Gate Burton Energy Park

Preliminary Environmental Information Report

Volume 3, Appendix 1-A: EIA Scoping Report

June 2022

Gate Burton Energy Park Limited

Delivering a better world

Prepared for:

Gate Burton Energy Park Limited

Prepared by:

AECOM Limited

AECOM

Gate Burton Energy Park

Environmental Impact Assessment Scoping Report

November 2021

Gate Burton Energy Park Limited

Delivering a better world

Quality Information

Prepared by	Checked by	Verified by	Approved by
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
00	October 2021	Draft for approval by Client			
01	November 2021	Final Version			

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1. Introduction

1.1 Background

1.1.1 Gate Burton Energy Park Limited (hereafter referred to as 'the Applicant') has commissioned this Environmental Impact Assessment (EIA) Scoping Report for the Gate Burton Energy Park (hereafter referred to as the 'Scheme'). The Scheme comprises the installation of solar photovoltaic (PV) generating panels and on-site energy storage facilities across a proposed site in Lincolnshire (hereafter referred to as the 'Site') together with grid connection infrastructure (hereafter referred to as the 'Grid Connection Corridor Options'). The Scheme would allow for the generation, storage and export of up to 500 megawatts (MW) electrical generation capacity.

1.1.2 The Site is located approximately 4 kilometres (km) south of Gainsborough and is denoted by the solid red line, and the potential grid connection corridor options are denoted by the red dashed line on Figure 1-1 and Figure 1-2. The Site is described in *Chapter 2: The Scheme* of this Scoping Report.

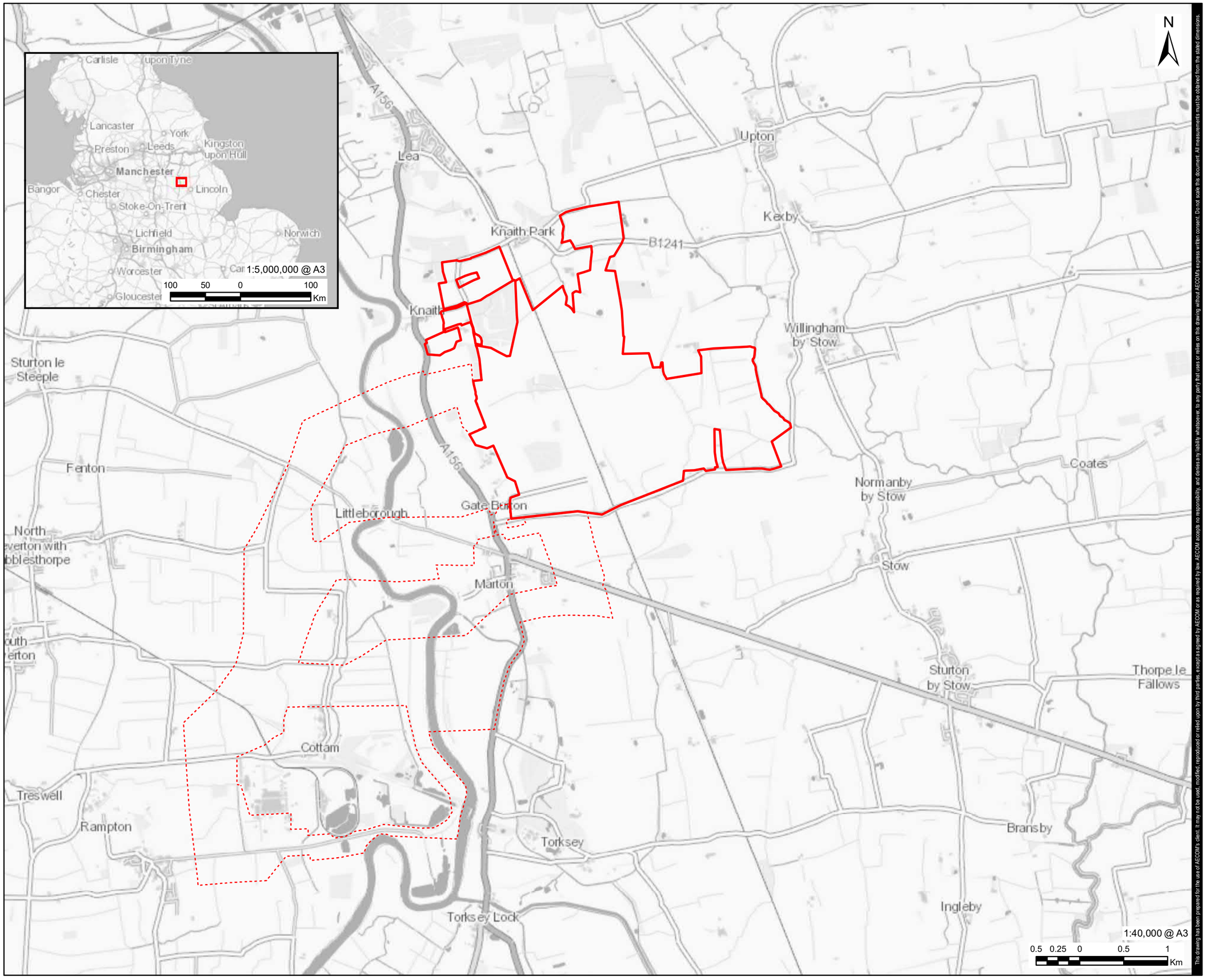
1.1.3 It is important to note that at this stage, Figure 1-2 shows the expected maximum extent of land that would be included within the application for a development consent order (DCO), which includes all land being considered for the purposes of the Scheme and provides a 'plan sufficient to identify the land' for the purposes of this Scoping Report. It should also be noted, Figure 1-2 represents the likely maximum extent of the Site boundary based on all the options for Scheme elements that have been, and will be, the subject of consultation.

1.1.4 Environmental constraints within the vicinity of the Scheme are illustrated on Figure 1-3a and Figure 1-3b.

1.1.5 This 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. 1).

Figure 1-1: Scheme Location

Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-12



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LEGEND

- Solar PV Site
- Grid Connection Corridor Options

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

Site Location

FIGURE NUMBER

Figure 1-1

Filename: F:\Projects\Gate Burton Energy Park\02_Maps\SCH_Figure1_1_SiteLocation.mxd

Figure 1-2: Site Boundary

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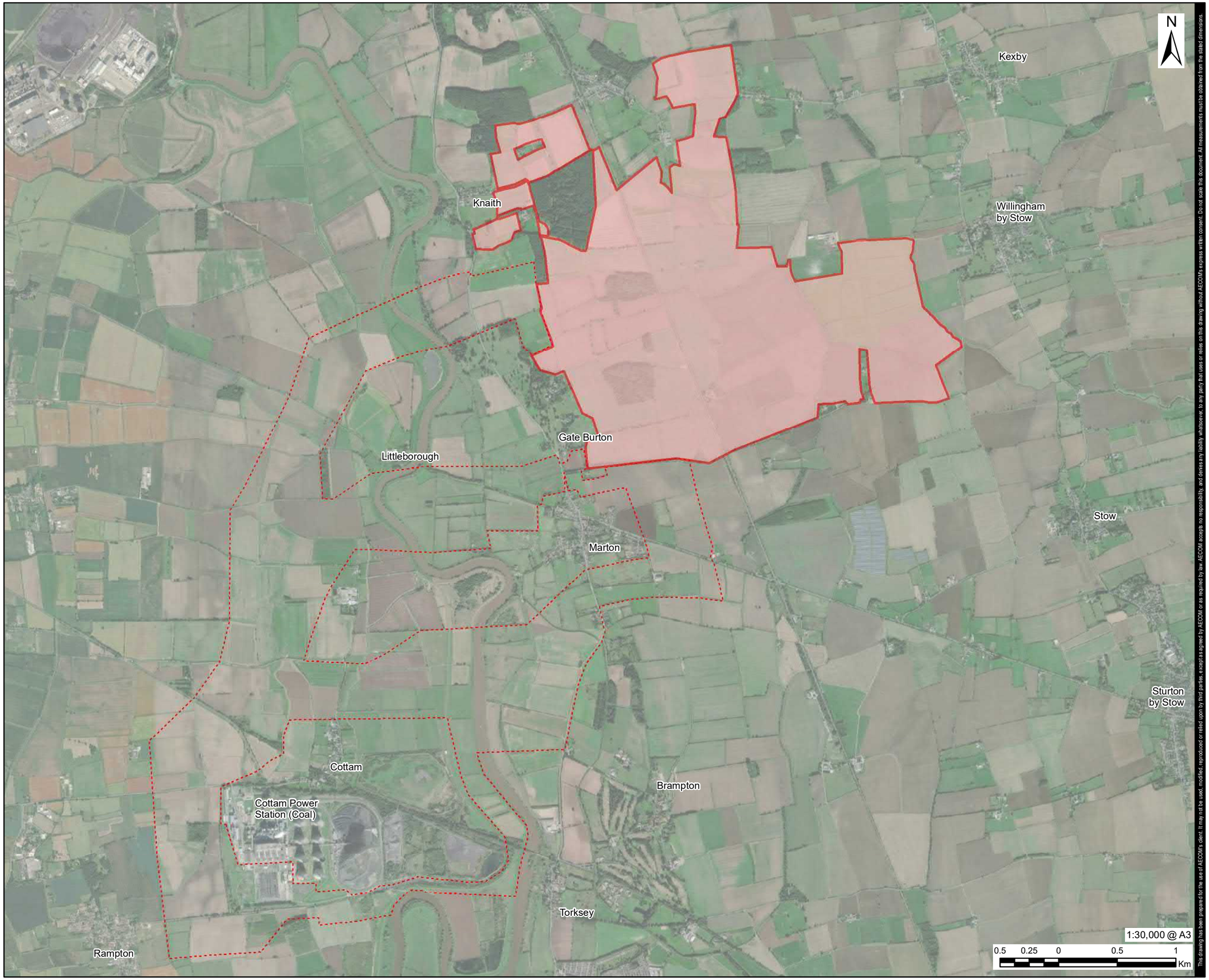

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LEGEND

Solar PV Site

Grid Connection Corridor Options

NOTES

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

ISSUE PURPOSE

EIA Scoping Report

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60664324

FIGURE TITLE

Site Boundary

FIGURE NUMBER

Figure 1-2

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Figure 1-3a and 1-3b: Constraints Plan

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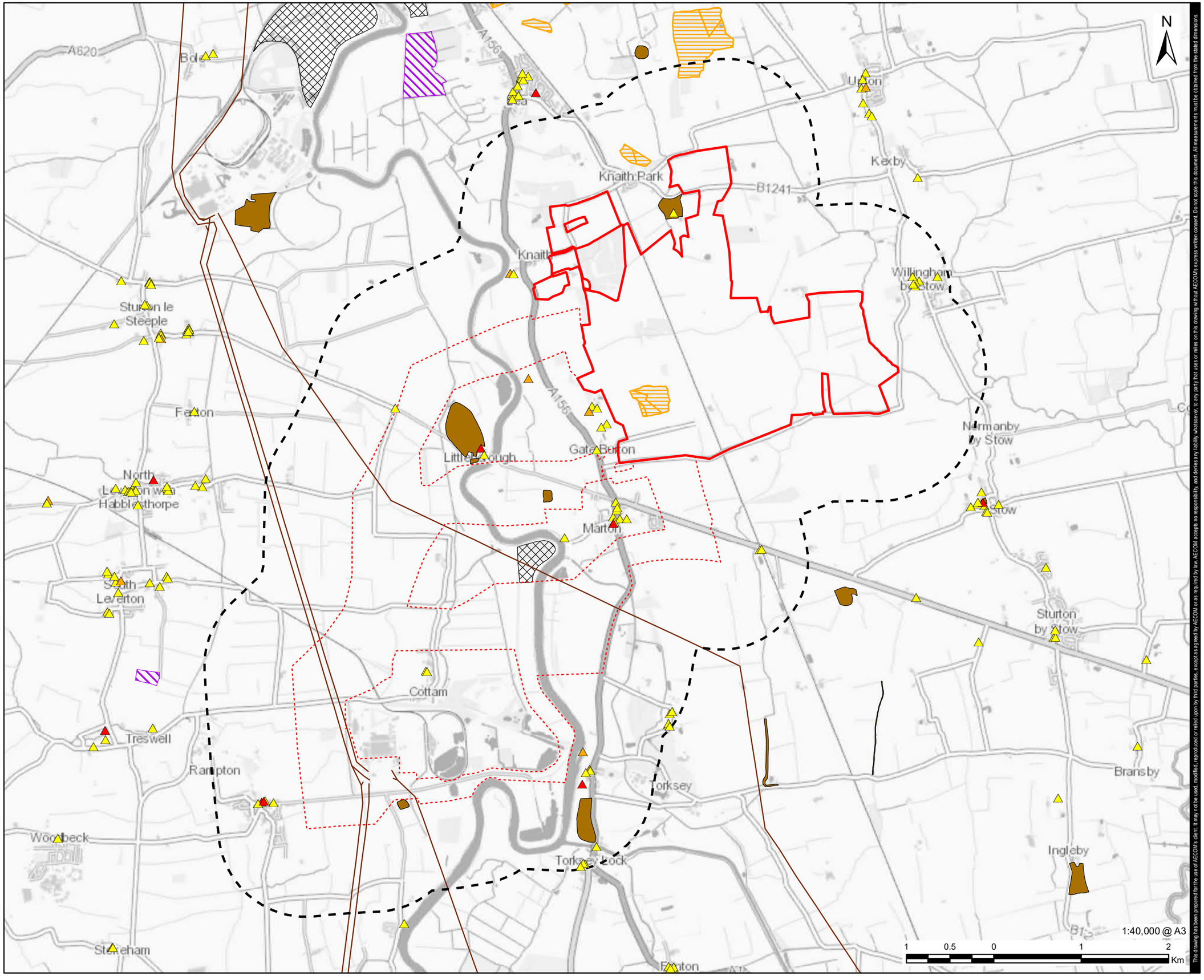

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LEGEND

- Solar PV Site
- Grid Connection Corridor Options
- 1km Buffer
- Overhead Line
- Ancient Woodland
- Landfill Site
- Scheduled Monument
- Site of Special Scientific Interest (SSSI)

Listed Building

- Grade I
- Grade II*
- Grade II

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

Environmental Constraints

FIGURE NUMBER

Figure 1-3a

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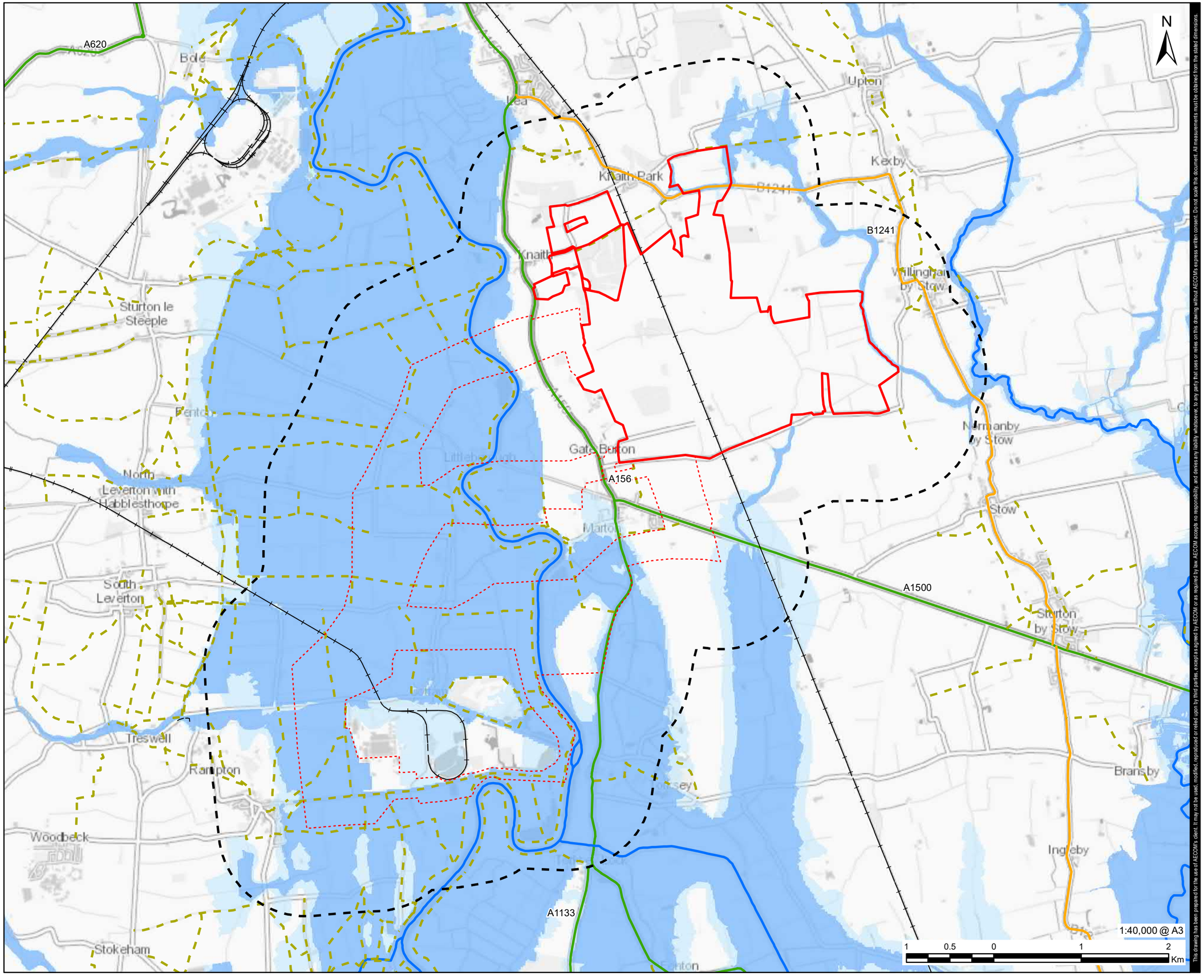

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LEGEND

- Solar PV Site
- Grid Connection Corridor Options
- 1km Buffer
- A Road
- B Road
- Main River
- Public Right of Way
- Railway
- Flood Zone 2
- Flood Zone 3

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

Constraints Plan

FIGURE NUMBER

Figure 1-3b

1.2 Legislative Context and Need for Environmental Impact Assessment

1.2.1 The Scheme is defined as a Nationally Significant Infrastructure Project (NSIP) under Sections 14(1)(a) and 15(2) of the Planning Act 2008 (Ref. 2) as an onshore generating station in England, exceeding 50MW. At this stage, the grid connection infrastructure (as part of the Grid Connection Corridor Options) could comprise of either underground cables or overhead lines. If the latter option is chosen, then the overhead lines will also constitute an NSIP under Sections 14(1)(b) and 16 of the Planning Act 2008.

1.2.2 The requirement to undertake an EIA for NSIP developments is transposed into UK law through the EIA Regulations (Ref. 1). The EIA Regulations specify which developments are required to undergo EIA and schemes relevant to the NSIP planning process are listed under either 'Schedule 1' or 'Schedule 2'. 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 this judgement must be made are set out in Schedule 3.

1.2.3 The Scheme is a 'Schedule 2' development under:

- Paragraph 3(a) of Schedule 2 of the EIA Regulations (Ref. 1) as it constitutes 'Industrial installations for the production of electricity, steam and hot water'; and
- Paragraph 3(b) of Schedule 2 of the EIA Regulations (Ref. 1) as it may also constitute "industrial installations for carrying gas, steam and hot water; transmission of electrical energy by overhead cables"

1.2.4 It is considered that due to the Scheme's nature, size or location, it 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. 1).

1.2.5 Following the completion of the surveys, assessments, and consultation processes outlined in this Scoping Report, an application for a DCO will be made to the Secretary of State (SoS) for determination in accordance with the Planning Act 2008 (Ref. 2). 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. 1).

1.2.6 The Localism Act 2011 (Ref. 4) appointed the Planning Inspectorate as the agency responsible for operating the DCO process for NSIPs. The SoS will appoint an Examining Authority from the Planning Inspectorate, who will examine the application for the Scheme and make a recommendation to the SoS, who will make the decision on whether to grant or to refuse the DCO.

1.2.7 In accordance with Section 104(2) of the Planning Act 2008 (Ref. 2), 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. Solar photovoltaic (PV) and battery storage are not currently covered by an NPS and therefore those elements of the application will be determined under Section 105 of the Planning Act 2008 (Ref. 2). Should the DCO application include overhead lines that meet the tests in Section 16 of the Planning Act 2008, then that element of the application would be determined under Section 104, as overhead lines are covered by NPS EN-5 (Electricity Networks Infrastructure) (Ref. 5).

1.2.8 At the time of writing the Department for Business, Energy and Industrial Strategy (BEIS) is currently consulting on a suite of draft national policy statements for new energy infrastructure which includes a revised EN-3 which has specific policies relating to Solar PV and battery storage, however these remain in draft and are not yet adopted policy. It is considered likely that the revised NPS documents will be adopted prior to compilation of any subsequent ES. In lieu of an adopted technology specific NPS for Solar PV and battery storage, this Scoping Report has been prepared taking account of the following NPS, which is important and relevant to the Scheme: Overarching NPS for Energy (EN-1) (Ref. 6). The

EIA approach adopted takes account of both NPS EN-1 and NPS EN-5. A summary of the relevant considerations for each technical assessment is provided for each environmental topic (*Chapters 6 to 14* of this Scoping Report).

1.2.9 The SoS will also consider other important and relevant matters, including national and local planning policy. For example, the revised National Planning Policy Framework (NPPF) published in July 2021 (Ref. 7) is considered relevant national planning policy.

1.2.10 Whilst the NPSs are the primary consideration in deciding applications for NSIPs, the local Development Plan is also an important and relevant matter. The Local Development Plan for the land in which the Scheme is located includes the following:

- Central Lincolnshire Local Plan 2012-2036, adopted 24 April 2017 (Ref. 52);
- Lincolnshire Minerals and Waste Local Plan including the Core Strategy & Development Management Policies Plan adopted in June 2006 and the Site Locations Plan adopted in December 2017 (Ref. 8);
- Treswell and Cottam Neighbourhood Plan, made February 2019 (Ref. 9);
- Rampton and Woodbeck Neighbourhood Plan, made May 2021 (Ref. 10);
- Bassetlaw District Council Core Strategy and Development Management Policies DPD, adopted 22 December 2011 (Ref. 11);
- Nottinghamshire Minerals Local Plan, adopted March 2021 (Ref. 12);
- Nottinghamshire Waste Local Plan, adopted 2002 (Ref. 13); and
- Nottinghamshire Waste Core Strategy, adopted 2013 (Ref. 14).

1.2.11 It should be noted that Bassetlaw District Council are currently consulting upon a new Local Plan 2020-2037 (Publication version). Based on the current Local Development Scheme it is expected that it will be adopted by the end of 2022. Accordingly, upon adoption that Local Plan would replace the current Core Strategy.

1.2.12 It should also be noted that work on a review of the Central Lincolnshire Local Plan has commenced. Based on the most recent details on the preparation timetable it is likely that the Local Plan will be adopted at some point after the planned submission and examination of the Scheme.

1.2.13 The purpose of considering the NPSs and other relevant national and local planning policy referred to above at the scoping stage of the EIA is twofold:

i. To identify policy that could influence the sensitivity of receptors (and therefore the significance of effects) and any requirements for mitigation; and

ii. 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.

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

1.3 Purpose and Structure of the Scoping Report

1.3.1 The EIA Regulations (Ref. 1) set out the requirements for an applicant who proposes to request a scoping opinion from the SoS. Regulation 10(3) of the EIA Regulations (Ref. 1) requires that a Scoping Report includes:

- 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.

1.3.2 The purpose of this Scoping Report is therefore to:

- Provide a summary of the Scheme;
- Set out the proposed scope of work and methods to be applied in carrying out the EIA; and
- Set out the proposed structure and coverage of the ES to be submitted with the DCO application.

1.3.3 This Scoping Report is set out in accordance with guidance provided by the Planning Inspectorate's Advice Note 7 'Screening, Scoping and Preliminary Environmental information' (Ref. 15).

1.3.4 Table 1-1 lists the suggested requirements identified in Advice Note 7 (Ref. 15) and details where they are presented in this Scoping Report. The requirements of the EIA Regulations (Ref. 1) regarding the content of the ES are also covered within the contents tabulated below.

Table 1-1: Contents for the Scoping Report based on Advice Note 7 (Ref. 15)

Suggested Scoping Report Contents	*Location in this Scoping Report*
Transboundary Screening Matrix	**Appendix A**
The Proposed Development An explanation of the approach to addressing uncertainty where it remains in relation to elements of the Proposed Development e.g.: design parameters	Chapter 2 (The Scheme)
Referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development	Figure 1-1 (Scheme Location) Figure 1-2 (Site Boundary) Figure 2-1 (Environmental Constraints)
EIA Approach and Topic Areas	
An outline of the reasonable alternatives considered and the reasons for selecting the preferred option;	Chapter 3 (Alternatives Considered)
A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues;	Chapter 16 (Summary and Conclusions)
A detailed description of the aspects and matters proposed to be scoped out of further assessment with justification provided;	Chapters 6 to 14 (Technical Topics)
Results of desktop and baseline studies where available and where relevant to the decision to scope in or out aspects or matters	Chapters 6 to 14 (Technical Topics)
Aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect e.g.: criteria for determining sensitivity and magnitude;	Chapters 6 to 14 (Technical Topics)
Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects;	Chapters 6 to 14 (Technical Topics)
Information Sources	
References to any guidance and best practice to be relied upon;	Chapters 6 to 14 (Technical Topics)
Evidence of agreements reached with consultation bodies (for example the statutory nature conservation bodies or local authorities); and	Chapters 6 to 14 (Technical Topics)
An outline of the structure of the proposed ES.	Chapter 16 (Structure of the ES)

1.3.5 A glossary and abbreviation list are presented at the back of this Scoping Report.

1.4 IEMA Quality Mark

1.4.1 AECOM is an IEMA Registered Impact Assessor and also holds the IEMA EIA 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 or qualifications of the experts who prepared the ES.

2. The Scheme

2.1 Description of the Scheme

Introduction

2.1.1 Solar PV and energy storage technologies are rapidly evolving. As a result, the parameters of the DCO will maintain flexibility to allow the latest technology to be utilised at the time of construction. To inform the scope of the assessment studies, this Scheme description provides information on:

- Solar and battery infrastructure, grid connection, and other associated and ancillary development equipment needed to operate and maintain the Scheme;
- Construction programme and activities;
- Operational and maintenance activities; and
- Decommissioning.

Overview of Solar and Battery Storage Infrastructure

2.1.2 The principal infrastructure will be as follows:

- Solar PV modules;
- PV module mounting structures;
- Inverters;
- Transformers;
- High voltage (HV) switchgear and control equipment (housed inside a building);
- Onsite cabling;
- An energy storage system;
- Onsite electrical compounds comprising of substations and control buildings;
- A circa 6km electrical connection route to connect with the National Grid at Cottam Substation;
- An off-site electrical compound comprising of a substation and control building;
- A spare parts storage building or enclosure;
- Fencing and security measures;
- Access tracks; and
- Landscaping and biodiversity enhancement.

2.1.3 During the construction phase, one or more temporary construction compound(s) will be required as well as temporary roadways to facilitate access to all land within the Site.

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

Solar PV infrastructure

Solar PV modules

2.1.5 Solar PV modules convert sunlight into electrical current (as direct current, DC). Individual panels are typically up to 2.5m long and up to 1.5m wide and typically consist of a series of PV cells beneath a layer of toughened glass (as shown in Photos 1-1 and 1-2). Other PV technologies are developing rapidly and

may be available at the time of construction. The module frame is typically built from anodised aluminium or steel.

2.1.6 Each module would have a DC generating capacity of between 400 and 800 watts (W), or more depending on advances in technology at the time of construction (the latest technology under development is up to 800 W). The modules are fixed to a mounting structure in groups known as 'strings'. Various factors will help to inform the number and arrangement of modules in each string, and it is likely some flexibility will be required to accommodate future technology developments.

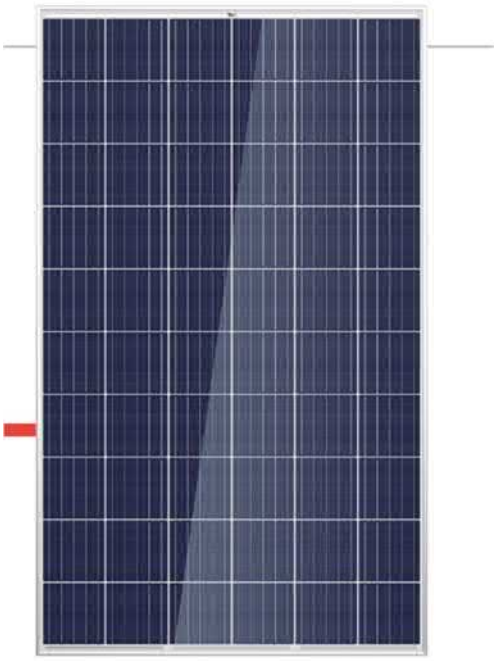


Photo 1-1: 60 cells solar panel

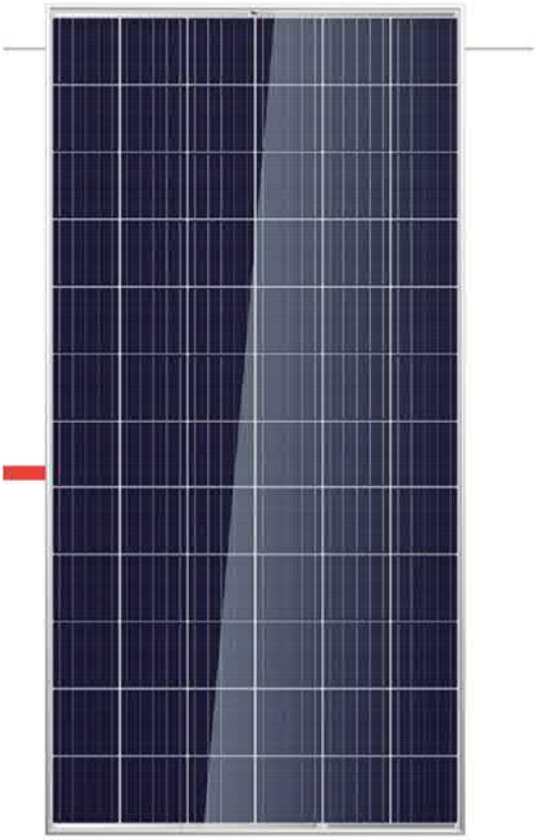


Photo 1-2: 72 cells solar panel

2.1.7 Two options for fixed panel orientation are being considered at this stage. The first option is for the modules to face to the south, which is commonly seen on existing UK solar farms. With this configuration, the modules would be angled towards the south at a slope of 10 to 45 degrees from horizontal (see Photo 1-3). The second option is for modules to be oriented towards the east and west, which is less commonly seen on existing UK solar farms. With this configuration, the modules would be angled towards the east and west at a slope of 5 to 20 degrees from horizontal (see Photo 1-4). Further to the fixed panel options, there is also the option to install the panels on tracking platforms. These may comprise 1-axis (which tracks the movement of the sun from east to west) or 2-axis trackers (which can also change the angle of the face of the panel to match the height of the sun as it moves east to west).

2.1.8 Where relevant, the EIA scoping study will consider the panel orientation which represents the worst-case scenario in terms of identifying potential environmental effects. For example, an east-west orientation will result in increased Heavy Goods Vehicle (HGV) traffic movements since more panels are required. As the Scheme design develops, the panel orientation (if fixed) or the most favourable tracking technology will be determined based upon economic, environmental and technical factors. A reasonable worst-case scenario will be assessed and presented in the ES.

Module Mounting Structures

2.1.9 Each string of modules will be mounted on a metal rack, known as a frame. In all fixed panel options the frames are usually supported by galvanized steel poles typically driven 1m - 2m into the ground. This is the most common solution on existing UK solar farms. Solar trackers use more proprietary ground-mounting methods that may vary from solutions very similar to fixed orientation arrays to more complex foundation designs that may involve elaborate foundations.

2.1.10 For a south facing configuration, between each row of frames, the separation distance will range from approximately 2m to 15m, dependent upon angle and length of slope, to allow for appropriate maintenance and to minimise inter-row shading.

2.1.11 For an east-west configuration, between each row of frames, the separation distance will be approximately 2.5m to 8m. The 'ridge' of each pair of strings could also include a separation distance of approximately 0.3m to 1m.

2.1.12 The panel modules across the Site are likely to be mounted on structures with a clearance above ground level (agl) of up to 0.9m, and an upper height of up to 4m agl. These dimensions are indicative at this stage as the final elevations of the racks will be influenced by various design factors such as local topography, flood risk and configuration.

