including:

- Pond at West Cottage End (west of Flashley Carr Lane) at NGR SE 61458 15774 is located just outside the Solar PV Site boundary in the southeast;
- Ponds at Bungalow Farm, north of West Lane at NGR SE 61768 16250 and SE 61648 16424 are just outside the eastern side of the Solar PV Site boundary;
- Ponds south of the River Went near to Topham at NGR SE 62153 17114 and SE 61984 17121 are located to the west of the Solar PV Site boundary, approximately 0.25 km and 0.075 km west respectively;
- Ponds north of River Went near to Topham at NGR SE 62051 17477 and SE 61809 17367 are located outside of the Solar PV Site boundary. One is located approximately 0.02 km north and the other approximately 0.16 km north of the Solar PV Site boundary; and
- Ponds at Riddings Farm at NGR SE 60543 16317 are located centrally approximately 0.12 km outside of the Solar PV Site boundary.

Grid Connection Corridor Search Area

9.5.32 Within the Grid Connection Corridor Search Area, there are many surface water features including Main Rivers, Ordinary Watercourses and ponds in addition to the surface water features identified for the Solar PV Site.

9.5.33 River Don (Main River) and River Don Navigation enter the Study Area in the south, and flow in a northerly direction; the River Don flows adjacent to the east side of the Grid Connection Corridor Search Area boundary for approximately 2.5 km before crossing the River Don Navigation near Kirk Bramwith and continuing northeast. The River Don Navigation also flows northeast through the Study Area, past Kirk Bramwith towards the Aire and Calder Navigation.

9.5.34 Smallholme and Tilts Drain (Main River) enters the Study Area and Grid Connection Corridor Search Area in the south west, and flows west to east before it becomes Thorpe Marsh Drain (Main River). It then continues to flow across the Grid Connection Corridor Search Area into the River Don (located in the Grid Connection Corridor Search Area Study Area). Cockshaw Dike (Ordinary Watercourse) drains into the Smallholme and Tilts Drain within the Grid Connection Corridor Search Area.

9.5.35 The following Ordinary Watercourses are located within the Grid Connection Corridor Search Area, or within the associated Study Area:

- Fur Water Drain located in the south is a tributary of the River Don;
- Bentley and Arksey Common Drain located in the south flows east and north before draining to Thorpe Marsh Drain;
- Cockshaw Drain located on the western side of the Grid Connection Corridor Search Area Study Area becomes Side Cutting Drain which flows adjacent to the Transpennine Express railway line;
- Green Dike located in the northeast flows west towards the Grid Connection Corridor Search Area, and becomes Clay Dike;
- Flashley Carr Drain becomes Braithewaite Drain before flowing south into Wrancarr Drain;
- Mill Dike located centrally flows west to east into Wrancarr Drain;
- Carrs Drain located centrally flows west to east adjacent to Mill Dike until it flows into Wrancarr Drain;
- Thistle Golt flows parallel (approximately 0.25 km to the south) to Mill Dike; within the Grid Connection Corridor Search Area and Study Area;
- Hayward and Trumfleet Drain flows parallel (approximately 0.3 km to the south) to Thistle Golt within the Grid Connection Corridor Search Area and Study Area;
- Tranmoor Drain (located to the south east of the Grid Connection Corridor Search Area Study Area) flows northwest into River Don Navigation south of Low Lane; and
- Engine Dike flows north within the Grid Connection Corridor Search Area and then northeast towards Kirk Bramwith, where it becomes Kirk Bramwith New Cut within the Grid Connection Corridor Search Area Study Area.

Hydromorphology

9.5.36 The River Went within the Study Area is designated as the Went from Blowell Drain to the River Don WFD water body, which is classified as heavily modified for its hydromorphological designation. The River Went itself flows from west to east across the northern boundary of the Solar PV Site. Geology mapping shows the River Went to possess a wide corridor of alluvium deposits that indicate the extent to which the river may have previously meandered across the floodplain. As stated earlier, the soils within the area local to the river are slowly permeable, seasonally wet, slightly acid, but base-rich loamy and clayey, of moderate fertility and indicative of areas of grassland and woodland, though arable and agriculture is the prevailing land use. Some sections of the River Went appear overly straight and have likely been modified, though any such modification will have been undertaken prior to 1900 as historic mapping shows no changes in the River Went's course since this date.

9.5.37 The watercourses within the Study Area found within the Don from Mill Dyke to River Ouse water body consists of the artificial drainage channel Smallhedge Rein, which is a tributary of the River Don. Superficial geology deposits underlying the channel are clay and silt rather than alluvium and so suggest the channel has no history of actively meandering across its floodplain, unlike the River Went. Soils within the area local to the river are slowly permeable, seasonally wet, slightly acid, but base-rich loamy and clayey, of moderate fertility and indicative of areas of grassland and woodland, though arable and agriculture is the prevailing land use. The watercourse drains between a series of agricultural fields on both banks and has followed its present course since at least 1900, with historic mapping showing no change in the drains course since this date.

9.5.38 The Bramwith Drain from Source to River Don water body underlies much of the Grid Connection Corridor Search Area, with a series of drains running across it. The water body is classified as artificial for hydromorphological designation as the watercourses are embanked and artificial drainage channels. As with Smallhedge Drain, the channels are aligned along the boundaries of agricultural fields and so will collect runoff which they will drain to the River Don to the east, with no modification to their alignment for over a century. Soils are slowly permeable, seasonally wet, slightly acid, but base-rich, loamy, and clayey with impeded drainage and moderate fertility. Towards the downstream end, where Bramwith drain enters the River Don, there are superficial alluvium deposits, but these are likely a result of the meandering nature of the River Don rather than the watercourses within the Study Area, which are instead associated with clay and silt.

9.5.39 The Ea Beck from the Skell to River Don water body forms the southern tip of the Grid Connection Corridor Search Area. The main watercourse, Thorpe Marsh Drain, flows northwards past the Existing National Grid Thorpe Marsh Substation to its confluence with the River Don. The channel is highly embanked, modified, and artificial and its hydromorphological designation is classed as 'heavily modified'. The channel appears unmoved from its pre-1900 alignment, which is between a series of agricultural fields. Soils within the water body are the same as stated earlier in paragraph 9.5.32. Away

from the alluvium corridor associated with the River Don, superficial geology deposits consist of clay and silt.

WFD Classification

9.5.40 The present (Cycle 3, 2019) WFD classifications of the surface water bodies underlying the Study Area are given in Table 9-4, as identified through the WFD screening assessment included as Appendix C: Water Framework Directive (WFD) Screening Assessment.

9.5.41 There are also two groundwater bodies, Idle Torne - PT (Permo-Triassic) Sandstone Nottinghamshire & Doncaster and Aire & Don Sherwood Sandstone, which are discussed under Hydrogeology and Groundwater.

Table 9-4: WFD Classification (2019 data) for WFD Surface Water Bodies Underlying the Study Area

Classification Item	Went from Blowell Drain to the River Don	Don form Mill Dyke to River Ouse	Bramwith Drain from Source to River Don	Ea Beck from the Skell to River Don
Water Body ID	GB104027064260	GB104027064243	GB104027063290	GB104027057591
Hydromorphological designation	Heavily modified	Artificial	Artificial	Heavily modified
Ecological	Moderate	Moderate	Moderate	Moderate
Biological quality elements	Poor	Poor	Good	Poor
Physico-chemical quality elements	Moderate	Moderate	Moderate	Moderate
Hydromorphological Supporting Elements	Supports good	Supports good	Supports good	Supports good
Hydrological Regime	Supports good	Supports good	High	Supports good
Supporting elements (Surface Water)	Moderate	Moderate	Good	Moderate
Mitigation Measures Assessment	Moderate or less	Moderate or less	Good	Moderate or less
Specific pollutants	High	High	Not given	High
Chemical	Fail	Fail	Fail	Fail
Priority hazardous substances	Fail	Fail	Fail	Fail
Priority substances	Good	Fail	Good	Good
Other pollutants	Does not require assessment	Good	Good	Good

Water Quality

9.5.42 This section sets out the baseline water quality conditions at the Site.

Solar PV Site

9.5.43 Water quality data for the River Went has been interrogated from the EA's Water Quality Archive website (Ref 141). Within the Solar PV Site and associated Study Area, there is one water quality sampling location on the River Went, at Topham Ferry Bridge, shown in Figure 9-1. This sample location is located less than 100 m downstream of the Site. Further upstream (outside of the Study Area, approximately 3 km upstream of the Site) there is the Went at A19 Askern sampling location, and further downstream (outside of the Study Area, approximately 5.5 km downstream of the Site) there is the Went at Sykehouse sampling location.

9.5.44 The water quality within the River Went (averaged across all three sampling locations) is slightly alkaline to circum-neutral in nature with an average pH of 7.95, but falls within the WFD high classification. A 10th percentile dissolved oxygen saturation from all three sites of 71.02 % is within the High WFD classification (with 70% being high). There has been no monitoring of Biochemical Oxygen Demand (BOD) in the last few years of data. Ammonia levels are on average 0.12 mg/l, which is within the High WFD Classification (with 0.3 mg/l or less being High).

9.5.45 Nitrate and orthophosphate values are somewhat elevated in the River Went within the Solar PV Site, at Topham Ferry Bridge with average values of 8.9 mg/l nitrate and 0.47 mg/l orthophosphate and indicates probable pressure from the surrounding agricultural land uses through use of fertilisers and other products which may runoff to the watercourses.

Grid Connection Corridor Search Area

9.5.46 Water quality data for some watercourses is available within the Grid Connection Corridor Search Area and associated Study Area from the EA's Water Quality Archive website (Ref 141). It is proposed that data from the sampling point locations identified in Table 9-5 and shown on Figure 9-1 will be used and analysed further in the ES.

Table 9-5: Water Quality Available Data for Watercourses within the Grid Connection Corridor Search Area and Study Area

Watercourse	Proxy for watercourse	Sampling Point ID	Comment	Summary
Thorpe Marsh Drain	Side Cutting Drain Smallholme and Tilts Drain	Ea Beck At Thorpe Marsh NE-49300665	Within Grid Connection Corridor Search Area	243 samples taken between 2021 and 2000

Watercourse	Proxy for watercourse	Sampling Point	ID	Comment	Summary
River Don	None	Don At Kirk Bramwith	E-49301600	Within the Grid Connection Corridor Search Area Study Area	268 samples taken between 2022 and 2000
Bramwith Drain	Engine Dike Wrancarr Drain	Bramwith Drain At South Bramwith	NE-49300294	Within Grid Connection Corridor Search Area Study Area	181 samples taken between 2022 and 2000
Mill Dike	Thistle Golt Carrs Drain	Mill Dike At Askern	NE-RSN0196	Within Grid Connection Corridor Search Area Study Area	19 samples taken between 2023 and 2022

Nutrient Neutrality

9.5.47 The City of Doncaster Council and North Yorkshire Council are Local Planning Authorities which cover the Scheme and the wider Study Area, however neither of these local planning authorities contain designated nature conservation sites that are affected by nutrient management restrictions as announced by Natural England.

9.5.48 The River Ouse is located approximately 16 km downstream of the Solar PV Site and is under the jurisdiction of East Riding of Yorkshire Council. East Riding of Yorkshire Council is a local planning authority affected by nutrient pollution (nutrient enrichment from elevated nitrogen and phosphorus levels) whereby reduced water quality is leading to adverse nutrient impacts on some designated habitats sites. However, within the county this only occurs in relation to the Hornsea Mere SPA and there is no hydrologic connectivity between this designated site and the Scheme (different catchments). Watercourses from the Site drain to the Humber Estuary and whilst the Humber Estuary is also a designated site (SPA, SAC, Ramsar) it is not currently listed in the latest advice note from Natural England issued in March 2022 (Ref 142) as a site requiring nutrient neutrality assessment.

9.5.49 Additionally, it is noted that as the Scheme would reduce the use of fertilisers on land within the Solar PV Site it would likely reduce the runoff of nutrients into the surrounding watercourses. Welfare facilities for construction staff would be temporary and are not anticipated to discharge into the mains network, whilst any permanent welfare facilities for example at substations would be small scale.

9.5.50 It is concluded therefore that in line with Natural England advice (Ref 142), a nutrient neutrality assessment can be scoped out of the assessment. However, where there is the potential for impacts and effects to occur in relation to nutrient or other pollution on water features, this will be addressed within the ES.

Water Resources

9.5.51 Within the Study Area, there are no Drinking Water Protected Areas or Drinking Water Safeguard Areas. However, approximately 900 m north of the Study Area for the Solar PV Site is the Great Heck and Pollington Drinking Water Safeguard Zone (Groundwater) (Water body ID GB40401G701000). Similarly, the Armthorpe Drinking Water Safeguard Zone (Water body ID GB40401G301500) is located approximately 1 km to the southeast of the Grid Connection Corridor Search Area.

9.5.52 These safeguard zones are catchment areas that influence the water quality for their respective Drinking Water Protected Area, which are at risk of failing the drinking water protection objectives. In this area, the water quality pressures are associated with risk of impacts from nitrate pollution.

9.5.53 Groundwater SPZs are defined zones centred on groundwater sources such as wells, boreholes and springs used for public drinking water supply (see Figure 9-2). These zones show the risk of contamination from any activities that might cause pollution to the source and surrounding area. The closer the activity to the source, the greater the risk. The SPZs are subdivided into 3 Zones; where Zone 1 is the Inner Protection Zone, Zone 2 is the Outer Protection Zone and Zone 3 is the Total catchment.

9.5.54 Within the Great Heck and Pollington Drinking Water Safeguard Zone, there are two areas of SPZ 1 and 2 for public water supply abstractions located to the north of the Solar PV Site, with the southern boundary of the total catchment (SPZ 3) for these sources expanding into the Study Area associated with the Solar PV Site.

9.5.55 Similarly, the southeastern part of the Grid Connection Corridor Search Area falls within the total catchment (SPZ 3) for three public water supply abstractions located to the southeast of the Study Area.

9.5.56 The Study Area lies within eight Nitrate Vulnerable Zones (NVZs) for both groundwater and surface water. NVZs are statutory designated areas as being at risk from agricultural nitrate pollution and includes about 55% of land in England. The NVZs are summarised below.

9.5.57 The groundwater NVZs consist of:

- Selby NVZ (Number G108);
- Yorkshire Mag Limestone NVZ (Number G101); and
- Nottinghamshire NVZ (Number G40).

9.5.58 The surface water NVZs consist of:

- Went from Blowell Drain to the River Don NVZ (Number S299);
- Bramwith Drain from Source to River Don NVZ (Number S280);

- Lower Don NVZ (Number S298);
- EA Beck from Abbess Dyke to River Don NVZ (Number S279); and
- Bentley Mill Stream Lower to River Don NVZ (Number S263).

9.5.59 Information on pollution incidents, licences and unlicensed water abstractions and water activity permits (i.e. discharges) will be obtained from the EA and presented in the ES.

Internal Drainage Boards

9.5.60 The Study Area is located within one IDB area, the Danvm Drainage Commissioners, part of the Yorkshire and Humber Drainage Boards. The IDB serves communities between the River Don and the River Aire. These areas are shown on Figure 9-1.

Aquatic Ecology and Nature Conservation Sites

9.5.61 This section describes the statutory sites designated for nature conservation that are relevant to the water environment assessment.

Solar PV Site

9.5.62 Statutory sites that are designated for nature conservation and are relevant to the water environment assessment were identified through a review of MAGIC (Ref 83). The following are located within the Study Area, or within a few km downstream (considered in order of proximity to the Site):

- The Humber Estuary Ramsar Site, SPA, SAC and SSSI is located approximately 16 km downstream of the Solar PV Site. The Humber Estuary is the ultimate downstream receptor for the Solar PV Site (and the Grid Connection Corridor Search Area), therefore the hydrological link means these receptors are scoped in for further assessment. The Humber Estuary SAC contains Annex I habitats and Annex II species. The Humber Estuary SPA is an extensive wetland and coastal habitat system. The estuary supports important numbers of waterbirds. The SSSI is designated as being a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes and coastal brackish/saline lagoons. Full details of these ecological designations are provided within **Chapter 8: Ecology** of this EIA Scoping Report; and
- Went Ings Meadows SSSI is located outside of the 1 km Study Area for the water resources assessment. These are meadows a few metres above sea level subject to waterlogging and seasonal flooding. Traditional hay meadows has led to wet neutral grassland developing into tall fen vegetation. This is located approximately 3 km downstream from the Site within the catchment area of the River Went. The Went Ings Meadows SSSI appears to be linked to drains parallel to the River Went, and is therefore scoped in to further assessment as part of the River Went water feature (Ref 143).

Grid Connection Corridor Search Area

9.5.63 There are no water dependent sites designated for nature conservation identified through a review of MAGIC (Ref 83) within the 1 km Study Area for the Grid Connection Corridor Search Area.

9.5.64 There are no groundwater dependent terrestrial ecosystems (GWDTEs) within the Site or the 1 km Study Area considered for the water resources assessment. The nearest SSSI that are considered to be groundwater dependent are the Shirley Pool SSSI and the Owston Hay Meadows SSSI, located more than 1.7 km to the west of the Grid Connection Corridor Search Area.

Hydrogeology and Groundwater

9.5.65 The Sherwood Sandstone Group and Chester Formation are both classified by the EA as a Principal Aquifer and the Roxby Formation as a Secondary B Aquifer (Ref 83).

9.5.66 The overlying alluvial deposits are designated as a Secondary A aquifer and the Head deposit to southeast of the Grid Connection Corridor Search Area is designated as a Secondary (undifferentiated) aquifer. All other superficial deposits such as the Hemingbrough Glaciolacustrine Formation are designated unproductive aquifers, covering a large proportion of the Site and Study Area. However, the permeable layers of the Breighton Sand Formation are also likely to be Secondary A aquifer.

9.5.67 Principal aquifers are important rock units that have high permeability, meaning they usually provide a high level of water storage and transmission. They usually support water supply and/or river baseflow on a strategic scale.

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

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

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

9.5.71 Groundwater vulnerability for the Site is generally low, however, there are small areas of medium/ medium to high vulnerability where the Breighton Sand Formation and the alluvial deposits are mapped in the Study Area (Ref 83).

9.5.72 The Study Area lies within the Humber (WFD groundwater) Management Catchment (Ref 132). The Aire and Don Sherwood Sandstone (WFD ID: GB40401G701000) which is within the Humber Management Catchment underlies the majority of the Study Area (Ref 132). The Idle Torne - PT Sandstone Nottinghamshire & Doncaster Water Body (WFD ID:

GB40401G301500) lies to the east of the River Don (see Figure 9-2) and is in the same management catchment.

9.5.73 The Aire and Don Sherwood Sandstone (WFD ID: GB40401G701000) has an overall classification of poor (Cycle 3, 2019), with both quantitative and chemical elements being poor. The limiting element within the quantitative status is the quantitative water balance. The limiting elements within the chemical status are the chemical drinking water protected area and the general chemical test. The reasons for not achieving good status are due to pressures from poor nutrient management predominantly from the agricultural industry. The water body has an overall objective of poor by 2015, which it has met. The reasons for the poor objective are due to disproportionate burdens.

9.5.74 The Idle Torne - PT Sandstone Nottinghamshire & Doncaster Water Body (WFD ID: GB40401G301500) which lies to the east of the Study Area (Ref 132) has an overall classification of poor relating to both quantitative and chemical elements. The limiting elements within the quantitative status are the quantitative dependent surface water body status and the quantitative water balance. The limiting elements within the chemical status are the chemical drinking water protected area and the general chemical test. The reasons for not achieving good status are from poor agricultural practices and groundwater resource impacts. The water body has an overall objective of poor by 2015, which it has met. The reasons for the poor objective are similar to that for the Aire and Don Sherwood Sandstone water body.

9.5.75 No Site-specific ground investigation information is currently available at this stage, however a review of selected BGS borehole records (Ref 135) was undertaken. The borehole logs indicates that shallow groundwater between 0.6 m and 3 m is likely to be encountered within the underlying superficial deposits across the Site. The higher groundwater is likely to be encountered along the eastern and in the southern parts of the Study Area.

9.6 Potential Effects and Mitigation

9.6.1 This section sets out the potential effects of the Scheme on the water environment.

Construction and Decommissioning

9.6.2 A number of activities which would be undertaken during the Scheme construction and decommissioning phases that are likely to generate impacts which have the potential to affect the water environment, if unmitigated.

9.6.3 The greatest risk of adverse water environment impacts during construction and decommissioning are in the WFD catchment of the Went from Blowell Drain to the River Don which may be directly affected by the Scheme.

9.6.4 During construction the following adverse impacts have the potential to occur if not mitigated:

- Pollution of surface water or groundwater (and any designated ecology sites that are water dependent) due to deposition or spillage of soils,

sediments, oils, fuels, or other construction chemicals, or through uncontrolled site run-off including dewatering of excavations or piling;

- Temporary impacts on the hydromorphology of watercourses from open-cut watercourse crossings or temporary vehicle access crossings as may be required;
- Temporary changes in flood risk from changes in surface water runoff (e.g. disruption of stream flows during any potential culvert construction works), and exacerbation of localised flooding, due to deposition of silt, sediment in drains, ditches; and
- Potential impacts on groundwater resources and local water supplies (licenced and unlicenced abstractions) and potentially the baseflow to watercourses from temporary dewatering of excavations or changes in hydrology.

9.6.5 The nature of the Scheme means there would be limited physical disturbance of aquifers and groundwater, limited to driving the solar PV module mounting structures to a depth of 1-2 m, with tracker systems having a pile of 3 to 5 m depth, and shallow cable trenches for cable routes. The need for piling or deep HDD has yet to be determined but will be confirmed in the ES.

9.6.6 The infrastructure within the Grid Connection Corridor Search Area would necessitate the crossing of watercourses and drainage ditches. The construction of cable routes crossing watercourses has the potential to result in modifications to WFD water bodies. Some of these may be temporary such as to provide field access across watercourses or for an open-cut excavation of the channel for the installation of the new cables.

9.6.7 There may be crossings of more significant water features, such as Main Rivers, or WFD monitored reaches of watercourses, by non-intrusive trenchless techniques (e.g. HDD) at a suitable depth beneath the bed level to avoid the risk of future exposure by scour of the bed (typically cables would be at least 1.5 m below the bed of a watercourse). It is also possible that watercourse crossings (or modifications to existing crossings) are required as part of works to above ground installations. For any other crossings it is likely that an open cut method would be used. It would be a requirement that the watercourses are reinstated as found and water quality monitoring will be undertaken prior to, during, and following on from the construction activity. Crossings of other drainage features would be risk assessed on a case-by-case basis.

9.6.8 During decommissioning, potential impacts would be similar to the construction phase although it is anticipated that the power cables may be left in situ beneath watercourses and there would be less excavation works required close to watercourses. There may also be some additional wastewater in pipework of above ground installations that would need to be removed, tested, and potentially treated as waste rather than discharged to a watercourse or to the ground.

9.6.9 Mitigation measures applicable to the Scheme construction phase will be included in a Framework CEMP which will be prepared as part of the DCO application. The Framework CEMP would be developed into a detailed (or

construction issue) CEMP by the appointed construction Contractor prior to the start of construction. Similarly, a Framework DEMP will be prepared as part of the EIA and will set out the general principles to be followed during the decommissioning of the Scheme. A detailed DEMP would be prepared and agreed with the relevant authorities at that time of Scheme decommissioning.

Operation and Maintenance

9.6.10 During the Scheme operational phase, the following water environment impacts may occur:

- Impacts on water quality in watercourses and groundwater from run-off and the potential for accidental spillages from new permanent hardstanding and operation and maintenance activities, assuming surface water run-off ultimately drains to a surface watercourse rather than simply to ground;
- Potential for impact on groundwater or surface water from firewater runoff in the event of a fire in the battery storage areas;
- Potential impacts on hydrology as a result of the Scheme. This may also have a subsequent effect on aquatic habitats and water-dependent nature conservation sites;
- Potential for permanent physical impacts to watercourses if crossings are required for access and depending on the design of the structure used;
- Potential impacts on the rate and volumes of surface water run-off entering local watercourses and increasing the risk of flooding;
- Potential for impact of foul drainage/ water supply in the Study Area due to the offices/ maintenance facilities required as part of the Scheme and/ or requirement for regular bi-annual panel cleaning;
- The current arable fields are likely treated with fertiliser. During the life of the Scheme the use of such chemicals would be ceased or reduced which would lead to potential beneficial impacts on the water environment;
- Potential impacts on groundwater resources and local water supplies, which may include reduced irrigation demand; and
- The conversion of the land from intensive farmland to solar PV grassland has the potential to enhance infiltration rates onsite.

9.6.11 Due to the potential for impacts and effects on water receptors and resources by the Scheme, a full water environment impact assessment will be included in the ES. This will also be supported by an FRA and a Surface Water Drainage Strategy and a WFD Assessment. The scope for these assessments and how the significance of effects will be determined is described in the following section.

9.6.12 Mitigation measures applicable to the Scheme's operation will be included in a Framework OEMP prepared as part of the DCO application. The Framework OEMP will form the basis of the detailed OEMP which is expected to be secured as a Requirement of the DCO.

9.7 Assessment Methodology

9.7.1 This section describes the methodology proposed for the assessment of effects on the water environment, including the criteria for the determination of the importance of the receptor and the magnitude of change from baseline conditions.

9.7.2 Potential impacts of the Scheme on the water environment will be assessed by:

- Considering the existing (baseline) status of the water environment within the Site and relevant surrounds with respect to flood risk, surface water, groundwater and drainage, following the source-pathway-receptor approach;
- Identifying potential impacts of the Scheme on the water environment during the operational, construction and decommissioning phases, as well as cumulative effects;
- Proposing suitable mitigation measures to be incorporated into the Scheme design, construction, operation and decommissioning to offset any adverse impacts (i.e. embedded mitigation); and
- Reviewing any residual impacts and presenting additional mitigation measures to limit impacts.

Source-Pathway-Receptor Approach

9.7.3 The water environment impact assessment will be based on a source-pathway-receptor model. For an impact on the water environment to exist the following is required:

- An impact source (such as the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a water body);
- A receptor that is sensitive to that impact (i.e. water bodies and the services they support); and
- A pathway by which the two are linked.

9.7.4 The first stage in applying the Source-Pathway-Receptor model is to identify the causes or ‘sources’ of potential impact from a development. The impact sources will be identified through a review of the details of the Scheme, including the size and nature of the Scheme, potential construction, operation and decommissioning methodologies and timescales. The next step is to undertake a review of the potential receptors, that is, the water environment receptors that have the potential to be affected. Water bodies including their attributes will be identified through desk study and Site surveys. The last stage of the model is, therefore, to determine if there is a viable exposure pathway or a ‘mechanism’ linking the source to the receptor. This will be undertaken in the context of local conditions relative to the water receptors within the Study Area, such as topography, geology, climatic conditions and the nature of the impact (e.g. the mobility of a liquid pollutant or the proximity to works that may physically impact a water body).

9.7.5 The assessment of the likely significant effects is qualitative, and will consider the construction, operational and decommissioning phases, as well as cumulative effects with other developments.

9.7.6 To support the assessment of effects on the water environment some sub-topic specific assessments will be undertaken. These are described in more detail in the following sections.

Water Quality and Resource Assessment

9.7.7 Relevant data will be requested and obtained from the EA. A Site walkover survey will be undertaken by a hydromorphologist and a water resources specialist. This will be to observe surface water features in the Study Area and to make observations about their current condition and character, the presence of existing risks and any potential pathways for construction, operation and decommissioning impacts as a result of the Scheme. Further Site surveys may be required as the Scheme develops.

9.7.8 Water quality data for the more important watercourses in the area (River Went, River Don, Thorpe Marsh Drain, Bramwith Drain and Mill Dike) is available from routine EA monitoring. The importance of water bodies will be determined from a holistic review of water body features and does not rely on water quality due to the principle that no controlled water may be polluted. Water quality impacts will be based on a risk assessment basis that does not require input of raw background water quality data. Water quality monitoring is also only effective when there is a clear purpose for it, and may require monitoring over a long period of time to ensure reliable and robust results. Therefore, no water quality sampling is proposed to support the water environment assessment.

9.7.9 A qualitative assessment of potential effects on surface water quality from construction, operation and decommissioning of the Scheme will be undertaken. This will consider the risk to surface water features resulting from construction, decommissioning works or future operation and maintenance activities using the source-pathway-receptor approach. Where there is a risk of pollution, mitigation measures will be described with reference to best practice guidance (e.g. Guidance on Pollution Prevention Notes and Construction Industry Research and Information Association guidance).

9.7.10 The appropriateness of the surface water drainage measures in terms of providing adequate treatment of diffuse pollutants will be assessed with reference to the Simple Index Assessment method described in the SuDS Manual (Ref 144). The Simple Index Approach follows three steps:

- Step 1 – Determine suitable pollution hazard indices for the land use(s);
- Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index (for three key types of pollutants: total suspended solids, heavy metals and hydrocarbons). Only 50% efficiency should be applied to second, third etc. treatment train components; and
- Step 3 – If the discharge is to a water body protected for drinking water, consider a more precautionary approach.

9.7.11 The SuDS Manual (Ref 144) only provides a limited number of land use types and so those selected will be the most suitable for the components of the Scheme, based on professional judgement. Where more than one pollution hazard category applies to a component of the Scheme, the worst pollution hazard will be selected.

9.7.12 As part of the groundwater assessment a groundwater risk analysis will be undertaken of each location where there would be a watercourse crossing. This will compare the likely depth of excavation with available estimates of groundwater level at each location.

Hydromorphology and Water Framework Directive (WFD) Assessment

9.7.13 Due to the potential for impacts upon WFD designated water bodies, initially a WFD Screening Assessment has been undertaken in keeping with PINS Advice Note 18: The Water Framework Directive (Ref 145). This assessment has been undertaken, and is included as Appendix C: Water Framework Directive (WFD) Screening Assessment. This identifies the waterbodies within the Study Area and states which are screened in for further assessment. At the ES stage, when more construction and design information is available, the assessment will be extended in order to determine the potential for any non-compliance of the Scheme with WFD objectives for affected water bodies, using readily available information and Site observations. This will include a qualitative examination of the potential construction, operation and decommissioning phase impacts of the Scheme on relevant WFD hydromorphological, biological and physio-chemical parameters. Depending on the outcomes of the assessment, more detailed investigations may be required, which will be determined in consultation with the EA.

Surface Water Drainage Strategy

9.7.14 The design of drainage systems aims to ensure that there would be no significant increases in flood risk downstream, during storms up to and including the 1 in 100 (1%) annual probability design flood, with an allowance for climate change.

9.7.15 A Surface Water Drainage Strategy will be prepared with the FRA to ensure the risk of surface water flooding is not increased as a result of the Scheme, including any increased land take for foundations and any access roads.

9.7.16 Careful consideration of the SuDS features, in keeping with local planning policy and through liaison with the City of Doncaster, in their role as LLFA, the Danvm IDB and EA, will be undertaken to ensure that the Surface Water Drainage Strategy adequately attenuates and treats runoff from the Scheme, whilst minimising flood risk to the Site and surrounding areas.

9.7.17 In accordance with planning policies of the City of Doncaster Council (Policy 56) and general good practice, mitigation would be provided by restricting surface water discharge rates and providing on-site attenuation to ensure there would be no increase in flood risk elsewhere.

Flood Risk Assessment

9.7.18 An FRA will be prepared for the Scheme which will be a technical appendix to the ES. The FRA will include a review of the current and future flood risk to the Study Area from all sources (including surface water, groundwater, tidal and fluvial sources and residual flood risks), in keeping with NPPF guidance, to inform the Scheme design and set out any proposed mitigation requirements that are to be addressed within the Surface Water Drainage Strategy. The FRA will also demonstrate how that flood risk would be managed over the Scheme's lifetime, to satisfy the requirements of the Sequential Test and Exception Test.

9.7.19 The NPPF includes solar farms as 'Essential Infrastructure', as categorised in Annex 3: Flood risk vulnerability classification.

9.7.20 With the exception of any above ground infrastructure (e.g. substations) and temporary works during installation, cable routes are not generally considered in flood risk terms. However, the approach to the Sequential and Exception Tests for the Grid Connection Corridor Search Area will be clarified with the EA and the City of Doncaster Council as required.

9.7.21 Parts of the Solar PV Site are located in Flood Zone 2. Where development is to take place within areas at risk of flooding (Flood Zones 2 and 3), there may be a requirement for the construction of flood compensation or mitigation measures to ensure no detrimental effect to flooding potential within or from the affected watercourse in the catchment once the Scheme is operational. The conclusions of this will be referred to within the water environment assessment presented in the ES. Development in Flood Zone 1 is considered acceptable without the need for additional flood risk mitigation.

9.7.22 As the Scheme is classified as 'Essential Infrastructure' and parts of the Solar PV Site are located in Flood Zone 3, an Exception Test is required to be undertaken as part of the FRA. For the Exception Test to be passed allowing development in Flood Zone 3 the FRA will be required to demonstrate that the development would be safe for its lifetime, taking into account the effects of climate change. This requirement will influence positioning of infrastructure within the Solar PV Site and the heights of panels.

Determining the Significance of Effects

9.7.23 The significance of effects will be determined using the principles of the guidance and criteria set out in the Design Manual for Roads and Bridges (DMRB) LA113 Road Drainage and the Water Environment (Ref 146) adapted to take account of hydromorphology. This can be applied to all development types and represents the most robust and nationally accepted criteria for the determination of potential effects on the water environment.

9.7.24 The criteria that will be used to determine receptors importance are presented in Table 9-6.

9.7.25 In accordance with the stages of the methodology, there are three stages to the assessment of effects on water resources as follows:

- A level of importance (low to very high) is assigned to the water resources receptor from Table 9-6 and is based on a combination of attributes (such as water supply, biodiversity, recreation) and on receptors to flood risk based on the vulnerability of the receptor to flooding (i.e. as shown in Table 9-6, essential infrastructure would be very high importance, to water compatible development which would be of low importance);
- The magnitude of potential and residual impact (classed as negligible, minor, moderate or major adverse/ beneficial) is determined based on the criteria listed in Table 9-7 and the assessor's knowledge of the Scheme. Embedded or standard mitigation measures are considered in the initial assessment, but any other mitigation is not considered until the assessment of residual effects. The magnitude of impact will be determined considering the likelihood of the effect occurring. The likelihood of an effect occurring is based on a scale of certain, likely or unlikely. Likelihood has been considered in the case of water resources only, as likelihood is inherently included within the flood risk assessment; and
- A comparison of the importance of the resource and magnitude of the impact (for both potential and residual impacts) results in an assessment of the overall significance of the effect on the receptor using the matrix presented in Table 9-8. The significance of each identified effect (both potential and residual) will be classed as very large, large, moderate, slight or neutral and either beneficial or adverse significance.

Table 9-6: Criteria to Determine Receptor Importance (Adapted from DMRB LA 113)

Importance	General Criteria	Surface Water	Groundwater	Hydromorphology[8]	Flood Risk
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.	Designated Salmonid/ Cyprinid fishery. Watercourse having a WFD classification as shown in a RBMP and Q95 ≥ 1.0 m^3/s. Site protected / designated under UK habitat legislation (SAC, SPA, SSSI, Water Protection Zones, Ramsar site). Species protected by UK legislation. Critical social or economic uses (e.g. public water supply and navigation).	SPZ 1. Principal aquifer providing a regionally important resource and/or supporting a site protected under UK legislation. Groundwater locally supports GWDTE. Water abstraction: >1,000 m^3/day.	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.	Essential Infrastructure or highly vulnerable development.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high	Watercourse having a WFD classification as shown in a RBMP and Q95 < 1.0 m^3/s; Major Cyprinid Fishery. Species protected under UK habitat legislation. Critical social or economic uses (e.g.	Principal Aquifer providing locally important source supporting rover ecosystem; SPZ 2; Groundwater supports GWDTE; Water abstraction: 500-1,000m^3/day.	Conforms closely to natural, unaltered state and will often exhibit well-developed and diverse geomorphic forms and processes characteristic of river and lake type. Deviates from natural conditions due to direct	More vulnerable development.

[8] Based on the water body 'Reach Conservation Status' presently being adopted for a major infrastructure project (and developed originally by Atkins) and developed from EA conservation status guidance (Environment Agency, 1998a; 1998b as LA113 (Ref 146) does not provide any criteria for morphology.

Importance	General Criteria	Surface Water	Groundwater	Hydromorphology[8]	Flood Risk
	environmental value, or of national importance.	water supply and navigation). Important social or economic uses such as water supply, navigation or mineral extraction.		and/or indirect channel, floodplain, bank modifications and/or catchment development pressures.	
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value or is of regional importance.	Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m^3/s. May be designated as a LWS and support a small/ limited population of protected species. Limited social or economic uses.	Secondary Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZ 3. Water abstraction: 50-499 m^3/day.	Shows signs of previous alteration and/or minor flow/ water level regulation but still retains some natural features, or may be recovering towards conditions indicative of the higher category.	Less vulnerable development.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.	Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001m^3/s. Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses.	Generally Unproductive strata. Water abstraction: <50m^3/day.	Substantially modified by past land use, previous engineering works or flow/ water level regulation. Watercourses likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in	Water compatible development.

Importance	General Criteria	Surface Water	Groundwater	Hydromorphology[8]	Flood Risk
				bedforms and bankside vegetation. Watercourses may also be realigned or channelized with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches will fall into this category.	
Negligible	The receptor is resistant to change and is of little environmental value	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Table 9-7: Magnitude of Impact Criteria (Adapted from DMRB LA 113)

Magnitude of Impact	Description	Examples
High Adverse	Results in a loss of attribute and/or quality and integrity of the attribute.	Loss of a fishery; decrease in surface water ecological or chemical WFD status or groundwater qualitative or quantitative WFD status; increase in peak flood level (>100 mm).
Medium Adverse	Results in impact on integrity of attribute, or loss of part of attribute.	Partial loss of a fishery; measurable decrease in surface water ecological or chemical quality, or flow; reversible change in the yield or quality of an aquifer; such that existing users are affected, but not changing any WFD status; increase in peak flood level (>50 mm).
Low Adverse	Results in some measurable change in attribute's quality or vulnerability.	Measurable decrease in surface water ecological or chemical quality, or flow; decrease in yield or quality of aquifer; not affecting existing users or changing any WFD status; increase in peak flood level (>10 mm).
Very Low	Results in impact on attribute, but of insufficient magnitude to affect the use or integrity.	Negligible change discharges to watercourse or changes to an aquifer which lead to no change in the attribute's integrity; negligible change in peak flood level (≤ +/- 10 mm).
Low Beneficial	Results in some beneficial impact on attribute or a reduced risk of negative impact occurring.	Measurable increase in surface water ecological or chemical quality; increase in yield or quality of aquifer not affecting existing users or changing any WFD status; creation of flood storage and decrease in peak flood level (>10 mm).
Medium Beneficial	Results in moderate improvement of attribute quality.	Measurable increase in surface water quality or in the yield or quality of aquifer benefiting existing users but not changing any WFD status; creation of flood storage and decrease in peak flood level (>50 mm).
Major Beneficial	Creation of new attribute or major	Increase in productivity or size of fishery; increase in surface water ecological or chemical WFD status;

Magnitude of Impact	Description	Examples
	improvement of attribute quality.	increase in groundwater quantitative or qualitative WFD status; creation of flood storage and decrease in peak flood level (>100 mm).
No change	No loss or alteration of characteristic, features of elements; no observable impact in either direction.	

9.7.26 The following significance categories will be used for both potential and residual effects:

- Negligible: An imperceptible effect or no effect to a water resources receptor;
- Beneficial: A beneficial/ positive effect on the quality of a water resources receptor; or
- Adverse: A detrimental/ negative effect on the quality of a water resources receptor.

9.7.27 In the context of this assessment, an effect can be temporary or permanent, with effects quantified temporally as being short-term (endures for up to 12 months after construction or decommissioning); medium term (endures for one to five years); long term – endures for more than five years.

9.7.28 At spatial level, ‘local’ effects are those affecting the Site and neighbouring receptors, while effects upon receptors beyond the vicinity of the Site are at a ‘regional’ level. Effects which affect different parts of the country, or England as a whole, are considered being at a ‘national’ level.

9.7.29 The importance of the receptor (Table 9-6) and the magnitude of impact (Table 9-7) are determined independently from each other and are then used to determine the overall significance of effects (Table 9-8). Options for mitigation will be considered and secured where possible to avoid, minimise and reduce adverse impacts, particularly where significant effects may have otherwise occurred. The residual effects of the Scheme with identified mitigation in place will then be reported. Effects of moderate or major are considered significant in planning terms (i.e. the shaded cells in Table 9-8).

Table 9-8: Matrix for Assessment of Significance (DMRB LA 104)

Importance of Receptor (Table 9-6)	Magnitude of Impact (Table 9-7)				
	High	Medium	Low	Very Low	No Change
Very High	Major	Major	Major	Minor	Neutral
High	Major	Major	Moderate	Minor	Neutral
Medium	Major	Moderate	Minor	Negligible	Neutral
Low	Moderate	Minor	Negligible	Negligible	Neutral
Very Low	Minor	Negligible	Negligible	Neutral	Neutral

9.8 Assumptions, Limitations and Uncertainties

9.8.1 The location and layout of infrastructure within the Grid Connection Corridor Search Area, and the cable route construction methodologies and mitigation, have not yet been determined. This is of particular importance when considering impacts associated with watercourse crossings, the quality of surface water runoff, impacts to hydromorphology and channel hydraulics. The protection of water environment receptors will be taken into account within the iterative design process, including the choice of crossing methodology and use of best practice methodologies for construction.

9.8.2 Details of the construction methodologies are not yet available, however, the Applicant has confirmed that Solar PV modules and mounting structures would be offset from watercourses by a minimum of 10 m measured from the centre line of narrow watercourse channels (typically 2-5 m wide) and from the bank edge of watercourses with a wider channel (as the top of a bank is a variable feature). The purpose of this buffer reduces the risk of any pollutants entering the watercourse directly during construction or direct physical impacts, whilst also providing space for mitigation measures (e.g. fabric silt fences) should they be required.

9.8.3 The locations of PWSs and licensed water abstractions have not yet been obtained, and so these are not included as receptors at this time. Water activity permits (i.e. permitted discharges) are also not yet known in detail and have not been considered in the current baseline. These receptors and water feature attributes will be considered as part of the assessment presented in the ES.

9.8.4 Requirements for hydraulic modelling of watercourses will be discussed with the EA/ City of Doncaster LLFA. Any modelling required will be undertaken as part of the ES to inform the FRA and Surface Water Drainage Strategy.

9.8.5 Visual surveys will be undertaken of accessible water/ drainage features to inform the Surface Water Drainage Strategy, impact assessment and WFD assessment. However, it may not be possible to survey all significant locations (such as crossing locations) or structures due to access constraints or visibility issues (e.g. dense vegetation). Where this is the case, in line with

best practice, and using reasonable assumptions, a survey close to the area of interest will be attempted and this data used as a proxy. In addition, some watercourses may be small, ephemeral and flow only intermittently, and these may not be identified in the field or observed when flowing.

9.8.6 Other than the site walkover survey, the FRA and Surface Water Drainage Strategy will be based on desktop surveys and best available site layout proposals in line with best practice. Where available, topographical data will be used to support the FRA. In the absence of topographical data, LiDAR data will be used to inform the FRA and the Surface Water Drainage Strategy.

9.8.7 Temporary works, for example minor areas of Site clearance, will not be assessed unless they are of a potentially significant scale and have the potential to adversely affect flood risk or impact the quality or form of water features. The temporary works where such risks are considered significant (for example, excavations for the cable routes) will be identified and assessed within the FRA, Screening and Scoping WFD Assessment and impact assessment reported in the ES.

9.8.8 As part of the EIA, the risk from surface water drainage to surface or groundwater features from new above ground development will be assessed according to the Simple Index Approach presented in the C753 The SuDS Manual (Ref 144). Given the very low risk the need for treatment measures is expected to be minimal. Furthermore, given the availability of space it is not anticipated that there would be any issues providing any treatment of diffuse pollutants, should the Simple Index Approach assessment identify such a need.

9.8.9 At the time of writing, it is not confirmed how any wastewater generated from the Scheme would be managed. Options may include connecting to the nearest available public sewer or a self-contained independent non-mains domestic storage and/or treatment system. The alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor. During the iterative design and EIA process the differing options will be considered and assessed, and the ES will consider the chosen option(s) adopting a precautionary worst-case approach. Wastewater generation would be disposed according to environmental legislation, with either online or offline solutions.

9.9 Summary of Elements Scoped In and Scoped Out

9.9.1 A summary of the elements scoped into and out of the water environment assessment are presented in Table 9-9.

Table 9-9: Elements Scoped In and Out of the Water Environment Assessment

Element	Scoped In / Scoped Out
Groundwater (construction, operation and decommissioning)	Scoped in – potential for impacts due to construction, operation and decommissioning of the Scheme.
Hydromorphology and WFD (construction, operation and decommissioning)	Scoped in – potential for impacts due to watercourse crossings by access bridges, and Grid Connection Corridor Search Area Study Area crossings.
Surface water (construction, operation and decommissioning)	Scoped in – potential for impacts due to construction, operation, and decommissioning of the Scheme.
Flood risk, including drainage (construction, operation and decommissioning)	Scoped in – potential for impacts on flood risk from all sources within the Site, downstream on watercourses and on surface water runoff.
Nutrient neutrality assessment (construction, operation and decommissioning)	Scoped out – no hydrologic connectivity between the Site and the designated sites identified by Natural England as requiring assessment.

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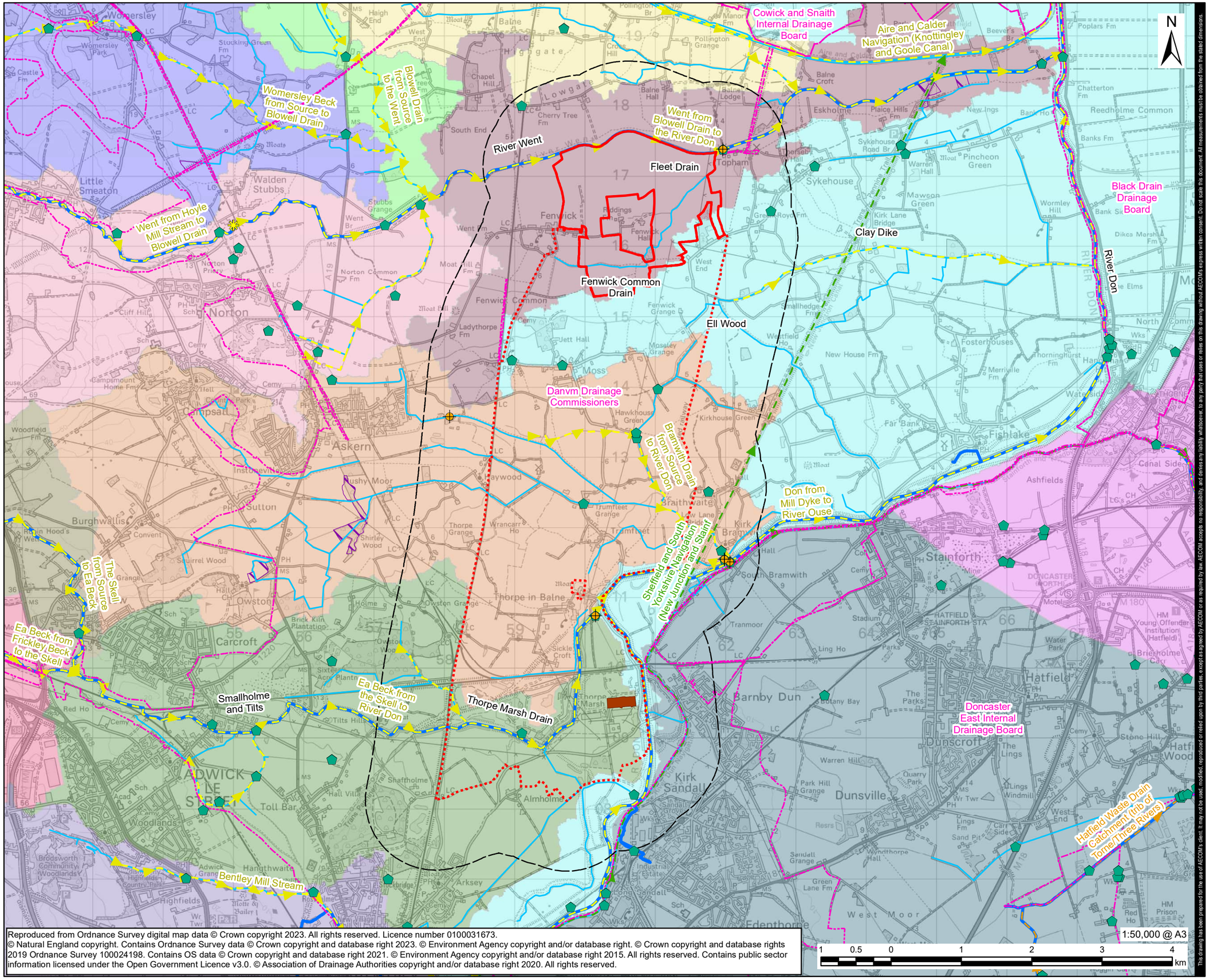

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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 1 km Buffer of Solar PV Site and Grid Connection Corridor Search Area
- Environment Agency Water Qualiy Monitoring Site
- Water Quality Sampling Location
- Walden Stubbs Gauging Station
- Main River
- Ordinary Watercourse
- Internal Drainage District
- Site of Special Scientific Interest (SSSI)

Water Framework Directive Surface Waterbody

- Good Ecological Status
- Moderate Ecological Status
- Poor Ecological Status

Water Framework Directive River Waterbody Catchment

- Bentley Mill Stream
- Blowell Drain from Source to the Went
- Bramwith Drain from Source to River Don
- Don from Mill Dyke to River Ouse
- Ea Beck from Frickley Beck to the Skell
- Ea Beck from the Skell to River Don
- Hatfield Waste Drain Catchment (trib of Torne/Three Rivers)
- New Fleet Drain from source to R Went
- North Soak Drain Catchment (trib of Torne/Three Rivers)
- The Skell from Source to Ea Beck
- Went from Blowell Drain to the River Don
- Went from Hoyle Mill Stream to Blowell Drain
- Womersley Beck from Source to Blowell Drain

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Surface Water Features

FIGURE NUMBER

Figure 9-1

Revision: 0 Drawn: LP Checked: DH Approved: TN Date: 2023-05-15

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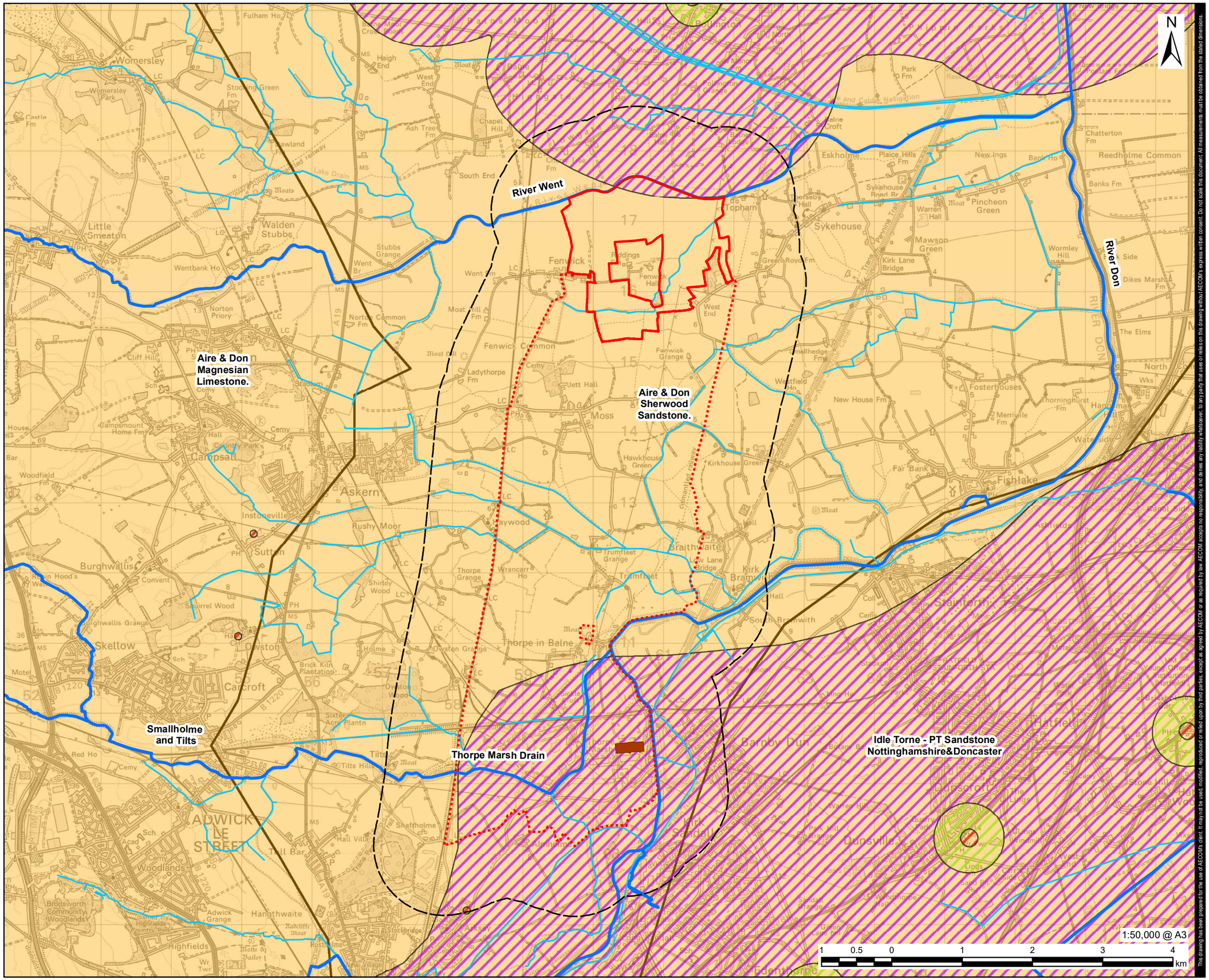

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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 1 km Buffer of Solar PV Site and Grid Connection Corridor Search Area
- Main River
- Ordinary Watercourse

Water Framework Directive Ground Waterbody Status

- Poor Overall Condition

Source Protection Zone (SPZ)

- Zone I - Inner Protection Zone
- Zone II - Outer Protection Zone
- Zone III - Total Catchment

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Groundwater Features

FIGURE NUMBER

Figure 9-2

Revision: 0 Drawn: LP Checked: DH Approved: TN Date: 2023-05-15

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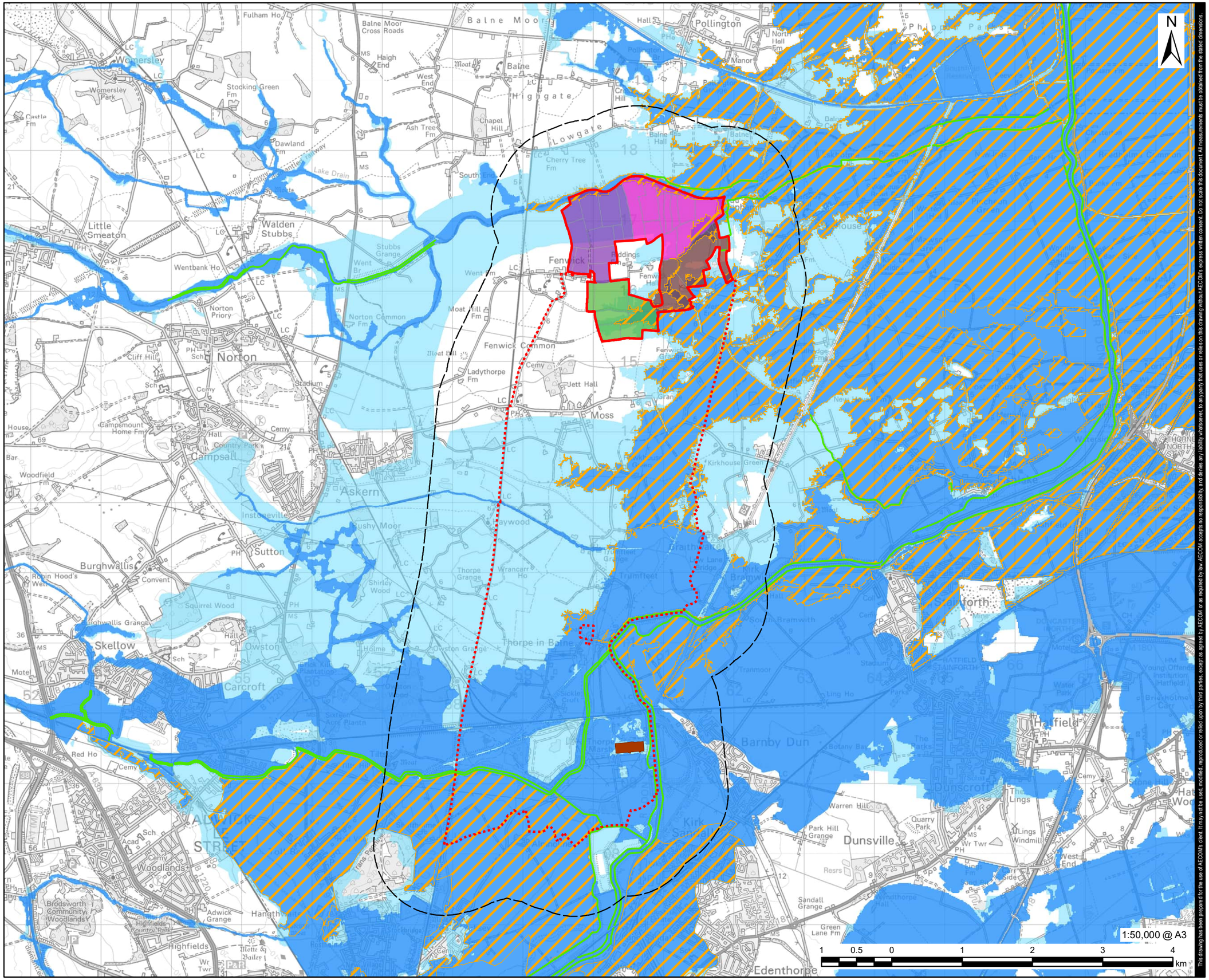

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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 1 km Buffer of Solar PV Site and Grid Connection Corridor Search Area
- Flood Defence
- Areas Benefitting from Flood Defences
- Flood Zone 2
- Flood Zone 3

Field Boundaries

- North East
- North West
- South East
- South West

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

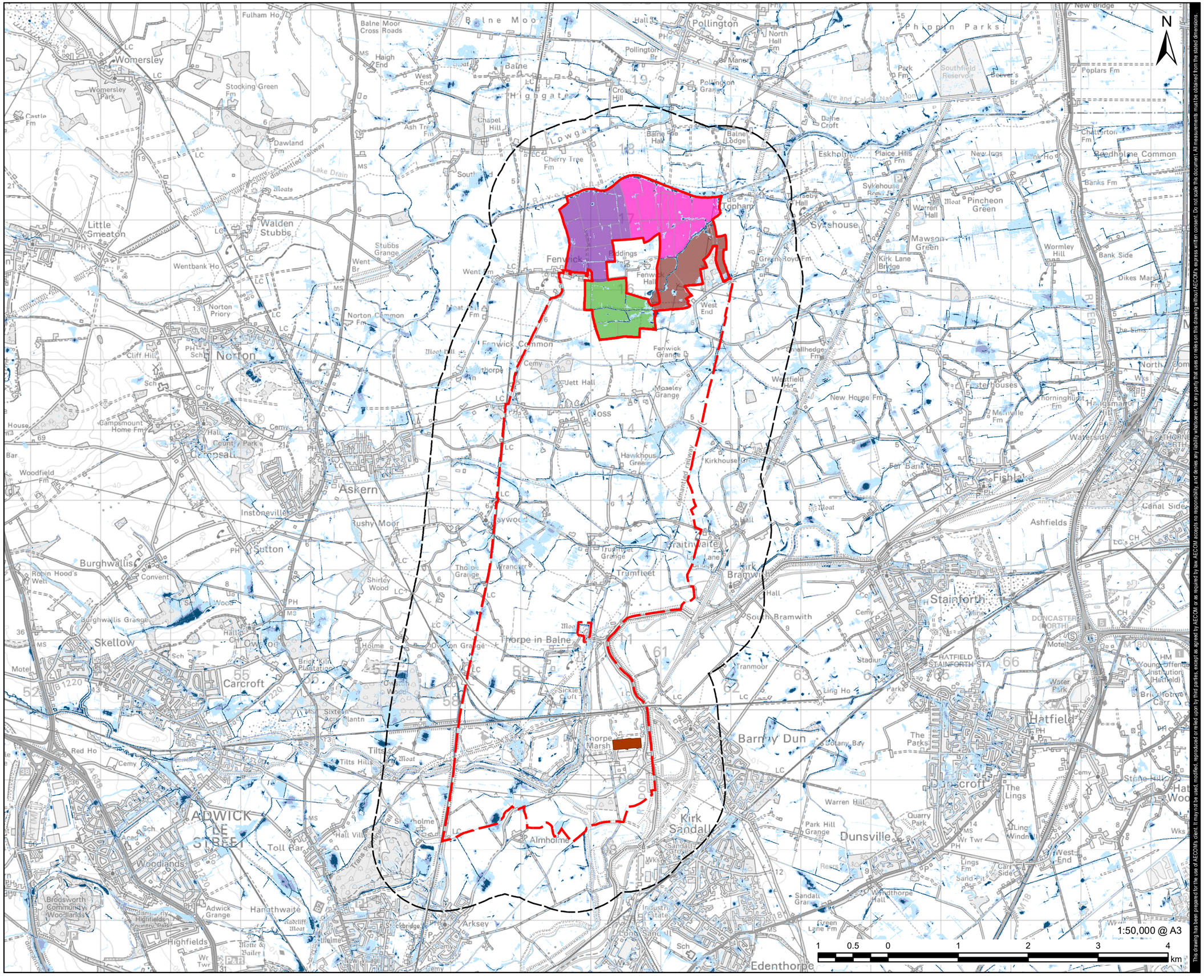
FIGURE TITLE

Fluvial and Tidal Flood Risk

FIGURE NUMBER

Figure 9-3

Revision: 0 Drawn: LP Checked: DH Approved: TN Date: 2023-05-15



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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- 1 km Buffer of Solar PV Site and Grid Connection Corridor Search Area

Risk of Flooding from Surface Water

- 3.33% Annual Exceedance Probability
- 1% Annual Exceedance Probability
- 0.1% Annual Exceedance Probability

Field Boundaries

- North East
- North West
- South East
- South West

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Surface Water Flood Risk

FIGURE NUMBER

Figure 9-4

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10. Landscape and Visual Amenity

10.1 Introduction

10.1.1 This chapter sets out the relevant landscape and visual matters which will be addressed within the ES, including the proposed landscape and visual impact assessment (LVIA) methodology.