Photo 1-3: Solar panels with south facing configuration

Photo 1-4: Solar panels with east-west facing configuration (*image reproduced courtesy of Huawei*)

Supporting Infrastructure (Inverter, transformer and switchgear)

2.1.13 The supporting infrastructure comprises inverters, transformers, and switchgear, which will be mounted on concrete foundations. This infrastructure is commonly termed 'solar stations' and fulfil a number of functions, namely converting the direct current to alternating current and stepping up the voltage so it can be exported to the National Grid, as well as containing isolators and monitoring equipment.

2.1.14 Two options are under consideration for the solar stations, as described below. As the Scheme design develops, the configuration of the solar station will be determined based upon environmental and technical factors. A reasonable worst-case scenario will be assessed and presented in the ES.

Option A: Independent outdoor equipment

2.1.15 As shown in Photo 1-5, with this option, the inverter, transformer, and switchgear are placed outdoors and are independent of each other. The approximate footprint for this option is up to 80 square meters and up to 3.5m in height.

Photo 1-5: Option A – outdoor structure

Option B: Indoor equipment in container

2.1.16 As shown in Photos 1-6 and 1-7, with this option, all equipment (inverter, transformer and switchgear) are included within a 40 foot ISO High Cube Container with an approximate footprint of up to 80 square

meters (i.e. the equipment is enclosed 'indoors') and a maximum height of up to 3.5m. The container would be painted in a colour in keeping with the prevailing surrounding environment, often with a green painted finish. It would be delivered within the maximum dimensions provided for the outdoor solution.

Photo 1-6: Option B – indoor equipment exterior (*image reproduced courtesy of Power Electronics*)

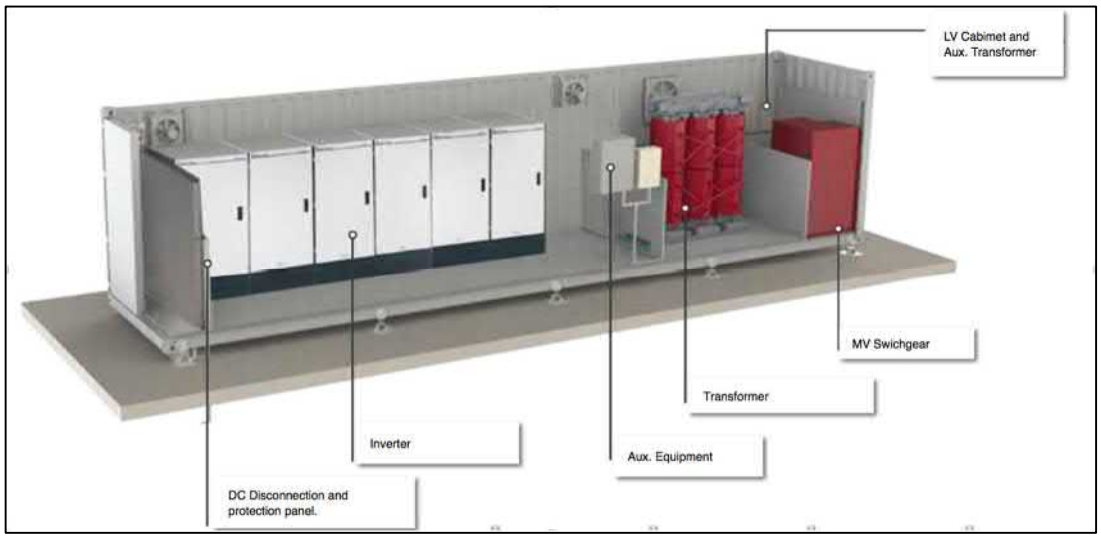


Photo 1-7: Option B – indoor equipment interior (*image reproduced courtesy of Power Electronics*)

2.1.17 The following sections describe inverters, transformers and switchgear in more detail.

Inverters

2.1.18 It is currently expected that either string or central inverters would be used. One single string inverter unit could be utilised, for example, for every 10 to 12 strings. String inverters are small enough to be mounted underneath the modules, as shown on Photo 1-8.

Photo 1-8: Typical string inverter (image reproduced courtesy of Huawei)

2.1.19 Central inverters are much larger because there are fewer of them, and require their own electrical cabinet enclosures, as shown as part of the solar station in Photo 1-5. These are usually located at regular intervals amongst the PV arrays, and they occupy an area that depends on such intervals. Typically, this area is 6m x 3m and can be up to 3.5m in height.

Photo 1-9: Typical outdoor centralised inverter (as per Supporting Infrastructure Option A)

Transformers

2.1.20 Transformers are required to step up the voltage of the electricity generated across the Site before it reaches the substation. Transformer cabins are therefore likely to be located across the Site at regular intervals. As shown in Photos 1-10 to 1-12, the transformers would be outdoor or indoor.

2.1.21 Photo 1-10 shows an example of an outdoor transformer. The footprint would be up to 4m x 3.5m and 3.5m in height.

Photo 1-10: Typical outdoor transformer

2.1.22 Indoor transformers can be installed in a cabin, jointly with indoor switchgear, typically with a footprint of 7m x 4m and with a height of 3.5m, as shown in Photo 1-11. Transformer cabins are typically externally finished in keeping with the prevailing surrounding environment, often with a green painted finish. Alternatively, as described above and shown on Photos 1-6 and 1-7, transformers can be installed in a high cube container together with an inverter and switchgear as part of an indoor solar station. As the Scheme design develops, the likely configuration of equipment will be determined based upon environmental and technical factors. A reasonable worst-case scenario will be assessed and presented in the ES.

Photo 1-11: Typical transformer cabin (including switchgear) (alternative option for Solar Station Option A) (*Image reproduced courtesy of Selma*)

Switchgear

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

2.1.24 Switchgear a typical footprint of 3m x 3.5m and up to 3.5m in height (as shown on Photo 1-12). As described in Paragraph 2.1.31 and shown on Photo 1-11, switchgear can be also located in a cabin together with the transformer and inverter. As the Scheme design develops, the likely configuration of

equipment will be determined based upon environmental and technical factors. A reasonable worst-case scenario will be assessed and presented in the ES.

Photo 1-12: Typical switchgear (as per Supporting Infrastructure Option A)

Energy Storage Facility

2.1.25 The Scheme will include an associated battery energy storage system. The battery energy storage system is designed to provide peak generation and grid balancing services to the electricity grid. It will do this primarily by allowing excess electricity generated from the solar PV panels to be stored in batteries and dispatched when required. It may also import surplus energy from the electricity grid.

2.1.26 There are a number of different designs for the battery energy storage system 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 EIA.

2.1.27 Batteries will either be in individual enclosures or housed within a larger building or buildings. The precise number of individual battery storage enclosures will depend upon the level of power capacity and duration of energy storage that the Scheme will require; investigations are ongoing to determine this. There needs to be an element of flexibility in this element as both the technology and business models are evolving, as is relevant policy which may affect the business case and support for the systems.

2.1.28 The location of the battery energy storage system, transformers, and dedicated switchgear will be determined in part by whether the battery energy storage system is AC-coupled or DC-coupled. If the system is AC-coupled they will be located together in one or more 'centralised' areas. If the systems are DC-coupled they will be spread around the Site, located alongside the centralised inverters and utilise some of the solar inverter infrastructure.

2.1.29 As mentioned above, the battery storage system provides flexibility and grid reliability. The total size and distribution of the battery stations across the Site will depend largely on the existing grid conditions at the time of construction design. The battery storage system would comprise DC/DC converters to control the charge of the batteries from the PV energy output and/or AC/DC inverters to control their charge using energy drawn from the grid. Depending on the same parameters, the battery storage system may be installed in one or two large battery compound areas with a footprint of up to 210m x 290m.

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

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

2.1.32 As the Scheme design develops, the likely configuration of equipment will be determined based upon environmental and technical factors. A reasonable worst-case scenario will be assessed and presented in the ES.

On-Site Cabling

2.1.33 Low voltage on-site electrical cabling is required to connect the PV modules and battery energy storage system(s) to inverters (typically via 1.5/1.8kV cables), and the inverters to the transformers on-site (typically via 0.4/1 kV cables). The dimension of the trenches will vary depending on the number of ducts they contain but could be typically be up to 1.2m in width and 0.8m to 1.2m in depth.

2.1.34 Higher voltage cables (around 33kV) are then required between the transformers and the switchgear and from switchgear to the on-site electrical infrastructure. The dimension of the trenches will vary depending on the number of circuits they contain but could be typically up to 1.2m in width and up to 1.2m in depth. Where possible, the higher voltage cables will share trenches with the lower voltage cables on the same route.

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

2.1.36 Data cables will also be installed, typically alongside electrical cables in order to allow for the monitoring during operation, such as the collection of solar data from pyranometers and inverters.

On-Site Substation

2.1.37 On-site substations will be required which will consist of electrical infrastructure such as the transformers, switchgear and metering equipment required to facilitate the export of electricity from the Site to the National Grid. The substation is also expected to include a control building, which would be up to 20m x 20m in plan, and up to 6m in height. This will include office space and welfare facilities as well as operational monitoring and maintenance equipment. Each control building would be a painted block building with external colours and finishes to be confirmed prior to construction. There are a number of different designs being explored. If a single on-site substation compound is chosen, it would have a footprint of up to 250m x 160m in plan and up to 11m in height. If smaller multiple substation compounds are chosen (2-3), they would have a footprint of up to 160m x 125m in plan and up to 11m in height. These dimensions are highly dependent on the findings of further work and will be refined through the iterative design process. Maximum parameters for the substation compound(s) will be defined in the DCO application, and a reasonable worst-case scenario will be assessed and presented in the ES.

Fencing and Security

2.1.38 A security fence will enclose the operational areas of the Site. The fence is likely to be a 'deer fence or other mesh security fencing, approximately 2.5m to 3m in height (Photo 1.14). Pole mounted internal facing closed circuit television (CCTV) systems are also likely to be deployed around the perimeter of the operational areas of the Site. It is anticipated that these would be 5m high. CCTV cameras would have fixed view sheds and will be aligned to face along the fence.

Photo 1-14: Typical deer security fence

2.1.39 To comply with British Standard (BS) EN 62271-1:2017 (Ref. 16), if outdoor transformers are used, they will be surrounded by a secure wire mesh fence, as shown in Photo 2-15 This fence is likely to be 1.8 to 2.5m in height. Additionally, the off-site substation will be fenced to the same standard and specifications.

Photo 1-15: Typical transformer compound fencing

2.1.40 It is likely that lighting sensors for security purposes will be deployed around the electrical infrastructure and potentially at other pieces of critical infrastructure. No areas are proposed to be continuously lit. It is anticipated that the lighting will be controlled via infrared.

2.1.41 The substation will also be fenced. This is likely to be metal palisade fencing, approximately 2.5m in height.

Site Access and Access Tracks

2.1.42 It is anticipated that construction access will include approximately three access/egress points during construction, with the primary point of access to the Site boundary expected to be from Gainsborough Road (A156) and with a potential second access from Kexby Lane for deliveries only. In addition, a new access is expected to be constructed on the northern side of Cottam Road (in the vicinity of the existing power station access) to provide construction vehicle access to the grid connection works in this area.

2.1.43 Operational access is expected to be from Gainsborough Road (A156), via Clay Lane. The majority of routine visits by vans and four-wheel drive vehicles could utilise the Clay Lane rail underpass for access to the eastern part of the Site. If larger vehicles are required to access the eastern part of the Site, these would utilise the proposed construction access points along Kexby Lane, which would be retained for the operational phase. However, this will be confirmed as the Scheme design progresses and in consultation with the relevant authorities.

2.1.44 Access tracks will be constructed across the Site. These would typically be 3.5m to 5m wide compacted stone tracks with 1:2 gradient slopes on either side.

Surface Water Drainage

2.1.45 An outline Drainage Strategy will be developed alongside the impact assessment outlining how surface water from the Scheme will be managed in order to prevent any increase in flood risk. This would be developed into a detailed drainage strategy prior to construction. It will provide suitable measures to manage drainage from new infrastructure required by the Scheme (e.g.: PV panel arrays, access tracks and areas of hardstanding across the Site) and manage any required changes to existing land drainage arrangements.

2.1.46 The design of new drainage systems will be based on the Flood Risk Assessment (FRA) and the hydrological assessment which will be undertaken for the ES.

2.1.47 Infiltration drainage design will be in accordance with Building Research Establishment (BRE) Digest 365: Soakaway Design (Ref. 17) and Sewers for Adoption and infrastructure will be placed at least 10m away from watercourses.

Biodiversity and Landscaping

2.1.48 The Scheme will involve new planting, field boundary enhancement and planting of seed mixes within the solar PV area (see Photo 1-16 as an example). Planting will also be used to provide screening. The enhancements and planting would increase biodiversity throughout the landscape and contribute to the Scheme achieving Biodiversity Net Gain (BNG) in line with the requirements of the Environment Bill (Ref 61) PPF and local planning policy: Central Lincolnshire Local Plan (Ref.8), and Bassetlaw District Council Core Strategy and Development Management Policies DPD (Ref.11).

Photo 1-16: Image showing enhanced planting surrounding the boundary of a PV farm (AECOM, 2021)

2.2 Electricity Export Connection to National Grid

2.2.1 The electricity generated by the Scheme is expected to be imported and exported via interface cables to the National Grid. The cabling will either be installed underground or overhead. Further feasibility studies and options appraisals are to be undertaken to determine the exact routing and installation method for the cable.

2.2.2 If the cable is underground, this is likely to be installed using an open trench method requiring a 30m to 40m working width, with trench widths approximately 2m wide and up to 2m deep. Where other specific techniques are required such as micro-tunnelling, boring, or horizontal directional drilling (HDD) this will be investigated.

2.2.3 If the cable is an overhead line this would be a maximum height of 50m and installed using metal towers or wood/composite poles.

2.2.4 The voltages for both the underground or overhead cables would range from 132kV to 400kV. The connection point is anticipated to be with the National Grid 400kV substation at Cottam, approximately 4km south-west of the Site.

2.2.5 There are a number of Grid Connection Corridor options under consideration for the cable to connect the Site to the National Grid. Subject to further assessment and consultation, these options and the respective connection routes will be refined. The current Grid Connection Corridor options are shown in Figure 1-1 and 1-2. Further studies and assessments will be undertaken to refine this corridor and to determine a narrower grid connection corridor that meets the objective of minimising environmental and social impact.

2.2.6 The requirement and feasibility for an off-site substation is being explored within the design options. If required, it would consist of electrical infrastructure such as the transformers, switchgear and metering equipment required to facilitate the export of electricity from the Site to the National Grid. The substation is also expected to include a control building, which would be up to 20m x 20m in plan, and up to 6m in height. The control building would be a painted block building with external colours and finishes to be confirmed prior to construction. The substation would have a footprint of up to 185m x 160m in plan and up to 11m in height. These dimensions are highly dependent on the findings of further work and will be refined through the design development process. Maximum parameters for the compound will be defined in the DCO application, and a reasonable worst-case scenario will be assessed and presented in the ES. The off-site substation is expected to be in close proximity to the National Grid substation at Cottam.

2.3 Construction Programme and Activities

Construction Programme

2.3.1 Subject to being granted consent and following a final investment decision, the earliest construction could start is Q1 2025 and construction will require an estimated 24 to 36 months, with operation therefore anticipated to commence around Q1 2027.

Construction Activities

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

2.3.3 The types of construction activities that may be required include (not necessarily in order):

- Site preparation to include:
  - Import of construction materials, plant and equipment to site;
  - The establishment of construction compound(s);
  - Upgrading of existing site tracks/access roads and construction of new tracks;

- The upgrade or construction of crossing points (bridges/culverts) over drainage ditches;
- Marking out the location of the infrastructure.

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

Construction Site Access

2.3.4 It is anticipated that the main construction and decommissioning access to the Site will be via road via Gainsborough Road (A156) with a potential further two access points from Kexby Lane for deliveries only, however, this will be confirmed as the Scheme design progresses and in consultation with the relevant authorities.

2.3.5 If an off-site substation at Cottam is required, this is likely to be accessed from Cottam Road, however this will be confirmed as the Scheme design progresses and in consultation with the relevant authorities. It is proposed that any abnormal loads would use these main access points and a swept path analysis will be undertaken to determine if land take or road widening is required. It is anticipated that abnormal loads will be required for the transformers for the on-site/or off-site substations. To minimise the construction of internal access roads, it is proposed to use the network of minor roads around the Site for some deliveries, subject to suitability of these roads to carry HGVs. All construction and decommissioning access will be confirmed as the Scheme design progresses and in consultation with the relevant authorities. At this stage, it is anticipated that as a worst case during the peak construction period, there could be up to 60 HGV deliveries per day. This is based upon an east-west configuration of panels (see Paragraph 2.1.11) over a 24 to 36 month construction programme. In addition, there will be Light Goods Vehicle (LGV) deliveries vehicle movements associated with construction worker arrivals and departures. Construction traffic predictions will be confirmed in the ES.

Construction Environmental Management

2.3.6 A Framework Construction Environmental Management Plan (CEMP) will accompany the DCO application, which will describe the framework of mitigation measures to be followed and to be carried forward to a detailed CEMP prior to construction. The aim of the CEMP is to reduce nuisance impacts 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;
- Utilities diversion;
- Dust generation;
- Soil removal; and
- Waste generation.

2.3.7 The detailed CEMP will be produced by the appointed construction contractor following grant of the DCO and will be approved by the relevant local planning authority prior to the start of construction (as part of a requirement attached to the DCO) and will identify the procedures to be adhered to and managed by the Principal Contractor throughout construction.

2.3.8 Contracts with companies involved in the construction works will incorporate environmental control, health and safety regulations, and current guidance and will ensure that construction activities are sustainable and that all contractors involved with the construction stages are committed to agreed best practice and meet all relevant environmental legislation including: Control of Pollution Act 1974 (COPA) (Ref. 18), Environment Act 1995 (Ref. 19), Hazardous Waste Regulations 2005 (as amended) (Ref. 20) and the Waste (England and Wales) Regulations 2011 (Ref. 21).

2.3.9 Records will be kept and updated regularly, ensuring that all waste transferred or disposed of has been correctly processed with evidence of signed Waste Transfer Notes (WTNs) that will be kept on-site for inspection whenever requested. Furthermore, all construction works will adhere to the Construction (Design and Management) Regulations 2015 (CDM) (Ref. 22).

Site Reinstatement and Habitat Creation

2.3.10 Following construction, a programme of site reinstatement and habitat creation will commence. A Framework Biodiversity and Landscape Management Plan will be submitted as part of the DCO application, and this document will set out the principles for how the land will be managed throughout the operational phase, following the completion of construction. A detailed Biodiversity and Landscape Management Plan will be produced following grant of the DCO and will be approved by the relevant local planning authority prior to the start of construction (as part of a requirement attached to the DCO).

2.4 Operational Activities

2.4.1 During the operational phase, activity on the Site will be minimal and would be restricted principally to vegetation management, equipment maintenance and servicing, replacement of any components that fail, periodic fence inspection, and monitoring to ensure the continued effective operation of the Scheme. Access to the site in the operational phase is expected to be from Gainsborough Road (A156), via Clay Lane. The majority of routine visits by vans and four-wheel drive vehicles could utilise the Clay Lane rail underpass for access to the eastern part of the Site. If larger vehicles are required to access the eastern part of the Site, these would utilise the proposed construction access points along Kexby Lane, both of which would be retained for the operational phase. However, this will be confirmed as the Scheme design progresses and in consultation with the relevant authorities. It is anticipated that there could be 10 to 20 visits per week with four-wheel drive vehicles or medium/large sized vans.

2.4.2 It is anticipated that there will be up to three permanent staff on-site during the operational phase.

2.5 Decommissioning

2.5.1 The design life of the Scheme is expected to be at least 60 years, although the operational life could be much longer than this; the condition of equipment will be reviewed at the end of the design life to determine whether it remains in a viable condition to continue operation after that time.

2.5.2 When the operational phase ends, the Site will require decommissioning. All PV modules, mounting poles, cabling, inverters and transformers would be removed from the Site and recycled or disposed of in accordance with good practice and market conditions at that time. The Site will be returned to its original use after decommissioning. The future of the substations and associated control buildings would be agreed with the relevant Local Planning Authority prior to commencement of decommissioning. A Decommissioning Environmental Management Plan, to include timescales and transportation methods, would be agreed in advance with the relevant Local Planning Authority.

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

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

3. Alternatives Considered

3.1 Introduction

3.1.1 The ES is required to outline the alternatives that have been considered as part of the EIA process, along with the environmental and social impacts associated with these.

3.1.2 The alternatives analysis is likely to focus on different scheme layouts, sizing, technologies and design parameters, and site location.

3.1.3 A 'no development' alternative would not deliver the additional electricity generation capacity associated with the Scheme and has therefore not been considered further. The ES will include a description of the alternatives relevant to the Scheme that have been considered, including their specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. This will include alternative site layouts, which will be considered during the design process. A full detailed appraisal of the options considered will be presented as part of the ES, discussing the rationale for the final site layout and design selection, as well as explaining the flexibility sought within the consent in this regard.

3.2 Site Selection

3.2.1 The evaluation process for site selection explored a range of possible alternatives. The reasons for selecting the site will be presented in the ES.

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

4. Consultation

4.1 Context

4.1.1 Effective stakeholder engagement and consultation is intrinsic to the Planning Act 2008 (Ref. 2) and fundamental to the success of the Scheme.

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

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

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

- Early and ongoing engagement to inform and influence the design process;
- Seeking feedback in the iterative design process and taking this feedback into consideration;
- Building of long-term relationships with key stakeholders throughout the different stages of the Scheme to help better understand their views;
- Where possible and practicable ensuring concerns are addressed; and
- Ensuring appropriate statutory consultation is undertaken in compliance with requirements of the Planning Act 2008 (Ref. 2), EIA Regulations (Ref. 1) 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. 2) and Regulation 13 of the EIA Regulations (Ref. 1). Further requirements set out how the Scheme must be publicised, and specific documents produced, including a Statement of Community Consultation (SoCC), Preliminary Environmental Information (PEI) Report and a Consultation Report.

4.3 Consultation to Date

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

- Lincolnshire County Council;
- Nottinghamshire County Council;
- Bassetlaw District Council; and
- West Lindsey District Council.

4.3.2 In addition, a project website has been set up to provide up to date information on the project: www.gateburtonenergypark.co.uk/ and information has been provided to local residents and local community groups in advance of the submission of this Scoping Report.

4.4 Scoping Consultation

4.4.1 The Planning Inspectorate (on behalf of the SoS) will consult on this Scoping Report under the EIA Regulations (Ref .1). 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. 1), the SoS must undertake consultation with statutory consultation bodies, including environmental bodies (such as Natural England, the Environment Agency and Historic England) and relevant planning authorities: Bassetlaw District Council, West Lindsey District Council, Nottinghamshire County Council, Lincolnshire County Council before adopting a Scoping Opinion.

4.5 Public Statutory Consultation

4.5.1 In accordance with Section 47(1) of the Planning Act 2008 (Ref. 2) 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. 1), and how it intends to publicise and consult on the Preliminary Environmental Information (PEI). The Applicant is required to consult the host local authorities (i.e. those local authorities whose administrative area the Scheme is located within) on the draft SoCC and they will have a period of at least 28 days following receipt of the request to comment on a draft SoCC prior to its publication for inspection by the public.

4.5.2 A two-stage approach to consultation with the local community and wider public is planned, as follows:

- A first round of non-statutory events in Q4 2021/Q1 2022 to introduce the Scheme and present a preliminary design and the options currently under consideration; and
- A second round of events in Q2/Q3 2022, being the statutory consultation pursuant to the Planning Act 2008 (Ref. 2) and EIA Regulations (Ref. 1), including consultation on the Preliminary Environmental Information. The PEI Report will report the outcomes of the preliminary assessment of likely significant environmental effects.

4.5.3 The approach to public consultation is currently being finalised, but is likely to include (without being limited to):

- Exchanges of correspondence, meetings and workshops with local community groups and businesses (online or in person where possible); and
- Public exhibitions at which members of the community can meet with members of the project team (where possible) and online.

4.5.4 Consultation will also be undertaken with prescribed consultation bodies as well as affected landowners, in accordance with Sections 42 and 48 of the Planning Act 2008 (Ref. 2) and Regulation 13 of the EIA Regulations (Ref. 1). All consultation events will be planned in accordance with the COVID-19 guidance and regulations in place at the time.

4.5.5 All responses received during consultation will be carefully considered and taken into account in the development of the Scheme in accordance with Section 49 of the Planning Act 2008 (Ref. 2). Details of any responses received during consultation and the account taken of those responses will be included in a Consultation Report. This Consultation Report will be submitted with the application for a DCO to the SoS and, if the application is accepted, will be available for public review.

4.5.6 The Consultation Report will demonstrate how the Applicant has complied with the consultation requirements of the Planning Act 2008 (Ref. 2) and EIA Regulations (Ref. 1) and will be considered by the SoS when determining whether to accept the application, and then in examining the application.

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 significance criteria;
- Review of secondary information, previous environmental studies and publicly available information and databases;
- Desk-top studies;
- Physical surveys and monitoring;
- Computer modelling (where required); and
- Expert opinion.

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

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

5.1.4 Impacts will be considered on the basis of their magnitude, duration, and reversibility. Cumulative and combined effects will also be considered where appropriate. Significance will be evaluated on the basis of the scale of the impact and the importance or sensitivity of the receptors, in accordance with standard assessment methodologies. More information on the assessment methodology is provided in Section 5.5..

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

5.2 Determining the Baseline Conditions

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

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

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

5.2.3 Consideration will also be given to how the baseline conditions would evolve in the absence of the Scheme, known as the 'future baseline'.

5.3 Embedded Measures

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

5.3.2 Once these measures are incorporated into the design, they are termed 'embedded measures'. Embedded measures relevant to the construction phase will be described within a Framework CEMP, and within the 'Environmental Design and Management' section of each technical chapter. For the operational phase, such embedded measures will be represented primarily in the design. Embedded measures are therefore either incorporated into the design from the outset or identified through the assessment process.

5.3.3 The ES assesses effects with embedded measures in place. Where significant adverse effects are identified after considering these embedded measures, 'additional mitigation measures' are proposed.

5.4 Timescales and Assessment Years

Construction Phase Effects

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

Operational Phase Effects

5.4.2 For the assessment, these are the effects that, although they may start during construction, are either permanent, endure for a substantial period beyond construction or decommissioning, 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:

- Short term – endures for up to 12 months after construction or decommissioning;
- Medium term – endures for 1-5 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).

Decommissioning Period Effects

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

Assessment Years

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

5.4.5 The peak construction year for the purpose of the EIA is anticipated to be during 2025 and 2026. This is based on the assumption that the Scheme is built out rapidly (over approximately 24 to 36 months), which is a worst case from a traffic generation point of view because it compresses the trip numbers into a shorter duration. This would therefore also be the worst case in terms of effects on drivers, pedestrians and cyclists, and traffic-related air quality and noise effects.

5.4.6 As described in Section 2.3, the phasing of the Scheme will be subject to a number of factors. Therefore, the peak construction assessment year will be reviewed as the anticipated construction programme is considered in more detail during design development. A full justification for the reasonable worst-case scenario that is assessed will be provided in the ES.

5.4.7 The proposed operational assessment year for the purpose of the EIA is 2027 (see Paragraph 2.3.1).

5.4.8 A future year of 2042 will also be considered for specific topics including landscape and visual amenity, in terms of the maturation of vegetation (i.e. 15 years after the operational assessment year).

5.4.9 The decommissioning assessment year for the purpose of the EIA is 2087, based on the design life of the Scheme, recognising that the operational life may extend beyond this date (see Paragraph 2.4.1).

5.5 Effect Significance Criteria

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

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

- Extent and magnitude 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 (described as high, medium, low and very low); and
- Compatibility with environmental policies.

5.5.3 The significance of residual effects will be evaluated with reference to available definitive standards, accepted criteria and legislation. For issues where definitive quality standards do not exist, significance will be based on the:

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

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

- **Adverse** – detrimental or negative effects to an environmental/socio-economic resource or receptor; or
- **Negligible** (also referred to as 'neutral' for some topics) – imperceptible effects to an environmental/socio-economic resource or receptor; or
- **Beneficial** – advantageous or positive effect to an environmental/socio-economic resource or receptor.

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

- **Minor –** slight, very short or highly localised effect of no significant consequence;
- **Moderate –** limited effect (by extent, duration or magnitude) which may be considered significant; and
- **Major –** considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards; considered significant.

5.5.6 Each of the technical chapters provides the criteria, including sources and justifications, for quantifying the different categories of effect. Where possible, this will be based upon quantitative and accepted criteria (for example, noise assessment guidelines), together with the use of value judgment and expert interpretation to establish to what extent an effect is environmentally significant. Table 5-1 illustrates an example of the classification of effects matrix.

Table 5-1: Example matrix to classify environmental effects

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

5.5.7 Following the classification of an effect, clear statements will be made within the topic chapters as to whether that effect is significant or not significant. As a general rule, major and moderate effects are considered to be significant (as shown by the shaded cells in Table 5-1 above), whilst minor and negligible effects are considered to be not significant. However, professional judgement will be applied, including taking account of whether the effect is permanent or temporary, its duration/frequency, whether

it is reversible, and/or its likelihood of occurrence. Generic definitions for the classification of effects are shown in Table 5-2.

Table 5-2: Generic effect descriptions

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

5.5.8 Where mitigation measures are identified to eliminate, mitigate or reduce adverse impacts, these have either been incorporated into the design of the Scheme; translated into construction commitments; or operational or managerial standards/procedures. The ES will highlight 'residual' effects, which remain following the implementation of suitable mitigation measures, and classify these in accordance with the effect classification terminology given above.

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

Assessment of Construction and Decommissioning Effects

5.5.10 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), phasing and timing of construction and decommissioning activities.

5.5.11 As described in Section 5.4, 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. 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 what has been assumed in terms of good practice measures, will be set out within the ES, and the 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 Interaction and Accumulation of Effects

5.6.1 In accordance with the EIA Regulations (Ref. 1), 'cumulative effects' will be considered. By definition, these are effects that result from incremental changes caused by other past, present or reasonably foreseeable actions together (i.e. cumulatively) with the Scheme.

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

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

Effect Interactions

5.6.3 There is no established EIA methodology for assessing and quantifying effect interactions that lead to combined effects on sensitive receptors, however the European Commission (EC) has produced guidelines for assessing effect interactions *"which are not intended to be formal or prescriptive, but are designed to assist EIA practitioners in developing an approach which is appropriate to a project…"* (Ref. 23).

5.6.4 AECOM has reviewed these guidelines and has developed an approach which uses the defined residual effects of the Scheme to determine the potential for effect interactions that lead to combined effects.

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

5.6.6 An exercise which tabulates the effects on receptors or receptor groups will be undertaken to determine the potential for effect interactions and therefore any combined effects. Only adverse or beneficial residual effects classified as minor, moderate, or major will be considered in relation to potential effect interactions. Residual effects, which are classified as negligible will be excluded from the assessment of the effect interactions as, by virtue of their definition (see Table 5-2), they are considered to be imperceptible effects to an environmental / socio-economic resource or receptor.

Cumulative Effects with Other Developments

5.6.7 The Planning Inspectorate's Advice Note 17 on the assessment of cumulative effects (Ref. 15) identifies a four-stage approach as follows:

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

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

5.6.9 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.

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

- Development currently under construction;
- Approved applications which have not yet been implemented (covering the past five years and taking account of those that received planning consent over three years ago and are still valid but have not yet been completed);
- Submitted applications not yet determined;
- Refused applications, subject to appeal procedures not yet determined;
- On the 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.

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

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

5.6.12 At Stage 2, 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 zone of influence for each environmental 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. 15).

Stage 3 – Information gathering

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

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

Stage 4 – Assessment

5.6.14 The assessment will include a list of those developments considered to have the potential to generate a cumulative effect together with the Scheme, and this will be documented in a matrix, in line with Matrix 2 (Appendix 2) of the Planning Inspectorate's Advice Note 17 (Ref. 15) 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.

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

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

5.7 Proposed topics to be included in the ES

5.7.1 The following chapters present a discussion of the likely or potential significant environmental effects associated with the Scheme that it is proposed will be considered as part of the EIA. The methodology

and assessment criteria that will be used to assess the identified effects are also outlined. These topics comprise:

- Climate Change (Chapter 6);
- Cultural Heritage (Chapter 7);
- Ecology and Biodiversity (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
- Human Health (Chapter 14).

5.7.2 Chapter 15 provides a summary of environmental topics which have been considered during the preparation of this Scoping Report, and for which standalone chapters are not anticipated to be required in the ES (due to the expected length of text needed to assess these topics). Technical appendices will be provided for these topics with a short summary provided in a single chapter within the ES. For clarity, these topics are not scoped out of the EIA. They are scoped in but the format of presentation within the ES will be different to the topics listed above. These topics comprise:

- Air Quality;
- Glint and Glare;
- Ground Conditions;
- Major Accidents or Disasters;
- Telecommunications, Television Reception and Utilities; and
- Waste.