10.1.2 Landscape effects relate to changes to the landscape as a resource, including physical changes to the fabric or individual elements of the landscape, its aesthetic or perceptual qualities and landscape character.

10.1.3 Visual effects relate to changes to existing views of identified visual receptors (people) from the loss or addition of features within their view due to the Scheme. For example, this may be residents or people travelling on a PRoW.

10.1.4 The LVIA will be undertaken in accordance with the Guidelines for Landscape and Visual Impact Assessment, Third Edition, 2013 (GLVIA 3) (Ref 29) and with reference to other environmental topics, including ecology and cultural heritage, along with supporting technical studies such as the glint and glare assessments and arboricultural assessments, as required.

10.2 Study Area

10.2.1 In accordance with GLVIA 3 (Ref 29), the LVIA Study Areas will include *"the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner".* GLVIA 3 explains that this will *"usually be based on the extent of Landscape Character Areas likely to be significantly affected… [or be based] on the extent of the area from which the development is potentially visible… or a combination of the two"*.

10.2.2 GLVIA 3 sets out that, at the scoping stage, the Study Area will be preliminary and may change as more detailed analysis is undertaken, discussion with Local Planning Authorities is undertaken and the design of the Scheme progresses through development. As the design of the Scheme evolves, the Study Area to be used for the LVIA may need to be refined to ensure all works, including temporary areas required for construction and permanent infrastructure, are included. The maximum parameters of these, in terms of height and location, will be determined as the Scheme design develops, taking into account environmental and technical factors. A reasonable worst case will be assessed and presented in the ES.

10.2.3 On the basis of the desk based review undertaken to date, and fieldwork undertaken in April 2023, the extent of visibility of the Scheme will likely vary in different directions, dependent on surrounding woodland, field boundaries, roadside vegetation and built features. The Scheme would be screened by many such features, given the relatively level topography that characterises

the area surrounding the Solar PV Site. The following landscape elements have a particular influence in limiting the potential visibility of the Scheme:

- Hedgerows and trees that form field boundaries across the Solar PV Site and flank local roads, such as Moss Road, located approximately 830 m south of the Solar PV Site;
- Aire and Calder Navigation, located approximately 1.8 km north of the Solar PV Site, which is elevated above the surrounding landscape and partially flanked by vegetation;
- Disused railway west of Sykehouse, located between 50 to 450 m east of the Solar PV Site, which is flanked by mature trees and scrub; and
- Blocks of woodland, such as Chapel Garth Wood, approximately 1.3 km north west of the Solar PV Site.

10.2.4 A review of the wider landscape found one local high point, Askern Hill, which is located approximately 4.5 km south west of the Solar PV Site and rises to approximately 25 m AOD. The plateaued top of Askern Hill, combined with houses and belts of vegetation that line its eastern slope, result in little to no intervisibility with the wider landscape, and therefore the Solar PV Site, such that landscape and visual receptors associated with the hill are not likely to experience significant effects.

10.2.5 The preliminary Study Area for the Solar PV Site therefore extends up to 2 km from the Solar PV Site to cover land between:

- Balne and Pollington to the north;
- Stubs Grange and Sykehouse in the centre; and
- Moss to the south.

10.2.6 Whilst there remains potential that the Scheme may be visible beyond 2 km, it is unlikely to result in any notable change to people's views given the intervening distance, vegetation, built form and overall visibility. The extent of the LVIA Study Area for the Solar PV Site will be reviewed throughout the iterative design process, informed by ongoing desk based research and field based analysis during winter and summer conditions to account for when deciduous vegetation is not in leaf. The extent of the LVIA Study Area for the Solar PV Site will be consulted upon with the Local Planning Authorities and the justification for its final extent provided in the ES.

10.2.7 The preliminary LVIA Study Area for the Grid Connection Corridor Search Area covers 500 m from the Grid Connection Corridor Search Area. It is unlikely that significant landscape or visual effects would occur beyond this distance, given the type and scale of equipment that will likely be required to install the underground cable and substation(s) and the short duration for which any one landscape or visual receptor beyond the Grid Connection Corridor Search Area would experience any change. This Study Area will also be refined throughout the Scheme design, assessment and consultation process. The Existing National Grid Thorpe Marsh Substation is located within the Grid Connection Corridor Search Area.

10.3 Legislation, Planning Policy Context and Guidance

10.3.1 The following legislation, planning policy and guidance are relevant to the LVIA.

Legislation

10.3.2 There is no applicable legislation specific to the LVIA.

National Planning Policy

National Policy Statements

10.3.3 NPS EN-1 (Ref 5) identifies that new energy infrastructure is likely to have some negative effects on landscape and visual amenity. The following paragraphs are of particular relevance to the LVIA:

- Paragraphs 4.5.1 to 4.5.3, which outline the requirements of high-quality design, including the aesthetic, functionality, fitness for purpose and sustainability of the Scheme, and noting *"good design in terms of siting relative to existing landscape character, landform and vegetation"*;
- Paragraphs 5.9.5 to 5.9.8, which set out the requirements for a LVIA;
- Paragraph 5.9.14 which sets out the importance of landscape character assessments in LVIAs;
- Paragraphs 5.9.14 to 5.9.17, which set out how local landscape designations should be considered, and the requirement to consider whether the Scheme has been designed to minimise harm to the landscape;
- Paragraph 5.9.18, which sets out that energy infrastructure is likely to have visual effects for many visual receptors; and
- Paragraphs 5.9.21 to 5.9.23, which outline methods for minimising adverse effects, including *"siting of infrastructure, colours and materials, landscaping schemes and building design".*

10.3.4 NPS EN-3 (Ref 6) is of relevance to the LVIA, notably paragraph 2.4.2 which states that *"proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity"*.

10.3.5 NPS EN-5 (Ref 7) is of relevance to the LVIA, notably paragraph 2.2.5 which sets out that consideration should be given to the location of substations to account for topography and the possibility of screening.

10.3.6 Draft NPS' were issued for consultation in March 2023. The following draft NPS' are of relevance to the LVIA:

- Draft NPS EN-1 (Ref 8), which states, in paragraph 5.10.5 that *"Virtually all nationally significant energy infrastructure projects will have adverse effects on the landscape, but there may also be beneficial landscape character impacts arising from mitigation".* Similarly paragraph 5.10.12 states that *"All proposed energy infrastructure is likely to have visual effects for many receptors around proposed sites".* Paragraphs 5.10.6

and 5.10.26 identify the importance of careful design to minimise harm to the landscape and people's views.

- Draft NPS EN-3 (Ref 9), notably paragraph 3.5.2 which states that *"Proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity..."*.
- Draft NPS EN-5 (Ref 10), notably paragraph 2.9.16 – 2.9.17 which includes the Holford Rules, which are *"intended as a common-sense approach to overhead line route design… [and]… should be embodied in the applicants' proposals…"*. Similarly, paragraph 2.9.18 – 2.9.19 list the Harlock Rules which provide *"guidelines for the design and siting of substations"*.

National Planning Policy Framework

10.3.7 NPPF (Ref 13) does not contain specific policies for NSIPs, however, the following paragraphs are of particular relevance to landscape and visual matters:

- Paragraph 100 in respect of protecting and enhancing PRoW;
- Paragraph 130 which requires development to be sympathetic to local character and setting;
- Paragraph 174 in relation to conservation and enhancing the natural environment; and
- Paragraph 185 in relation to development that is appropriate for its location taking account of effects and mitigation.

10.3.8 The Government's Department for Levelling Up, Housing and Communities published a consultation draft of a revised NPPF in 2022. Other than the paragraph numbering, the consultation draft does not amend the paragraphs listed above.

National Guidance

Planning Practice Guidance

10.3.9 Reference will be made to the following NPPG through the LVIA and Scheme design process:

- NPPG, Natural Environment (Ref 148) which sets out the benefits of landscape character assessments and the importance of considering green infrastructure in the early stages of schemes; and
- NPPG, Renewable and Low Carbon Energy (Ref 149) which sets out that planning has an important role in the delivery of new renewable and low carbon energy infrastructure. The NPPG identifies several LVIA considerations, including visual impact, mitigation through screening and glint and glare.

Local Planning Policy

Doncaster Local Plan

10.3.10 The Scheme and LVIA will have regard to, and be informed by, the following adopted policies from the Doncaster Local Plan (Ref 14):

- Policy 1: Settlement Hierarchy (Strategic Policy), with reference to section five regarding the Countryside Policy Area;
- Policy 18: Development Affecting PRoW;
- Policy 19: Access, Design and Layout of PRoW;
- Policy 25: Development in the Countryside Policy Area;
- Policy 26: Green Infrastructure (Strategic Policy);
- Policy 29: Ecological Networks (Strategic Policy);
- Policy 32: Woodlands, Trees and Hedgerows;
- Policy 33: Landscape (Strategic Policy);
- Policy 46: Design of Non-Residential, Commercial and Employment Developments (Strategic Policy);
- Policy 48: Landscaping of New Developments; and
- Policy 58: Low Carbon and Renewable Energy (Strategic Policy).

10.4 Consultation

10.4.1 Agreement will be sought through consultation with the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council regarding:

- LVIA methodology;
- Extent of the LVIA Study Area;
- Distribution and extent of Local LCAs;
- Visual receptors and associated representative viewpoints; and
- Number and location of viewpoints to be supported by photomontages.

10.5 Baseline Conditions

10.5.1 This section provides an overview of the landscape and visual features and characteristics across the preliminary LVIA Study Areas for the Solar PV Site and for the Grid Connection Corridor Search Area, respectively. The Existing National Grid Thorpe Marsh Substation is located within the Grid Connection Corridor Search Area.

Landscape Context

Landform and Hydrology

10.5.2 The northern part of the Study Area associated with the Solar PV Site is located between the River Went, in the south, and the Aire and Calder

Navigation in the north. The River Went flows eastwards, following the Solar PV Site's northern boundary and typically is not flanked by vegetation, other than occasional clumps of deciduous woodland. The land between the two watercourses is flat and low lying at less than 10 m AOD (Ref 130).

10.5.3 The topography follows the same pattern across the central part of the Study Area associated with the Solar PV Site, covering the Solar PV Site and land to the east and west. A series of drains cross the central part of the Study Area for Solar PV Site, including Fleet Drain which runs from south of Fenwick Hall to connect to the River Went, north of Topham. A number of ponds are present in the east, mostly concentrated between Topham in the north, and Bungalow Farm in the south.

10.5.4 The southern part of the Study Area associated with the Solar PV Site is also low lying. There are no watercourses across the southern part of the Study Area other than the New Junction Canal which crosses the south eastern corner, and a series of drains, such as the Ell Wood and Fenwick Grange Drain.

10.5.5 The Study Area associated with the potential Grid Connection Corridor Search Area is crossed by numerous field drains and, at its southern extent, follows the western bank of the River Don. Similar to the Study Area for the Solar PV Site, the Study Area associated with Grid Connection Corridor Search Area is also flat and low lying, at approximately 6 m AOD.

10.5.6 The Grid Connection Corridor Search Area terminates at the Existing National Grid Thorpe Marsh Substation, which is located between the River Don to the east, and Smallholme and Tilts Drain to the west. The Existing National Grid Thorpe Marsh Substation sits at approximately 5 m AOD.

Settlement, Land Use and Infrastructure

10.5.7 The Study Area for the Solar PV Site is mostly in agricultural use, comprising predominantly small to medium sized fields, interspersed with some larger fields. The fields are defined by hedgerows in varying condition. A series of villages, hamlets and individual properties are located across the landscape. The East Coast Main Line railway extends from north to south through the western part of the Study Area associated with the Solar PV Site. A line of pylons, with associated overhead lines, extends across the Study Area for the Solar PV Site from north to south. A second line of pylons extends east, perpendicular from the first, from approximately the centre of the Solar PV Site Study Area.

10.5.8 The road network comprises local roads, such as Moss Lane/West Lane, connecting settlements.

10.5.9 The hamlet of Balne is located at the north west. A number of farmsteads are also located in the northern part of the Study Area associated with the Solar PV Site, situated on Little Common Lane, Lowgate, Balne Hall Road and Highgate, including: Sunnyside Farm, Highgate Farm, Beechtree Farm, Brick Pond Farm, Fir Tree Farm, Linton House Farm, Lowgate Farm, Cherry Tree Farm, Lockgate Farm, Hollytree Farm, Wood Farm and Yewtree Farm.

10.5.10 The villages of Fenwick and Sykehouse are located in the central part of the Study Area associated with the Solar PV Site, as is the hamlet of Topham. The settlements follow a linear pattern, extending along the edge of the local road network.

10.5.11 Many farmsteads are also located along the road network, including Starkbridge Farm, Baxter Royal Oak Farm and White Cock Hall Farm, each located west of Sykehouse; Haggs Farm, Riddings Farm and Bungalow Farm, located east of Fenwick; and Went Farm and Fenwick Farm, located west of Fenwick.

10.5.12 The village of Moss is located in the south of the Study Area associated with the Solar PV Site, centred on the junction of Trumfleet Lane and Moss Road. A series of farmsteads are situated along Moss Road, including Manor Farm, Moseley House Farm and Moss Farm.

10.5.13 The part of the Study Area associated with the Grid Connection Corridor Search Area follows a similar pattern of settlements that line the local road network, such as Trumfleet and Thorpe in Balne. The overhead line that extends through the Solar PV Site and Study Area also extends through the Grid Connection Corridor Search Area, terminating at the Existing National Grid Thorpe Marsh Substation in the south.

10.5.14 A series of overhead lines, from the north west and south east, converge at the Existing National Grid Thorpe Marsh Substation.

Vegetation Patterns

10.5.15 The vegetation pattern across the northern part of the Study Area associated with the Solar PV Site comprises the hedgerow network, interspersed with hedgerow trees, that defines the agricultural fields. There is relatively little woodland cover other than Parkshaw Wood, located in the north west of the Solar PV Site Study Area, which is designated as Ancient Replanted Woodland. A series of woodland belts line the northern edge of the River Went. A buffer of mature deciduous trees also lines the disused railway that runs north to south through the eastern part of the Study Area for the Solar PV Site.

10.5.16 Pockets of woodland are found across the central part of the Study Area associated with the Solar PV Site, including Bunfold Shaw, designated as Ancient Woodland, and a clump of woodland surrounding Bungalow Farm.

10.5.17 There is little woodland across the southern part of the Study Area associated with the Solar PV Site, limited to Copley Spring Wood and pockets of woodland surrounding Moss.

10.5.18 Despite the relatively limited woodland cover found across the Solar PV Site and associated Study Area, the combination of the flat landform and field boundary hedgerows with trees results in the appearance of a more wooded character than suggested by maps and aerial photography.

10.5.19 In a similar way, the Study Area associated with the Grid Connection Corridor Search Area is sparsely wooded, but views are typically short range, truncated by mature field boundary vegetation.

10.5.20 The road network adjacent to the Existing National Grid Thorpe Marsh Substation is typically flanked by mature hedgerows with some hedgerow trees, limiting visibility of the Existing National Grid Thorpe Marsh Substation to occasional glimpses across gaps in the vegetation. More open views are experienced from the PRoW network in proximity to the Existing National Grid Thorpe Marsh Substation.

Public Rights of Way

10.5.21 Figure 2-3 shows the PRoW within the Solar PV Site, the Grid Connection Corridor Search Area, and the surrounding landscape. There is a comprehensive network of PRoW across the northern part of the Study Area associated with the Solar PV Site. Footpath 35.3/15/1 follows the northern edge of the River Went, following the Site's northern boundary. Further north a series of footpaths provide access across the fields, between the local road network.

10.5.22 The Trans Pennine Trail enters the Solar PV Site Study Area on Broad Lane, through Sykehouse, before extending north through the Solar PV Site Study Area and crossing the Aire and Calder Navigation south of Pollington. The route also forms part of National Cycle Route 62.

10.5.23 Within the central part of the Study Area associated with the Solar PV Site, there is no public access to land between Fenwick and the River Went other than Footpaths 6 and 7 which extend north from Fenwick Lane, approximately 550 m west of the Site. There is greater access across the land south of Fenwick, including several footpaths that cross the Site (or follow its boundary), namely: Footpaths 10, 12, 13, 14 and 15.

10.5.24 The southern part of the Study Area associated with the Solar PV Site also includes a series of footpaths extending north and south from Moss Road.

10.5.25 A network of footpaths similarly cross the part of the Study Area associated with the Grid Connection Corridor Search Area, including the Trans Pennine Trail and National Cycle Route 62.

Tranquillity

10.5.26 With reference to the Campaign to Protect Rural England's Tranquillity Map (Ref 150), infrastructure corridors and settlements within the Study Area (covering both the Solar PV Site Study Area and Grid Connection Corridor Search Area Study Area) typically reduce the level of tranquillity locally. Areas not crossed by main roads or rail corridors are shown to be the most tranquil.

10.5.27 This distribution was confirmed via the initial field work, which found that the western part of both the Solar PV Site Study Area and Grid Connection Corridor Search Area were typically the least tranquil, due to proximity to the railway, whilst land flanking the River Went was amongst the most tranquil.

10.5.28 The area close to the Existing National Grid Thorpe Marsh Substation was found to have amongst the lowest level of tranquillity given the activity associated with two railway lines, running north / south and east / west.

10.5.29 The level of tranquillity will be included in the definition of Local LCAs proposed as part of the LVIA.

Designations

10.5.30 No part of the Solar PV Site or the Grid Connection Corridor Search Area, nor either of the associated Study Areas, is covered by any statutory landscape designations i.e. National Parks or Areas of Outstanding Natural Beauty, or a Conservation Area, or is subject to a local landscape designation.

10.5.31 The western part of both the Solar PV Site Study Area and the Study Area associated with the Grid Connection Corridor Search Area, west of the East Coast Main Line, is designated as Green Belt land. No part of the Solar PV Site, nor the Grid Connection Corridor Search Area, is located within the Green Belt.

Landscape Character

Published Landscape Character Assessments and Related Studies

10.5.32 The Solar PV Site and associated Study Area, and the Grid Connection Corridor Search Area, and the associated Study Area are covered by several published character assessments and related studies, as set out below. These documents will inform the landscape baseline and the iterative Scheme design process that will be reported in the ES. The following section provides an overview of these publications.

National Landscape Character Assessments

10.5.33 At the national level, the Solar PV Site and Grid Connection Corridor Search Area, and their associated Study Areas, is covered by Natural England's National Character Area 39: Humberhead Levels (NCA 39) (Ref 151), which is characterised as:

"A flat, low-lying and large scale agricultural landscape bounded to the west by the low ridge of the Southern Magnesian Limestone and to the east by the Yorkshire Wolds (north of the Humber) and the Northern Lincolnshire Edge with Coversands (south of the Humber)."

10.5.34 Statements of Environmental Opportunity for NCA 39 include: safeguard, manage and expand wet pastures and watercourses to contribute to landscape character and to manage the agricultural landscape, historic field patterns to retain its distinctive character. Green infrastructure should be accommodated to retain long views and make a positive contribution to biodiversity.

Regional and District Assessments and Studies

10.5.35 The LVIA will refer to the following character assessments:

- Landscape Character and Capacity Assessment of Doncaster Borough, March 2007 (Ref 152), in particular:
  - LCA F2: Owston to Sykehouse Settled Clay Farmlands;

- The Selby Landscape Character Assessment (Ref 153), in particular:
  - Landscape Character Type (LCT) 023: Levels Farmland; and
  - LCA 17: Southern Farmland.

Extent of Visibility

Solar PV Site

10.5.36 The combination of flat landform and the strong pattern of hedgerows results in a relatively open character across the Solar PV Site and Study Area, with views of open skies, but greatly limits low level views, and therefore the extent to which the Solar PV Site is visible.

10.5.37 The Solar PV Site's northern boundary is typically the most open, given the fragmented line of vegetation that lines the River Went. As such, the longest distance views into the Solar PV Site are likely to be from the north. However, such views are typically limited to locations within 1 km of the Solar PV Site's northern boundary.

10.5.38 Views of the Solar PV Site from the east are mostly truncated by intervening vegetation, in particular the mature trees that line the disused railway extending the length of the Solar PV Site. As such, there is likely no intervisibility between the Solar PV Site and Sykehouse or Topham. Glimpses of the Solar PV Site are afforded from West Lane, where the Solar PV Site abuts the road.

10.5.39 There's potential for glimpses of the Solar PV Site from the south, including from the settlement of Moss, although such views are heavily filtered by intervening vegetation.

10.5.40 Similarly, the existing networks of hedgerows and tree belts mostly screen views of the Solar PV Site from the west, including from Fenwick. Vegetation flanking Fenwick Common lane similarly screens any intervisibility with the Solar PV Site. Further west, the East Coast Main Line, which is elevated above the surrounding landscape, screens views towards the Solar PV Site.

10.5.41 Open views of the Solar PV Site are experienced from PRoW that cross the southern part of the Solar PV Site, and from Lawn Lane, which spans approximately 200 m from east to west across the central part of the Solar PV Site.

10.5.42 The Solar PV Site is not visible in its entirety from any one location.

Grid Connection Corridor Search Area

10.5.43 There is potential for views of the Grid Connection Corridor Search Area from within the associated Study Area, from the PRoW network, from settlements/individual dwellings, and from the road network. Potential for landscape and visual effects will be considered throughout the Scheme design and assessment process informing the potential route and layout of infrastructure within the Grid Connection Corridor Search Area.

Further Visibility Analysis

10.5.44 Further fieldwork will be undertaken throughout the Scheme design and assessment process. The fieldwork will be informed by Zones of Theoretical Visibility (ZTV) mapping, which will model the key structures proposed in relation to existing landform (bare earth) and with the addition of existing vegetation and buildings (with screening).

10.5.45 The findings of the fieldwork will be presented to the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council, seeking their agreement of the visual receptors that have the potential to be impacted by the Scheme, and the locations of viewpoints that will be used to represent their views.

10.5.46 Photography will be captured from each representative viewpoint used in the assessment, in both summer and winter conditions, showing the effect of the seasons on the potential visibility of the Scheme. This photography will be undertaken in accordance with the methodology for Type 1 photographs as set out in the Landscape Institute's Technical Guidance Note 06/19 Visual Representation of Development Proposals (Ref 154).

Key Landscape and Visual Receptors

10.5.47 Table 10-1 records the preliminary list of landscape and visual receptors that will be assessed in the LVIA to be reported in the ES. This list is based on the analysis completed to date and will be reviewed as the design and assessment of the Scheme progresses. Agreement regarding updates to the list of receptors will be sought with the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council.

Table 10-1: Landscape and Visual Receptors to be Scoped In

Receptor Group	Receptor
Landscape receptor	• NCA 39: Humberhead Levels (Ref 151); • Landscape Character and Capacity Assessment of Doncaster Borough, March 2007: LCA F2: Owston to Sykehouse Settled Clay Farmlands (Ref 152); • The Selby Landscape Character Assessment: LCA 17: Southern Farmland (Ref 153); and • Local LCAs (to be defined and agreed during the assessment).

Receptor Group	Receptor
Visual receptors – residents	• Residents of Cherry Tree Farm, Lowgate Farm, Linton House Farm, Fir Tree Farm, Balne Hall, Topham, West End, Fenwick Grange, Moseley House Farm, Jet Hall, Moss, Ridings Farm, Fenwick Hall, Fenwick, Sykehouse and Topham; and • Residents living in the following areas will be considered if works in the Grid Connection Corridor Search Area are required: Hawkhouse Green, Trumfleet, Haywood and Thorpe in Balne.
Visual receptors – people engaged in recreational activity	• Users of PRoW (walking and cycling) within the Site boundary and a proportionate number of routes across the Study Areas associated with the Solar PV Site and Grid Connection Corridor Search Area to provide a representative assessment of views from the north, east, south and west of the Site boundary.
Visual receptors – motorists and people travelling on trains	• People travelling on the road network including Lowgate, West Lane, Moss Road and Lawn Lane; • People travelling on the East Coast Main Line; and • People travelling on the following roads will be considered if works within the Grid Connection Corridor Search Area are required: Hayworth Lane, Trumfleet Lane, Willow Bridge Lane, Wrancarr Lane and Marsh Road.

10.6 Potential Effects and Mitigation

10.6.1 The Scheme has the potential to result in temporary significant adverse landscape effects during the construction phase due to alterations to surface landform and vegetation, the presence of construction machinery and associated reductions in tranquillity. These aspects of the construction phase also have the potential to result in temporary significant adverse visual effects, due to the changes in the composition of views, in comparison to views of fields and general farming activity.

10.6.2 The Scheme has the potential to result in significant adverse landscape effects during operation (assessed at year 1 and year 15) due to the change in land use resulting from the presence and massing of the solar panels and associated structures, although the Scheme is reversible. Similarly, the Scheme has potential to result in significant adverse visual effects resulting from the introduction of solar panels and associated infrastructure into people's views.

10.6.3 The Scheme also has the potential to result in beneficial landscape and visual effects in the longer term, resulting from changes to land cover and new planting across the Solar PV Site.

10.6.4 The decommissioning phase has the potential to result in significant adverse landscape and visual effects, similar to the construction phase, due to the presence of machinery and general activity to remove the solar panels and associated structures.

10.6.5 The LVIA will inform the iterative design of the Scheme and mitigation measures, specifically with regard to the siting and layout of the solar panels and associated structures; as well as the colour and tone of associated structures to minimise their visibility and perceived scale in people's views.

10.6.6 The LVIA will also seek opportunities for new green infrastructure, including new planting and recreational access, which will be embedded into the Scheme design, connecting into the wider green infrastructure network.

10.6.7 The relevant landscape and visual mitigation measures will be set out in the LVIA to be reported in the ES and included in the Framework CEMP, OEMP and DEMP that will be prepared as part of the DCO application for the construction, operation and decommissioning phases, respectively. The plans will form the basis of the detailed CEMP, OEMP, and DEMP, and are expected to be secured through a Requirement in the DCO.

10.7 Assessment Methodology

10.7.1 The LVIA will be undertaken in accordance with the following best practice guidance:

- GLVIA 3 (Ref 29);
- The Landscape Institute's Technical Guidance Note 02/21: Assessing Landscape Value Outside National Designations, 2021 (Ref 155); and
- The Landscape Institute's Technical Guidance Note 06/19: Visual Representation of Development Proposals, 2019 (Ref 154).

10.7.2 These publications form a standard reference for undertaking LVIA for renewable energy schemes in the UK.

10.7.3 The LVIA will also refer to:

- An Approach to Landscape Character Assessment, by Natural England (Ref 156);
- Infrastructure Technical Guidance Note 04/2020 by the Landscape Institute (Ref 157);
- Tranquillity Technical Guidance Note 2017 by the Landscape Institute (Ref 158); and
- Technical Guidance Note 2/19: 'Residential Visual Amenity Assessment' (2019) by the Landscape Institute (Ref 159).

10.7.4 The LVIA methodology will be presented in full to the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council to receive their comment and seek their agreement. The methodology will

reflect the process set out in Figure 3.5 of GLVIA 3 (Ref 29) as shown in Plate 10-1.

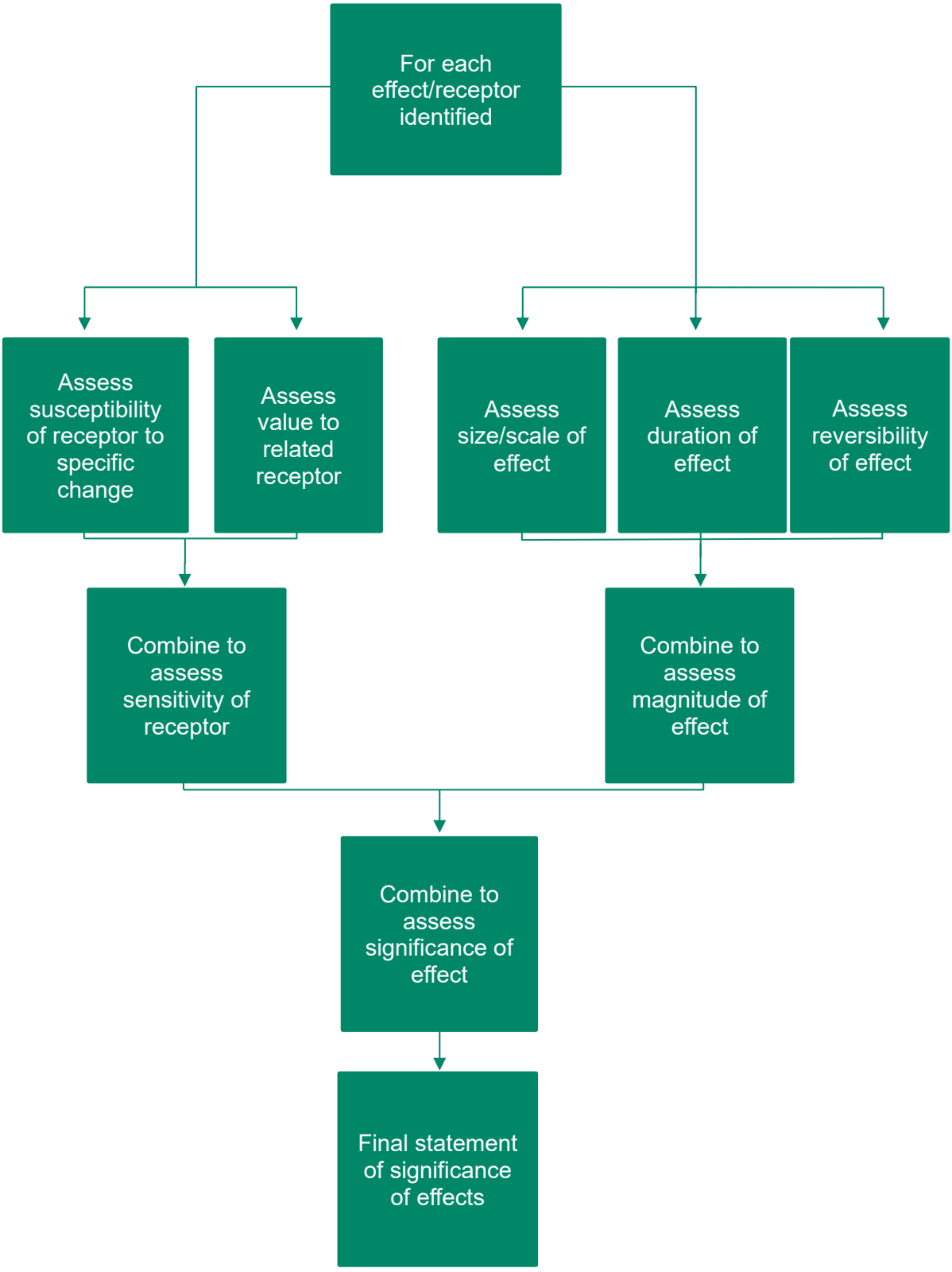

Plate 10-1: LVIA Methodology (Ref 29)

10.7.5 In accordance with the GLVIA 3 process, the LVIA methodology will include the following key stages:

- Building on the analysis presented above, a baseline review of published landscape assessments, studies, relevant supporting evidence base documents, aerial photography, mapping and fieldwork will be undertaken to identify the landscape and visual baseline and receptors. These will be presented to the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council to seek their agreement of the scope of the LVIA, including the extent of the Study Area;
- An assessment of the sensitivity of landscape and visual receptors will be undertaken, based on an assessment of their respective value and susceptibility to change;
- An assessment of the magnitude of impact resulting from the Scheme during construction, Year 1, Year 15 and decommissioning will be undertaken. The assessment of magnitude of impact will consider the scale, duration, and reversibility of the impact;
- The receptor's sensitivity and the magnitude of impact experienced will be combined to determine the resultant level of effect; and
- An assessment of the significance of the effect to the landscape and visual receptors identified will be undertaken. The threshold for a significant effect will be agreed with the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council.

10.7.6 The LVIA will review the glint and glare assessment provided within the ES to include consideration of how glint and/or glare might contribute to landscape or visual effects.

10.8 Assumptions, Limitations and Uncertainties

10.8.1 All fieldwork will be undertaken from publicly accessible locations. Professional judgement will be used to assess residents' views, aided by aerial photography and fieldwork observations.

10.8.2 Short term durations are considered to be two years or less; medium term durations are considered to be between two and five years; and long-term durations are considered to be more than five years.

10.8.3 For the construction phase assessment, it will be assumed that, as a worst case, construction activity will occur in winter and be undertaken across the Site at the same time. PRoW which cross the Site boundary would be kept open or temporarily closed for short periods of time only, and therefore the assessment will consider recreational receptors using these routes during the construction phase.

10.8.4 For the year 1 operational assessment, it will be assumed that the Scheme will be operational in winter conditions. The year 15 assessment will assume summer conditions and the establishment of mitigation planting. Assessing both winter and summer conditions provides an assessment of the Scheme throughout the seasons, in line with GLVIA3 (Ref 29) which requires consideration to be given to seasonal differences, assessing the winter

season (year 1) and the fuller screening of vegetation in summer conditions (year 15).

10.8.5 For the decommissioning assessment, it will be assumed that the Scheme is no longer operational, and that the solar panels and associated structures and equipment are being removed in a manner similar to the construction phase, requiring machinery and localised excavation. It is currently expected that the proposed green infrastructure (planting) would remain (although the Applicant cannot control what the landowners do to the green infrastructure after completion of the decommissioning phase and once the land is handed back; any changes at this point would not be part of the Scheme).

10.8.6 Uncertainties at this stage are the layout, siting and heights of the solar panels, BESS, substations and associated structures including fencing, cameras etc. The LVIA Study Area and landscape and visual receptors will be reviewed as the design progresses and the heights of these features are confirmed, informed by the ZTVs.

10.8.7 Any lighting during the construction phase would be directional, temporary and only used during working hours. When used, lighting would be designed to minimise potential for light spillage beyond the Solar PV Site, particularly towards houses, roads and ecological habitats, in so far as it is reasonably practicable. During operation any lighting would be directed at infrastructure and only triggered by motion detection or manually during emergencies. Commitments on the principles of the lighting strategy will be provided in **Chapter 2: The Scheme** and within the Framework CEMP that will be submitted with the ES. As such, a standalone quantitative lighting assessment is scoped out of the LVIA. The effect of lighting will be considered as part of the Scheme, rather than as a stand-alone assessment, and will therefore be included in the description of impacts on landscape character and visual amenity included in the ES.

10.8.8 The LVIA will assess the potential visual effects to different types of visual receptor, including residential receptors i.e. private views (albeit assessed from publicly accessible locations). In the event that the visual assessment identifies major adverse effects on residents at year 15 of operation (i.e. major adverse visual effects that have not been mitigated), a Residential Visual Amenity Assessment will be undertaken in line with the Landscape Institute's Technical Guidance Note 2/19: 'Residential Visual Amenity Assessment' (Ref 159).

10.9 Summary of Elements Scoped In and Scoped Out

10.9.1 A summary of the elements scoped into and out of the assessment of landscape and visual amenity are presented in Table 10-2.

Table 10-2: Elements Scoped In and Out of the Assessment of Landscape and Visual Amenity

Element	Scoped In / Scoped Out
Assessment of landscape and visual effects (construction, operation and decommissioning)	Scoped in – no potential landscape or visual receptors located within the preliminary LVIA Study Areas are currently scoped out. Should it become apparent, through the design and assessment process, that there would be no landscape or visual effects on a receptor, the receptor will be scoped out, following consultation with the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council.
Separate lighting assessment (construction, operation and decommissioning)	Scoped out – the effect of lighting will be considered in the LVIA, rather than as a stand-alone assessment. Commitments on the principles of the lighting strategy will be provided in the ES and Framework CEMP.

11. Noise and Vibration

11.1 Introduction

11.1.1 This chapter sets out the scope and methodology for the noise and vibration assessment of the Scheme. The purpose of the assessment is to identify and characterise any relevant sensitive receptors, to consider the nature and scale of potential noise and vibration impacts arising from the Scheme, and to assess the significance of any likely effects.

11.1.2 Note that the scope of this chapter considers noise and vibration effects on human receptors and excludes the assessment of noise and vibration on heritage or ecological receptors. In-combination effects on heritage or ecological receptors due to the introduction of the Scheme are considered in **Chapter 7: Cultural Heritage** and **Chapter 8: Ecology** of this EIA Scoping Report.

11.2 Study Area

11.2.1 The Study Area includes construction, decommissioning and operational noise and vibration features likely to be at risk from possible direct and indirect impacts that might arise from the Scheme.

11.2.2 For construction and decommissioning noise effects from the Solar PV Site, the area for which noise and vibration impacts are expected is considered to be 300 m, based on guidance in BS 5228-1 (Ref 160) which states that construction noise predictions are generally reliable up to 300 m. However, for operational noise effects, an area up to 500 m from the Solar PV Site will be considered. This distance of 500 m is based on previous experience of undertaking noise assessments for solar farm projects.

11.2.3 A 500 m Study Area for the Solar PV Site has therefore been used for the construction, decommissioning and operational noise and vibration assessment. It is considered that receptors further than 500 m from the Solar PV Site would experience considerably lower levels of noise and vibration emissions as these would attenuate over distance, resulting in negligible noise and vibration effects from the Scheme. The Study Area for the Solar PV Site is illustrated in Figure 11-1.

11.2.4 The Study Area for construction noise effects associated with works in the Grid Connection Search Area includes receptors within 300 m, as per guidance in BS 5228-1 (Ref 160). These receptors will be identified in the PEIR, once the Grid Connection Search Area has been refined and following additional consultation. The Existing National Grid Thorpe Marsh Substation is located within the Grid Connection Corridor Search Area. Additionally, a 500 m Study Area to the footprint of any operational plant locations within the Grid Connection Search Area will be defined, along with a Study Area of 50 m either side of construction traffic routes, based on guidance in the Design Manual for Roads and Bridges LA111 (Ref 146).

11.2.5 Noise receptors in the vicinity of the Solar PV Site are presented in Table 11-1 which have been determined by desktop study. A finalised list of assessment receptors for the Site (including the Grid Connection Search

Area and Existing National Grid Thorpe Marsh Substation) will be selected through the scoping process and in consultation with key stakeholders including Environmental Health Officers of the City of Doncaster Council. Selected noise receptors will be defined within the ES.

Table 11-1: Noise Sensitive Receptor Locations – Solar PV Site

ID	Name	Approximate Co-ordinates (Latitude, Longitude)
R1	Fenwick Hall, Lawn Lane	53.639861°, -1.081671°
R2	Riddings Farm, Lawn Lane	53.640709°, -1.086459°
R3	Fenwick Receptors	53.638897°, -1.101459°
R4	Topham Receptors	53.648408°, -1.062149°
R5	West Lane, Sykehouse Receptors	53.639429°, -1.059185°
R6	Stockbridge Farm, Bale Lane	53.643953°, -1.057451°
R7	Bungalow Farm, Bale Lane	53.637603°, -1.066795°
R8	West End Farm, Bale Lane	53.635729°, -1.069728°

11.2.6 As discussed in Section 11.1.2, the assessment of noise effects on built heritage or ecological receptors will be addressed in the cultural heritage and ecology chapters of the ES.

11.3 Legislation, Planning Policy Context and Guidance

11.3.1 Legislation, planning policy and guidance relating to noise and pertinent to the Scheme is set out below.

Legislation

11.3.2 Relevant legislation includes:

- COPA 1974 (Ref 24); and
- Environmental Protection Act 1990 (Ref 161).

National Planning Policy

11.3.3 Relevant national planning policy includes:

- The Overarching NPS for Energy (EN-1) (Ref 8). Reference will be made to Section 5.11 and paragraphs 5.11.4 to 5.11.10 in relation to the assessment of noise;
- The NPS for Electricity Networks Infrastructure (EN-5) (Ref 10), taken together with NPS EN-1, provides the primary basis for decisions taken by the SoS on applications it receives for the categories of nationally significant electricity networks infrastructure included within it. Reference will be made to Section 2.9 (Noise and Vibration). Paragraph 2.9.7 relates to noise from substation equipment;

- Paragraph 5.12.6 of the draft NPS EN-1 (Ref 8) provides details of what should be included in a noise assessment. Section 3.10 of the draft EN-3 (Ref 9) includes the consideration of transport noise and vibration associated with solar PV generation schemes. Paragraphs 2.9.37 to 2.9.38 of the draft NPS EN-5 (Ref 10) identifies substations as a source of audible noise effects and identifies BS 4142 as example guidance for assessing substation noise;
- The NPPF (Ref 13) contains the government's planning policies relating to noise in paragraph 174 and 185; and
- The Noise Policy Statement for England (NPSE) (2010) (Ref 162) sets out the long-term vision for the government's noise policy. The NPSE sets definitions for 'significant adverse effects' and 'adverse effects' using the concepts:
  - Lowest Observed Adverse Effect Level (LOAEL) – the level above which, as an average response, adverse effects on health and quality of life can be detected; and
  - Significant Observed Adverse Effect Level (SOAEL) – the average response level above which, as an average response, significant adverse effects on health and quality of life occur.

National Guidance

11.3.4 Relevant national guidance includes:

- Planning Practice Guidance: Noise (PPGN) (Ref 163) provides guidelines that are designed to assist with the implementation of the noise requirements set out in the NPPF.

Local Planning Policy

11.3.5 Relevant local planning policy includes:

- Doncaster Local Plan (2021) – Policy 54: Pollution (Ref 14).

11.3.6 This policy seeks to ensure that potential noise generated from new energy developments is acceptable and that impacts are mitigated.

11.4 Consultation

11.4.1 Consultation with the Environmental Health Officers at the City of Doncaster Council will be carried out to agree the scope and methodology of baseline noise level surveys, ensuring that they are representative of surrounding noise sensitive receptors.

11.5 Baseline Conditions

11.5.1 The land use in the Site is primarily agricultural. There are individual and clusters of residential properties located adjacent to the Site boundary. The main sources of sound in the Study Area identified through aerial mapping are traffic on the local road network and agricultural activities.

11.5.2 Baseline sound monitoring will be undertaken at selected locations to define representative baseline data at noise-sensitive receptors around the Site.

Five monitoring locations have been selected for the Solar PV Site with approximate locations illustrated in Figure 11-1. The final monitoring locations for the Site (including within the Grid Connection Search Area and the Existing National Grid Thorpe Marsh Substation) will be selected as the Scheme design progresses and through consultation with the City of Doncaster Council.

11.5.3 The monitoring procedures will follow guidance from BS 7445-1:2003 'Description and environment of environmental noise – Part 1: Guide to quantities and procedures' (Ref 164) and BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (Ref 165).

11.5.4 A combination of long-term unattended and short-term attended measurements will be used. A weather station will also be installed for the duration of the sound surveys so that any periods of adverse weather conditions can be identified and omitted from the noise data.

11.6 Potential Effects and Mitigation

Construction and Decommissioning Noise and Vibration (Temporary Effects)

11.6.1 Potential noise and vibration effects during the Scheme construction and decommissioning phases are likely to include works activities associated with site preparation, plant installation, substation construction, cable laying, and construction-related vehicle movements within the Site boundary and along access routes.

11.6.2 Mitigation measures to control noise as defined in Annex B of British Standard (BS) 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites - Part 1: Noise' (Ref 160) and mitigation measures to control vibration as defined in Section 8 of BS 5228:2009+A1:2014 'Part 2: Vibration' (Ref 166) will be adopted where reasonably practicable.

11.6.3 These measures represent Best Practicable Means (BPM) (as defined by section 72 of the COPA 1974) (Ref 24) to manage noise and vibration emissions from construction activities. Examples of BPM that may be implemented during construction and decommissioning works are presented below:

- Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use;
- Appropriate routing of works traffic on public roads and along access tracks;
- Drop heights of materials will be minimised;
- Plant and vehicles will be sequentially started up rather than all together;
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas; and

- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications.

11.6.4 Embedded mitigation measures relevant to the construction phase will be described within the Framework CEMP which will form part of the ES and which would be developed into a detailed CEMP prior to the start of construction (see paragraph 5.3.6), and then implemented by the construction contractor. Embedded mitigation measures relevant to the decommissioning phase will be described within a Framework DEMP which will form part of the ES and which would be developed into a detailed DEMP in advance of the commencement of decommissioning works (see paragraph 5.3.6).

Operational Noise (Reversible Long-Term Effects)

11.6.5 The potential noise effects during operation of the Scheme are likely to include noise from solar farm plant (e.g. inverters, transformers, switchgears and the motors for the tracking panels (if used) and associated battery storage plant (e.g. cooling units, transformers)), the substation(s) (e.g. transformers) and any associated maintenance vehicle movements.

11.6.6 Plant items such as solar PV modules, PV module mounting structures and cabling (both onsite and via the electricity export connection cable) would not produce any operational noise emissions.

11.6.7 Equipment is of a type and would be used in locations such that operational plant would not generate perceptible levels of vibration. As such, there would be no associated operational vibration effects. This will be confirmed in the detailed Scheme description within the ES. It is proposed that operational vibration is scoped out of the EIA.

11.6.8 At this phase no specific noise mitigation measures have been included for operational plant. However, based on the proposed plant installations it is assumed that plant would be designed to have no tonal, impulsive or intermittent features.

11.6.9 As the plant design is progressed, the specification of plant and machinery with low noise emission and properly attenuated supply and extract terminations would help to minimise noise emissions. The use of enclosures, local screening, mufflers, and silencers would also be used as appropriate. These measures will be described in the ES.

11.6.10 Operational traffic will be limited in numbers and not sufficient enough to result in significant changes to ambient noise levels in areas around the local road network. Therefore, it is proposed that operational traffic noise is scoped out of the EIA.

11.6.11 Mitigation measures applicable to the Scheme's operation will be included in a Framework OEMP prepared as part of the DCO application. The Framework OEMP will form the basis of the detailed OEMP which is expected to be secured as a Requirement of the DCO.

11.7 Assessment Methodology

11.7.1 All noise effects are local, only affecting nearby sensitive receptors and are direct in nature. However, defining a likely noise effect and whether it is significant or not depends on the nature of a noise source. Likely noise effects have been defined based on guidance set out in the NPSE (Ref 162) and NPPG for noise (Ref 163).

11.7.2 A new source of noise will be assessed through the absolute noise level it generates at sensitive receptors. Where an exceedance of the defined SOAEL for each noise source occurs, it is an indication of a likely significant effect. However, where an existing noise source is changed (e.g. construction traffic changing road traffic noise levels), the assessment of the effect level due to the change in noise refers to guidance within the IEMA Guidelines for Environmental Noise Impact Assessment (Ref 167).

11.7.3 Government policy for noise in the NPSE (Ref 162) is based on community exposure response relationships and noise insulation of a typical dwelling. Consequently, an assessment based on LOAELs and SOAELs cannot be applied to non-residential sensitive receptors. As such, the approach to the assessment of non-residential receptors differs from that adopted for residential receptors. Non-residential receptors will be considered on a case-by-case basis by considering the applicable design criteria for good internal noise levels.

Construction and Decommissioning Noise and Vibration

11.7.4 Noise and vibration levels associated with construction and decommissioning works will be assessed at chosen sensitive receptors. Annex E of BS 5228-1 (Ref 160) provides example methods for the assessment of the significance of construction noise effects. With reference to the NPSE (Ref 162), the LOAEL, SOAEL and Unacceptable Adverse Effect Level (UAEL) thresholds have been set as detailed in Table 11-2.

Table 11-2: Thresholds of Potential Effects of Construction and Decommissioning Noise at Residential Buildings (Ref 160)

Time Period	Threshold Value (LAeq,T dB)		
	LOAEL	SOAEL	UAEL
Weekday (07:00 – 19:00) Saturday (07:00 – 13:00)	65	75	85
Evening (19:00 – 23:00) Weekends (13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays)	55	65	75
Night (23:00 – 07:00)	45	55	65

11.7.5 Table 11-3 details Peak Particle Velocity (PPV) levels (a standard measure of vibration effects) and their potential effect on humans based on guidance from BS 5228-2 (Ref 166).

Table 11-3: Thresholds of Potential Effects of Construction and Decommissioning Vibration (Human Response)

Magnitude of Impact	PPV Vibration Level	BS 5228-2 Description of Impact
LOAEL	0.3 mm/s	Vibration might be just perceptible in residential environments.
SOAEL	1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but it can be tolerated if prior warning and explanation has been given to residents.

11.7.6 The temporary changes in road traffic noise levels along the local road network due to Scheme decommissioning and construction traffic will be assessed based on guidance in the IEMA Guidelines for Environmental Noise Impact Assessment (Ref 167). Assessment criteria are presented in Table 11-4.

Table 11-4: Construction and Decommissioning Traffic Noise Assessment Criteria

Effect Level	Magnitude Criteria
Negligible	≥ 0 dB and < 1 dB
Minor	≥ 1 dB and < 3 dB
Moderate	≥ 3 dB and < 5 dB
Major	≥ 5 dB

Operational Noise

11.7.7 The impact of the proposed operational plant such as noise from the inverters, tracker panels (if used) and BESS will be assessed with reference to the Doncaster Local Plan, which provides assessment criteria based on guidance from BS 4142:2014 (Ref 165). Reference will also be made to BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (Ref 168) and the World Health Organization (WHO) Guidelines for Community Noise (1999) (Ref 169).

11.7.8 The assessment criteria for noise from fixed plant installations are summarised in Table 11-5. The assessment will be based on available information on the operating conditions and the levels of noise generated by the plant.

Table 11-5: Operational Noise Assessment Criteria

Effect Level	Rating Level (External) at Receptor, $L_{Ar,Tr}$	
	Daytime (07:00-19:00) and Evening (19:00-23:00)	Night-time (23:00-07:00)
LOAEL	Less than or equal to +5dB above the typical background level ($L_{A90,T}$) – minimum of 35 dB $L_{Ar,Tr}$	Less than or equal to +5dB above the typical background level ($L_{A90,T}$) – minimum of 30 dB $L_{Ar,Tr}$
SOAEL	Greater than +10 dB above the background noise level – minimum of 45 dB $L_{Ar,Tr}$	Greater than +10 dB above the background noise level – minimum of 40 dB $L_{Ar,Tr}$

Assessment of Non-Residential Receptors

11.7.9 Design criteria for good internal conditions in non-residential receptors are set in BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (Ref 168) and the WHO Guidelines for Community Noise (Ref 169). Reference to specific design criteria for non-residential receptors will be undertaken when deriving assessment criteria.

11.8 Assumptions, Limitations and Uncertainties

11.8.1 Noise and vibration effects during the Scheme decommissioning phase would be similar to or less than noise and vibration effects during the construction phase. The noise and vibration assessment presented for the construction phase will therefore be considered representative (or an overestimate) of the decommissioning phase. As such, a separate assessment for noise and vibration from the decommissioning phase is not proposed.

11.8.2 Predictions of sound levels have an associated degree of uncertainty. Modelling and measurement processes have been carried out in such a way to reduce such uncertainty; however, it is unavoidable that some degree of prediction uncertainty remains so a precautionary approach will be adopted in sound predictions.

11.8.3 Construction works noise levels will be predicted following guidance from BS 5228-1 (Ref 160) which provides a realistic estimate of sound propagation from construction plant. The predictions will use representative noise levels, sourced from industry standard guidance documents such as BS 5228-1, for typical items of plant that are used in such developments.

11.8.4 Construction phase vibration will be assessed based on historic vibration measurement data from relevant guidance documents including BS 52282-2 (Ref 166) and Transport Research Laboratory (TRL) Report 429 (Ref 170). No predictions of ground-borne vibration propagation are proposed.

11.8.5 Predictions of operational plant and activities sound pressure levels will be undertaken following guidance from International Organisation for Standardisation (ISO) 9613 ‘Attenuation of Sound during Propagation Outdoors’ (Ref 171) which are based on an assumption of moderate

downwind propagation, and hence could be considered as a worst-case calculation. However, the standard also indicates an estimated accuracy of ±3 dB(A) in predicted levels.

11.8.6 Any measurement of existing ambient or background sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels and a small degree of uncertainty will always remain in the values taken. Every effort will be made to ensure that measurements are undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions and school holiday periods (which are often considered to result in atypical sound levels). Consequently, the level of uncertainty in measurements will be reduced as far as reasonably practicable.

11.9 Summary of Elements Scoped In and Scoped Out

11.9.1 A summary of the elements scoped into and out of the assessment of noise and vibration are presented in Table 11-6.

Table 11-6: Elements Scoped In and Out of the Assessment of Noise and Vibration

Element	Scoped In/ Scoped Out
Noise and vibration levels (construction and decommissioning)	Scoped in – temporary noise and vibration emissions from construction and decommissioning works may adversely impact on sensitive receptors.
Traffic noise (construction and decommissioning)	Scoped in – temporary noise from construction traffic movements may adversely affect receptors near public roads that are part of construction traffic routes.
Noise (operation)	Scoped in – permanent noise emissions from solar farm infrastructure may adversely affect nearby sensitive receptors.
Vibration (operation)	Scoped out – equipment is of a type and would be used in locations such that operational plant that would not generate perceptible levels of vibration. As such, there would be no associated operational vibration effects. This will be confirmed in the detailed Scheme description within the ES.
Traffic noise (operation)	Scoped out – the Scheme would generate limited numbers of operational traffic that would not result in perceptible changes in road traffic noise.

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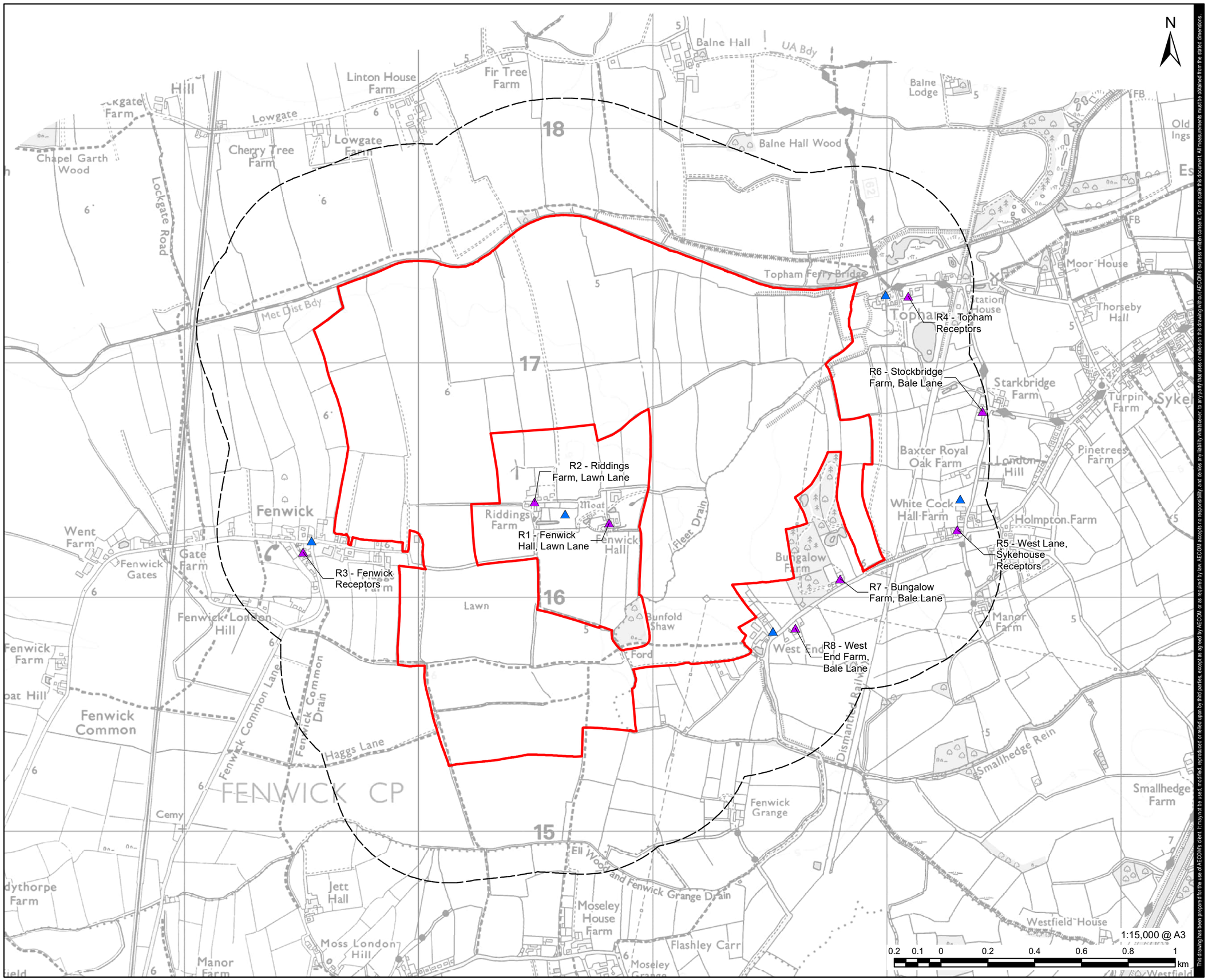

AECOM

PROJECT

Fenwick Solar Farm

CLIENT

Fenwick Solar Project Limited

CONSULTANT

AECOM Limited
Midpoint,
Alencon Link
Basingstoke, RG21 7PP
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LEGEND

- Solar PV Site
- 500m Buffer of Solar PV Site
- Monitoring Location
- Noise Receptor

NOTES

ISSUE PURPOSE

Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Noise Receptor Locations - Solar PV Site

FIGURE NUMBER

Figure 11-1

12. Socio-Economics and Land Use

12.1 Introduction

12.1.1 This chapter sets out the scope and methodology for the socio-economics and land use assessment of the Scheme. The purpose of the assessment will be to identify and characterise any relevant socio-economic and land use receptors, to consider the nature and scale of potential impacts arising from the Scheme, and to assess the significance of any likely effects.

12.2 Study Area

12.2.1 The potential temporary and permanent economic and employment impacts arising from the Scheme will be considered relative to a principal economic area, defined based on consideration of Local Planning Authority boundaries, a typical travel time from the Site and drawing on demographic and economic data/indicators for the combined statistical area that aligns with the radius deemed most appropriate.

12.2.2 The Study Area for land use receptors (residential properties, local businesses, visitor attractions relevant for tourism, community facilities, open space, recreational assets and development land) reflects receptors that could be directly or indirectly affected by the Scheme. The receptors that could be impacted are therefore those within the Site, including the Solar PV Site, the Grid Connection Search Area and the Existing National Grid Thorpe Marsh Substation, and those within 500 m of the Site boundary, noting that a 2 km radius is used for community facilities.

12.2.3 Impacts on Best and Most Versatile (BMV) agricultural land and soils will also be considered, with the Study Area comprising the land within the Site boundary.

12.2.4 A map of the above-mentioned Study Areas, in relation to the Solar PV Site and the Grid Connection Search Area/Existing National Grid Thorpe Marsh Substation, will be included in the ES.

12.3 Legislation, Planning Policy Context and Guidance

12.3.1 There is no applicable legislation specific to the assessment of socio-economics and land use. Planning policy and guidance relating to socio-economics and land-use and pertinent to the Scheme are set out below.

National Planning Policy, Other Policy, and Guidance

12.3.2 Relevant national planning and other policy and guidance includes:

- NPS EN-1 (Ref 5), with particular reference to: paragraphs 4.1.3 and 4.1.4 in relation to the potential socio-economic adverse effects and benefits associated with the Scheme; paragraph 4.2.1 in relation to requirements for the content of an Environmental Statement; paragraph 4.2.2 in relation to socio-economics; paragraph 5.10.8 in relation to impacts on the BMV agricultural land; and section 5.12 in relation to socio-economic impacts;

- The Draft NPS EN-1 (Ref 8), with reference to: paragraph 4.1.5 in relation to potential adverse effects and benefits associated with the Scheme; paragraph 4.2.4 in relation to socio-economics; paragraph 5.11.8 in relation to land use impacts, paragraph 5.11.12 in relation to BMV agricultural land impacts; paragraph 5.11.23 in relation to mitigation, paragraph 5.11.30 in relation to PRoW impacts and section 5.13 in relation to socio-economic impacts;
- There is no relevant policy contained within NPS EN-3 (Ref 6), however, Draft NPS-EN3 (Ref 9) includes the additional consideration of socio-economic impacts associated specifically with solar PV generation schemes and highlights the need to consider effects on PRoW. Paragraph 3.10.2 of the Draft EN-3 (Ref 9) sets out the government's support of solar that is co-located with other functions (including agriculture) to maximise the efficiency of land use and paragraph 3.10.60 references the socio-economic benefits of retaining site infrastructure after the operational life of a solar farm, such as retaining pathways through the site. Paragraph 3.10.15 highlights the need to consider effects on agricultural land classified as 1, 2 and 3a;
- NPPF (Ref 13), with particular reference to: Section 6, Building a strong, competitive economy (particularly paragraphs 81-83); Section 12, Achieving well-designed places (paragraphs 127-128); Section 15, Conserving and enhancing the natural environment; and, Section 17, Facilitating the sustainable use of minerals;
- Planning Practice Guidance (Ref 172), with particular reference to guidance on planning and the economy and the potential future needs of the population in terms of economic development, jobs and employment opportunities; and
- National Economic Development Policy (Ref 173), with particular reference to the Government's Industrial Strategy White Paper ambitions to increase productivity and drive growth. Clean Growth in particular is highlighted as a method through which to lead the world in the development, manufacture and use of low carbon technologies.

Regional and Local Planning and Other Policy

12.3.3 Relevant regional and local planning and other policy includes:

- Adopted Doncaster Local Plan 2015-2035 (2021) (Ref 14), with particular reference to: Policy 18: Development affecting PRoW; Policy 27: Protecting open space and non-designated open space; Policy 51: Protection of education, community and leisure facilities; Policy 58: Low carbon and renewable energy; Policy 60: Protecting and Enhancing Doncaster's Soil and Water Resources; and Policy 61: Providing for and safeguarding mineral resources;
- Yorkshire and the Humber Climate Action Plan (2021) (Ref 174), with particular reference to: Proposed Actions 32 (support the greatly accelerated decarbonisation of energy supply), and 33 (promote significant expansions in community energy and distributed renewables);

12.3.4 South Yorkshire Mayoral Combined Authority Strategic Economic Plan 2021-2041 (2021) (Ref 175), with particular reference to: Section 4: Skills, education and employment and Section 5: Clean energy and Net-Zero; and

12.3.5 Adopted Selby District Core Strategy (2013) (Ref 224) (now part of North Yorkshire Council), with particular reference to Policy SP1 (Presumption in Favour of Sustainable Development), Policy 12 (Access to Services, Community Facilities, and Infrastructure), Policy SP15 (Sustainable Development and Climate Change) and Policy SP17 (Low-Carbon and Renewable Energy).

12.4 Consultation

12.4.1 Consultation will be undertaken with the Minerals and Waste Officers for the City of Doncaster Council to confirm that as minerals will be accessible following decommissioning, the Scheme satisfies the requirements of the City of Doncaster Mineral Safeguarding policy and that mineral safeguarding can be scoped out of further assessment. There are no Minerals Safeguarding Areas located within 500 m of the Solar PV Site. There is one Mineral Safeguarding Area for sand and gravel within the 500 m Study Area for the Grid Connection Corridor Search Area (Land to the east of Doncaster between Thorne and Bawtry).

12.4.2 No further consultation will be undertaken specifically to inform the assessment of socio-economic and land use impacts, however, the information gathered during the non-statutory and statutory consultation events will be used as appropriate to help inform the scope of the assessment.

12.5 Baseline Conditions

12.5.1 The potential impacts arising from the Scheme will be assessed relative to baseline conditions and benchmarked against regional and national standards where appropriate. Key indicators and measures of the Study Areas will be established for:

- Population and deprivation;
- An overview of the local economy;
- The local labour market; and
- Land use.

12.5.2 A high-level summary of baseline conditions has been presented in the following paragraphs, based upon review of the following datasets:

- Office for National Statistics (ONS) 2021 Census Data (Ref 176);
- ONS Mid-Year Population Estimates (2021) (Ref 177);
- Ministry of Housing, Community and Local Government (MHCLG) (2019) English Indices of Deprivation (2019) (Ref 178);
- ONS (2022) UK Business Register and Employment Survey (Ref 179);
- ONS (2023) Claimant count by sex and age (February 2023) (Ref 180);

- ONS (2018) Gross Value Added (Income Approach) (2017) (Ref 181); and
- ONS (2022) Annual Population Survey (January 2021 to December 2021) (Ref 182).

Population and Deprivation

12.5.3 The Site is located within the area administered by the City of Doncaster Council, and on the boundary with North Yorkshire Council to the north. The North Yorkshire Council administrative area is located within the Study Areas for socio-economics and land use as described above. Therefore, this section considers the baseline conditions within both local authorities. It should be noted that until 1st April 2023 Selby District Council (SDC) was the Local Authority to the north of the site. While Selby District has now been incorporated into North Yorkshire, many of the statistical sources reflect the pre-existing administrative boundaries and therefore data for Selby District is presented below.

12.5.4 The population of Doncaster has grown from 302,468 in 2011 to 308,705 in 2021, representing a growth rate of 2.1%. In Selby District the population has grown from 83,547 in 2011 to 92,401 in 2021, representing a higher population growth rate of 10.6%.

12.5.5 Doncaster is ranked the 41st most deprived out of England's 317 Local Authority areas (where 1st is the most deprived). In Doncaster, 23.7% of the Lower Layer Super Output Areas (LSOAs) are within the top 10% most deprived LSOAs in England. Selby is the 252nd most deprived of England's 317 Local Authority areas, with 2% of the Local Planning Authority's LSOAs within the top 10% most deprived LSOAs nationally.

Local Economy and Labour Market

12.5.6 Gross Value Added (GVA) per head is lower in Doncaster (£17,404) than in Yorkshire and the Humber (£21,748) and England (£27,949). The sectors which contribute the most towards GVA in Doncaster are the public administration, education and health, distribution and manufacturing sectors.

12.5.7 GVA per head in North Yorkshire (which includes Selby) is slightly higher than in Doncaster and the wider Yorkshire and the Humber region. However, at £22,915 it is still below the GVA per head for England (£27,949). The manufacturing, distribution, real estate and public administration sectors contribute the most towards GVA in North Yorkshire.

12.5.8 In 2021, the Annual Population Survey (Ref 182) showed that 27.2% of working-age residents in Doncaster have a degree-level qualification or equivalent (National Vocational Qualification (NVQ) Level 4 or above), which is lower than the rate in Selby (44.5%), the Yorkshire and The Humber region (38.0%) and England (43.2%). In Doncaster 9.4% of the population hold no qualifications, compared with 10.0% in Selby, 7.8% in Yorkshire and The Humber, and 6.4% in England.

12.5.9 In 2021, the number of people of employment age (16 to 64 year-olds) was 191,299 in Doncaster and 56,879 in Selby. The economic activity rate was

73.8% in Doncaster, lower than the rates in Selby (78.1%), Yorkshire and The Humber (77.3%) and England as a whole (78.8%).

12.5.10 In 2021, the unemployment rate for working-age residents (16 to 64 year-olds) was 6.6% in Doncaster – higher than the average rates across the Yorkshire and The Humber (4.5%) and England (4.6%). The claimant count (as a proportion of residents aged 16 to 64 years), recorded in February 2023, was 4.6% in Doncaster, higher than the rates across the Yorkshire and The Humber (4.1%) and England (3.7%). The claimant count (as a proportion of residents aged 16-64 years) in Selby was lower than the comparable geographies (2.1%).

Employment

12.5.11 The broad industrial groups that employ the most people in Doncaster are the health sector (16.8% of total employment) and the transport and storage sector (12.2%). The manufacturing sector is the predominant sector in Selby, contributing to 21.1% of total employment, followed by the business administration and support services and the transport and storage sectors (9.2%). The transport and storage sector in both local authorities represent a much larger proportion of employment than in either the Yorkshire and The Humber region (5.6%) or England (5.2%).

12.5.12 The mining, quarrying and utilities broad industrial group (which includes employment from the generation of energy) is higher in Selby (3.3%) than in Yorkshire and The Humber (1.0%) and England (1.1%). The proportion of the Doncaster population employed in the mining, quarrying and utilities broad industrial group is broadly in line with the regional and national average (1.0%).

12.5.13 Employment in the construction industry is 6.1% in Doncaster and 5.9% in Selby, higher than the regional (4.6%) and national averages (4.9%).

Land Use Receptors

12.5.14 No socio-economic receptors are located within the Solar PV Site. Within the Solar PV Site boundary and the immediate adjacent area, the area is mostly used for agricultural purposes, characterised by large-scale regular arable fields. There are multiple receptors located within the Grid Connection Search Area, which encompasses the Existing National Grid Thorpe Marsh Substation. Further detail is provided below.

Residential Properties

12.5.15 No residential properties are located within the boundary for the Solar PV Site. A number of small settlements containing residential properties and farm buildings lie within 500 m of the Solar PV Site and comprise of Fenwick approximately 100 m to the south-west of the Solar PV Site, Topham approximately 455 m to the east and Sykehouse approximately 500 m to the east.

12.5.16 Various settlements are located within the Grid Connection Search Area such as Moss, Hawkhouse Green and Thorpe in Balne. Moss mainly comprises of residential properties and farms (Moss Farm and Fir Tree Farm). A large proportion of the land use located within the Grid Connection

Search Area is agricultural; noting that there are various agricultural buildings located on Hawkhouse Green Lane, as well as Trumfleet Grange Farm on Trumfleet Lane.

12.5.17 Thorpe in Balne contains residential properties and multiple farms (Sickle Croft Farm, Ash Tree Farm, and Elm Stone Farm all located on Thorpe Lane). Thorpe Marsh Nature Reserve is located inside the Grid Connection Search Area.

Community Facilities

12.5.18 The community facilities located within the 2 km Study Area for the Solar PV Site include:

- The Holy Trinity Church, Sykehouse located approximately 1.1 km east of the Site;
- Sykehouse Cricket Club located approximately 1.5 km east of the Site on Broad Lane;
- The Church of St John the Baptist, located approximately 1.6 km north of the Site on Balne Moor Road;
- Pollington Balne Church of England Primary School, located approximately 1.6 km north of the Site on Balne Moor Road; and
- Pollington Preschool, located approximately 1.6 km north of the Site on Balne Moor Road.

12.5.19 The community assets located within 2 km Study Area of the Grid Connection Search Area include:

- St Mary's Church in Kirk Bramwith located approximately 480 m east of the Site;
- The Church of St Peter and St Paul, Barnby Dun located approximately 560 m east of the Site on Church Road;
- Barnby Dun Primary School, located approximately 790 m east of the Site on Church Road;
- Friends of St Oswald's, Kirk Sandall located approximately 1.1 km east of the Site on Pine Hall Road;
- Doncaster Golf Range located approximately 1.6 km east of the Site on Armthorpe Lane;
- Kirk Sandall Junior School located approximately 1.6 km south-east of the Site on Magnolia Close;
- Kirk Sandall Infant School located approximately 1.6 km south-east of the Site on Graham Road;
- St Oswald's Church, Kirk Sandall located approximately 580 m south-east of the Site on Pilkington Road;
- Canon Popham Church of England Primary Academy located approximately 1.9 km south-east of the Site on Church Balk Road;

- Little Rascals Pre-School located approximately 1.7 km south-east of the Site on St Nicholas Close;
- Edenthorpe Juniors Football Club located approximately 1.7 km south-east of the Site on Marian Road;
- Edenthorpe Community Library located approximately 2.0 km south-east of the Site on Bardon Road; and
- Dr P Donk Hollybush Health Centre located approximately 1.5 km south-east of the Site on Church Balk Road.

12.5.20 There are no open spaces or other community land assets located within 2 km of the Solar PV Site. There are multiple community land assets located within 2 km of the Grid Connection Search Area, namely: Barnby Dun Play Park accessed via Top Road located approximately 1 km to the east; Barnby Dun Allotments located approximately 1.6 km to the east on Armthorpe Lane; whilst there are various open spaces in Edenthorpe including Hollybush Lane Park located approximately 1.9 km south-east of the Grid Connection Search Area.

Business Premises and Development Land

12.5.21 The only business premises within the 500 m Study Area of the Solar PV Site are two public houses (The Old George Inn and The Baxter Arms), a trucking company (Roger Petch Transport Limited) and Sykehouse Arena, an equestrian centre. No development land is located within the Study Area.

12.5.22 The business premises located within the Grid Connection Search Area include:

- Business premises located in Moss comprising a farm, carpet retail shop, a work clothes shop, a caravan supply shop, an equestrian shop and a horse riding school;
- Business premises located in Thorpe in Balne comprising farms and an equestrian centre; and
- Existing National Grid Thorpe Marsh Substation.

12.5.23 The Advantage Business Gifts shop located in Braithwaite is located within the 500 m Study Area of the Grid Connection Search Area.

12.5.24 The only development land receptor located within the 500 m Study Area of the Grid Connection Search Area is the consented site allocation MUA02: Land Off Grove Road, Kirk Sandall, a 2.59 ha site allocated for the development of 96 residential units.

PRoW

12.5.25 In terms of recreational routes, there are 18 PRoW within 500 m of the Solar PV Site boundary (see Figure 2-3) as follows (the distances are the approximate length of the PRoW):

- Fenwick 8 Footpath (approximate length 290 m);
- Fenwick 10 Footpath (approximate length 1.4 km);
- Fenwick 11 Footpath (approximate length 1.1 km);

- Fenwick 12 Footpath (approximate length 630 m);
- Fenwick 13 Footpath (approximate length 765 m);
- Fenwick 14 Footpath (approximate length 830 m);
- Fenwick 15 Footpath (approximate length 670 m);
- Fenwick 16 Footpath (approximate length 940 m);
- Fenwick 17 Footpath (approximate length 100 m);
- Moss 6 Footpath (approximate length 480 m);
- Moss 7 Footpath (approximate length 490 m);
- Sel-Balne 35.3/15/1 Footpath (approximate length 2.1 km);
- Sel-Balne 35.3/15/2 Footpath (approximate length 1 km);
- Sel-Balne 35.3/17/1 Bridleway (approximate length 1.5 km);
- Sel-Balne 35.3/8/1 Footpath (approximate length 750 m);
- Sykehouse 1 Bridleway (approximate length 74 m);
- Sykehouse 27 Footpath (approximate length 300 m); and
- Sykehouse 29 Footpath (approximate length 640 m).

12.5.26 Footpaths Fenwick 10, 12, 13, 14 and 15 and Sykehouse 29 traverse the Solar PV Site boundary. There are approximately 48 PRoW that are located within the Grid Connection Corridor Search Area and could be impacted by the works.

Mineral Safeguarding Areas

12.5.27 There are no Minerals Safeguarding Areas located within 500 m of the Solar PV Site. There is one Mineral Safeguarding Area for sand and gravel within the 500 m Study Area for the Grid Connection Corridor Search Area (Land to the east of Doncaster between Thorne and Bawtry).

Agricultural Land Use

12.5.28 Based on the Natural England Provisional ALC dataset (Ref 20), the Solar PV Site is predominantly located in ALC Grade 4 (poor quality agricultural land) with some in Grade 3 (moderate quality agricultural land) (see Figure 12-1). An ALC soil survey will be undertaken which will confirm the ALC quality of the land within the Solar PV Site. The agricultural quality of the land will be primarily determined by wetness / workability limitations and by flooding risk. The ALC soil survey of the Solar PV Site will be carried out in accordance with the Ministry of Agriculture, Fisheries and Food (MAFF) guidelines (Ref 185). The MAFF developed a method for classifying agricultural land by grade according to the extent to which physical or chemical characteristics impose long-term limitations on agricultural use for food production. The MAFF ALC system classifies land into five grades numbered 1 to 5, with grade 3 divided into two subgrades (3a and 3b).

12.5.29 An ALC soil survey will be undertaken where there are any substation(s) located in the Grid Connection Corridor Search Area, to determine the ALC quality of the land. However, a survey is proposed to be completed in areas

where there are only underground cables as impacts will be temporary and no land will be unable to be used for agriculture beyond the duration of the construction period.

12.6 Potential Effects and Mitigation

12.6.1 The Scheme may generate a range of socio-economic and land use effects, some of which may be temporary, whilst others would be permanent. For the purposes of the ES, due consideration will be given to the Scheme in terms of the following:

- Temporary employment during the construction and decommissioning phases of the Scheme;
- Gross Value Added during the construction and decommissioning phases of the Scheme;
- Creation of long-term employment opportunities once the Scheme is operational, including consideration of any existing employment uses on-site;
- Creation of training and apprenticeship opportunities during construction, operation and decommissioning of the Scheme;
- Impacts on local services and facilities, including impacts resulting from construction phase workers and associated accommodation requirements, and the provision of educational and visitor facilities;
- Any indirect impacts for the region hosting the Scheme, in particular in relation to the use of local support services and supply chains, and contribution to the Scheme of low-carbon industries at the local, regional and national level;
- Potential temporary and/or permanent adverse land take impacts on residential properties, local businesses, visitor attractions, community facilities, open space, PRoW or recreational routes, or development land;
- Potential temporary and/or permanent changes to accessibility including severance of access to residential properties, local businesses, visitor attractions, community facilities, open space, PRoW or recreational routes, or development land; and
- Potential temporary and/or permanent adverse land take impacts on BMV agricultural land.

12.6.2 Where appropriate, evaluation of job creation associated with the Scheme will include information related to the sustainability of the jobs created, including the extent to which they will help develop the skills needed for the UK's transition to Net Zero.

12.6.3 The Grid Connection Search Area is located within one of the City of Doncaster's Minerals Safeguarding Areas (Land to the east of Doncaster between Thorne and Bawtry), an area of safeguarded sand and gravel mineral resource. However, mineral deposits within the Minerals Safeguarding Area would not be permanently sterilised by the Scheme and could be extracted, if required, after the Scheme's decommissioning. It is

considered that this satisfies the requirements of the City of Doncaster Mineral Safeguarding policies, and therefore it is proposed to scope out the effects on these areas. Consultation will be undertaken with the City of Doncaster Waste Officers to confirm this approach.

12.6.4 Embedded mitigation measures will be included in the design where practicable to help avoid, prevent or reduce effects on socio-economics and land use.

12.6.5 Access to land use receptors would be maintained during Scheme construction and decommissioning wherever possible. This would be achieved through the use of best practice measures, regard to phasing of works and if necessary, providing diversions for users. Severance would also be reduced, where practicable, through careful siting of construction compounds and lay down areas, and careful planning of construction activities through consultation with landowners.

12.6.6 Additionally, embedded measures would be implemented during construction and operation to ensure that access to recreational routes and PRoW in the Study Area is maintained as far as possible. Where temporary disruption to or closure of PRoW or other recreational routes during construction is unavoidable, suitable diversions would be agreed with the relevant Local Planning Authorities (City of Doncaster Council and North Yorkshire Council) as relevant.

12.6.7 Direct impacts to land use would be managed through negotiations with stakeholders including landowners and owners of businesses to mitigate impacts.

12.7 Assessment Methodology

Baseline

12.7.1 Relevant policy will be reviewed at the local, regional and national levels to identify the key socio-economic and land use issues of relevance to the Scheme. This will include Local Plans, and any relevant SPG, NPS and NPPF measures.

12.7.2 A baseline assessment will be undertaken using a range of sources to provide a description of the socio-economic conditions within the local area, including employment and the economy. This will be undertaken using established statistical sources, such as those presented in Section 12.5.

12.7.3 An ALC soil survey will be undertaken for the land within the Solar PV Site, as deemed necessary to determine the ALC quality of the land. The ALC soil survey will be based on observations at intersects of a 100 m grid, giving a density of one observation per ha. During the survey, soils will be examined by hand augerings and pits to a maximum depth of 1.2 m.

12.7.4 An ALC soil survey will also be undertaken where there are planned to be any substations located in the Grid Connection Corridor Search Area, using the same approach. However, areas where there would only underground cables are not proposed to be surveyed. This is because the impacts in these areas would be temporary, during construction. During operation, the

cable would be buried at sufficient depth to allow arable and pastoral farming to continue (with ploughing) and so the Scheme would not affect the agricultural use of the land during operation. Any potential impacts would be mitigated through industry standard measures which will be outlined in the ES and included in the Framework CEMP.

Assessment of Effects (including significance)

Socio-economics and Land Use

12.7.5 An assessment of effects will be undertaken to consider the impact of the Scheme on the baseline socio-economic conditions. The methodology will entail:

- An assessment of the likely scale, permanence and significance of effects associated with socio-economic receptors; and
- An assessment of the potential cumulative effects with other schemes in the surrounding area.

12.7.6 The assessment of potential socio-economic effects will use policy thresholds and expert judgement to assess the scale and nature of the effects of the Scheme against baseline conditions. For socio-economics, there is no accepted definition of what constitutes a significant (or not significant) socio-economic effect. It is, however, recognised that effects are categorised according to the scale (or magnitude) of impact and the sensitivity (or value) of the affected resource or receptor.

12.7.7 As such, the socio-economic effects will be assessed on the basis of:

- Sensitivity of resources/receptors: specific values in terms of sensitivity are not attributed to socio-economic resources/receptors due to their diverse nature and scale, however, the assessment will take account of the qualitative (rather than quantitative) ‘sensitivity’ of each receptor, and in particular, their ability to respond to change based on recent rates of change;
- Magnitude of impact: this entails consideration of the size of the impact on people or business within the context of the area in which the impacts would be experienced; and
- Scope for adjustment or mitigation: the socio-economic study is concerned in part with economies. These adjust themselves continually in response to changes in supply and demand. The scope for the changes brought about by the Scheme to be accommodated by market adjustment will therefore be a criterion in assessing effect significance.

12.7.8 As part of the chapter in the ES, the likely effects on land-use that could result from the construction and operation of the Scheme will be considered.

12.7.9 The assessment of effects on recreational facilities, including PRoW and community facilities will consider direct impacts arising from any closures and loss of routes and/or diversions. Effects on development land will consider direct (land-take) and indirect (access) impacts on the delivery of any development proposals or allocations both within and adjacent to the Site.

12.7.10 The assessment aims to be objective and quantify effects as far as possible. However, some effects can only be evaluated on a qualitative basis. Effects are defined as follows:

- Beneficial classifications of effect indicate an advantageous effect on an area, which may be minor, moderate, or major;
- Negligible classifications of effect indicate imperceptible effects on an area;
- Adverse classifications of effect indicate a disadvantageous effect on an area, which may be minor, moderate or major; and
- No effect classifications indicate that there are no effects on an area.

12.7.11 Based on consideration of the above, where an effect is assessed as being beneficial or adverse, the scale of the effect has been assigned using the below criteria:

- Minor: a small number of receptors are beneficially or adversely affected. The effect will make a small measurable positive or negative difference on receptors at the relevant area(s) of effect;
- Moderate: a noticeable number of receptors are beneficially or adversely affected. The effect will make a measurable positive or negative difference on receptors at the relevant area(s) of effect; and
- Major: all or a large number of receptors are beneficially or adversely affected. The effect will make a measurable positive or negative difference on receptors at the relevant area(s) of effect.

12.7.12 Socio-economic and land use effects reflect the relationship between the sensitivity of the affected receptor and the magnitude of the impact, as set out in Table 12-1.

Table 12-1: Impact Assessment and Effect Significance

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

12.7.13 Those effects which are found to be moderate or major are considered to be ‘significant’ and those which are minor or negligible are considered to be ‘not significant’.

12.7.14 Duration of effect is also considered, with more weight given to reversible long-term or permanent changes than to temporary ones. Permanent effects

are considered to be those effects which cannot be reversed following decommissioning.

12.7.15 Consideration of employment and GVA effects will reflect the temporary and permanent impact on a principal economic area defined based on consideration of Local Planning Authority boundaries and a typical travel time from the Site. Homes and Communities guidance on 'Additionality' will be applied to assess direct, indirect and induced impacts (Ref 183). Estimates for the number and types of jobs created by the Scheme in the context of the available workforce in the area during each phase of the development will be provided in the ES.

12.7.16 The works in the Grid Connection Search Area may have impacts on socio-economic receptors and land use during the construction and decommissioning phases of the Scheme. 400 kV cables may be required to export the electricity produced by the Scheme to the Existing National Grid Thorpe Marsh Substation. The cables would be installed below ground, which would require trenching, typically of minimum 1.2 m depth, which would be covered after a short period of time. The installation would be for a relatively short duration and could be implemented in phases to limit disruption to the public.

BMV Agricultural Land

12.7.17 The assessment of effects on agricultural land use will consider the impacts that could result from the construction and operation of the Scheme, arising from the change to the dominant land use within the Site boundary, from its current use for arable cultivation, to that of energy generation and battery storage using solar PV. The assessment of BMV agricultural land will be in accordance with Natural England 'Technical Information Note 049 – Agricultural Land: Protecting the BMV Agricultural Land (Technical Information Note (TIN) 049)' (Ref 184) and the ALC survey results. The sensitivity of agricultural land will be assessed according to the land's ALC grade (with Grades 1, 2 and 3a land being defined as BMV land), whilst the magnitude of impact will be assessed based on the extent of BMV land lost, with an area of 20 ha being derived from the threshold contained within the former MAFF (Ref 185) and maintained by Natural England when informing their consultation on projects. As this is the area of BMV change that triggers a requirement to consult with Natural England, it implies that this is also the point at which the change is no longer considered to be 'not significant'. Therefore, for the purposes of the assessment:

- Total permanent loss of BMV land which exceeds 20 ha is considered significant;
- A loss of BMV which is either temporary and reversible after construction, or which falls below the 20 ha threshold, is considered as being not significant; and
- A loss of non-BMV land is considered as being not significant.

12.8 Assumptions, Limitations and Uncertainties

12.8.1 Information on current land use, for example from landowners on the Site, will be required to determine existing employment within the existing Site. In the absence of this information, good practice guidance and professional judgement will be applied.

12.9 Summary of Elements Scoped In and Scoped Out

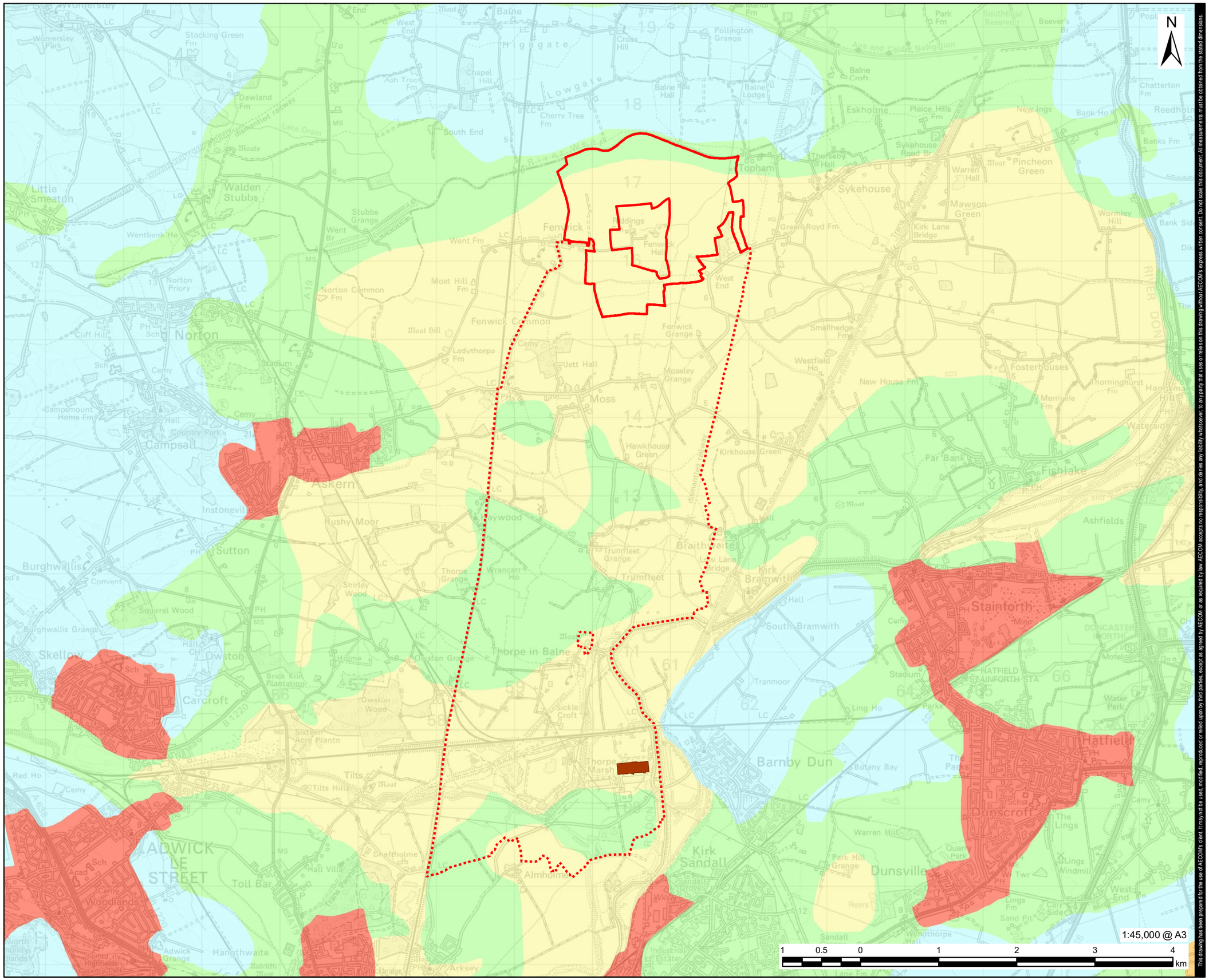
12.9.1 A summary of the elements scoped into and out of the assessment of socio-economic impacts is presented in Table 12-2.

Table 12-2: Elements Scoped In and Out of the Socio-Economic and Land Use Assessment

Element	Scoped In/ Scoped Out
Employment, economic growth and training (construction, operation and decommissioning)	Scoped in – there is potential for the creation of jobs as well as training and apprenticeship opportunities, including for local residents.
Recreation, open space (including PRoW), community facilities and local services (construction, operation and decommissioning)	Scoped in – there may be effects on the accessibility of recreational routes (including PRoW), open space, community facilities and local services both within and beyond the Site boundary.
Private assets (construction, operation and decommissioning)	Scoped in – there is potential for the accessibility of receptors within and beyond the Site boundary, including businesses, residential properties, visitor attractions and development land, to be impacted.
BMV agricultural land within the Solar PV Site and substation(s) within the Grid Connection Corridor Search Area (construction, operation and decommissioning)	Scoped in – there is potential for land take from agricultural land which may comprise BMV within the Solar PV Site and substation areas within the Grid Connection Corridor Search Area.
BMV agricultural land within the underground cable areas in the Grid Connection Corridor Search Area (construction, operation and decommissioning)	Scoped out – within the Grid Connection Corridor Search Area where there would be underground cables only, impacts would be temporary, during construction, and during operation the cable would be buried at sufficient depth to allow arable and pastoral farming to continue (with ploughing). Potential impacts would be mitigated through industry standard measures which will be outlined in the ES and included in the Framework CEMP.

Element	Scoped In/ Scoped Out
Minerals Safeguarding (construction, operation and decommissioning)	Scoped out – subject to consultation with City of Doncaster Council. The mineral deposits would not be permanently sterilised by the Scheme and could be extracted, if required, after its decommissioning. It is therefore unlikely that the Scheme would have an impact on the Land to the east of Doncaster between Thorne and Bawtry Minerals Safeguarding Area.

Revision: 0 Drawn: LP Checked: MV Approved: TN Date: 2023-05-15



AECOM

PROJECT

Fenwick Solar Farm

CLIENT

Fenwick Solar Project Limited

CONSULTANT

AECOM Limited
Midpoint,
Alencon Link
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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation

Provisional Agricultural Land Classification (ALC)

- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Provisional Agricultural Land Classification (ALC)

FIGURE NUMBER

Figure 12-1

Filename: I:\60698207_Fenwick_Solar_Farm\02_Maps\Scoping Report\SAA_SCO_Fig12_1_ALC_A3L_20230515_R0.mxd

13. Transport and Access

13.1 Introduction

13.1.1 This chapter outlines the proposed scope of the traffic and transport assessment of the Scheme.

13.1.2 The objectives of this chapter are to:

- Describe the baseline environment in relation to traffic and transportation;
- Outline the methods and assessment to be undertaken for inclusion within the ES; and
- Identify any potential effects on users of the local transport network that may arise as a result of the Scheme and any potential mitigation measures.

13.1.3 This chapter should be read in conjunction with **Chapter 11: Noise and Vibration**, **Chapter 12: Socio-Economics and Land Use**, and **Chapter 14: Other Environmental Topics** of this EIA Scoping Report.

13.2 Study Area

13.2.1 Due to the nature of the Scheme consideration will need to be given to a number of locations within the surrounding highway network which could potentially be impacted. Key roads likely to require consideration include:

- Fenwick Lane;
- Fenwick Common Lane;
- Lawn Lane;
- Moss Road;
- Kirkhouse Green Road;
- Fishlake Nab;
- Sour Lane;
- A614;
- A19;
- M18; and
- M62.

13.2.2 The extent of the Study Area for assessment in terms of highway impact will be subject to further analysis to determine the extent of potential impacts and likely receptors, and agreement will be sought with National Highways and the City of Doncaster Council. The rationale for selecting the Study Area is based on professional judgement and a review of online mapping to identify that the above roads are those likely to be used to access the Site. Further details will be provided within the ES.

13.3 Legislation, Planning Policy Context and Guidance

13.3.1 The following planning policy and guidance is of relevance to the transport and access assessment of the Scheme.

National Planning Policy

13.3.2 Relevant national planning policy includes:

- NPS for Energy (EN-1) (Ref 5), Section 5.13, with particular reference to paragraphs 5.13.3, 5.13.4 and 5.13.5, which states that if a project is likely to have significant transport implications, a Transport Assessment, Travel Plan and, if necessary, additional transport infrastructure should be provided to mitigate the impacts of a proposed development;
- The Draft Overarching NPS EN-1 (Ref 8) with particular reference to paragraphs 5.14.3, 5.14.4 and 5.14.5 which reiterate the measures in the current NPS EN-1 version adding that potential disruption to services and infrastructure (such as road, rail and airports) should be considered;
- There is no applicable policy on transport and access in the current NPS for Renewable Energy Infrastructure (EN-3) (Ref 6), however, the draft EN-3 (Ref 9) sets out specific considerations which apply to solar farms in Section 3.10, with particular reference to paragraphs 3.10.111 to 3.10.117. These consider the need for the most appropriate routes to be selected, the assessment of route suitability and the requirement for modifications to roads or bridges to be assessed, and the assessment of the impact of additional vehicles on the road network, including the cumulative effects of the solar farm with other developments (including abnormal load movements); and
- NPPF (Ref 13) with particular reference to paragraph 110 which states the application should promote sustainable transport modes where possible given the type and location of development; consider safe and suitable site access, reflect current guidance in terms of the design on parking and other transport elements, and ensure that any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree. Paragraph 11 states development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe. Paragraph 113 states a development that generates a significant amount of movement should be supported by a Transport Statement or Transport Assessment and should provide a Travel Plan.

National Guidance

13.3.3 Relevant national guidance includes:

- Overarching principles on Travel Plans, Transport Assessments and Statements (DfT, 2014) (Ref 186); and
- Department for Transport Circular 01/22 (Ref 187).

Local Planning Policy

13.3.4 The Doncaster Local Plan (2015-2035) (Ref 14) sets out policies and proposals to meet Doncaster's needs for housing, employment and other development as well as how much is required, where it should go and when it should happen. Specific policies are also included that make reference to Low Carbon and Renewable Energy in relation to the council's aim to increase supply of these energy types.

13.3.5 Chapter 7 of the Local Plan specifically references Transport, Access and Infrastructure within the region, with a focus on the overall strategic transport network, cycling, walking and parking. Specific requirements relating to parking standards and Transport Statements, Assessments and Travel Plans are included within Appendix 6 and 7 of the Local Plan. The traffic and transport supporting documents will be developed with due cognisance to these policies and specific requirements.

13.3.6 The Doncaster Infrastructure Strategy (2019) (Ref 188) outlines the investment requirements and funding mechanisms to support the delivery of growth set out in the Doncaster Local Plan period related to roads, public transport and energy and utilities.

Industry Guidance

13.3.7 The Institute of Environmental Assessment's (IEA, now known as IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (January 1993) (Ref 1) provides guidance on examining the environmental impacts of developments in terms of traffic and transportation. This guidance has been used to define the scope of the transport and access assessment.

13.4 Consultation

13.4.1 National Highways and the Local Highway Authority team at the City of Doncaster Council will be consulted with regard to traffic and transport to determine, and seek agreement on, the proposed scope and approach to the assessment.

13.4.2 This will include the extent of the Study Area for assessment in terms of highway impact and the scoping of potential junction capacity analysis.

13.5 Baseline Conditions

13.5.1 The Site is located to the north of Doncaster in the vicinity of the village of Fenwick to the east of the A19 and south of the M62. The traffic and transport Study Area will include the anticipated construction routes serving the Scheme. As a minimum, it is anticipated that the links mentioned in Section 13.2.1 will likely be used by construction vehicles to access the Site.

13.5.2 Baseline conditions for the land associated with the Scheme will be described in detail in the ES.

Sources of Baseline Information and Consultation

13.5.3 To inform the transport and access assessment of the Scheme, information from a number of sources will be collected as set out below:

- Automatic Traffic Counts (ATCs) will be undertaken at a number of locations in the vicinity of the Site to determine the baseline traffic conditions of the surrounding highway network. Average Annual Daily Traffic (AADT) flows will be derived from the ATC data to enable baseline traffic flows to be established at the required design years. The extent of the traffic data and scope for any traffic surveys that may be required will be agreed with the City of Doncaster Council and National Highways;
- Personal Injury Accident (PIA) data for the most recent five-year period (excluding Covid-19 years, i.e. 2020 and 2021), obtained from the Local Highway Authority, will provide information on each collision including severity as well as factors which attributed to the collision;
- Local travel information will be gathered from various sources, including local bus operators and the City of Doncaster Council website; and
- OS/Architectural Base Mapping will be used to ascertain an accurate geographical representation of the areas in the vicinity of the Scheme.

13.5.4 To determine the impact of the Scheme, a number of scenarios will be assessed using the information collated from the sources above. The scenarios considered appropriate for assessment are:

- Baseline (2023);
- Peak Construction Year without the Scheme; and
- Peak Construction Year with the Scheme.

13.5.5 The peak construction year will be confirmed and justified in the ES as the anticipated construction programme is considered in more detail during the Scheme design development and will consider both HGV and all other traffic associated with the construction of the Scheme.

13.5.6 The future baseline will be established by growthing the 2023 traffic data to the future assessment year using appropriate factors (based on the local Middle Layer Super Output Area (MSOA)) using the industry standard Trip End Model Presentation Program (TEMPro) software. This will provide a robust estimate as to the future baseline traffic levels.

13.5.7 A consideration of any committed and cumulative developments within the area will be included (see section 5.6 in **Chapter 5: Environmental Impact Assessment Methodology**).

Planned Surveys

13.5.8 ATCs will be undertaken during a neutral month and will provide two-way traffic flows, classified by vehicle type, including HGVs. In line with Transport Analysis Guidance (TAG) Unit M1.2 (Ref 189) neutral periods are defined as Monday to Thursday from March through to November (excluding August) and avoiding the weeks before and after Easter. Surveys may be carried out outside these months if the conditions being surveyed are representative. The locations and timings of the ATC surveys, along with the requirement for any detailed junction capacity modelling, will be agreed with the City of Doncaster Council and National Highways prior to any survey work.

13.5.9 The ATC locations that have been selected, subject to agreement, will provide a basis for the analysis and incorporate local routes within the Study Area close to potential sensitive receptors, and routes along local strategic links, to provide a robust baseline for assessment. These locations will be surveyed for one full week (Monday to Sunday) for 24 hours a day to produce a dataset to inform the assessment.

13.5.10 The proposed ATC locations are shown on Figure 13-1.

13.5.11 A site visit will be undertaken to inform the assessment and clarify the information obtained from the high-level desktop based assessments. Detailed notes and a photographic record will be undertaken during the site visit and consideration will be given to the identification of receptor locations.

13.6 Potential Effects and Mitigation

13.6.1 The nature of the Scheme is such that the greatest impact is likely to occur during the construction and decommissioning phases (including the removal of materials and waste), and thus the assessment of transport effects presented in the ES will focus on these phases.

Construction

13.6.2 During construction there would be temporary increases in traffic flows on the road network that would be used by construction vehicles to access the different construction areas. At this phase the levels of construction vehicles is unknown and will be discussed with the City of Doncaster Council once this information is known, including the likely construction routes.

13.6.3 A key change from the baseline position is the number and percentage of cars, Light Goods Vehicles (LGVs) and HGVs using local roads. Traffic generation for each phase of the Scheme will be used for the assessment and to inform the future baseline.

13.6.4 Other aspects of the construction phase that could lead to a significant transport and access effect, include:

- Severance to communities caused by a large increase in traffic for a longer period;
- Temporary increase in abnormal loads;
- Increased risk of road traffic accidents caused by a large increase in traffic for a longer period;
- Temporary road closures, diversions and widening;
- Construction traffic using temporary bell mouths and site entrances for access to construction areas; and
- Temporary closures or diversions of PRoW and other public access routes.

13.6.5 Traffic associated with all aspects of the Scheme and phases will be added to the road network to form the future traffic levels. This will then be used to form the basis of assessment to be presented in the ES.

13.6.6 Further detail on proposed accesses to the Scheme will be included within the ES and the Transport Assessment, which will be submitted with the DCO application.

13.6.7 A Framework CTMP and CEMP will be developed and submitted with the DCO application. The Framework CTMP will define potential mitigation measures which could be implemented during the construction phase, such as restrictions of HGV movements to certain routes, days of the week and times of the day. In addition, a Construction Worker Travel Plan could be developed by the construction contractor, which would include details of methods to be used to encourage sustainable travel to and from the Site for workers. The Framework CTMP and CEMP will form the basis of the detailed CTMP and CEMP which are expected to be secured as a Requirement of the DCO.

Operation

13.6.8 At this phase the number of vehicle movements required to operate the Scheme is unknown, as such the level of predicted impact cannot be identified. However, given the nature of the Scheme, the number of vehicle movements would be significantly less than during the construction phase. For example, there are expected to be 1-3 permanent staff on site per day, with up to 20 visitors per month for deliveries and servicing of equipment. As such, it is proposed to scope operational phase transport effects out of the EIA. Further details of the operational phase transport arrangements will be set out in the ES and Transport Assessment to support this approach.

13.6.9 Mitigation measures applicable to the Scheme's operation will be included in a Framework OEMP prepared as part of the DCO application. The Framework OEMP will form the basis of the detailed OEMP which is expected to be secured as a Requirement of the DCO.

Decommissioning

13.6.10 At this phase the number of vehicle movements required to decommission the Scheme is not known, as such the levels of baseline traffic cannot be identified at this phase. However, the number of vehicle movements is predicted to be no worse than the construction phase. The effects and mitigation measures defined for Scheme construction are therefore considered applicable for decommissioning and the ES will provide further commentary on the likely transport effects of the decommissioning process. As such, a separate decommissioning phase assessment is scoped out. A Framework DEMP will be prepared as part of the ES and will include mitigation measures identified through the assessment for the construction phase, as appropriate. The Framework DEMP is expected to be secured through a requirement in the DCO and will form the basis of the detailed DEMP that would be prepared in advance of the commencement of decommissioning works by the applicable contractor.

Mitigation

13.6.11 Based on the potential for significant effects generated by the Scheme associated with traffic and transport, it is likely that mitigation would be required to reduce the potential impacts.

13.6.12 Embedded and additional (Scheme specific) mitigation measures including travel planning and HGV management will be incorporated into the Framework CTMP that will be submitted with the DCO application.

13.6.13 Programming of HGV and/or construction worker movements may be subject to restricted periods of the day and the working week on some, or all, of the access routes. For example, on routes close to schools HGV movements may be restricted during drop off and pick up times to improve traffic flow and safety.

13.6.14 Other minor highway improvements could potentially be carried out in sensitive locations to reduce the impact of the construction traffic. This will be presented in the ES where required.

13.6.15 The assessment of routes from the A road network to the Site will determine the feasibility of routes and where mitigation works are required.

13.6.16 It is anticipated that all mitigation required will be set out within the outline designs where required for route improvements between the A road network and the Site. Swept path analysis will be presented to support these designs where required. Temporary diversion or other mitigation measures for PRoW and cycle paths will be proposed where necessary.

13.7 Assessment Methodology

Transport Assessment

13.7.1 The ability of the highway network to accommodate the development traffic will be assessed and reported in a Transport Assessment which will form a technical appendix to the ES. The Transport Assessment will include:

- A review of relevant national, regional and local policies;
- A description of the existing baseline conditions – a thorough description of the roads, railway lines, footpaths, bridleways and cycle paths. Traffic flows on these routes and levels of use on bridleways, footpaths and cycle paths will be measured through Site observations and agreed with City of Doncaster Council;
- A review of the road safety data for the most recent five-year period within the identified Study Area;
- A description of the Scheme, setting out timescales for construction, compound locations, access routes to compounds, construction methods;
- Traffic generation of compounds and any other relevant sites for construction staff with a profile of arrivals and departures for the day and HGV traffic with a profile of arrivals and departures for the day;
- The distribution and assignment of trips on the road network with construction traffic distributed based on a gravity model of worker catchment area and HGVs assigned from the A road network;
- An analysis of abnormal load requirements and routing;

- A swept path analysis to assess construction vehicle movements and access suitability;
- Mitigation measures; and
- Summary and conclusions.

Impact Assessment Methodology

13.7.2 The methodology for assessing the impact of development-generated traffic will be based on that outlined in IEMA's 'Guidelines for the Environmental Assessment of Road Traffic' (Ref 1). The IEMA guidelines state that a link to the highway network should be included within the assessment if one of the following criteria is met:

- Rule 1 – traffic flows increase by more than 30% (or HGV flows increase by more than 30%); or
- Rule 2 – traffic flows in sensitive areas increase by more than 10%.

13.7.3 The IEMA guidelines recommend that several environmental effects may be considered important when considering traffic from an individual development. The chapter of the ES will consider the following effects:

- Peak hour total traffic increase;
- Peak hour HGV increase;
- Severance;
- Pedestrian delay;
- Pedestrian and cyclist amenity;
- Fear and intimidation;
- Accidents and safety, including the risk of major accidents and disasters from road collisions; and
- Hazardous loads.

13.7.4 The significance of effect will be determined through consideration of two elements; the magnitude of the impact and the sensitivity of the receptor. The following sections outline the approach that will be used to determine these factors.

13.7.5 The overall effect will be determined by measuring the magnitude of the impact following embedded mitigation measures (where applicable) against criteria including; the number of activities of the population affected; the type and sensitivity of the receptor; and the type of impact. Effects are defined as beneficial or adverse, with effects further defined using the following classifications:

- Minor – slight, very short, or highly localised impact of no significant consequence;
- Moderate – limited impact (by extent, duration or magnitude) which may be considered significant; and

- Major – considerable impact by extent, duration or magnitude) of more than local significance, or in breach of recognised acceptability, legislation, policy or standards.

13.7.6 The IEMA guidelines state that the magnitude of each impact should be determined as the predicted deviation from the baseline conditions.

Receptor Sensitivity

13.7.7 As stated above, the methodology for assessing the impact of Scheme generated traffic will be based on that outlined in the IEMA guidelines (Ref 1). The general criteria for defining the importance or sensitivity of receptors are set out in Table 13-1.

Table 13-1: Receptor Sensitivity Criteria (Transport and Access)

Sensitivity	Description
Very High	Schools, colleges, playgrounds, hospitals, retirement homes.
High	Heavily congested junctions, residential properties very close to carriageway.
Medium	Congested junctions, shops/businesses, areas of heavy pedestrian/cycling use, areas of ecological/nature conservation, residential properties close to carriageway.
Low	Tourist/visitor sites, places of worship, residential areas set back from the highway with screening.
Negligible	Those people and places located away from the affected highway link.

13.7.8 The link sensitivity will be based upon an average sensitivity of the whole link with a separate assessment of high/very high receptors. Some links will be broken down into sensible sections where appropriate i.e. between two main junctions or villages.

Magnitude

13.7.9 General criteria for defining the magnitude of an impact are set out in Table 13-2. Key factors influencing impact magnitude include:

- The physical or geographical scale of the impact (note that this will be relative to the scale of the receptor or resource affected);
- The duration of the impact – will it be short term, lasting for a few days or weeks, or long term, lasting for several years;
- The frequency of the impact – will it occur hourly, daily, monthly or will it be permanent lasting for the duration of the development; and
- The reversibility of the effect – can it be reversed following completion of construction of the development.

Table 13-2: Impact Magnitude (Transport and Access)

Magnitude	Description
High	Total loss or major alternation to key elements/features of the baseline conditions such that post development character/composition of baseline condition will be fundamentally changed.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed.
Low	Minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation.

13.7.10 The IEMA guidelines (Ref 1) state that the magnitude of each impact should be determined as the predicted deviation from the baseline conditions. This will be done for the Scheme construction and decommissioning phases. As detailed above, the operational phase will be scoped out of the assessment.

13.7.11 The IEMA guidelines set out a number of criteria by which the magnitude of impact can be measured as outlined below. Many of the criteria do not provide specific thresholds by which such impacts can be measured, and as a result will be defined qualitatively where necessary. These are described below and summarised in Table 13-3.

13.7.12 Severance is defined in the IEMA guidelines as the *"perceived division that can occur with a community when it becomes separated by a major traffic artery"*. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. IEMA guidelines suggest that a 30%, 60% and 90% increase in all traffic flows will result in a low, medium, and high change in severance, respectively.

13.7.13 Pedestrian delay is considered to be affected by the changes in volume, composition or speed of traffic, in terms of their respective impacts on the ability of pedestrians to cross roads. In general, increases in traffic levels and/or traffic speeds are likely to lead to greater increases in pedestrian delay.

13.7.14 Driver delay results from traffic delays to non-development traffic which can occur at several points on the network surrounding the Site including; at the Site entrance where there would be additional traffic movements, on the

highways passing the Site where there is likely to be additional traffic, at other key intersections along the highway which might be affected by increased traffic. These delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the network.

13.7.15 Pedestrian and cycle amenity is broadly defined as *"the relative pleasantness of a journey and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic"*. The guidance suggests that a tentative threshold for judging the significance of changes in pedestrian and cycle amenity would be where the traffic flow is halved or doubled.

13.7.16 Fear and intimidation is *"dependent on the volume of traffic, its HGV composition, and its proximity to people or the lack of protection caused by such factors as narrow pavement widths"*.

13.7.17 A detailed assessment of accidents and safety will be carried out by examination of road traffic accident data for the most recent five-year period available. This analysis will be included in the Transport Assessment and undertaken to highlight if there are any existing safety issues on the local road network which may be exacerbated by the Scheme. The outcome of the assessment will be presented in the ES.

13.7.18 Information provided in Table 13-3 expands on the information from Table 13-2 and shows further details of the individual aspects of the assessment and the thresholds to be applied for each.

Table 13-3: Impact Magnitude Criteria (Transport and Access)

Magnitude	Description	Illustrative Criteria
High[9]	HGV construction traffic	High number of construction vehicles using roads over a protracted period of time. More than a 40% increase for more than six months.
	Pedestrians/ cyclist amenity	Limited or no facilities for pedestrians and cyclists with limited crossing facilities and low-quality linkages to the local facilities.
	Severance	Increase in total traffic flows of 90% and above (or increase in HGV flows over 10% based on the sensitivity of the receptors).
	Accidents and safety	High increase in traffic at known collision locations.
	Pedestrian delay	Where traffic flows exceed 1,400 vehicles per hour the severity of the

[9] Professional judgement will be applied where baseline traffic flows are low and a traffic percentage change criterion is not appropriate. Therefore, where a high magnitude of impacts is apparent based on low baseline traffic flows, the overall magnitude will be reduced to medium.

Magnitude	Description	Illustrative Criteria
		impact will be determined based on the thresholds identified above for severance.
	Driver delay	Increase in traffic flow of 90% and above.
	Fear and intimidation	Increase in total traffic flows or HGV flows of 90% and above.
	Hazardous loads	Based on the probability of a personal injury collision, categorised as fatal or serious, involving a hazardous load.
Medium	HGV construction traffic	Moderate number of construction vehicles using roads over a protracted time period: 16-39% increase for more than 6 months or more than 40% increase for 3-6 months.
	Pedestrians/ cyclist amenity	Few facilities for pedestrians and cyclists with limited crossing facilities and linkages to the local facilities.
	Severance	Increase in total traffic flows of 60-89% (or increase in HGV flows over 10% based on the sensitivity of the receptors).
	Accidents and safety	Moderate increase in traffic at known collision locations.
	Pedestrian delay	Where traffic flows exceed 1,400 vehicles per hour the severity of the impact will be determined based on the thresholds identified above for severance.
	Driver delay	Increase in total traffic flow of between 60% and 89%.
	Fear and intimidation	Increase in total traffic flows of 60%-89% (or increase in HGV flows between 40%-89%).
	Hazardous loads	Based on the probability of a personal injury collision, categorised as fatal or serious, involving a hazardous load.
Low	HGV construction traffic	Small number of construction vehicles using roads over a short period of time. 6-15% increase for more than 6 months; 31-39% for 3-6 months; or >40% increase for less than 3 months.
	Pedestrians/ cyclist amenity	Facilities for pedestrians and cyclists with safe and convenient crossing

Magnitude	Description	Illustrative Criteria
		facilities and good linkages to the local facilities.
	Severance	Increase in total traffic flows of 30-59% (or increase in HGV flows over 10% based on the sensitivity of the receptors).
	Accidents and safety	Minor increase in traffic at known collision locations.
	Pedestrian delay	Where traffic flows exceed 1,400 vehicles per hour the severity of the impact will be determined based on the thresholds identified above for severance.
	Driver delay	Increase in total traffic flow of between 30% and 59%.
	Fear and intimidation	Increase in total traffic flows of 30-59% (or increase in HGV flows of between 10%- 39%).
	Hazardous loads	Based on the probability of a personal injury collision, categorised as fatal or serious, involving a hazardous load.
Negligible	HGV construction traffic	Occasional construction vehicles using roads over a short period of time. Less than 5% Increase for more than six months; between 6-30% increase for three to six months; or between 31-40% for less than three months.
	Pedestrians/ cyclist amenity	Dedicated facilities for pedestrians and cyclists with safe and convenient crossing facilities and good linkages to the local facilities.
	Severance	Increase in total traffic flows of 29% or under (or increase in HGV flows under 10%).
	Accidents and safety	Negligible increase in traffic at known collision locations.
	Pedestrian delay	Total traffic flows under 1,400 per hour.
	Driver delay	Increase in total traffic flow of less than 29%.
	Fear and intimidation	Increase in total traffic flows or HGV flows of 29% or under (or increase in HGV flows under 10%).