5.7.3 Chapters 6 – 14 of this Scoping Report provide an outline of the proposed scope of works for the topics identified above.

6. Climate Change

6.1 Introduction

6.1.1 To align with the requirements of the EIA Regulations (Ref. 1) and IEMA Guidance for assessing climate mitigation (Ref. 24) and adaptation (Ref. 25) in EIAs, consideration has been given within this chapter to three aspects of climate change assessment:

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

6.2 Study Area

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 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 impact 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 (Ref. 26) and associated five-year, legally binding carbon budgets.

In-combination climate change impact assessment

6.2.4 The study area for the in-combination climate change impact assessment is as defined in each environmental assessment within the ES (Chapters 6-14), and includes all environmental receptors identified within the assessments undertaken by the environmental disciplines.

Climate change resilience review

6.2.5 The study area for the climate change resilience review is the land within the Site boundary, i.e. it covers the construction, operation and decommissioning of all assets and infrastructure which constitute the Scheme.

6.3 Planning Policy Context and Guidance

6.3.1 Legislation, planning policy and guidance relating to climate change, and pertinent to the Scheme comprises:

[1] In line with IEMA guidance, this is 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'.

Legislation

- Climate Change Act 2008 (Ref. 26); and
- Carbon Budgets Order 2009 (Ref. 27).

National Planning Policy

- NPS EN-1 (Ref. 6), with particular reference to paragraphs 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 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;
- NPS EN-5 (Ref. 5) – paragraph 2.4.1 regarding NPS EN-1 and the importance of climate change resilience, and paragraph 2.4.2 in relation to ES requirements regarding climate change resilience; and
- NPPF (Ref. 7) – paragraphs 8, 20 and 149 in relation to adaptation, mitigation and climate change resilience; paragraphs 148 and 157 in relation to flood risk and damage to property and people; paragraphs 150 and 153 in relation to reduction of CO_2 emissions through design and reduced energy consumption; and paragraphs 155 to 165 in relation to climate projections, associated flood risk and adaptation.

6.3.2 It is noted that NPSs are undergoing a review, with draft updates available and are undergoing consultation. Any updated versions, once finalised, will be considered within the PEI Report and ES.

National Guidance

- Planning Practice Guidance, Climate Change (Ref. 28).

Local Planning Policy

- Central Lincolnshire Local Plan 2012 - 2036 (2017) (Ref. 52) with particular reference to Policy LP14 (Managing Water Resources and Flood Risk), LP18 (Climate Change and Low Carbon Living), LP19 (Renewable Energy Proposals) and LP20 (Green Infrastructure Network);
- Draft Bassetlaw Local Plan 2020 – 2037 (2021) (Ref. 53) with particular reference to Policy ST50 (Reducing Carbon Emissions, Climate Change Mitigation and Adaptation), Policy ST51 (Renewable Energy Generation), Policy ST52 (Flood Risk and Drainage); and
- Bassetlaw District Council Core Strategy & Development Management Policies DPD (2011) (Ref. 54) particularly strategic object SO6 related to ensuring that all new development addresses the causes and effects of climate change by, as appropriate, reducing or mitigating flood risk; realising opportunities to utilise renewable and low carbon energy sources and/or infrastructure, alongside sustainable design and construction; taking opportunities to achieve sustainable transport solutions; and making use of Sustainable Drainage Systems. And development management policies DM10 (Renewable and Low Carbon Energy) and DM12 (Flood Risk, Sewerage and Drainage).

6.3.3 Where required, relevant Neighbourhood Plans and Supplementary Planning Documents (SPD's)/Guidance (SPG's) will be considered.

6.3.4 The national planning policies identify the requirement for consideration of climate change resilience. 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.

6.3.5 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.

6.4 Baseline Conditions

GHG impact assessment

6.4.1 The current land use within the Site boundary consists of predominantly arable land, and managed hedgerows and trees. Trees are present individually in some areas, as well as in rows and within small woodland areas. The abundance of vegetation within the Site boundary suggests a relatively high carbon sink potential. Also, current land use within the Site boundary has minor levels of associated GHG emissions as the land use is largely agricultural. Baseline agricultural GHG emissions are dependent on soil and vegetation types present, and fuel use for the operation of vehicles and machinery.

6.4.2 There are emissions associated with the existing road network within the Site boundary, as well as rail emissions due to the Sheffield-Lincoln line which runs north-south through the centre of the Site boundary. There is not expected to be any impact on rail operations as a result of the Scheme.

6.4.3 For the GHG assessment, the baseline is a 'business as usual' scenario whereby the Scheme is not implemented. The baseline comprises existing carbon stock and sources of GHG emissions within the Site boundary of the existing activities on-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.

In-combination climate change impact assessment

6.4.4 The receptors for in-combination climate change impact are receptors within the surrounding environment that will be impacted by the Scheme in combination with future climatic conditions. Baseline conditions for the in-combination climate change impact assessment are determined using the climate change projections data.

6.4.5 An initial review of UK Climate Projections 2018 (UKCP18) data (Ref. 29) for the 25km^2 grid square within which the Scheme is located suggests that by the 2050s time period (2040-2069), the region will experience an increase of around 2.2°C in summer mean air temperature at 1.5m and an increase of 1.6°C in winter mean air temperature at 1.5m, compared to a 1981-2010 baseline period. For the same time period, summer mean precipitation is expected to decrease by around 19%, whilst in winter it is expected to increase by 7%. This is based on 50% probability levels of the RCP8.5 scenario, which is considered to be the high-emissions global scenario with the greatest concentration of GHGs in the atmosphere.

Climate change resilience review

6.4.6 The receptor for climate change resilience is the Scheme itself including its construction, operation and decommissioning. The climate resilience review will provide a description of how the Scheme will be designed to be more resilient to the climate change impacts identified during the review of the UKCP18 data (Ref. 29).

6.4.7 A more detailed assessment of climate change projections will be conducted for the land within the Site boundary as part of the ES.

6.5 Potential Effects and Mitigation

GHG impact assessment

6.5.1 For the purposes of this assessment, it has been 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 (global climate) to increases in GHG emissions. This is in line with the IEMA guidance (Ref. 24), 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. GHG impacts will be put into context in terms of their impact on the UK's 5-year carbon budgets, including sub-sectoral budgets for energy generation, which set legally binding targets for GHG emissions.

Table 6-1: Potential sources of GHG emissions

Lifecycle stage	*Activity*	*Primary emission sources*
Product Stage	Raw material extraction and manufacturing of products required to build the equipment for the Scheme. Due to the complexity of the equipment, this stage 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.
Construction process stage	On-site construction activity including emissions from construction compounds. Transportation of construction materials (where these are not included in product-stage embodied GHG emissions). 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-stage 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 impact of changes to carbon sink value of the Site. Provision of clean water, and treatment of wastewater.
Operation stage	Operation and maintenance of the scheme	GHG emissions from energy consumption, provision of clean water and treatment of wastewater. These operational emissions are expected to be negligible in the context of the overall GHG impact. Leakage of potent GHGs, such as SF_6, during operation. GHG emissions from energy consumption, 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 the complexity of the equipment involved.
Decommissioning stage	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 the Site.

6.5.2 The GHG emissions associated with the Scheme will be compared to the projected GHG intensity of the National Grid, as well as alternative forms of electricity generation, to determine the potential benefit of cleaner electricity generation.

6.5.3 A Construction Environmental Management Plan (CEMP) will be prepared and implemented by the selected Principal Contractor to include a range of best practice construction measures, 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.

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

In-combination climate change impact assessment

6.5.5 In-combination climate impact assessment identifies how the resilience of various receptors in the surrounding environment is affected by a combination of future climate conditions and impacts from the Scheme. The climate parameters relevant to the Scheme are detailed in Table 6-2 below together with the rationale for scoping. On the basis of the information presented in Table 6-2, an in-combination climate change impact assessment is proposed to be scoped out.

Table 6-2: Climate parameters for the in-combination climate change impact of the Scheme

Parameter	*Scoped In/Out*	*Rationale for Scoping Conclusion*
Temperature change	Out	While impacts are expected as a result of projected temperature increases, these temperature increases in combination with the Scheme are not expected to have a significant impact upon receptors identified by other environmental disciplines.
Sea level rise	Out	The Scheme is not located in an area that is susceptible to sea level rise.
Precipitation change (frequency and magnitude of precipitation events and droughts)	Out	Climate change may lead to an increase in substantial precipitation events that could lead to flash flooding or changes to groundwater levels. However, no significant impacts on surface water or groundwater levels are expected as a result of precipitation changes, in combination with the Scheme, as the flow of precipitation to ground will not be significantly hindered. The Scheme, in combination with projected changes in precipitation, is also not expected to have a significant impact upon receptors identified by other environmental disciplines.
Wind	Out	The Scheme, in combination with projected changes in wind patterns, is not expected to have a significant impact upon receptors identified by other environmental disciplines.

Climate change resilience review

6.5.6 Climate parameters relevant to the climate change resilience review are detailed in Table 6-3 below.

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.
Increased average temperatures and incidence of heatwaves	In	Extremes in temperatures may result in heat stress of materials and structures.

Parameter	*Scoped In/Out*	*Rationale for Scoping Conclusion*
Increased frequency of heavy precipitation events	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.
Increase in strong wind events	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 not located in an area that is susceptible to sea level rise.

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

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

6.6 Assessment Methodology

GHG impact assessment

6.6.1 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. 24).

6.6.2 In line with the World Business Council for Sustainable Development and World Resources Institute GHG Protocol guidelines (Ref. 33), the GHG assessment will be reported as tonnes of carbon dioxide equivalent (tCO_2e) and will consider the seven Kyoto Protocol gases:

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

6.6.3 Expected GHG emissions arising from the construction 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:

Activity data x GHG emissions factor = GHG emissions

6.6.4 Department for Environment, Food and Rural Affairs (Defra) 2021 emissions factors (Ref. 34) and embodied carbon data from the University of Bath Inventory of Carbon and Energy (ICE) v3 (Ref. 35) will be used as the source data for calculating GHG emissions.

6.6.5 The sensitivity of the receptor (global climate) to increases in GHG emissions is always defined as high as any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore meet its future five-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. 36) and the climate science community.

6.6.6 Due to the absence of any defined industry guidance for assessing the magnitude of GHG impacts for EIA, standard GHG accounting and reporting principles will be followed to assess impact magnitude. In GHG accounting, it is common practice to consider exclusion of emission sources that are <1% of a given emissions inventory on the basis of a minimal contribution. Both Department of Energy and Climate Change (DECC) guidance (Ref. 37) and the PAS (publicly available specification) 2050 (2011) (Ref. 38) allow emissions sources of <1% contribution to be excluded from emission inventories, and these inventories to still be considered complete for verification purposes. This would therefore suggest that a development with emissions of <1% of the UK inventory and relevant carbon budget would be minimal in its contribution to the wider national GHG emissions.

6.6.7 Where carbon budgets are not available for certain assessment periods, a qualitative approach will be taken. The UK carbon budgets are currently available to 2037 (6th Carbon Budget).

Climate change resilience review

6.6.8 The Scheme's resilience to climate change will be considered qualitatively. This will be completed in liaison with the project design team and the other environmental disciplines by considering the climate projections for the geographical location and timeframe of the Scheme. The significance of climate resilience will not be assessed.

6.6.9 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.

6.7 Assumptions, Limitations and Uncertainties

6.7.1 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, assumptions will be made based on industry approximations and professional best practice.

6.7.2 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.

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, to consider the nature and scale of potential impacts arising from the Scheme, and to assess the significance of any likely effects.

7.2 Study Area

7.2.1 The study area for archaeological assets will extend to a distance of 1km from the Site boundary and 3km for built heritage assets. This will allow for all cultural heritage assets to be set within their wider context and allow for the assessment of archaeological potential within the Site boundary.

7.2.2 A flexible approach will be taken to the identification of high-value assets on which there may be an impact upon setting, up to 5km beyond the Site boundary. Assets beyond this distance may also be considered, where identified as necessary by the technical team or county archaeologist. This will be guided by the Scheme's Zone of Theoretical Visibility (ZTV) (to be prepared as part of Chapter 10 Landscape and Visual Amenity of the PEI Report) but will also consider physical and historical connectivity and relationships with other monuments and the wider landscape.

7.3 Planning Policy Context and Guidance

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

Legislation

- Infrastructure Planning (Decisions) Regulations 2010 (Ref. 37);
- Planning (Listed Buildings and Conservation Areas) Act 1990 (Ref. 40); and
- Ancient Monuments and Archaeological Areas Act 1979 (Ref. 41) (amended by the National Heritage Act 1983 (Ref. 42) and 2002 (Ref. 43).

National Planning Policy

- 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-5 (Ref. 6) with particular reference to Paragraph 2.8.9 in relation to the archaeological consequences of electricity line installation; and
- NPPF (Ref. 7) with particular reference to Section 16: Conserving and Enhancing the Historic Environment.

National Guidance

7.3.2 The following guidance is of relevance for cultural heritage:

- Planning Practice Guidance, Section 16: Conserving and enhancing the historic environment (Ref. 44);
- Historic Environment Good Practice Advice in Planning Note 2. Managing Significance in Decision Taking in the Historic Environment. Historic England (Ref. 45);

- Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets. Historic England (2nd edition, 2017) (Ref. 46);
- Historic Environment Statement of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12. Historic England (2019) (Ref. 47);
- Commercial Renewable Energy Development and the Historic Environment. Historic England Advice Note 15 (2021) (Ref. 204);
- Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (Ref. 48);
- CIfA Code of Conduct (Ref. 49); and
- Institute of Environmental Management and Assessment (IEMA), the Institute of Historic Building Conservation (IHBC) and the Chartered Institute for Archaeologists (CIfA), Principles of Cultural Heritage Impact Assessment in the UK (Ref. 50).

Local Planning Policy

7.3.3 Central Lincolnshire Local Plan 2012-2036 (Ref. 52) was adopted by the Central Lincolnshire Joint Strategic Planning Committee (CLJSPC) on 24 April 2017.

7.3.4 The strategy for the historic environment is achieved through the implementation of Policy LP25. The key points are:

- In instances where a development proposal would affect the significance of a heritage asset (whether designated or non-designated), including any contribution made by its setting, the applicant will be required to undertake the following, in a manner proportionate to the asset's significance;
- Development affecting archaeological remains, whether known or potential, designated or undesignated, should take every practical and reasonable step to protect and, where possible, enhance their significance; and
- Planning applications for such development should be accompanied by an appropriate and proportionate assessment to understand the potential for and significance of remains, and the impact of development upon them.

7.3.5 Bassetlaw Core Strategy & Development Management Policies DPD (Ref. 53) was adopted by Bassetlaw District Council on 22 December 2011. The strategy for the historic environment is achieved through the implementation of Policy DM8: The Historic Environment. The key points are:

- Support will be given to development proposals or regeneration schemes (particularly in central Worksop, Retford and Tuxford) that protect and enhance the historic environment;
- Such proposals must recognise the significance of heritage assets as a central part of the development; and
- There will be a presumption against development, alteration, advertising or demolition that will be detrimental to the significance of a heritage asset.

7.3.6 The setting of an asset is an important aspect of its special architectural or historic interest and proposals that fail to preserve or enhance the setting of a heritage asset will not be supported.

7.4 Baseline Conditions

7.4.1 To assist with the scoping assessment, data has been considered form the National Heritage List (Ref. 50), the Lincolnshire Historic Environment Record (HER), and the Nottinghamshire HER to gain an understanding of the designated and non-designated built heritage assets within the study area. All heritage assets identified within the study area are listed in a gazetteer (Appendix C) and illustrated on

Figure 7-1 and Figure 7-2. They are referred to in the text by a unique identity code in brackets (e.g. MLI50512, MNT4944 or 1008685).

Designated assets

7.4.2 There are six scheduled monuments within the study area. Three of the scheduled monuments are of medieval date (1066 – 1500). The site of Heynings Priory (1008685) is on the northern boundary of the Site and dates to the medieval period. Fleet Plantation moated site (1008594), is located within Nottinghamshire close to Cottam substation. The third is the site of Torksey medieval town (1004991) located to the east of the River Trent. Two further scheduled monuments within the study area are related to the evidence of extensive Roman (AD43 – 409) presence within the study area. The Roman fort south of Littleborough Lane (1004935) is located on the eastern side of the River Trent and the scheduled Roman town of Segelocum (1003669) is on the western bank. The sixth scheduled monument is the ruins of a 16th century (post-medieval) Elizabethan mansion (1005056).

7.4.3 Within the study area are 21 listed buildings. These are formed of five Grade I, five Grade II* and 31 Grade II listed buildings. These listed buildings are largely grouped in the settlements of Gate Burton, Marton, Willingham and Torksey and include buildings relating to residential, ecclesiastical and agricultural activities. There are no other designated sites recorded within the study area, including World Heritage Sites, Registered Parks and Gardens, Registered Battlefields or conservations areas. There are no designated assets within the Site boundary itself.

Summary baseline

7.4.4 Assets recorded on the HER range in date from the Middle Palaeolithic (70000-40000 BC) to the modern period (1900 to present). Evidence of this early period include flint nodules found on the bed of the River Trent (MNT5792) which showed clear evidence of being worked and are thought to date from as early as the Middle Palaeolithic. Flint artefacts (MLI51382) and a stone pounder (MLI51383) found in a field close to Lea Grange and dated to the Mesolithic (10000 – 3500 BC), and a flit adze dating from the Upper Palaeolithic (40000 – 10000 BC) or Mesolithic period found in Torksey, represent the earliest evidence of human activity within the study area. The later prehistoric periods, through to the Bronze Age (2500 - 700 BD), is sparsely represented by individual recorded finds and limited evidence of settlement or funerary practices have previously been recorded within the study area. There is significant increase in evidence of the development of the area during the Iron Age (700BC - AD43), particularly in the later phase of the period leading into the transition into the Roman period (AD43 – AD409). The study area is crossed by Till Bridge Lane, a Roman road (MLI50575) linking Ermine Street north of Lincoln to a ford crossing the River Trent at Matron (MLI52485) to Segelocum Roman town (1003669). Evidence of settlement (MLI51369, MLI51374), agricultural practices (MLI52472, LMI52489) and a military presence in the form of forts (MLI50544, MLI50596), as well as multiple individual finds, contribute to the understanding of the significance of the Roman presence in this area.

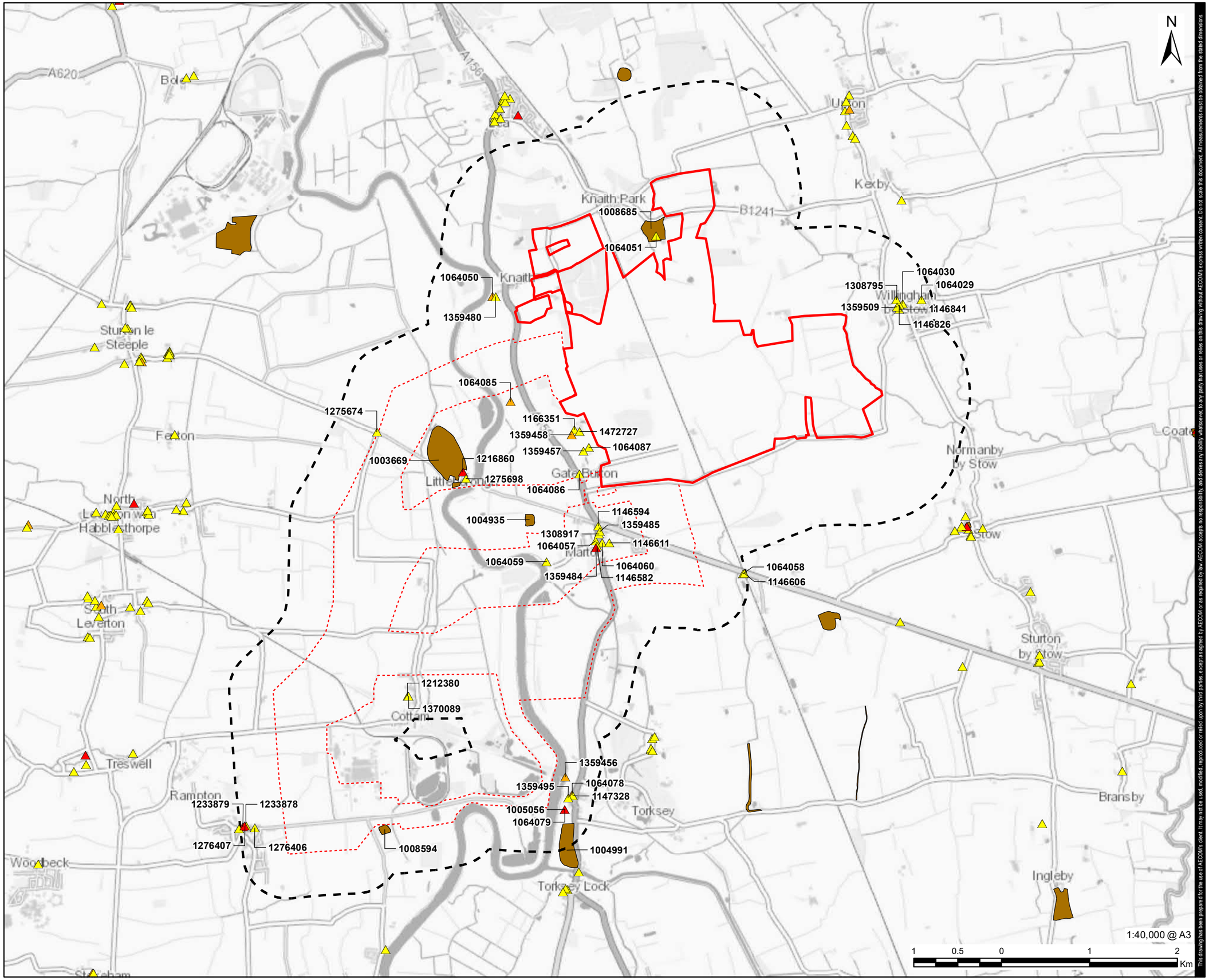
7.4.5 There is evidence of development of the landscape through the early medieval (AD409 – 1066) and medieval (1066 – 1500) periods including the scheduled medieval town at Torksey. A number of the villages in the area have origins in the medieval period, and there is widespread evidence of ridge and furrow. Many of the extant settlements, such as the former village of Knaith (MLI50529) and the extant village of Marton, have their origins during this time and remnants of these changes are preserved in the landscape. The remains of a moated site at Fleet plantation is scheduled and dates to the medieval period (1008594). Heyning Priory (1008685) was founded in 1135 and survives as scheduled earthworks. Many of the churches within the study area, such as St Margaret's Church in Marton (1064050), also have their origins in the medieval period.

7.4.6 The deserted settlement of Gate Burton (MLI50512), and the parkland associated with Gate Burton Hall (MLI98360), extends into the Site boundary and is a classic example of population dispersal caused by emparking (the enclosing of land to create parkland) in the 18th century. In the 17th and early 18th century the lordship of Gate Burton formed part of the Knaith estate of the Lords Willoughby of Parham. When the Hutton family purchased the estate, they built the present Gate Burton Hall (1359458) and developed the surrounding landscaped parkland. It is speculated that the village was cleared at this time to accommodate the changes.

7.4.7 Archaeological evidence of post-medieval (1500–1900) date comprises the sites of buildings and industrial activity including windmills, quarries, kilns, and brick yards. The route of the railway and improvement to the River Trent to improve navigation are also recorded. The majority of the built heritage assets within the study area date to the post-medieval period. Evidence of modern (1900 – present) date is largely limited to improvements to buildings and infrastructure.

Figure 7-1: Designated Heritage Assets

Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-12



AECOM

PROJECT

Gate Burton Energy Park

CLIENT

Gate Burton ENERGY PARK

CONSULTANT

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Surrey, CR0 2AP, UK
www.aecom.com

LEGEND

- Solar PV Site
- Grid Connection Corridor Options
- Study Area
- Scheduled Monument

Listed Building

- Grade I
- Grade II*
- Grade II

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FIGURE TITLE

Designated Assets

FIGURE NUMBER

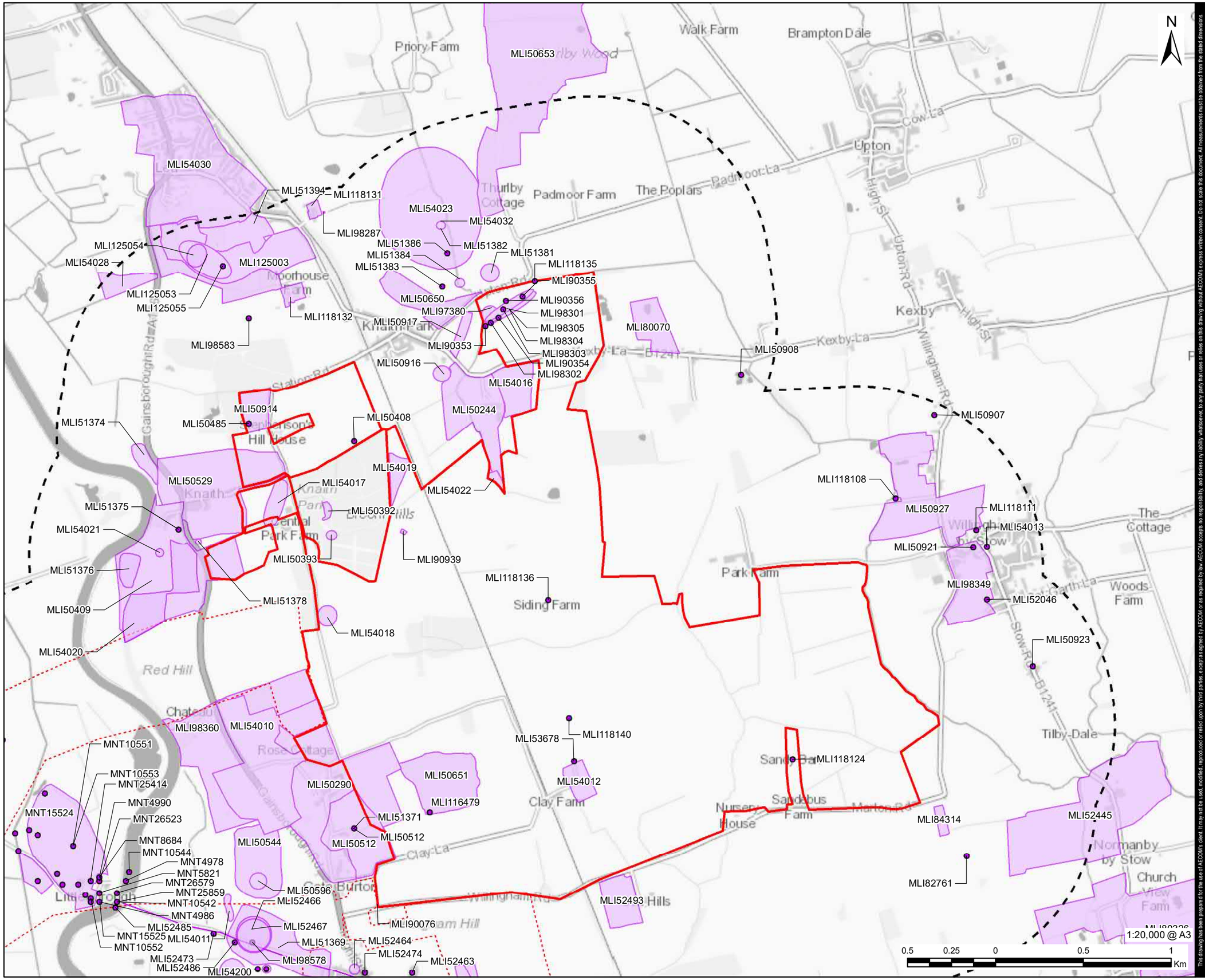
Figure 7-1

Filename: F:\Projects\Gate Burton Energy Park\02_Maps\HER_Figure7_1_DesignatedAssets.mxd

Figure 7-2: Non-Designated Heritage Assets

Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-15

Filename: F:\Projects\Gate Burton Energy Park\02_Maps\HER_Figure\7_2_NonDesignatedAssets.mxd



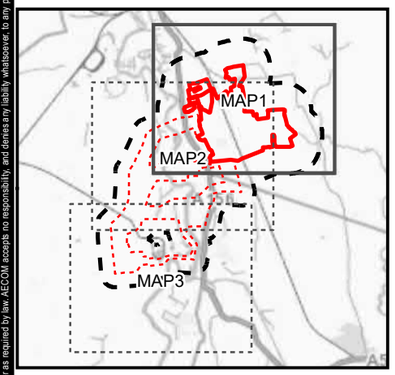


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FIGURE TITLE

Non-Designated Assets

FIGURE NUMBER

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Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-15

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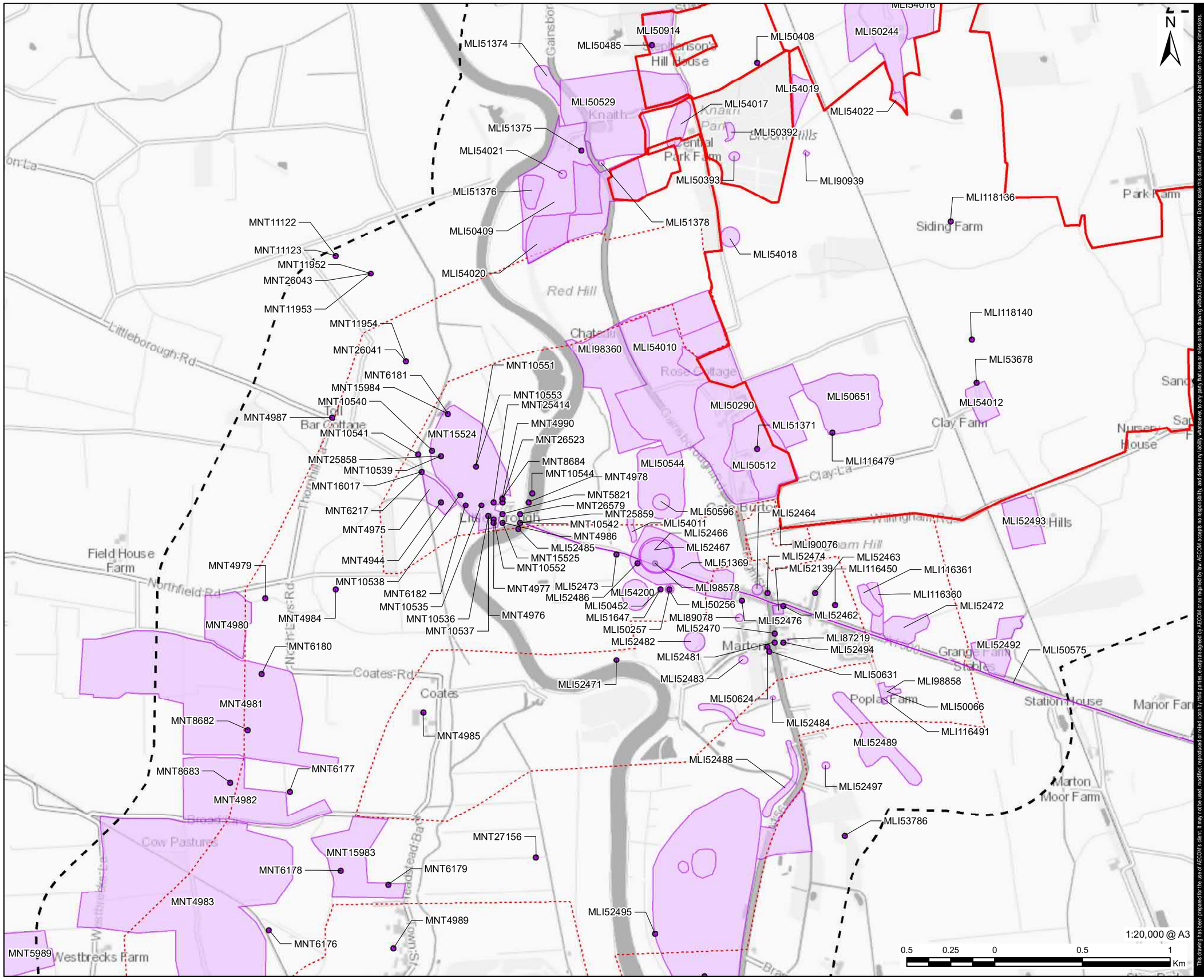

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FIGURE TITLE

Non-Designated Assets

FIGURE NUMBER

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Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-15

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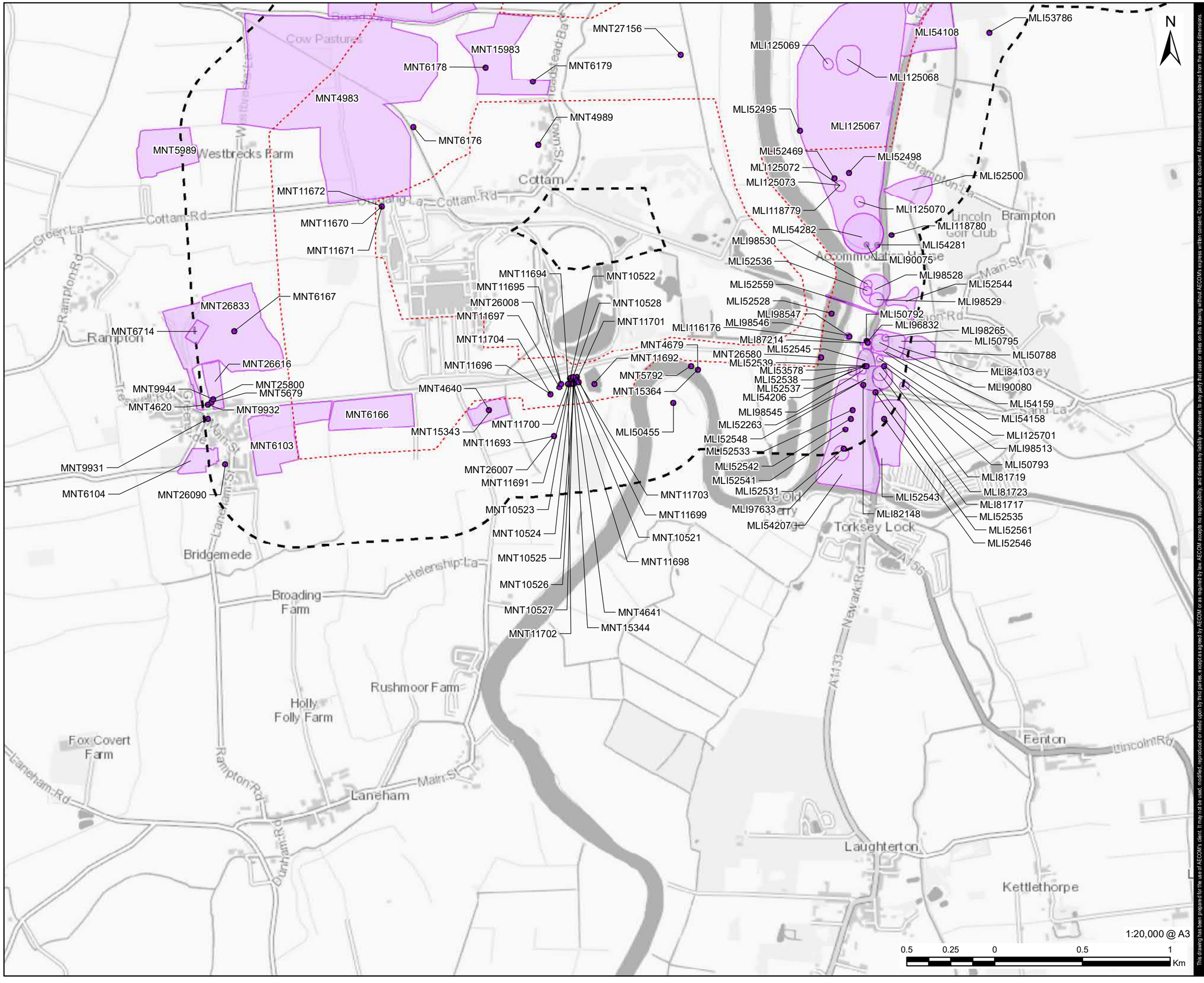

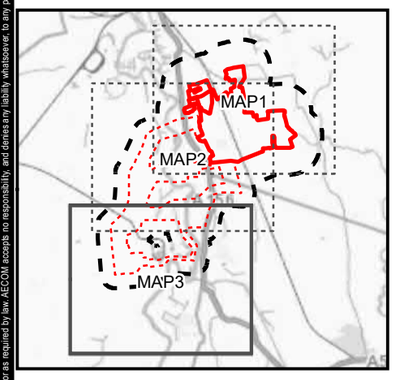

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ISSUE PURPOSE

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PROJECT NUMBER

60664324

FIGURE TITLE

Non-Designated Assets

FIGURE NUMBER

Figure 7-2 Page 3 of 3

7.5 Potential Effects and Mitigation

7.5.1 There are a number of designated and non-designated built heritage assets within the study area which may be affected by the Scheme. Such effects could consist of:

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

7.5.2 There is potential for previously unrecorded archaeological deposits to survive within the Site boundary. These remains could potentially be affected during excavation works required during construction including, but not limited to, the construction of the solar module mounting structures, power control infrastructure and on-site cabling, the laying of the required connector cables and the establishment of a construction compounds and access tracks. There is also the potential for effects on the setting of non-designated archaeological assets within the study area to be impacted during construction and operation of the Scheme.

7.5.3 Given the potential for effects on the historic environment, heritage is scoped in to the EIA.

7.6 Assessment Methodology

7.6.1 The assessment of potential effects as a result of the proposed development on cultural heritage will be undertaken using the methodology set out below.

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

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

Asset value	*Description*
High	World Heritage Sites Scheduled Monuments Grade I and II* listed buildings Registered battlefields Grade I and II* registered parks and gardens Conservation areas of demonstrable high value Non-designated heritage assets (archaeological sites, historic buildings, monuments, parks, gardens or landscapes) that can be shown to have demonstrable national or international importance Well preserved historic landscape character areas, exhibiting considerable coherence, time-depth or other critical factor(s)
Medium	Grade II listed buildings Conservation areas Grade II registered parks and gardens Conservation areas Non-designated heritage assets (archaeological sites, historic buildings, monuments, park, gardens or landscapes) that can be shown to have demonstrable regional importance Averagely preserved historic landscape character areas, exhibiting reasonable coherence, time-depth or other critical factor(s) Historic townscapes with historic integrity in that the assets that constitute their make-up are clearly legible
Low	Locally listed buildings Non-designated heritage assets (archaeological sites, historic buildings, monuments, park, gardens or landscapes) that can be shown to have demonstrable local importance Assets whose values are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade

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

7.6.3 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 development. Impacts may arise during construction or operation and can be temporary, reversible, or permanent. Impacts can occur to the physical fabric of the asset or affect its setting. The contribution of the setting to the significance of any affected assets will be subject to assessment.

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

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

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

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

7.6.6 Major and moderate effects will be considered significant. Within the NPPF Section 16 Paragraphs 199-204 (Ref. 7) and NPS EN-1, section 5.8 Paragraphs 5.8.14 – 5.8.15 (Ref. 6), 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 NPPF. A major (significant) effect on a heritage asset would, however, more often be the basis by which to determine that the level of harm to the significance of the asset would be substantial. A moderate (significant) effect is unlikely to meet the test of substantial harm and would therefore more often be the basis by which to determine that the level of harm to the significance of the asset would be less than substantial. A minor or negligible (not significant) effect would still amount to a less than substantial harm. However, a neutral effect is classified as no harm.

7.6.7 Pursuant to NPS EN-1, Paragraph 5.8.15 (Ref. 6), any harmful impact to the significance of a designated heritage asset should be weighed against the public benefit of the Scheme, whilst Regulation 3 of the Infrastructure Planning (Decisions) Regulations 2010 (Ref. 37) requires the Secretary of State to have regard to the desirability of preserving a listed building or its setting. In all cases, the determination of the level of harm to the significance of the asset arising from development impact is one of professional judgement.

7.6.8 This baseline assessment will be undertaken in accordance with guidance set out by the CIfA and Historic England, in particular the Standard and Guidance for Historic Environment Desk-Based Assessment (Ref. 48) and the Code of Conduct (Ref. 49).

7.6.9 Principles of Cultural Heritage Impact Assessment in the UK (Ref. 50) 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.

Sources of information

Desk-based sources

7.6.10 Sources of information that will be consulted include:

- National Heritage List for England (NHLE) database (Ref. 50);
- Lincolnshire Historic Environment Record (HER) (Ref. 52) and Historic Landscape Characterisation (HLC);
- Various online resources including the British Geological Survey (BGS) Geology of Britain Viewer (Ref. 55) and the local planning portal for the Local Plan and other planning information;
- Published and unpublished literature (including a detailed review of reports for previous fieldwork carried out within the proximity to the Site boundary);
- Existing geotechnical data;
- Available LiDAR and aerial photography;
- Documentary, cartographic and other resources as deposited within the local Archives and Local Studies Library and the National Archives at Kew; and
- Local Planning Authority Plans, Guidance and Lists.

7.6.11 Consultation will be undertaken with the following bodies as part of the assessment process:

- The County Archaeologists for Lincolnshire and Nottinghamshire;
- Relevant Conservation Officers; and
- Historic England.

Walkover survey

7.6.12 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.

7.6.13 A site visit will also be undertaken to the study area 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.

Field Investigation

7.6.14 The desk-based research will be supported by a programme of archaeological evaluation surveys. A geophysical survey will be undertaken within areas of the Site boundary that are suitable for survey and where land access can be obtained by way of landowner agreement.

7.6.15 Further archaeological evaluation and detailed setting assessments will be undertaken as part of the assessment process, the scope of which will be informed by the desk-based analysis of information, the outcomes of the geophysical survey, and through consultation with relevant bodies.

7.7 Assumptions, Limitations and Uncertainties

7.7.1 It is assumed that there will be access to all required land to undertake both intrusive and non-intrusive archaeological surveys and evaluation, and that the results will be available to incorporate within the ES. In the event that access is not available, professional judgement will be used, based on available research and data, to assess the archaeological potential of the area.

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

8. Ecology and Biodiversity

8.1 Introduction

8.1.1 The Ecology and Biodiversity chapter in 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.

8.1.2 The assessment will identify prevention, avoidance, reduction, mitigation and, if necessary, compensation measures that may be required to enable the Scheme to proceed, in compliance with relevant nature conservation legislation and planning policies. It will demonstrate that due consideration has been given to ecological features, including recommendations for biodiversity enhancements.

8.1.3 Ecological surveys commenced in August 2021 and will continue in 2022, 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 (PEA), together with AECOM's professional judgement and local knowledge of the geographical area and range of important ecological features.

8.2 Study Area

8.2.1 The study area for ecological surveys includes the land within the Scheme and appropriate buffer zones, as described below.

8.2.2 The boundaries and zones for the ecology study area reflect standard industry good practice and the scoping distances that statutory consultees would typically expect to be considered for identification of features external to the Scheme that could be affected. This is informed by published guidance and professional judgement.

8.2.3 The desk study search was undertaken from the Site boundary and included:

- Sites of international nature conservation value (e.g. Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites, as well as proposed or potential sites) within 10km (see Figure 8-1), as well as any SACs within 30km where bats are noted as the, or one of the, qualifying features;
- Statutorily and non-statutorily designated sites of nature conservation value (e.g. Sites of Special Scientific Interest (SSSI), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) (which includes ancient woodland)) within 2km (see Figure 8-2);
- Ancient woodland and other notable habitats within 2km; and
- Records of protected or notable species up to 2km.

8.2.4 The desk study enabled determination of an appropriate study area, within which all important ecological features requiring assessment, as well as ecological features that could be directly or indirectly affected by the Scheme, will be subject to field survey. The study area varies according to the spatial characteristics of each species or habitat potentially impacted. A 'zone of potential influence' representing the areas within which effects could occur from the Scheme and associated activities will be identified and detailed in the assessment.

8.3 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 is outlined below.

Legislation

8.3.2 The applicable legislation includes:

- Regulation (EU) 1143/2014 on the introduction and spread of invasive alien species (IAS) (Ref. 60);
- The Environment Bill 2020 (once enacted) (Ref. 61);
- The Wildlife and Countryside Act (WCA) 1981, as amended (Ref. 62);
- The Countryside and Rights of Way Act 2000 (Ref. 63);
- The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. 64);
- The Natural Environment and Rural Communities (NERC) Act 2006 (Ref. 65);
- The Protection of Badgers Act 1992 (Ref. 66);
- The Hedgerows Regulations 1997 (Ref. 67);
- Animal Welfare Act 2006 (Ref. 68);
- Salmon and Freshwater Fisheries Act 1975 (Ref. 69);
- Eels (England and Wales) Regulations 2009 (Ref. 70);
- Invasive Alien Species (permitting and enforcement) Order 2019 (Ref. 71); and
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 72).

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

8.3.4 As part of the assessment of a development, it is necessary to consider whether the Scheme is likely to have a significant effect on areas that have been internationally designated for nature conservation purposes (i.e. European sites). European sites are protected under the Conservation of Habitats and Species Regulations 2017 (as amended; relevant to England and Wales) (Ref. 197). 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. 198) – make it clear that the need for Habitats Regulations Assessment (HRA) continues to apply.

8.3.5 The HRA will be undertaken with reference to the general EC guidance on HRA (Ref. 199), general guidance on HRA published by the UK government in July 2019 (Ref. 200) and Planning Inspectorate (PINS) Advice Note 10 (Ref. 201).

8.3.6 Although the UK has departed the EU, the HRA will nonetheless take account of relevant EU case law (for instance, the Holohan (Ref. 202) and People over Wind (Ref. 203) cases) as a precaution.

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

National Planning Policy

8.3.8 The Ecology and Biodiversity chapter will take account of relevant National Policy Statements (NPS) for solar, including relevant sections of updated versions of these NPSs. The following NPSs are considered important and relevant to the Scheme:

8.3.9 Overarching National Policy Statement for Energy (EN-1) (2011) (Ref. 6), with particular reference to paragraphs 4.2.2 and 4.2.3, which provide national policy on what an ES for a Nationally Significant Infrastructure Project (NSIP) project should contain; paragraph 4.3.1 which states what the Secretary of State must, under the Conservation of Habitats and Species Regulations 2017 consider when granting a development consent order; and Part 5 section 5.3 which sets out guidance on generic impacts relating to biodiversity for the applicant's assessment and decision-making on the application. The Draft

Overarching National Policy Statement for Energy (EN-1) (Ref. 6) (2021) includes guidance for biodiversity net gains in paragraphs 4.5.1 to 4.5.3 and generic impacts on biodiversity in Part 5.4.

8.3.10 The Draft National Policy Statement for Renewable Energy EN-3 (2021) (Ref. 73) now includes sections 2.47 to 2.54 (inclusive) which set out policy requirements specific to solar generation. The detail of these provisions are however subject to consultation and thereafter implementation.

8.3.11 Part 2.7 of the National Policy Statement for Electricity Networks Infrastructure (EN-5) (2011) (Ref. 5) sets out generic impacts concerning biodiversity, although these are more relevant to considerations for birds, their feeding and hunting grounds, migration corridors and breeding grounds, and potential implications on the above in light of the development proposals. This is also the same of Part 2.8 and 2.10 of the Draft National Policy Statement for Renewable Energy EN-3 (2021) (Ref. 73). However, paragraph 2.8.9 of EN-5 (2011) details biodiversity considerations when choosing an underground electricity line. This includes the environmental consequences as underground cables can disturb sensitive habitats.

8.3.12 The National Planning Policy Framework (NPPF) (Ref. 7), with particular reference to Section 15 and paragraphs 174, 175, 179, 180 and 181, 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

8.3.13 Local planning policies that are relevant to the Scheme and ecology and biodiversity are:

- Central Lincolnshire Local Plan 2012-2036, adopted 24 April 2017, specifically Policies LP20: Green Infrastructure Network and Policy LP21: Biodiversity and Geodiversity (Ref. 8); and
- Bassetlaw District Council Core Strategy and Development Management Policies DPD, adopted 22 December 2011, specifically Policy DM9: Green Infrastructure, Biodiversity & Geodiversity, Landscape; Open Space & Sports Facilities (Ref. 11).

Other Guidance

8.3.14 Other guidance documents relevant to the assessment of the impacts of the Scheme on ecology and biodiversity include:

- The 25-year Environment Plan (Ref. 74);
- Natural England and Department for Environment, Food and Rural Affairs (DEFRA) Standing Advice (protected species) (Ref. 75);
- UK Post 2010 Biodiversity Framework (Ref. 76);
- Lincolnshire Biodiversity Action Plan (3rd edition) (Ref. 77); and
- Nottinghamshire Biodiversity Action Plan (Ref. 78).

8.4 Baseline Conditions

8.4.1 The known or predicted ecological baseline conditions are summarised in the following sections.

Statutory Sites

8.4.2 Statutory sites that are designated for nature conservation were identified through a review of the Multi-Agency Geographic Information for the Countryside (MAGIC) (Ref. 79) website within the study area. There are no international sites designated for nature conservation within 10km of the Site boundary. There are two national sites designated for nature conservation within 2km of the Site boundary. These sites are shown on Figure 8-1 and summarised below in Table 8-1.

Table 8-1: Statutorily Designated Sites within 10km (international) and 5km (national) of the Site boundary

Site Name	*Description*	*Distance (km) and direction from closest point of the Site*
Ashton's Meadow SSSI	The reserve is an ancient meadow and has not been chemically treated or ploughed in recent times. The ancient ridges and furrows are clearly visible. This traditional meadow has a variety of flowers and grasses, including Cowslips *Primula veris*, Green-winged Orchid Anacamptis *morio*, Oxeye Daisy *Leucanthemum vulgare* and Yellow Rattle *Rhinanthus minor*. It is maintained by a traditional method of allowing the grassland to grow throughout the spring and early summer, before cutting it back for hay in July. The livestock on site then keep the grass short through late summer and autumn before being removed just before Christmas, a method that maintains a wide variety of flora, moths and butterflies on the reserve. The grassland also offers a home for moths and ground based species of butterfly like the Meadow Brown *Maniola jurtina*, Ringlet *Aphantopus hyperantus* and Gatekeeper *Pyronia tithonus*. The hedgerows around the site are another important habitat, supporting bird species such as Yellowhammer *Emberiza citronella.*	1.5km to the west of the Grid Connection Corridor Option
Lea Marsh SSSI	Lea Marsh is an important area of unimproved floodplain meadow and wet pasture adjacent to the River Trent in north-west Lincolnshire. The site lies on seasonally-inundated alluvial soils and includes an unusually large area of a nationally rare grassland type. Populations of two nationally scarce plants with a restricted distribution in the East Midlands are particularly notable, whilst breeding waders provide additional interest.	1.7km to the north-west of the Site boundary

Non-statutory Sites

8.4.3 There are 11 non-statutory sites designated for nature conservation identified within 2km of the Site boundary. These sites have been designated as Local Wildlife Sites (LWS) 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 2km of the Site

Site Name	*Description*	*Distance and direction from closest point of the Site*
Littleborough Lagoons LWS	This lagoon, surrounded by sheep-grazed pasture, is situated beside the River Trent near the historic hamlet of Littleborough. The relatively shallow water contained an interesting aquatic flora at the time of the last survey in 2012, however due to the hot, dry summer the water levels were low and eutrophic with much algae and expanses of exposed mud. Despite this Bulbosus Rush *Juncus bulbosus* was found growing in the lagoon while muddy areas were being colonised by typical Trentside annual plants including Creeping Yellow-cress *Rorippa sylvestris*, Celery-leaved Buttercup *Ranunculus sceleratus* and Red Goosefoot *Chenopodium rubrum*.	Within the Grid Connection Corridor Options
Coates Wetland LWS	The River Trent meanders around this site comprising a mosaic of habitats including wetland, developing woodland and grassland enclosed within a flood bank. The site was sheep-grazed and very dry at the time of the last survey. The eastern half of the site is dominated by grassland and tall ruderal vegetation with abundant False Oat-grass *Arrhenatherum elatius* and stands of Creeping Thistle *Cirsium arvense* interspersed with patches of Wild Angelica *sylvestris* and Purple Loosestrife *Lythrum salicaria* on damper soils. To the north a developing woodland is dominated by a variety of willow Salix sp. species. Damper areas on the western side of the site include a seasonally wet area, dry at the time of the survey but supporting a number plant species typical of a Trentside inundation community. These include Marsh Yellow-cress *Rorippa palustris*, Pink Water-speedwell *Veronica catenata* and Marsh Dock *Rumex palustris*. To the south a small, deeper pond is edged by species such as Greater Pond-sedge *Carex riparia*, Reed Sweet-grass *Glyceria maxima* and Yellow Iris *pseudacorus*. The site is bounded to the west by a flood bank with an area of marshy grassland/tall ruderal vegetation and a drainage channel containing locally dominant Branched Bur-reed *Sparganium erectum*, Gypsywort *Lycopus europaeus* and Water-plantain *Alisma plantago-aquatica*.	Within the Grid Connection Corridor Options
Cottam Wetlands LWS	Part of the former Cottam Power Station, these wetlands are a former ash disposal site.	Within the Grid Connection Corridor Option
Mother Drain, Upper Ings LWS	Mother drain is notable for water beetles.	Within the Grid Connection Corridor Option
Thornhill Lane Drain, Littleborough LWS	This stretch of drain meanders through intensively farmed arable land. It supports a variety of aquatic plants including Blunt-fruited Water-starwort *Callitriche obtusangula* and the *county*-rare Opposite-leaved Pondweed *Groenlandia* densa. Among the marginal species are Branched Bur-reed *Sparganium erectum*, Reed Sweet-grass and Reed Canary-grass *Phalaris arundinacea*. The drain supports a number of rushes Juncus sp., along with Pink Water-speedwell *Veronica catenata*, Water cress *Nasturtium officinale* and Amphibious Bistort *Persicaria amphibia*.	Within the Grid Connection Corridor Option

Site Name	*Description*	*Distance and direction from closest point of the Site*
Cow Pasture Lane Drains LWS	These drains are notable for their bankside vegetation and aquatic features.	Within the Grid Connection Corridor Option
Torksey Ferry Road Ditch LWS	Not known	Within the Grid Connection Corridor Option
Knaith Park Wood LWS	Located on the north side of Knaith Park, this site comprises Moor Plantation and Stag Wood. The latter is ancient woodland, although it is only Moor Plantation that has a canopy of old deciduous trees. In contrast, the western half of Stag Wood is mature Corsican pine plantation, while the eastern half appears to have been felled a few decades ago but is not yet mature. Overall, the site has a good range of woodland indicator species and some nice wetland, but there are no rides and access is difficult, particularly in the east.	Approximately 20m from the Solar PV Site
05/324 LWS	Not known	Approximately 85m from the Grid Connection Corridor Option
Out Ings LWS	Adjacent to the River Trent Out Ings is a floristically rich site comprising a diverse mosaic of grassland, willow carr, open water and wetland. Stands of Common Reed *Phragmites australis* and Reed Sweet-grass grow around the wetland margins with willow *Salix* sp. carr dominating the central area.	Approximately 405m from the Grid Connection Corridor Option
Thurlby Wood LWS	This 38ha site to the south-east of Gainsborough is contiguous with Caistor's Wood to the north. Most is considered to be semi-natural ancient woodland, and all parts are of significant botanical interest. Management to favour the flora and fauna takes place as far as limited resources allow, including ride-side coppicing, annual ride cutting, pond maintenance and bramble & bracken clearance.	Approximately 420m from the Solar PV Site
Broad Lane Grassland, North Leverton LWS	A neutral grassland, cut for hay.	Approximately 815m from the Grid Connection Corridor Option
Priory Farm LWS	This area is predominantly wooded, but with a partially open southern fringe. At the northern end there is an east-west track bisecting a strip of nice pasture that has an excellent shallow ditch on its northern edge.	Approximately 990m from the Solar PV Site
Ashton's Meadow LWS	See Ashton's Meadow SSSI in Table 8-1	1.5km to the west of the Grid Connection Corridor Option

Figure 8-1: Statutory Ecological Sites

Revision: 0 Drawn: BF Checked: DH Approved: RW Date: 2021-11-12

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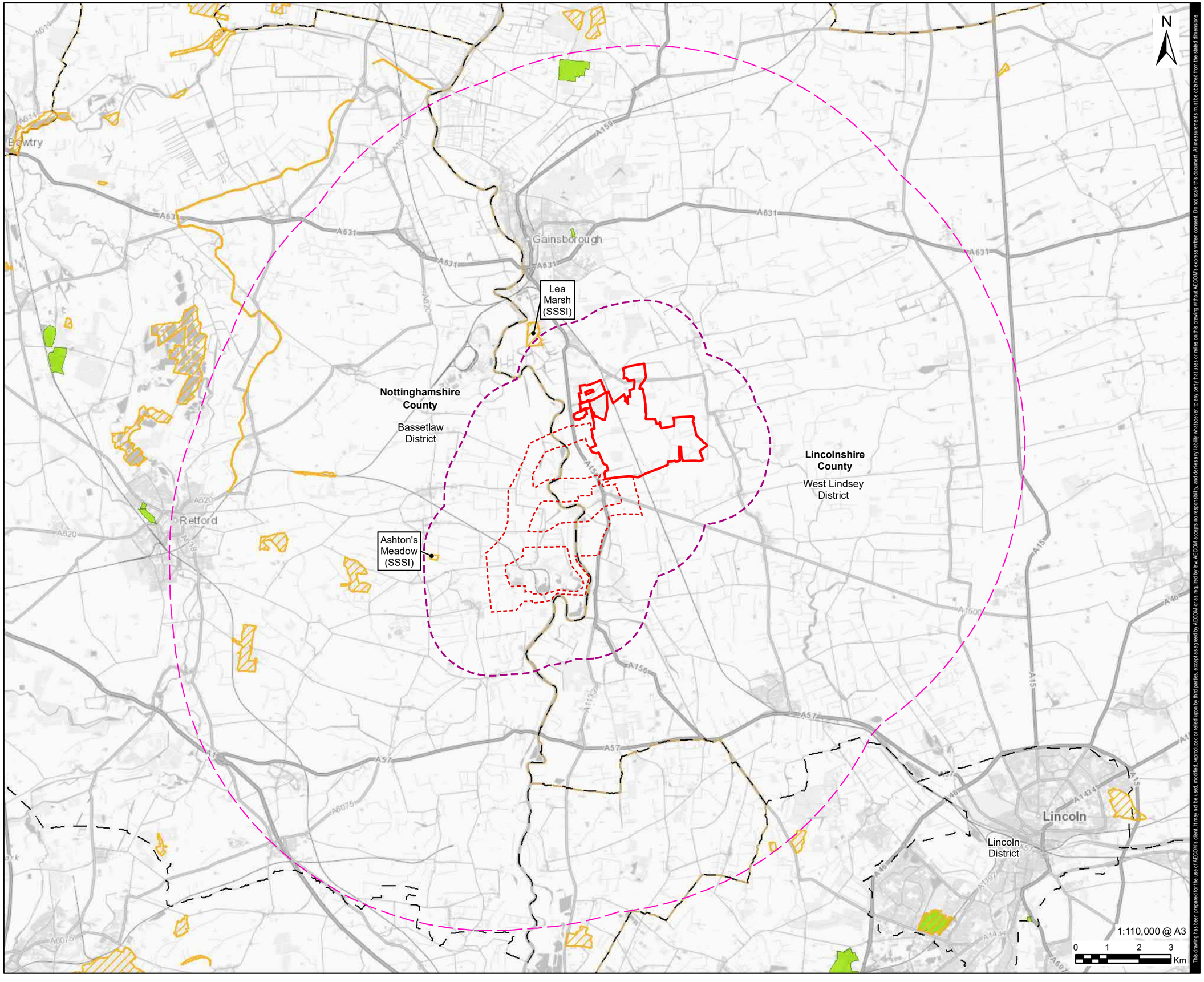

AECOM

PROJECT

Gate Burton Energy Park

CLIENT

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LEGEND

- Main Site
- Cable Route Boundary
- 2km Scheme Buffer
- 10km Scheme Buffer

Other Statutory Sites, within 2km of proposed site

- Site of Special Scientific Interest (SSSI)
- Local Nature reserve (LNR)
- District Boundary
- County Boundary

NOTES

ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

60664324

FIGURE TITLE

Sites statutorily designated for nature conservation value

FIGURE NUMBER

Figure 8.1

Figure 8-2: Non-Statutory Ecological Sites

Revision: 0 Drawn: BF Checked: DH Approved: RW Date: 2021-11-12

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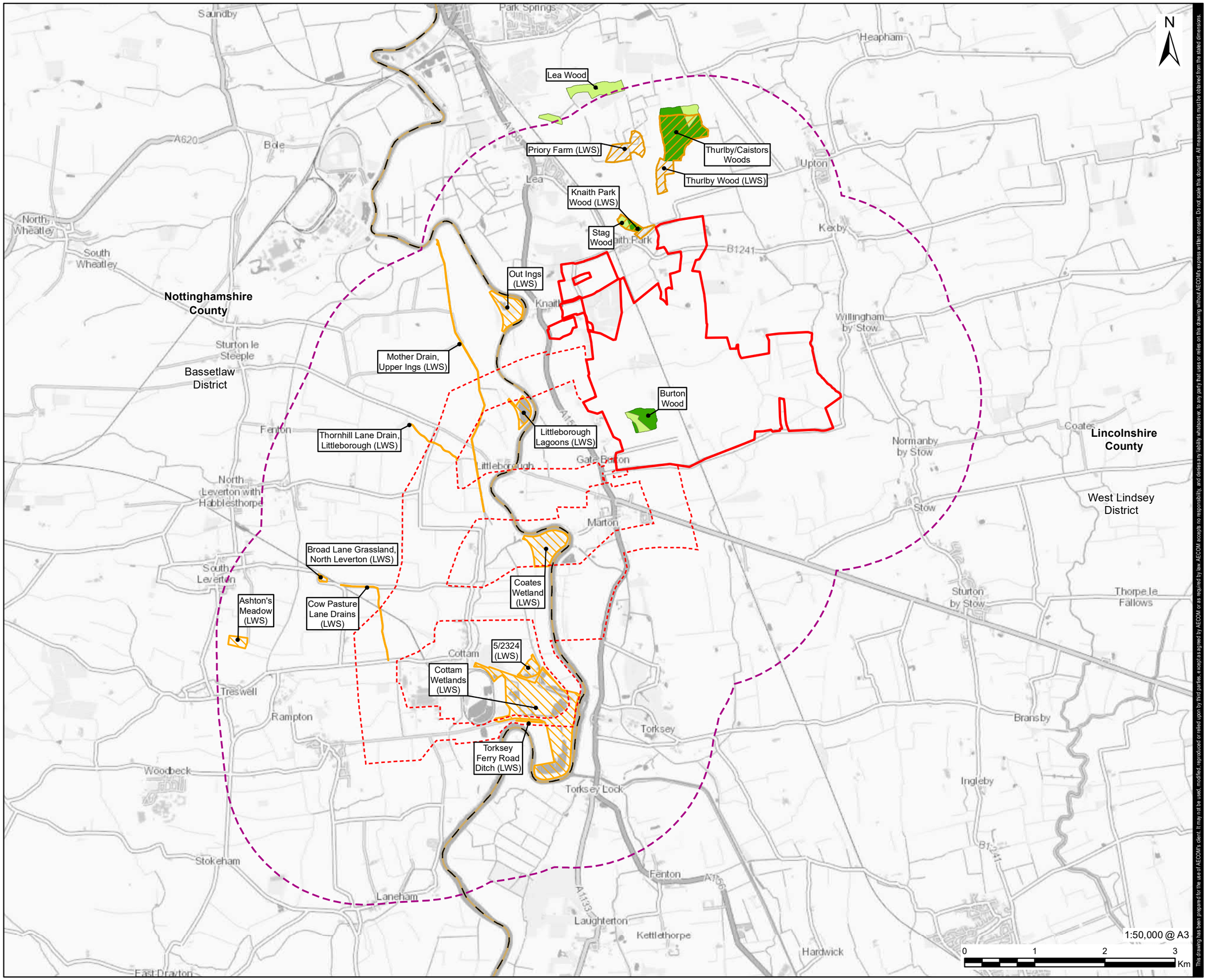

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LEGEND

- Solar PV site
- Grid Connection Corridor Options
- 2km Scheme Buffer
- District Boundary
- County Boundary
- Lincolnshire local wildlife site
- Nottinghamshire local wildlife site
- Ancient & Semi-Natural Woodland
- Ancient Replanted Woodland

NOTES

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ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

60664324

FIGURE TITLE

Non statutory sites designated for nature conservation value

FIGURE NUMBER

Figure 8.2

Habitats

8.4.4 There are five areas of ancient woodland within 2km of the Site boundary. Burton Wood is within the Site boundary and Stag Wood is approximately 195m to the north of the Site boundary. Thurlby/Caistor's Wood is approximately 835m north of the Site boundary and Lea Wood and an unnamed woodland (which both include replanted woodland) are approximately 1.9km to the north of the Site boundary.