Magnitude	Description	Illustrative Criteria
	Hazardous loads	Based on the probability of a personal injury collision, categorised as fatal or serious, involving a hazardous load.

Significance

13.7.19 The general approach adopted for evaluating the significance of traffic and transport effects considers the sensitivity of the receptor and the magnitude of impact and is outlined in Table 13-4. Effects predicted to be 'major' or 'moderate' are considered significant, whilst effects predicted to be 'minor' or 'negligible' are considered not significant.

Table 13-4. Significance of Effects Matrix (Transport and Access)

Impact Magnitude	Receptor Sensitivity				
	Negligible	Low	Medium	High	Very High
High	Minor	Moderate	Moderate	Major	Major
Medium	Negligible	Minor	Moderate	Moderate	Major
Low	Negligible	Negligible	Minor	Moderate	Moderate
Negligible	Negligible	Negligible	Negligible	Minor	Minor

13.8 Assumptions, Limitations and Uncertainties

13.8.1 At this stage the exact extent of the Study Area cannot be confirmed in terms of traffic and transport as detailed discussions have not yet taken place with National Highways or City of Doncaster Council as highway authorities for the Strategic Road Network (SRN) and Local Road Network (LRN) respectively. As set out in Section 13.4, such discussions are due to take place and will be carried out in advance of the assessment.

13.8.2 The Site is located within a rural area where access is likely to be constrained in terms of the design of highway and access to public transport.

13.8.3 It is assumed that as traffic surveys will be carried out during a neutral month (see paragraph 13.5.8), baseline data will be representative of normal traffic conditions.

13.8.4 Construction traffic flows will be based upon a best estimate of likely requirements, adopting a precautionary approach so that numbers are not underestimated, and thus provide a robust assessment.

13.9 Summary of Elements Scoped In and Scoped Out

13.9.1 A summary of the elements scoped into and out of the assessment of transport and access is presented in Table 13-5.

Table 13-5: Elements Scoped In and Out of the Assessment of Transport and Access

Element	Scoped In/ Scoped Out
Severance, driver delay, pedestrian delay, pedestrian and cyclist amenity, fear and intimidation, accidents and safety, total traffic increase, HGV increase (construction)	Scoped in – the temporary increase in traffic could generate potentially significant effects.
Hazardous loads (construction)	Scoped out – there are no nearby road features which suggest that the transfer of materials poses a risk beyond that which would be expected on the general highway network. The ES will explain the measures employed to ensure safe vehicular transport of components such as panels and batteries to and from the Site.
Transport and access assessment (operation)	Scoped out – no significant effects predicted due to low vehicle numbers required once operational.
Transport and access assessment (decommissioning)	Scoped out – due to uncertainties in relation to future traffic flows and the magnitude of impacts being the same or less than during construction and therefore able to conclude with confidence the significance of effect would be no worse than has been determined for the construction phase. The ES will provide further commentary on the likely transport effects of the decommissioning process.

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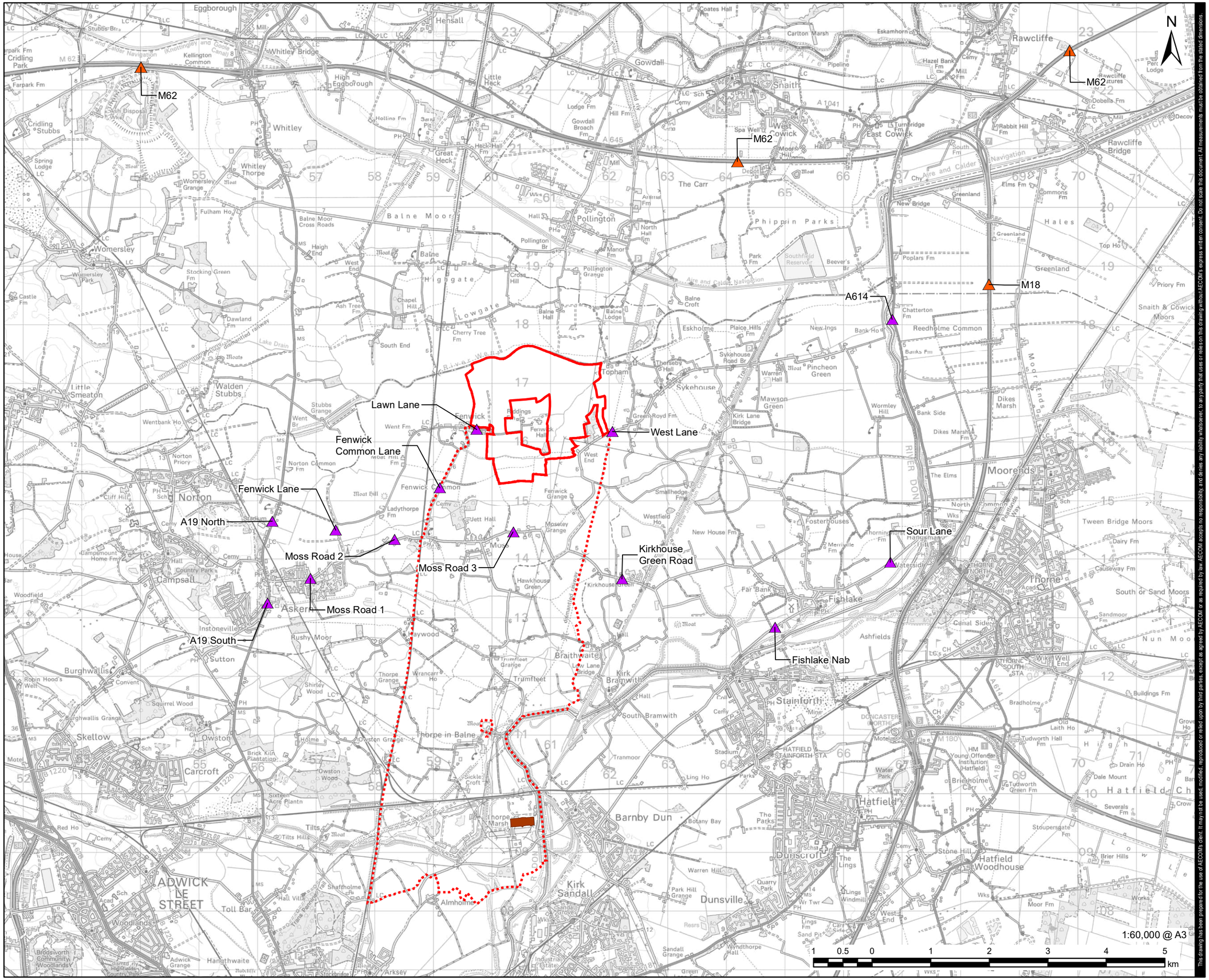

AECOM

PROJECT

Fenwick Solar Farm

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LEGEND

- Solar PV Site
- Grid Connection Corridor Search Area
- Existing National Grid Thorpe Marsh Substation
- Automatic Traffic Count Survey Locations
- National Highways Web based Traffic Information System Data Survey Locations

NOTES

ISSUE PURPOSE

Scoping Report

PROJECT NUMBER

60698207

FIGURE TITLE

Potential Automatic Traffic Count Locations

FIGURE NUMBER

Figure 13-1

14. Other Environmental Topics

14.1 Introduction

14.1.1 The aim of the EIA scoping stage is to focus the EIA on those environmental topics where significant effects may be generated by the Scheme. The following sections provide a summary of environmental topics other than those as detailed in **Chapter 6** to **13** which have been considered during the preparation of this EIA Scoping Report. Standalone chapters for the topics detailed within this chapter are not anticipated to be required in the ES.

14.1.2 As described in paragraphs 5.7.2 and 5.7.3, from previous experience of undertaking environmental assessments of NSIP solar farms, it is considered that for the topics considered in this chapter the demonstration of no likely significant effects can be quickly established without the need for detailed information on legislation and policy, methodology and baseline conditions.

14.1.3 The Other Environmental Topics chapter of the ES will include a brief assessment of each of the topics identified below, supported by a technical note that will be appended to the ES that contains further information that evidences the ES section conclusions. The EIA methodology set out in **Chapter 5: Environmental Impact Assessment Methodology** of this EIA Scoping Report will not apply to this chapter – it may not be necessary, for example, to outline an assessment methodology or baseline conditions if a preliminary or screening assessment identifies that the impacts would be none or negligible.

14.1.4 For clarity, the topics covered in sections below are not scoped out of the EIA. Rather, they will be addressed proportionately within the ES in relation to the likelihood for significant effects based on the scoping work undertaken to date. The potential for cumulative effects with other development will also be assessed in the ES, in line with the methodology presented in **Chapter 5: Environmental Impact Assessment Methodology** of this EIA Scoping Report.

14.2 Air Quality

Introduction

14.2.1 This section discusses the baseline conditions, potential effects of the Scheme and mitigation, and the assessment methodology in relation to air quality.

Study Area

14.2.2 Based upon the Institute of Air Quality Management's (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (Ref 195), the Study Area for the dust assessment covers an area up to 350 m from the Site boundary or within 50 m of the routes used by construction vehicles on the public highway, and up to 500 m from the Site entrance(s). The Study Area will be confirmed in the ES.

Baseline Conditions

14.2.3 The City of Doncaster Council undertakes routine monitoring of ambient air quality as part of their Local Air Quality Management (LAQM) responsibilities under Part IV of the Environment Act (1995), as amended by the Environment Act 2021 (Ref 23). The City of Doncaster Council has carried out automatic (continuous) monitoring at five locations in 2021, with four sites monitoring for nitrogen dioxide (NO_2), three sites monitoring for particulate matter (PM_{10}), and one site also monitoring $PM_{2.5}$ (Ref 189). Particulate matter concentrations at these continuous monitoring sites have remained below the annual mean objectives for PM_{10} and $PM_{2.5}$ since 2017. Annual mean NO_2 concentrations recorded at the City of Doncaster Council continuous monitors were below the annual mean NO_2 objective of 40 micrograms per cubic metre ($\mu g/m^3$) in 2021. It should be noted the continuous monitors which measure particulate matter are located within Doncaster and Conisbrough and may not be representative of concentrations at the Site.

14.2.4 While Selby District has now been incorporated into North Yorkshire Council, many of the statistical sources reflect the pre-existing administrative boundaries and therefore data for Selby District is presented below. Neighbouring SDC and East Riding of Yorkshire Council (ERYC) did not undertake automatic (continuous) monitoring using reference methods for any pollutants during 2021, hence there are no available measurements of any pollutants from reference methods (Ref 191, Ref 192). ERYC has conducted monitoring of NO_2, PM_{10}, $PM_{2.5}$ and ozone with two low-cost monitors. Whilst these are not reference-grade monitoring methods, the results from 2021 indicate that there are no exceedances of any relevant air quality objectives.

14.2.5 The City of Doncaster Council also conducts monitoring using a network of 69 diffusion tubes located along principal traffic routes across the borough to quantify NO_2 concentrations in the vicinity of sensitive receptors (Ref 193). SDC (now North Yorkshire Council) undertakes NO_2 monitoring at 36 diffusion tube locations, whilst ERYC has 92 diffusion tube locations. Amongst these monitoring sites, there were five exceedances of the annual mean NO_2 objective in 2021. However, these sites are located primarily in the town centres of Doncaster and Selby and are not likely to be representative of concentrations at the Site. There are no diffusion tube monitoring locations within 1 km of the Site.

14.2.6 There are eight Air Quality Management Areas (AQMAs) within the administrative area of the City of Doncaster Council, and there is one AQMA within the administrative area of SDC. The AQMAs are generally located in city and town centres or along major traffic routes. ERYC does not have any designated AQMAs. All AQMAs are at least 5 km away from the Site. Due to the distance of the AQMAs from the Site, they are not considered likely to be affected by the Scheme.

14.2.7 Background concentrations of NO_2 and fine PM_{10} are considered to be low in the vicinity of the Site (Ref 194), which is located in a rural area with no large conurbations.

14.2.8 The Site is surrounded by numerous ecologically sensitive sites, which are potential receptors for air quality. There is one LWS (Went Valley (Part)) within the Solar PV Site, an Ancient Woodland and LWS (Bunfold Shaw) located approximately 15 m from the Solar PV Site within the central area and Riddings Farm Pond cLWS and Fenwick Hall Moat LWS are both located approximately 0.1 km from the Solar PV Site within the central area. There are several LWS within and surrounding the Grid Connection Corridor Search Area, as listed in Table 8-3 in **Chapter 8: Ecology**. These sites will be confirmed in the ES and will be screened for their sensitivity to construction dust impacts and nitrogen deposition and included as receptors in the air quality impact assessment as appropriate.

14.2.9 Consultation with stakeholders will be undertaken, and confirmation sought as to whether baseline air quality monitoring is considered necessary.

Potential Effects and Mitigation

14.2.10 The potential air quality impacts associated with the Scheme are considered to be:

- Impacts from dust arising during the construction and decommissioning phases of the Scheme;
- Impacts from vehicle and plant emissions during the construction and decommissioning phases of the Scheme; and
- Impacts from vehicle emissions during the operation of the Scheme.

14.2.11 Following construction, the Scheme is expected to result in minimal alteration to the baseline situation in respect of air quality.

Assessment Methodology

14.2.12 As described in **Chapter 13: Transport and Access** of this EIA Scoping Report, the nature of the Scheme is such that the greatest impact is likely to occur during the construction and decommissioning phases (including the removal of materials and waste), and thus the assessment of transport effects presented in the ES will focus on these phases. During the operational phase there will be minimal vehicle movements to and from the Site. Therefore, consideration of air quality impacts from vehicle emissions during the Scheme operational phase is proposed to be scoped out of the EIA.

14.2.13 The potential impacts from dust emissions arising from activities during the construction and decommissioning phases of the Scheme will be considered using an approach based on the IAQM guidance (2014) (Ref 195) for assessing impacts from such activities. This is both a screening assessment and a risk-based qualitative assessment approach and is applied for air quality assessments throughout the UK. Mitigation measures will be identified and incorporated into the Framework CEMP and Framework DEMP. The implementation of these measures through the detailed CEMP and detailed DEMP means that no significant air quality effects from dust generation are envisaged.

14.2.14 As part of the air quality assessment, potential sensitive receptors will be identified for the construction and decommissioning of the Scheme based on a review of aerial photography, Defra's Magic Map Application (275Ref 83), the Air Pollution Information System (APIS) database (Ref 196), construction and decommissioning phasing plans and OS mapping, and with consideration to current guidance, including:

- IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction (Ref 195);
- Defra (2022) LAQM Technical Guidance (TG22) (Ref 197);
- IAQM (2020) A guide to the assessment of air quality impacts on designated nature conservation sites (Ref 198);
- Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001) (2018) (Ref 199).

14.2.15 Construction and decommissioning related plant emissions are anticipated to represent a small source of emissions relative to ambient local conditions in the vicinity of the Site based on the scale of work that would occur and the number of plant vehicles that would be required. However, suitable mitigation measures for plant and motorised equipment will be recommended based on advice prescribed in IAQM (2014) (Ref 195) guidance and incorporated into the Framework CEMP and Framework DEMP.

14.2.16 The anticipated number of vehicles that would be used during the construction and decommissioning phases of the Scheme will be considered in the context of the guidance published by Environmental Protection UK (EPUK)/IAQM (2017) (Ref 200), IAQM (2014) (Ref 195) and EPUK (2021) (Ref 201). The latter sets out the criteria to establish the need for an air quality assessment for the construction phase of a development as being *"Large, long-term construction sites that would generate large HGV flows (>200 movements per day) over a period of a year or more".* Should the predicted construction traffic flows be below the criteria, they would not be expected to adversely affect air quality. If this is the case, it will be proposed that the impact of construction traffic emissions on air quality is scoped out of the EIA.

14.2.17 Similarly, the number of additional vehicles on the road once the Scheme is operational will be considered in the context of the same guidance documents.

14.2.18 Following construction, the Scheme is expected to result in minimal alteration to the baseline situation in respect of air quality. No emissions are anticipated from the on-site infrastructure, and there will be minimal vehicle movements to and from the Site. Therefore, consideration of air quality impacts during the operational phase is proposed to be scoped out of the ES.

14.2.19 The assessment methodology, findings, and recommendations for air quality will be presented in Chapter 14: Other Environmental Topics of the ES. Air quality mitigation measures will be incorporated into the Framework CEMP and Framework DEMP which will be submitted with the ES.

14.3 Glint and Glare

Introduction

14.3.1 This section identifies potential receptors and the potential effects of the Scheme in relation to glint and glare , along with mitigation and the proposed assessment methodology.

14.3.2 Glint and glare is the effect of reflected sunlight causing harm or discomfort to a sensitive receptor. A glint can be defined as the momentary receipt of a bright light and a glare can be defined as the receipt of a bright light over an extended or continuous period of time (Ref 11).

14.3.3 Solar panels are designed to absorb as much light as possible and not to reflect it. However, glint can be produced as a reflection of the sun from the surface of a solar PV panel. This can also be described as a momentary flash.

14.3.4 Glare is significantly less intense in comparison to glint and can be described as a continuous source of bright light, relative to diffused lighting. This is not a direct reflection of the sun, but a reflection of the sky around the sun.

14.3.5 Glint and glare assessments are sometimes required to accompany consent applications for solar developments, with the following guidelines set out in paragraphs 3.10.94 to 3.10.97 in the draft NPS EN-3 (Ref 11) on how to determine the requirement and scope:

“Applicants should map receptors to qualitatively identify potential glint and glare issues and determine if a glint and glare assessment is necessary as part of the application.

When a quantitative glint and glare assessment is necessary, applicants are expected to consider the geometric possibility of glint and glare affecting nearby receptors and provide an assessment of potential impact and impairment based on the angle and duration of incidence and the intensity of the reflection.

The extent of reflectivity analysis required to assess potential impacts will depend on the specific project site and design. This may need to account for ‘tracking’ panels if they are proposed as these may cause differential diurnal and/or seasonal impacts.

When a glint and glare assessment is undertaken, the potential for solar PV panels, frames and supports to have a combined reflective quality may need to be assessed, although the glint and glare of the frames and supports is likely to be significantly less than the panels.”

14.3.6 Relevant mitigation measures are also outlined in paragraphs 3.10.125 to 3.10.127 within the Draft NPS EN-3 (Ref 11):

“Applicants should consider using, and in some cases the Secretary of State may require, solar panels to comprise of (or be covered with) anti-glare/anti-reflective coating with a specified angle of maximum reflection attenuation for the lifetime of the permission.

Applicants may consider using screening between potentially affected receptors and the reflecting panels to mitigate the effects.

Applicants may consider adjusting the azimuth alignment of or changing the elevation tilt angle of a solar panel, within the economically viable range, to alter the angle of incidence. In practice this is unlikely to remove the potential impact altogether but in marginal cases may contribute to a mitigation strategy."

14.3.7 The receptors and weight of impact that influences the SoS decision making for glint and glare is outlined in paragraphs 3.10.149 to 3.10.150 within the Draft NPS EN-3 (Ref 11):

"Solar PV panels are designed to absorb, not reflect, irradiation. However, the Secretary of State should assess the potential impact of glint and glare on nearby homes, motorists, public rights of way, and aviation infrastructure (including aircraft departure and arrival flight paths).

Whilst there is some evidence that glint and glare from solar farms can be experienced by pilots and air traffic controllers in certain conditions, there is no evidence that glint and glare from solar farm results in significant impairment on aircraft safety. Therefore, unless a significant impairment can be demonstrated, the Secretary of State is unlikely to give any more than limited weight to claims of aviation interference because of glint and glare from solar farms."

14.3.8 As described in **Chapter 10: Landscape and Visual Amenity** of this EIA Scoping Report, consideration of how glint and/or glare might contribute to landscape or visual effects will be included in the EIA and presented within Chapter 10: Landscape and Visual Amenity of the ES.

Study Area

14.3.9 As glint and glare impacts disperse further and become less significant at greater distances, a 1 km Study Area will be used initially for ground-based receptors. Should there be any significant effects identified at the edge of the 1 km Study Area, then the Study Area will be increased and any significant effects will be assessed.

14.3.10 Study areas to identify aviation assets vary depending on the safeguarding criteria of that asset. All aerodromes within 30 km will be identified, however generally the detailed assessments are only required within 20 km for large international aerodromes, within 10 km for military aerodromes and within 5 km for small aerodromes.

Baseline Conditions

14.3.11 Potential receptors identified for the glint and glare assessment are listed below and fall in line with those outlined within the Draft NPS EN-3 (Ref 11):

- Residential homes within 1 km of the Solar PV Site;
- Roads within 1 km of the Solar PV Site (Broad Lane, West Lane, Fenwick Lane, Lawn Lane, Fenwick Common Lane, Moss Road and Flashy Carr Lane);

- Doncaster-Sheffield Airport (approximately 17.1 km south), Askern Airfield (approximately 3.5 km southwest), Great Heck Airfield (approximately 3.1 km north) and Sherburn in Elmet Airfield (approximately 16.8 km northwest);
- Railway users of the East Coast Main Line (approximately 0.7 km west); and
- Users of the local PRoW (see Figure 2-3).

Potential Effects and Mitigation

14.3.12 Construction and decommissioning activities would be undertaken in accordance with a CEMP and DEMP respectively. A Framework CEMP and Framework DEMP will be prepared as part of the ES and will include information on how reflective surfaces are to be treated during the construction and decommissioning phases with a view toward their final placement across the Solar PV Site. These would be developed into a detailed CEMP and a detailed DEMP prior to Scheme construction and decommissioning, respectively.

14.3.13 It is expected that avoidance of the effects of glint and glare would be considered as part of construction and decommissioning planning. Further, the scale of the Site is such that the full area would not be occupied for the duration of construction and decommissioning activities and the movement of reflective surfaces would be temporarily localised to smaller areas on a rolling basis until the works are complete. Based on the nature of the activities, the distances to receptors and the implementation of the detailed CEMP and detailed DEMP, construction and decommissioning glint and glare effects are proposed to be scoped out of the assessment.

14.3.14 Operational effects are considered to be fixed and would last for the duration of the Scheme's operation. The interaction of solar PV panels with sensitive locations, for example vehicular junctions or pedestrian crossings on roads, or viewpoints along rail lines or roads, is primarily influenced by their siting, as solar PV panels require orientation toward the sunpath, and the choice of materials, where more reflective, or specular surfaces create a higher chance of creating distraction through discomfort or disability glare. Mitigation measures applicable to the Scheme's operation will be included in a Framework OEMP prepared as part of the DCO application. The Framework OEMP will form the basis of the detailed OEMP which is expected to be secured as a Requirement of the DCO.

14.3.15 The setback mounting of the solar PV panels within the Solar PV Site from its boundaries combined with the distance to potential receptors and angling of the panels from the horizontal could help to limit how and where potential occurrences of glare could be created by the Scheme.

14.3.16 Furthermore, the dark colour and a matt material finish of the solar PV panels is designed to absorb light and minimise potential occurrences of reflected light, reducing the likelihood that glare conditions could be created from the panels themselves.

14.3.17 Based on the expected design, screening and distance to sensitive receptors, significant glint and glare effects are not considered likely.

Nevertheless, as the design develops, consideration will be given to the potential for solar reflections to impact on sensitive receptors. This will include undertaking calculations to determine whether the solar PV panels will be visible from sensitive locations and if a solar reflection could occur, whether it is likely to be a significant nuisance or hazard. The calculations will be made using specialised software based on the Sandia Laboratories Solar Glare Hazard Analysis Tool. If glint and glare is likely to be a nuisance or hazard, mitigation will be proposed.

Assessment Methodology

14.3.18 Consultation with the relevant bodies will be undertaken to agree the approach to the assessment, including but not limited to:

- City of Doncaster Council;
- Civil Aviation Authority;
- Network Rail; and
- National Highways.

14.3.19 As discussed in paragraph 2.3.11, there are currently three options for PV module mounting structures (fixed south facing, fixed east-west facing and single axis tracker). The type of PV module mounting structure taken forward may be refined as the Scheme design progresses. The glint and glare assessment will assess impacts from each PV module mounting structure presented in the ES.

14.3.20 The assessment methodology, findings, and recommendations for glint and glare will be incorporated into the Scheme design and presented as a technical appendix to the ES. Any mitigation planting or fencing recommended by the modelling will be incorporated into the Scheme design and assessed by the other technical chapters in the ES. It is considered that this will negate the need for a specific glint and glare chapter in the ES, however, the assessment will be summarised in Chapter 14: Other Environmental Topics of the ES and will inform other technical assessments, including the LVIA that will be presented in Chapter 10: Landscape and Visual Amenity of the ES, as appropriate.

14.4 Ground Conditions

Introduction

14.4.1 This section discusses potential effects of the Scheme and mitigation in relation to ground conditions, along with the proposed assessment methodology.

Baseline Conditions

14.4.2 Baseline ground conditions will be set out in Chapter 14: Other Environmental Topics of the ES, in accordance with the methodology set out below.

Potential Effects and Mitigation

14.4.3 Potential effects of the Scheme on Minerals Safeguarding Areas are included in **Chapter 12: Socio-economics and Land Use** of this EIA Scoping Report.

14.4.4 Based upon the PRA, a number of environmental design and management measures would be employed as standard best practice to minimise impacts to human health, controlled waters and other sensitive receptors during the construction and decommissioning phases of the Scheme. These will be incorporated into the Framework CEMP and the Framework DEMP which will be provided alongside the ES as part of the DCO application. As discussed previously, these would be developed into a detailed CEMP and a detailed DEMP prior to Scheme construction and decommissioning, respectively.

14.4.5 Potential environmental impacts that would be avoided, prevented, reduced or offset through the implementation of defined mitigation measures include:

- Human exposure through direct contact, inhalation or dermal uptake of contaminants, potentially present in soils and groundwater;
- Creation of preferential pathways and mobilisation of contaminants;
- Contamination of natural soils, driving of contamination into an aquifer during piling, contamination of groundwater with concrete, paste or grout;
- Pollution and degradation of water quality of any underlying aquifer;
- Infiltration and/or runoff into the local drainage/sewerage network, or pollution of the drainage/sewerage network and any adjacent surface water features;
- Run-off and infiltration of contaminants from material stockpiles;
- Contamination of drainage and sewerage network and/or groundwater; and
- Spread of nuisance dusts and soils to the wider environment and local roads.

14.4.6 When the Scheme construction is complete and operational, operation and maintenance activities would largely be limited to maintenance and inspection/monitoring of the infrastructure. During operation and maintenance activities, there may be the need to use oils, grease, fuels, lubricants or cleaning agents. There is a limited risk of chemical pollution arising from accidental spillages during these operations.

14.4.7 Operation and maintenance activities during the Scheme operational phase would be managed through an OEMP. A Framework OEMP will be submitted with the DCO application to address all operational related issues. This will include a spillage Emergency Response Plan, which maintenance staff would be required to read and understand. On-Site provisions would be made to contain a serious spill or leak through the use of booms, bunding and absorbent material. The Framework OEMP would be developed into a detailed OEMP following the grant of the DCO. Given that operation and

maintenance activities would be appropriately controlled, it is proposed that operation and maintenance activities are scoped out of the assessment.

Assessment Methodology

14.4.8 The EA's Land Contamination Risk Management guidance (Ref 202) identifies that the first step (known as Stage 1, Tier 1) in evaluating land contamination risks is a PRA. The objective of a PRA is to identify and evaluate potential land quality risks and development constraints associated with a development and to construct an initial conceptual site model that can be used to inform future decision making and the design future ground investigation and/or mitigation, should it be required.

14.4.9 A PRA Report for the Scheme will be prepared, covering the land within the Site. The PRA will be presented as a technical appendix to the ES.

14.4.10 The EA guidance on Managing and Reducing Land Contamination: Guiding Principles (Ref 203) and the Draft National Policy Statement for Energy (Draft EN-1) (Ref 8) will be referred to in the PRA.

14.4.11 The PRA will include the following:

- Details of land within the Site and surrounding land including development history, geology, hydrogeology, hydrology, soil and groundwater quality and environmental setting;
- A review of available environmental data and details of any available site investigation, risk assessment, remediation, or validation reports for land within the Site;
- Details from a Site walkover documenting:
  - The existing layout, current operations and condition of land within the Site and immediately surrounding land; and
  - The visual inspection of any accessible stormwater, foul and offsite effluent discharges.
- A conceptual site model and an evaluation of potential contamination linkages; and
- Conclusions and recommendations based on the findings.

14.4.12 It is anticipated that the results and recommendations of the PRA, once incorporated into the Framework CEMP and the Framework DEMP, along with the environmental design and management measures above for the construction, operational and decommissioning phases (including controls in the Framework OEMP), negate the need for a specific ground conditions chapter in the ES. This ground conditions assessment will thus be set out in Chapter 14: Other Environmental Topics of the ES.

14.5 Major Accidents and Disasters

Introduction

14.5.1 This section discusses the baseline conditions, likely effects of the Scheme and mitigation, and the assessment methodology in relation to major accidents and disasters.

14.5.2 The EIA Regulations (Ref 2) consider major accidents or disasters. The EIA Regulations (Ref 2) cite two specific Directives as examples of risk assessments to be brought into EIA, namely Directive 2012/18/EU of the European Parliament and of the European Council which deals with major accident hazard registered sites (Ref 204) and Council Directive 2009/71/Euratom which deals with nuclear sites (Ref 205). Neither of these Directives are relevant to the Scheme.

14.5.3 Schedule 4 article 5d of the EIA Regulations (Ref 2) requires that the EIA contains *"a description of the likely significant effects of the development on the environment resulting from the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)"* whilst Schedule 4, Part 8 requires that the EIA contains *"a description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned"*.

Baseline Conditions

14.5.4 The potential receptors of effects resulting from major accidents or disasters will be reported in the ES in accordance with the assessment methodology presented below.

Assessment Methodology

14.5.5 In accordance with IEMA guidance (Ref 207), the following methodology has been adopted where 'accidents' are considered to be an occurrence resulting from uncontrolled developments in the course of their construction and operation (e.g. major emission, fire or explosion), whilst 'disasters' are considered to be naturally occurring extreme weather events or ground related hazard events (e.g. subsidence, landslide, earthquake). In general, major accidents or disasters, as they relate to the Scheme, fall into three categories:

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

14.5.6 An initial scoping exercise has been undertaken to identify major accidents or disasters that could be relevant to the Scheme. This list was drawn from a number of sources, including the National Risk Register 2020 (Ref 208). Major accidents or disasters with little relevance in the UK were not included. The long list of major accidents or disasters is presented in Appendix D: Long List of Major Accidents and Disasters of this EIA Scoping Report. This initial scoping exercise shows the potential vulnerability of the Scheme to the risk of a major accident and/ or disaster associated with a variety of different events.

14.5.7 This long list was then screened to identify the third group of major accidents or disasters listed above, to form a short list of events (see Table 14-1) to be taken forward for further consideration. Appendix D: Long List of Major Accidents and Disasters of this EIA Scoping Report therefore provides further clarity on the topics and events which have been scoped into the EIA, and those which have been scoped out, with suitable reasoning provided.

14.5.8 Although the majority of the major accidents or disasters identified in the long list are considered under other legislative or design requirements, this is not considered to be sufficient reason to automatically eliminate the major accident or disaster from further consideration. This is consistent with the approach for other topics, for example that the need to comply with nature conservation legislation does not mean that ecology and nature conservation does not need to be considered in EIA. However, where it is concluded that the need for compliance is so fundamental that the risk of any receptors being affected is remote, major accidents or disasters on the long list are not included on the short list.

14.5.9 Likewise, it is considered reasonable and proportionate to exclude certain receptor groups from the outset. Construction workers, as a receptor, can be excluded from the assessment because existing legal protection is considered to be sufficient to minimise any risk from major accidents or disasters to a reasonable level. Legislation in force to ensure the protection of workers in the workplace includes:

- Health and Safety at Work etc. Act 1974 (Ref 209);
- The Management of Health and Safety at Work Regulations 1999 (Ref 210);
- The Workplace (Health, Safety and Welfare) Regulations 1992 (Ref 211); and
- The CDM 2015 Regulations (Ref 28).

Potential Effects and Mitigation

14.5.10 It is considered highly likely that as the design of the Scheme evolves during the preparation of the DCO application, it will become clear that there is no real risk or serious possibility of these events interacting with the Scheme. In that eventuality, it is proposed to scope out the assessment of such major accidents or disasters from the ES. The ES will note and explain where this approach has been taken. Should the possibility of any events interacting with the Scheme remain, this will be assessed and presented in the ES.

14.5.11 Where further design mitigation is unable to remove the potential interaction between a major accident or disaster and a particular topic, the relevant chapter of the ES will identify the potential consequence for receptors covered by the topic and give a qualitative evaluation of the potential for the significance of the reported effect to be increased as result of a major accident or disaster.

14.5.12 The potential receptors of effects resulting from major accidents or disasters will be reported in the relevant topic chapter of the ES, and as such it is considered that this will negate the need for a specific major accidents or

disasters technical chapter in the ES. Nevertheless, there will be signposting of major accident or disaster impacts in the ES to enable these to be identified.

Table 14-1: Major Accidents and Disasters Short Listed for Further Consideration

Major accident or disaster	Potential receptor	Comments	Location in ES or DCO
Floods	Property and people in areas of increased flood risk.	Parts of the Site are located within Flood Zones 2 and 3. Both the vulnerability of the Scheme to flooding and its potential to exacerbate flooding will be considered in the FRA and reported in the ES. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	• ES Chapter 9: Water Environment
Fire	Local residents, habitats, species and heritage features.	There may be potential for fire due to the battery storage element of the Scheme. However, the BESS would include cooling systems designed to regulate temperatures to within safe conditions, which minimises the risk of fire. In addition, the Scheme design would include adequate separation between battery banks to ensure an isolated fire would not become widespread and lead to a major incident. Fire detection and suppression features would be installed to detect (e.g. multispectral infrared flame detectors) and suppress (e.g. water base suppression systems) fires to minimise this risk. A Framework Battery Safety Fire Management Plan will be prepared for the Scheme and submitted alongside the DCO application. The development of the Framework Battery Safety Fire Management Plan will be considered in the iterative design of the Scheme ensuring that design requirements to ensure fire safety (such as ensuring adequate provision of land for water storage) and management of any firewater runoff are captured.	• ES Chapter 2: The Scheme • Framework Battery Safety Fire Management Plan
Road accidents	Road users and the aquatic environment.	The risk posed by spillages from hazardous loads due to a road traffic accident during construction or decommissioning	• ES Chapter 8: Ecology

Major accident or disaster	Potential receptor	Comments	Location in ES or DCO
		will be considered in the Ecology and Water Environment chapters of the ES. The risk posed by construction and decommissioning traffic on the local road network will be considered in the Transport and Access chapter of the ES. No significant effects are predicted during operation due to the low vehicle numbers that would be required. The potential for glint and glare to affect road users will be considered within a technical appendix to the ES and summarised under Chapter 14: Other Environmental Topics of the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	• ES Chapter 9: Water Environment • ES Chapter 13: Transport and Access • ES Chapter 14: Other Environmental Topics
Rail accidents	Rail users	The Site is located approximately 700 m east of the East Coast Main Line railway, from Shaftholme Junction to Temple Hirst Junction. The potential for glint and glare to affect trains will be considered within a technical appendix to the ES and summarised in the Chapter 14: Other Environmental Topics of the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	• ES Chapter 14: Other Environmental Topics
Aircraft disasters	Aircraft users	The closest airfield to the Scheme is Great Heck Airfield, located approximately 3.1 km north of the Scheme. The potential for glint and glare to affect aircraft will be considered within a technical appendix to the ES and summarised in Chapter 14: Other Environmental Topics of the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	• ES Chapter 14: Other Environmental Topics

Major accident or disaster	Potential receptor	Comments	Location in ES or DCO
Flood defence and reservoir (dam) failure	Property and people in areas of increased flood risk.	Parts of the site may be at risk of flooding from flood defence failure or reservoir (dam) failure. This will be covered in the FRA and reported in ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	• ES Chapter 9: Water Environment
Utilities failure (gas, electricity, water, sewage, oil, communications)	Employees and local residents.	The Scheme has the potential to affect existing utility infrastructure above and below ground. To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. Consultation with relevant utilities providers is a routine part of solar development and consultees include water, gas and electricity utilities providers and telecommunications providers, as appropriate. Information obtained from consultation will be used to inform the Scheme layout and design.	• ES Chapter 14: Other Environmental Topics
Mining/ extractive industry	Employees.	There is potential for mining/extractive industry activities to have occurred in the vicinity of the Grid Connection Corridor Search Area. This may have led to unstable ground conditions, however, this will be considered as part of the geotechnical design to ensure the risk is designed out.	• ES Chapter 14: Other Environmental Topics
Plant disease	Habitats and species.	New planting may be susceptible to biosecurity issues, such as the increased prevalence of pests and diseases due to climate change. However, the planting design will take account of biosecurity risks through a wider mix of species including some non-natives.	• ES Chapter 8: Ecology • ES Chapter 10 Landscape and Visual Amenity

Major accident or disaster	Potential receptor	Comments	Location in ES or DCO
			• Framework Biodiversity and Landscape Management Plan

14.6 Telecommunications and Utilities

Introduction

14.6.1 This section discusses the potential effects of the Scheme and mitigation, and the assessment methodology in relation to telecommunications and utilities.

14.6.2 Solar farms have the potential to affect existing below ground utility infrastructure, for example, through 'cable strike' when piling the solar PV frames or excavating the cable trenches. However, such developments are not at a height to affect above ground telecommunications.

Baseline Conditions

14.6.3 Existing infrastructure constraints will be identified and confirmed in Chapter 14: Other Environmental Topics of the ES, as described below.

Potential Effects and Mitigation

14.6.4 The Scheme will be designed to ensure appropriate buffers are applied in relation to buried infrastructure and overhead lines to allow safe access and working areas. As set out in **Chapter 2: The Scheme**, there would be no overhead electricity cables used or constructed as part of the Scheme.

Assessment Methodology

14.6.5 To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. Consultation with relevant telecommunication and utilities providers is a routine part of development and consultees will include water, gas and electricity utilities providers and telecommunication providers, as appropriate. Information obtained from consultation will be used to inform the Scheme design and appropriate protective provisions will be included in the DCO to ensure the protection of apparatus wherever any existing infrastructure has the potential to be affected by the Scheme and to mitigate against any identified risks, such as utilities failure. The findings of the desk-based study and consultation, along with any required mitigation measures, will be presented in Chapter 14: Other Environmental Topics of the ES.

14.6.6 Taking the above into account, relevant measures will be captured within the Scheme design, and therefore a separate utilities chapter is not considered to be required in the ES.

14.6.7 The assessment methodology, findings, and recommendations for telecommunications and utilities will be confirmed and presented in Chapter 14: Other Environmental Topics of the ES.

14.7 Electromagnetic Fields

Introduction

14.7.1 This section discusses the potential effects of the Scheme and mitigation, and the proposed assessment methodology in relation to electromagnetic fields.

14.7.2 Electric fields are the result of voltages applied to electrical conductors and equipment. Fences, shrubs and buildings easily block electric fields. Electromagnetic fields are produced by the flow of electric current; however, unlike electric fields, most materials do not readily block electromagnetic fields. The intensity of both electric fields and electromagnetic fields diminishes with increasing distance from the source.

14.7.3 Baseline ConditionsPotential receptors will be identified and confirmed in Chapter 14: Other Environmental Topics of the ES.

Potential Effects and Mitigation

14.7.4 No overhead electricity cables would be used or constructed as part of the Scheme. With the exception of relatively short lengths of cabling connecting parts of the Scheme, such as the solar panels to the inverters, all cables would be buried underground. Underground cables eliminate the electric field altogether as it is screened out by the sheath around the cable, but they still produce electromagnetic fields. Therefore, there is a need to consider the effects associated with electromagnetic fields as a result of the Scheme.

Assessment Methodology

14.7.5 An assessment will be undertaken which will take account of relevant legislation, policy and guidance, including (but not limited to) the International Commission of Non-Ionizing Radiation Protection (ICNIRP) reference levels (Ref 212) and National Grid guidance (Ref 212). The Energy Networks Associate publication ‘Electric and Magnetic Fields’ (Ref 215) states that the Government sets guidelines for exposure to electromagnetic fields in the UK on advice from the Health Protection Agency (HPA). In March 2004 the UK adopted the 1998 guidelines published by the ICNIRP and this policy was reaffirmed by a Written Ministerial Statement in October 2009. These guidelines also form the basis of a European Union Recommendation on public exposure and a Directive on occupational exposure. The ICNIRP ‘reference levels’ for the public are: 100 microteslas for magnetic fields. It goes on to say: *“These are the levels above which more investigation is needed if this level of exposure is likely to occur; the permitted levels of exposure are somewhat higher, 360 microteslas and 9000 volts per metre. They apply where the time of exposure is significant. These guidelines are designed to ensure that electromagnetic fields do not interfere with nerves, but were set after examining all the evidence, including the evidence on cancer. The occupational limits are five times higher”.*

14.7.6 As a worst case the lower ‘reference level’ of 100 microteslas is proposed to be used in the assessment as the threshold at which potentially significant effects could occur.

14.7.7 No significant impacts are expected to be identified from electromagnetic fields as a result of the Scheme. The logic for this is outlined below:

- DECC guidance (Ref 214) states that underground cables at voltages up to and including 132 kV are considered not capable of exceeding the ICNIRP exposure guidelines for electromagnetic fields (Ref 212) and that compliance with exposure guidelines for such equipment can be assumed unless evidence is brought to the contrary in specific cases. However, there is potential for exceedances of 132 kV where infrastructure overlaps. Cumulative effects with other existing or proposed electricity infrastructure will be considered as part of the assessment and potential effects identified;
- The electricity export connection options to the National Grid are described in Section 2.3.41. Depending on the option selected, 132 kV or 400 kV underground cables may be required within the Grid Connection Corridor Search Area. A typical burial depth recommended by National Grid for underground cables is 1.5 m wide and 1.2 m deep and the distance as the crow flies between the Solar PV Site and the Existing National Grid Thorpe Marsh Substation is approximately 6 km;
- The National Grid document 'Undergrounding high voltage electricity transmission lines' (Ref 212) states that for a 400 kV cable buried at 0.9 m depth, the typical magnetic field is 24 microteslas when on top of the cable and 3 microteslas at 5 m from the centreline, with the maximum level known by National Grid being 96 microteslas on top of the cable at 0.9 m depth, and 13 microteslas at 5 m; and
- Taking into account this guidance and the UK limits set for safety of members of the public, the maximum reported electromagnetic for HV cables buried at a minimum depth of 1.2 m would comply with the ICNIRP limits even if the cabling were directly under a human receptor. Therefore, no significant impacts are expected to arise from electromagnetic fields as result of the Scheme.

14.7.8 The assessment methodology, findings, and recommendations for electromagnetic fields will be confirmed and presented in Chapter 14: Other Environmental Topics of the ES.

14.8 Materials and Waste

Introduction

14.8.1 This section discusses the baseline conditions, potential effects of the Scheme and mitigation, and the assessment methodology in relation to materials and waste.

14.8.2 This section follows the methodology and checklist for action set out in the IEMA guide to: Materials and Waste in Environment Assessment, Guidance for a Proportionate Approach (referred from herein as the 'IEMA Guidance') (Ref 216).

14.8.3 For the purposes of this EIA Scoping Report, materials and waste comprise:

- The consumption of materials (key construction materials only); and

- The generation and management of waste.

14.8.4 Materials are defined in the IEMA Guidance (Ref 216) as *"physical resources that are used across the lifecycle of a development. Examples include key construction materials such as concrete, aggregate, asphalt and steel".*

14.8.5 Other material assets considered include built assets such as landfill void capacity and allocated/ safeguarded mineral and waste sites.

14.8.6 Impacts on Mineral Safeguarding Areas are not assessed in a materials and waste assessment in accordance with the IEMA Guidance, however, are included here since minerals are a planning consideration. Potential effects of the Scheme on Minerals Safeguarding Areas are included in **Chapter 12: Socio-economics and Land Use** of this EIA Scoping Report.

14.8.7 Waste is defined as per the Waste Framework Directive (Waste FD) (Ref 217) as "*any substance or object which the holder discards or intends or is required to discard"*.

Study Area

14.8.8 Two Study Areas for materials and waste assessment have been defined in accordance with IEMA Guidance (Ref 216):

- A Scheme Study Area: for construction, operational and decommissioning waste generation; use of construction materials; and consideration of impacts on allocated/safeguarded mineral, waste sites and presence of Minerals Safeguarding Areas. This Study Area is deemed to include the footprint of the proposed works, together with any temporary land requirements during the construction or decommissioning phases. For the purposes of this EIA Scoping Report, sites within 500 m of the Site have been reviewed; and
- An expansive Study Area: within which waste is managed and materials are sourced, namely:
  - Non-hazardous and inert waste management – Yorkshire and the Humber;
  - Hazardous waste management – England;
  - Availability of key construction materials, crushed rock, sand and gravel, ready-mixed concrete and asphalt – Yorkshire and the Humber; and
  - Availability of key construction materials (steel) – UK.

Baseline Conditions

14.8.9 Baseline information has been reviewed and consists of:

- National and regional availability (consumption/sales) for key construction materials (steel (Ref 218), aggregates, asphalt and concrete (Ref 219);
- Landfill void capacity in Yorkshire and the Humber (non-hazardous and inert landfill void capacity) and England (hazardous landfill void capacity) (Ref 220); and

- Allocated/safeguarded waste and mineral sites, Minerals Safeguarding Areas, historic and permitted landfills (Ref 221, Ref 222) in the vicinity of the Scheme.

Potential Effects and Mitigation

14.8.10 Potential materials and waste effects associated with the Scheme include changes in demand for construction materials, changes in available landfill void capacity and direct impacts on allocated/safeguarded mineral and waste sites during construction, operation and decommissioning.

14.8.11 Management measures that are inherent in the design, construction, operation and decommissioning of the Scheme (or are required regardless of any EIA, as they are imposed, for example, as a result of legislative requirements and/or standard sectoral practices, known as embedded mitigation) have been considered. Some of these measures have been identified and are described in the following paragraphs.

Construction

14.8.12 Construction materials required to construct the Scheme are unlikely to be significant in the context of regional or national construction material availability.

14.8.13 The types of wastes generated during Scheme construction are likely to comprise:

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

14.8.14 The PV panels, racks, inverters, BESS, transformers, switchgear and other supporting equipment would be manufactured off-site to the specified sizes, and thus wastage during their installation is expected to be minimal.

14.8.15 Large-scale earthworks are not expected, and therefore a surplus or shortfall of fill material requiring either export or import is not anticipated. If required, a Materials Management Plan (MMP) would be developed under the Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice (Ref 223) by the appointed construction Contractor to support the reuse of excavated materials, minimise off-site disposal; and to demonstrate the necessary lines of evidence to support the proper reuse / offsite disposal of materials and ensure compliance with regulatory guidance.

14.8.16 It is anticipated that a large proportion of non-hazardous and inert waste from the construction of the Scheme is likely to be recovered rather than disposed of to landfill, reducing the overall quantities of waste for disposal. Therefore, waste arisings are unlikely to be significant in the context of regional or national landfill void capacity.

14.8.17 There are no allocated / safeguarded waste and mineral sites, or historic and permitted landfills within the Site boundary. There is one Mineral Safeguarding Area for sand and gravel within the 500 m Study Area (Land to the east of Doncaster between Thorne and Bawtry) (see **Chapter 12: Socio-economics and Land Use** of this EIA Scoping Report).

14.8.18 Throughout the design, construction, operation and decommissioning phases, the Scheme would aim to prioritise waste prevention, followed by preparing for reuse, recycling and recovery and lastly disposal to landfill as per the waste hierarchy.

14.8.19 All management of waste would be in accordance with the relevant regulations and waste would be transported by licenced waste carriers to waste management sites which hold the necessary regulatory authorisation and/ or permits for those wastes consigned to them.

14.8.20 The construction of the Scheme would be subject to measures and procedures defined within the CEMP. The CEMP would require the implementation of industry standard practice and control measures for environmental impacts arising during Scheme construction, such as the control of dust and the approach to material and waste management on Site, including recycling opportunities and off-site disposal, following circular economy principles. A Framework CEMP and Framework Site Waste Management Plan (SWMP) will be prepared alongside the ES as part of the DCO application. The construction contractor would use these documents to prepare their detailed CEMP and SWMP prior to works commencing on Site.

Operation

14.8.21 During Scheme operation and maintenance activities, waste generation is expected to be negligible since solar PV panels do not generate any waste as part of the energy production process. Waste estimates associated with operation and maintenance activities such as component replacement will be set out in the ES and would be managed through the Framework OEMP. The Framework OEMP would be submitted with the DCO application and developed into a detailed OEMP following the grant of the DCO.

Decommissioning

14.8.22 At the end of the Scheme's operational life, it would be decommissioned. As this is expected to be at least 40 years in the future, it is not possible to identify at this stage either the waste management routes or specific facilities that would be used, as these are liable to change over such a timescale.

14.8.23 A Framework DEMP, also known as a Decommissioning Strategy, will be included alongside the ES, and which will set out the general principles to be followed during Scheme decommissioning. Waste estimates for decommissioning will be included in the ES and managed through the Framework DEMP, along with any measures that would be implemented to minimise waste such as the use of the waste hierarchy. A detailed DEMP based on the Framework DEMP would be prepared by the applicable contractor and agreed with relevant authorities at that time of decommissioning, in advance of the commencement of decommissioning

works. It is expected that the detailed DEMP would be secured through a Requirement in the DCO.

Assessment Methodology

14.8.24 A checklist in the IEMA Guidance (Ref 216) offers the basis for action during the EIA scoping stage. The scoping questions within the checklist have been considered and the following can be concluded:

- The scale, nature and timing of the Scheme are known;
- Comparable/historical data for developments of a similar scale and/ or nature are available;
- There is appropriate assurance in the validity of data, information and evidence concerning primary and tertiary mitigation measures; and
- The Study Area is defined.

14.8.25 Given that construction materials required to construct the Scheme are unlikely to be significant in the context of regional or national construction material availability, and that all wastes would be managed in accordance with the waste hierarchy, significant adverse materials and waste impacts are not expected during Scheme construction, operation or decommissioning. As such, the need for a separate waste chapter in the ES has been scoped out of the EIA. Potential material and waste impacts will be assessed at a high level (as described above) and presented within Chapter 14: Other Environmental Topics of the ES.

15. Structure of the Environmental Statement

15.1.1 The ES will consist of three volumes and a Non-Technical Summary (NTS). This section provides a summary of each document that will form the ES.

15.1.2 **ES Volume I: Main Report** – this will form the main body of the ES, detailing the results of the EIA, likely significant effects arising from the Scheme, and the proposed mitigation measures. The ES will also identify opportunities for social and economic benefits and environmental enhancement. The ES will be divided into a number of background and technical chapters, each being supported with figures and tabular information. Volume I of the ES will consider the environmental effects associated with a number of identified topics, which may receive significant environmental effects. Each topic will be assigned a separate technical chapter in the ES, as follows:

- Chapter 6: Climate Change;
- Chapter 7: Cultural Heritage;
- Chapter 8: Ecology;
- Chapter 9: Water Environment;
- Chapter 10: Landscape and Visual Amenity;
- Chapter 11: Noise and Vibration;
- Chapter 12: Socio-Economics and Land Use;
- Chapter 13: Transport and Access; and
- Chapter 14: Other Environmental Topics.

15.1.3 In addition to the above, the following chapters will be included within the ES:

- Chapter 1: Introduction;
- Chapter 2: The Scheme;
- Chapter 3: Alternatives and Design Evolution;
- Chapter 4: Consultation;
- Chapter 5: Environmental Impact Assessment Methodology;
- Chapter 15: Cumulative Effects and Interactions; and
- Chapter 16: Summary of Environmental Effects.

15.1.4 **ES Volume II: Figures** – a complete set of figures will be provided for reference, which support the assessments in Volume I of the ES.

15.1.5 **ES Volume III: Technical Appendices** – a complete set of appendices will be provided for reference. These comprise background data, technical reports, tables, figures and surveys which support the assessments in Volume I of the ES.

15.1.6 **ES Non-Technical Summary** – the NTS will be presented in a separate document and will provide a concise description of the Scheme, the considered alternatives, baseline conditions, assessment methodology,

potential environmental effects and mitigation measures. The NTS will be designed to provide information on the Scheme in an accessible format which can be understood by a wide audience and to assist interested parties with their understanding of the Scheme and its associated environmental effects.

16. Summary and Conclusions

16.1.1 This EIA Scoping Report represents notification under Regulation 8(1)(b) of the EIA Regulations that the Applicant will undertake an EIA in respect of the Scheme and produce an ES to report the findings of the EIA.

16.1.2 It also represents a formal application to PINS under Regulation 10 of the EIA Regulations for a 'Scoping Opinion' as to the information to be provided within the ES that will form part of the DCO application. This report has identified the environmental effects that are considered to have the potential to be significant and proposes the approach to be used in assessments that will be undertaken for the EIA to characterise and understand the significance of these effects. The prescribed consultees are invited to consider the contents of this report and comment accordingly within the statutory 42 day time period.

16.1.3 For clarity, Table 16-1 presents a summary of the proposed scope of the technical chapters as well as which elements of these topics are to be scoped out and the rationale behind this decision.

16.1.4 Table 16-2 summarises the approach taken to the topics discussed in **Chapter 14: Other Environmental Topics** of this EIA Scoping Report.

Table 16-1: Scope of Technical Assessments and Elements to be Scoped Out

Technical Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
Climate Change	Assessment of GHG emissions during construction, operation, and decommissioning. In-combination climate impact assessment during construction, operation and decommissioning. CCR review during construction, operation and decommissioning.	In-combination impacts of sea level rise are proposed to be scoped out of the in-combination climate impact assessment. Sea level rise is proposed to be scoped out of the CCR review.	The Site is located inland more than 40 km from the sea, in an area not susceptible to sea level rise (see Section 9.5 of **Chapter 9: Water Environment**).
Cultural Heritage	An assessment of impact on built heritage assets including impacts arising from changes to their setting during construction, operation and decommissioning. An assessment of impact on archaeological assets including impacts arising from changes to their setting and physical impacts to below ground archaeological remains during construction, operation and decommissioning. An assessment of impact on the historic landscape, including impacts arising from changes to setting during construction, operation and decommissioning.	None.	Not applicable.
Ecology	An assessment considering effects on designated sites and protected and/or notable habitats and species. Effects considered include habitat loss, fragmentation, disturbance, and indirect impacts such as watercourse pollution during construction and disturbance during	The impact pathway for the attraction of some species of aquatic invertebrates to solar panels. Terrestrial invertebrate surveys are not anticipated to be required due	There are no designated sites with aquatic invertebrate species or assemblages as qualifying features within the Study Area and the attraction of

Technical Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
	maintenance, security lighting, and management of on-site and adjacent habitats during operation. A PEAR will be undertaken, and further surveys, including: additional Phase 1 habitat surveys as required, hedgerow, breeding birds, wintering and passage birds, GCN, bats, badger, otter, water vole, reptiles, aquatic ecology, aquatic invertebrates and fish. Habitat condition assessments will also be carried out on land within the Site to inform the BNG assessment. A HRA will be prepared.	to the limited suitability of the habitats to be affected.	some species of aquatic invertebrates to solar panels. Due to the predominantly arable nature of the Site, it should be possible to avoid areas of likely high habitat suitability for terrestrial invertebrates; therefore, it is not proposed at this stage to undertake detailed terrestrial invertebrate surveys.
Water Environment	A qualitative assessment of potential effects on surface water and groundwater features from the construction, operation and decommissioning of the Scheme using a source-pathway-receptor approach. The assessment criteria will follow guidance in the DMRB LA113 Road Drainage and the Water Environment, as a robust and well tested method for scoping the assessment and predicting the significance of effects of development projects. A WFD assessment, Surface Water Drainage Strategy and FRA will be prepared.	Nutrient neutrality assessment.	There is no hydrologic connectivity between the Site and any of the designated sites identified by Natural England as requiring a nutrient neutrality assessment.
Landscape and Visual Amenity	Assessment of likely effects on landscape features and character, and views and visual	Separate lighting assessment.	The effect of lighting will be considered in the LVIA,

Technical Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
	amenity during construction, operation and decommissioning. Engagement with the City of Doncaster Council, North Yorkshire Council and East Riding of Yorkshire Council will be undertaken to seek agreement of the visual receptors that have the potential to be impacted by the Scheme, and the locations of viewpoints that will be used to represent their views.		rather than as a stand-alone assessment.
Noise and Vibration	Baseline noise monitoring will be undertaken at locations representative of surrounding noise-sensitive receptors. An assessment of temporary noise and vibration emissions from construction and decommissioning works and permanent noise emissions during operation. Road traffic noise during the construction and decommissioning phases of the Scheme will be assessed.	Vibration from the operation of the Scheme.	Equipment is of a type and would be used in locations such that operational plant that would not generate perceptible levels of vibration. As such, there would be no associated operational vibration effects. This will be confirmed in the detailed Scheme description within the ES.
		Traffic noise from the operation of the Scheme.	The Scheme would generate limited numbers of operational traffic that would not result in perceptible changes in road traffic noise.

Technical Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
Socio-Economics and Land Use	Assessment of effects on the creation of jobs as well as training and apprenticeship opportunities, including for local residents, during construction, operation and decommissioning. Assessment of effects on the accessibility of recreational routes, open space, community facilities and local services both within and beyond the Site boundary during construction, operation and decommissioning. Assessment of effects on accessibility for receptors within and beyond the Site boundary, including businesses, residential properties, visitor attractions and development land during construction, operation and decommissioning. Assessment of effects on BMV agricultural land within the Solar PV Site and substation(s) within the Grid Connection Corridor Search Area during construction, operation and decommissioning.	Minerals safeguarding.	The mineral deposits will not be permanently sterilised by the Scheme and can be extracted, if required, after its decommissioning.
		Assessment of effects on BMV agricultural land within the underground cable areas in the Grid Connection Corridor Search Area.	Impacts would be temporary, during construction, and during operation the cable would be buried at sufficient depth to allow arable and pastoral farming to continue (with ploughing). Potential impacts would be mitigated through industry standard measures which will be outlined in the ES and included in the Framework CEMP.
Transport and Access	Construction vehicle movements associated with the Scheme will be established and assessed in terms of impact on the local highway network. This will include an assessment of the impact on severance, driver delay, pedestrian delay, pedestrian and cyclist amenity, fear and intimidation, accidents and safety, total traffic increase, HGV increase.	Operational vehicle movements.	Scoped out due to the low vehicle numbers that would be required once the Scheme is operational.
		Hazardous loads.	There are no nearby road features which suggest that the transfer of materials poses a risk beyond that

Technical Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
			which would be expected on the general highway network. The ES will explain the measures to be employed to ensure safe vehicular transport of components such as panels and batteries to and from the Site.
		Assessments for the decommissioning phase.	Scoped out due to uncertainties in relation to future traffic flows and the magnitude of impacts being the same or less than during construction and therefore able to conclude with confidence the significance of effect would be no worse than has been determined for the construction phase. The ES will provide further commentary on the likely transport effects of the decommissioning process.
Human Health	It is considered that human health as a result of the Scheme will be covered through the	A standalone assessment of Human Health is proposed to be scoped out of the EIA.	The technical chapters of the PEIR and ES will consider the potential

Technical Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
	assessment findings undertaken in other technical chapters of the ES, namely: • Landscape and Visual Amenity; • Noise and Vibration; • Transport and Access; and • Air Quality. A standalone assessment of human health is not proposed.		effects of human health within their own assessments. There are not expected to be any significant human health effects beyond those identified for these assessments. A detailed human health assessment is therefore not proposed.