8.4.5 Priority habitats under Section 41 of the NERC Act 2006 (Ref. 80) present or likely to be present (where determination by further survey is required) on land within the Site boundary include: ancient and/or species rich hedgerows, rivers, standing water/ponds, arable field margins and lowland mixed deciduous woodland. These habitats have potential to support a range of protected and notable species.

Species

8.4.6 The desk study identified records of protected or notable species of flora and fauna within the 2km study area. These include:

- Scarce and 'near threatened' plants, including *Juncus compressus, Persicaria mitis* and *Callitriche truncata*;
- Four amphibian species (Great Crested Newt *Triturus cristatus*, Smooth Newt *Lissotriton vulgaris*, Common Frog *Rana temporaria*, and Common Toad *Bufo bufo*);
- Sixty-six bird species, including Peregrine *Falco peregrinus*, Hobby *Falco subbuteo*, Golden Plover *Pluvialis apricaria*, Barn Owl *Tyto alba*, Cetti's Warbler *Cettia cetti*, Kingfisher *Alcedo atthis* and Red Kite *Milvus*;
- Several invertebrate species, including two species of beetle; one butterfly species (Small Heath *Coenonympha pamphilus*), three molluscs and 35 moth species;
- One reptile species (Grass Snake *Natrix helevtica*);
- At least six bat species (Brown Long-eared *Plecotus auritus*, Common Pipistrelle *Pipistrellus*, Noctule *Nyctalus noctule*, Natterer's bat *Myotis nattereri*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Daubenton's bat *Myotis daubentonii*, and *Myotis sp*.);
- Five notable mammal species (Brown Hare *Lepus europaeus*, Eurasian Badger *Meles meles*, European Otter *Lutra lutra*, European Water Vole *Arvicola amphibius* and West European Hedgehog *Erinaceus europaeus*);
- Two fish species (European Eel *Anguilla anguilla*, Roach *Rutilus rutilus*); and
- Five invasive species, including Mitten Crab *Eriocheir sinensis*, American Mink *Mustela vison*, New-Zealand Pigmyweed *Crassula helmsii*, Himalayan Balsam *Impatiens glandulifera* and Japanese Knotweed *Reynoutria japonica*.

8.4.7 Several of these species are offered full or part protection under the Wildlife and Countryside Act 1981. Several species recorded within the study area are also listed on the UK Biodiversity Action Plan (UKBAP); on Section 41 of the NERC Act 2006 as being of priority conservation concern and listed as a priority habitat or species in Nottinghamshire or Lincolnshire. Full details of these species and their legal status and conservation value will be provided in the Ecology and Biodiversity chapter.

Additional Survey Requirements

8.4.8 The PEA, which consists of a Phase 1 Habitat Survey (following the established JNCC methodology (Ref. 81)) and Protected Species Scoping Survey, will confirm the requirements for further surveys to support the ecology and nature conservation impact assessment, but these are anticipated to include the following:

- Botanical surveys including for any invasive non-native plant species, arable flora, grasslands and hedgerows;

- Aquatic habitat and species surveys including for any invasive non-native species (potentially including River Habitat Surveys, macrophytes, macroinvertebrates and fish surveys);
- Terrestrial invertebrate surveys;
- Reptile presence/absence surveys;
- Habitat Suitability Index (HSI) assessment and Great Crested Newt eDNA surveys at ponds identified on and within 500m of the Scheme;
- Great Crested Newt population size surveys (where applicable);
- Breeding bird surveys, including targeted surveys for species listed on Schedule 1 of the Wildlife and Countryside Act, 1981;
- Non-breeding (Wintering) bird surveys;
- Preliminary roost assessment (PRA) of trees, buildings and structures (including tree climbing surveys for bats (where applicable));
- Bat activity surveys;
- Dusk emergence and dawn return surveys of trees, buildings and structures, where impacts are known, or likely to occur;
- Badger surveys; and
- Tiparian mammal surveys (Otter and Water Vole).

8.4.9 A habitat conditions assessment will also be undertaken on land within the Scheme boundary in order to perform a BNG assessment. 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.

Table 8-3 Study Areas and methods to be used during further ecological surveys

Receptor	*Study Area and Survey methodology reference*
Botanical surveys including for any invasive non-native plant species, arable flora, grassland and hedgerows	Site only and using relevant evaluation criteria for *e.g.* arable flora, grasslands and hedgerows
Aquatic habitat and species surveys including for any invasive non-native species (potentially including River Habitat Surveys, macrophytes, macroinvertebrates and fish surveys)	1km from the proposed Scheme boundary. Environment Agency, The River Habitat Survey in Britain and Ireland Field Survey Guidance Manual. Environment Agency; Peterborough, 2003. European Committee for Standardization, BS EN 14184: 2014 Water quality. Guidance for the surveying of aquatic macrophytes in running waters, 2014. WFD-UKTAG, River Assessment Method. Macrophytes and Phytobenthos. Macrophytes (River LEAFPACS2), 2014. Water Framework Directive – United Kingdom Technical Advisory Group (WFD-UKTAG). River Assessment Method. Benthic Invertebrate Fauna. Invertebrates (General Degradation): Whalley, Hawkes, Paisley & Trigg (WHPT) metric in River Invertebrate Classification Tool (RICT). 2014. WFD-UKTAG. Lake Assessment Methods: Benthic Invertebrate Fauna, Chironomid Pupal Exuviae Technique (CPET), 2008. CIEEM 2018 Guidelines for Ecological Impact Assessment in the UK and Ireland.
Terrestrial invertebrate surveys	Within and immediately adjacent to proposed Scheme boundary. Professional judgement, based on the habitat.
Reptile presence/ absence surveys	Within and immediately adjacent to the Site. Professional judgement, based on the habitat and Froglife's Advice Sheet 10 for Reptile Surveys.
Habitat Suitability Index (HSI) assessment and Great Crested Newt eDNA surveys and	Up to 500m from the Site. Oldham *et al.,* (2001).

Receptor	*Study Area and Survey methodology reference*
Great Crested Newt population size surveys (where applicable)	
Breeding bird surveys, including targeted surveys for species listed on Schedule 1 of the Wildlife and Countryside Act (WCA), 1981	Up to 50 m from the Site using methods for territory mapping, based on Bibby *et al.* (2000) and Gilbert *et al.* (1998). Survey area will be extended out and species—specific methods used, as appropriate, for any species listed on Schedule 1 of the WCA, 1981.
Non-breeding (Wintering) bird surveys	Up to 50 m from the Site using methods for transect surveys as based on Bibby *et al.* (2000) and Gilbert *et al*. (1998).
PRA survey of trees, buildings and structures (including tree climbing surveys for bats (where applicable)) Bat activity surveys Dusk emergence and dawn return surveys of buildings, structures and trees (if applicable and impacted upon by the Scheme)	Up to 50 m from the Site using guidance by the Bat Conservation TrustCollins (2016).
Badger surveys	Up to 50 m from the Site using methods as described in Harris *et al.*, (1989) and Scottish Badgers, (2018).
Riparian mammal surveys (Otter and Water Vole)	Watercourses up to 200 m from the Site and up to 50m within terrestrial habitats. Dean, M. *et. al* (2016); Strachan *et. al* (2011) Environment Agency, 2010, Chanin, 2003.

8.5 Value of ecological resources and receptors

8.5.1 To support focussed ecological impact assessment, there is a need to determine the scale at which the relevant ecological features identified through the desk studies and field surveys undertaken for the Scheme are of value. A hierarchical geographical approach will be used to assign nature conservation resource importance (or value) based upon those within the Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM) (Ref. 82) (hereafter referred to as the CIEEM guidelines) and professional judgement.

8.5.2 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 proposed Scheme. In its guidance, CIEEM makes clear that there is no need to "*carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable*". 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.

8.5.3 The frames of reference used for the assessment, based on Section 4.7 in the CIEEM guidelines will be:

- International (generally this is within an 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 (East Midlands);
- County (Lincolnshire and Nottinghamshire);
- District (West Lindsey and Bassetlaw); and

- Local (has value at the 'Site' level).

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

8.5.5 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 the great crested newt 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 great crested newt is internationally important. It is important to consider the particular population in its context. Therefore, in assigning values to species, the geographic scale at which they are important will be considered. The assessments of value rely on the professional opinion and judgment of experienced ecologists.

8.5.6 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.

8.5.7 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.

8.5.8 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.

8.6 Potential Effects and Mitigation

Construction

8.6.1 There is the potential for the following impacts associated with construction activity on important ecological features which may result in significant effects:

- 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;
- Habitat degradation – direct or indirect impacts resulting in the reduction in the condition of a habitat and its suitability for some or all of the species it supports, for example changes in chemical water quality or changes in surface flow or groundwater and
- Species mortality – direct impacts on species populations associated with mortalities due to construction activities, for example site clearance.

Operation

8.6.2 The operation of the Scheme may result in significant effects on important ecological features and these effects may include:

- Changes to foraging and commuting habitats, e.g. from agriculture (arable crops/cattle grazing) to grassland (potentially cut or grazed);

- Potential attraction to or avoidance by species such as bats and birds to the solar panels from potential increases in prey (i.e. flying insects), potential noise attraction/disturbance from a Battery Energy Storge System (BESS), operational compound and solar panels, barrier effects;
- Potential for nesting and/ or roosting in new infrastructure; and
- Indirect beneficial impacts through a possible reduction of agriculture chemical inputs to soil and watercourses, reduction in pesticide use on crops within the local area resulting in an increase in prey availability.

8.6.3 Whilst it is considered unlikely, the potential for the PV panels (during operation) to attract congregations of birds, which may lead to displacement of populations and increase the risk of mortality (through collision), will also be considered.

Decommissioning

8.6.4 Impacts on biodiversity features during decommissioning of the Scheme are likely to be the same as construction.

Potential Mitigation and Enhancement

8.6.5 Compliance with planning policy 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).

8.6.6 BNG is defined 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 either on-site, off-site or through a combination of on-site and off-site measures.

8.6.7 Therefore, a BNG assessment will be undertaken (using Defra Metric 3.0 or the most up to date metric) 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 Bill (Ref. 61), the NPPF (Ref. 7) and local planning policy: Central Lincolnshire Local Plan (Ref. 8) and Bassetlaw District Council Core Strategy and Development Management Policies DPD (Ref. 11).

8.7 Assessment Methodology

8.7.1 The approach used for the ecological impact assessment (EcIA) will be undertaken in accordance with best practice guidance as published in the CIEEM guidelines (Ref. 82) and summarised below.

8.7.2 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 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 incorporated design 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 are reported; and
- Scope for ecological enhancement is considered.

8.7.3 The ecological surveys to be conducted between 2021 and 2022 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.

8.7.4 The 'zone of influence' for the Scheme (see also section 8.2) is the area over which ecological features may be affected by changes as a result of the Scheme and associated activities. The zone of influence 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 evolves.

8.7.5 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.

8.7.6 In line with Section 1.21 in the CIEEM guidelines (Ref. 82), 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, construction activities of a development removing a hedgerow; and
- **Effect** – outcome resulting from impact acting upon the conservation status or structure and function of an ecological feature. For example, the effects on a population of bats as a result of the loss of a bat roost.

8.7.7 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):

- **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;
- **Timing** and **frequency** – i.e. consideration of the point at which the impact occurs in relation to critical life-stages or seasons; and
- **Reversibility** – i.e. is the impact temporary or permanent. A temporary impact is one from which recovery is possible or for which effective mitigation is both possible and enforceable. A permanent effect is one from which recovery is either not possible or cannot be achieved within a reasonable timescale (in the context of the feature being assessed).

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

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

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

8.7.10 Sections 5.24 to 5.28 in the CIEEM guidelines (Ref. 82) 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".

"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)".

8.7.11 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.

8.7.12 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.

Table 8-4 Relating CIEEM assessment terms to those used in other EIA chapters

Effect classification terminology used in other EIA chapters	*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.

Effect classification terminology used in other EIA chapters	*Equivalent CIEEM assessment*
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 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.

8.8 Assumptions, Limitations and Uncertainties

8.8.1 The following assumptions and limitations have been noted during the scoping:

- Baseline ecological surveys commenced in August 2021 and will continue through 2022 to determine the baseline ecological conditions. The surveys may highlight new important ecological features with potential to be significantly affected which have not been identified (or considered not to be significant) at this stage of the assessment;
- An assumption has been made that the following habitats will be retained as part of the Scheme: woodlands, ponds, watercourses and the majority of hedgerows; and
- 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.

9. Water Environment

9.1 Introduction

9.1.1 This chapter relates to the potential effects of the Scheme on surface water bodies (e.g. rivers, streams, ditches, canals, lakes and ponds) including water quality and hydromorphology, flood risk and drainage. This chapter also considers potential effects on hydrogeology, with ground condition issues discussed in Chapter 15 Other Environmental Topics. The potential for likely significant effects as a result of the Scheme on the water environment, the scope for mitigation, and how it is proposed to assess the significance of these potential effects, is described.

9.2 Study Area

9.2.1 For the purposes of this assessment, a study area of approximately 1km from the Site boundary and Grid Connection Corridor Options has been considered in order to identify water bodies that are hydrologically connected to the Site boundary, and have the potential to be directly impacted by the activities associated with the Scheme (see Figure 9-1).

9.2.2 Given that watercourses flow and water quality and flood risk impacts may propagate downstream, where relevant, the assessment will also consider a wider study area to include 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.

9.3 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 Scheme includes the following (please note that details of European Directives are not included, just the national legislation that transposes them):

- Water Act 2014 (Ref. 83);
- Flood and Water Management Act 2010 (Ref. 84);
- Environment Act 1995 (Ref. 85);
- Environmental Protection Act 1990 (Ref. 86);
- Land Drainage Act 1991 (as amended) (Ref. 88);
- Water Resources Act 1991 (as amended) (Ref. 89);
- Salmon and Freshwater Fisheries Act 1975 (as amended) (Ref. 90);
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 91);
- The Environmental Damage (Prevention and Remediation) Regulations 2017 (as amended) (Ref. 92);
- Environmental Permitting (England and Wales) Regulations 2016 (as amended 2018) (Ref. 93);
- Groundwater (England and Wales) Regulations 2009 (Ref. 94);
- Eels (England and Wales) Regulation 2009 (Ref. 95);
- Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref. 96).
- The Water Resources Act (Amendment) (England and Wales) Regulations 2009 (Ref. 97);

- The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 (Ref. 84);
- The Control of Substances Hazardous to Health (Amendment) Regulations 2004 (Ref. 96);
- The Anti-Pollution Works Regulations 1999 (Ref. 101); and
- The Water Framework Directive (Standards and Classification) Directions 2015 (Ref. 100).

9.3.3 The UK Government is currently proposing a new Environment Bill (Ref. 61) that will supersede many of the existing regulations that transposed European Directives into law in the UK. The timetable for this Bill is uncertain but given its relevance to the assessment of environmental impacts it will also be considered.

National Planning Policy

National Policy Statements

9.3.4 The following planning policies from relevant National Policy Statements (NPS) have been taken into account as part of identifying the assessment methodology, receptor selection/sensitivity, potential significant environmental effects, and mitigation:

- NPS EN-1 (Ref. 6) with particular reference to section 5.15 (water quality and resources) paragraphs 5.15.1 to 5.15.10 regarding what an ES should describe which includes: the existing water quality, the existing water resources, and the physical characteristics of the water environment.
- Additionally, paragraph 4.8.6 states that applicants for new energy infrastructure must take into account the potential impacts of climate change, including the most up to date UK climate change projections, and adopt appropriate mitigation or adaption measures for the lifetime of the propose infrastructure.
- Paragraphs 5.15.4 – 7 outline the decision-making process with regard to water pollution, and more weight is attributed to any impacts that would have an adverse effect on the achievement of environmental objectives under the Water Framework Directive (WFD). Within paragraphs 5.15.8-10 it is stated that the possible requirement for mitigation measures over and above those included within the application should be considered by the examining authority.
- National Policy Statement for Renewable Energy (NPS EN-3) (Ref. 73). Although this technology specific NPS does not cover solar developments it is considered an important and relevant policy document. It highlights the importance of considering potential impacts on water quality, water resources and flood risk, and taking into account climate change.
- Paragraph 2.4.1 of the National Policy Statement for Electricity Networks Infrastructure (NPS EN-5), (Ref. 5) sets out that applications should demonstrate the extent of vulnerability of the proposed development and as appropriate how resilient it would be to flooding. It refers to section 4.8 of EN-1 which advises that the resilience of a project to climate change should be assessed in the ES and that future increased risk of flooding would be covered in a Flood Risk Assessment (FRA).

Draft National Policy Statements

9.3.5 Revised Draft National Policy Statements were released by the UK Government for consultation in September 2021. Notably, the National Policy Statement for Renewable Energy (NPS EN-3) now includes a specific section on solar developments. With regard to the water environment, the requirements include:

- A FRA should be provided taking into consideration the impact of drainage.
- Where access tracks are needed, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS) should be used to control runoff.
- Given the temporary nature of solar farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses.

- Culverting existing watercourses/drainage ditches should be avoided. When unavoidable, it should be demonstrated that no reasonable alternatives exist and where necessary it will only be for the construction period.

National Planning Policy Framework

9.3.6 National Planning Policy Framework (NPPF) 2021 (Ref. 102) paragraphs 159 to 169, states that for developments over 1ha a Flood Risk Assessment (FRA) is required; and paragraph 174 'conserving and enhancing the natural environment' includes a statement that development will be prevented that produces unacceptable levels of water pollution; annex 3: flood risk vulnerability classification, classifies solar farms as essential infrastructure.

National Planning Practice Guidance

9.3.7 The National Planning Practice Guidance (Ref. 103) provides planning guidance on a range of topics including flood risk. Planning Policy Guidance (updated August 2021) for Flood Risk and Coastal Change provides additional guidance in the implementation of NPPF.

Other Policy and Guidance

9.3.8 Consideration will also be given to:

- The UK Government's 25 Year Environment Plan (Ref. 106);
- The UK Government's Future Water Strategy (2011) (Ref. 107);
- The Non-statutory technical standards for Sustainable Drainage Systems (SuDS) (Ref. 108);
- The Building Regulations 2010 Approved Document H Drainage and Waste Disposal (Ref. 109); and
- The BRE Digest 365: Soakaway Design and Sewers for Adoption (7th Edition, 2012) (Ref. 110).

Regional Guidance

9.3.9 At a regional level, water management is coordinated through ten River Basin Management Plans (RBMPs). RBMPs are prepared by the Environment Agency for six-year cycles and set out how organisations, stakeholders and communities will work together to improve the water environment. The most recent plans were published in 2015 (the second cycle) and will remain in place until after 2021. The study area falls under the Witham Management Catchment within the Anglian RBMP (Ref. 114) and the Lower Trent and Erewash Management Catchment within the Humber RBMP (Ref. 115).

Local Planning Policy

9.3.10 The Scheme study area spans two county districts: Lincolnshire and Nottinghamshire. The following local planning policy will also be taken into consideration:

Central Lincolnshire Local Plan (2017)

9.3.11 Central Lincolnshire Local Plan 2012 - 2036 (2017) (Ref. 52) includes several relevant policies, particularly Policy LP14 (Managing Water Resources and Flood Risk), LP18 (Climate Change and Low Carbon Living), LP19 (Renewable Energy Proposals) and LP20 (Green Infrastructure Network).

Bassetlaw District Council Core Strategy (2011)

9.3.12 Bassetlaw District Council Core Strategy (Ref. 11) seeks to ensure that all new development reduce or mitigate flood risk; realise opportunities to utilise renewable and low carbon energy sources and/or infrastructure, alongside sustainable design and construction and make use of Sustainable Drainage Systems (SuDS). Relevant development management policies include DM10 (Renewable and Low Carbon Energy) and DM12 (Flood Risk, Sewerage and Drainage).

Draft Bassetlaw Local Plan 2020 – 2037 (2021)

9.3.13 The Draft Bassetlaw Local Plan 2020 – 2037 (2021) (Ref. 53) is likely to be adopted in 2022, and has numerous relevant policies including Policy ST51 (Renewable Energy Generation), Policy ST52 (Flood Risk and Drainage) and Policy ST53 (Protecting Water Quality and Management).

Lincolnshire County Council SuDS Guidance (2018)

9.3.14 In 2018, Lincolnshire County Council produced the 'Sustainable Drainage Design and Evaluation Guide' (Ref. 116). This guide links the design of SuDS with the evaluation requirements of planning to facilitate consultation in order to achieve the best possible SuDS design. It is primarily intended for use by developers, designers and consultants who are seeking guidance on the Lead Local Flood Authority (LLFA) standards for the design of sustainable surface water drainage in Lincolnshire.

9.3.15 All major developments will be required to incorporate water management measures to reduce surface water runoff and ensure that it does not increase flood risk elsewhere by considering all sources of flood risk both to and from a proposed scheme. The principal method to do so should be the use of SuDS. Surface water runoff should be managed to ensure that there is no increase in surface water flow rate run off.

9.4 Baseline Conditions

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

- British Geological Survey (BGS) online Borehole and Geology Mapping (Ref. 117);
- Online Ordnance Survey (OS) maps viewed to identify any surface water bodies within 1km of the Scheme as well as general topography and land uses (Ref. 118);
- Cranfield Soilscapes Map (Ref. 119)
- Meteorological Office website for general climate information for the study area (Ref. 120);
- National River Flow Archive website (Ref. 122);
- Environment Agency Catchment Data Explorer tool (Ref. 121);
- Defra's Multi-agency geographical information for the countryside website (MAGIC) map (Ref. 79);
- Natural England website for designated sites (Ref. 125);
- Environment Agency Online Interactive Maps (Ref. 126):
  - Flood map for planning (rivers and sea);
  - Risk of flooding from surface water;
  - Risk of flooding from reservoirs; and
  - Flood warning areas and risk.

9.4.2 Where relevant, water bodies and their attributes have been presented in a series of figures that support this chapter. Figure 9-1 presents surface and groundwater bodies, Figure 9-2 shows Environment Agency flood zones and Figure 9-3 shows surface water flood risk.

9.4.3 Further review of existing geological plans, hydrogeological data and site investigation data will be carried out at the Preliminary Environmental Information (PEI) stage to provide a preliminary assessment of local ground and groundwater conditions.

9.4.4 In addition, further information and data relevant to the identification of all receptors and their attributes will be obtained from the Environment Agency and local councils and will be presented in the next stages of the assessment (i.e. the PEI Report). This will include water quality, water resources (such as pollution incidents, abstraction licences and water activity permits (consented discharges), hydrogeology (e.g. groundwater levels), WFD data and flooding data.

9.4.5 An initial site walkover was undertaken on 22 September 2021 in fair conditions. The aim of this site visit was to assess watercourse connectivity, quality, and condition. Further site visits would be undertaken at the impact assessment stage when design details have been finalised.

Figure 9-1: Surface Waterbodies and Attributes

Revision: 0 Drawn: VC Checked: DH Approved: RW Date: 2021-11-12

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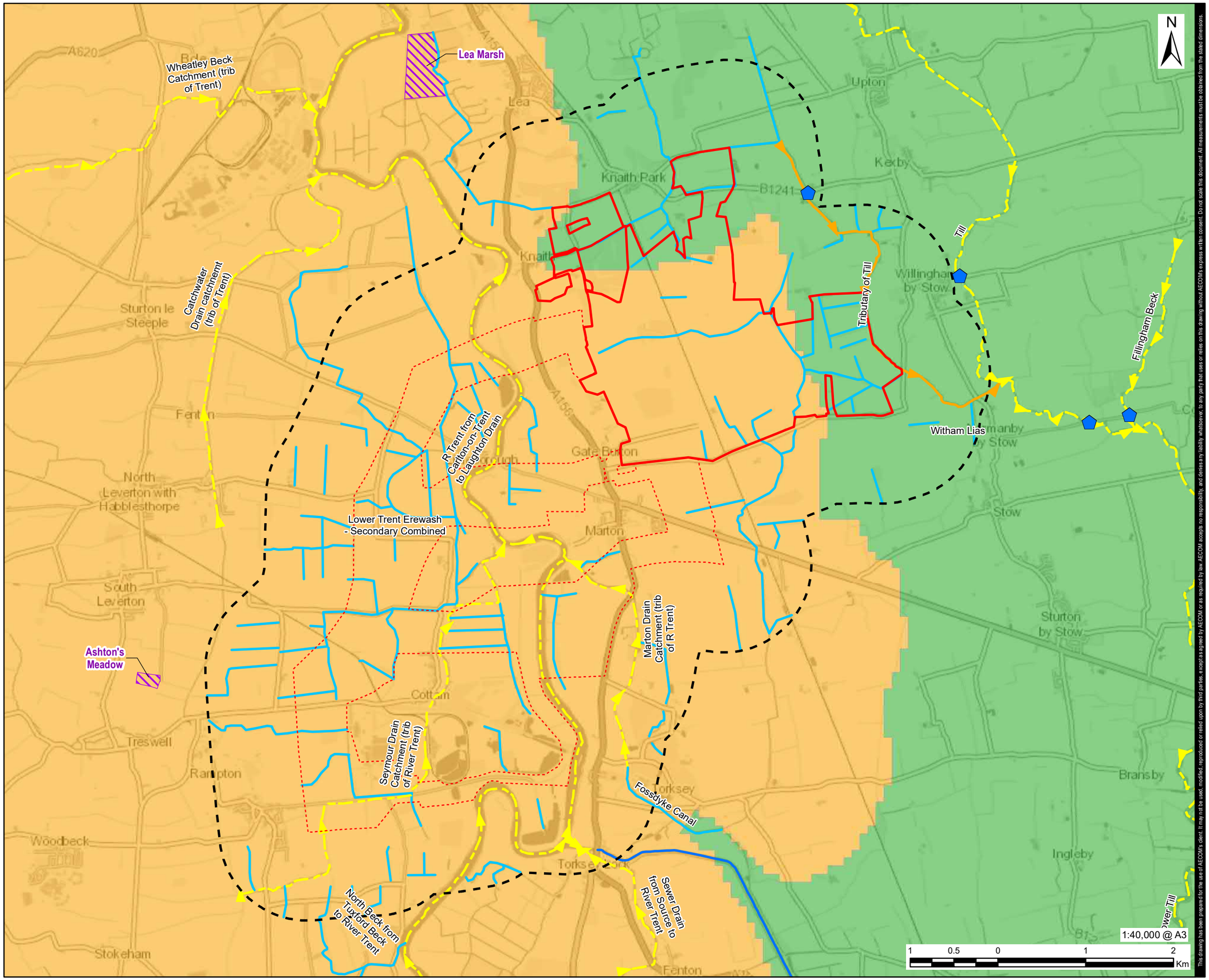

AECOM

PROJECT

Gate Burton Energy Park

CLIENT

Gate Burton ENERGY PARK

CONSULTANT

AECOM Limited
Sunley House
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Surrey, CR0 2AP, UK
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LEGEND

- Solar PV Site
- Grid Connection Corridor Options
- 1km Buffer
- Environment Agency Water Quality Monitoring Sites
- Main River
- Ordinary Watercourse
- Site of Special Scientific Interest (SSSI)

WFD Surface Waterbody Status

- Moderate Ecological Potential
- Poor Ecological Status

WFD Ground Waterbody Status

- Good Status
- Poor Status

NOTES

The entire study area is in a Nitrate Vulnerable Zone but is not underlain by a Drinking Water Safeguard Zone. Contains indicative watercourses.

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

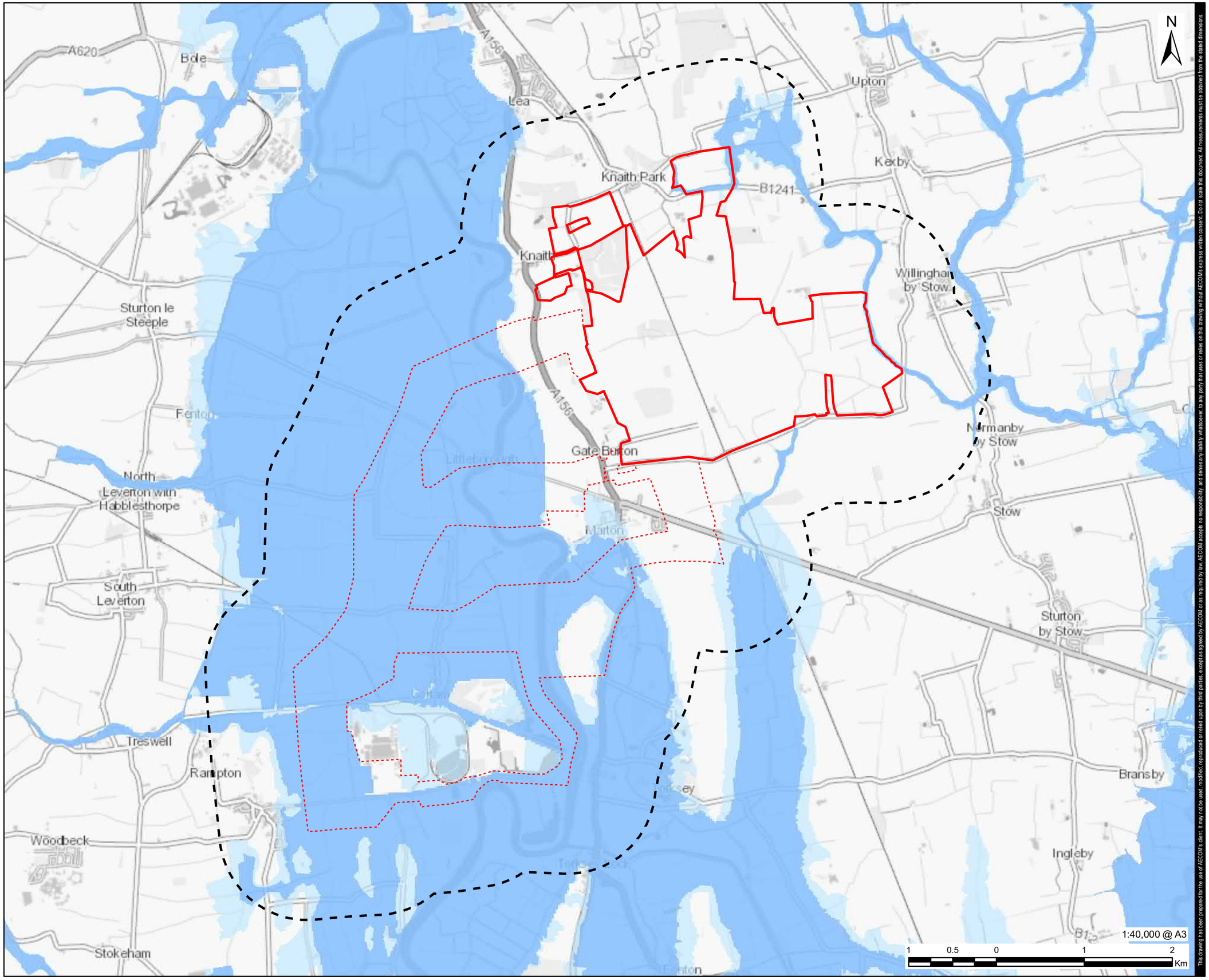
Surface Waterbodies and their Attributes

FIGURE NUMBER

Figure 9-1

Figure 9-2: Flood Zones

Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-12



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LEGEND

- Solar PV Site
- Grid Connection Corridor Options
- 1km Buffer
- Flood Zone 2
- Flood Zone 3

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

Flvial Flood Risk

FIGURE NUMBER

Figure 9-2

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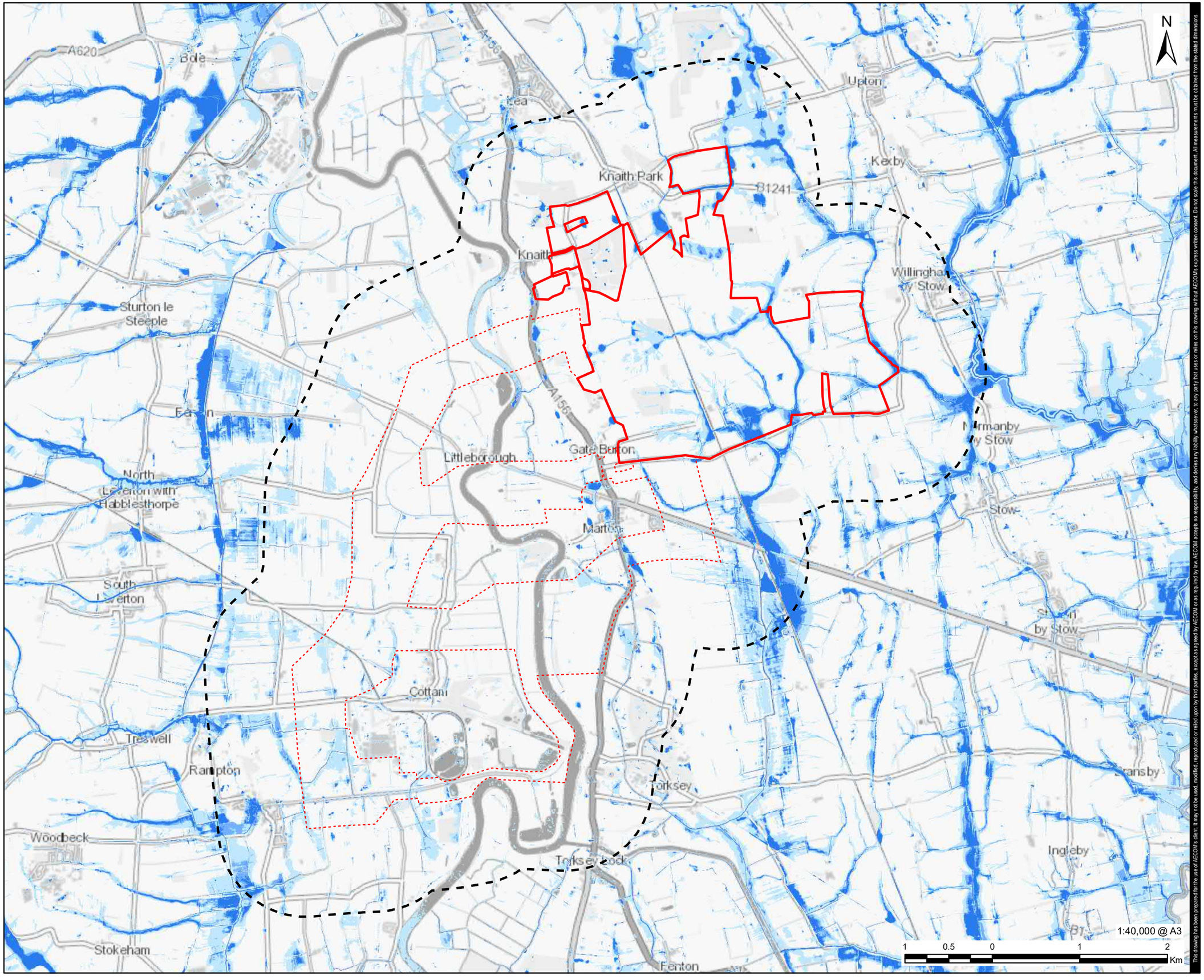
Figure 9-3: Surface Water Flood Risk

Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-12



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PROJECT

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CLIENT

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LEGEND

- Solar PV Site
- Grid Connection Corridor Options
- 1km Buffer
- 3.33% Annual Exceedance Probability (AEP)
- 1% Annual Exceedance Probability (AEP)
- 0.1% Annual Exceedance Probability (AEP)

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

Surface Water Flood Risk

FIGURE NUMBER

Figure 9-3

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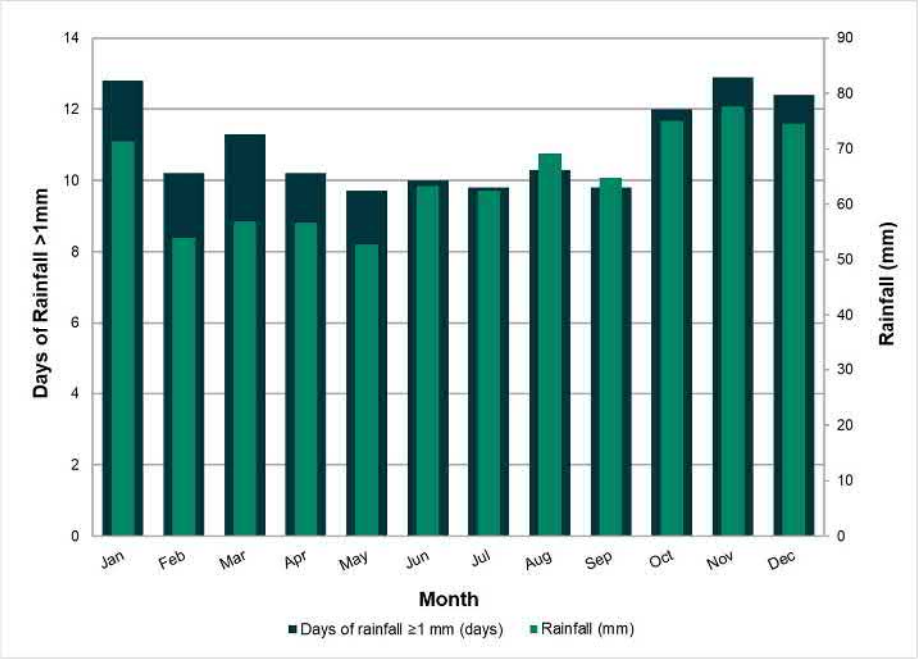
Topography, Climate and Land Use

9.4.6 The topography of the study area is generally flat. The elevation ranges from 30m above ordnance datum (AOD) to <10m AOD (Ref. 118). The topographical highs (~30m AOD) are found within the north of the Site boundary and the topographical lows are associated with the River Trent waterbody and its floodplain, resulting in a gentle slope from north-east to south-west across the Site boundary. Land rises very gently away from the River Trent on its western bank, with the majority of the study area on this western side of the river being <10m AOD.

9.4.7 The land use within the area is generally a mosaic of arable farmland and small patches of woodland with several small drains and ponds scattered across the study area and the River Trent which bisects the area. There is a large decommissioned power station (Cottam Power Station) to the south of the Scheme located next to Cottam Substation, which is the proposed Grid Connection point. The study area also includes several small villages such as Gate Burton, Willingham by Stow, and Knaith Park. The A156 (Gainsborough Road) runs almost parallel to the River Trent waterbody through the study area, and a railway line passes across the Scheme in an approximately north-south orientation. Lincoln Golf Course lies within the study area to the south east of the Scheme.

9.4.8 The nearest weather monitoring station is Scampton which is located approximately 12km to the south-east of the Scheme (Ref. 120). Based on the available data from this weather station (1981–2010), it is estimated that the study area is likely to receive an average of 613.2mm of rainfall per year, with it raining (greater or equal to 1mm of rain) on approximately 115.6 days per year. This suggests that rainfall in the area is low and can be considered below average for rainfall in the United Kingdom. Rainfall is highest from mid-winter to mid-spring and generally peaks in January, with the least rainfall falling in May on average (Graph 9-4).

9.4.9 The same weather station reports that the area generally gets around 54.8 days of air frost a year, distributed across all months except July and August, whereas the majority (11.7 days) occurs across February. Based on the minimum air temperature records, it is clear that frost cover may be a consideration for this Scheme depending on how cold or wet the winter is.



Graph 9-4 Scampton weather station: monthly rainfall and days of rainfall >1 mm

Geology, Groundwater and Soils

9.4.10 The Scheme is primarily underlain by three bedrock geologies of which are all mudstone formations (Ref. 196). These include:

- Scunthorpe Mudstone Formation - mudstone and limestone, interbedded;

- Penarth Group – mudstone; and
- Mercia Mudstone Group – mudstone.

9.4.11 The Site boundary is primarily underlain by the Scunthorpe Mudstone Formation whereas the Grid Connection Corridor Options are underlain by the Mercia Mudstone Group and the Penarth Group.

9.4.12 The superficial deposits are generally patchy across the study area. To the west of the Scheme and it's 1km boundary, the main deposit is alluvium (clay, silt sand and gravel) associated with the River Trent that bisects the area. The centre of the study area is primarily covered by the Hole Pierrepoint Sand and Gravel Member and the Solar PV Site is underlain by patches of Mid-Pleistocene glaciofluvial deposits (sand and gravel). Sparse patches of till and peat are also present.

9.4.13 The bedrock beneath the Solar PV Site (bordering either side of the Trent Waterbody) is generally classified as a Secondary B aquifer. Secondary B aquifers are 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. There is a strip of Secondary (undifferentiated) aquifer, which is seemingly associated with the Penarth Group mudstone. Secondary (undifferentiated) aquifer is where it is not possible to apply either a Secondary A or B definition. 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. The patchy superficial deposits within the proposed site area are Secondary A aquifer. Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.

9.4.14 The study area falls within two WFD groundwater bodies. The north and east of the Solar PV Site and it's 1km boundary fall within the Witham Lias groundwater body (GB40502G401400) within the Anglian RBMP, while the remainder of the Scheme is covered by the Lower Trent Erewash – Secondary Combined groundwater body (GB40402G990300) within the HBMP (see Figure 9-1).

9.4.15 The Witham Lias groundwater body (GB40502G401400) covers a total area of 683.57 km^2 and during 2019 Cycle 2, was given Good Status, overall, quantitively and chemically. The Lower Trent Erewash – Secondary Combined groundwater body (GB40402G990300) covers a total area of 1924.4 km^2 and during 2019 Cycle 2, was given Good Status, overall, quantitively and chemically.

9.4.16 The Soilscape map viewer (Ref. 119) describes the soils on the Solar PV Site area of the Scheme as 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'. These have moderate fertility and are most at risk from overland flow from compacted or poached fields. The floodplain of the River Trent is underlain by 'Loamy and clayey floodplain soils with naturally high groundwater' which has moderate fertility and is most at risk from pollution from floodwater scouring, interspersed are areas of 'Naturally wet very acid sandy and loamy soils' and 'Lime-rich loamy and clayey soils with impeded drainage' throughout the study area.

Surface Water Bodies

9.4.17 The Scheme is located within the Witham Management Catchment within the Anglian RBMP (Ref. 114) and the Lower Trent and Erewash Management Catchment within the Humber RBMP (Ref. 115). There are six WFD surface waterbodies within the study area. These are:

- Tributary of the Till (GB105030062480);
- Till (Witham) (GB105030062500);
- Marton Drain Catchment (Trib of Trent) (GB104028057840);
- Trent from Carlton-on-Trent to Laughton Drain (GB104028058480);
- Seymour Drain Catchment (GB104028058340); and
- Skellingthorpe Main Drain waterbody (GB105030062390).

9.4.18 The Tributary of the Till waterbody (GB105030062480) is designated from its source to the north of the Scheme, just north of Kexby Lane, and continues south along the eastern margin of the Scheme, and then continues south to meet the River Till at Tilby Dale. Tributaries/drains of this watercourse extend

into the Scheme. The watercourse is not designated artificial or heavily modified and is at Poor Ecological Status and Fail Chemical Status. Reasons for not achieving good status for this watercourse include diffuse pollution from poor soil management and physical modification relating to land drainage. The watercourse and its tributaries are ordinary watercourses.

9.4.19 The Till (Witham) waterbody (GB105030062500) rises to the south of Gainsborough and continues east and south to its confluence with the 'Lower Till' waterbody near Coates. The watercourse is hydrologically connected to the Scheme (which is less than 1km upstream) via the 'Tributary of the Till' watercourse. Till (Witham) is heavily modified and is at Moderate Ecological Potential and Fail Chemical Status. Reasons for not achieving good status for the waterbody include trade/industry discharges, sewage discharge (continuous) and poor nutrient management from agriculture. The watercourse is a main river.

9.4.20 The Marton Drain Catchment (tributary of Trent) waterbody (GB104028057840) is located south of the Scheme. It rises to the east of Cottam Power Station in the village of Torksey where it flows for 3.12km before reaching its confluence with the River Trent. It drains a total area of 5.04 km^2. It is classified as a heavily modified waterbody. During the 2019 Cycle 2 its overall classification was Moderate with its Ecological status being Moderate and its Chemical Status Failing. It is not achieving Good Status due to its physical modifications, sewage discharge pollution and poor livestock management (Ref. 121).

9.4.21 The Trent from Carlton-on-Trent to Laughton waterbody (GB104028058480) is designated from the town of Carlton-on-Trent where it flows predominantly north-north east for 58.6km to Laughton where the waterbody is then designated as the 'Humber Upper' WFD waterbody. It is located to the west of the main Scheme area but would be crossed by the Grid Connection Corridor Options to Cottam Substation. The waterbody drains a total area of 126km^2. It is classified as an artificial waterbody. During the 2019 Cycle 2 its overall classification was Moderate with its Ecological status being Moderate and its Chemical Status Failing. It is not achieving Good Status due to its physical modifications, sewage discharge pollution, poor soil management and transport drainage (Ref. 121). The watercourse is a main river.

9.4.22 Seymour Drain Catchment (tributary of Trent) (GB104028058340) rises in an agricultural region, south of the village of Rampton where it flows in a step-like fashion in a north easterly direction for 6.5km before reaching the confluence with Trent from Carlton-on-Trent to Laughton waterbody (River Trent). It is located west of the River Trent but could be crossed by the Scheme depending on the Grid Connection Corridor Route. It drains a total catchment area of 19.6km^2. It is classified as a heavily modified waterbody. During the 2019 Cycle 2 its overall classification was Moderate with its Ecological status being Moderate and its Chemical Status Failing. It is not achieving Good Status due to its physical modifications, sewage discharge pollution, poor soil management and transport drainage (Ref. 121). The watercourse and its tributaries are ordinary watercourses.

9.4.23 Skellingthorpe Main Drain (GB105030062390) is approximately 10km south of the Scheme and flows south-east from near Saxilby towards Lincoln. However, its WFD catchment covers much of the Scheme and there may be hydrological connectivity to the watercourse through upstream drains and tributaries. It drains a total catchment area of 125.2km^2. It is classified as a heavily modified waterbody. During the 2019 Cycle 2 its overall classification was Moderate with its Ecological status being Moderate and its Chemical Status Failing. It is not achieving Good Status due to its contaminated land, sewage discharge pollution, land drainage and urbanisation (Ref. 121). The watercourse and its tributaries are ordinary watercourses.

9.4.24 In addition to the WFD watercourses, there are several undesignated tributaries of these waterbodies present within the Scheme area, along with ditches and ponds. The most prominent are Padmoor Drain (that incurs the associated flood risk to the Scheme) to the east of the Scheme boundary, and a large pond that lies adjacent to the River Trent (SK 82713 83290). This lies on the western side of the River Trent waterbody and the current proposed Grid Connection Corridor Options crosses this drain. Seymour Drain lies to the west of this. Another small pond lies within the Solar PV Site at NGR SK 85038 84807 which appears to have agricultural use. There are also several waterbodies on the Cottam Power Station site in the southern extent of the study area.

9.4.25 The nearest Environment Agency gauging station on the River Trent is at North Muskham which lies approximately 23km south (upstream) of the Scheme near the village of Collingham. Annual mean flow

at this station is 90.43m^3/s, with a maximum daily flow of 962m^3/s registered on 26/02/1997. The flow that is exceeded 95% of the time (Q95) is 28.9 m^3/s (Ref. 122).

Hydromorphology

9.4.26 A high-level walkover survey was conducted by a chartered geomorphologist on 23 September 2021 to assess the baseline hydromorphological condition of nine watercourses that could interact with the Scheme.

9.4.27 The most notable, and by far largest, watercourse that would interact with the Scheme is the main River Trent. The river occupies an expansive floodplain which is flanked by successions of terrace deposits that indicate the river's former dynamic character. However, the Trent has a long history of anthropogenic modification, resulting in a single-thread, passively meandering and morphologically homogenous river that is disconnected from its floodplain by extensive embankments. Flow within the channel was noted to be uniform and laminar, owing to the over-deep form maintained by artificial confinement; with no apparent hydraulic variance present. It was not possible to view the substrate character of the channel during the site visit; however, it is assumed to consist of fine gravels, sands and silts (the latter of which is derived predominantly from catchment-wide intensive agriculture and urbanisation). The adjacent riparian zone is severely depleted with only a thin yet fragmented strip adjoining the channel. However, the aforementioned embankments, which are maintained for the purposes of flood management, limit potential for development of a high-functioning riparian zone.

9.4.28 The agricultural watercourses observed across the Scheme were noted to be of a highly modified character, with extensive straightened sections and ongoing dredging activity observed throughout. The presence of many of the linear watercourses within the study area is probably a consequence of land drainage activities which have facilitated intensive arable farming across what was once expansive floodplain and wetland environments connected to the rivers Trent and Till. Consequently, the watercourses are grossly over-deepened, trapezoidal ditches, with very little hydraulic variation, although the survey was conducted during exceptionally low flow conditions. Channel substrate is predominantly silt, with little or no gravel present, resulting in essentially no variance of bedform throughout.

9.4.29 The riparian zone adjacent to the channels is generally depleted with obvious signs of management and cutting, presumably to maintain drainage conveyance. In-channel vegetation is mostly defined by excessive nutrient ingress and lack of flow: duck weed was especially abundant, indicating that flow within the channels is very slow or stagnated.

9.4.30 Overall, the watercourses within the Site boundary are either man-made or extensively modified, with limited potential for hydromorphological improvement.

Water Resources

9.4.31 The north-east of the Site boundary and the wider study area west of Knaith falls under a Drinking Water Protected Area. Drinking Water Protected Areas (Surface Water) which are where raw water is abstracted from rivers and reservoirs and additional measures are required to protect the raw water supply to reduce the need for additional purification treatment (Ref. 122). However, the study area does not fall within any Drinking Water Safeguard Zones for surface water or groundwater.

9.4.32 The entire study area is within a Nitrate Vulnerable Zones (NVZ) (S347 - R Trent from Carlton-on-Trent to Laughton Drain NVZ and S375 - Lower Witham NVZ). Nitrate Vulnerable Zones are areas designated as being at risk from agricultural nitrate pollution.

9.4.33 There are no Source Protection Zones within the study area.

9.4.34 Information on water quality, pollution incidents, licences and unlicensed water abstractions, and water activity permits (i.e. discharges) will be obtained from the Environment Agency and presented in the PEI Report.

Nature Conservation Sites

9.4.35 Within the study area, there are no designated protected areas including Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs). The nearest such site is the Lea Marsh SSSI, approximately 1.8km north-west of the Main Site. The Lea Marsh SSSI is 27ha in area. It is designated as an important area of unimproved floodplain meadow and wet pasture adjacent to the River Trent. The site lies on seasonally-inundated alluvial soils and includes an unusually large area of a nationally rare grassland type. Populations of two nationally scarce plants (narrow-leaved water-dropwort *Oenanthe silaifolia* and mousetail *Myosurus minimus*) with a restricted distribution in the East Midlands are particularly notable, whilst breeding waders provide additional interest. Approximately 45% of the site is meeting 'favourable' status, while 52% is 'unfavourable – no change'.

Flood risk from all sources

9.4.36 Flood risk from all sources for the Scheme is summarised in Table 9-4 below and Figures 9-2 and 9-4.

Table 9-4: Flood Risk from All Sources

Flood Risk Source	*Comments*
Fluvial	The Scheme lies within a variety of flood risk zones. It is predominantly in Flood Risk Zone 1 (land assessed as having a less than 1 in 1000 annual probability of river or sea flooding). The north of the Solar PV Site does cross an area of Flood Risk Zone 2. This is land assessed as having between 1 in 1000 and 1 in 100 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability (AEP)). To the east of the study area is a corridor of Flood Risk Zone 3 that is associated with Padmoor Drain (1 in 100 or greater annual probability of river flooding (>1% AEP)). To the west of the Scheme boundary, the area lies within Flood Risk Zone 2 and 3 which is associated with the River Trent waterbody, however there are flood defences that border this watercourse through its entire length through the Scheme.
Surface Water	The risk of surface water flooding is generally very low (annual chance of flooding of less than 0.1% AEP) with isolated patches of low (chance of flooding of between 0.1% and 1% AEP), medium (chance of flooding of between 1% and 3% AEP) and high risk (chance of flooding of greater than 3.3% AEP) generally associated with drains and agricultural ditches.
Groundwater	There is considered to be low risk of groundwater flooding in the study area. This will be reviewed at the assessment stage when further information is available.
Sewers	Considered low risk but sewer flooding incident records will be reviewed at the assessment stage
Reservoirs	The River Trent channel and some of its immediate riparian margin as it passes through the Scheme area is within the risk of flooding from a reservoir breach. The remainder of the Site is not at risk from reservoir flooding. There is also flood risk associated with Cottam Power Station to the south of the Scheme.
Tidal	No tidal influence in the study area.

9.5 Potential Effects and Mitigation

Construction and Decommissioning

9.5.1 A number of activities during construction and decommissioning phases are likely to generate impacts, which have the potential to affect the water environment, if unmitigated.

9.5.2 The greatest risks of adverse impacts during construction and decommissioning are in the vicinity of the watercourses and numerous small ponds present in the study area, which may be directly affected by the Scheme (and potentially local groundwater resources noting that information on licenced and unlicensed abstractions has not yet been obtained but will be available by the publication of the PEI Report).

9.5.3 Overall, during construction and decommissioning phases the following adverse impacts may occur:

- Pollution of surface or groundwater due to deposition or spillage of soils, sediment, oils, fuels, or other construction chemicals, or through uncontrolled site run-off and foul waste water, or break out of drilling fluids when crossing watercourses using non-intrusive techniques;
- Potential impact on groundwater quality from piling and dewatering operations associated with watercourse crossings;
- Temporary impacts on sediment dynamics and hydromorphology within watercourses and waterbodies, e.g. where new crossings are required due to construction works to lay cables;
- Temporary changes in flood risk from changes in surface water runoff and exacerbation of localised flooding, due to deposition of silt, sediment in drains and ditches;
- Temporary changes in flood risk due to the construction of solar PV panels, site compound and storage facilities, which alter the surface water runoff from the Scheme; and
- Potential impacts on local water supplies[2].

Operation

9.5.4 During the operational phase, the following adverse impacts may occur:

- Impacts on water quality in affected water bodies that may receive surface water run-off or be at risk of chemical spillages from supporting infrastructure (e.g. substations, battery stores, solar stations, local site offices and car parking etc. and including the use of fire-water) and maintenance activities;
- Potential for reduced chemical loading of watercourses associated with the change in land use and the possible cessation of nitrate, pesticide, herbicide and insecticide applications on arable fields, which would be beneficial.
- Impacts on groundwater quality from the creation of new pollutant pathways along any piled foundations;
- Impacts on hydromorphology within watercourses and waterbodies where new crossings or drainage outfalls are required;
- Impacts on flood risk from increased runoff from new impervious areas across the Site;
- Potential impacts on hydrology as a result of the Scheme by changing the way water infiltrates into the ground; and
- Potential for reduced irrigation of crops, if it is confirmed that water is abstracted locally for this purpose.

[2] • The potential presence of any known PWS will be investigated during the impact assessment by requesting records from the environmental health departments for the local planning authority. Details of licenced abstractions will be obtained from the Environment Agency.

9.5.5 Depending on the design of any watercourse crossings, floodplain compensation may be required. Where possible new crossings should be of a clear span design with the abutments set back from the top of the bank surrounding the watercourse, with new culverting avoided. However, where floodplain compensation is still required this should be provided on a 'like for like' and 'level for level' basis. Alterations to surface water flow pathways will also need to be considered and, if necessary, mitigated. This will include consideration of the span and soffit height of any works to existing or proposed bridges to ensure no increase in flood risk.

9.5.6 In addition, any adverse impact to watercourses should be compensated for by providing 'length for length' improvements elsewhere within the site.

9.5.7 During the operational phase, the Scheme is anticipated to be primarily unmanned, with ad-hoc maintenance checks being the only time in which there would be staff present. As such, there will be no foul water discharge from the Scheme and no mains connected foul water drainage systems are deemed necessary. As such, impacts on foul sewer capacity is scoped out of further assessment.

9.6 Assessment Methodology

9.6.1 This section describes the methodology proposed for the assessment of effects on the water environment, including the criteria for the determination of the significance of the receptor and the magnitude of change from the baseline condition. Potential impacts of the Scheme on the water environment will be assessed by:

- Considering the existing (baseline) status of the water environment within the Scheme 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 and construction phases, as well as cumulative effects;
- Proposing suitable mitigation measures to be incorporated into the development design, construction and operation to offset any adverse impacts (i.e. embedded mitigation); and
- Reviewing any residual impacts and presenting additional mitigation measures to limit their impacts.

Source-Pathway-Receptor Approach

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

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

9.6.3 The first stage in applying the Source-Pathway-Receptor model is to identify the causes or 'sources' of potential impact from a development. The sources will be identified through a review of the details of the Scheme, including the size and nature of the development, potential construction methodologies and timescales. The next step in the model 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 have been 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 is 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).

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

9.6.5 To support the assessment some sub-topic specific assessments will be undertaken. These are described in more detail in the following sections.

Water Quality Assessment

9.6.6 Relevant data will be requested and obtained from the Environment Agency as the impact assessment is undertaken. A further site walkover survey will be undertaken by a surface water specialist and hydromorphologist. This is to observe surface waterbodies 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. At this stage, and given the type of development, no water quality monitoring or other field studies are proposed.

9.6.7 A qualitative assessment of potential effects on surface and groundwater water quality from construction, operation and decommissioning of the Scheme will be undertaken following a source-pathway-receptor approach. Where there is a risk of pollution, mitigation measures will be described with reference to best practice guidance (e.g. Guidance on Pollution Prevention Notes and CIRIA C753 The SuDS Manual).

Hydromorphological Assessment

9.6.8 Potential hydromorphological impacts will be assessed qualitatively based on desk study of available information (e.g. historic maps and aerial imagery) and a walkover survey. This will target (where access permits) all locations where watercourses may need to be crossed either for access or by power cables linking land parcels and for the Grid Connection Corridor Options. The geomorphological walkover will define the baseline catchment characteristics, watercourse typology, flow regime and sediment transport regime of potentially affected watercourses. Consideration will be given to how the Scheme is likely to impact upon these processes and will determine whether the WFD objectives for the watercourses are impacted in a detrimental way as a result of the proposed works. Where appropriate mitigation or enhancement measures will be proposed in consultation with the Environment Agency and LLFA. Effects will be described according to the method for determining effect significance described below.

Water Framework Directive Assessment

9.6.9 Due to the potential impacts upon WFD designated water bodies, a Screening and Scoping WFD Assessment will be undertaken and presented alongside the PEI Report as a technical appendix. The aim of this assessment would be 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 an examination of the potential construction, operation and decommissioning phase effects of the Scheme on relevant WFD hydromorphological, biological and physio-chemical parameters. It would be prepared following guidance presented in PINS Note 18 The Water Framework Directive (Ref. 129). Depending on the outcomes of the Screening and Scoping WFD Assessment, more detailed investigations and assessments may be required, which will be determined in consultation with the Environment Agency. If further assessment is required, this would be provided alongside the ES.

Surface Water Drainage Strategy

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

9.6.11 A Surface Water Drainage Strategy will be undertaken to ensure the risk of flooding is not increased as a result of the Scheme, on or off-site.

9.6.12 Careful consideration of the SuDS features, in-keeping with local planning policy and through liaison with the LLFA and Environment Agency, will be undertaken to ensure that the Surface Water Drainage Strategy adequately attenuates and treats runoff from the Scheme, whilst minimising flood risk to the Scheme site, and surrounding areas.

9.6.13 In accordance with planning policy and general good practice, mitigation will be provided by restricting surface water discharge rates and providing on-site attenuation.

9.6.14 The risk associated with surface water runoff from built development to surface or groundwater bodies will be assessed according to the Simple Index Approach presented in CIRIA C753 The SuDS Manual (Ref. 128).

Flood Risk Assessment

9.6.15 A FRA will be prepared for the Scheme, to review the current and future flood risk to the Site from all sources (including surface water, groundwater and fluvial sources), in-keeping with the 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.

9.6.16 The majority of the development is located outside of areas with a risk of flooding. Where development is proposed in flood risk areas 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 chapter presented in the ES. The FRA will be a technical appendix to the ES.

Determining the Significance of Effects

9.6.17 The significance of effects will be determined using the principles of the guidance and criteria set out in the DMRB LA113 Road Drainage and the Water Environment (Ref. 129) adapted to take account of hydromorphology. This approach was selected rather than using the standard matrix (as outlined in section 5.5) as DMRB LA113 is considered to be a robust, nationally accepted approach to the water environment assessment. The criteria that will be used to determine receptors importance is presented in Table 9-5.

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

- A level of importance (low to very high) is assigned to the water resource receptor 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;
- 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 9-6 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; 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 9-7. The significance of each identified effect (both potential and residual) is classed as very large, large, moderate, slight or neutral and either beneficial or adverse significance

Table 9-5: Criteria to Determine Receptor Importance (Adapted from LA113 (Ref. 129))

Importance	*General Criteria*	*Surface Water*	*Groundwater*	*Hydromorphology*[3]	*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.	EC Designated Salmonid / Cyprinid fishery; Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0 m^3/s; site protected / designated under EC or UK habitat legislation (SAC, SPA, SSSI, WPZ, Ramsar site, Species protected by EC legislation. Critical social or economic uses (e.g. public water supply and navigation).	Source Protection Zone (SPZ) 1; Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and 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.	Floodplain or defence protecting more than 100 residential properties from flooding; Flood Zone 3a and/or 3b; Essential Infrastructure or highly vulnerable development. Very high risk from non-fluvial flood sources.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.	Watercourse having a WFD classification as shown in a River Basin Management Plan (RBMP) and Q95 < 1.0 m^3/s; Major Cyprinid Fishery; Species protected under EC or UK habitat legislation. Critical social or economic uses (e.g. water supply and navigation). Important social or economic uses such as water supply, navigation or mineral extraction.	Principal Aquifer providing locally important source supporting rover ecosystem; SPZ2; Groundwater supports GWDTE; Water abstraction: 500-1,000m3/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 and/or indirect channel, floodplain, bank modifications and/or catchment development pressures.	Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding; Flood Zone 2; More vulnerable development. High risk from non-fluvial flood sources.
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 local wildlife site (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.	Floodplain or defence protecting 10 or fewer industrial properties from flooding; Flood Zone 2; Less vulnerable development. Medium risk from non-fluvial flood sources.
Low	The receptor is tolerant of change without detriment to its	Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001m^3/s. Low	Generally Unproductive strata. Water abstraction: <50m^3/day	Substantially modified by past land use, previous engineering works or flow / water level	Floodplain with limited constraints and low probability of flooding of residential and

[3] 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 (Ref. 123) as LA113 (Ref. 129) does not provide any criteria for morphology.

Importance	*General Criteria*	*Surface Water*	*Groundwater*	*Hydromorphology*[3]	*Flood Risk*
	character, is low environmental value, or local importance.	aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses.		regulation. Watercourses likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in 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.	industrial properties; Flood Zone 1; Water compatible development. Low risk from non-fluvial flood sources.
Negligible	The receptor is resistant to change and is of little environmental value	Not applicable.	Not applicable.	Not applicable.	Not applicable.

9.6.19 The magnitude of impact will be determined based on the criteria in Table 9-6 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 FRA.

Table 9-6: Magnitude of Impact Criteria (Adapted from DMRB LA 113 (Ref. 129))

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 improvement of attribute quality.	Increase in productivity or size of fishery; increase in surface water ecological or chemical WFD status; 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.	

9.6.20 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 resource receptor; or
- **Adverse:** A detrimental/negative effect on the quality of a water resources receptor.

9.6.21 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 1 to 5 years); Long term – endures for more than five years.

9.6.22 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.

9.6.23 The importance of the receptor (Table 9-5) and the magnitude of impact (Table 9-6) are determined independently from each other and are then used to determine the overall significance of effects (Table 9-7). 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 greater are considered significant in planning terms.

Table 9-7: Matrix for Assessment of Significance (DMRB LA 104 (Ref. 130))

Importance of Receptor	*Magnitude of Impact*					
		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

9.7 Assumptions, Limitations and Uncertainties

9.7.1 Within the impact assessment, flood risk will be considered in terms of the potential for the Scheme to change existing flood risk (from all sources) and to impact on receptors including existing infrastructure assets, residential buildings, commercial buildings, agricultural land, and property potentially affected by the Scheme.

9.7.2 Requirements for any hydraulic modelling of watercourses has not yet been determined. If required, the scope of this will be discussed with the Environment Agency/LLFA and undertaken as part of the PEI Report and ES to inform the FRA and Surface Water Drainage Strategy.

9.7.3 Visual surveys will be undertaken of accessible water/drainage features to inform the Surface Water Drainage Strategy. However, it may not be possible to survey all relevant locations/structures due to access constraints. If this occurs the assessment will be based on desk study.

9.7.4 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. 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.

9.7.5 Temporary works will not be assessed unless they are of a potentially significant scale and have the potential to adversely affect flood risk or impact the quality or form of water bodies. The temporary works where such risks are considered significant (for example, excavations for the Grid Connection Corridor Options), will be identified and assessed within the FRA, Screening and Scoping WFD Assessment and impact assessment.

9.7.6 Details on construction methodologies are not yet available. The nature of construction works will generally be informed by professional judgement based on similar schemes where detailed methodologies are not available for the ES.

9.7.7 At this stage it is assumed that solar PV panels will be off set from watercourses by a minimum of 10m measured from the edge of the watercourse (i.e. the channel that confines the flows under normal flow conditions). 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 as identified at the PEI and ES stages.