Table 16-2: Approach to Other Environmental Topics

Environmental Topic	Proposed Approach
Air Quality	Qualitative dust assessment based on IAQM guidance (Ref 195). Suitable mitigation measures for construction and decommissioning plant and motorised equipment will be identified and included in the Framework CEMP and Framework DEMP. The effect of construction, operation and decommissioning traffic on air quality is proposed to be scoped out should the predicted traffic flows be below the criteria set out in Environmental Protection UK guidance (Ref 201). Consideration of air quality impacts during the operational phase is proposed to be scoped out of the assessment.
Glint and Glare	An assessment will be undertaken to identify the potential for solar reflections to impact on sensitive receptors for each PV module mounting structure presented in the ES, which will inform design development. Construction and decommissioning effects are proposed to be scoped out of the glint and glare assessment.
Ground Conditions	A PRA will be presented as a technical appendix to the ES and the results and recommendations will be incorporated into the Framework CEMP and the Framework DEMP. Operation and maintenance activities during the operational phase will be managed through the controls set out in the Framework OEMP and are proposed to be scoped out of the ground conditions assessment.
Major Accidents and Disasters	Where the major accidents and disasters identified are not already being considered within the scope of existing technical assessments, they will continue to be reviewed by the design team to ensure the risks are understood and addressed through design as necessary. However, it is considered highly likely that as the design of the Scheme evolves in preparation of the DCO application, it will become clear that there is no real risk or serious possibility of the event interacting with the Scheme. In that eventuality, it is proposed to scope out from the ES the assessment of such major accidents or disasters. The ES will note and explain where this approach has been taken.
Telecommunications and Utilities	Consultation and a desk-based study to identify any existing infrastructure constraints. This information will be used to inform the Scheme design.

Environmental Topic	Proposed Approach
Electromagnetic Fields	The assessment will focus on the effects associated with electromagnetic fields as a result of the Scheme. Cumulative effects with other existing or proposed electricity infrastructure will be considered and potential effects identified.
Materials and Waste	A description of the potential streams of construction, operation and decommissioning waste and estimated volumes will be provided in the ES, along with any measures that would be implemented to minimise waste, such as the use of the waste hierarchy.

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18. Glossary

Term	Definition
Agricultural Land Classification	The standardised method for classifying agricultural land in England and Wales according to its versatility, productivity and workability, based upon inter-related parameters including climate, relief, soil characteristics and drainage, i.e. ALC assesses land quality based upon the type and level of agricultural production the land can potentially support. These factors form the basis for classifying agricultural land into one of five grades (with Grade 3 land divided into Subgrades 3a and 3b), ranked from excellent (Grade 1) to very poor (Grade 5).
Air Quality Management Area (AQMA)	Places where air quality objectives are not likely to be achieved. Where an AQMA is declared, the local authority is obliged to produce an Action Plan in pursuit of the achievement of the air quality objectives.
Baseline conditions	The conditions against which potential effects arising from the Scheme are identified and evaluated.
Battery Energy Storage System(s)	The installation of battery storage infrastructure for the storage and exportation of electrical energy to the National Grid.
Best and most versatile agricultural land	The highest grades of agricultural land quality, including excellent (ALC Grade 1), very good (Grade 2) and good (Subgrade 3a) agricultural land.
Construction Environmental Management Plan	A site specific plan developed to ensure that appropriate environmental management and monitoring practices are followed during the construction phase of the Scheme.
Cumulative Effects	Effects that result from the incremental changes caused by other past, present or reasonably foreseeable actions together.
Decommissioning Environmental Management Plan	A site specific plan developed to ensure that appropriate environmental management and monitoring practices are followed during the decommissioning phase of the Scheme.
Environmental Impact Assessment (EIA)	A process by which information about the potential effects of a proposed development is collected, assessed and used to inform decision making. For certain projects, EIA is a statutory requirement.
Environmental Statement	A document produced in accordance with the EIA Regulations to report the results of an EIA.
Existing National Grid Thorpe Marsh Substation	The land located within the existing compound for the Thorpe Marsh Substation.

Term	Definition
Flood Zone 1	This is land assessed as having a less than 1 in 1,000 chance of river or sea flooding in any year (<0.1% AEP).
Flood Zone 2	This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 chance of river flooding (1% –0.1% AEP), or between a 1 in 200 and 1 in 1,000 chance of sea flooding (0.5% –0.1% AEP) in any year.
Flood Zone 3	This zone comprises land assessed as having a 1 in 100 or greater chance of river flooding (>1% AEP), or a 1 in 200 or greater chance of flooding from the sea (>0.5% AEP) in any year.
Geophysical survey	A non-intrusive pre-construction archaeological evaluation technique that exploits a variety of physical or chemical characteristics of rocks and soils, in an attempt to locate underground features of archaeological interest. Types of geophysical survey include magnetometer survey, magnetic susceptibility survey and resistivity survey.
Grid Connection Corridor Search Area	The land between the Solar PV Site and the Existing National Grid Thorpe Marsh Substation, representing the maximum extent of land required for the Grid Connection Corridor.
Heavy Goods Vehicle (HGV)	Vehicles with 3 axles (articulated) or 4 or more axles (rigid and articulated).
Historic Environment Record	The record of archaeological and built heritage features in a county or district, usually held and maintained by the relevant county council.
Inverter	Inverters convert the direct current (DC) electricity collected by the PV modules into alternating current (AC). BESS also use inverters to convert between DC and AC. The batteries function in DC and electricity must be converted to AC to pass into or from the National Grid.
Mitigation	Measures including any process, activity, or design to avoid, prevent, reduce, or, if possible, offset any identified significant adverse effects on the environment.
National Policy Statement	National Policy Statements comprise the UK Government's central policy documents for the development of nationally significant infrastructure.
Nationally Significant Infrastructure Project	Large scale developments (such as onshore generating stations with a capacity exceeding 50 megawatts) which require a type of consent known as 'development consent' under procedures governed by the Planning Act 2008.

Term	Definition
Operational Environmental Management Plan	A site specific plan developed to ensure that appropriate environmental management and monitoring practices are followed during the decommissioning phase of the Scheme.
Preliminary Ecological Appraisal Report (PEAR)	Comprises a desk study, walkover survey and ecological appraisal to categorise the habitats present within a site, to identify the presence or potential presence of legally protected species, to identify potential ecological constraints / further survey requirements and to make recommendations to avoid or mitigate impacts or to deliver biodiversity enhancements.
Preliminary Environmental Information Report (PEIR)	Defined in the EIA Regulations as: *"information referred to in Regulation 14(2) which –(a) has been compiled by the applicant; and (b) is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)".*
Preliminary Risk Assessment	Report that presents a summary of readily available information on the geotechnical and/or geo-environmental characteristics of the site and provides a qualitative assessment of geo-environmental and/or geotechnical risks in relation to a proposed development.
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
Receptor or Resource	A component of the natural or man-made environment that is affected by an impact, including people.
the Scheme	Fenwick Solar Farm comprising the installation of solar photovoltaic (PV) generating panels, interconnecting cabling, associated BESS, one or more substation, a cable or line drop connecting the new substation to the Existing National Grid Thorpe Marsh Substation, and other supporting infrastructure including fencing, access tracks, drainage, and biodiversity and landscaping enhancements at the Site.
Solar PV Site	The maximum extent of land potentially required for the solar PV generating panels and on-site energy storage facilities.

Term	Definition
Source Protection Zone (SPZ)	Defined zones centred on groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution to the source and surrounding area. The closer the activity to the source, the greater the risk. The Source Protection Zones are subdivided into 3 Zones; where Zone 1 is the Inner Protection Zone, Zone 2 is the Outer Protection Zone and Zone 3 is the Total catchment.
Transformers	Transformers control the voltage of the electricity generated across a site before it reaches the electrical infrastructure.
Zone of Theoretical Visibility	The zone within which views of a proposed scheme may be experienced, as modelled through analysis of mapping data and field survey. It is influenced by many factors including topography and intermediate visual intrusions, such as blocks of woodland, vegetation and buildings.

19. Abbreviations

Abbreviation	Definition
AADT	Average Annual Daily Traffic
AC	Alternating Current
AEP	annual exceedance probability
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
APIS	Air Pollution Information System
AQMA	Air Quality Management Area
ATC	Automatic Traffic Count
BAP	Biodiversity Action Plan
BESS	Battery Energy Storage System(s)
BGS	British Geological Survey
BMP	Best Practicable Means
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
BoCC5	Birds of Conservation Concern 5
BOD	Biochemical Oxygen Demand
BRE	Building Research Establishment
BS	British Standard
CBC	Common Bird Census
CCC	Climate Change Committee
CCR	Climate change resilience
CCTV	Closed Circuit Television
CDM	Construction (Design and Management) Regulations
CEMP	Construction Environmental Management Plan
CH_4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CifA	Chartered Institute for Archaeologists
CL:AIRE	Contaminated Land: Applications in Real Environments
cLWS	candidate Local Wildlife Sites
CO_2	Carbon Dioxide
COPA	Control of Pollution Act
CTMP	Construction Traffic Management Plan
DBA	Desk-Based Assessment
DC	Direct Current

Abbreviation	Definition
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DEMP	Decommissioning Environmental Management Plan
DLL	District Level Licence
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EcIA	Ecological Impact Assessment
EEA	European Economic Association
EIA	Environmental Impact Assessment
EPS	European Protected Species
EPUK	Environmental Protection UK
ERYC	East Riding of Yorkshire Council
ES	Environmental Statement
FRA	Flood Risk Assessment
GCN	great crested newt
GHG	Greenhouse Gas
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GRP	Glass Reinforced Plastic
GVA	Gross Value Added
GWDTE	groundwater dependent terrestrial ecosystem
ha	Hectares
HDD	Horizontal Directional Drilling
HER	Historic Environment Record
HFC	Hydrofluorocarbon
HGV	Heavy Goods Vehicle
HSI	Habitat Suitability Index
HMSO	His Majesty's Stationery Office
HPA	Health Protection Agency
HRA	Habitats Regulations Assessment
HV	High Voltage
HVAC	Heating, Ventilation and Cooling
IAQM	Institute of Air Quality Management
ICCI	In-combination climate change impact
ICE	Inventory of Carbon and Energy
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IDB	Internal Drainage Board

Abbreviation	Definition
IEA	Institute of Environmental Assessment
IEF	Important Ecological Feature
IEMA	Institute of Environmental Management and Assessment
IHBC	Institute of Historic Building Conservation
JNCC	Joint Nature Conservation Committee
km	Kilometres
kV	Kilovolt
LAQM	Local Air Quality Management
LCA	Landscape Character Area
LCT	Landscape Character Type
LGV	Light Goods Vehicle
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
LSE	Likely Significant Effect
LV	Low Voltage
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
m	Metre
MAGIC	Multi-Agency Geographic Information for the Countryside
MHCLG	Ministry of Housing, Communities and Local Government
MMP	Materials Management Plan
MP	Member of Parliament
MSOA	Middle Layer Super Output Area
MV	Medium Voltage
MW	Megawatts
NCA	National Character Area
NDC	Nationally Determined Contribution
NERC	Natural Environment and Rural Communities
NF_3	Nitrogen Trifluoride
NGET	National Grid Electricity Transmission
NGR	National Grid Reference
NHLE	National Heritage List for England
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance

Abbreviation	Definition
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
NVQ	National Vocational Qualification
NVZ	Nitrate Vulnerable Zones
OEMP	Operational Environmental Management Plan
ONS	Office for National Statistics
OS	Ordnance Survey
PEAR	Preliminary Ecological Appraisal Report
PEIR	Preliminary Environmental Information Report
PFC	Perfluorocarbons
PIA	Personal Injury Accident
PM_{10}	particulate matter
PPG	Pollution Prevention Advice and Guidance
PPGN	Planning Practice Guidance: Noise
PPV	Peak Particle Velocity
PRA	Preliminary Risk Assessment
PRF	Preliminary Roost Feature
PRoW	Public Rights of Way
PV	Photovoltaic
PWS	Private water supplies
RBMP	River Basin Management Plans
RCP	Representative Concentration Pathway
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SDC	Selby District Council (now part of North Yorkshire Council)
SF_6	sulphur hexafluoride
SFRA	Strategic Flood Risk Assessment
SOAEL	Significant Observed Adverse Effect Level
SoCC	Statement of Community Consultation
SoS	Secretary of State
SPA	Special Protection Area
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone

Abbreviation	Definition
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage Systems
SWMP	Site Waste Management Plan
TAG	Transport Analysis Guidance
TEMPro	Trip End Model Presentation Program
TIN	Technical Information Note
TRL	Transport Research Laboratory
UAEL	Unacceptable Adverse Effect Level
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
W	Watt
WCA	Wildlife and Countryside Act
WFD	Water Framework Directive
WHO	World Health Organization
WTN	Waste Transfer Note
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Appendix A: Transboundary Effects Screening Matrix

Transboundary Effects Screening Matrix

Regulation 32 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires the consideration of any likely significant effects on the environment of European Economic Association (EEA) States as associated with the Scheme.

Guidance upon the consideration of transboundary effects is provided in the Planning Inspectorate's Advice Note 12: Development with significant transboundary impacts consultation[10].

The following screening matrix provides the consideration of transboundary effects for the Scheme, taking guidance from Advice Note 12 (Annex 1).

Table A1: Screening Matrix for Possible Substantial Effects on the Environment of EEA States

Criteria and Relevant Considerations	Commentary with Regard to the Scheme
Characteristics of the development: • Size of the development; • Use of natural resources; • Production of waste; • Pollution and nuisance; • Risk of accidents; and • Use of technologies.	The resources required for the construction, operation and decommissioning of the Scheme are likely to be obtained from the global market, but it is envisaged that materials would be obtained locally wherever possible. No waste, nuisances or accidents are likely to extend beyond the border of the UK. No novel technologies are proposed that have the potential for transboundary effects.
Location of development (including existing use) and geographical area: • What is the existing use? • What is the distance to another EEA state? • What is the extent of the area of a likely impact under the jurisdiction of another EEA state?	The Site is currently predominantly used as agricultural land. The Scheme's closest EEA boundary is Ireland, located approximately 330 km to the west of the Site. No impacts are likely to extend beyond the jurisdiction of the UK, with the exception of potential greenhouse gas (GHG) emissions. The latter is expected to be minimal given the nature of the Scheme, which would not emit GHG emissions during its operation (except for any emissions associated with maintenance vehicles and repair works).
Environmental importance: • Are particular environmental values (e.g. protected areas – name them) likely to be affected?	There are a number of international statutory designated nature conservation sites located within 10 km of the Scheme. The potential for significant effects relating to these designated sites will be

[10] https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-twelve-transboundary-impacts-and-process/

Criteria and Relevant Considerations	Commentary with Regard to the Scheme
• Capacity of the natural environment. • Wetlands, coastal zones, mountain and forest areas, nature reserves and parks, Natura 2000 sites, areas where environmental quality standards already exceeded, densely populated areas, landscapes of historical, cultural or archaeological significance.	accounted for in the EIA. However, it is not anticipated that there is the potential for transboundary effects (and therefore any effects on important environmental receptors beyond the UK).
Potential impacts and carrier: • By what means could impacts be spread (i.e. what pathways)?	The only potential transboundary environmental impact which is considered likely is from GHG emissions. These emissions would be spread by atmospheric processes and are anticipated to be minimal given the nature of the Scheme. The Scheme is expected to offset GHG emissions through the generation of clean electricity, that otherwise would have been generated from a typical fuel mix comprising technologies such as gas fired power stations.
Extent: • What is the likely extent of the impact (geographical area and size of the affected population)?	The only potential transboundary environmental impact which is considered likely is from GHG emissions, which are known to contribute to changes on climate on a global scale.
Magnitude: • What would the likely magnitude of the change in relevant variables relative to the status quo, taking into account the sensitivity of the variable?	The impact of GHG emissions is considered irreversible within human lifetimes, however, as above, GHG emissions associated with the Scheme are expected to be minimal during construction and decommissioning (in the order of one to two years) whilst the Scheme is expected to lead to a beneficial contribution to UK GHG emissions during its operation (assumed to be 40 years). The temporal pattern of GHG emissions is likely to be relatively constant during the construction and decommissioning phases.
Probability: • What is the degree of probability of the impact? • Is the impact likely to occur as a consequence of normal conditions or exceptional situations, such as accidents?	
Duration: • Is the impact likely to be temporary, short-term or long-term?	It is proposed to calculate the likely GHG emissions as part of the EIA. GHG impacts will be put into context in terms of their impact on the UK's five-year carbon

Criteria and Relevant Considerations	Commentary with Regard to the Scheme
• Is the impact likely to relate to the construction, operation or decommissioning phase of the activity?	budgets, which set legally binding targets for GHG emissions. The GHG emissions offset through the production of cleaner electricity during the operational phase will be accounted for within the GHG emissions calculations.
Frequency: • What is the likely to be the temporal pattern of the impact?	The global nature of GHG impacts means that it is not possible to apportion or identify any impact in GHG emissions in terms of environmental effects on any particular country or state. It follows that there is no potential for significant effects on the environment of any EEA State or group of EEA States resulting from GHG emissions from the Scheme, as the environmental receptor in this regard is the global atmosphere, rather than the environment of any country or state or group of countries or states. The GHG emissions are considered at a global level, and so are captured by the assessment in any event.
Reversibility: • Is the impact likely to be reversible or irreversible?	
Cumulative Impacts: • Are other major developments close by?	Proposed developments within 5 km of the Scheme will be taken into consideration in the EIA. However, it is not anticipated that there is potential for significant cumulative transboundary effects.

Appendix B: Preliminary Ecological Appraisal Report (PEAR)

Fenwick Solar Farm

Environmental Impact Assessment Scoping Report

Appendix B: Preliminary Environmental Appraisal Report
Solar PV Site

Fenwick Solar Project Limited

June 2023

Delivering a better world

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1. Executive Summary

Site Details	• Name: Fenwick Solar Farm – Solar Photovoltaic (PV) Site • Location: Fenwick, Doncaster, SE 60658 16767 • Approximate area: 323 hectares (ha)
Scheme Details	Fenwick Solar Farm site is located approximately 5 kilometres (km) north of Doncaster, and is comprised of three main areas: the land located east of Fenwick and immediately south of the River Went, hereafter referred to as the 'Solar PV Site'; the land between the Solar PV Site and the existing compound for Thorpe Marsh Substation, hereafter referred to as the 'Grid Connection Corridor Search Area'; and the land located within the existing compound for Thorpe Marsh Substation approximately 6 km to the south, hereafter referred to as the 'Existing National Grid Thorpe Marsh Substation'. The Solar PV Site, Grid Connection Corridor Search Area and Existing National Grid Thorpe Marsh Substation are collectively referred to as 'the Site'. Fenwick Solar Farm, hereafter referred to as 'the Scheme', comprises the installation of solar PV panels, interconnecting cabling, associated Battery Energy Storage System(s), one or more substation, a cable or line drop connecting the new substation to the Existing National Grid Thorpe Marsh Substation, and other supporting infrastructure including fencing, access tracks, drainage and biodiversity and landscaping enhancements. This Preliminary Ecological Appraisal Report (PEAR) includes the Solar PV Site only. A separate assessment will be prepared for the Grid Connection Corridor Search Area (encompassing the Existing National Grid Thorpe Marsh Substation). The Scheme is classified as a Nationally Significant Infrastructure Project (NSIP). This PEAR is intended to inform the ecological work required to accompany the Development Consent Order (DCO) application for the Scheme.
Ecological Features that may be affected by the Scheme	Much of the Solar PV Site is arable farmland and semi-improved or improved grassland used for grazing livestock. There are trees, hedgerows, running water, and ditches present on the Solar PV Site and within the zone of influence, which provide suitable habitat for birds, bats,

	otters, water voles, great crested newts, reptiles, aquatic invertebrates, aquatic macrophytes and fish.
Recommendations for Further Survey and Assessment	Designated sites: It is recommended that a Habitats Regulations Assessment Screening Report is completed to evaluate the risk of likely significant effects upon the qualifying features and conservation objectives of European Sites within the Study Area. Natural England should be consulted on the conclusions of the Habitats Regulations Assessment Screening Report. Designated sites: If it is not possible to avoid the Local Wildlife Site on the Solar PV Site, then it is recommended that further surveys (such as National Vegetation Classification surveys) be carried out to assess the likely impacts from the Scheme. Appropriate protection zones should be implemented around the boundary of Bunfold Shaw (semi-natural ancient woodland habitat) where it is close to the Site boundary, to protect it. Habitats: A detailed vegetation survey may be required to obtain specific survey information for any potential Habitat of Principal Importance, and determine whether any significant plant communities are present that may inform any mitigation requirements. It is recommended that a hedgerow survey is carried out on the hedgerows present on the Solar PV Site. Bats: If trees with the potential to support bats are affected by the Scheme, then it is recommended that further survey be carried out to establish the likely presence of a bat roost and evaluate impacts and appropriate mitigation. To assess how bats use the habitats for foraging and commuting away from roosts, it is recommended that bat activity transects and static monitoring are carried out across the Solar PV Site. Otters: It is recommended that two detailed surveys of the River Went, and any associated drains and ditches be carried out. This involves investigating the watercourses 250 m up and downstream, searching for signs of otter. Any suitable terrestrial habitat within 200 m of the River Went, the Fleet Drain and Fenwick Common Drain will also be inspected for signs of resting sites. Water voles: If the Scheme is to impact suitable water vole habitat within 5 m, it is recommended that two detailed surveys of the River Went be carried out. This involves investigating the watercourses 200 m up and downstream, searching for signs of water vole.

	Great Crested Newts: It is recommended that environmental DNA surveys be carried out on the existing waterbodies within the Solar PV Site. This will confirm the presence or likely absence of great crested newts in the waterbodies within the Solar PV Site. Reptiles: It is recommended that seven visits be made to the Solar PV Site, to search for reptile presence on artificial refugia (sheets of roofing felt or metal corrugated roofing panels). Birds: It is recommended that wintering bird surveys be carried out over the months of September to March and breeding bird surveys be carried out over the months of April to August. Aquatic Receptors: Further surveys for aquatic invertebrates and aquatic macrophytes are recommended for identifying protected/ notable species and INNS. Fish surveys are recommended on the River Went, Fleet Drain, and Fenwick Common Drain, to assess habitat suitability for river and sea lamprey, and to carry out electric fishing surveys for these and other fish species. If it can be established that these watercourses would not be impacted, fish surveys would no longer be required. Invasive non-native species: It is recommended that an invasive non-native species survey is carried out during April to September to assess the potential impact of invasive non-native species to the Scheme and to inform any mitigation measures required. The recommended aquatic ecological surveys would also detect the presence of invasive non-native species within water bodies and marginal habitats.
Recommendations for Mitigation	The Scheme design should seek to avoid or minimise impacts to notable habitats that have the potential to represent Habitat of Principal Importance, as well as any trees or hedgerows present on the Solar PV Site. Habitats: To minimise the risk of habitat loss the following protection measures are recommended for these habitats: (1) Retained trees and hedgerows should be protected in accordance with the guidance of BS5837:2012 Trees in relation to design, demolition, and construction, and (2) Watercourses should be protected with a 10 m stand-off and ditches should be protected by a 5 m stand-off. Badgers/ other mammals: During construction general measures should be implemented to avoid the risk of harm to badgers (and other mammals), including covering any open excavations or providing an adequate

	means of escape and capping any pipes >250 mm in diameter. All active badger setts should be retained and protected within the Scheme design and this may be enforced through the use of fencing. Where impacts to active badger setts cannot be avoided then these should be covered by a Natural England badger licence. Bats: In the event that bat roosts would be lost or disturbed then mitigation will be detailed in a Natural England European Protected Species Licence. It is also recommended that the risk of indirect impacts to bat habitat from any artificial lighting should be mitigated through the use of directed or low intensity lighting. Birds: The clearance of any suitable bird nesting habitat is undertaken in the autumn/ winter, to be outside of the main bird nesting season (March to August, inclusive). Where this is not possible then clearance would be preceded by a nesting bird check and appropriate stand-offs enforced until the chicks have fledged. Invasive non-native species: Measures should be implemented during construction to prevent the spread of invasive non-native species and where possible to locally eradicate these species within the Solar PV Site. The requirement for mitigation measures for other protected species will be informed by further surveys. Where necessary the mitigation for protected species will be detailed in the relevant protected species licence as appropriate.
Opportunities for Biodiversity Enhancements	Opportunities for biodiversity enhancements at the Solar PV Site are described below: • Improve the defunct and species-poor hedgerows on the Solar PV Site to add diversity and improve habitat connectivity; • Over-sowing a wildflower meadow within areas of semi-improved grassland could provide a good food source for several species of invertebrates such as pollinator bees; • Pond creation and the maintenance of the ditches present on Site would be beneficial to invertebrates, birds, amphibians and reptiles. Pond creation should be focused within the areas with the lowest value to wildlife, and ditch management should focus on creating shady and sunlit areas, and varying depths along the lengths; • Bat boxes could be placed around the Site to enhance roosting opportunities for bat species; • Bird boxes could be placed around the Site to offer shelter for breeding bird species;

- ‘Bug hotels’ could be placed around the Site in different locations (such as on trees or underneath hedgerows), to provide habitat for terrestrial invertebrates; and
- Hibernacula, such as log, rock and stone piles, could be created around the Site to provide habitat for reptiles and amphibians. Additionally, these piles would be beneficial to a variety of terrestrial invertebrates.

2. Introduction

Background

2.1 This Preliminary Ecological Appraisal Report (PEAR) has been prepared by AECOM on behalf of Fenwick Solar Project Limited, to assess the ecological constraints in connection with Fenwick Solar Farm (hereafter referred to as 'the Scheme'), located in Fenwick, Doncaster, as shown by the boundary on Figure 1 in Appendix A. The proposed Fenwick Solar Farm Site includes three locations: the land located east of Fenwick and immediately south of the River Went, hereafter referred to as the 'Solar PV Site'; the land between the Solar PV Site and the existing compound for Thorpe Marsh Substation, hereafter referred to as the 'Grid Connection Corridor Search Area'; and the land located within the existing compound for Thorpe Marsh Substation, hereafter referred to as the 'Existing National Grid Thorpe Marsh Substation'. The Solar PV Site, Grid Connection Corridor Search Area and Existing National Grid Thorpe Marsh Substation are collectively referred to as 'the Site'.

2.2 This PEAR considers the Solar PV Site only. A separate assessment will be prepared for the Grid Connection Corridor Search Area (encompassing the Existing National Grid Thorpe Marsh Substation), if required as part of the Scheme.

2.3 The assessment of ecological constraints has been undertaken with reference to current good practice[1] and forms part of the technical information commissioned by Fenwick Solar Project Limited in connection with the Scheme. The PEAR addresses relevant wildlife legislation and planning policy as summarised in Appendix B and is consistent with the requirements of *British Standard 42020:2013 Biodiversity. Code of Practice for Planning and Development.*

2.4 This PEAR is intended to provide advice in respect of the Scheme design, site layout and/or site investigation. Further ecological surveys and/or ecological impact assessment (including detailed mitigation measures) will be undertaken in connection with the Development Consent Order (DCO) application in the format of an Environmental Impact Assessment (EIA) once the Scheme proposals have been finalised and required surveys completed.

The Site

2.5 The Solar PV Site is located within the village of Fenwick, approximately 12 km north of Doncaster, approximately centred at Ordnance Survey national grid reference SE 60658 16767. The Solar PV Site is approximately 323 hectares (ha) in size.

2.6 The Solar PV Site comprises arable and pasture fields, and small patches of broadleaved woodlands, with the River Went delineating the northern

[1] CIEEM (2017). *Guidelines for Preliminary Ecological Appraisal, 2nd edition.* Chartered Institute of Ecology and Environmental Management, Winchester.

boundary and two large drains running through the eastern part of the Solar PV Site (Fenwick Common Drain, and Fleet Drain).

2.7 The Solar PV Site is bounded by further arable and pasture fields to the east, west and south, and the wider area consists of a landscape that is much the same in terms of land use. The small town of Askern is located approximately 3 km to the southwest of the Solar PV Site and nearby rural villages Moss and Balne are present within a few kilometres to the south and north respectively.

The Scheme

2.8 The Scheme comprises the installation of solar PV panels, interconnecting cabling, associated Battery Energy Storage System(s), one or more substation, a cable or line drop connecting the new substation to the Existing National Grid Thorpe Marsh Substation and other supporting infrastructure including fencing, access tracks, drainage, and biodiversity and landscaping enhancements. As noted above this PEAR considers the Solar PV Site only.

Purpose of the Preliminary Ecological Appraisal

2.9 This PEAR presents ecological information obtained during the following:

- A desk-study undertaken on 20th February 2023 to obtain records of designated sites, notable habitats2 and protected and notable species3 (the area covered by the desk study is hereafter referred to as the Study Area, as defined in section 3); and,
- A walkover survey of accessible land within and adjacent to the Solar PV Site (the area covered by the survey is hereafter referred to as the Survey Area) on 28th – 31st March 2023 and 25th April 2023.

2.10 The purpose of the PEAR is to provide a high-level ecological appraisal of the Solar PV Site, specifically:

- To establish baseline conditions and determine the presence of Important Ecological Features (IEF)[4] (or those that could be present), as far as is possible;
- To identify potential ecological constraints to the Scheme and make initial recommendations to avoid impacts on IEFs, where possible;
- To identify requirements for mitigation, where possible, including mitigation measures that will be required and those that may be required (depending on results of further surveys or final Scheme design);

[2] Notable habitats are taken as principal habitats for the conservation of biodiversity listed under Section 41 of the *Natural Environment and Rural Communities Act 2006*; habitats listed under the Doncaster Local Biodiversity Action Plan and the East Riding of Yorkshire Local Biodiversity Action Plan; hedgerows identified as being 'important' under the wildlife criteria of the *Hedgerow Regulations 1997*, ancient woodlands and veteran trees.

[3] Notable species are taken as principal species for the conservation of biodiversity listed under Section 41 of the *Natural Environment and Rural Communities Act 2006*; any species listed in an IUCN Red Data Book; and any other species listed under the Doncaster Local Biodiversity Action Plan and the East Riding of Yorkshire Local Biodiversity Action Plan.

[4] Important Ecological Features are habitats, species, ecosystems and their functions and processes that are of conservation importance and could potentially be affected by the Scheme.

- To establish any requirements for more detailed surveys; and
- To identify any opportunities offered by the Scheme to deliver biodiversity enhancements.
- The methodology followed for undertaking the desk study and field surveys is detailed in Appendix C, including any limitations to the assessment.

3. Ecological Baseline, Constraints and Recommendations

3.1 The following sections detail the results of the desk and field-based studies undertaken to inform this PEAR. Where necessary, recommendations for mitigation measures to protect known IEFs, or further surveys to determine the presence or likely absence of likely IEFs, are provided.

3.2 With regard to background data, 'recent' records are those no older than 10 years from the date of the desk study. Records outside of this period are historical and have only been reported where more recent records for a feature do not exist. Exceptions to this are detailed in the appropriate sections below.

3.3 Desk study species record locations are shown in Figure 5, Appendix A.

3.4 Table 3-1 shows the desk study data sources.

Table 3-1: Desk Study Data Sources

Data Source	Accessed	Data obtained
Multi-Agency Geographic Information for the Countryside (MAGIC) website	February 2023	• International statutory designated considered up to 30 km for bats, where potential hydrological links may exist and within 10 km for all other sites; • National statutory sites within 2 km; • Ancient woodlands and notable habitats within 2 km; and • Ponds and standing water within 0.5 km.
Environment Agency	February 2023	• Current Water Framework Directive (WFD) status (Catchment Data Explorer website); • Ecological survey data from the last 10 years and within 5 km of the study area. (Environment Agency Ecology and Fish Data Explorer); and • Historical crayfish records (National Biodiversity Network, 2021).
Doncaster Local Records Centre (DLRC)	February 2023	• Non-statutory designations within 2 km; • Protected and notable species records within 2 km; and • DLRC has a cross boundary agreement with NEYEDC up to 2 km, so this records centre was the only one contacted.
The North & East Yorkshire Ecological Data Centre (NEYEDC)		

Designated Sites

European Designated Sites

3.5 There are no European Sites for which bats are a qualifying feature within 30 km of the Scheme.

3.6 The River Went is connected to the Humber Estuary SAC/Ramsar approximately 16 km downstream via the River Don and Dutch River. The Humber Estuary SAC/Ramsar is partly designated for the migratory fish species river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*), which have the potential to be present in the River Went and connected watercourses.

3.7 There are two European statutory sites of nature conservation designation within the 10 km Study Area. These are Thorne and Hatfield Moors Special Area of Conservation (SPA) and Thorne Moor Special Protection Area (SAC).

3.8 Table 3-2 summarises the statutory designated sites situated within the Study Area. These are shown on Figure 2 in Appendix A.

Table 3-2: European Designated Sites within Study Area

Designated Site	Designation	Reason for Designation	Location of Designated Site [5]
Thorne & Hatfield Moors	SPA	The site is used regularly by 1% or more of the Great Britain population of Nightjar (*Caprimulgus europaeus*). The site also supports small numbers (at non-qualifying levels) of other Annex 1 species. Hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*) and short-eared owl (*Asio flammeus*) hunt over the site in winter and at least one pair of hobbies (*Falco subbuteo*) feed over the site in summer. Also notable are nightingales (*Luscinia megarhynchos*) breeding at one of their most northerly regular sites in Britain.	8 km east of the Solar PV Site. The M18 acts as a barrier to the Solar PV Site.
Thorne Moor	SAC	The Annex I habitat that is a primary reason for selection of this site is degraded raised	8 km east of the Solar PV Site. The M18 acts as a

[5] Where designated sites are situated outside of the Solar PV Site boundary, the distance and direction is given at the closest point of the designated site from the Solar PV Site.

Designated Site	Designation	Reason for Designation	Location of Designated Site [5]
		bogs still capable of natural regeneration.	barrier to the Solar PV Site.
Humber Estuary	SAC	Annex I habitats that are a primary reason for selection of this site: • Estuaries; and • Mudflats and sandflats not covered by seawater at low tide. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Sandbanks which are slightly covered by sea water all the time; • Coastal lagoons; • Salicornia and other annuals colonizing mud and sand; • Atlantic salt meadows (Glauco-Puccinellietalia maritimae); • Embryonic shifting dunes; • "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"); • "Fixed coastal dunes with herbaceous vegetation ("grey dunes")"; and • Dunes with Hippopha rhamnoides. Annex II species present as a qualifying feature, but not a primary reason for site selection: • Sea lamprey; • River lamprey; and Grey seal (Halichoerus grypus).	16 km downstream of the River Went, connected via the River Don and Dutch River.
Humber Estuary	Ramsar	The site is a representative example of a near-natural estuary with the following component habitats: dune	16 km downstream of the River Went,

Designated Site	Designation	Reason for Designation	Location of Designated Site [5]
		systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons. The site supports a breeding colony of grey seals and bird species/populations occurring at levels of international importance.	connected via the River Don and Dutch River.

National Statutory Designated Sites

3.9 There are no national statutory designated sites (Sites of Special Scientific Interest (SSSI), Local Nature Reserves (LNR)) within the 2 km Study Area.

Non-statutory Designated Sites

3.10 There are 11 non-statutory designated sites within the 2 km Study Area. These are all Local Wildlife Sites (LWS) or Candidate Local Wildlife Sites (cLWS).

3.11 Table 3-3 summarises the non-statutory designated sites situated within the Study Area. These are shown on Figure 3 in Appendix A.

Table 3-3: Non-Statutory Designated Sites within Study Area

Designated Site	Designation	Reason for Designation	Location of Designated Site [6]
Went Valley (Part)	LWS	This extensive site comprises a series of semi-improved and cattle-grazed neutral grasslands which are located immediately south of the River Went.	Within the northern part of the Solar PV Site (adjacent to and south of the River Went).
Bunfold Shaw	LWS	This small, irregularly shaped site is predominantly pedunculate oak (*Quercus robur*) dominated woodland in the eastern and central sectors, while the western and south-western edge is an open clearing, which	Approximately 15 m from the Solar PV Site boundary, within the central area of the Solar PV Site.

[6] Where designated sites are situated outside of the Solar PV Site boundary, the distance and direction is given at the closest point of the designated site from the Solar PV Site.

Designated Site	Designation	Reason for Designation	Location of Designated Site [6]
		supports mainly tall ruderal vegetation, with one or two scattered oaks and several young, planted Scot's pine (*Pinus sylvestris*). This area of woodland is also listed as 'Ancient and semi-natural woodland'.	
Riddings Farm Pond	cLWS	This is a small pond and wetland feature containing small populations of fine-leaved water dropwort (*Oenanthe aquatica*) (which is locally scarce) and good numbers of submerged plant species.	0.1 km from the Solar PV Site boundary, within the central area at Riddings Farm.
Fenwick Hall Moat	LWS	The moat edges support some very large mature trees including ash (*Fraxinus excelsior*) and white willow (*Salix alba*). The deepest area of standing open water is located at the north-eastern corner of the moat where the pond has been deepened in recent years. The wet mud of the moat supports a dense stand of reed sweet-grass (*Glyceria maxima*) with great willowherb (*Epilobium hirsutum*), plicate sweet-grass (*Glyceria notata*), marsh bedstraw (*Galium palustre)* and hard rush (*Juncus inflexus*).	0.1 km from the Solar PV Site boundary, within the central area surrounding Fenwick Hall.
Went Valley (near Sykehouse)	LWS	This site supports a mosaic of habitats spread over a series of fields. The site is bounded to the north by a small young plantation and the River Went. The southern and eastern boundary is	Located 0.9 km east of the Solar PV Site. Topham Ferry Lane separates the Solar PV Site and the LWS, but there is direct habitat

Designated Site	Designation	Reason for Designation	Location of Designated Site [6]
		formed by a grassy embankment and established hedge lines.	connectivity between the two via the River Went.
Fenwick Churchyard	LWS	This site comprises a small graveyard and contains an area of mildly calcareous to neutral unimproved grassland with scattered planted trees mainly in a line opposite to the site entrance.	Located 1.1 km southwest of the Solar PV Site. Fenwick Common Lane separates the Solar PV Site and the LWS. There is no direct habitat connectivity.
Went Valley (Eskholme)	LWS	The riverbank supports an abundance of reed sweet-grass (*Glyceria maxima*), fool's-watercress (*Apium nodiflorum*), amphibious bistort (*Persicaria amphibia*), reed canary-grass (*Phalaris arundinacea*), branched bur-reed (*Sparganium erectum*), bulrush (*Typha latifolia*) and locally-frequent pink water speedwell (*Veronica catenata*).	Located 1.5 km northeast of the Solar PV Site. Topham Ferry Lane separates the Solar PV Site and the LWS, but there is direct habitat connectivity via the River Went.
Moss Brick Pond	LWS	Disused claypit, surrounded by dense scrub. Now used as a fishing lake, the open water area contains locally-abundant curly pondweed (*Lagarosiphon major*). Both southern marsh (*Dactylorhiza praetermissa*) and common spotted orchid (D. *fuchsii*) are present.	Located 1.8 km southwest of the Solar PV Site. Moss Road separates the Solar PV Site and the LWS. There is no direct habitat connectivity.
Clay Bridge Field	LWS	The site is a small damp meadow enclosed by dense hedgerows on all sides except the south, which has a slightly	Located 1.9 km east of the Solar PV Site. New Junction Canal separates the

Designated Site	Designation	Reason for Designation	Location of Designated Site [6]
		raised bank along a dry ditch, supporting an old defunct hedgerow comprising a line of mature oak pedunculate and Turkey oaks (*Quercus robur* and Q *cerris*). A deep water-filled drain runs along the northern side of the site.	Solar PV Site and the LWS. There is no direct habitat connectivity.
Westfield Ings	LWS	The site is formerly a marsh within which ponds had been dug and trees planted. The southern part has recently been cleared of scrub and the ponds filled in but the area still contains marsh plants and could, with suitable management, redevelop as a marsh habitat.	Located 1.9 km southeast of the Solar PV Site. New Junction Canal separates the Solar PV Site and the LWS. There is no direct habitat connectivity.
River Went Oxbow	cLWS	The old course of the River Went now forms a loop south of the present canalised river. Between one-third to almost a half of this old course is now a dry, or only seasonally wet, depression choked by tall ruderal and scattered wetland vegetation and is shaded throughout much of this western half by dense to scattered scrub and tree cover.	Located 2 km west of the Solar PV Site. Linked to the Solar PV Site via the River Went.

Field Survey

3.12 Summary descriptions of the designated sites within the Survey Area are provided below. Their locations are illustrated on Figure 6, Appendix A and are highlighted by Target Notes (TNs). TN descriptions and photographs are provided in Appendix D.

3.13 The Went Valley (Part) LWS (TN16) is located within the northern part of the Solar PV Site. It comprises marshy grassland and swamp, and it is directly adjacent to the River Went. The area is regularly inundated, an indicated by the presence of common reeds and rush species (*Juncus* sp). There are also

signs of fertiliser enrichment present, with perennial rye-grass (*Lolium perenne*) dominating the grassland areas of the LWS. The eastern section of the LWS is heavily browsed by geese, and there are patches of dense tufted hair grass (*Deschampsia cespitosa*) and areas of semi-improved grassland.

3.14 Bunfold Shaw LWS (TN15) is located approximately 15 m outside the Solar PV Site boundary, within the central area. Pedunculate oak (*Quercus robur*) dominates, and the woodland also contains hawthorn (*Crataegus monogyna*), ash (*Fraxinus excelsior*), silver birch (*Betula pendula*), overtopping hazel (*Corylus avellana*), alder (*Alnus glutinosa*), aspen (*Populus tremula*), and some scattered conifer species (*Pinus* sp.). Ground flora was limited due to the time of year but included lesser celandine (*Ficaria verna*) and bramble (*Rubus* sp.).

3.15 This area is on the Ancient Woodland inventory, however ancient woodland ground flora species were not visible at the time of survey due to the time of year (see limitations, Appendix C).

3.16 The River Went runs along the northern edge of the Solar PV Site. It is slow-moving and flows west to east. Vegetation was visible in the water; however, these could not be identified to species level due to the lack of direct access and turbidity of water. The banks are flat, and there are scattered willows within the floodplain.

Constraints and Recommendations

European Sites

3.17 The Scheme is unlikely to affect either Thorne & Hatfield Moors SPA or Thorne Moor SAC. Thorne & Hatfield SPA is designated for the presence of breeding nightjar. Nightjar are known to forage up to 4 km from their breeding habitat, and as Thorne & Hatfield Moor SPA is located over 8 km from the Solar PV Site it is unlikely that the habitats within the Solar PV Site represent Functionally Linked Land to the SPA. Therefore, the Scheme is unlikely to result in significant adverse effects upon the qualifying feature of the Thorne & Hatfield Moors SPA. No further survey or mitigation is required in relation to this statutory designated site.

3.18 Thorne Moor SAC is designated for the presence of Annex I heathland habitats. There are no habitat connections to Thorne Moor SAC, including hydrological links, and there is no heathland habitat within the Solar PV Site boundary. The lack of ecological links and the magnitude of the intervening distance (approximately 8 km) is considered sufficient to conclude that there would be no significant adverse effects upon the qualifying features of Thorne Moor SAC as a result of the Scheme. No further survey or mitigation is required in relation to this statutory designated site.

3.19 The River Went is connected to the Humber Estuary SAC/Ramsar approximately 16 km downstream via the River Don and Dutch River. The Humber Estuary SAC / Ramsar is partly designated for the migratory fish species river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) (see ‘Fish’ section below), which have the potential to be present in the River Went and connected watercourses. In the event that there are any direct impacts to the River Went or associated watercourses (for example, through culverting) then further fish survey and habitat assessment may be

required to determine if there would be any effect upon populations that are qualifying features of the Humber estuary SAC/Ramsar.

3.20 It is recommended that a Habitats Regulations Assessment (HRA) Screening Report is completed to evaluate the risk of likely significant effects upon the qualifying features and conservation objectives of European Sites within the Study Area. Natural England should be consulted on the conclusions of the HRA Screening Report.

Non-statutory Designated Sites

3.21 The Went Valley (Part) LWS is located within the Solar PV Site boundary and may be impacted by the Scheme. It is recommended that the Scheme avoids construction within the boundary of The Went Valley LWS. Best practice measures should be implemented during construction and operation to avoid the risk of indirect pollution or hydrological change to this designated site. If direct or indirect impacts to The Went Valley LWS cannot be avoided then further detailed vegetation surveys (such as NVC surveys) would be required to evaluate the likely impacts of the Scheme and to plan effective mitigation and compensation.

3.22 Bunford Shaw LWS is an area of ancient woodland located approximately 15 m from the Solar PV Site boundary and therefore any direct impacts (during both construction and operation) are considered unlikely and would be in line with relevant guidance. Best practice measures should be implemented during construction and operation to avoid the risk of indirect pollution (including dust) or hydrological change to this designated site.

3.23 The Riddings Farm Pond cLWS and Fenwick Hall Moat LWS are located within the central area of the Solar PV Site (outside of the Site boundary and approximately 100 m away). The Scheme may also affect the River Went, which is on the northern boundary of the Solar PV Site and connected to a number of non-statutory designated sites. There are no direct impacts to any of these non-statutory sites, but potential indirect impacts may occur as a result of pollution during construction and / or changes in the rate or quality of greenfield run-off. Therefore, best practice measures should be implemented during construction and operation to avoid the risk of indirect pollution or hydrological change to these designated sites. Additional constraints and recommendations relating directly to aquatic invertebrates, fish and aquatic macrophytes are detailed in the relevant species sections below.

3.24 There is no direct habitat connectivity between any of the other LWSs and the Solar PV Site, and intervening land largely consists of arable fields and residential areas. Due to the distance from the Solar PV Site, lack of connectivity and the proposed works being confined to the Solar PV Site itself the LWSs are unlikely to be affected by the Scheme and no further survey or mitigation in relation to these sites is considered necessary.

Habitats

Desk Study

3.25 There are 10 records of habitat of principal importance (referred to as 'Priority Habitats) within the Study Area. The nearest of these is a coastal and floodplain grazing marsh and the river habitat of the River Went, both of which fall within the boundary of the Solar PV Site.

3.26 Priority habitats within the Study Area are shown on Figure 4 in Appendix A. Table 3-4 summarises the records of priority habitats within the Study Area.

3.27 There are no recent records of notable plant species within the Study Area.

Table 3-4: Priority Habitats within Study Area

Habitat Feature	Reason for Conservation Interest[7]	Location of Habitat[8]
Coastal and floodplain grazing marsh	Rich in plants and invertebrates, Solar PV Site may contain seasonal water-filled hollows and permanent ponds with emergent swamp communities, but not extensive areas of tall fen species like reeds.	Falls within the Solar PV Site boundary.
Rivers	This habitat type includes a very wide range of types, encompassing all natural and near-natural running waters in the UK (i.e. with features and processes that resemble those in 'natural' systems). These range from torrential mountain streams to meandering lowland rivers.	The River Went forms the northern boundary to the Solar PV Site.
Deciduous Woodland	Great variety in the species composition of the canopy layer and the ground flora.	The nearest location of this habitat type is Bunfold Shaw, approximately 15 m from the Solar PV Site boundary. Bunfold Shaw is also designated as a LWS as detailed in Table 3-3 above.

[7]JNCC: UK BAP Priority Habitats. UK BAP Priority Habitats | JNCC - Adviser to Government on Nature Conservation.

[8] Where features are situated outside of the Site boundary, the distance and direction is given at the closest point of the designated site from the Solar PV Site.

Habitat Feature	Reason for Conservation Interest[7]	Location of Habitat[8]
Traditional orchard	Traditional orchards are structurally and ecologically similar to wood-pasture and parkland, with open-grown trees set in herbaceous vegetation, but are generally distinguished from these priority habitat complexes by the following characteristics: the species composition of the trees, these being primarily in the family Rosaceae; the usually denser arrangement of the trees; the small scale of individual habitat patches; the wider dispersion and greater frequency of occurrence of habitat patches in the countryside.	Located 0.1 km east of the Solar PV Site boundary, a hedgerow directly links it to the Solar PV Site, the River Went hydrologically connects it to the Solar PV Site.
Reedbeds	They incorporate areas of open water and ditches. Small areas of wet grassland and carr woodland may be associated with them.	Located 0.1 km from the Solar PV Site boundary, within the central area, on Fenwick Hall land.
Lowland meadows	This habitat type has declined in the 20th century, almost entirely due to changing agricultural practice, associated with low-input nutrient regimes. Lowland meadows also covers the major forms of neutral grassland which have a specialist group of scarce and declining plant species.	Located 0.2 km east of the Solar PV Site boundary, surrounding waterbody P18.
Lowland fens	Fens are peatlands which receive water and nutrients from the soil, rock and ground water as well as from rainfall.	1.3 km northeast of the Solar PV Site boundary, adjacent to the River Went.

Field Survey

3.28 The habitat types described below, and any TN numbers referenced are shown on Figure 6 – Phase 1 Habitat plan, Appendix A. The approximate areas of each of the habitat types recorded on Solar PV Site are provided in Table 3-5.

3.29 Much of the Solar PV Site is arable land and improved and poor semi-improved grassland. There are patches of marshy grassland and swamp within the northern part of the Solar PV Site. The boundaries of the fields present on Solar PV Site consist of hedgerows (mostly species-poor), and each hedgerow has an associated drainage ditch. The ditches are mostly dry, only getting wet after periods of rain.

3.30 The extent of the Coastal Floodplain Grazing Marsh is illustrated in Figure 6, Appendix A. These areas are made up of grasslands, swamp, marshy grassland and ditches, and are found to the northeast and southeast areas of the Solar PV Site. To the north, the Went Valley (Part) LWS also forms part of this habitat type, and it runs alongside the edge of the River Went, down into the footprint of the Fleet Drain. To the south, it runs along the edge of the arable farmland, adjacent to ditches on the Solar PV Site boundary.

Arable land

3.31 Over 50% of the land within the Solar PV Site boundary is cultivated and used for the production of arable crops, including *Brassica* sp. and wheat.

3.32 Adjacent to the fields in the north (TN18), there are margins with arable flora. Arable flora recorded in this habitat include mayweed (*Anthemis* sp.), shepherd's purse, red dead nettle, yarrow, Colt's foot, chickweed, speedwell, wavy bittercress and hairy bittercress.

3.33 There is also an area of disturbed ground within an arable field in the southern part of the Solar PV Site (TN20), which was close to farm buildings and with no signs of recent cultivation. Species present here include nettle, umbellifer species (*Daucus* sp.), mayweed (*Anthemis* sp.) and cleavers.

Semi-improved neutral grassland

3.34 Approximately 30% of the Solar PV Site semi-improved neutral grassland, used for livestock grazing. These areas are dominated by perennial ryegrass (*Lolium perenne*) with few other species noted within the sward. Some of the grasslands to the northeast of the Solar PV Site have *Brassica* crop which have spread from the arable fields. These areas are also likely to be subject to some periodic inundation due to the proximity to the River Went and this was supported by the presence of occasional reed and rush species.

3.35 The areas to the eastern part of the Solar PV Site mainly comprise coarse grass species that were dominated by red fescue (*Festuca rubra*), with abundant perennial rye-grass. Other species include Yorkshire fog (*Holcus lanatus*), cocksfoot (*Dactylis glomerata*), reed canary grass (*Phalaris arundinacea*) and bent species (*Agrostis* sp.).

Marshy grassland

3.36 Areas of marshy grassland are found in the northern part of the Solar PV Site, adjacent to the River Went. These areas fall within the area of

designated coastal floodplain grazing marsh and also extend beyond it. They are all characterised by tussocks of tufted hairgrass (*Deschampsia cespitosa*) and rush species.

3.37 To the north of the River Went (outside the Solar PV Site boundary), there is an area of wet grassland which is inundated (TN17). Temporary pools of water from a recent rain event were recorded in this area. No vegetation typical of permanent inundation were noted in this location. This area was inaccessible during the survey and was only viewed at a distance from the areas south of the River Went that were accessible.

Broadleaved woodland

3.38 There is an area of broadleaved woodland approximately 15 m from the Solar PV Site (Bunfold Shaw (TN15)), which covers an area of less than 2 ha. The woodland is described above in Paragraph 3.144.

3.39 Willow (*Salix* sp.) carr is located to the north of the hedgerow H20. This is approximately 1,700 m^2, unmanaged, and the adjacent ditch shows signs of being regularly inundated (evidenced by the presence of common reeds both within and adjacent to the drain).

Dense scrub

3.40 The following three areas of dense scrub are present either within the Solar PV Site:

- A small area on a flood bank in the eastern part of the Solar PV Site (associated with H43). Hawthorn dominates, but dogrose and willow species are also present. The dense scrub becomes a line of Douglas fir to the west;
- In the northern part of the Solar PV Site (associated with H20), which is alongside the willow carr, and is hawthorn dominated with holly elder and bramble present. This area is unmanaged and may possibly be a remnant of a hedgerow; and
- The final area on Solar PV Site (TN14) is a remnant of a previous hedgerow and is a dense patch of hawthorn only. There is a ditch which runs around it and it is heavily grazed at the base by livestock.

Tall ruderal

3.41 There are two areas of tall ruderal vegetation on Solar PV Site. One patch is found within the northern part of the Solar PV Site (TN13), which is within an area of unmanaged land containing rubble and old snapped branches, dominated by curled dock (*Rumex crispus*).

3.42 There is a second patch in the western part of the Solar PV Site (adjacent to H76); this grows on a rubble bund and consists of nettle (*Urtica dioica*), willowherb species (*Epilobium* sp.), cleavers (*Galium aparine*), bramble, hogweed (*Heracleum sphondylium*), and dog rose (*Rosa canina*).

Swamp

3.43 The land to the north of the Solar PV Site, adjacent to the River Went is predominantly swamp habitat consisting of swards that are dominated by common reed with soft rush (*Juncus effusus*), scattered pond sedge (*Carex*

sp.) and greater bulrush (*Typha latifolia*). These areas, dominated by common reed, represent a reedbed priority habitat.

3.44 Some of the swamp habitat is associated with the River Went (Part) LWS (TN16), however there are some areas which sit outside of the Went Valley (Part) boundary. these areas (TN21 and TN22), also extend out of the boundary of the coastal floodplain grazing marsh priority habitat. There was no evidence of grazing within the swamp or adjacent habitats during the Solar PV Site visits, although the lack of boundary with adjacent pasture fields indicates that selected areas may be subject to occasional grazing. The presence of grazing in these areas would be consistent with this habitat representing coastal and floodplain grazing marsh Priority Habitat.

3.45 There are also reedbeds on Solar PV Site (TN9), located in and around some of the drainage ditches and the River Went. These areas appear to be regularly inundated (likely after prolonged periods of rain) but dry out regularly.

Ditches

3.46 Drainage ditches were associated with every hedgerow, scattered tree line and field edge at the Solar PV Site (Appendix D, Ditches). Although the majority of each ditch was dry, every ditch contained some water at the time of survey. The water present is likely to be as a result of recent rainfall as the majority of ditches lacked any flora that is typical of periodic or permanent inundation, with only some localised stands of common reed indicating more regular inundation. The water present which was either very slow flowing or standing.

Running water

3.47 The River Went (TN18) is directly adjacent to the north of the Solar PV Site boundary. At the time of survey it was flowing from west to east and at a higher than normal level due to recent rainfall. The river channel was approximately 7 m wide and the water level was high during the survey visit. The banks of the river were less than 1 m high and vegetated with nettle and common reed (*Phragmites australis*).

3.48 The Fleet Drain and Fenwick Common Drain are two watercourses that run through the Solar PV Site and are connected to (fed by) the network of field drains mentioned above. The Fleet Drain is connected to the River Went, and to Fenwick Common Drain. These drains are both slow flowing but water levels were high during the site visit due to recent rain and contained water throughout their entire length. Banks are steep, and approximately 2 to 3 m high, and 2 to 3 m wide. Flora adjacent to the drains includes nettle, lesser celandine, and cow parsley.

Hedgerows

3.49 There are 82 hedgerows on the Solar PV Site (see Appendix D for details). They are native species, hawthorn or blackthorn dominated, and most have some evidence of current management. A few of the hedges present appears more diverse than others; supporting a number of woody species, including blackthorn, ash, dogrose and oak standards.

3.50 Each hedgerow has an associated drainage ditch, which together delineate the field borders. There is evidence of heavy browsing and/or agrochemical run-off or drift (evidenced by the lack of any ground flora and little to no branches at the base of the hedgerows). Consistent with this, where associated ditches are dry, the recorded ground flora consists mainly of nettle, cleavers and cow parsley. Where the associated ditch is regularly inundated, common reeds are present in the ground flora of the hedgerows.

3.51 There are two defunct hedgerows on the Solar PV Site. These (TN3 and TN4) are remnants of past hedgerows and contain scattered dense scrub and hawthorn.

Scattered treeline

3.52 There are remnants of previous hedges in a number of locations on the Solar PV Site that have been left unmanaged and as a result now form scattered treelines, rather than hedges. They delineate some of the field boundaries, except for one (TL9), which sits adjacent to the field boundary. These tree lines consist of hawthorn trees, oak and ash. In wetter locations (on the banks of drainage ditches at the northern end of the Solar PV Site, adjacent to the River Went) the tree lines contain mature examples of willow (TL6 and TL7).

3.53 Some of the trees exhibited features typically associated with veteran trees, such as deadwood, tear outs and but rot.

Hardstanding

3.54 There are a number of small (mostly private) roads present on Solar PV Site and within 50 m of the Solar PV Site boundary.

Fence

3.55 Fences can be found at some field boundaries, varying in type. The main type is post-and-rail fencing with barbed wire, but solid wood panelled fences are also present.

Table 3-5: Habitats Present within the Solar PV Site

Habitat	Area (hectares) or Length (kilometres)	Approximate % of Solar PV Site area
Arable land	208.61 ha	64.1
Semi-improved neutral grassland	103.4 ha	31.85
Swamp	8.2 ha	2.53
Marshy grassland	1.3 ha	<1
Tall ruderal and other tall herb	0.43 ha	<1

Habitat	Area (hectares) or Length (kilometres)	Approximate % of Solar PV Site area
(non-ruderal)		
Dense scrub	0.26 ha	<1
Broadleaved woodland	0.17 ha	<1
Scattered trees	0.12 ha	<1
Reedbed	0.02 ha	<1
Scattered treeline	2.5 km	-
Ditches	21.2 km	-
Hedgerows (including defunct hedgerows)	17.91 km	-
Fence	3.16 km	-

Constraints and Recommendations

3.56 Outside the boundary of designated sites, it is recommended that the loss of any habitats of Principal Importance that are present within the Solar PV Site should be avoided. To minimise the risk of habitat loss the following protection measures are recommended for these habitats:

- Retained trees and hedgerows should be protected in accordance with the guidance of BS5837:2012 *Trees in relation to design, demolition, and construction*; and
- Watercourses should be protected with a 10 m stand-off and ditches should be protected by a 5 m stand-off.

3.57 Best practice measures should also be implemented during construction and operation to avoid the risk of indirect pollution or hydrological change to these notable habitats.

3.58 The majority of hedgerows on the Solar PV Site are uniform in their woody species composition or have poor diversity, although some hedgerows do exhibit greater species and structural diversity. All hedgerows are dominated by native species and are likely to represent Habitat of Principal Importance. It is recommended that if the Scheme directly affects any hedgerow that it is subject to a detailed hedgerow survey against the criteria Hedgerow Regulations 1997. This survey can be carried out any time between April and October, but May to June are the optimal months.

3.59 If the Scheme directly or indirectly impacts any other areas that have the potential to represent Habitat of Principal Importance (floodplain grazing

marsh, reedbed, marshy grassland, wet woodland), then a detailed vegetation survey (e.g. National Vegetation Classification (NVC)[9] survey) may be required to determine whether any significant plant communities are present and to inform the requirement for mitigation or compensation. NVC survey should be carried out at the appropriate time of year (May to August) by a suitably experienced ecologist.

3.60 A habitat condition survey should be completed to inform Biodiversity Net Gain (BNG). Habitat condition data from terrestrial habitats would be collected in accordance with the condition assessment criteria outlined in Biodiversity Metric 4.0[10] and applying professional judgement.

Badger

Desk Study

3.61 There are no recent records of badger within the Study Area.

Field Survey

3.62 The Solar PV Site supports areas of woodland, grassland, scrub, hedgerows, and ponds which provide suitable commuting, foraging and watering habitat for badgers.

3.63 Signs of badger activity were recorded during the Phase 1 habitat survey, although the detail of the findings is not included in this report owing to the persecution faced by badgers and the need for information pertaining to their whereabouts to be treated as confidential. A separate confidential badger report will be produced in due course.

Constraints and Recommendations

3.64 Detailed constraints and recommendations relating to badgers will be provided in a separate confidential badger report that will be produced in due course. In brief, the following is recommended to protect badgers:

- During construction general measures should be implemented to avoid the risk of harm to badgers (and other mammals), including covering any open excavations or providing an adequate means of escape and capping any pipes >250 mm in diameter.

3.65 All active badger setts should be retained and protected within the Scheme design and this may be enforced through the use of fencing:

- Where impacts to active badger setts cannot be avoided then these should be covered by a Natural England badger licence; and
- Habitat connectivity for badgers between their setts and foraging areas should be maintained across the Scheme during construction and operation. This may for example include the use of badger gates in perimeter fencing.

[9] Rodwell, J. S. National Vegetation Classification: Users' handbook
[10] Natural England (2023): Biodiversity Metric 4.0 LINK

Bats

Desk Study

3.66 The Doncaster Local Records Centre (DLRC) holds 12 records of bats within the Study Area made within the past 10 years, including one record of a bat roost. This bat roost is the closest of the records, located 1.7 km northwest of the Solar PV Site, in 2015. There were records of common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), pipistrelle species (*Pipistrellus* sp.) and a brown long eared bat (*Plecotus auritus*) emerging from this roost, and noctules (*Nyctalus noctula*) sightings.

3.67 A further search of the MAGIC database showed a Natural England licence was granted for 'the destruction of a resting place' (roost) located 1.6 km to the north of the Solar PV Site boundary. The licence details/information about the roost are not provided.

Field Survey

3.68 Many trees on Solar PV Site were noted to have features that are potentially suitable for roosting bats (Appendix D, trees). At this stage, only an initial appraisal of the trees has been made (from the ground, with the use of binoculars) and has found that the suitability of the trees ranges from low to high suitability based on the number and type of features they possess.

3.69 There are no buildings or built structures present within the Solar PV Site boundary.

3.70 There are nearby buildings within the central area (such as farm buildings and Fenwick Hall), which may be suitable roosting habitat. Additionally, there are a number of mature trees within Bunfold Shaw LWS, which are likely to have suitability for roosting bats. As these buildings and trees are outside the Solar PV Site boundary, these are not included in this appraisal.

3.71 The 82 hedgerows and associated wet and dry ditches on Solar PV Site, as well as the River Went to the north of the Solar PV Site and hedgerows and ditches beyond the Solar PV Site boundary are linear features that are likely to provide suitable foraging and commuting habitat for bats. The coastal floodplain grazing marsh areas may also offer suitable foraging habitat for bats, as the areas of inundated ground may support invertebrates that are likely to provide a foraging resource for bats (see 'Terrestrial Invertebrates' section below). The pasture fields, particularly those frequently grazed by livestock, are also likely to offer some foraging opportunities to bats due to invertebrates being attracted to the animals and their dung.

Constraints and Recommendations

3.72 It is reasonable to expect that the habitats within the Solar PV Site and surrounding areas are used by bats due to the presence of local records and the suitability of habitats present for this group. All species of bats are fully protected by law. Some bats for which there are records within the Study Area, including the soprano pipistrelle, noctule and brown long-eared bat, are also Species of Principal Importance (refer to Appendix B).

3.73 If trees with the potential to support bats are affected by the Scheme, then further survey would be needed to establish the likely presence of a bat roost and evaluate impacts and appropriate mitigation. Surveys should be completed in accordance with the latest best practice guidelines. A Preliminary Roost Assessment (PRA) should be undertaken first, which may lead to further surveys (including detailed inspections and/or night-time emergence/re-entry) if a feature with roosting potential is detected that would or could be affected by the Scheme. In the event that a bat roost is impacted by the Scheme then mitigation and compensation may need to be provided as part of Natural England European Protected Species licence. The licence would include detail of the appropriate timing of works, best working practices, ecological supervision and provision of compensatory habitat (for example, bat boxes).

3.74 To assess how bats use the foraging and commuting habitats it is recommended that bat activity transects are carried out across the Solar PV Site. Given the suitability of habitats present and that the Scheme is expected to result in minor impacts to bat commuting and foraging habitat, it is considered that seasonal activity surveys (single transect and static monitoring surveys in each season, spring, summer and autumn) would be proportionate. These activity surveys should focus on the linear features, such as the hedgerows/ tree lines, ditches and the River Went, which are suitable for bat flight routes. The activity surveys should assess the value of the foraging and commuting habitat within the Solar PV Site and identify the bat species present in the local area. Scheme design should also be planned to minimise the loss of any suitable foraging or commuting habitat and to maintain functional connections for bats between their roosts and foraging habitat.

3.75 It is also recommended that the risk of indirect impacts to bat habitat from any artificial lighting should be mitigated through the use of directed or low intensity lighting.

Otter

Desk Study

3.76 There are no recent records of otter (*Lutra lutra*) within the Study Area.

Field Survey

3.77 The River Went is suitable to support foraging and commuting otters, and the trees and stands of reedbed along the edge of the banks (TN1) may provide potential opportunities for breeding and shelter.

3.78 The Fleet Drain and Fenwick Common Drain are two watercourses present on Solar PV Site which may provide suitable commuting habitat for otter.

3.79 The willow carr to the north of H20 may also provide suitable breeding and shelter opportunities.

3.80 The ponds within 250 m of the Solar PV Site may also offer suitable foraging habitat for otter.

Constraints and Recommendations

3.81 Although otters are not known to be present within the Study Area, the habitat within the Solar PV Site and in the surrounding area (including the River Went, drainage ditches and water bodies in particular) is suitable for otter, so it is reasonable to assume they may be present on Solar PV Site and/or nearby.

3.82 The Scheme does have the potential to cause disturbance to any otters using the Solar PV Site, via both noise and lighting during the construction phase, and potentially the via the destruction of resting places. Therefore, it is recommended that further surveys are carried out to determine presence or likely otter absence on the watercourses and surrounding terrestrial habitat.

3.83 It is recommended that two detailed otter surveys of the River Went, and any associated drains and ditches are conducted with at least a three-month interval between surveys. Otter surveys can take place at any time of year but April to September is recommended. The surveys should extend to 250 m up and downstream of the Solar PV Site and be carried out in accordance with best practice guidelines[11]. The surveys should focus on finding field signs which indicate the presence of otters, such as spraints, footprints, feeding remains, slides/ haul-outs and resting sites (couches, lay-up sites and holts). Any suitable terrestrial habitat within 200 m of the River Went, the Fleet Drain and Fenwick Common Drain should also be inspected for signs of resting sites. If evidence of otter is found, an assessment of the potential impacts of the Scheme upon them will be made and appropriate mitigation may be required.

Water Vole

Desk Study

3.84 There are four recent records of water voles (*Arvicola amphibius*) within the Study Area. The most recent record is from 2016 and is approximately 0.1 km south of the Solar PV Site boundary, close to Pond P14.

Field Survey

3.85 The River Went, ponds and the ditches associated within and surrounding the Solar PV Site have the potential to support water voles. Three ditches in particular (D17, D32 and D50) contain banks for burrowing and abundant common reeds, which is suitable foraging for water voles. There are areas along the river and around the ponds that have significant reedbeds and associated marginal vegetation provides good foraging opportunities for water voles. Water voles may also use the banks of the river and ditches for burrowing.

[11] Environment Agency's Fifth Otter Survey of England 2009-2010 (Environment Agency, 2010); DMRB Vol 10 Section 4 Part 4
and; Monitoring the Otter (Chanin, 2003).

Constraints and Recommendations

3.86 As water vole are known to be present in the nearby area, and as there is suitable habitat within the Solar PV Site boundary, water vole presence cannot be ruled out without further survey.

3.87 The Scheme may cause disturbance to any water vole using the Solar PV Site, via both lighting and noise disturbance, and the destruction or pollution of resting and foraging sites. It is therefore recommended that any work should be carried out over 5 m away from any suitable water vole habitat.

3.88 If work must be carried out within 5 m of suitable habitat, then it is recommended that further surveys are carried out to determine presence or likely absence on the watercourses, ditches and water bodies on Solar PV Site.

3.89 It is recommended that two surveys of the River Went, and the surrounding aquatic habitats, is undertaken at least 200 m up and downstream to identify the presence or likely absence of water vole. This can be done via a boat, with suitably experienced ecologists searching for signs of water voles, or with detection dogs.

3.90 In accordance with water vole survey guidelines[12], the first survey should be undertaken between mid-April and June, and the second should be undertaken between July and September.

3.91 Water vole field signs include latrines, feeding stations, burrows, paths, and sightings of water voles.

Great Crested Newt

Desk Study

3.92 There are 36 recent records of great crested newt (GCN) within the Study Area. The most recent record is from 2015, and it is located 0.2 km east of the Solar PV Site boundary (at P19).

Field Survey

3.93 There are no ponds within the Solar PV Site boundary, but there are numerous drainage ditches, some of which contain standing water that could provide suitable breeding habitat for GCN, although it appears that the majority of the ditches dry out and refill throughout the year with the varying weather conditions, so the suitability is considered to be low.

3.94 The desk study identified 23 ponds within 250 m of the Solar PV Site; these are summarised in Table 3-6 and shown on Figure 7, Appendix A.

3.95 Of the 23 ponds, 16 were inaccessible. Of the seven visited, two were absent, one was dry, and four were present and contained water.

[12] Water Vole Conservation Handbook (2011).

3.96 Where access to aquatic features was possible, habitat suitability index (HSI)[13] assessments have been completed.

Table 3-6: Summary of Features with Potential to Support Great Crested Newt

Feature	Description of Feature and Location[14]	HSI Score
P1	Pond adjacent to farm buildings off Lawn Lane. 23 m southwest from the Solar PV Site boundary. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	No access.
P2	Ponds in a cluster, but clearly separate. All south of the buildings, within the central area. Ponds P2 to P4 all appear to have trees and vegetation surrounding them. P5 is not on any OS maps but looks to be an open pond from the aerial imagery maps. P2 is 100 m from the Solar PV Site boundary, P3 is 164 m from the Solar PV Site boundary, P4 is 155 m from the Solar PV Site boundary, and P5 is 182 m away. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	Pond absent.
P3		No access.
P4		No access.
P5		No access.
P6	Pond surrounded by trees on Fenwick Hall land. P6 is 214 m from the Solar PV Site boundary, within the central area. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	0.71 (Good)
P7	Pond in a hedgerow between two arable fields to the north of Fenwick Hall. P7 is 200 m from the Solar PV Site boundary, within the central area. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	Pond dry.
P8	Large pond surrounded by trees on Fenwick Hall land. P8 is 120 m from the Solar PV Site boundary, within the central area. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	0.69 (Average)
P9	Pond surrounded by trees to the south of Fenwick Hall. P9 is 90 m from the Solar PV Site boundary, within the central area. There are previous records of GCN at this pond.	0.80 (Excellent)
P10	Pond approximately 325 m northeast of P9. There are previous records of GCN at this pond. P10 is 37 m from the Solar PV Site boundary, in the	0.70 (Good)

[13] Habitat Suitability Index score is an assessment of the potential for a waterbody to support great crested newts. See Appendix C for more details.

[14]Where features are situated outside of the Site boundary, the approximate distance and direction is given at the closest point of the feature from the Solar PV Site.

Feature	Description of Feature and Location[14]	HSI Score
	central area. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	
P11	Small pond adjacent to a hedgerow 184 m to the south of the Solar PV Site boundary, potentially connected to the Solar PV Site via hedgerows, however West Lane may act as a barrier to movement for GCN.	No access.
P12	Waterbody seen on OS map but unable to see clearly on aerial images. Assumed to be an overgrown pond, within a residential garden. Pond located 48 m east of the Site boundary. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	No access.
P13	Small pond surrounded by trees; 90 m east of the Solar PV Site boundary. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	Pond absent.
P14	Pond located 20 m south of the Solar PV Site boundary, shaped like a figure of eight. Pond has a small island in the middle of the western section. Directly adjacent to the Solar PV Site.	No access.
P15	Pond to the north-west of P14, in the corner of a field. Appears to be clear of any tall vegetation on the aerial imagery. There are previous records of GCN at this pond.	No access.
P16	Pond located to the south of pond P17. Within a hedgerow, 230 m east of the Solar PV Site boundary. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	No access.
P17	Appears to be three ponds clustered together from aerial maps but appears to be one pond on OS maps. Located approximately 75 m east of the Solar PV Site boundary. There are direct terrestrial habitat links to the Solar PV Site via hedgerows. There are previous records of GCN at this pond.	No access.
P18	Located to the east of P19, 237 m east of the Solar PV Site boundary. Small pond which appears to be surrounded by vegetation and in a residential garden. There are direct terrestrial habitat links to the Solar PV Site via hedgerows.	No access.
P19	Residential pond, located to the south of Topham Ferry Lane approximately 95 m east of the Solar PV Site boundary. Looks to be a dry pond from the aerial imagery. There are direct terrestrial habitat links to the Solar PV Site via hedgerows. There are previous records of GCN at this pond.	No access.

Feature	Description of Feature and Location[14]	HSI Score
P20	A cluster of ponds to the north of the Solar PV Site boundary. Approx. 175 m away from the Solar PV Site boundary to the north of the River Went. The River Went has a relatively fast flow and is likely to act as a barrier to movement for GCN.	No access.
P21	Located 42 m to the north of the Solar PV Site boundary to the north of the River Went. The River Went has a relatively fast flow and is likely to act as a barrier to movement for GCN.	No access.
P22	An elongated waterbody located northwest of P21, 120 m north of the Site boundary and to the north of the River Went. Appears to be dry from recent aerial imagery. The River Went has a relatively fast flow and is likely to act as a barrier to movement for GCN.	No access.
P23	Pond appears to be surrounded by trees. 51 m north of the Solar PV Site boundary and to the north of the River Went. The River Went has a relatively fast flow and is likely to act as a barrier to movement for GCN.	No access.

Constraints and Recommendations

3.97 The accessible ponds within the Study Area are considered good in the GCN HSI, there are recent records of GCN within the Study Area, and there are ditches present within the Solar PV Site which may have potential to support GCN. It is likely that GCN are present in areas of suitable habitat (both aquatic and terrestrial) across the Solar PV Site and the Scheme has the potential to affect them. As such a licence would be required in order for Scheme construction to proceed.

3.98 It is currently proposed that the Scheme will make use of Natural England's District Level Licencing (DLL) Scheme (as opposed to applying for a traditional European Protected Species Mitigation Licence (EPSML)). Although a licence application for a DLL can be made without providing any survey data, providing data through survey evidence can assist Natural England in their calculations of the number of GCN ponds that require compensation. Therefore, further survey is recommended to confirm presence or likely absence of GCN in all potentially suitable water bodies on Solar PV Site and within 250 m of the Solar PV Site boundary where records of GCN do not already exist to inform a future DLL application. Where survey data is not available the calculations will be made on a 'worst case' basis that assumes waterbodies within 250 m of the Solar PV Site boundary support GCN and require compensation.

3.99 Surveys using eDNA water sampling techniques are therefore recommended on all accessible and potentially suitable waterbodies within 250 m of the

Solar PV Site boundary to rule out GCN presence[15]. This includes taking a sample of the water and testing it for GCN DNA. These surveys can be carried out from mid-April to the end of June.

Common Species of Reptile

3.100 Common species of reptile refers to common lizard, slow worm, adder and grass snake.

Desk Study

3.101 There are no recent records of reptiles within the Study Area.

Field Survey

3.102 The potential for reptiles to be present at the Solar PV Site is considered to be low, owing to the majority of the habitats present being either arable crop fields or pasture grazed to a low height by livestock, which are open and present limited opportunities for reptiles to forage or shelter. The following areas provide potential opportunities for reptiles:

- The areas of marshy grassland in the northern part of the Solar PV Site, which supports a mosaic of ruderal vegetation, wet tussocky grassland and is near to the River Went (it is part of the Went Valley LWS) (TN11);
- The hedgerows and small areas of scrub and woodland edge habitats within the Solar PV Site also have the potential to support reptiles;
- Where there are mosaic or transitional habitats, such as in the eastern part of the Solar PV Site, where hedgerow H44 meets broadleaved woodland and semi-improved grassland habitats and where there are also nearby off-site ponds;
- Bunfold Shaw (TN15) and adjoining ditch, hedgerow and rough grassland habitats may also support reptiles; and
- There is a brick pile present within the arable land in the southern part of the Solar PV Site (TN2), and a brick pile present within an improved grassland in the eastern part of the Solar PV Site (TN8), both of which are suitable refugia for species of reptile.

Constraints and Recommendations

3.103 Reptiles may be present within the Solar PV Site in particular, within the habitats described above, which provide suitable basking, foraging and hibernation opportunities.

3.104 It is recommended that a reptile survey is carried out in the most suitable areas of habitat, following good practice to determine presence or absence[16]. This involves placing artificial refugia (sheets of roofing felt or metal corrugated roofing panels) in suitable locations and visiting the Solar PV Site seven times during suitable weather conditions, between April to

[15] https://www.gov.uk/government/publications/great-crested-newts-district-level-licensing-schemes-for-developers/ecologists-how-to-provide-pond-and-waterbody-data-for-district-level-licensing [accessed 12/05/23]

[16] Froglife (1999) Reptile Survey, Froglife Advice Sheet 10, Froglife, Halesworth.

September, to directly observe any reptiles using the artificial refugia or other areas of suitable habitat.

3.105 These surveys will confirm the risk, if any, to this species posed by the Scheme and design advice and/or suitable mitigation strategies can be determined from this. In brief, measures to protect reptiles would include avoiding areas of suitable habitat and where this is not possible it may be necessary to displace reptiles from the construction area, either through the careful management of vegetation and/or the translocation of reptiles to areas of suitable habitat.

Birds

Desk Study

3.106 There are 34 recent records of notable[17] bird species within the Study Area. Nine species on the Royal Society for the Protection of Birds 'Birds of Conservation Concern red list', and the Birds of Conservation Concern 5 (BoCC5) Red list, and 16 species listed on the BoCC5 Amber list. There are also birds protected under Schedule 1 of the Wildlife and Countryside Act 1981, including a record of a Barn owl from 2017.

Field Survey

3.107 The mix of habitats within the Solar PV Site provides suitable nesting and foraging habitat for birds. The trees, deadwood trees, hedgerows, reedbeds and arable fields are expected to be used by a broad range of common breeding bird species. The River Went is also suitable for a range of breeding waterfowl and wintering bird species. The more undisturbed areas of grassland and arable land may also be used by some ground-nesting species, such as skylarks (*Alauda arvensis*) and lapwing (*Vanellus vanellus*).

3.108 Many bird species were recorded within the Solar PV Site during the field survey, including skylarks (TN6) and mallards (*Anas platyrhynchos*) (TN11). A male hen harrier (*Circus cyaneus*) (TN12) was also recorded during the surveys, although this is likely to be a foraging individual and was not present in suitable breeding habitat.

3.109 [redacted]

Constraints and Recommendations

3.110 To assess how the Solar PV Site is used by the bird species present, it is recommended that breeding bird surveys and wintering bird surveys are undertaken. Bird surveys would be based upon the methods detailed by Bibby et al (2007[18]).

[17] Notable bird species are taken as those listed: on Annex I of the EC Birds Directive (2009/147/EC); on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); as Species of Principal Importance (SPI) for the Conservation of Biodiversity in England listed in Section 41 of the Natural Environment and Rural Communities Act 2006; as Red or Amber in the Birds of Conservation Concern (BoCC) 4 (Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708-746); bird species or groups listed under the Doncaster LBAP.

[18] Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S. (2007) Bird Census Techniques. 2nd Edition. Academic Press, London

3.111 Breeding bird surveys should be completed over five monthly visits in the period March to July, inclusive. The survey in each month would comprise walked transects to ensure full coverage of the Solar PV Site. Experienced ornithologists would use bird sound and behaviour to classify the breeding status of birds present. The locations of all species of conservation importance that are breeding or likely to breed will be mapped and an estimate of their numbers (pairs/territories) derived.

3.112 Wintering bird surveys should be completed over four monthly visits in the period November to February, inclusive. The survey in each month would also comprise separate walked transects. Experienced ornithologists would record the species and number of birds using the site. The locations of all species of conservation importance present would be mapped.

3.113 These surveys will confirm the risk, if any, to bird species posed by the Scheme and design advice and / or suitable mitigation strategies can be determined from this, as applicable.

3.114 Active nests of all wild birds are protected at all times under the Wildlife & Countryside Act 1981 (as amended). Species (including barn owl) listed under Schedule 1 of the Act also receive additional protection from disturbance. It is recommended that the clearance of any suitable bird nesting habitat is undertaken in the autumn/winter, to be outside of the main bird nesting season (March to August, inclusive).

3.115 Prior to construction, a suitably experienced ecologist would need to check suitable nesting habitat to be cleared. This must take place immediately prior to the commencement of any vegetation clearance works. If a nest is discovered, the clearance and other construction works in the area should not be started and an exclusion zone (to be determined by the supervising ecologist) would need to be implemented. Works within the exclusion zone would need to be postponed until an ecologist has confirmed that all young have fledged, and the nest is no longer in use.

Terrestrial Invertebrates

Desk Study

3.116 There are no recent records of notable[19] terrestrial invertebrates within the Study Area.

Field Survey

3.117 The majority of the Solar PV Site is intensively managed arable fields and improved grassland that are of limited interest for invertebrates. However, there are areas (such at TN18) where this management is less intense, where arable flora is present. The arable field margins may also present foraging opportunities for terrestrial invertebrates. This flora associated with

[19] Notable terrestrial and aquatic invertebrates are taken as principal species for the conservation of biodiversity listed under Section 41 of the Natural Environment and Rural Communities Act 2006; any invertebrate listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended); any invertebrate listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended); any invertebrate listed in the IUCN Invertebrate Red Data Book (1991); and any invertebrate listed under the Doncaster LBAP.

these areas and the semi-improved grasslands offers nectar sources and foodplants for insects.

3.118 The areas of coastal floodplain grazing marsh may also contain foodplant and nectar sources unique to this habitat type. This, along with the ditches and their associated flora and grasses, may support certain species of beetle and dragonflies. The areas of inundated ground (TN9 and TN16) may have some potential to support similar terrestrial invertebrates.

3.119 The complement of fallen deadwood habitat, which may support saproxylic (dead wood) invertebrates, is limited but there are several dead trees within the Solar PV Site that are likely to support invertebrates. The mature trees with veteran features and the well-structured hedgerows present on Solar PV Site may also provide suitable habitat for species of butterfly and beetle.

Constraints and Recommendations

3.120 Overall the Solar PV Site has poor suitability for terrestrial invertebrates, and it is unlikely that there would be significant effects due to the Scheme.

3.121 The measures set out in the above sections, to protect habitats, are likely to be sufficient to protect invertebrates. However, should there be significant adverse effects upon the most suitable habitats present on Solar PV Site, such as the woodland and coastal floodplain grazing marsh habitat, then further invertebrate survey may be required.

Aquatic Invertebrates

Desk Study

3.122 There are no recent records of notable or protected[20] aquatic invertebrates, including white-clawed crayfish (*Austropotamobius pallipes*) within the Study Area.

3.123 Although protected and notable aquatic invertebrate records were absent from the study area, it should be noted that for the Went from Blowell Drain to the River Don Water Framework Directive (WFD) Water Body (ID: GB104027064260), aquatic invertebrates were classified as High status for the 2019 WFD cycle.

3.124 There were no Environment Agency monitoring sites on Fleet drain and Fenwick common drain. Therefore, desk study data were taken from an Environment Agency monitoring site (Solar PV Site ID: 916) on the River Went, 2 km upstream from the study area and 4.7 km upstream of the confluence of Fleet drain with the River Went. The non-native New Zealand mud snail (*Potamopyrgus antipodarum*) was identified in 2016. There are no statutory obligations pertaining to the spread of the species. No other notable species were recorded.

3.125 Consistent with the habitat field survey, desk study data and aerial imagery identified three watercourses within the study area, including, the River Went, Fenwick Common Drain, and Fleet Drain. Furthermore, 11 ditches were also identified.

Field Survey

3.126 Aquatic invertebrate field surveys have not been completed to date. The following ditches were assessed during the aquatic walkover surveys; D60, D29, D33, D55, D9, D10, D15, D12, D3, D26, D27. A targeted approach was taken to assess a representative number with the potential to be affected by the scheme. Of these, six were recorded as wet (D60, D29, D33, D9, D15 and D12) and five were dry (D55, D10, D3, D26 and D27). Wet ditches were generally found to be showing little sign of physical damage and visible INNS were absent however, heaving shading was present, marginal vegetation was lacking along many and there was a lack of diversity in aquatic plants.

Constraints and Recommendations

3.127 Due to the proximity of the River Went to the Solar PV Site, there is potential for the River Went to be impacted through site drainage during construction and resulting impacts to water quality, changes to hydrological regime, or watercourse crossings.

3.128 Initial assessment of ditches indicated that the habitats were of low suitability for aquatic inverts and that further survey of the representative ditches will be provided as part of the separate aquatic baseline assessment.

3.129 In the event that direct or indirect impacts to watercourses or ditches are identified, then further aquatic macroinvertebrate surveys are recommended to identify protected, notable and invasive species, and to inform WFD assessment.

Fish

Desk Study

3.130 According to Environment Agency data (Solar PV Site: 4355) and NBN Atlas, two notable fish species were identified in 2012, 2017 and 2019 approximately 2 km upstream of the Study Area. These are the Habitats Directive Annex II species European bullhead (*Cottus gobio),* and European eel (*Anguilla Anguilla*); a Species of Principal Importance. European eel is also afforded protection under the Eel Regulations 2009 in terms of fish passage and impacts of screening and abstraction. Furthermore, additional fish species recorded here included seven records of three-spined stickleback (*Gasterosteus aculeatus*), with the most recent record being in 2017.

3.131 Environment Agency data within 2 km of Fleet drain and Common drain were not available. Alternatively, data available from an Environment Agency monitoring site (Solar PV Site ID: 4355) approximately 2 km upstream of the study area on the River Went are available for interpretation. This is located approximately 4.7 km upstream of the confluence of Fleet drain with the River Went. The confluence of Fenwick Common Drain and Fleet Drain occurs a further 2.1 km upstream of Fleet Drain. Six fish taxa were identified here in 2017 which included the notable (Habitats Directive Annex II) and UK BAP priority species Bullhead (*Cottus gobio*). No other notable species were recorded.

3.132 According to Environment Agency data, fish are classified as Poor status within the Went from Blowell Drain to the River Don WFD Water Body.

3.133 The Species Audit of the City of Doncaster Council, produced for the Doncaster LBAP in 2007[20], also listed twenty-two records of European eel, six records of Atlantic salmon (*Salmo salar*), four records of brown trout (*Salmo trutta*) located at various unconfirmed locations, and one record of sea lamprey (*Petromyzon marinus*) within the New Junction Canal which is connected to the River Went approximately 6 km downstream of the study area.

Constraints and Recommendations

3.134 Desk study data may be limited due to the age of the most recent records available.

3.135 Given the designated status of sea lamprey, Atlantic salmon and brown trout, these species should also be considered in further reporting.

3.136 Furthermore, given the most recent update of the BAP was in 2007, these records are not current and may need updating to reflect current species presence.

3.137 Impacts to watercourses and ditches due to the Scheme are expected to be minimal, and it is envisaged that any temporary or permanent culverts for watercourse crossings would ensure fish passage. However, given the potential for sea lamprey to be affected and their importance in the context of the Humber Estuary SAC / Ramsar, further fish surveys are recommended. Surveys are recommended on the River Went, Fleet Drain, and Fenwick Common Drain, to assess habitat suitability for river and sea lamprey, and to carry out electric fishing surveys for these and other fish species. If it can be established that these watercourses would not be impacted, fish surveys would no longer be required.

Aquatic Macrophytes

Desk Study

3.138 According to Environment Agency data, there are no recent records of protected aquatic macrophytes within the study area in relation to the River Went, Fleet Drain and Fenwick Common Drain.

3.139 According to Environment Agency catchment database data, macrophytes as a sub-element scored poorly on the Went from Blowell Drain to the River Don Water Body during the 2019 cycle.

Field Survey

3.140 Aquatic macrophyte field surveys have not been undertaken to date.

[20] https://dmbcwebstolive01.blob.core.windows.net/media/Default/Planning/Documents/Natural%20Environment/Biodiversity/Species/Species%20Audit.pdf

Constraints and Recommendations

3.141 Given the most recent update of the BAP was in 2002, these records are not current and may need updating to reflect current species presence.

3.142 Due to the location of the River Went, Fleet Drain and Common Drain within the Study Area, there is potential for the these watercourses, and all ditches, to be impacted through site drainage during construction and resulting impacts to water quality, changes to hydrological regime, or watercourse crossings.

3.143 Further aquatic macrophyte surveys are recommended to identify protected, notable and invasive species, and to inform the WFD assessment.

Invasive Non-Native Species (INNS)

Desk Study

3.144 Several aquatic non-native species were identified in the desk study, as shown in Table 3-7.

3.145 There are no recent records of terrestrial INNS within the Study Area.

Table 3-7: Aquatic invasive/non-native species identified within 2 km of the Study Area and within the last ten years

Species	Designation/ status	Total Number of Records	Most recent record	Distance of closest record to Study Area
New Zealand mud snail Potamopyrgus antipodarum	Non-native but naturalised	15	Not given, 2013	2 km
Nuttall's Waterweed *Elodea nuttallii*	Invasive Alien Species (Enforcement and Permitting) Order 2019	5	2016	70 m downstream on River Went
Curly waterweed Lagarosiphon major	Invasive Alien Species (Enforcement and Permitting) Order 2019	1	2016	2 km

Field survey

3.146 Aquatic INNS field surveys have not been completed to date.

3.147 During the field survey, no terrestrial plant INNS were seen, however Muntjac deer are present on Solar PV Site and were sighted several times during the surveys.

Constrains and Recommendations

3.148 There are statutory constraints regarding the potential spread of INNS listed in the Invasive Alien Species (Enforcement and Permitting) Order 2019, and therefore measures should be implemented during Scheme construction to prevent their spread and where possible locally eradicate these species within the Solar PV Site. The spread of non-native species not listed in statutory legislation should also be controlled by biosecurity measures during construction, operation, and decommissioning.

3.149 Further aquatic macrophyte and aquatic invertebrate surveys have been recommended, which would include data collection on INNS species within the Solar PV Site.

3.150 It is considered likely that terrestrial plant INNS may still present but were unobservable at the time of the survey. Muntjac deer were sighted several times during the Phase 1 survey; this species is listed in the Invasive Alien Species (Enforcement and Permitting) Order 2019.

3.151 It is therefore recommended that an INNS survey is carried out during April to September to assess the potential impact of INNS species to the Scheme and to inform any mitigation measures required.

Other Notable Species

Desk Study

3.152 In addition to great crested newt records, there are six recent records of other amphibians within the Study Area. There are three records of common frog (*Rana temporaria*), one record of a common toad (*Bufo bufo*) and two records of smooth newt (*Lissotriton vulgaris*). The closest of these records is 1.3 km east of the Solar PV Site (a sighting of one frog and one smooth newt).

Field Survey

3.153 Hares (*Lepus europaeus*) were seen in the arable fields to the western part of the Solar PV Site during the survey. These are notable as they are a Species of Principal Importance.

Constraints and Recommendations

3.154 During the Scheme construction phase, if excavations are to be left uncovered overnight, material that could function as a ladder should be placed to allow any animals to escape, that may otherwise have become trapped (see badger section for more details).

3.155 There are considered to be no constraints from potential notable species presence that would be likely to affect the Scheme and as such, no further surveys or recommendations in relation to other species are considered necessary.

3.156 It is recommended that to avoid harm to common and wide-spread species, a Reasonable Avoidance Method Statement (RAMS) should be followed. The RAMS should be in addition to any mitigation that is required for other protected species. Typical mitigation methods may include:

- The appointment of an ecological clerk of works (EcoW) to provide a 'toolbox' talk at the start of the construction period on ecological responsibilities. This would identify the species likely to be present and any suitable habitat within or nearby the working area;
- The hand dismantling of any refugia suitable for common and widespread species;
- The sensitive management of vegetation and site material to discourage common and widespread species from the site; and
- If any animals (excluding GCN) are encountered during the works, they will be carefully moved away from the works area and released into nearby suitable habitat identified by the EcoW. However, if GCN are encountered, works must stop immediately, and an ecologist must be contacted for advice.

4. Opportunities for Enhancements

4.1 This section highlights opportunities for providing ecological enhancements consistent with current best practice guidelines[21] and based on the location of the Scheme. These are high level opportunities and would need to be developed in greater detail once further surveys have been completed and the Scheme proposals, such as detailed areas of habitat loss are confirmed.

Biodiversity Net Gain (BNG)

4.2 It is government policy that planning decisions should minimise impacts on and provide net gain for biodiversity (National Planning Policy Framework 2021). The Environment Act, granted Royal Assent November 2021, includes provisions to make BNG a mandatory requirement within the planning system in England. Schedule 15 of the Environment Act 2021[22] makes provision for BNG in relation to development consent for NSIPs. Although the requirement for a minimum 10% gain in biodiversity for NSIPs will not become mandatory until 2025, the Scheme will aspire to achieve at least this level of Net Gain in biodiversity (as set out in the incoming legislation).

Other Enhancements

4.3 The following enhancements could be delivered for biodiversity as part of the Scheme, that do not contribute towards the calculation of BNG but can still deliver significant improvements for biodiversity:

- Improve the defunct and species-poor hedgerows on Solar PV Site to add diversity and improve habitat connectivity. Enriching species-poor hedgerows with native plant species and leaving dead wood and leaf litter in situ will support many invertebrates, in turn providing foraging opportunities for bird and bat species;
- Over-sowing a wildflower meadow within areas of semi-improved grassland could provide a good food source for several species of invertebrates such as pollinator bees. Species could include those listed in the Royal Horticultural Society's Perfect for Pollinator's list23 such as yellow rattle (Rhinanthus Minor), and birds-foot trefoil (Lotus Corniculatus);
- Pond creation and the maintenance of the ditches present on Solar PV Site would be beneficial to invertebrates, birds, amphibians and reptiles. Pond creation should be focused within the areas with the lowest value to wildlife, and ditch management should focus on creating shady and sunlit areas, and varying depths along the lengths;
- Bat boxes could be placed around the Solar PV Site to enhance roosting opportunities for bat species;

[21] BRE National Solar Centre Biodiversity Guidance for Solar Developments: https://www.bre.co.uk/filelibrary/pdf/Brochures/NSC-Biodiversity-Guidance.pdf
[22] Environment Act 2021 (legislation.gov.uk)
[23] Plants for Pollinators advice and downloadable lists / RHS Gardening

- Bird boxes could be placed around the Solar PV Site to offer shelter for breeding bird species;
- ‘Bug hotels’ could be placed around the Solar PV Site in different locations (such as on trees or underneath hedgerows), to provide habitat for terrestrial invertebrates. These ‘hotels’ could have varying structures, such as small holes for solitary bees and wasps, and ‘beetle buckets’ for stag beetles. The creation of bare ground may also be beneficial for some species of invertebrates; and
- Hibernacula, such as log, rock and stone piles, could be created around the Solar PV Site to provide habitat for reptiles and amphibians. Additionally, these piles would be beneficial to a variety of terrestrial invertebrates.

5. Conclusion

5.1 This PEAR is based on a desk study and ecological surveys undertaken 28th-31st March, and 25th April 2023, to assess the ecological constraints to the Scheme (within the Solar PV Site) and to provide advice in respect of Scheme design, site layout and/or site investigation.

5.2 The following further surveys, summarised in Table 5-1, are recommended to support detailed design and planning application.

Table 5-1: Summary of Recommendations

Feature	Recommendation	Timing
Designated sites	• It is recommended that a HRA screening is carried out	Prior to submission of DCO application.
	• If it is not possible to avoid the LWS on Solar PV Site, then further surveys (such has NVC surveys) will need to be carried out to assess the likely impacts from the Scheme.	Prior to any works or plans relating to the Scheme.
	• Appropriate protection zones should be implemented around Bunfold Shaw LWS (semi-natural ancient woodland habitat) to protect it.	During the construction phase.
	• Indirect impacts to River Went and aquatic LWSs adjacent to the Solar PV Site should be mitigated through construction best practice. • (Additional constraints and recommendations relating directly to mammals, aquatic invertebrates, fish and aquatic macrophytes are detailed below)	Prior to commencement of the Scheme.
Habitats	• It is recommended that the notable habitats present at the Solar PV Site, including ancient woodland, trees and areas of marginal vegetation should be retained where possible. • If this is not possible, a NVC survey should be completed of habitats any Priority Habitats that may be impacted.	Prior to any works or plans relating to the Scheme.

Feature	Recommendation	Timing
	• It is recommended that a hedgerow survey is carried out.	April to October, with the optimal months April to June.
	• A habitat condition survey should be completed to inform BNG. Habitat condition data from terrestrial habitats should be collected in accordance with the condition assessment criteria outlined in Biodiversity Metric 4.0.	April to October.
Bats	• If trees with the potential to support bats are affected by the Scheme, then further survey would be needed to establish the likely presence of a bat roost and evaluate impacts and appropriate mitigation.	Potential Roost Assessments can be carried out any time of the year. Subsequent presence/absence surveys (such as Emergence/Re-Entry surveys) are carried out between May and August/September.
	• To assess how bats use habitats for foraging and commuting, it is recommended that bat activity transects are carried out across the Solar PV Site.	One survey each season (spring, summer, and autumn).
Badgers	• Best practice measures during construction to protect badgers (and other mammals) from harm	During construction.
	• Separate badger survey to be carried out and discussed in a separate confidential report.	Can be completed at any time of year.
Otter	• Two detailed surveys of the River Went, and any associated drains and ditches. • This involves investigating the watercourses within the Solar PV Site and up to 250 m up and downstream, searching for signs of otter. • Any suitable terrestrial habitat within 200 m of the River Went, the Fleet Drain and Fenwick Common Drain should also be inspected for signs of resting sites.	Two separate visits between April and September, at three-monthly intervals.

Feature	Recommendation	Timing
Water vole	• It is recommended that any work should be carried out over 5 m away from any suitable water vole habitat. • If work must be carried out within 5 m of suitable habitat, then it is recommended that further surveys are carried out to determine presence or likely absence on the watercourses, ditches and water bodies on Solar PV Site. • Two detailed surveys of the River Went and any suitable associated drains and ditches. • This involves investigating the watercourses 200 m up and downstream, searching for signs of water vole.	If the work will impact suitable water vole habitat then in accordance with survey guidelines. • Two surveys should be undertaken, one between mid-April and June, and a second survey should be undertaken between July and September.
GCN	• GCN eDNA surveys should be carried out of the existing waterbodies within and up to 250 m of, the Solar PV Site. • This will rule out or confirm the presence of GCN in the waterbodies within the Solar PV Site. • Mitigation to be delivered as part of DLL.	During GCN breeding season (between mid-April to June).
Reptiles	• Reptile presence/absence surveys should be undertaken. This involves making seven visits to the Solar PV Site, to search for reptile presence following installation of artificial refugia (sheets of roofing felt or metal corrugated roofing panels). • The artificial refugia should be placed in suitable areas to maximise the chances of reptile use.	Seven surveys between April to September. The timing of these visits is dependent on temperatures and weather conditions.
Birds	• Wintering Bird Surveys (WBS)) in each month would comprise walked transects to ensure full coverage of the Solar PV Site. • Experienced ornithologists would record the species and number of birds using the site. The	Monthly visits between November and February.

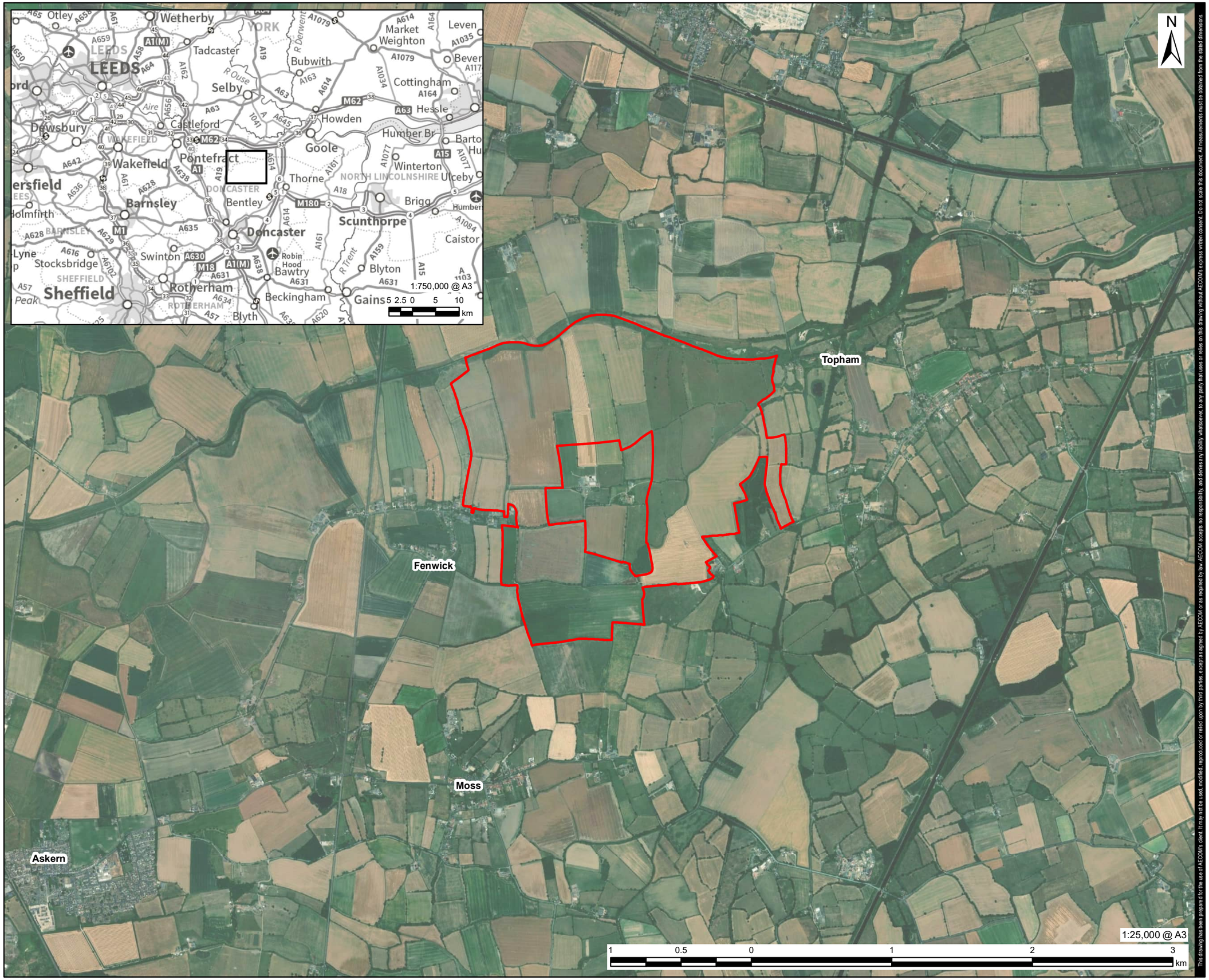
Feature	Recommendation	Timing
	locations of all species of conservation importance present would be mapped.	
	• Breeding bird surveys (BBS) in each month would comprise walked transects to ensure full coverage of the Solar PV Site. • Experienced ornithologists would use bird sound and behaviour to classify the breeding status of birds present.	Monthly visits between March and July.
	• Active nests of all wild birds are protected under the Wildlife & Countryside Act 1981. • It is recommended that a nesting bird check would need to be carried out on any suitable vegetation to be cleared by a suitably experienced ecologist. • If a nest is discovered, the clearance and other construction works in the area should not be started and an exclusion zone (to be determined by the supervising ecologist) would need to be implemented. Works within the exclusion zone would need to be postponed until an ecologist has confirmed that all young have fledged, and the nest is no longer in use.	Vegetation clearance should be carried out outside of the main bird nesting season (which is generally accepted as March to August, inclusive). The nesting bird check should be carried out immediately prior to any clearance of suitable nesting habitat.
Aquatic Receptors	• Aquatic macroinvertebrate surveys of watercourses and ditches likely to be impacted (otherwise, representative reaches).	Spring (March to May) and/or Autumn (September to November).
	• Aquatic macrophyte surveys of watercourses and ditches likely to be impacted (otherwise, representative reaches).	Summer (June to September).
	• Fish surveys are recommended on the River Went, Fleet Drain, and Fenwick Common Drain, to assess habitat suitability for river and sea lamprey, and to carry out electric fishing surveys for these and other fish species. If it can be established that these	Summer (June to September).

Feature	Recommendation	Timing
	watercourses would not be impacted, fish surveys would no longer be required.	
INNS	• Aquatic INNS are included in the surveys above.	Summer (June to September).
	• It is recommended that a terrestrial INNS survey is carried out to assess the potential impact of INNS species to the Scheme and to inform any mitigation measures required.	Between April to September, with June and July being the optimal months.

5.3 Enhancements for biodiversity that could be delivered as part of the Scheme include enhancing the existing habitats on Solar PV Site by planting native species, creating ponds and maintaining ditches on Solar PV Site, and providing artificial refugia for species present on site.

Appendix A Figures

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-12



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LEGEND
Solar PV Site

NOTES

ISSUE PURPOSE
PEA

PROJECT NUMBER
60698207

FIGURE TITLE
Site Boundary

FIGURE NUMBER
Figure 1

Filename: I:\5004 - Information Systems\60698207_Fenwick_Solar_Farm\02_Maps\PEA\ECO_PEA_Fig1_SiteBoundary_A3L_20230510_R0.mxd

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-12

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LEGEND

- Solar PV Site
- 2km Buffer of the Solar PV Site
- 10km Buffer of the Solar PV Site
- Ramsar
- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

NOTES

ISSUE PURPOSE

PEA

PROJECT NUMBER

60698207

FIGURE TITLE

Statutory Sites within 10km of the Site Boundary

FIGURE NUMBER

Figure 2

Revision: 01 Drawn: LP Checked: BE Approved: TN Date: 2023-05-26

Filename: I:\60698207_Fenwick_Solar_Farm\02_Maps\PEA\ECO_PEA_Fig3_Non-StatutorySites_A3L_20230525_R0.mxd

East Riding of Yorkshire Council

North Yorkshire Council

City of Doncaster Council

River Went Oxbow

Went Valley (Eskholme)

Went Valley (near Skyehouse)

Went Valley (Part)

Riddings Farm Pond

Fenwick Hall Moat

Bunfold Shaw

Clay Bridge Field

Fenwick Churchyard

Moss Brick Pond

Westfield Ings

1:25,000 @ A3

0.5 0.25 0 0.5 1 1.5 2 km

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LEGEND

- Solar PV Site
- 2km Buffer of the Solar PV Site
- Local Authority Boundary

Local Wildlife Site* (City of Doncaster Council Only)

- Local Wildlife Site (LWS)
- Candidate LWS

NOTES

Note: Contraints are only labelled up to 2km.

*LWS site boundaries are indicative only based upon information available on the Doncaster Metropolitan Borough Council public facing Biodiversity Map on 26/04/2023

ISSUE PURPOSE

PEA

PROJECT NUMBER

60698207

FIGURE TITLE

Non-Statutory Sites within 2km of the Site Boundary

FIGURE NUMBER

Figure 3

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-12

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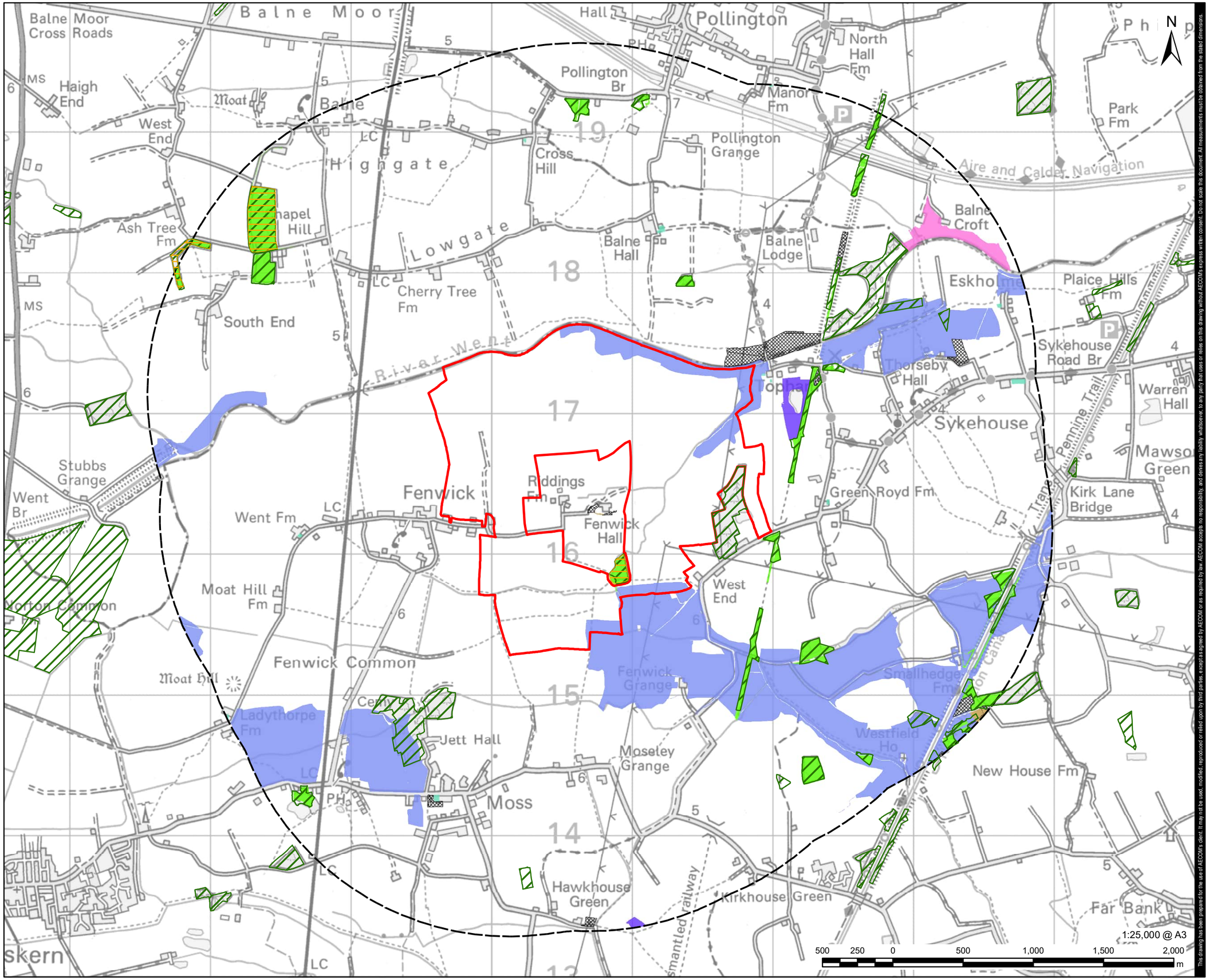

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LEGEND

- Solar PV Site
- 2km Buffer of the Solar PV Site
- Ancient Woodland
- National Forest Inventory

Priority Habitats (within 2km)

- Coastal and Floodplain Grazing Marsh
- Deciduous Woodland
- Lowland Fens
- Lowland Meadows
- No Main Habitat But Additional Habitats Present
- Reedbeds
- Traditional Orchard

NOTES

ISSUE PURPOSE

PEA

PROJECT NUMBER

60698207

FIGURE TITLE

Habitats within 2km of the Site Boundary

FIGURE NUMBER

Figure 4

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-15

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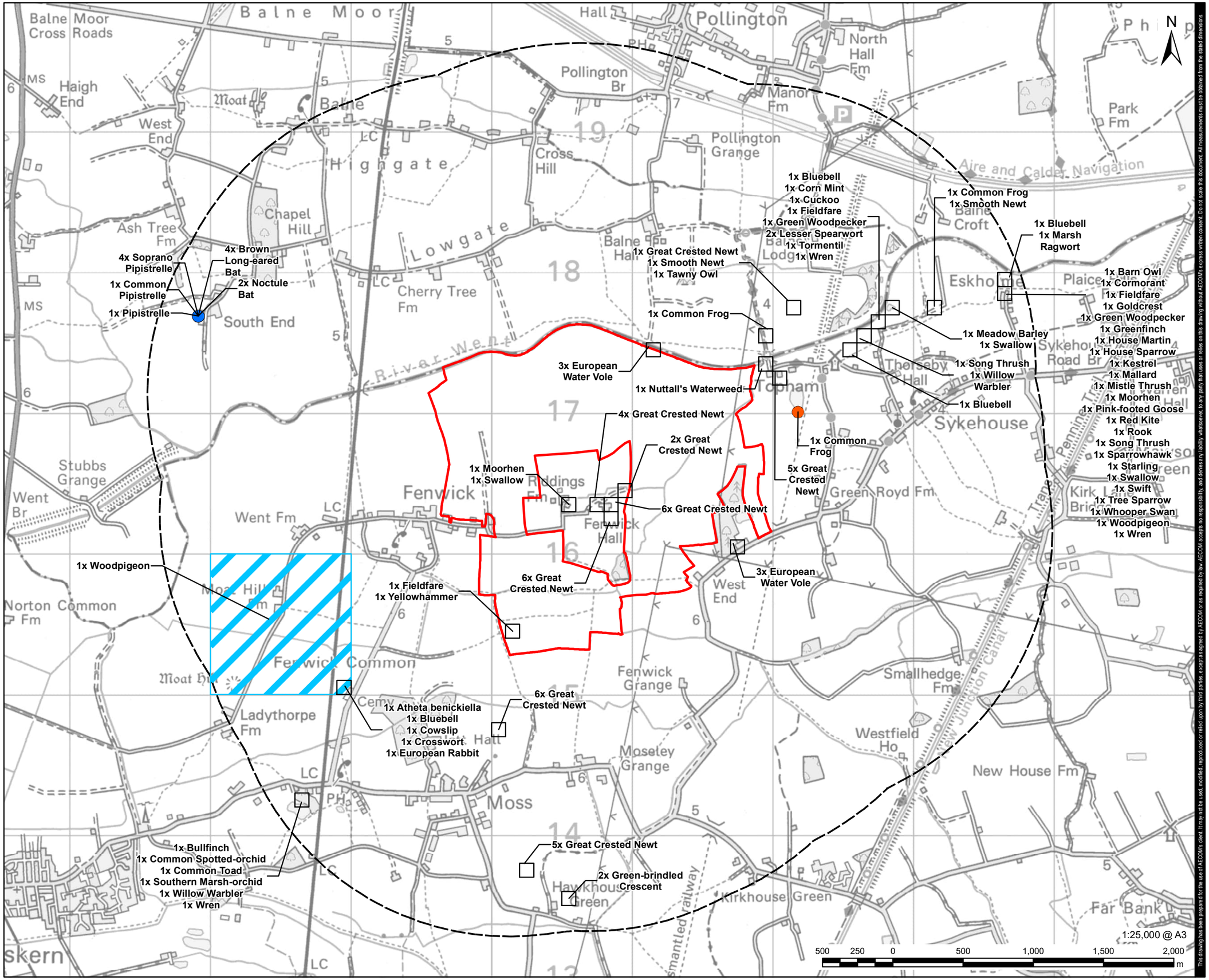

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LEGEND

- Solar PV Site
- 2 km Buffer of the Solar PV Site
- Notable Species Record - 100m Accuracy
- Notable Species Record - 1km Accuracy

Desk Study Records - 10m Accuracy

- Amphibian
- Terrestrial Mammal

NOTES

ISSUE PURPOSE

PEA

PROJECT NUMBER

60698207

FIGURE TITLE

Desk Study Species

FIGURE NUMBER

Figure 5

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-15

Filename: I:\5004 - Information Systems\60698207_Fenwick_Solar_Farm\02_Maps\PEA\ECO_PEA_Fig6_Phase1Habitat_A3L_20230512_R0.mxd

Legend

- Solar PV Site
- 50m Buffer of the Solar PV Site
- Inaccessible / Not Surveyed
- Target Note
- A3.1 - Broadleaved parkland/scattered trees
- A3.1 - Broadleaved parkland/scattered trees
- A3.3 - Mixed parkland/scattered trees
- Hedge
- G2 - Running water
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A1.3.2 - Mixed woodland - plantation
- A2.1 - Scrub - dense/continuous
- A3.3 - Mixed parkland/scattered trees
- B2.2 - Neutral grassland - semi-improved
- B5 - Marsh/marshy grassland
- C3.1 - Other tall herb and fern - ruderal
- F1 - Swamp
- G1 - Standing water
- G2 - Running water
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J2.3.2 - Hedge with trees - species-poor
- J2.6 - Dry ditch
- J3.6 - Buildings
- J5 - Other habitat
- Hardstanding
- Priority Habitat Inventory - Coastal and Floodplain Grazing Marsh
- Local Wildlife Site (LWS)