9.7.8 As part of the full environmental impact assessment, the risk from surface water runoff from new hard standing to surface or groundwater bodies will be assessed according to the Simple Index Approach presented in the C753 The SuDS Manual (Ref. 131). It is expected that the pollutant risk will not be very high and that there will be sufficient space within the Order limits for a treatment solution following SuDS principles. However, the potential to also used proprietary measures if there is a greater risk or there are localised constraints is possible.

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 landscape and visual impact assessment (LVIA) methodology.

10.1.2 The two components of LVIA are defined in the Guidelines for Landscape and Visual Impact Assessment, Third Edition, 2013 (GLVIA3) (Ref. 132) as:

1. Landscape Effects: effects on the landscape as a resource in its own right;
2. Visual Effects: effects on specific views and on the general visual amenity experienced by people.

10.1.3 The LVIA will be undertaken in accordance with the GLVIA3 (Ref. 132) and with reference to other environmental topics, including Ecology and Biodiversity, Cultural Heritage, Arboriculture and Glint and Glare Assessments.

10.2 Study Area

10.2.1 In accordance with GLVIA3 (Ref. 132), the purpose of the landscape study area is to identify the area which the Scheme may influence in a significant manner. The visual study area is concerned with the area across which the Scheme may be visible and the individuals or groups of people who may be significantly affected by changes in the composition of their views.

10.2.2 At this scoping stage, the study area has been defined in a preliminary way and this is likely to be modified as more detailed analysis is undertaken, in combination with discussions with the Local Planning Authority's (LPA's).

10.2.3 From the desk-based review the visibility of the Site varies, due to the landform, woodland, field boundaries and roadside vegetation within the surrounding landscape.

10.2.4 The preliminary LVIA study area has been defined to encompass receptors up to 5km from the Site boundary and 500m from the Grid Connection Corridor Options. The study area encompasses sections of Nottinghamshire County Council (NCC), Lincolnshire Country Council (LCC), Bassetlaw District Council (BDC) and West Lindsey District Council (WLDC) local authority areas.

10.2.5 The extent of the LVIA study area will be reviewed throughout the iterative design process and via fieldwork in winter, when the deciduous vegetation is not in leaf. The extent of LVIA study area will also be consulted upon with the LPA's and the justification for its final extent will be set out in the ES. This will be guided by the Scheme's ZTV (to be prepared as part of the LVIA and professional judgement.

10.2.6 It is assessed that beyond the 5km study area, there are unlikely to be any significant effects on landscape or visual receptors due to the scale and nature of the Scheme.

10.3 Planning Policy Context and Guidance

10.3.1 The following planning policies are relevant to the landscape and visual matters.

National Planning Policy

10.3.2 National Policy Statement (NPS) EN-1 (Ref. 6) section 1.7, which identifies new energy infrastructure is likely to have some negative effects on landscape and visual amenity:

- Paragraphs 4.1 to 4.5.3, which outline the requirements of high-quality design include the aesthetic, functionality, fitness for purpose and sustainability;
- Paragraphs 5.9.5 to 5.9.8, which set out the requirements for a landscape and visual impact assessment;

- Paragraph 5.9.14 which sets out the importance of landscape character assessments in LVIAs;
- Paragraphs 5.9.15 to 5.9.18, which set out that schemes are likely to be visible and have visual effects; and
- Paragraph 5.9.22 which outlines methods for minimising adverse effects, including "*siting of infrastructure, colours and materials, landscaping schemes and building design*."

10.3.3 NPS EN-5 (Ref. 5) - paragraph 2.2.5 in relation to location and landscape considerations and paragraph 2.8.4 in relation to landscape and visual assessment.

10.3.4 National Planning Policy Framework (NPPF) (Ref. 7):

- Paragraph 98 in respect of protecting and enhancing public rights of way (PRoW);
- Paragraph 127 which requires development to be sympathetic to local character and setting;
- Paragraph 170 in relation to conservation and enhancing the natural environment; and
- Paragraph 180 in relation to siting development that is appropriate for its location taking account of effects and mitigation.

National Guidance

10.3.5 Planning Practice Guidance (PPG), Natural Environment (Landscape), paragraph 37 (Ref. 133) sets out the benefits of landscape character assessments and the importance of considering green infrastructure in the early stages of schemes.

10.3.6 Planning Practice Guidance, Renewable and Low Carbon Energy (Ref. 134) sets out that planning has an important role in the delivery of new renewable and low carbon energy infrastructure. The PPG identifies several LVIA considerations, including visual impact, mitigation through screening and glint and glare.

County and Local Planning Policy

10.3.7 Relevant NCC and LCC, BDC and WLDC policies and supporting evidence-base documents are listed below:

- Nottinghamshire County Council Landscape Character Assessment 2009 (Ref. 135);
- West Lindsey Landscape Character Assessment 1999 (Ref. 136);
- Bassetlaw District Council Landscape Character Assessment 2009 (Ref. 137);
- West Lindsey Local Plan 2006 (Ref. 138);
- Bassetlaw Local Plan 2020-2037: Publication Version August 2021 (Ref. 53);
- Gainsborough Neighbourhood Plan including Gainsborough Heritage and Character Assessment and Green Infrastructure Strategic Plan (Ref. 139); and
- Green Infrastructure Study for Central Lincolnshire 2011 (Ref. 140).

10.3.8 These will be reviewed and referenced in the LVIA as appropriate.

10.4 Baseline Conditions

10.4.1 This section provides an overview of the landscape and visual features and characteristics across the preliminary LVIA study area.

Landscape Overview

10.4.2 The main land use across the study area is agriculture, characterised by large scale regular arable fields which are generally open in character defined by low, often gappy, neatly trimmed hedgerows. Woodland is more prevalent in the north of the study area, often associated with the elevated ridgeline running north-south parallel to and east of the River Trent. The field boundaries within the immediate site

boundary are defined by the hedgerows which enclose the individual fields. Patches of woodland mixes can also be found across this immediate field network.

10.4.3 Land to the west of the ridgeline is lower and forms the flat floodplain of the River Trent, which forms the boundary between Lincolnshire and Nottinghamshire.

10.4.4 The influence of the River Trent is strong within the western and southern part of the study area, with the valley containing the prominent power stations at West Burton and Cottam which provide a sense of industrialisation in the otherwise rural context.

10.4.5 Settlement within the immediate study area consists of the main town of Gainsborough in the north section and numerous small villages, hamlets and individual properties within the rural landscape. In the western section of the study area the settlements of Sturton-le-Steeple, North Leverton with Habblesthorpe and South Leverton form a line parallel to the Trent, occupying a localised and indistinct ridge of higher ground. To the east of the Trent, Lea occupies the wooded southern area to the south of Gainsborough with the settlements of Marton, Brampton and Torksey occupying elevated land overlooking the floodplain to the west. Further east settlement is again located on a localised ridgeline containing the villages Upton, Willingham by Stow and Stow. There are smaller scale hamlets such as Gate Burton and Knaith, as well as individual farmsteads interspersed between these settlements. The villages are long established, and several include historic elements of note such as manor houses, scheduled monuments and windmills.

10.4.6 The A1500 (Stow Park Road/Till Bridge Lane) and A156 (Gainsborough Road) cross the southern and western part of the study area, contrasting with the north-south alignment of the River Trent and the railway line connecting Lincoln and Doncaster.

10.4.7 Other infrastructure within the study area includes overhead powerlines carried by pylons through the Trent valley. The River Trent corridor is well vegetated, being bordered by narrow belts of riverside trees, such that in the southern part of the study area, the main woodland patterns are associated with the River Trent.

10.4.8 Roads and lanes across the study area are generally well vegetated and enclosed, either by hedgerows, scrub or individual trees. The vegetation patterns within the Site are representative of those across the study area, consisting of woodlands, hedgerows and trees, as well as open field patterns.

10.4.9 Public Rights of Way (PRoW) within the study area are primarily located west of the River Trent and form a network of recreational value. LCC's online PRoW mapping indicates that east of the River Trent PRoW is limited, and routes are predominantly in the north and far east of the study area. PRoW - Public Bridleway - Stow/70/1 3 lies within and adjacent to the Site boundary.

Landscape Designations

10.4.10 Neither the study area, nor the Site boundary or Grid Connection Corridor Options are covered by any national landscape designations, i.e. National Parks or Areas of Outstanding Natural Beauty (AONB).

10.4.11 WLDC has designated several Areas of Great Landscape Value which are present within the study area. The villages retain their essential historic character and include listed buildings and conservation areas. There are several ancient woodlands within the study area.

Visual Amenity

10.4.12 Initial desktop analysis been undertaken across the study area to identify visual receptors (i.e. people) whose views may be impacted by the Scheme.

10.4.13 A desktop study undertaken during September and October 2021 indicates that the Site boundary is not visible in its entirety due to the variations in landform and the screening from vegetation and that the overall visibility of the Site boundary is localised.

10.4.14 The northern parts of the Site boundary are visible from residential properties adjacent to Station Road, Uptown Road, Kexby Lane, Willingham Road and Marton Road due to its proximity and position to the Scheme boundary. These parts of the Site are also visible for motorists and recreational users along

these routes. From elevated locations in the northern part of the study area, the fields within the Site boundary are not visible, due to the combination of distance, landform and intervening vegetation.

10.4.15 Views from visual receptors located in Gainsborough and to the south of the settlement will unlikely have views of the Scheme given the number of woodlands within the intervening landscape potentially screening views. In the western section of the study area the settlements of Sturton-le-Steeple, North Leverton with Habblesthorpe and South Leverton form a line parallel to the Trent, occupying a localised and indistinct ridge of higher ground, views from here are therefore likely given the slight elevation from this area. Further east settlement is again located on a localised ridgeline containing the villages Upton, Willingham by Stow and Stow, where visual receptors have potential views of the Site. There are smaller scale hamlets such as Gate Burton and Knaith, as well as individual farmsteads interspersed between these settlements.

10.4.16 The central parts of the Site are visible for motorists on A156, and B1241 and along the A1500 as well as by residents adjacent to these roads. The Site is also visible for recreational users on the PRoW within the Site boundary. The composition of these views is predominantly of relatively enclosed fields, individual mature trees, hedgerows and woodland to the east of the River Trent and more open flatter land to the west with the power stations, overhead powerlines and infrastructure being more dominant.

10.4.17 The southern parts of the Site boundary are visible from Stow Park Road and residential properties adjacent to the road, including the northern properties of Stow and for recreational users which cross this part of the Site boundary.

10.4.18 It is acknowledged that there was only a desktop study undertaken at this stage. Therefore, further fieldwork will be undertaken between December 2021 and March 2022 to review the visibility of the Site boundary and the visual receptors in winter (i.e. the worst-case). The fieldwork will be informed by the generation of a Zone of Theoretical Visibility (ZTV), which will model the key structures in relation to the existing landform alone (i.e. bare-earth) and with the addition of existing vegetation and buildings (i.e. with existing visual screening).

10.4.19 The findings of the fieldwork will be presented to the LPAs to seek to agree the visual receptors/representative viewpoints and visual study area for the assessment.

10.4.20 Photography will provide representative views towards the Site from the identified receptors. 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. 141).

10.5 Potential Effects and Mitigation

10.5.1 The Scheme has the potential to result in temporary significant adverse landscape effects during the construction phase, due to alterations to surface landform and vegetation, the presence of construction machinery and associated reductions in tranquillity. These aspects of the construction phase also have the potential to result in significant adverse visual effects, due to changes to the composition of views, in comparison to views of fields and general farming activity.

10.5.2 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 PV panels and associated structures, although the Scheme is reversible. The proposed structures also have the potential to result in significant adverse visual effects due to the changes in the composition of views, in comparison to the baseline views of fields and general farming activity.

10.5.3 The decommissioning phase has the potential to result in significant adverse landscape and visual effects, like the construction phase, due to the presence of machinery and general activity to remove the panels and associated structures.

10.5.4 The LVIA will inform the iterative design process of the Scheme and the mitigation measures, specifically with regards to the siting, layout and colour tones of the solar panels and associated structures to reduce their visibility and perceived scale and mass within the landscape.

10.5.5 The LVIA will also inform the iterative design process via identifying opportunities for new Green Infrastructure (e.g. planting and permissive recreational routes).

10.5.6 The relevant landscape and visual mitigation will be set out in the LVIA.

10.6 Assessment Methodology

Overview

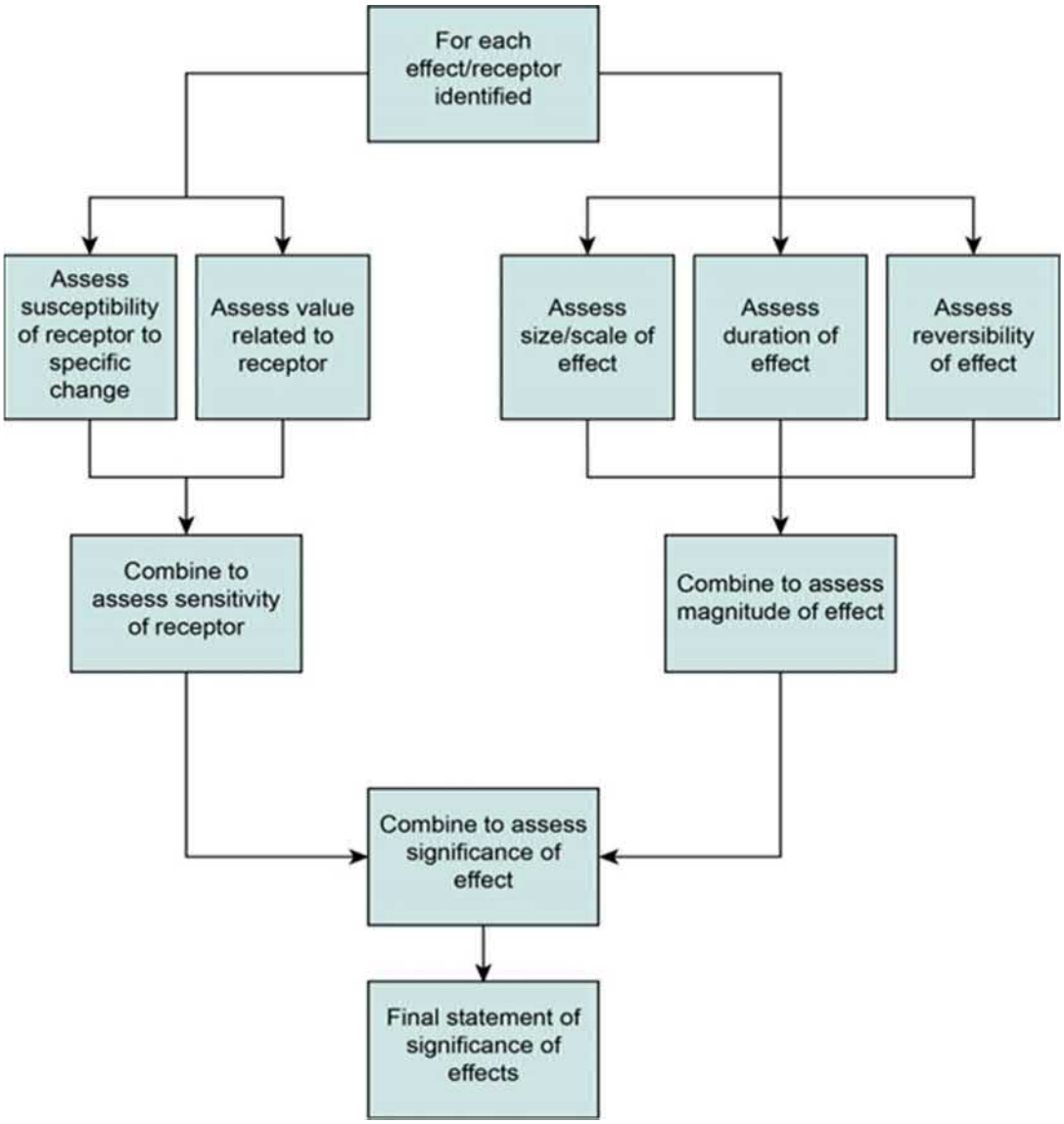
10.6.1 The LVIA will be undertaken in accordance with the following:

- GLVIA3 (Ref. 132); and
- The Landscape Institute's Technical Guidance Note 06/19: Visual Representation of Development Proposals, 2019 (Ref. 141).

10.6.2 These publications form a standard reference for undertaking LVIA for renewable energy schemes in the UK.

10.6.3 The LVIA methodology will reflect the process set out in Figure 3.5 of GLVIA3 (Ref. 132), as shown below in Diagram 10-1.

Diagram 10-1: GLVIA3, Assessing the significance of effects



10.6.4 In accordance with the GLVIA3 process, the LVIA will include the following key stages:

- A baseline review of published landscape assessments, studies, relevant supporting evidence base documents, aerial photography, mapping and fieldwork to identify the landscape and visual baseline and the landscape and visual receptors. Following the identification of the landscape and visual receptors, these shall be presented to the LPAs to seek agreement, along with the extent of the LVIA study area;
- An assessment of the sensitivity (nature of the receptor) of landscape and visual receptors, via an assessment of their value and susceptibility to change (as set out below);
- An assessment of the magnitude of impact (nature of effect) of the Scheme during the construction, year 1 year 15 and decommissioning phases. The magnitude of impact will be assessed in relation to the size, scale, duration and reversibility of the effect; and
- An assessment of the significance of the effect to the landscape and visual receptors for the above phases of the Scheme.

10.6.5 The assessment of the Scheme will be undertaken for the:

- Peak construction activity and in winter;
- Year 1 of operation, assuming the Scheme is fully built out and in winter;
- Year 15 of the operation, assuming the proposed planting has established, and the season is summer; and
- Decommissioning and in winter.

Significance of Effect

10.6.6 The significance of landscape and visual effects will be determined by considering the relationship between the sensitivity of the receptor and the magnitude of impact and follow the significance matrix as set out in Table 5-1, in *Chapter 5: Environmental Impact Assessment Methodology*. However, should professional judgement consider that the effect is different to that in the matrix, then a reasoned justification will be presented in the LVIA. Similarly, where the matrix allows for different levels of significance of effect (e.g. major or moderate) a reasoned explanation will be provided in the assessment as to the conclusion. This guide is specific to LVIA and therefore differs from other EIA disciplines.

10.6.7 Following the classification of an effect, clear statements will be made within the LVIA as to whether that effect is significant or not significant.

10.6.8 As a general rule, major and moderate (adverse or beneficial) effects are considered to be significant, whilst minor, negligible and neutral effects are considered not to be significant.

Relationship to the Glint and Glare Assessment

10.6.9 The LVIA will review the conclusions of the Glint and Glare Assessment and consider these within assessment of the magnitude of landscape and visual impacts as set above for the visual magnitude of impact.

Relationship to Residential Visual Amenity

10.6.10 The LVIA will assess the potential visual effects to different types of visual receptor, including residential receptors, i.e. private views.

10.6.11 With reference to the Landscape Institute's Technical Guidance Note 2/19: 'Residential Visual Amenity Assessment' (Ref. 142), the Residential Visual Amenity Threshold is considered as to whether:

> *"the effect of the development on Residential Visual Amenity of such nature and / or magnitude that it potentially affects 'living conditions' or Residential Amenity."*

10.6.12 The guidance is based upon a 'four' stage approach. Stages 1 to 3 accord with the above LVIA methodology, whereby, in line with GLVIA3 (Ref. 132), visual receptors are identified, along with the magnitude of impact and the significance of effect.

10.6.13 The fourth step is a more detailed examination of residential properties, where appropriate, when the highest 'significance of effect' levels are identified via Stages 1 to 3. Although, as stated by the guidance,

there are no 'hard and fast rules' as to making a judgement on the Residential Visual Amenity Threshold (RVAT).

10.6.14 Therefore, if at year 15 of operation, i.e. post the establishment of the proposed mitigation there are residential receptors predicted to experience significant adverse effects, a RVAT shall be undertaken, with the methodology stated in the ES.

10.7 Assumptions, Limitations and Uncertainties

10.7.1 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.

10.7.2 Short term durations are considered to be two years or less; medium term durations are considered to be between two and ten years, and long-term durations are considered to be more than ten years.

10.7.3 Agreement will be sought on viewpoints through consultation with the LCC Landscape Advisor and verified views and photomontages will be prepared from a select number of the agreed viewpoints.

10.7.4 For the construction phase assessment, the assumptions are that construction activity will be undertaken across the Site at the same time and during winter. This assumes that existing deciduous vegetation is not in leaf, thereby representing a worst-case assessment scenario. PRoW which cross the Site boundary will be temporarily closed and therefore recreational receptors along these routes will not be assessed for the construction phase.

10.7.5 For the year 1 operation assessment, the assumptions are the Scheme will be operational across all of the Site, the season will be winter, and deciduous vegetation will not be in leaf. This therefore reflects a worst-case assessment scenario.

10.7.6 For the year 15 operation, the assumptions are that the Scheme is operational across all of the Site, the season is summer, such that existing vegetation and proposed planting is in leaf. All new planting would have successfully established, having increased in height by 5m since the year 1 assessment (i.e. 1m of growth every three years).

10.7.7 For the decommissioning assessment, the assumptions are the Scheme is no longer operational, and the solar PV panels and associated structures and equipment are being removed in a manner similar to the construction phase, requiring machinery and localised excavation. The proposed green infrastructure would remain.

10.7.8 Uncertainties at this stage are the layout, siting and heights of the solar panels, sub-stations and associated structures. The LVIA study area, landscape and visual receptors will be reviewed accordingly in relation to the heights of these features, informed by ZTVs.

10.7.9 A lighting assessment is scoped out of the assessment, as any lighting during the construction phase would be temporary.

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.

11.1.2 Note that the scope of this section considers noise and vibration effects on human receptors and excludes assessment of noise and vibration on ecological or heritage receptors. In-combination effects on local ecological or heritage receptors due to the introduction of the proposed development will be considered in Chapter 7: Cultural Heritage and Chapter 8: Ecology and Biodiversity.

11.2 Study Area

11.2.1 For the purposes of providing an assessment of likely significant noise and vibration effects the Study Area has been determined by receptors within 500m of the Site boundary (including the Grid Connection Corridor Options).

11.2.2 At this stage the nearest sensitive receptors (predominantly residential properties) are identified in Table 11-1 and their locations relative to the Site boundary shown in Figure 11-1.

11.2.3 These receptors have been determined by desktop study; a finalised list of assessment receptors will be selected through the scoping process and consultation with key stakeholders including Environmental Health Officers of West Lindsey District Council (WLDC), Lincolnshire County Council (LCC), Bassetlaw District Council (BDC) and Nottinghamshire County Council (NCC).

Table 11-1: Sensitive Receptor Locations

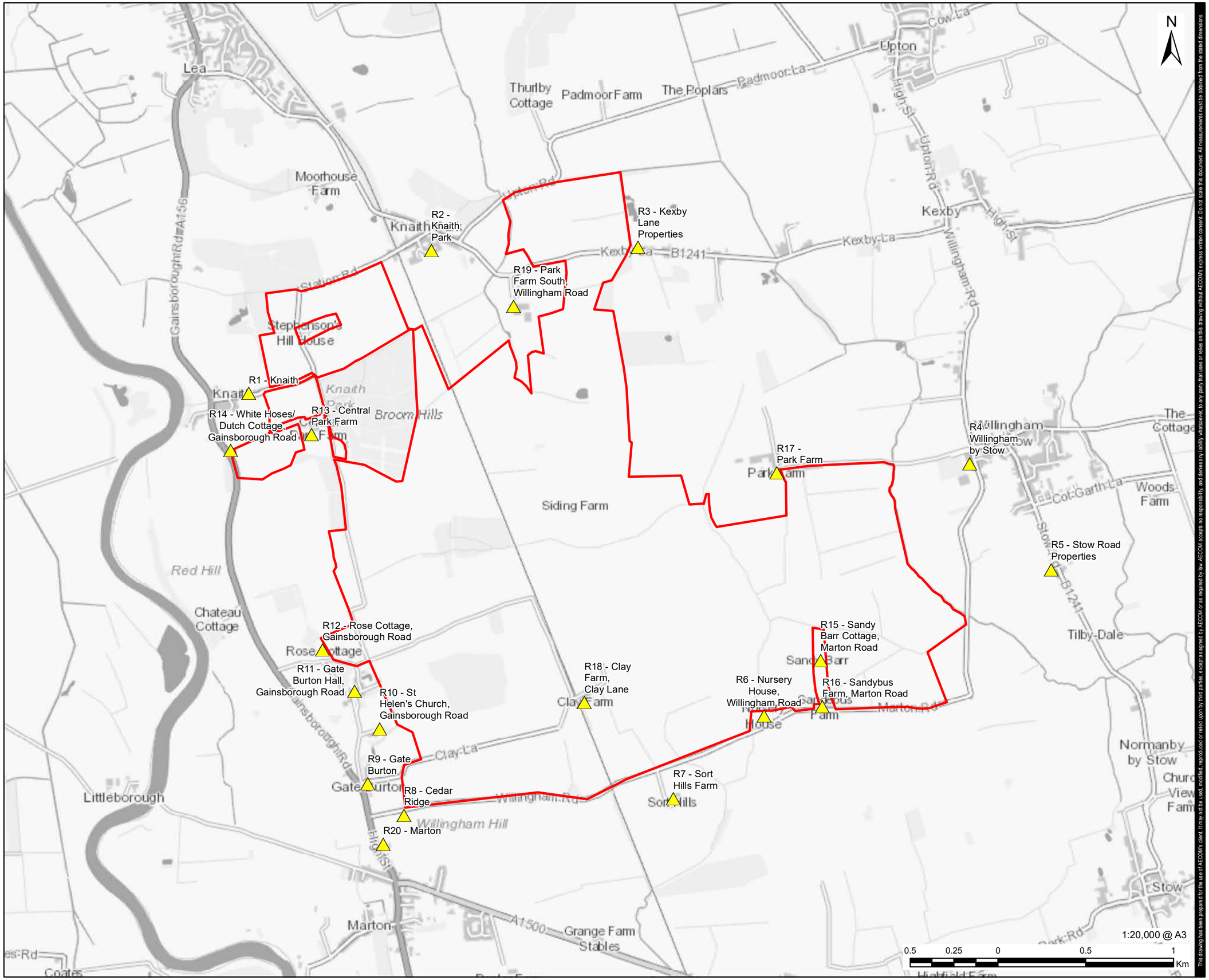
Name	*Approximate Co-ordinates (Latitude – Longitude)*
Knaith	53°21'13.04"N, 0°45'8.29"W
Knaith Park	53°21'38.74"N, 0°44'11.30"W
Kexby Lane Properties	53°21'38.69"N, 0°43'7.70"W
Willingham by Stow	53°20'57.77"N, 0°41'26.87"W
Stow Road Properties	53°20'37.99"N, 0°41'2.36"W
Nursery House, Willingham Road	53°20'12.03"N, 0°42'31.56"W
Sort Hills Farm, Willingham Road	53°19'57.09"N, 0°42'59.90"W
Cedar Ridge, Willingham Road	53°19'54.95"N, 0°44'22.82"W
Marton	53°19'49.70"N, 0°44'29.37"W
Gate Burton	53°20'0.83"N, 0°44'33.77"W
St Helen's Church, Gainsborough Road	53°20'10.93"N, 0°44'29.84"W
Gate Burton Hall, Gainsborough Road	53°20'17.90"N, 0°44'37.35"W
Rose Cottage, Gainsborough Road	53°20'25.59"N, 0°44'46.98"W
Central Park Farm	53°21'5.22"N, 0°44'49.21"W
White Hoses/ Dutch Cottage, Gainsborough Road	53°21'2.63"N, 0°45'14.21"W
Sandy Barr Cottage, Marton Road	53°20'22.00"N, 0°42'13.82"W
Sandybus Farm, Marton Road	53°20'13.53"N, 0°42'13.58"W
Park Farm, Gainsborough Road	53°20'56.71"N, 0°42'26.26"W
Clay Farm, Clay Lane	53°20'15.08"N, 0°43'26.70"W
Park Farm South, Willingham Road	53°21'28.26"N, 0°43'46.35"W

11.2.4 Additionally, receptors along the proposed Grid Connection Corridor Options that may be impacted during construction activities will be considered in the assessment. Receptors located along the Grid Connection Corridor Options will be identified from the calculated distance that likely significant effects due to construction works may occur.

11.2.5 Note that, as discussed in Section 11.1.2, the assessment of noise effects on ecological or built heritage receptors is outside the scope of this chapter.

Figure 11-1 Noise Receptors

Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-12



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PROJECT

Gate Burton Energy Park

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LEGEND

- Solar PV Site
- Noise Receptors

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

Noise Receptors

FIGURE NUMBER

Figure 11-1

11.3 Planning Policy Context and Guidance

11.3.1 Legislation, planning policy and guidance relating to noise and pertinent to the Scheme comprises:

Legislation

- Control of Pollution Act 1974 (Ref. 143); and
- Environmental Protection Act 1990 (Ref. 144).

National Planning Policy

- The Overarching National Policy Statement (NPS) for Energy (EN-1) (Ref. 6) sets out national policy for energy and will be an 'important and relevant consideration' in the Secretary of State's ('SoS') determination of consent in respect of the Scheme. Reference will be made to Section 5.11 and Paragraphs 5.11.4 to 5.11.7, in relation to the assessment of noise;
- The NPS for Electricity Networks Infrastructure (Ref. 6), 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 and Paragraphs 2.9.7 which relates to noise from substation equipment;
- The NPPF (Ref. 7) contains the government's planning policies relating to noise in Paragraph 174 and 185; and
- The Noise Policy Statement for England (NPSE) (2010) (Ref. 145) sets out the long-term vision of the government's noise policy.

National Guidance

- Planning Practice Guidance: Noise (Ref. 146) provides guidelines that are designed to assist with the implementation of the noise requirements set out in the NPPF.

Local Planning Policy

- Central Lincolnshire Local Plan 2012-2036 (Ref. 52), adopted 24 April 2017: with particular reference to Policy LP26: Design and Amenity, which states "*Proposals should demonstrate, where applicable and to a degree proportionate to the proposal, how the following matters have been considered, in relation to both the construction and life of the development: […] r. Adverse noise and vibration".*
- Lincolnshire Minerals and Waste Local Plan including the Core Strategy & Development Management Policies Plan adopted in June 2006 (Ref. 8): with particular reference to Policy DM3: Quality of Life and Amenity, which states "*Planning permission will be granted for minerals and waste development provided that it does not generate unacceptable adverse impacts arising from: […] noise".*
- Bassetlaw District Council Core Strategy and Development Management Policies DPD, adopted 22 December 2011 (Ref. 11): with particular reference to Policy DM10: Renewable and Low Carbon Energy, which states: "*Proposals for renewable and low carbon energy infrastructure will also need to demonstrate that they: […] will not result in unacceptable impacts in terms of visual appearance; noise; shadowflicker; watercourse engineering and hydrological impacts; pollution; or traffic generation*".
- Nottinghamshire Minerals Local Plan (Ref. 12), adopted March 2021: with particular reference to Policy DM3: Quality of Life and Amenity, which states "*Proposals for minerals development will be supported where it can be demonstrated that any adverse impacts on amenity are avoided or adequately mitigated to an acceptable level. The types of impacts that need to be considered include but are not restricted to: […] noise".*

- Nottinghamshire Waste Local Plan (Ref. 13), adopted 2002: with particular reference to Policy W3.9, which states "When planning permission is granted for a waste management facility, conditions will be imposed to reduce the potential noise impact. Such conditions may include:

  (a) *restricting hours of operation;*

  (b) *sound proofing of fixed and mobile plant;*

  (c) *alternatives to the use of reversing bleepers;*

  (d) *stand-off distances between operations and noise sensitive locations;*

  (e) *noise baffle mounds and screen fences; and*

  (f) *setting maximum noise levels at sensitive locations*".

11.4 Baseline Conditions

11.4.1 The land use within the Site boundary is primarily agricultural. The surrounding land use is also arable farming, woodland, residential and quarries. There are individual and clusters of residential properties located adjacent to the Site boundary.

11.4.2 The dominant sources of sound in the area are considered to be road traffic on:

- Kexby Lane, Station Road and Knaith Hill to the north;
- A156 Gainsborough Road to the west;
- Willingham Road to the south; and
- A156 Gainsborough Road and Marton Road to the east.

11.4.3 Additionally, train movements along the Sheffield to Lincoln Line pass north-south through the centre of the Site.

11.5 Potential Effects and Mitigation

Construction and decommissioning noise and vibration (temporary effects)

11.5.1 Potential noise and vibration effects during the 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.

11.5.2 Measures to control noise as defined in Annex B of BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites - Part 1: Noise' (Ref. 147) and measures to control vibration as defined in Section 8 of BS 5228:2009+A1:2014 'Part 2: Vibration' (Ref. 148) will be adopted where reasonably practicable.