SHEET 1

SHEET 2

SHEET 3

SHEET 4

N

1:12,500 @ A3

0.5 0.25 0 0.5 1 1.5 km

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PROJECT NUMBER
60698207

FIGURE TITLE
Phase 1 Habitats
Legend and Overview Map

FIGURE NUMBER
Figure 6

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-15

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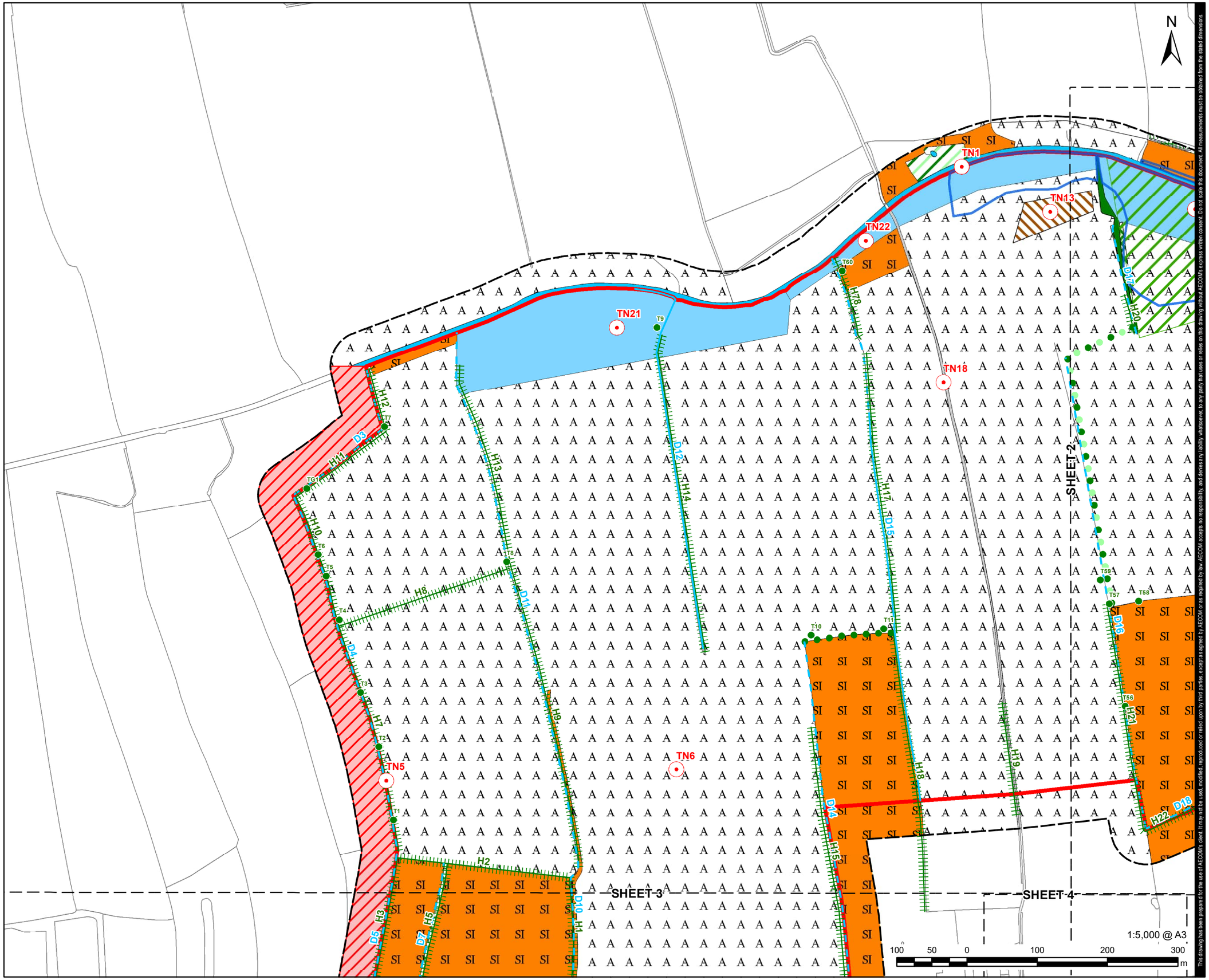

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FIGURE TITLE

Phase 1 Habitats
Sheet 1 of 4

FIGURE NUMBER

Figure 6

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-15

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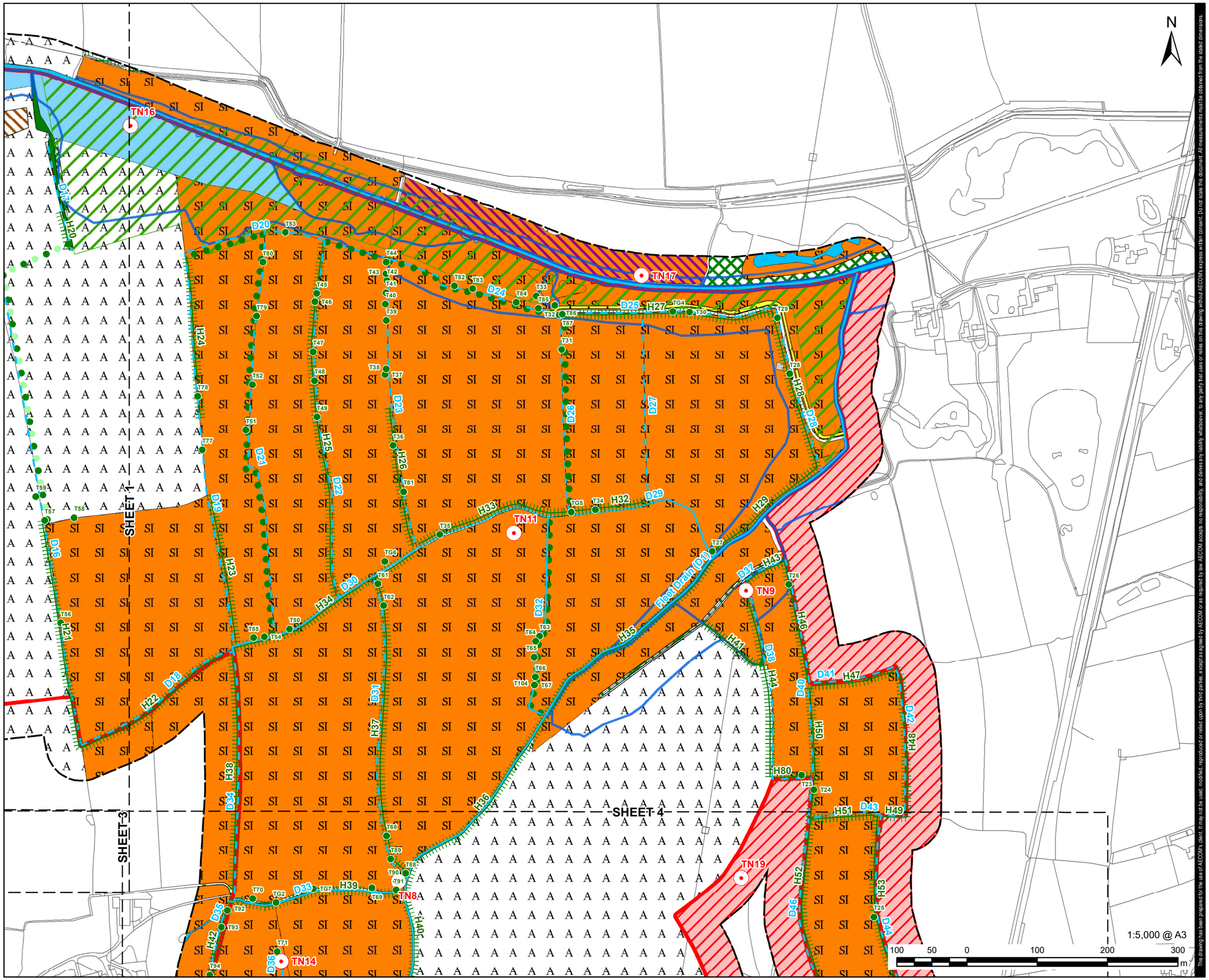

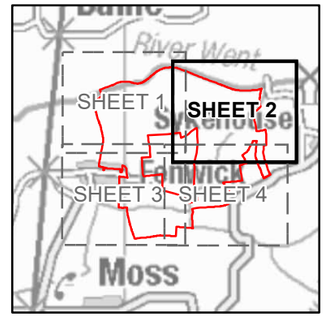

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PROJECT NUMBER

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FIGURE TITLE

Phase 1 Habitats
Sheet 2 of 4

FIGURE NUMBER

Figure 6

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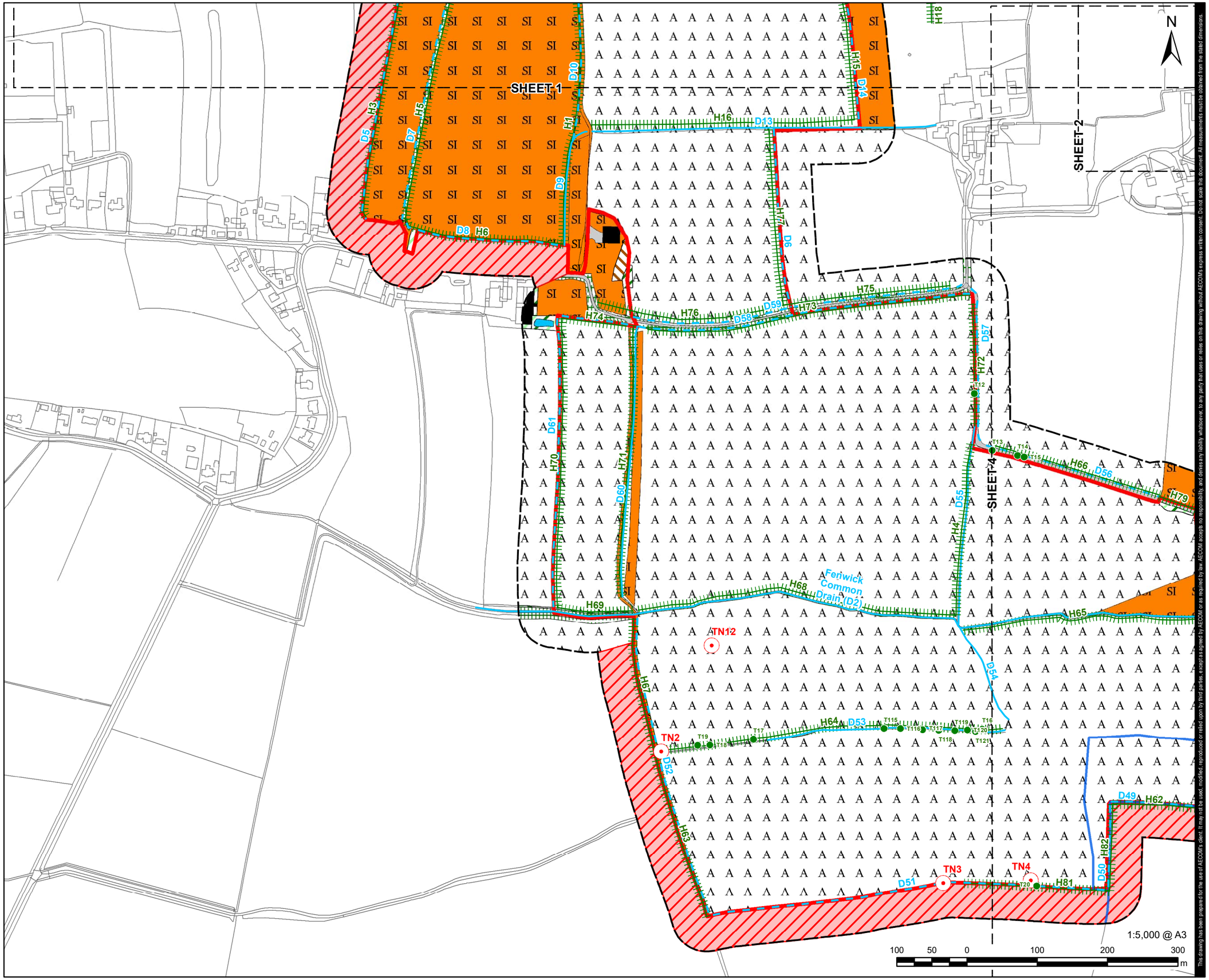

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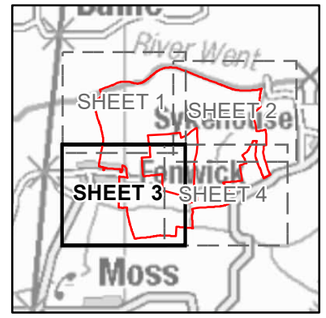

NOTES
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*LWS site boundaries are indicative only based upon information available on the Doncaster Metropolitan Borough Council public facing Biodiversity Map on 26/04/2023.
Phase 1 Surveys were conducted between 15 February - 24 March, 2023.

ISSUE PURPOSE
PEA

PROJECT NUMBER
60698207

FIGURE TITLE
Phase 1 Habitats
Sheet 3 of 4

FIGURE NUMBER
Figure 6

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-15

Filename: I:\5004 - Information Systems\60698207_Fenwick_Solar_Farm\02_Maps\PEA\ECO_PEA_Fig6_Phase1Habitat_A3L_20230512_R0.mxd

SHEET 1

SHEET 2

SHEET 3

TN4 TN7 TN8 TN10 TN14 TN15 TN19 TN20

H36 H37 H38 H39 H40 H42 H43 H45 H52 H53 H54 H55 H60 H61 H62 H65 H66 H79 H81 H82

D31 D33 D34 D35 D36 D40 D44 D45 D46 D47 D48 D49 D50 D51 D54 D56

Fleet Drain (D1)

Fenwick Common Drain (D2)

N

1:5,000 @ A3

100 50 0 100 200 300 m

AECOM

PROJECT

Fenwick Solar Farm

CLIENT

Fenwick Solar Project Limited

CONSULTANT

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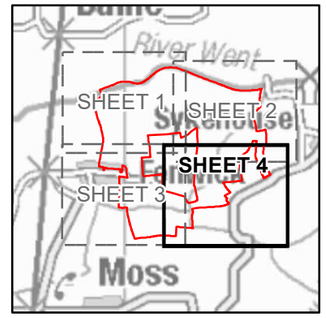

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ISSUE PURPOSE

PEA

PROJECT NUMBER

60698207

FIGURE TITLE

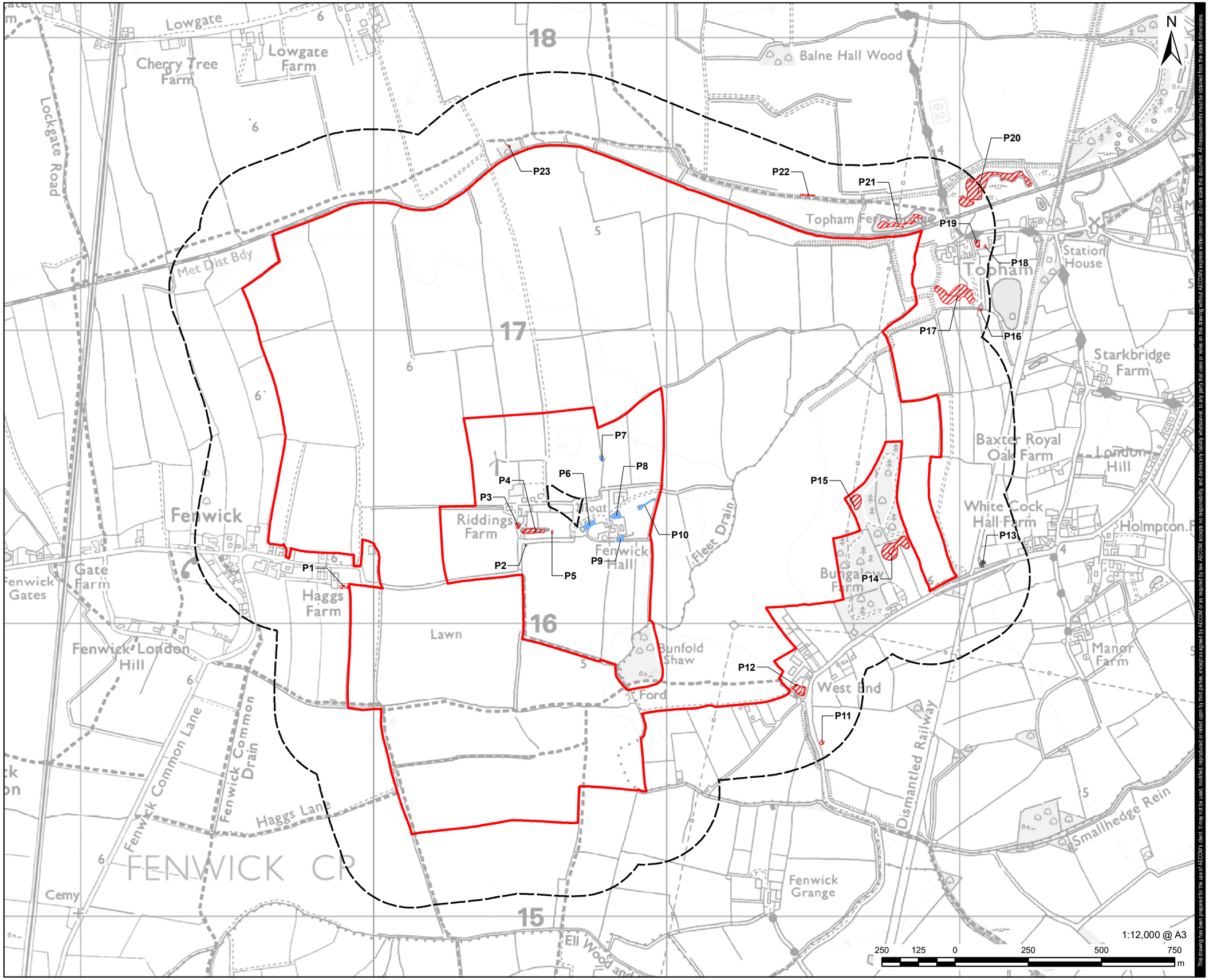
Phase 1 Habitats
Sheet 4 of 4

FIGURE NUMBER

Figure 6

Revision: 0 Drawn: LP Checked: BE Approved: TN Date: 2023-05-12

Filename: I:\5004 - Information Systems\60698207_Fenwick_Solar_Farm\02_Maps\PEA\ECO_PEA_Fig7_PondsWithin250mofSolarPVSite_A3L_20230512_R0.mxd



AECOM

PROJECT

Fenwick Solar Farm

CLIENT

Fenwick Solar Project Limited

CONSULTANT

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LEGEND

- Solar PV Site
- 250m Buffer of the Solar PV Site

Ponds Within 250m of the Solar PV Site

- Pond Accessed
- Pond Absent
- No Access

NOTES

ISSUE PURPOSE

PEA

PROJECT NUMBER

60698207

FIGURE TITLE

Ponds within 250m of the Solar PV Site

FIGURE NUMBER

Figure 7

Appendix B Relevant Legislation and Planning Policy

Legislation

1.1 The UK is no longer a member of the European Union (EU). EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation. EU legislation which applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'.

1.2 The Secretary of State for the Environment, Food and Rural Affairs and Welsh Ministers have made changes to parts of the *Conservation of Habitats and Species Regulations 2017* (referred to as the 2017 Regulations*)* so that they operate effectively. Most of these changes involve transferring functions from the European Commission to the appropriate authorities in England. All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant.

Designated Sites

Special Protection Areas (SPA)/ Special Areas of Conservation (SAC)

1.3 These sites in the UK no longer form part of the EU's Natura 2000 ecological network. The *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019* (referred to as the 2019 Regulations) have created a national site network on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes:

- Existing SACs and SPAs; and
- New SACs and SPAs designated under these Regulations.

1.4 Any references to Natura 2000 in the 2017 Regulations and in guidance now refers to the new national site network.

1.5 Formal Appropriate Assessment is required to be undertaken by the competent authority before undertaking, or giving consent, permission or other authorisation for any work which are likely to have a significant effect on such a site.

Locally Designated Sites

1.6 Local Wildlife Sites are sites with 'substantive nature conservation value'. They are defined areas, identified, and selected for their nature conservation value, based on important, distinctive and threatened habitats and species with a region.

1.7 They are usually selected by the relevant Wildlife Trust, along with representatives of the local authority and other local wildlife conservation groups.

1.8 The LWS selection panel, select all sites that meet the assigned criteria, unlike SSSIs, which for some habitats are a representative sample of sites that meet the national standard. Consequently, many sites of SSSI quality are not designated and instead are selected as LWSs. Consequently, LWSs can be amongst the best sites for biodiversity.

Protected Species

Bats/Otter/Great Crested Newt/Smooth Snake

1.9 These species, known as European Protected Species, are protected under Regulation 43 of the 2017 Regulations as amended by the 2019 Regulations. This makes it an offence to deliberately capture, injure or kill an animal; deliberately disturb an animal; or damage or destroy a breeding site or resting place used by an animal.

1.10 Deliberate capture or killing is taken to include “accepting the possibility” of such capture or killing. Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.

1.11 Where development works are at risk of causing one or more of the offences listed above, a mitigation licence from Natural England can be obtained to facilitate the works that would otherwise be illegal.

1.12 These species are also protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). This makes it an offence to intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb an animal in such a place.

1.13 Lower levels of disturbance not covered by the *Conservation of Habitats and Species Regulations 2017* remain an offence under the *Wildlife and Countryside Act 1981* although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

Water Vole

1.14 Water voles are protected under the *Wildlife and Countryside Act 1981* (as amended). There are no licensing purposes that explicitly cover development or other construction activities which could have an impact on water voles.

1.15 When development work is proposed in or near an area which is either known to or likely to contain water voles, then the developer will need to implement suitable mitigation to prevent impacts to water voles. The preferred mitigation option is to leave water voles *in situ*, with the development works adopting avoidance measures through redesign of the proposals.

1.16 Where impacts cannot be avoided, operations aimed at displacing water voles from a development site are now no longer covered by the “*incidental result of an otherwise lawful action*” defence in the *Wildlife and Countryside*

Act 1981 (as amended). Displacement of water voles now needs to be undertaken under a licence.

1.17 In England, small scale (limited to continuous lengths of bank not exceeding 50 m) displacement of water voles can be carried out at certain times of the year (February to April) for the purposes of conservation under a Class Licence by a registered person. For larger scale displacements or displacements outside of this period, displacement can be undertaken under a site-specific conservation licence.

1.18 Where it is considered that the best outcome for water voles is capture and translocation to a different location then this action is considered by Natural England to be outside the scope of the defence as the intentional capture of water voles is unlikely to be considered 'incidental'. In these circumstances there may be genuine grounds for issuing a conservation licence for the purpose of translocating the water vole population to suitable alternative habitat.

Nesting Birds

1.19 All wild birds are protected under the *Wildlife and Countryside Act 1981* (as amended), with some species afforded greater protection under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). In addition to the protection from killing or taking that all birds receive, Schedule 1 birds and their young must not be disturbed at the nest.

1.20 There are no licensing purposes that explicitly cover development activities affecting wild birds.

White-clawed Crayfish

1.21 White-clawed crayfish are protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). It is illegal to take or to sell white-clawed crayfish.

1.22 White-clawed crayfish is a species under major threat of global extinction and is referred to in various biodiversity related policy[24]. Several organisations involved in works on rivers or other water bodies have general legal obligations[25] to take the presence of white-clawed crayfish into account when issuing permissions to undertake works.

Common Species of Reptile (common lizard, slow worm, grass snake and adder)

1.23 Common species of reptile are protected against intentional killing and injury under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). There is no requirement for a licence where development works affect common species of reptiles. Instead, Natural England advise[26] that where

[24]White-clawed crayfish is listed under the following: as a "priority" species of conservation importance under Section 41 of the Natural Environment and Rural Communities Act (2000).

[25] Under the *Water Resources Act 1991* and the *Land Drainage Act 1991* there is a requirement to consider the presence of notable species such as white-clawed crayfish when the Environment Agency, Internal Drainage Board or other statutory agency is considering granting consent for proposed operations to a water course.

[26]Reptiles: guidelines for developers, English Nature 2004

reptiles are present, they should be protected from any harm that might arise during the development works through appropriate mitigation.

Badger

1.24 Badgers and their setts are protected under the *Protection of Badgers Act 1992* (as amended). This makes it an offence to wilfully kill, injure or take a badger; or intentionally or recklessly damage, destroy or obstruct access to a badger sett or disturb a badger in its sett.

1.25 It is not illegal to carry out disturbance activities near setts that are not occupied, i.e. those that do not show signs of current use.

1.26 Where required, licences for development activities involving disturbance or sett interference or closure are issued by Natural England. Licences for activities involving watercourse maintenance, drainage works or flood defences are issued under a separate process.

1.27 When assessing the requirement for a licence in respect of development, Natural England[27] state that badgers are relatively tolerant of moderate levels of noise and activity around their setts, and that a low or moderate level of apparent disturbing activity at or near to badger setts does not necessarily disturb the badgers occupying those setts.

1.28 Licences are normally not granted from December to June inclusive (the badger breeding season) because dependent cubs may be present within setts.

Species and Habitats of Principal Importance for the Conservation of Biodiversity

1.29 Section 40 of the Natural Environment & Rural Communities Act (NERC) 2006 sets out the duty for public authorities to conserve biodiversity in England.

1.30 Habitats and species of principal importance for the conservation of biodiversity are identified by the Secretary of State for England, in consultation with Natural England, are referred to in Section 41 of the NERC Act for England. The list, known as the 'England Biodiversity List', of habitats and species can be found on the Natural England web site.

1.31 The 'England Biodiversity List' is used as a guide for decision makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act 2006 to have regard to the conservation of biodiversity in England when carrying out their normal functions.

Hedgerows

1.32 Under the Hedgerows Regulations 1997, it is against the law to remove or destroy certain hedgerows without permission from the local planning authority. In general, permission will be required before removing hedges that are at least 20 metres in length, over 30 years old and contain certain

[27] Interpretation of 'Disturbance' in relation to badgers occupying a sett, Natural England (2009)

species of plant. The local planning authority will assess the importance of the hedgerow using criteria set out in the regulations.

Non-native Invasive Plant Species

1.33 Under the Wildlife and Countryside Act 1981 (as amended), it is an offence to plant or otherwise cause these species to grow in the wild.

1.34 Any contaminated soil or plant material is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the *Environmental Protection Act 1990*.

1.35 Furthermore, The Invasive Alien Species (Enforcement and Permitting) Order 2019 cites non-native plants and animals which may result in serious negative consequences for their new environment with the aim of minimising and mitigating the impacts caused by these species.

Planning Policy

National Planning Policy Framework, 2019

1.36 The National Planning Policy Framework (NPPF) sets out the Governments planning policies for England and how these are expected to be applied by Local Authorities within their Local Development Frameworks (LDF). Chapter 15 of the NPPF '*Conserving and enhancing the natural environment*' sets out the requirements to consider biodiversity in planning decisions.

Local Planning Policy

1.37 The Doncaster Local Plan contains the following policies for nature conservation.

Policy 29: Ecological Networks (Strategic Policy)

1.38 Proposals will only be supported which deliver a net gain for biodiversity and protect, create, maintain and enhance the Borough's ecological networks by:

a. Being of an appropriate size, scale and type in relation to their location within and impact on the ecological network;

b. Maintaining, strengthening and bridging gaps in existing habitat networks;

c. Planting native species and creating new, or restoring existing, national and local priority habitats and/or species; and

d. Working with strategic partnerships to deliver conservation projects at a landscape scale where appropriate.

Policy 30: Valuing Biodiversity and Geodiversity (Strategic Policy)

1.39 The Borough has a range of internationally, nationally, and locally important habitats, sites and species that will be protected through the following principles:

a. All proposals shall be considered in light of the mitigation hierarchy in accordance with National Policy;

b. Proposals which may harm designated Local Wildlife Solar PV Sites, Local Geological Solar PV Sites, Priority Habitats, Priority Species, protected species or non-designated sites or features of biodiversity interest, will only be supported where:

   i. They use the DEFRA biodiversity metric to demonstrate that a proposal will deliver a minimum 10% net gain for biodiversity;

   ii. They protect, restore, enhance and provide appropriate buffers around wildlife and geological features and bridge gaps to link these to the wider ecological network;

   iii. They produce and deliver appropriate long term management plans for local wildlife and geological sites as well as newly created or restored habitats;

   iv. They can demonstrate that the need for a proposal outweighs the value of any features to be lost; and

   v. If the permanent loss of a geological site is unavoidable, then provision will be made for the site to first be recorded by a suitably qualified expert.

c. Proposals which may impact Special Areas of Conservation, Special Protection Areas or RAMSAR Solar PV Sites will only be supported where it can be demonstrated that there will be no likely significant effects and no adverse effects on the integrity of European sites, unless there are no alternative solutions, and it is justified by an “imperative reasons of overriding public interest” (IROPI) assessment under the Habitats Directives;

d. Proposals that may either directly or indirectly negatively impact Solar PV Sites of Special Scientific Interest will not normally be supported. Proposals should seek to protect and enhance Solar PV Sites of Special Scientific Interest and maintain, strengthen, and bridge gaps to link them to the wider ecological network wherever possible; and

e. In order to ensure development does not negatively impact on nightjar populations, proposals located within 3km of Thorne and Hatfield Moors Special Protection Area, that impact habitats that nightjars may use for feeding on, will only be supported where they deliver a net gain in nightjar foraging habitat.

Policy 32: Woodlands, Trees and Hedgerows

1.40 Proposals will be supported where it can be demonstrated that woodlands, trees and hedgerows have been adequately considered during the design process, so that a significant adverse impact upon public amenity or ecological interest has been avoided. There will be presumption against development that results in the loss or deterioration of ancient woodland and/or veteran trees. Proposals will need to include:

a. The submission of survey information of woodland, trees and hedgerows, as appropriate, to a recognised professional and fit for purpose standard which is able to demonstrate evaluation of these features for realistic long-term retention, and how this has positively informed the design process;

b. Demonstration of how retained features are to be protected during development;

c. An adequate landscape buffer (which excludes built development and residential gardens) adjacent to existing woodlands, wildlife sites and at settlement edges;

d. Sufficient provision of appropriate replacement planting where it is intended to remove trees and hedgerows; and

e. Avoidance of the loss or deterioration of woodland.

Local Biodiversity Action Plans

1.41 The Doncaster Local Biodiversity Action Plan was adopted in 2007, and underpins the duty placed on all local authorities towards biodiversity protection, as set out in the 2006 Natural Environment and Rural Communities Act, and at a strategic level will ensure that biodiversity principals are;

a. Adopted into approaches regarding the delivery of services and functions and involve all Partner landholdings;

b. Promoted in urban development, and regeneration plans and projects;

c. Incorporated into land management practices in rural regeneration schemes; and

d. Encouraged to help engender local pride and environmental stewardship.

Appendix C Methodology

Desk Study

Background Records Search

1.42 The preliminary ecological assessment for the Solar PV Site includes a desk study to obtain background records relevant to a Solar PV Site and the Scheme. The data obtained provides contextual information for the scope of field surveys, to aid the evaluation of field survey results, and to provide supplementary information where complete field survey coverage is not possible.

1.43 The Study Area is dependent upon the nature, timing and scale of the Scheme, as well as the location of the Solar PV Site and the surrounding landscape. These variables all contribute to what is referred to as the Zone of Influence (ZoI) of the Scheme, which is the area over which ecological features may be affected by biophysical changes because of the works and associated activities.

1.44 In February the Doncaster Local Records Centre (DLRC) was contacted to obtain the following ecological data:

- Records of non-statutory designated sites (Local Wildlife Sites (LWS) and candidate Local Wildlife Sites (cLWS)) within 2 km of the Solar PV Site boundary;
- Records of legally protected and notable species (fauna and flora) within 2 km of the Solar PV Site boundary, including Species of Principal Importance for the Conservation of Biodiversity listed under Section 41 of the Natural Environment & Rural Communities Act 2006 in the England Biodiversity List.

1.45 The Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) was reviewed for the following information:

- Designated sites of nature conservation importance (statutory sites only) within 2 km of the Solar PV Site. This was extended to 10 km for internationally designated sites: Special Protection Areas (SPAs), Wetlands of International Importance (Ramsar sites) and Special Areas of Conservation (SACs); and, Notable habitats within 2 km of the Solar PV Site, these being areas of ancient woodland and 'Habitats of Principal Importance for the Conservation of Biodiversity' included in the England Biodiversity List28.

1.46 A desk-based review of Water Framework Directive (WFD) information and aquatic ecology receptors was undertaken for the River Went, and any other watercourses in the vicinity that have the potential to be affected by the Scheme.

[28] Section 40 of the Natural Environment & Rural Communities (NERC) Act 2006 requires that eThe Secretary of State has drawn up, in accordance with Section 41 of the Act and in consultation with Natural England, a list of habitats and species of principal importance for the conservation of biodiversity in England that is known as the *England Biodiversity List*.

Great Crested Newt Pond Search

1.47 Ordnance Survey maps and the *Where's the Path* website (https://wtp2.appspot.com/wheresthepath.htm) have been used to identify the presence of water bodies within 250 m of the Solar PV Site boundary, in order to help establish if the land within and immediately surrounding the Solar PV Site could be used by great crested newts. This species can use suitable terrestrial habitat up to 500 m from a breeding pond[29], though there is a notable decrease in great crested newt abundance beyond 250 m from a breeding pond[30].

Field Survey

1.48 The preliminary ecological assessment includes a walkover survey of the Survey Area (all land within the Solar PV Site and up to 50 m from the Solar PV Site boundary (where access was granted)), broadly following the Phase 1 habitat survey methodology as set out in Joint Nature Conservation Committee guidance (JNCC, 2010)[31]. This survey method records information on habitat types and is 'extended' to record any evidence of and potential for protected or notable species to be present. Plant names recorded during the survey follow Stace (2010)[32].

1.49 During the walkover survey, the following protected or notable species are considered:

- Badger: the survey involves searching for signs of badger activity including setts, tracks, snuffle holes and latrines, following the methodology detailed in Scottish Badgers (2018)33 and Harris et al (1989)34;
- Bats: the survey involves searching for potential roosting sites for bats within trees and structures (such as buildings, bridges or underground features such as mines) and categorising the potential of those trees or structures to support roosting bats (negligible to high, or confirmed roost), in accordance with Bat Conservation Trust (BCT) guidance (2016)35;
- Otter: the survey involves assessing the potential of watercourses and water bodies, and adjacent terrestrial habitat within the Survey Area to support otter, following RSPB (1994)36 and Chanin, P. (2003)37 guidance;

[29] Great Crested Newt Mitigation Guidelines (English Nature, 2001).

[30] Natural England. An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt (ENRR576) http://publications.naturalengland.org.uk/publication/134002.

[31] Joint Nature Conservation Committee (2010) Handbook for Phase 1 habitat survey - a technique for environmental audit.

[32] Stace, C E (2010) *New Flora of the British Isles, 3rd edition*. Cambridge University Press.

[33] Scottish Badgers (2018). Surveying for Badgers: Good Practice Guidelines. Version 1.

[34] Harris, S. Cresswell, P. and Jefferies, D. (1989). *Surveying Badgers*.

[35] Collins, J.(ed) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conversation Trust. London.

[36] Ward, D. Holmes, N. Jose, P. (1994). *The New Rivers and Wildlife Handbook*. Royal Society for the Protection of Birds. Bedfordshire.

[37] Chanin, P (2003b). *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No 10. English Nature, Peterborough.

- Water vole: the survey involves assessing the potential of watercourses and water bodies within the Survey Area to support water vole, following The Mammal Society (2016)38 guidance;
- Birds: the survey involves assessing the potential of habitats within the Survey Area to support breeding, wintering or migrating birds, either individually notable species or assemblages of both common and rarer species;
- Great crested newt: the survey involves assessing the potential of habitats within the Survey Area to support great crested newt, following English Nature (2001)39 and Froglife (2001)40 guidance;
- Reptiles: the survey involves assessing the potential of habitats within the Survey Area to support reptiles (typically adder, grass snake, common lizard and slow worm only, though in some locations and habitat types (most notably heathland) may also include smooth snake and sand lizard), following Froglife (1999)41 and JNCC (2003)42 guidance;
- Notable species of invertebrate: the survey involves assessing the potential of habitats within the Survey Area to support notable species of invertebrates, both terrestrial and aquatic (including white-clawed crayfish);
- Protected or Notable species of plants: the survey involves recording protected or notable plant species;
- Other notable species: the survey involves assessing the potential of habitat within the Survey Area to support other Notable Species, such as hedgehog, brown hare, polecat or common toad; and
- Non-native invasive plant species: the survey involves recording evidence of the presence of invasive plants listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and subject to strict legal control.

Habitat Suitability Index for Great Crested Newt

1.50 The calculation of the great crested newt HSI for water body requires that the following ten variables are recorded and assigned a numerical value:

- Location within Britain;
- Pond area;
- Pond drying (based on both local knowledge and field evidence);
- Water quality;
- Percentage perimeter shaded;

[38] Dean, M. Strachan, R. Gow, D. Andrews, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Guidance Series).* Eds Fiona Mathews and Paul Chanin. The Mammal Society. London.

[39] English Nature (2001). The Great Crested Newt Mitigation Guidelines.

[40] Froglife (2001). The Great Crested Newt Conservation Handbook.

[41] Froglife (1999). Reptile Survey: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth.

[42] Joint Nature Conservation Committee (2003). *Herpetofauna Workers Manual*.

- Presence or absence of waterfowl;
- Presence or absence of fish;
- Number of water bodies situated within 1 km;
- Suitability of terrestrial habitat; and
- Percentage of macrophyte cover.

1.51 The results of the HSI assessment for a water body have been interpreted using Table 1 which is taken from the HSI guidance.

Table 1. Habitat Suitability Index score and interpretation

HSI Score	Water Body Suitability for Great Crested Newts
< 0.5	Poor
0.5	Below average
0.6	Average
0.7	Good
> 0.8	Excellent

Limitations and Assumptions

1.52 The aim of a desk study is to help provide a baseline for a proposed Scheme and provide valuable background information that would not be captured by a single field survey alone. The information obtained during a desk study is dependent upon people and organisations having made and submitted records for the area of interest. A lack of records for habitats or species does not necessarily mean that the habitats or species do not occur in the Study Area. Likewise, the presence of records for habitats and species does not automatically mean that these still occur within the area of interest or are relevant in the context of the Scheme.

1.53 Some areas of the Solar PV Site were inaccessible at the time of the Phase 1 survey between 28th March and 31st March and 25th April 2023, including the areas up to 50 m from the Solar PV Site boundary. This is a significant constraint to this report and as a precaution, these habitats would be inspected separately as part of further survey work, as recommended. This report will be updated at that time to include information that would instruct any future consideration for further survey or mitigation work.

1.54 The recording of plant species, including invasive non-native plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and listed as species of EU concern (EU Invasive Alien Species Regulation, 2014) can be constrained by the time of year that the survey was undertaken. Most such species are not visible or cannot be reliably mapped outside the growing season (April to September), and some species are only apparent during certain months. Populations of annual plant species may fluctuate between years dependent on the growing conditions present in any

given season. As the survey took place during March, this was a constraint to the identification of plants present within each habitat.

1.55 Where habitat boundaries coincide with physical boundaries recorded on OS maps the resolution is as determined by the scale of mapping. Elsewhere, habitat mapping is as estimated in the field and/or recorded by hand-held GPS. Where areas of habitat are given, they are approximate and should be verified by measurement on Solar PV Site where required for design or construction. While indicative locations of trees are recorded this does not replace requirements for detailed specialist arboriculture survey to British Standard 5837:2012 Trees in Relation to Design, Demolition and Construction British Standards (BSI, 2012).

1.56 Due to the potential for protected species to be present, if construction has not started on the Solar PV Site within 12 months of the completion of the Phase 1 Habitat Survey, it is recommended to review this PEAR including the data search and provide a revised up-to-date baseline. The data in the desk study itself is valid for 12 months from the date of supply. This follows guidance from the Chartered Institute of Ecology and Environment Management (CIEEM, 2019).

1.57 Some areas of the 50 m buffer around the Solar PV Site were inaccessible at the time of the Phase 1 survey. This include the ponds (listed in Table 3-6, the area to the north of the River Went, and the central area of the Solar PV Site (Fenwick Common Hall). These areas are indicated on Figure 6 and Figure 7 in Appendix A.

Appendix D Target Notes and Photographs

Target Note	Description	Photograph(s)
TN1	Large willow trees present on the banks of the River Went, suitable resting sites for otters.	
TN2	Large rock pile suitable for reptile refugia.	
TN3	Defunct field boundary, reduced to scattered shrubs and semi mature standards, with hawthorn, oak, ash, and blackthorn. Growing over shallow drainage ditch with common reed and bramble.	

Target Note	Description	Photograph(s)
TN4	Defunct field boundary turns into a species poor, managed hedgerow over a dry ditch, hawthorn dominated with oak standards and blackthorn.	
[redacted]	[redacted]	[redacted]
TN6	Skylark territorial calling over the field.	No photo available.
TN7	No boundary between two fields.	

Target Note	Description	Photograph(s)
TN8	Deep depression in ground with bricks that may provide refugia for newts and reptiles.	
TN9	Terrestrial reedbed under a pylon, at the end of a ditch.	
TN10	A large rabbit warren.	
TN11	Several pairs of mallards seen and heard. Present in ditches.	No photo available.
TN12	Male hen harrier seen displaying hunting behaviour	No photo available.

Target Note	Description	Photograph(s)
	over winter feeding grounds.	
TN13	A patch of unmanaged land, used as waste tip. Tall ruderals and common reed present. High density of cured dock over poor improved grassland.	
TN14	Patch of hawthorn and scrub, looks like the remnants of a hedgerow.	
TN15	Bunfold Shaw LWS (beyond Site boundary): Pedunculate oak dominates, and the woodland also contains hawthorn, ash, silver birch, overtopping hazel, alder, aspen, and some scattered conifer species.	

Target Note	Description	Photograph(s)
TN16	The Went Valley (Part): extensive site comprises semi-improved and cattle-grazed neutral grasslands which are located immediately south of the River Went.	
TN17	Large waterbody across river, looks to be an area which has been flooded by the river. Wetland habitat with lapwings sighted. Unable to access, outside of the Solar PV Site boundary.	
TN18	Arable field margins with arable flora. Species include mayweed (*Anthemis* sp.), shepherd's purse, red dead nettle, yarrow, Colt's foot, chickweed, speedwell, wavy bittercress and hairy bittercress.	No photo available
TN19	Area of plantation woodland not accessed during the survey.	No photo available

Target Note	Description	Photograph(s)
TN20	A patch of disturbed ground, within an arable field in the southern part of the Solar PV Site. Species present include nettle, umbellifer species (Daucus sp.), mayweed (Anthemis sp.) and cleavers.	
TN21	Reed bed on land, dominated by common reed with soft rush, pond sedge. Snipe species seen.	
TN22	Reed bed on land, dominated by common reed.	

Hedgerows

There are 82 native hedgerows on Solar PV Site, hawthorn or blackthorn dominated, and most have some evidence of current management. Each hedgerow has an associated drainage ditch, which together delineate the field borders. There is evidence of heavy browsing and/ or agrochemical run-off or drift. The below pictures show representatives of what the hedgerows look like on the Solar PV Site.

Plate 1: Example of a managed hedgerow (H2)

Plate 2: Example of an unmanaged hedgerow (H52)

Plate 3: Example of a gappy hedgerow (H38)

Hedgerow	Description
H1	Managed hedge with an associated shallow, dry, field drain below it. 2-3m high, 1-2m wide. Hawthorn dominated, with immature standards present. Species include pedunculate oak ad ash. High evidence of agricultural enrichment, ground flora is dominant cleavers and tall ruderals.
H2	Hedge is less than 20 years old, with hawthorn, three oak standards, and a fence running through it. Hedge is managed, 2 to 3m high, 1m wide.
H3	Dominating blackthorn and hawthorn, frequent dogrose. Has standards including an oak tree, and a managed mature white willow. The associated drainage Ditch holds water, but only after recent rain.
H4	Dominated by hawthorn and scrub over dry land drain. Occasional ash and oak standards present. Other species include dogrose, bramble. Not strictly a hedge but functions as effective barrier.
H5	Managed on one side, unmanaged on the other. Fence runs inside the hedgerow. 3 m high, 2 m wide. Hawthorn dominated, cherry standard and ash standard. Cleavers at the ground level.

Hedgerow	Description
H6	Unmanaged and overgrown hedgerow. 5/6 m tall, 2 m wide. Hawthorn dominated with abundant blackthorn and oak standards. Cow parsley at the base.
H7	Species poor, managed hedge, with a fence present. The associated drainage ditch holds water due to recent rain but doesn't hold water permanently. Immature standards include pedunculate oak [redacted] and field maple. Hawthorn dominates, with rare holly and poor ground flora due to agrochemical use and browsing, nettles and cleavers dominate.
H8	Species poor, managed hawthorn dominated hedge with a fence running through it. Approximately 2-3m high, 1-2m wide, with a single immature oak standard. There are 5 m gaps at each end for field access and poor ground flora.
H9	Unmanaged hedge with trees up to 10m high. Hedge is approximately 4 m high and 2 m wide. Hawthorn dominates, with frequent blackthorn, and poor ground flora due to heavy agrochemical influence. There are mature crab apple standards, and other species include oak, ash, willow species.
H10	Managed hedgerow, with an associated fence and field drain. Hedge is 1-2 m high, 1-2m wide, with limited ground flora due to agricultural chemicals and browsing. Hawthorn and blackthorn dominate, with rare dog rose and, immature oak, ash, white willow, and field maple standards. *Arum maculatum* and lesser celandine were present in the ground flora.
H11	Managed hedgerow with a fence and field drain present. Hedge is 1-2 m high, 1-2m wide, with limited ground flora due to agricultural chemicals and browsing. Hawthorn dominates, with blackthorn and dog rose present. Immature standards present, and *Arum maculatum* and celandine present in the ground flora.
H12	Managed hedgerow with a fence and field drain present. Hedge is 1-2 m high, 1-2m wide, with limited ground flora due to agricultural chemicals and browsing. Hawthorn dominates, with blackthorn and dog rose present. Immature standards present, and *Arum maculatum* and celandine present in the ground flora. Willow Standard present.
H13	Unmanaged hawthorn dominated hedge. Occasional dog rose and rare elder present, as well as immature oak and ash standard. Hedge is 3-4m high, 2-3m wide, with trees managed to the east. Associated drainage ditch is dry at present, with limited ground flora, and abundant bramble.
H14	Hawthorn dominates, with willow and 1 ash standards. Hedge is managed in places and has gaps in places, and brambles, frequent blackthorn, dog rose, and ivy are present.
H15	Defunct hedge, essentially a line of scattered willow, oak, and hawthorn trees with tall ruderals and scrub.

Hedgerow	Description
H16	Poorly managed hedgerow, not laid, approximately 3-4m high, 1-2 m wide, with an adjacent running drainage ditch. Hawthorn dominates, with rare dog rose. Ground flora subject to heavy browsing, with little evidence of AWI species. Western section unmanaged to 8m high.
H17	Hedge has dense scrub and is adjacent to a drainage ditch. There was scattered hedgerow species, including bramble, young oak, blackthorn, young ash, wild carrot, nettles, dogrose, immature oak, hawthorn, holly, and yarrow. Also, sites along a barbed wire fence, and has large gaps.
H18	Hawthorn dominates, with other species including nettles, blackthorn, dog rose cleavers, wild carrot, cow parsley, nettles, and holly. Hedge contains an ivy-covered immature oak standard, and is gappy in places. Evidence of some recent management, hedge sits in and adjacent to a mostly dry drainage ditch.
H19	Highly managed hawthorn hedge along a road. Some new planted oak standards.
H20	Looks like a remnant of previous hedge. Gappy in parts, contains willow, ash, oak, hawthorn, holly, elder and bramble (in patches of dense scrub).
H21	Evidence of recent management. Blackthorn and hawthorn dominate, with other species including cleavers, nettles, holly, brambles, ivy, cow parsley, dog rose, and immature oak. hedgerow is very gappy, with some scrub at the base.
H22	Evidence of recent management, hedge is 5m tall and 3m wide. Blackthorn and hawthorn dominate, with other species including cleavers, nettles, holly, brambles, ivy, cow parsley, dog rose, and immature oak. Standards present include a semi mature oak standard, and a young silver birch. There is a depression in the soil for drainage, and an adjacent fence. Hedge is heavily browsed at the base by sheep.
H23	Evidence of recent management. Blackthorn and hawthorn dominate. This hedge has a wet drain adjacent to it.
H24	Species include an oak standard, dominant hawthorn, blackthorn, groundsel, and cleavers. The associated drain has some wet patches, but otherwise is mostly dry.
H25	This hedge has an associated drainage ditch with wet patches (although this is due to recent rain). Dominant hawthorn and blackthorn, with ground flora including nettles and cow parsley, and standards including willow, oak, and ash. Hedge is 3 m tall, 2 m wide, poorly managed, and heavily browsed at base.
H26	Hawthorn dominates, with cleavers, blackthorn, and willow standards. Associated ditch contains water. Where the hedge ends, it turns into a scattered tree line.

Hedgerow	Description
H27	Gappy hedgerow, 5 m high, 1 m wide, unmanaged. Hawthorn dominates, with occasional immature oak, tufted hairgrass, ash standards, oak standards, blackthorn, and nettles. Ground flora limited as heavily grazed.
H28	Dominate hawthorn, hedge contains deadwood, oak standards, and a young ash standard. Hedge is 6 m high, and 1 m wide. It is unmanaged, and the ground flora is limited as it is heavily grazed. The associated drain is dry.
H29	Species include nettles, brambles, dog rose, cow parsley, dock species, oak, tufted hair grass, and dominate hawthorn. There is a wire fence alongside the hedgerow.
H30	Hawthorn dominates both these hedgerows, and other species include nettles, goat willow, dead willow, other *Salix* sp. These two hedges are connected and share the same associated drainage ditch. They are both approximately 5 m high, 2 m wide, unmanaged, and heavily browsed at base by sheep.
H31	Gappy, unmanaged hawthorn dominated hedge.
H32	Gappy, hawthorn dominated hedgerow with oak standards.
H33	Gappy hedgerow, 3 m high, 1 m wide, unmanaged, heavily grazed at base. Hawthorn dominates, and other species includes oak standards, ivy, blackthorn, brambles, and nettles. The associated drain has slow flowing water.
H34	Hawthorn dominates, with frequent cleavers and blackthorn. The associated drain makes this hedgerow partially flooded. Runs along 3 fields to the south.
H35	Unmanaged, hawthorn dominated hedgerow. Contains blackthorn, brambles, cleavers, nettle, honeysuckle, lesser celandine, white dead nettle and hogweed. Willow standards. Hedge is across ditch.
H36	Unmanaged, hawthorn dominated hedge. 44 m high, 2 m wide. Hogweed, cleavers, and nettle at the base.
H37	Unmanaged, 4 m tall, 1 m wide, hawthorn dominated. The associated ditch runs into an adjacent drain. Other species include blackthorn, ash standard, cow parsley, broadleaved dock, cleavers, dog rose, and buttercup species.
H38	Blackthorn and hawthorn dominate, with other species including cleavers, nettles, and holly. There is a barbed wire fence running through, very gappy and unmanaged. The associated drain running through it is wet in parts. Heavily grazed at base.
H39	Hedge is 4 m high, 1 m wide, and unmanaged. Hawthorn dominates, but other species include ash, willow and oak standards, nettles, cleavers, brambles, and blackthorn. There is a fence adjacent and an associated drain.

Hedgerow	Description
H40	Dominated by hawthorn, species also include immature oak standards, and blackthorn. Hedge is unmanaged, 4 m high, and 3 m wide. Has associated running water ditch, with a fence which runs alongside it.
H41	Poorly managed flood bank, essentially a line of trees and scrub plants. Trees are ash and oak, and the hedge is over 5 m wide, and managed for height due to overhead power lines. Species include dogrose, willow, dense nettles, and common tall ruderals.
H42	Unmanaged and overgrown, hawthorn dominated hedge. 6 m tall, 2 m wide. Contains willow standards.
H43	Dominated by hawthorn, hedge also contains reed species, hogweed, nettles, cleavers, dead willow, oak, brambles, and dogrose. Hedge also contains standalone hedgerow species. There is a shallow drain between the two fields, which is presently dry. There is a pylon at the end of hedgerow.
H44	Unmanaged hedge, 6 m high with oak and ash standards. There is a fence present, and the hedge overtops a shallow land drain holding less than 5 cm water. Hawthorn dominates, and other species include blackthorn, Honeysuckle, and dog rose. Poor ground flora, *Arum maculatum* present but evidence of tall sward grasses and common ruderals present.
H45	Gappy, hawthorn dominated hedge, with some recent management. 2 m tall, and 1 m wide. Other species include blackthorn and oak standards.
H46	Hawthorn dominated, other species include cleavers, nettles, blackthorn, bramble, and oak standards.
H47	Blackthorn and hawthorn dominate, but also present are bramble, ivy, nettles, cleavers, and dogrose.
H48	Unmanaged hedge to 8 m, 3-4 m wide. Fence present, poor ground flora visible. Hawthorn dominates, with oak and ash standards, becomes more a line of trees overtopping hedge shrubs to the north.
H49	Short section of defunct hedge, hawthorn scrub and fence. Semi-mature oak to the west corner, and poor ground flora present.
H50	Species poor rarely managed hedge. Hawthorn dominated, with oak, blackthorn, cleavers, and dogrose. Runs adjacent to a barbed wire fence.
H51	Hawthorn dominated species poor hedge. One large oak standard and a fence runs through.
H52	Hawthorn dominated, with semi-mature oak standards, ivy, dog rose, *arum* species, brambles, cow parsley, willow standard, cleavers, honeysuckle, blackthorn, field maple standard, nettles, Aspen standard, and thistle species. Hedge is adjacent to a barbed wire fence, it is unmanaged, 5 m high, and 2 m wide. The

Hedgerow	Description
	oak standards have good bat roost potential. There are some gaps, approximately 10 m long in places. There is a slight depression in soil in hedgerow, which acts as a drain. This is wet in some parts due to recent rain.
H53	Unmanaged hedge to 8 m with oak, willow species and ash standards. 2-4m wide with a shallow, dry land drain below and an adjacent barbed wire fence. Hawthorn dominated, with moderate ground flora, high density arum species, and primrose present, but also fog, cocksfoot, with nettle and cleavers.
H54	Managed hawthorn dominated hedge, 2-4 m high, 2-3 m wide, fence present, adjacent hedge within 15 m. Occasional dog rose and blackthorn, rare elder and a high density of nettle and cleavers with common tall ruderals and daffodils.
H55	Unmanaged hawthorn dominated hedge, 5 m tall, 3 m wide. Species include ash, dog rose, bramble, ivy, nettles, cleavers, and blackthorn.
H56	Old hedgerow, left to disrepair. Semi-mature oak standards overtopping poorly managed hawthorn and dogrose scrub. NB forms domestic curtilage.
H57	Species include young horse chestnut, hawthorn, lesser celandine, oak standard, *Arum maculatum*, Turkey oak, cleavers, yarrow, ivy, nettles, blackthorn, cow parsley, thistle sp. vetch species, geranium species, white dead nettle, wavy bittercress, dog rose, and large cracked willow standards.
H58	Species include young horse chestnut, hawthorn, lesser celandine, oak standard, *Arum maculatum*, Turkey oak, cleavers, yarrow, ivy, nettles, blackthorn, cow parsley, thistle sp. vetch species, geranium species, white dead nettle, wavy bittercress, dog rose, and large cracked willow standards.
H59	Species include young horse chestnut, hawthorn, lesser celandine, oak standard, *Arum maculatum*, Turkey oak, cleavers, yarrow, ivy, nettles, blackthorn, cow parsley, thistle sp. vetch species, geranium species, white dead nettle, wavy bittercress, dog rose, and large cracked willow standards.
H60	Hawthorn dominated hedgerow, 2m tall, 3 m wide. Other species include blackthorn, immature oak, ash, Bramble, oak Standards, Cleavers, cow Parsley, knapweed, ivy and elder. Associated dry ditch runs beneath the hedgerow.
H61	Poorly managed hedge with mature oak standards.
H62	Managed, hawthorn dominated hedgerow over shallow drainage ditch, ditch wet due to recent rain. Abundant blackthorn, oak and willow semi mature standards, and no ground flora to note. Adjacent field farmed to the hedgerow.
H63	Species poor, partly managed, hawthorn dominated hedgerow over a wet drainage ditch. Ditch wet due to recent rain. Abundant

Hedgerow	Description
	hazel, and oak immature standards present. No notable flora and is adjacent to Public Right of Way.
H64	Gappy in parts, evidence of recent tree management, hawthorn dominated hedgerow. Other species present include blackthorn, brambles, semi-mature oak standards, willow standards, and goat willow.
H65	Species poor, hawthorn dominated, managed hedgerow with semi mature oak and ash standards. Over tops main drain channel.
H66	Hawthorn dominated hedge, with dog rose, blackthorn, brambles, cow parsley, dandelion, nettles, cleavers, red dead nettle, ash and ivy, and oak and ash standards. Heavy browsing by deer and agrochemical spill-over limits ground flora.
H67	Hawthorn dominated hedge is 3 m high, and gappy in parts, with piles of deadwood in the gaps. There is a dry drain beneath the hedge. Species include hazel, cleavers, nettles, *Arum maculatum*, brambles, immature ash and oak standards, dogrose, blackthorn.
H68	Species rich, blackthorn dominated hedgerow. Other species include abundant hawthorn, frequent ash and dog rose, and oak standards.
H69	Species poor hedge, over drainage ditch. Hawthorn dominated with immature standard oaks.
H70	Species poor, partially managed gappy hedge with semi mature standards hawthorn, oak, and blackthorn.
H71	Unmanaged, hawthorn dominated hedge, 3 m tall, 1 m wide. Species include blackthorn, ivy, immature oak standards, cow parsley, bramble, goat willow, and nettles. A drainage ditch runs adjacent to it. Hedge is gappy in places.
H72	Species poor, hawthorn dominated, managed hedge to 4 m high, and 4 m wide. Many semi-mature standards present, along with a dry land drain to the west. East adjacent track designated Public Right of Way.
H73	Recently managed, hawthorn dominated hedge. 3 m high, and 2 m wide. Hedge contains willow, ash and oak standards, blackthorn, *Arum maculatum*, broadleaved dock, cow parsley, nettles, brambles, willowherb species, hogweed and ivy.
H74	Hawthorn dominates, with abundant blackthorn, hedge contains a single immature oak standard and poor ground flora.
H75	Little management, overgrown in parts. Hawthorn dominated with scrub in ground flora. 2 m tall, 1 m wide.
H76	Unmanaged, hawthorn dominated hedge with ash and oak standards.
H77	Unmanaged hawthorn dominated hedgerow at the edge of a horse paddock. 5 m tall in places.

Hedgerow	Description
H78	Hedgerow is just dense scrub in parts, and hawthorn dominated. Other species include nettles, a dead ash tree, ash standards, cleavers, speedwell, holly, ivy and brambles. The associated drainage ditch has a little water in, and runs into the River Went.
H79	Hawthorn dominated hedge, with dog rose, blackthorn, and brambles. Heavy browsing by deer and agrochemical spill-over limits ground flora.
H80	Unmanaged hedge with oak standards, borders a plantation broadleaf woodland. There is a fence present, and species include oak, ash, hawthorn, bramble. Hedge has poor ground flora.
H81	Gappy, unmanaged, hawthorn dominated hedgerow, over a drain. Abundant blackthorn. 3 m high, 2 m wide with a single oak standard. Cleavers, nettle and brambles at the base.
H82	Species poor, hawthorn dominated hedge, with an associated dry ditch. Other species include oak, willow species, and dog rose, with oak standards.

Tree Lines

There are remnants of previous hedges in a number of locations on Solar PV Site that have been left unmanaged and as a result now form scattered treelines, rather than hedges. These tree lines consist of hawthorn trees, oak and ash. Below are some examples of the tree lines on the Solar PV Site.

Plate 4: Example of a line of trees (TL2)

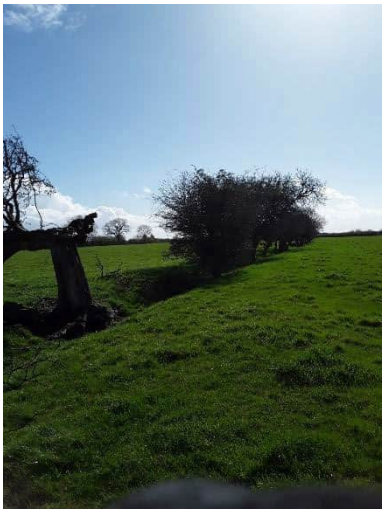

Plate 5: Example of a line of mature trees (TL3)

Plate 6: Example of a scattered deadwood tree line (TL7)

Tree Line	Description
TL1	Line of hawthorn trees could be a remnant of a previous hedge. Individual scrub bushes over semi-improved grassland.
TL2	Barbed wire fence on field boundary, with a mix of oak, ash and hawthorn trees and scrub, looks to turn into a hedgerow further down.
TL3	Individual hawthorn, ash, and oak trees, with an associated drainage ditch.
TL4	Line of scattered hawthorn, along a fence. Could be a remnant of a previous hedgerow.
TL5	Scattered hawthorn trees along wet drain.
TL6	Scattered willow, oak and ash trees along northern edge of field boundary.
TL7	Line of willow, deadwood, and hawthorn trees with cleavers and nettles at their base.
TL8	Very gappy, not a hedgerow, but resembles one in places. Blackthorn, hawthorn and holly bushes, with nettles at their base. Has

Tree Line	Description
	associated ditch, runs into perpendicular ditch.
TL9	Small line of hawthorn trees, with scrub and nettles at their base. Looks to be a remnant of a previous hedgerow.

Ditches

Drainage ditches were associated with every hedgerow, scattered tree line and field edge. Although the majority of each ditch was dry, every ditch contained some water at the time of survey. The water present is likely to be as a result of recent rainfall as the majority of ditches lacked any flora that is typical of periodic or permanent inundation, with only some localised stands of common reed indicating more regular inundation. The water present which was either very slow flowing or standing. Below are some representative photos of the ditches present on the Solar PV Site.

Plate 7: Example of a wet ditch (D13)

Plate 8: Example of a dry drainage depression (D16)

Plate 9: Example of a drainage ditch which is wet in parts (D36)

Ditch	Description
Fleet Drain (D1)	Fleet Drain runs through the east side of the Solar PV Site. Slow flowing, connects to Fenwick Common Drain to the south.
Fenwick Common Drain (D2)	Fenwick Common Drain, runs along the south side of the Solar PV Site, connected to the Fleet Drain.
D3	Contains standing water, but it comes and goes. Dry in patches.
D4	Dry drainage depression, wet in patches due to recent rain.
D5	Drainage ditch, it has water but only after rain.
D6	Dry ditch, runs inside H77. Wet when it rains.
D7	Dry depression inside H5.
D8	Dry depression in H6.
D9	Clearly managed, recently dug out. The was water present, run off from fields. Hairy bittercress on edges.
D10	Dry, more of a depression than a ditch. Within hedgerow between 2 fields.
D11	Dry drainage depression.

Ditch	Description
D12	Wet and flowing. Water drain for fields with a fast flow. Clearly recently excavated.
D13	Very wet ditch, gentle flow W to E. Well managed, hedgerow alongside it. Nettle, cleavers, dock, brambles, and red dead nettle at the edges. Higher water levels after heavy rain.
D14	Dry depression drain, within hedgerow scrub.
D15	Drainage ditch currently has water but empties regularly.
D16	Drainage depression between two fields, mostly dry, wet in parts.
D17	Dry, reed sp. present. Looks to be a terrestrial reedbed. Adjacent to willow carr.
D18	A depression in the soil for drainage.
D19	A depression in the soil for drainage.
D20	Only dry in parts, drainage ditch.
D21	Dry ditch, wet after rain.
D22	Wet patches due to recent rain.
D23	Ditch with standing water in, likely to dry out over the summer.
D24	Small depression in soil, to act as a drain for the field. Dry and unmanaged. Some areas are shallower than others.
D25	Dry depression in the soil for drainage.
D26	Dry depression in tree line in centre of field.
D27	Mostly dry drain between two fields. <1 m deep, 1 m wide, some wet patches due to recent rain.
D28	Drain is dry depression in the soil.
D29	Standing water drain, less than 50 cm deep, 1.5m wide.
D30	Slow moving water, flowing east to west.
D31	Mostly dry with some running water patches.
D32	Rush sp. present in ditch, the water runs into the Fleet Drain (D1).
D33	Dry in places, wet patches are standing water.
D34	Drain running through hedge in parts, wet in parts.
D35	Dry, shallow ditch inside hedgerow.
D36	Tree lined, drainage ditch, mostly dry. Shallow soil depression between two fields, wet in patches.
D37	Shallow drain between two fields, dry. Mostly dry field drain.
D38	Shallow land drain holding less than 5cm water, inside a hedgerow contained by two barbed wire fences.
D39	Dry depression on field boundary. Small divots in the ground along a hedgerow.

Ditch	Description
D40	Dry depression between two fields.
D41	Wet in patches, associated with hedgerow.
D42	Wet in patches, associated with hedgerow.
D43	Wet in patches, associated with hedgerow.
D44	Wet in patches around field edge 2 m wide, shallow dry land drain.
D45	Wet in patches around field edge.
D46	Slight depression in soil in hedgerow, acts as a drain. Wet in some parts.
D47	Dry ditch for drainage.
D48	Dry ditch running alongside the field wet in places due to recent rain. Associated with hedgerows.
D49	Shallow drainage ditch, wet due to recent rain.
D50	Shallow drainage ditch, wet due to recent rain. Common reeds present in ditch.
D51	Shallow drainage ditch within a defunct field boundary.
D52	Drainage ditch, wet due to rain.
D53	Small areas of wet in the ditch. Unmanaged for a while, standing water.
D54	Overgrown ditch with standing water, unmanaged and manmade, drains and fills. Flows into Fenwick common drain (D2).
D55	Scrub over dry land drain.
D56	Drain running between two fields.
D57	Dry land drain.
D58	Dry drain, along road side of a hedgerow.
D59	Dry drain, along road side of a hedgerow.
D60	Shallow, wet ditch. Water present due to recent rain.
D61	Associated with H70 and H74. Dry depression between two fields.

Trees

Many trees on the Solar PV Site were noted to have features that are potentially suitable for roosting bats. At this stage, only an initial appraisal of the trees has been made (from the ground, with the use of binoculars). This initial assessment did not include the trees present within Bunfold Shaw. Below are some example photos trees with features for bats.

Plate 10: Example of a tree with multiple features for bats, including butt rot and dead and snapped branches (T120)

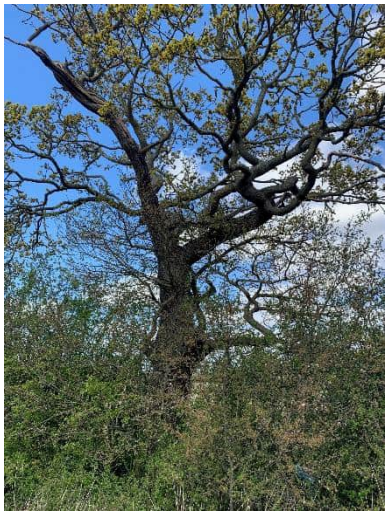

Plate 11: Example of a tree fewer features to support bats, but still has some suitability such as broken limbs and lifted bark (T121)

Plate 12: Example of a tree with single or few features to support bats (T85)

Tree	Description
T1	Immature oak, 25-30 years old, west facing woodpecker hole, east facing split in trunk.
T2	Immature oak with southeast facing hole in trunk.
T3	Oak with southeast facing hole and snapped branches.
T4	Oak with two south east facing broken branches.
T5	Oak with south facing hole, 3 m high.
T6	Semi-mature oak with a south facing hole in an east facing branch.
T7	Willow with many cracks in its trunk, snapped branches.
T8	Standing deadwood ash. Large trunk cavity to east, ground level to 3.5 m. Open branch cavity, 4.5m east.
T9	Single willow between two fields.

Tree	Description
T10	Willow with lots of cracks in stem and snapped branches.
T11	Willow with many cracks and snaps.
T12	Oak, 0.6m diameter at breast height (DBH), long trunk cavity and lifted bark on southeast at 2 m to 4.5 m.
T13	Single immature oak.
T14	Ash with north facing hole in branch, snapped branches.
T15	Oak with south facing holes, hard to see if holes go all the way in.
T16	Willow with snapped stem and deadwood, north facing. Hollow stem on south side. High potential.
T17	Oak with 4 m southwest facing hole and a north facing hole, and a torn branch.
T18	Oak with north facing lifted bark.
T19	Semi-mature oak, with 5 m north facing branch with tear out.
T20	Standing deadwood oak with potential roost feature visible up northern aspect. Lifted bark and trunk crack.
T21	Semi-mature oak with a woodpecker hole 3.5 m high on eastern side. Moderate PRF.
T22	Oak, 0.7m DBH, trunk split from 1.5m high to 4m. Light visible. Moderate PRF.
T23	Multi stemmed ash, 50 cm DBH, two woodpecker holes at 4 and 4.5m eastern aspect. Cluttered exit.
T24	Half dead ash tree with roost potential.
T25	Immature oak, 0.4m DBH, branch split on eastern aspect to 2.5 m high.
T26	Oak with split in stem and broken branches.
T27	Many stemmed willow.
T28	Semi-mature oak with snapped branches approximately 5 m up.
T29	Semi-mature oak.
T30	Semi-mature ash.
T31	Mature willow with 10 stems. Cracks in stems.
T32	Mature willow with cracks in trunk and snapped branches.

Tree	Description
T33	Mature willow hanging over flooded grassland. Snapped branches, unsafe to climb.
T34	Semi-mature oak, no bat roost potential (BRP).
T35	Semi-mature oak.
T36	Willow with but rot snapped branches, deadwood with cracks and crevices.
T37	Immature ash, no brp.
T38	Semi-mature oak.
T39	Mature willow with but rot and fallen stems.
T40	Mature willow.
T41	Hawthorn, no brp.
T42	Dead willow with lots of fallen branches and deadwood.
T43	Hawthorn, no brp.
T44	Immature willow.
T45	Willow with split stems and snapped branches.
T46	Oak, no brp.
T47	Willow. No photo.
T48	Oak.
T49	Ash with two rot holes in the stem.
T50	Ash.
T51	Oak with tear outs and snapped branches.
T52	Standing dead wood tree.
T53	Willow with split trunk.
T54	Ash.
T55	Ash with dead branches, tear outs, has bat roost potential.
T56	Oak with tear outs in stem and broken branches.
T57	Ash with tear out on one of the branches.
T58	Willow, unsafe to climb, large split, single tree.
T59	Semi-mature oak, 0.5m DBH, tear out / branch cavity at 4.5m to west aspect. Moderate PRF.
T60	Dead ash, half of the trunk has fallen away, upwards facing holes.
T61	Immature ash, snapped branch on east side.

Tree	Description
T62	Ash with snapped branches, lifted bark.
T63	Mature willow adjacent to a ditch, cracked branches, but rot.
T64	Willow which is half snapped off, deadwood, but rot, not safe to climb as dropping to pieces.
T65	Snapped branch, 6 m up.
T66	Ash with snapped branches and rot holes approximately 6 m high.
T67	Mature willow with but rot, dropping to pieces.
T68	Ash, tear out 6m up on west side.
T69	Ash.
T70	Ash with snapped branches.
T71	Single semi-mature oak.
T72	Immature oak with split in stem, tear out approximately 4 m high, west facing.
T73	Semi-mature oak, no brp.
T74	Semi-mature oak, with but rot and snapped branches.
T75	Single semi-mature oak, may have bat roost potential.
T76	Ivy-covered oak, semi-mature, with tear outs and missing branches, some bat roost potential.
T77	Mature oak within a large gap in the hedgerow along field boundary
T78	Ash with splits in stem and snapped branches.
T79	Half dead with branch snaps and split stem.
T80	Mature willow with snapped branches.
T81	Oak with moderate potential.
T82	Oak with negligible potential.
T83	Willow with moderate/high potential.
T84	Willow with high potential.
T85	Oak with low potential.
T86	Willow with low potential.
T87	Willow with low potential.
T88	Willow.
T89	Willow.
T90	No information.
T91	No information.

Tree	Description
T92	Willow with low potential.
T93	No information.
T94	Ash with low potential.
T95	No information.
T96	No information.
T97	No information.
T98	No information.
T99	No information.
T100	No information.
T101	No information.
T102	No information.
T103	No information.
T104	Dead and fallen willow tree stump, approximately 2.5 m tall.
T105	Oak with damaged limbs. Low potential.
T106	Oak with dead wood at the top and lifted bark. Low potential.
T107	Oak with snapped branches and damage limbs. Low potential.
T108	Ivy covered oak with a split in trunk. Low potential.
T109	Oak with a tear out. Moderate potential.
T110	Oak with cracked bark. Low potential.
T111	Oak with tear outs and some ivy covering.
T112	Dead, hollow oak. Rot holes all the way up the trunk. High potential.
T113	Oak with bat roost potential.
T114	Oak with bat roost potential.
T115	Oak with snapped limbs. Low potential.
T116	Many stemmed willow with cracks. Moderate potential.
T117	Oak with a cavity 4 m up on the south side, snapped branches and splits. High potential.
T118	Oak with cracked or lifted bark. Cracks in trunk. Low potential.
T119	Willow with snaps in and off limbs. Trunk rot.

Tree	Description
T120	Oak with butt rot and dead and snapped branches. High potential.
T121	Oak with broken limbs and lifted bark. Moderate potential.

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Appendix C: Water Framework Directive (WFD) Screening Assessment

Fenwick Solar Farm

Environmental Impact Assessment Scoping Report

Appendix C: Water Framework Directive Screening Assessment

Fenwick Solar Project Limited

June 2023

Delivering a better world

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1 Introduction

1.1 Background

1.1.1 This Water Framework Directive (WFD) Screening Assessment has been produced in support of the Environmental Impact Assessment (EIA) Scoping Report for Fenwick Solar Farm (hereafter referred to as 'the Scheme').

1.1.2 Fenwick Solar Farm would comprise the installation of solar photovoltaic (PV) generating panels, interconnecting cabling, associated Battery Energy Storage System(s) (BESS), one or more substation, a cable or line drop connecting the new substation to the Existing National Grid Thorpe Marsh substation, and other supporting infrastructure including fencing, access tracks, drainage, and biodiversity and landscaping enhancements at a proposed site near Doncaster (hereafter collectively referred to as the 'Scheme'). The Scheme would allow for the generation, storage and export of more than 50 megawatts (MW) electrical generation capacity.

1.1.3 Due to its proposed generating capacity, the Scheme is classified as a Nationally Significant Infrastructure Project (NSIP) and therefore requires consent via a Development Consent Order (DCO) under the Planning Act 2008 (Ref 1).

1.1.4 The Scheme is located approximately 5 kilometres (km) north of Doncaster and is comprised of three main areas (depicted in Figure 1-1 of the EIA Scoping Report):

- The land located east of Fenwick and immediately south of the River Went, hereafter referred to as the 'Solar PV Site' and denoted by a solid red line on Figure 1-1 of the EIA Scoping Report;
- The land between the Solar PV Site and the existing compound for Thorpe Marsh Substation, hereafter referred to as the 'Grid Connection Corridor Search Area' and denoted by the dashed red line on Figure 1-1 of the EIA Scoping Report; and
- The land located within the existing compound for Thorpe Marsh Substation, hereafter referred to as the 'Existing National Grid Thorpe Marsh Substation' and denoted by the brown area within the Grid Connection Corridor Search Area on Figure 1-1 of the EIA Scoping Report.

1.1.5 Full details of the Scheme components are provided in **Chapter 2: The Scheme** of the EIA Scoping Report.

1.1.6 The Scheme interacts with four WFD surface water bodies and thus it is necessary to consider the activities and constituent parts of the Scheme to determine compliance with WFD objectives. This includes assessing the impacts of new solar PV panels, supporting infrastructure, site drainage and cable crossings of water bodies on the biological, physico-chemical and hydromorphological quality elements that comprise the WFD to ensure no

deterioration and no prevention of future improvement in water body status. Both surface and groundwater bodies are considered.

1.1.7 In accordance with the Planning Inspectorate's Advice Note Eighteen (Ref 2), a three-stage approach may be adopted:

- **Stage 1: WFD Screening** – Identification of the proposed work activities that are to be assessed and determination of which WFD water bodies could potentially be affected through identification of a Zone of Influence. This step also provides a rationale for any water bodies screened out of the assessment;
- **Stage 2: WFD Scoping** – For each water body identified in Stage 1, an assessment is carried out to identify the effects and potential risks to quality elements from all activities. The assessment is made taking into consideration embedded mitigation (measures that can reasonably be incorporated into the design of the proposed works) and good practice mitigation (measures that would occur with or without input from the WFD assessment process); and
- **Stage 3: WFD Impact Assessment** – A detailed assessment of the water bodies and activities carried forward from the WFD screening and scoping stages.

1.1.8 This report therefore presents the findings of an initial WFD screening exercise (the first stage in the WFD assessment process) which has been undertaken in relation to the Scheme.

1.1.9 Detailed scoping and full assessment of WFD compliance will be undertaken as part of the Environmental Statement (ES) that will forms part of the DCO Application.

1.2 Study Area

1.2.1 For the purposes of this assessment, and consistent with **Chapter 9: Water Environment** of the EIA Scoping Report, a general Study Area (Zone of Influence) of approximately 1 km from the Site boundary has been considered in order to identify water bodies that are hydrologically connected to the Scheme, and potential works associated with the Scheme, that could cause direct impacts. However, given that water quality impacts may propagate downstream, where relevant the assessment also considers a wider Study Area to as far downstream as a potential impact may influence the quality or quantity of the water body (which in this case is typically for a few kilometres). Professional judgement has been applied to identify the extent to which such features are considered.

1.2.2 The Study Area falls within the following surface water body catchments:

- Went from Blowell Drain to the River Don (GB104027064260);
- Don from Mill Dyke to River Ouse (GB104027064243);
- Bramwith Drain from Source to River Don (GB104027063290); and
- Ea Beck from the Skell to River Don (GB104027057591).

1.2.3 There are also several tributaries of these water bodies present within the Study Area; these are predominantly unnamed agricultural ditches, drains and springs. It should be noted that WFD requirements apply equally to all watercourses regardless of whether they are Environment Agency reportable reaches.

1.2.4 The Study Area is also underlain by two WFD groundwater bodies:

- Aire & Don Sherwood Sandstone (GB40401G701000); and
- Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).

1.2.5 Refer to **EIA Scoping Report Volume 2: Figure 9-1** for water body locations in relation to the Site.

1.3 Introduction to the Water Framework Directive

1.3.1 The WFD, EC Directive 2000/60/EC (Ref 3) aims to protect and enhance the quality of the water environment across all European Union (EU) member states. England and Wales have adopted the WFD as national law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 4). Following the departure of the United Kingdom from the EU these Regulations continue to apply until they are revoked or superseded by new legislation.

1.3.2 The WFD takes a holistic approach to the sustainable management of water by considering the interactions between surface water, groundwater and water-dependent ecosystems. Ecosystem quality is evaluated according to interactions between biological, physico-chemical and hydromorphological elements (or ‘Quality Elements’).

1.3.3 Under the WFD ‘Water bodies’ are the basic management units and are defined as all or part of a river system or aquifer. Water bodies form part of larger River Basin Districts (RBD) for which River Basin Management Plans (RBMPs) are developed and environmental objectives are set. RBMPs are produced every six years, in accordance with the river basin management planning cycle. Cycle 3 plans were published in 2022 with the most recent RBMP data available on the online Catchment Data Explorer are from 2019 .

1.3.4 The WFD requires water bodies to be classified according to their current condition (i.e. the ‘Status’ or ‘Potential,’ depending on whether they are heavily modified or artificial water bodies) and to set a series of objectives for maintaining or improving conditions so that water bodies maintain or reach Good Status or Potential.

1.3.5 The Environment Agency has a duty to exercise its relevant functions so as to best secure that the requirements of WFD for the achievement of environmental objectives are co-ordinated. The Planning Inspectorate’s Advice Note 18 (Ref 2) summarises the overall aims and objectives of the WFD as to:

- Enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystems;

- Ensure progressive reduction of groundwater pollution;
- Reduce pollution of water, especially by Priority Substances and Certain Other Pollutants;
- Contribute to mitigating the effects of floods and droughts;
- Promote sustainable water use; and
- Achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2015 (or good ecological potential in the case of artificial or heavily modified water bodies).

1.3.6 As a result, new developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the WFD objectives of the potentially affected water bodies. It must be demonstrated that there is no deterioration or prevention of future improvement against any WFD element for a designated water body.

1.3.7 Regulation 33 of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 5) (i.e. the WFD) states that, like other public bodies, local authorities have a statutory duty to *"have regard to the River Basin Management Plan"* and *"any supplementary plans"* covering proposed activities when exercising its functions. Local authorities must therefore reflect water body improvement priorities as outlined in RBMPs.

1.3.8 In determining whether a development is compliant or non-compliant with the WFD objectives for a water body, the Environment Agency and partnering organisations must also consider the conservation objectives of any Protected Areas (i.e. sites within the national site network or water dependent Sites of Special Scientific Interest (SSSIs)) and adjacent WFD water bodies, where relevant.

2. Methodology

2.1.1 Guidance on how to undertake WFD assessments can be found in the Environment Agency's 'Water Framework Directive risk assessment – How to assess the risk of your activity' (Ref 6) and Planning Inspectorate's 'The Water Framework Directive – Advice note eighteen: The Water Framework Directive' (Ref 2). These guidance documents have informed the approach taken in this screening exercise.

2.1.2 A stepwise approach consisting of screening, scoping and impact assessment phases is generally followed in order to: (a) rationalise the levels of WFD assessment and impact mitigation that are required; and (b) verify that proposals meet the requirements of the WFD. As noted in paragraph 1.1.7, this assessment follows the general approach described by The Planning Inspectorate (Ref 2) as summarised below.

Stage 1: Screening

2.1.3 Screening identifies the zone of influence of a proposed development, and if proposed activities pose a risk to the water environment. It is used to identify if there are activities that do not require further consideration for WFD objectives, for example activities which have been ongoing since before the current RBMP plan cycle and which have thus formed part of the baseline.

Stage 2: Scoping

2.1.4 Scoping is used to identify any potential impacts of the proposed activities to specific WFD receptors and their water quality elements. This involves review of WFD impact pathways, shortlisting which WFD water bodies and quality elements could or could not be affected by proposed activities, and collecting baseline information from the relevant RBMP on the status and objectives for each water body.

Stage 3: Impact Assessment

2.1.5 This involves rationalised assessment of water bodies and quality elements that could be affected by proposed activities, in order to identify any areas of WFD non-compliance. Proposed activities are reviewed in terms of both positive and negative impacts, and the baseline mitigation measures, enhancements, and contributions to the WFD objectives described in the RBMP. Any proposed activities with potentially deleterious impacts are reviewed simultaneously with their corresponding mitigation proposals, to determine a net effect on WFD objectives.

Mitigation Commitments

2.1.6 Proposed mitigation measures that the Scheme relies upon to demonstrate compliance at any of the stages referred to above must be appropriately defined and secured.

Regulation 19 Derogation

2.1.7 Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration can be

avoided, additional assessment is needed in the context of WFD Regulation 19 which covers procedures for WFD derogation. This is equivalent to Article 4.7 of the EU directive that no longer applies in England.

2.1.8 Regulation 19 is a 'last resort' planning and legal process, and it is a matter for the Secretary of State to consider whether derogation under Regulation 19 is justified. An applicant would be required to provide detailed and often complex evidence to justify its case that the following four stringent tests have been met:

- Test (a): All practicable steps are to be taken to mitigate the adverse impacts on the water body concerned;
- Test (b): The reasons for modifications or alterations are specifically set out and explained in the RBMP;
- Test (c)(1): There is an overriding public interest in the Scheme and/or Test (c)(2): its benefits outweigh the benefits of the WFD objectives (i.e. that the benefits of the project to human health, human safety or sustainable development outweigh the benefits of achieving the WFD objectives); and
- Test (d): The benefits of the project cannot be achieved by a significantly better environmental option (that are technically feasible and do not lead to disproportionate cost.

2.1.9 In addition, the Scheme must not permanently exclude or compromise achievement of the WFD objectives in other bodies of water within the same RBD and must be consistent with the implementation of other environmental legislation. In applying Regulation 19, steps must also be taken to make sure that the new provisions guarantee at least the same level of protection as the existing legislation.

2.2 Desk Study

2.2.1 A desk-based study was carried out to capture information pertaining to the Scheme and support the understanding of water environment baseline conditions. Review of relevant information relating to the Study Area was undertaken to develop a baseline overview for WFD catchments, watercourses and surrounding areas. The following data sources were used for the desk study:

- WFD status and objectives from the appropriate River Basin Management Plan for Cycle 2[1] data, available from the Catchment Data Explorer (Ref 7);
- Defra's Multi Agency Geographical Information for the Countryside website, including contemporary Ordnance Survey (OS) maps (Ref 8);
- Historical maps (Ref 9);
- British Geological Survey maps (Ref 10);
- Soilscapes website (Ref 11);

[1] Cycle 3 data have not yet been published at the time of writing (April/May 2023).

- Aerial photography (Ref 12);
- Hydrological information (Ref 13);
- Climate information (Ref 14);
- Environment Agency Fish and Ecology Data Viewer (Ref 15); and
- Environment Agency Water Quality Archive website (Ref 16).

2.2.2 For a full summary of the baseline conditions for the Study Area refer to **EIA Scoping Report Chapter 9: Water Environment**.

2.3 Assumptions and Limitations

2.3.1 This Screening exercise is based on the baseline and Scheme design information available at the time of writing. It is based on the Scheme design set out in **Chapter 2: The Scheme** of the EIA Scoping Report.

2.3.2 A request for water resources data (e.g. licensed abstractions, Water Activity Permit locations, pollution incident locations), WFD information (including waterbody mitigation measures) and water quality and flow data was requested from the Environment Agency to inform the desk study in March 2023. A response had not been received at the time of writing. Any data received will be considered within the further WFD assessment at the ES stage.

2.3.3 At the time of writing, the full details regarding locations and methodologies of construction and installation of the infrastructure, and decommissioning, within the Grid Connection Corridor Search Area have not been confirmed. Construction methods including the size and depths of any launch or receiving pits are yet to be confirmed. Smaller watercourse crossings are currently assumed to require open cut installation techniques. As such, open cut crossings are assumed as a worst-case scenario at this stage, but will be reviewed for the WFD assessment provided as part of the ES. For these crossings it is assumed that water flow would be maintained by damming and over pumping. It would be a requirement that the watercourses are reinstated as found and water quality monitoring be undertaken prior to, during, and following on from construction activity.

2.3.4 The PV modules and mounting structures would be offset from watercourses. The point of measurement will be agreed with the Environment Agency through further consultation, but for the purposes of the assessment it is assumed for all watercourses to be measured from the centre line of the watercourse as determined from OS mapping. This avoids issues related to determining the watercourse edge in situations where this varies considerably as flow rate changes. This buffer would ensure all construction activities for the installation of PV modules and mounting structures would be offset from surface watercourses, other than where there is a need for crossing of a watercourse (for cabling installation or possible temporary access) of temporary discharge of treated construction site runoff. Any works to enhance watercourses would require direct works to the channel and banks, although given the aim of these works and their small-scale and ‘soft-engineering’ nature, construction impacts would be minimal. Overall, the purpose of this buffer reduces the risk of any pollutants entering

the watercourse directly, whilst also providing space for mitigation measures (e.g. fabric silt fences) should they be required.

2.3.5 The risk from surface water runoff to surface or ground water bodies has been provisionally considered qualitatively on the basis of design principles that will be presented in a Surface Water Drainage Strategy as part of the Flood Risk Assessment which will form a technical appendix to the ESAs part of the EIA and WFD assessment, the risk of surface water runoff from new hard standing to surface or ground water bodies will be assessed according to the Simple Index Approach presented in the C753 The Sustainable Drainage Systems (SuDS) Manual. It is expected that the pollutant risk will not be very high from runoff and that only one layer of treatment may be required. It is also expected that there would be sufficient space within the Site for a treatment solution following SuDS principles. However, there is also potential to use proprietary measures if there is a greater risk or there are localised constraints.

2.3.6 Removal of productive farmland within the Site to accommodate the Scheme would reduce water quality risk to watercourses associated with diffuse agricultural chemicals and possibly reduce soil erosion and the need for local abstractions for irrigation, thereby providing a beneficial impact. However, there is limited data on the existing conditions and activities, therefore no further consideration has been given to this potential benefit at this stage.

2.3.7 Welfare facilities for construction staff would be temporary and are not anticipated to discharge into the mains network, whilst any permanent welfare facilities, for example, at substations would be small scale. At the time of writing, it is not confirmed how any wastewater generated from the Scheme would be managed. Options may include connecting to the nearest available public sewer or a self-contained independent non-mains domestic storage and/or treatment system. The alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor.

3. WFD Screening

3.1.1 The purpose of the WFD screening stage, as outlined in PINS Advice Note 18 (Ref 2), is to identify a zone of influence of the Scheme and to determine whether that influence has the potential to adversely impact upon WFD water body receptors. This approach has been taken in this assessment and is outlined below.

3.1.2 A Study Area of 1 km from the Site has been considered in order to identify water bodies that are potentially hydrologically connected to the Scheme and potential works associated with the Scheme that could cause direct impacts.

3.1.3 The screening stage also identifies specific activities of the Scheme that could affect receptor water bodies' WFD status, and which should be carried forward to subsequent stages of the assessment process at the ES stage. Justification is provided where water body receptors are screened out and are not carried forward through the assessment. Water bodies or activities screened 'out' of the assessment will therefore not be considered further at the scoping and impact assessment stages, subject to agreement with the Environment Agency.

3.2 Screening of WFD Water Bodies

3.2.1 The Scheme interacts with four WFD surface water bodies. WFD Screening of these water bodies is provided in Table 3-1. Water bodies such as smaller tributaries within each of the WFD water body catchments that may be impacted by the Scheme have been included in this assessment. Any other remaining downstream water bodies not mentioned below are considered sufficiently far downstream to avoid impacts of the Scheme and are therefore screened out of further assessment.

Table 3-1: Screening of WFD Waterbodies Potentially Impacted by the Scheme

Water Body (ID)	Screening Outcome	Justification
Surface Water Bodies		
Went from Blowell Drain to the River Don (GB104027064260)	In	These WFD water bodies may be directly impacted by the Scheme due to a range of activities that would interact with the local watercourse network during the construction, operation and decommissioning phases of the Scheme.
Don from Mill Dyke to River Ouse (GB104027064243)		
Bramwith Drain from Source to River Don (GB104027063290)		
Ea Beck from the Skell to River Don (GB104027057591)		
Bentley Mill Stream (GB104027057541)	Out	The Scheme does not interact with these water bodies and there are unlikely to be impact pathways that would adversely affect them. Therefore, they are screened out of this assessment.
Blowell Drain from Source to the Went (GB104027063390)		
New Fleet Drain from source to R Went (GB104027063411)		
North Soak Drain Catchment (tributary of Torne/Three Rivers) (GB104028064350)		
The Skell from Source to Ea Beck (GB104027063280)		
Went from Hoyle Mill Stream to Blowell Drain (GB104027063360)		
Womersley Beck from Source to Blowell Drain (GB104027063370)		
Hatfield Waste Drain Catchment (tributary of Torne/Three Rivers) (GB104028064330)		
Groundwater Bodies		
Aire & Don Sherwood Sandstone (GB40401G701000)	In	These WFD groundwater bodies underlie the Site and may be affected by a range of activities during the construction, operation and decommissioning phases of the Scheme.
Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).		

3.3 Screening of Activities

3.3.1 As described in Section 1, the Scheme comprises a number of activities, some of which present a potential risk to the WFD status of water bodies. These components and activities are listed in Table 3-2 together with a screening assessment.

Table 3-2: Screening of the Scheme Against WFD Quality Elements

Activity	Description	Screening Outcome	Justification
Solar photovoltaic (PV) modules and mounting structures.	The type of mounting structure to be used is currently being evaluated, but all options will mount solar PV panels 0.8 m above ground level on module mounting structures. This would avoid creation of an impermeable surface on the ground or the need for extensive earthworks. Solar PV modules and mounting structures would also not be located within proximity of watercourses within the Site. Mounting structures would generally be driven or screwed into the ground to an indicative depth of 1 m to 3 m. For further details please see **Chapter 2: The Scheme Description** of this EIA Scoping Report.	**Out**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	There are unlikely to be any direct hydromorphological impacts to these watercourses given the buffer from PV modules and mounting structures, although these are predominantly around watercourses where there would be no construction aside from the crossings for access tracks and cable routes. Groundwater across most of the site is anticipated to be generally below 3 m, with some areas along the eastern and southern boundary potentially shallower at 0.6m. However, as there are no continuous foundations within the design, the shallow, regularly spaced discrete strut PV panel foundations are considered to have a negligible impact on groundwater flow on a water body scale. Therefore, this element is screened out of further assessment.
Supporting infrastructure: inverters,	Inverters are required to convert the direct current (DC) electricity collected by the PV	**Out**: • Went from Blowell Drain to the River Don (GB104027064260);	Supporting infrastructure would not be located within close proximity (<10 m) of watercourses so there is no

Activity	Description	Screening Outcome	Justification
transformers, and switchgear.	modules into alternating current (AC), which allows the electricity generated to be exported to the National Grid. Inverters are sized to deal with the level of voltage and current, which is output from the strings of PV modules. Transformers are required to step up the voltage of the electricity generated across the Solar PV Site from low voltage produced by the inverters to medium voltage (33 kV) or high voltage (>66 kV), if required for transmission to the National Grid. Switchgears are the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switchgear is used both to protect and isolate/ de-energise equipment to allow work to be done and to clear faults downstream.	• Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	mechanism for direct hydromorphological impacts to surface water bodies. As no continuous foundations are in the design and given that groundwater is anticipated to be largely below 3 m across the majority of the Site, the shallow, regularly spaced discrete strut PV panel foundations are considered to have a negligible impact on groundwater flow. Therefore, this element is screened out of further assessment.

Activity	Description	Screening Outcome	Justification
	The Applicant is currently exploring the configuration of these supporting infrastructure. As the Scheme design develops, the configuration of the supporting infrastructure would be determined based upon environmental and technical factors. A reasonable worst-case scenario will be assessed in the ES.		
Medium voltage substations within the Solar PV Site.	Low voltage electricity from the inverters is fed into field substations (within the Solar PV Site) which consist of transformers and switchgear. Low voltage electricity passes through the transformers and exits through switchgear into 33 kV cables. Field substations are typically packaged in containers with an approximate footprint of up to 14 m x 4 m and a height of up to 3.5 m. Field substations would normally be mounted on concrete foundations, although other types of foundations may	**Out**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); and • Ea Beck from the Skell to River Don (GB104027057591). **In:** • Aire & Don Sherwood Sandstone; and(GB40401G701000) • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	Infrastructure would not be located within close proximity of watercourses, therefore there are no mechanisms for hydromorphological impacts to surface water bodies. Therefore, this element is screened out of further assessment. A Flood Risk Assessment (FRA) and Surface Water Drainage Strategy will be submitted with the DCO application which will provide for the attenuation of surface water runoff from areas of hardstanding associated with the on-site substations. In accordance with planning policy guidance, runoff from the Scheme would be attenuated to ensure no increase in surface water

Activity	Description	Screening Outcome	Justification
	be used depending on the local geology. Multiple field substations would be distributed throughout the Solar PV Site. The exact number of field substations is subject to detailed design studies. Transformers and switchgear may also be packaged in standalone units. Standalone transformers have a footprint of up to 7 m x 4 m and with a height of up to 3.5 m. Transformer cabins are typically externally finished in keeping with the prevailing surrounding environment, often with a green painted finish. Standalone switchgears would be housed in a cabin of up to 2.5 m by 6.5 m in plan and up to 3.5 m in height.		discharge rates and to provide water quality treatment of runoff water. Field substations would be mounted on concrete foundations which would increase impermeable surfaces within the Site leading to potential impacts on underlying groundwater bodies. The number of required substations and thus the extent of impact is unknown at the time of writing; therefore, this activity is screened in for further assessment.
Interconnecting cabling.	Low voltage electrical cabling is required to connect the PV modules and Battery Energy Storage System(s) to inverters and the inverters to the transformers (typically via	**In**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243);	Indicative trench depths for the on-site cabling specify that it would have a maximum depth of 1.2 m. Groundwater data available on the Geoindex website (Ref 10) indicates water table depths of around 3 m

Activity	Description	Screening Outcome	Justification
	0.6/1 kV cables). The dimension of the trenches vary depending on the number of cables or ducts they contain, but would typically be up to 0.8 m in width and 0.6 m to 0.8 m in depth. Cabling between PV modules / Battery Energy Storage System(s) and the inverters would typically be required to be above ground level (along a row of racks), fixed to the mounting structure, and then underground if required (between racks and in the inverter's input). All other cabling would be underground. Medium voltage cables (normally 33 kV) are required between the transformers/ switchgears and the field substations. These cables would be buried underground. The dimension of the trenches vary depending on the number of cables or ducts they contain but could be typically up to 1.2	• Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); and • Ea Beck from the Skell to River Don (GB104027057591). **Out:** • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	across most of the Site, with some areas where it may be shallower. However, there would likely be negligible or no impact to the groundwater body when considering the large scale of the WFD groundwater bodies, and so they are screened out at this level of assessment. Any watercourse crossings required for on-site cabling will be reviewed as part of the ES and potential impact sources and pathways will be scoped and assessed accordingly. Therefore, this activity is screened in for further assessment. Water quality impacts related to construction or decommissioning runoff or spillages that have potential to enter watercourses would be adequately mitigated by measures to be detailed in the Framework Construction Environmental Management Plan (CEMP) and Framework Decommissioning Environmental Management Plan (DEMP), which will be submitted with

Activity	Description	Screening Outcome	Justification
	m in width and up to 1.2 m in depth. Data cables (typically fibre optic) would be installed, typically alongside electrical cables in order to allow for monitoring during operation and maintenance, such as the collection of solar data from pyranometers.		the ES and secured as a Requirement of the DCO.
Battery Energy Storage Systems (BESS).	The Scheme would include the provision of BESS, with the specific design and location(s) to be explored as part of the design process. The BESS would require heating, ventilation, and cooling.	**Out**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	Infrastructure would not be located within close proximity of a watercourse, and so there are no mechanisms for hydromorphological impacts to surface water bodies. Therefore, this element is screened out of further assessment. An FRA and Surface Water Drainage Strategy will be submitted with the DCO application which will provide for the attenuation of surface water runoff from areas of hardstanding associated with the BESS (if required). In accordance with planning policy guidance, runoff from the Site would be attenuated to ensure no increase in surface water discharge rates and to

Activity	Description	Screening Outcome	Justification
			provide water quality treatment of runoff water. Transformers would be installed with suitable bunds to contain any oil spillage in case of an oil leakage event. Bunds would be designed to contain at least 110% of the volume of the oil to ensure there is some tolerance to prevent breaching of the bund. Under normal conditions any rainwater collected within the bund would be removed by use of special pump, which automatically switches off if it detects the smallest presence of oil in the water. Pumps would be linked to control and monitoring equipment to raise alarms if oil is detected. In the unlikely event of a malfunction to one of the battery arrays, there is a range of integrated controls that would activate depending on the extent and severity of the event. In case the malfunction progresses to a catastrophic fire event and so long as there are no lives under threat, the fire brigade would ensure surrounding elements and structures (intact battery

Activity	Description	Screening Outcome	Justification
			arrays nearby, other electrical equipment, trees etc.) are kept adequately wet and cool to prevent the fire from expanding any further but the battery infrastructure would be allowed to burn within the controlled area. Consultation with the emergency services would be undertaken as part of the Applicant's pre-application work. Further details regarding management of firewater will be outlined in the Framework Battery Fire Safety Fire Management Plan and Framework Surface Water Drainage Strategy submitted alongside the DCO application, as appropriate.
Grid connection substation(s).	One or more substations within the Solar PV Site or the Grid Connection Corridor Search Area would receive the electricity from the 33 kV field substations. The grid connection substation(s) would step up the voltage ready to be exported to the National Grid via underground cables. There may also be a requirement for modifications or upgrades to the Existing	**Out**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and	Infrastructure would not be located within close proximity of watercourses, therefore there are no mechanisms for hydromorphological impacts to surface water bodies and this element is screened out of further assessment. An FRA and Surface Water Drainage Strategy will be submitted with the DCO Application which will provide for the attenuation of surface water runoff from areas of hardstanding associated with substations. In accordance with

Activity	Description	Screening Outcome	Justification
	National Grid Thorpe Marsh Substation. A typical substation is up to a maximum of approximately 40 m by 100 m in plan and up to 13 m high, securely fenced with a separate control building measuring 20 m by 20 m in plan and up to 6 m high.	• Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	planning policy guidance, runoff from the Scheme would be attenuated to ensure no increase in surface water discharge rates and to provide water quality treatment of runoff water. Transformers would be installed with suitable bunds to contain any oil spillage in case of an oil-leakage event. Bunds would be designed to contain at least 110% of the volume of the oil to ensure there is some tolerance to prevent breaching of the bund. Under normal conditions any rainwater collected within the bund would be removed by use of special pump, which automatically switches off if it detects the smallest presence of oil in the water. Pumps will be linked to control and monitoring equipment to raise alarms if oil is detected. Given the above mitigation, there are considered no mechanisms for impacts to surface water bodies. It is anticipated that foundations for the substations would be above the water table, based on groundwater data available on the Geoindex

Activity	Description	Screening Outcome	Justification
			website (Ref 10). As such, there would be negligible or no impact to the groundwater bodies, particularly given the large scale of the WFD groundwater bodies.
Electricity export connection to National Grid.	The electricity generated by the Scheme is expected to be imported and exported via interface cables to the National Grid at one or more substations within the Solar PV Site or Grid Connection Corridor Search Area. Connection options are still being considered (see **Chapter 2: Scheme Description** of this EIA Scoping Report).	**In**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	The configuration, location and specific option for this element is unknown at the time of writing, however there is potential for excavations and channel crossings to generate impacts upon WFD surface water and groundwater receptors. Therefore, this element is screened in for further assessment.
Operations and maintenance hub with welfare facilities.	A permanent operations and maintenance storage area would be established within the Site, either within an existing agricultural building or in a new temporary welfare unit or agricultural building. The permanent operations and	**Out**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243);	New buildings would not be located within close proximity of watercourses, therefore there are no mechanisms for hydromorphological impacts to surface water bodies. Using existing buildings would not impart additional impacts over and above baseline conditions.

Activity	Description	Screening Outcome	Justification
	maintenance storage area is expected to be in place during both the construction and the operation of the Scheme.	• Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	Therefore, this element is screened out of further assessment.
Fencing and security measures.	A security fence would enclose the operational areas of the Solar PV Site. Fencing would be around 2 m to 3 m high, with pole mounted internal facing closed circuit television (CCTV) systems deployed around the perimeter.	**Out**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	Infrastructure would not be located within close proximity of watercourses, therefore there are no mechanisms for hydromorphological impacts to surface water bodies and this element is screened out of further assessment.
Access tracks	Access tracks would be constructed across the Solar	**In**:	Access tracks may cross watercourses within the Site boundary

Activity	Description	Screening Outcome	Justification
	PV Site. These would typically be 3.5 m to 5 m wide compacted stone tracks with 1:2 gradient slopes on either side (where required).	• Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and • Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	and provide a source of fine and other contaminants which may have impacts on WFD quality element receptors. The route of access tracks, the watercourses they may interact with, and the mode of watercourse crossing are unknown at the time of writing; therefore, this element is screened in for further assessment.
Landscaping and biodiversity enhancement.	The Scheme would involve field boundary enhancement and planting of seed mixes within the Solar PV Site. Enhancements would increase biodiversity and contribute to the Scheme's Biodiversity Net Gain (BNG) requirements.	**Out**: • Went from Blowell Drain to the River Don (GB104027064260); • Don from Mill Dyke to River Ouse (GB104027064243); • Bramwith Drain from Source to River Don (GB104027063290) Tributary of the Till (GB105030062480); • Ea Beck from the Skell to River Don (GB104027057591); • Aire & Don Sherwood Sandstone (GB40401G701000); and	Landscape and biodiversity enhancements would not impart direct impacts to WFD quality element receptors. Replacing existing impactful land use practices such as arable and cattle farming with native grasses and areas of wild flower (for example) would have indirect benefits to WFD receptors; therefore, this element is screened out of further assessment.

Activity	Description	Screening Outcome	Justification
		• Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).	

4. Summary

4.1.1 A WFD screening exercise has been undertaken following guidance provided in the PINS Advice Note 18 (Ref 2). Proposed work activities that could adversely influence water bodies have been outlined and the WFD water bodies that could potentially be affected have been identified through consideration of the 1 km Study Area (Zone of Influence).

4.1.2 The following water bodies have been identified within the Study Area and screened in for further consideration:

- Went from Blowell Drain to the River Don (GB104027064260);
- Don from Mill Dyke to River Ouse (GB104027064243);
- Bramwith Drain from Source to River Don (GB104027063290);
- Ea Beck from the Skell to River Don (GB104027057591);
- Aire & Don Sherwood Sandstone (GB40401G701000); and
- Idle Torne - PT Sandstone Nottinghamshire & Doncaster (GB40401G301500).

4.1.3 As design details for the Scheme are finalised for assessment within the ES, the following WFD assessment stages will be advanced and included within a full WFD Assessment that will accompany the DCO Application:

- **Stage 2: WFD Scoping** – For each water body identified in Stage 1 (WFD Screening), a qualitative assessment informed by readily available data and a Site walkover survey will be carried out to identify the effects and potential risks to quality elements from all relevant activities. The assessment will take into consideration embedded mitigation (measures that can reasonably be incorporated into the design of the Scheme) and good practice mitigation (measures that would occur with or without input from the WFD assessment process); and
- **Stage 3: WFD Impact Assessment** – A detailed assessment of the water bodies and activities carried forward from the WFD Screening and Scoping stages.

4.1.4 The Scheme will have to demonstrate that there is no deterioration in any of the identified baseline classifications, and no prevention of future improvement for these classifications. If this cannot be achieved, an Article 4.7 derogation would be required.

4.1.5 These stages of assessment will be undertaken in consultation with the Environment Agency and the Danvm Internal Drainage Board, to ensure an appropriate level of assessment.

5. References

Ref 1 His Majesty's Stationary Office (HMSO) (2008) The Planning Act 2008. Available at https://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf

Ref 2 The Planning Inspectorate (2017) The Water Framework Directive - Advice note eighteen: The Water Framework Directive.

Ref 3 Official Journal of the European Communities (2000) Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.

Ref 4 The Water Environment (Water Framework Directive) (England Wales) Regulations (2016).

Ref 5 His Majesty's Stationery Office (2017) Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available at: https://www.legislation.gov.uk/uksi/2017/407/pdfs/uksi_20170407 _en.pdf.

Ref 6 Environment Agency (2016) Water Framework Directive risk assessment: How to assess the risk of your activity.

Ref 7 Environment Agency Catchment Data Explorer website. Available at: https://environment.data.gov.uk/catchment-planning/.

Ref 8 The Department for Environment, Food and Rural Affairs (Defra)'s Multi Agency Geographical Information for the Countryside website. Available at: https://magic.defra.gov.uk/magicmap.aspx.

Ref 9 Historic mapping: National Library of Scotland. Available at: https://maps.nls.uk/.

Ref 10 British Geological Survey Borehole and online mapping. Available at: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/.

Ref 11 Soilscapes website. Available at: http://www.landis.org.uk/soilscapes/.

Ref 12 Bing Maps. Available at: https://www.bing.com/maps.

Ref 13 National River Flow Archive website. Available at: https://nrfa.ceh.ac.uk/.

Ref 14 Met Office website. Available at: https://www.metoffice.gov.uk/.

Ref 15 Environment Agency Fish and Ecology Data Explorer. Available at: https://environment.data.gov.uk/ecology/explorer/.

Ref 16 Environment Agency Water Quality Archive. Available at: https://environment.data.gov.uk/water-quality/view/landing.

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Appendix D: Long List of Major Accidents and Disasters

Table D1: Long List of Major Accidents and Disasters

	Major Accident or Disaster	Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
1	Geological disasters				
1.1	Landslides	No	The risk of landslides would be considered as part of the geotechnical design, ensuring the risk is designed out in terms of the vulnerability of the Scheme to these types of events. However, given the flat nature of the land this risk is considered low. The Scheme is not anticipated to increase the risk of landslip on the Site or elsewhere as it is not substantially heavy, and the Site is relatively flat. The Scheme would not significantly change the erosion potential of the soil or stability of the land.	N/A	N/A
1.2	Earthquakes	No	The Scheme is not located in a geologically active area and, as such, earthquakes are not considered to be a real risk or serious possibility.	N/A	N/A
1.3	Sinkholes	No	The risk of sinkholes would be considered as part of the geotechnical design and the construction method. If needed, the Scheme design would be amended to ensure risks are designed out in terms of the vulnerability of the Scheme to these types of events and the potential for the Scheme to increase the risk of such an event happening.	N/A	N/A
2	Hydrological disasters				

Major Accident or Disaster		Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
2.1	Floods	Yes	Parts of the Site are located within Flood Zones 2 and 3. Both the vulnerability of the Scheme to flooding, and its potential to exacerbate flooding, will be covered in the FRA and reported in the ES. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	Property and people in areas of increased flood risk.	Chapter 9: Water Environment
2.2	Limnic eruptions	No	There are no lakes located within 3 km of the Scheme.	N/A	N/A
2.3	Tsunami/Storm surge	No		The Scheme is not situated in a coastal location.	N/A N/A
3	Meteorological disasters				
3.1	Blizzards	No	The Scheme is not considered to be more vulnerable to blizzards than any other development. It would be designed to cope with the UK climate and extreme weather events. Blizzards should not affect the integrity of the Scheme.	N/A	N/A
3.2	Cyclonic storms	No	Although storms occur in the UK, their destructive force tends to be much less than in other parts of the world and the Scheme is not particularly vulnerable to any potential effects. It would be designed for the British climate and weather extremes.	N/A	N/A

Major Accident or Disaster	Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
3.3 Droughts	No	Droughts are only considered as a disaster due to water shortages for essential services and where there are indirect impacts on food production, loss of soils etc. The Scheme is not considered to be vulnerable to drought.	N/A	N/A
3.4 Thunderstorms	No	As the Scheme includes metal components, there is a risk of lightning strikes. However, these risks would be removed or reduced through inbuilt control systems and, therefore, can be scoped out.	N/A	N/A
3.5 Hailstorms	No	The Scheme is not considered to be more vulnerable than any other developments with regard to hailstorms. Solar panels are designed to withstand hail and, therefore, it is considered that hailstorms can be scoped out of the assessment.	N/A	N/A
3.6 Heat waves	No	While impacts may occur due to projected temperature increases resulting from climate change, these are not expected to have a significant impact on the Scheme. The BESS would include cooling systems designed to regulate temperatures to within safe conditions.	N/A	N/A
3.7 Tornadoes	No	Although there are tornadoes in the UK, their destructive force tends to be much less than in other parts of the world and the Scheme is not particularly vulnerable to any potential effects.	N/A	N/A

Major Accident or Disaster	Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
3.8 Fire	Yes	There may be potential for fire due to the battery storage element of the Scheme. However, the BESS would include cooling systems designed to regulate temperatures to within safe conditions which minimises the risk of fire. In addition, the Scheme design would include adequate separation between battery banks to ensure an isolated fire would not become widespread and lead to a major incident. Fire detection and suppression features would be installed to detect (e.g. multispectral infrared flame detectors) and suppress (e.g. water base suppression systems) fires to minimise this risk. A Framework Battery Safety Fire Management Plan will be prepared for the Scheme and submitted alongside the DCO application. The development of the Framework Battery Safety Fire Management Plan will be considered in the iterative design of the Scheme ensuring that design requirements to ensure fire safety (such as ensuring adequate provision of land for water storage) and management of any firewater runoff are captured.	Local residents, habitats, and species.	Chapter 2: The Scheme, Framework Battery Safety Fire Management Plan.
3.9 Air Quality Events	No	There are no Air Quality Management Areas (AQMAs) within 5 km of the Site. Due to the distance of the AQMAs from the Site, they are not considered likely to be affected by the Scheme.	N/A	Chapter 14: Other Environmental Topics

Major Accident or Disaster		Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
			Although there will be emissions during the construction and decommissioning of the Scheme, it is considered that these can be managed through the implementation of a Construction Environmental Management Plan (CEMP) and Decommissioning Environmental Management Plan (DEMP). Good practice measures will be set out in a Framework CEMP and Framework DEMP appended to the ES.		
4	Transport				
4.1	Road Accidents	Yes	The risk posed by spillages from hazardous loads due to a road traffic accident during Scheme construction or decommissioning will be considered in the Water Environment chapter of the ES. The risk posed by construction and decommissioning traffic on the local road network will be considered in the Transport and Access chapter of the ES. No significant effects are predicted during operation due to the low vehicle numbers that would be required. The potential for glint and glare to affect road users will be considered within a technical appendix to the ES and summarised under the Other Environmental Topics ES chapter if any risks are identified.	Road users and the aquatic environment	Chapter 9: Water Environment Chapter 13: Transport and Access Chapter 14: Other Environmental Topics

Major Accident or Disaster		Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
			Mitigation will be considered and, where necessary, incorporated into the Scheme design.		
4.2	Rail Accidents	Yes	The Site is located approximately 700 m east of the East Coast Main Line from Shaftholme Junction to Temple Hirst Junction. The potential for glint and glare to affect trains will be considered within a technical appendix to the ES and summarised in the Other Environmental Topics ES chapter if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	Rail users	Chapter 14: Other Environmental Topics
4.3	Aircraft Disasters	Yes	The closest airfield to the Scheme is Great Heck Airfield, located approximately 3.1 km north of the Scheme. The potential for glint and glare to affect aircraft will be considered within a technical appendix to the ES and summarised in the Other Environmental Topics ES chapter if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	Aircraft users	Chapter 14: Other Environmental Topics
5	Engineering Accidents/ Failures				
5.1	Bridge Failure	No	No bridges are to be used or constructed as part of Scheme.	N/A	N/A
5.2	Tunnel Failure or Fire	No	There are no tunnels located in proximity to the Scheme.	N/A	N/A

Major Accident or Disaster		Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
5.3	Reservoir (Dam) Failure	Yes	Parts of the Site are at risk from flooding from reservoirs. This will be covered within the FRA and reported in the ES, both in terms of the risks to the Scheme and increased risk to third parties that could be caused by the Scheme. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	Property and people in areas of increased flood risk.	Chapter 9: Water Environment
5.4	Flood Defence Failure	Yes	Parts of the site may be at risk of flooding from flood defence failure. This will be covered in the FRA and reported in ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme. Mitigation will be considered and, where necessary, incorporated into the Scheme design.	Property and people in areas of increased flood risk.	Chapter 9: Water Environment
5.5	Mast and Tower Collapse	No	There are no masts or towers located in close proximity to the Scheme.	N/A	N/A
5.6	Building failure or fire	No	While there are buildings in proximity to the Scheme, these are not considered close enough for them to be affected by building failure or fire.	N/A	N/A
5.7	Utilities failure (gas, electricity, water, sewage, oil, communications)	Yes	The Scheme has the potential to affect existing utility infrastructure above and below ground. To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. Consultation with relevant utilities providers is a routine part of solar development and consultees	Employees and local residents	Chapter 14: Other Environmental Topics

Major Accident or Disaster		Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
			will include water, gas and electricity utilities providers and telecommunications providers as appropriate. Information obtained from consultation will be used to inform the Scheme layout and design.		
6	Industrial Accidents				
6.1	Defence industry	No	There is no defence manufacturing in proximity to the Scheme.	N/A	N/A
6.2	Energy Industry (fossil fuel)	No	There is no energy industry (fossil fuel) in proximity to the Scheme. The closest power station, Drax, located approximately 12 km north east of the Site, is a biomass power plant capable of co-firing petroleum coke.	N/A	N/A
6.3	Nuclear Power	No	There are no nuclear power stations located in the vicinity of the Scheme.	N/A	N/A
6.4	Oil and gas refinery/ storage	No	There are no oil and gas refinery or storage facilities in the vicinity of the Scheme.	N/A	N/A
6.5	Food Industry	No	While the Scheme is located within existing agricultural land, the area currently used for food production is limited and there is not expected to be an increased risk to the food industry as a result of the Scheme.	N/A	N/A
6.6	Chemical Industry	No	There is no chemical industry in the vicinity of the Scheme.	N/A	N/A

Major Accident or Disaster		Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
6.7	Manufacturing Industry	No	There is no manufacturing industry in the vicinity of the Scheme.	N/A	N/A
6.8	Mining/ Extractive Industry	Yes	There is potential for mining / extractive industry activities to have occurred in the vicinity of the Grid Connection Corridor Search Area. This may have led to unstable ground conditions, however, this will be considered as part of the geotechnical design to ensure the risk is designed out.	Employees and local residents	Chapter 14: Other Environmental Topics
7	Terrorism/Crime/Civil unrest	No	It is considered the Scheme is unlikely to be a target for these types of incidents due to its rural location and low number of exposed targets.	N/A	N/A
8	War	No	The Scheme is not considered to be more vulnerable to war than any other development.	N/A	N/A
9	Disease				
9.1	Human disease	No	The Scheme is not considered to be more vulnerable to human disease than any other development.	N/A	N/A
9.2	Animal disease	No	The Scheme is not considered to be more vulnerable to animal disease than any other development.	N/A	N/A
9.3	Plant disease	Yes	New planting may be susceptible to biosecurity issues, such as the increased prevalence of pests and diseases due to climate change. However, the planting design will take account of	Habitats and species	Chapter 8: Ecology Chapter 10: Landscape and Visual Amenity

Major Accident or Disaster	Relevant for Long List?	Why? (Note if risk to the project, or project exacerbates risk)	Potential Receptors	Covered already in proposed ES or DCO? If so, where?
		biosecurity risks through a wider mix of species including some non-natives.		Framework Biodiversity and Landscape Management Plan

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