11.5.3 These measures represent 'Best Practicable Means' (BPM) (as defined by section 72 of the Control of Pollution Act 1974) (Ref. 143) to manage noise and vibration emissions from construction activities. Examples of BPM that may be implemented during construction works are presented below:

- Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use;
- Appropriate routing of construction traffic on public roads and along access tracks;
- Drop heights of materials will be minimised;
- Plant and vehicles will be sequentially started up rather than all together;
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be undertaken 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.

11.5.4 Embedded measures relevant to the construction phase will be described within a Framework CEMP.

Operational noise (reversible long-term effects)

11.5.5 The potential noise effects during operation of the Scheme are likely to include noise from solar infrastructure (e.g. inverters, transformers, switchgear) and associated battery storage plant (e.g. cooling units, transformers), the on-site substation (e.g. transformers), and any associated vehicle movements.

11.5.6 Plant items such as solar PV modules, PV module mounting structures, and cabling (both onsite and via the cable route) will not produce any operational noise emissions.

11.5.7 No major vibration sources are envisaged to be introduced as part of the Scheme and as such there will be no associated operational vibration effects. It is proposed that operational vibration is scoped out of any further assessment.

11.5.8 At this stage no specific noise mitigation measures have been included for operational plant. However, based on the proposed plant installations it is assumed that plant will be designed to have no tonal, impulsive or intermittent features.

11.5.9 As the plant design is progressed, the specification of plant and machinery with low noise emission and properly attenuated supply and extract terminations will help to minimise noise emissions. The use of enclosures, local screening, mufflers, and silencers will also be used as appropriate.

11.6 Assessment Methodology

11.6.1 The criteria presented in Chapter 5: Environmental Impact Assessment Methodology, of this Scoping Report, will be followed in assigning categories to construction and operational phase noise and vibration impacts, and determining if the effects are significant.

11.6.2 Baseline noise monitoring will be undertaken to establish the noise environment around the Site and representative of surrounding noise sensitive receptors. Monitoring will be undertaken at selected locations representative of noise-sensitive receptors around the Site (as agreed with the relevant local authorities). 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. 148) and BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (Ref. 150). 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 noise surveys so any periods of adverse weather conditions could be identified and omitted from noise data.

11.6.3 Baseline noise surveys will be undertaken post-scoping, and the scope and methodology will be sought to be agreed in consultation with the local planning authorities, where possible, prior to commencement of surveys.

11.6.4 Noise and vibration levels associated with construction and decommissioning works will be assessed (at chosen sensitive receptors, intended to be agreed with the Environmental Health Officers at the local planning authorities) using the data and procedures given in BS 5228:2009+A1:2014 Part 1: Noise and Part 2: Noise (Ref. 147 and Ref. 148).

11.6.5 The temporary changes in road traffic noise levels along the local road network due to construction traffic will be assessed based on guidance from the Institute of Environmental Management and Assessment (IEMA) Guidelines for environmental noise impact assessment (2014) (Ref. 151).

11.6.6 The impact of the proposed operational plant will be assessed following guidance from BS 4142:2014 (Ref. 150), based on available information on the operating conditions and the levels of noise generated by the plant.

11.7 Assumptions, Limitations and Uncertainties

11.7.1 Noise effects during the decommissioning phase of the Scheme will be similar or less than noise effects during the construction phase. The noise assessment presented for the construction phase will therefore be considered representative (or an overestimate) of the decommissioning phase. As such a separate assessment for noise from the decommissioning phase is not proposed.

11.7.2 Predictions of sound levels have an associated degree of uncertainty. Modelling and measurement processes have been undertaken in such a way to reduce such uncertainty; however, it is unavoidable that some degree of prediction uncertainty remains.

11.7.3 Construction works noise levels will be predicted following guidance from BS 5228:2009+A1:2014 (Ref. 147) 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 5228:2009+A1:2014 (Ref. 147), for typical items of plant that are used in such developments as advised by the Applicant.

11.7.4 Construction phase vibration will be assessed based on historic vibration measurement data from relevant guidance documents including BS 5228:2009+A1:2014 (Ref. 147) and TRL Report 429 (Ref. 152). No predictions of ground-borne vibration propagation are proposed.

11.7.5 Predictions of operational plant and activities sound pressure levels will be undertaken following guidance to ISO 9613 ‘Attenuation of sound during propagation outdoors’ (Ref. 153), 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.

11.7.6 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. 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). However, a small degree of uncertainty will always remain in the values taken from such a measurement survey.

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.

12.2 Study Area

12.2.1 The potential economic and employment impacts arising from the Scheme are considered relative to a study area that represents the principal labour market catchment area for the Scheme and will be derived based on analysis of reasonable travel times to the Scheme and drawing on demographic and economic data/indicators for the combined statistical areas that aligns with the radius deemed most appropriate.

12.2.2 The assessment of impacts on recreation receptors, and existing and future land use receptors (agricultural land, recreational facilities (including PRoW), and community facilities) will consider those within the Site, including the Grid Connection Corridor Options and the immediately adjacent land, and any direct effects that may occur due to this change.

12.3 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 comprises:

National Planning Policy

- NPS EN-1 (Ref. 6) with particular reference to and 4.1.4 in relation to adverse effects and benefits, paragraph 4.2.1 in relation to EU directive requirements, paragraph 4.2.2 in relation to socioeconomics, paragraph 5.10.8 in relation to impacts on best and most versatile agricultural land, and paragraph 5.12.2 in relation to socio-economics;
- NPPF (Ref. 7) with particular reference to Section 6: Building a strong, competitive economy (paragraphs 81-83), Section 12: Achieving well designed places (paragraphs 127-128) and Section 15: Conserving and enhancing the natural environment (paragraph 174b, in relation to impacts on best and most versatile agricultural land) and Section 17 (Facilitating the sustainable use of minerals);
- National Economic Development Policy (Ref. 154) with particular reference to the Government's Industrial Strategy White Paper ambitions to increase productivity and drive growth, one way that is highlighted is through Clean Growth to lead the world in the development, manufacture and use of low carbon technologies; and
- Planning Practice Guidance (Ref. 155) with particular reference to guidance on planning and the economy and the potential future needs of the population in terms of economic development, jobs and employment opportunities.

Local Planning Policy

- Central Lincolnshire Local Plan (2017) (Ref. 156) with particular reference to Policy LP5 (Delivering Prosperity and Jobs), Policy LP12 (Infrastructure to Support Growth), and Policy LP19 (Renewable Energy Proposals); and
- Draft Bassetlaw Local Plan (2021) (Ref. 53) with particular reference to Policy ST11 (Rural Economic Growth), Policy ST37 (Landscape Character), Policy ST51 (Renewable and Low Carbon Energy Generation).

Other Planning Guidance

- West Lindsey Sustainability, Climate Change and Environment Strategy (2021) (Ref. 55) with particular reference to the "Land Use and Green Space", "Power" and "Carbon Management Plan" chapters.

12.4 Baseline Conditions

12.4.1 The potential impacts arising from the Scheme are assessed relative to the baseline conditions and benchmarked against regional and national standards where appropriate. The key indicators and measures of the areas will be established for:

- Population and deprivation;
- An overview of the local economies;
- The local labour markets; and
- Land use.

12.4.2 A high-level summary of baseline conditions has been presented in the following paragraphs, based upon review of the following documents:

- 2001 and 2011 Census Data (Ref. 157);
- Office for National Statistics (ONS) Mid-Year Population Estimates (2020) (Ref. 158);
- English Indices of Deprivation (2019) (Ref. 159);
- ONS (2019); UK Business Register and Employment Survey (Ref. 160);
- ONS (2017); Gross Value Added (Income Approach) (2016) (Ref. 161); and
- ONS (2021); Annual Population Survey (January 2020 to December 2020) (Ref. 162).

12.4.3 The Site is located within the areas administered by WLDC and BDC. This section will establish the baseline conditions in both local authorities.

12.4.4 In West Lindsey the population has grown from 89,250 in 2011 to 96,186 in 2020 representing an increase of 7.8%. The population of Bassetlaw has grown from 112,863 in 2011 to 118,300 in 2020. This represents an increase of 4.8%.

12.4.5 West Lindsey is ranked 146 out of the 317 national boroughs. In West Lindsey, four of the Lower layer Super Output Areas (LSOAs) are within the top 10% most deprived boroughs in England. Bassetlaw is the 108th most deprived out of the 317 national boroughs (as defined by the indices of multiple deprivation). Five of the LSOAs in the borough are within the top 10% most deprived boroughs in the country.

12.4.6 Gross Value Added (GVA) per head is slightly lower in West Lindsey (£15,558) compared to the average for East Midlands and for England. The sectors which contribute the most towards GVA in West Lindsay are the Public Services, Distribution and Real Estate sectors.

12.4.7 The Bassetlaw economy performs worse than the regional (East Midlands) economy in a number of measures. In Bassetlaw, GVA per head is £18,703 compared to the East Midlands average of £21,845 and the England average of £28,096. The Distribution, Manufacturing and Public Services sectors make up the greatest percentages of GVA to the Bassetlaw economy.

12.4.8 In 2020 the Annual Population Survey showed that 29.5% of working age residents in Bassetlaw have a degree level qualification or higher (National Vocational Qualification [NVQ] Level 4+), lower than the rate in West Lindsey (31.1%), the East Midlands (37.2%) and England and Wales (42.6%). Similarly, the proportion of residents in Bassetlaw with no qualifications is 9.2%, much higher than 3.5% in West Lindsey and the rates recorded for the East Midlands (6.2%) and England and Wales (6.3%).

12.4.9 The broad industrial groups that employ the most people in Bassetlaw are the manufacturing sector (18.4% of total employment), the health sector (14.3%) and the retail sector (10.2%). These industrial

groups are also predominant in West Lindsey with 13% total employment in the manufacturing sector and 9.3% in the health sector.

12.4.10 In addition, the mining, quarrying and utilities broad industrial group (which includes employment from the generation of energy) is similar in Bassetlaw and West Lindsey with only 1.6% and 1.5% of total employment allocated to energy related industries. This is in line with the rate represented by the East Midlands (1.6%) and higher than England and Wales levels (1.2%).

12.4.11 In 2020 approximately 57,200 people were of employment age in Bassetlaw and 25,200 in West Lindsey. The economic activity rate of 16 to 64-year-olds in Bassetlaw was 78.8%% and 72.5% in West Lindsey, lower than the East Midlands rate of 79.5% and England and Wales rate of 79.2%. In 2020 the unemployment rate for 16 to64-year-olds in Bassetlaw was 5.2%, slightly higher than in West Lindsey (4.9%) and higher than East Midlands (4.8%) and England and Wales (5%). Bassetlaw also has a higher/lower proportion of working age residents compared to West Lindsey and the regional and national averages.

12.4.12 The Site is mostly used for agricultural purposes, being characterised by large scale regular arable fields across several land-holdings.

12.4.13 In respect of recreational routes, it is understood that there is one PRoW within the Site boundary PRoW Knai 44/2 – a footway – and there are two which run along the Site boundary, PRoW Knai 44/1 and PRoW Mton 69/1, both of which are footways. There are also a number of PRoW which could be impacted by the Grid Connection Corridor Options. More information on all these routes is provided in Section 13.4.

12.4.14 The Site will be connected to an existing sub-station in Cottam. The route of the connection is currently being assessed.

12.5 Potential Effects and Mitigation

12.5.1 The Scheme may generate a range of socio-economic effects, some of which would be temporary, whilst others would be permanent. For the purposes of this 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 (principally related agricultural land uses); and
- The change of land use within the Site boundary and any impacts that occur due to this. Likely impacts are anticipated to arise from the displacement of agricultural land uses for the duration of the Scheme. Consideration will also be given to impacts experienced by users or recreational facilities, open space (including PRoW), community facilities and development land.

12.6 Assessment Methodology

Baseline

12.6.1 Relevant policy will be reviewed at the local, regional and national levels to identify the key issues of relevance to the Scheme. This will include Local Plans, and any relevant SPG, NPS and NPPF measures.

12.6.2 A baseline assessment will be undertaken using a range of sources to provide a description of the socio-economic conditions within the local area and at borough level, including employment and the economy. This will be done using established statistical sources as presented in Section 12.4 above.

12.6.3 As described below, an Agricultural Land Classification (ALC) soil survey will be undertaken for the land parcels within the Site boundary, as deemed necessary.

Assessment of effects (including significance)

12.6.4 An assessment of effects will be undertaken to assess the impact of the Scheme on the baseline socio-economic conditions. The methodology for assessing socio-economic impacts will follow standard EIA guidance and will entail:

- Assessment of the likely scale, permanence and significance of effects associated with socio-economic receptors; and
- An assessment of the potential cumulative effects with other schemes within the surrounding area.

12.6.5 The assessment of potential socio-economic effects will use policy thresholds and expert judgment to assess the scale and nature of the effects of the Scheme against baseline conditions. For socio-economics there is no accepted definition of what constitutes a significant (or not significant) socio-economic effect. It is however recognised that effects are categorised based upon the relationship between the scale (or magnitude) of effect and the sensitivity (or value) of the affected resource or receptor.

12.6.6 As such, the socio-economic effects will be assessed on the basis of:

- Consideration of sensitivity to effects: specific values in terms of sensitivity are not attributed to socio-economic resources/receptors due to their diverse nature and scale, however the assessment takes account of the qualitative (rather than quantitative) 'sensitivity' of each receptor and, in particular, their ability to respond to change based on recent rates of change and turnover (if appropriate);
- Scale of effect: this entails consideration of the size of the effect on people or business in the context of the area in which effects will be experienced; and
- Scope for adjustment or mitigation: the socio-economic study is concerned in part with economies. These adjust themselves continually to changes in supply and demand, and the scope for the changes brought about by the Scheme to be accommodated by market adjustment will therefore be a criterion in assessing significance.

12.6.7 The assessment aims to be objective and quantifies effects as far as possible. However, some effects can only be evaluated on a qualitative basis. Effects are defined as follows:

- Beneficial classifications of effect indicate an advantageous or beneficial effect on an area, which may be minor, moderate, or major in effect;
- Negligible classifications of effect indicate imperceptible effects on an area;
- Adverse classifications of effect indicate a disadvantageous or adverse effect on an area, which may be minor, moderate or major in effect; and
- No effect classifications indicate that there are no effects on an area.

12.6.8 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.

12.6.9 Those effects which are found to be moderate or major are considered to be 'significant' and those which are minor or negligible are 'not significant'.

12.6.10 Duration of effect is also considered, with more weight given to reversible long-term or permanent changes than to temporary ones. Temporary effects are considered to be those associated with the

construction works. Long-term reversible effects are generally those associated with the completed and operational development. For the purposes of this assessment, short term effects are considered to be of one year or less, medium term effects of one to four years and long-term effects for five or more years.

12.6.11 Employment and GVA effects will consider the temporary and permanent impact on a principal economic area defined based on consideration of local authority area boundaries and a typical travel time from the Site. Homes and Communities guidance on "Additionality" will be applied to assess direct, indirect and induced impacts (Ref. 163).

12.6.12 As part of this chapter the likely effects on land-use that could result from the construction and operation of the Scheme will be considered.

12.6.13 The assessment of effects on agricultural land-use will consider the impacts that could result from the construction, operation and decommissioning of the Scheme, arising from the change to the dominant land-use within the Site, from its current use for arable cultivation, to that of energy generation using solar PV. To inform this, an ALC survey of the Site boundary will be undertaken with reference to the Ministry of Agriculture, Fisheries and Food guidelines (Ref. 164).

12.6.14 This assessment will be undertaken with reference to the ALC survey result. It is not currently confirmed how the land will be managed under and around the solar PV modules. There is potential for continued agricultural use of the land through grazing and the proposals relating to this will be presented in the ES to inform the assessment.

12.6.15 There are no defined thresholds for assessing the effects of non-agricultural development on agricultural assets. The NPPF states that *"planning policies and decisions should contribute to and enhance the natural and local environment by … recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland"* (Ref. 7).

12.6.16 The assessment of effects on recreational facilities, including PRoW, and community facilities will consider direct impacts arising from any closures, loss of use and/or diversions and indirect impacts relating to amenity. Effects on development land will consider direct (land-take) and indirect (access) impacts on any on the delivery of development proposals or allocations both within and adjacent to the Site.

12.6.17 The impact of the Grid Connection Corridor Options, connecting the Site to the National Grid Substation in Cottam, on socio-economic receptors is proposed to be scoped into the assessment as there may be impacts upon those receptors during the construction and decommissioning phases of the Scheme. 132-400kV cables are likely to be required to export the electricity produced by the Scheme to the National Grid Substation in Cottam. Cables could either be installed below ground or installed as overhead lines during the construction phase. If the cables are installed below ground, this would require trenching typically of 1.2m depth which would be covered after a short period of time. If cables are installed overhead, part closure along the route may be required for health and safety purposes during installation of the line. For both options, this would be for a relatively short duration and could be implemented in phases to limit disruption to the public. Due to the potential for impacts on socio-economic receptors including PRoW, agricultural land or recreational facilities, it is proposed that the impact of the Grid Connection Corridor Options will be scoped into the assessment, however as the impacts are anticipated to be limited both in terms of scope and duration during the construction and decommissioning phases and nil during the operation phase of the Scheme the Grid Connection Corridor Options will be scoped out if the Scheme design avoids PRoW closures.

12.7 Assumptions, Limitations and Uncertainties

12.7.1 Information on current land use from landowners on the Site will be required to determine existing employment generated within the existing Site. In the absence of this information, good practice guidance and professional judgement will be applied.

13. Transport and Access

13.1 Introduction

13.1.1 This chapter outlines the anticipated traffic and transport scope of assessment. A Transport Scoping Note/Access Strategy will also be prepared, which will set out the proposed scope specific to the future Transport Assessment (TA), which will follow the approach set out below.

13.2 Study Area

13.2.1 Due to the nature of the Scheme and proposed access strategy, consideration will be given to a number of locations within the surrounding highway network which could potentially be impacted. Links and junctions likely to require consideration are identified below.

Site Boundary (Lincolnshire)

- A156 (Gainsborough Road) (running north-south, bordering the Site to the west) between and including its junctions with the A631 (Thorndike Way and The Flood Road)/ A159 (Gainsborough Road) within Gainsborough to the north and the A57 to the south-west of Saxilby to the south;
- B1241 (Kexby Lane) (running east-west, bordering the Site to the north) between and including its junctions with the A156 (Gainsborough Road) to the west and B1241 Kexby Lane/Upton Road/ Willingham Road to the east;
- B1241 (running north-south, to the east of the Site) between and including its junctions with the B1241 Kexby Lane/Upton Road/Willingham Road to the north and A1500 Till Bridge Lane to the south; and
- A1500 (Stow Park Road/Till Bridge Lane) (running east-west, to the south of the Site) between and including its junctions with the A156 (Gainsborough Road) to the west and the B1241 (High Street) to the east.

Grid Connection Corridor (Nottinghamshire)

13.2.2 Cottam Road (located approximately 6km to the south-west of the Site) between its junction with Rampton Road/Green Lane to the west and the village of Cottam to the east.

Summary

13.2.3 The extent of the study area for assessment in terms of highway impact will be subject to discussion, and agreement will be sought, with LCC and NCC as Highway Authorities for the Local Road Network (LRN). National Highways (formerly Highways England) will also be consulted if deemed necessary, as the location of the Site is a significant distance away from the motorway and trunk road network. The Scheme itself is 'severed' by a north to south running rail line (the Sheffield to Lincoln line) and so consultation with Network Rail is also proposed.

13.3 Planning Policy Context and Guidance

13.3.1 Planning policy and guidance relating to transport and pertinent to the Scheme comprises:

National Planning Policy

National Planning Policy Framework (July 2021)

13.3.2 The Government's National Planning Policy Framework (NPPF) (Ref. 7) was originally published in March 2012 and later revised in July 2021, outlining the Government's planning policies and how they are expected to be applied. The most relevant paragraphs in the context of transport are set out below:

- Paragraph 104 outlines that "transport issues should be considered from the earliest of stages of plan-making and development proposals";
- Paragraph 110 outlines the key considerations when assessing sites to be allocated for development in plans or specific development applications;
- Paragraph 111 states that development should only be prevented or refused on highways grounds where there would be an unacceptable impact on highway safety, or the residual cumulative impacts of development on the road network would be severe;
- Paragraph 112 states that applications for development should give priority first to pedestrian and cycle movements and then, as far as possible, to facilitating access to high quality public transport; and
- Paragraph 113 outlines that all developments that generate significant amounts of movement should be required to provide a Travel Plan, and the application should be supported by a Transport Statement or TA so that the likely impacts of the proposal can be assessed.

National Policy Statement for Energy, EN-1 (September 2011)

13.3.3 The National Policy Statement (NPS) for Energy (EN-1) (Ref. 6) was published in 2011 and provides the basis for decisions regarding nationally significant energy infrastructure. Section 5.13 outlines the planning policy for traffic and transport, including guidance on undertaking relevant parts of the EIA. The most relevant paragraphs for this purpose are Paragraphs 5.13.3 to 5.13.5 which are set out as follows:

- Paragraph 5.13.3, which states that if a project is likely to have significant transport implications, a Transport Assessment should be included with the ES;
- Paragraph 5.13.4, which states that where appropriate, a Travel Plan to include demand management measures to mitigate transport impacts should be prepared; and
- Paragraph 5.13.5, which states that where additional transport infrastructure is proposed, this should be discussed with the relevant network providers (in terms of the possibility of co-funding by the Government for any third-party benefits).

13.3.4 The NPS EN-1 is currently under review and an updated draft was published for consultation in September 2021, where the above paragraphs are proposed to be relocated to Section 5.14, supported by the following proposed updates:

- Paragraph 5.14.4, which also states that the assessment should consider any possible disruption to services and infrastructure (such as road, rail and airports); and
- Paragraph 5.14.8, which states that the Secretary of State (SoS) should only consider preventing or refusing development on highways grounds if there would be an unacceptable impact on highway safety, or residual cumulative impacts on the road network would be severe.

National Policy Statement for Renewable Energy Infrastructure, EN-3 (September 2011)

13.3.5 The NPS for Renewable Energy Infrastructure (EN-3) (Ref. 73) was published in 2011 and sets out the policies relating to electricity generation from renewable sources of energy, to be considered in conjunction with NPS EN-1. It should however be noted that solar farms are not explicitly included within the document.

13.3.6 The NPS EN-3 is currently under review and an updated draft was published for consultation in September 2021, which the inclusion of solar photovoltaic generation impacts within Section 2.54. The most relevant paragraphs are set out as follows:

- Paragraph 2.54.3, which discusses the importance of assessing various potential routes to the site for the delivery of materials and components during the construction period;
- Paragraph 2.54.4, which considers the suitability of access roads for vehicles transporting components and the need to identify potential modifications where required;
- Paragraph 2.54.9, which states that consistent with EN-1, the SoS should be satisfied, taking into account the views of the relevant local highway authorities, that any abnormal loads can be

safely transported whilst minimising inconvenience to other road users and that the environmental effects of this and other construction traffic, after mitigation, are acceptable; and

- Paragraph 2.54.10, which states that once solar farms are in operation, traffic movements to and from the site are expected to be generally very light, and it is therefore very unlikely that traffic or transport impacts from the operational phase of a project would prevent it from being approved by the SoS.

National Guidance

National Planning Practice Guidance

13.3.7 The Government's Planning Practice Guidance; Travel Plans, TAs and Transport Statements in Decision Taking (2014) (Ref. 165) provides advice on when TAs and Transport Statements are required, and what they should contain. The most relevant paragraphs are summarised below:

- Paragraph 002: assessing and mitigating the negative transport impacts of a development in order to promote sustainable development;
- Paragraphs 004 and 005: evaluating the potential transport impacts of a development proposal and may propose mitigation measures to promote sustainable development;
- Paragraph 006: positively contributing to encouraging sustainable travel, reducing traffic generation and detrimental impacts, reducing carbon emissions and climate impacts, creating accessible, connected and inclusive communities, improving health outcomes and quality of life, improving road safety and reducing the need for new development to increase existing road capacity of providing new roads;
- Paragraph 007: discusses early stage consultation and, tailored to local circumstances, collaborative ongoing working between the local planning authority/transport authority, transport operators, rail network operators, as well as National Highways where there may be implications for the strategic road network and other relevant bodies; and
- Paragraphs 013 to 015 discuss the potential scope and establishes what information should be included.

Local Planning Policy

13.3.8 A summary of the local planning documents which will be reviewed within the ES and TA are set out below.

Lincoln Transport Strategy 2020 to 2036

13.3.9 The new Lincoln Transport Strategy (Ref. 166) has been developed by LCC, City of Lincoln Council, North Kesteven District Council and WLDC. It aims to provide a clear vision for the future of transport across the Lincoln area up to 2036, the strategy includes:

- Enhancing connectivity across the network for all modes;
- Increasing the capacity of the network and supporting the reduction in traffic in the urban area; and
- Rebalance movement towards walking and cycling.

Adopted Central Lincolnshire Local Plan

13.3.10 Policy LP19 of the adopted Central Lincolnshire Local Plan (Ref. 52) identifies the factors which will be considered when assessing proposals for renewable energy:

- Proposals for non-wind renewable energy development (renewable technology will be assessed on their merits, with the impacts). Proposals will be supported where the benefit of the development outweighs the harm caused and it is demonstrated that any harm will be mitigated as far as is reasonably possible; and

- Renewable energy proposals which will directly benefit a local community, have the support of the local community and/or are targeted at residents experiencing fuel poverty, will be particularly supported.

13.3.11 Policy LP20 identifies the considerations which will be considered when assessing proposals which aims to maintain and improve the green infrastructure network in the area:

- Proposals that cause loss or harm to the network will not be permitted unless the need for and benefits of the development demonstrably outweigh any adverse impacts;
- Where adverse impacts on green infrastructure are unavoidable, development will only be permitted if suitable mitigation measures for the network are provided;
- Development proposals should ensure that existing and new green infrastructure is considered and integrated into the scheme design from the outset; and
- Development proposals must protect the linear features of the green infrastructure network that provide connectivity between green infrastructure assets, including PRoW, bridleways, cycleways and waterways, and take opportunities to improve such features.

Fourth Lincolnshire Local Transport Plan 2013/14 to 2022/23

13.3.12 The Fourth Lincolnshire Local Transport Plan (LTP4) (Ref. 167) builds on the strategies and policies adopted by previous Local Plans, the transport goals set out within this document include:

- Providing a reliable, resilient transport system which supports a thriving economy and growth whilst encouraging sustainable and healthy travel;
- Improving access to key services, particularly enabling employment and training opportunities; and
- Minimising the impacts of transport on people's lives, maximise opportunities to improve the environment and help tackle carbon emissions.

13.3.13 In addition, Section 5.17 relates to travel planning and sustainable travel within new developments whilst Section 14.33 relates to reducing the impact of traffic.

Gainsborough Transport Strategy (October 2010)

13.3.14 The Gainsborough Transport Strategy (Ref. 168) aims to understand and quantify transport problems and to develop a Transport Strategy based on short-term and long-term interventions, these include:

- Better management of movements into and through Gainsborough;
- Management of existing and future levels of congestion; and
- Addressing the impacts of existing and future movements in Gainsborough.

Nottinghamshire Local Transport Plan 2011-2026

13.3.15 The Nottinghamshire Local Transport Plan (LTP) (Ref. 169) sets out Nottinghamshire's transport strategy and outlines a programme of measures to be delivered over the short, medium and long-term. The strategy covers all types of transport including public transport, walking, cycling, cars and freight.

Nottinghamshire Local Transport Plan Implementation Plan 2018/19-2020/21

13.3.16 The Nottinghamshire LTP Implementation Plan (Ref. 170) highlights the key priorities related to transport for businesses and residents of Newark and Sherwood as being:

- Reduction of traffic congestion on roads;
- Improving walking and cycling routes; and
- Improving the safety along roads.

Industry Guidance

13.3.17 Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic (1993) (Ref. 171), provides guidance on examining the environmental impacts of developments in terms of traffic and transportation.

13.4 Baseline Conditions

13.4.1 Baseline conditions for the land within the study area will be described in detail in the ES, however for the purposes of this scoping report, they have been summarised below.

Existing Local Highway Network

Site Boundary (Lincolnshire)

13.4.2 The Scheme encompasses a large area of agricultural land located between four strategic A-roads and B-roads which surround the Scheme, namely:

- The A156 High Street/Gainsborough Road (western side). The A156 is the key strategic route in the vicinity of the Site boundary and provides access to the A631 strategic east-west route and the A159 (route through Gainsborough to the north) and the A57 in the south, which subsequently provides east-west access to Lincoln in the east and Worksop in the west;
- The A1500 Stow Park Road/ Marton Road/Till Bridge Lane (southern side of the Site boundary);
- The B1241 Kexby Road/Willingham Road (northern side of the Site boundary); and
- The B1241 Willingham Road/ Gainsborough Road/ Normanby Road/Sturton Road/ Stow Road (eastern side of the Site boundary).

13.4.3 All of the above routes are single carriageway roads with a single lane in each direction. Speed limits on the routes vary from between derestricted (60mph) to 30mph when they pass through settlements; within the settlements the routes frequently feature footway provision and street lighting.

13.4.4 Within the study area there are a number of other smaller roads which run through, alongside or in the vicinity of the Scheme. These include:

- Willingham Road/Marton Road – a narrow single lane road with passing places which runs west to east along the southern border of the Site boundary from the A156 before turning north (within the Site boundary) to join the B1421 in the village of Willingham by Stow. This route has signing stating it is unsuitable for HGV use;
- Stow Park Road – a narrow, single lane rural road which provides a north east/south west link between the A1500 (Till Bridge Lane) and the B1421 (Sturton Road) to the south-east of the Site boundary;
- Knaith Hill/Station Road, which links the A156 in the west with the B1241 Willingham Road in the north and is a single lane road with passing places and partially runs within the north-western part of the Site boundary; and
- Clay Lane, a no-through road single lane track (with passing places) accessed via the A156 to the south-west of the Site boundary and passing underneath the railway via a relatively narrow and low underpass within the Site boundary.

Grid Connection (Nottinghamshire)

13.4.5 The Grid Connection Corridor Options run in a south-west direction from the Site boundary, crossing the A156 and the A1500, the River Trent and proceeds across agricultural land to the former Cottam Power Station. West of the River Trent, depending on the final routing, the route is expected to cross some (but not all) of Littleborough Road, Thornhill Lane, Northfield Road, Coates Road, Broad Lane, Headstead Bank and Town Street; all of which are narrow, minor, very low trafficked single-track roads with no pedestrian facilities/street lighting etc.

13.4.6 The Grid Connection Corridor Options is also expected to cross Cottam Road in the vicinity of the former Cottam Power Station. Cottam Road is a single carriageway road, with a single lane in each direction and subject to a derestricted speed limit. Sections of footway exist on Cottam Road around the existing power station access and to the east of the power station towards Cottam village.

Existing Walking Facilities

Site Boundary

13.4.7 Due to the location of the Scheme in rural Lincolnshire, there is limited footway provision in the surrounding area. Footways are limited to the settlements that surround the Site boundary, as follows:

- A156 – footways on both sides of A156 within Marton village; footways on western side of A156 north of Marton to Gate Burton and further north between Knaith and Lea;
- B1241 (North) - footway provision, varying from both sides to one side between Lea and Knaith Park and then on the northern side of B1241 between Upton Rd/Willingham Road junction and western extent of residential dwellings on eastern part of Kexby Lane;
- B1242 (East) – footway provision, on at least one side of the carriageway exists along the full extent of the route from the Kexby lane junction in the north to the A1500 junction in the south; and
- A1500 – other than in the settlements of Marton and Sturton by Stow (at either extent of the A1500 within the study area) there is no footway provision along this route.

13.4.8 It is understood that there is one Public Right of Way (PRoW) within the Site boundary:

- **PRoW Knai 44/2** – a footway which runs for 452m along the northern section of the Site boundary (in its north-west corner) from Knaith Hill/Station Road to the railway line to the east.

13.4.9 In addition, there are two further PRoW which run along the Site boundary; these are:

- **PRoW Knai 44/1** – a footway which runs for 330m within the vicinity of the northern extent of the Site boundary, running in an east-west direction between the railway line in the west and B1241 to the east; and
- **PRoW Mton 69/1** – a footway which runs for 339m and meets the Site boundary to the south-west, running in a north-south direction between the Site boundary in the north and A1500 Stow Park Road in the south.

Grid Connection Corridor

13.4.10 Sections of footway exist on Cottam Road around the Cottam Power Station access and to the east of the power station leading into Cottam village, however there is no other formal footway provision in this part of the study area.

13.4.11 There are a number of PRoW which could be impacted by the grid connection route (once confirmed) including the following:

- PRoW Sturton Le Steeple FP8, footway which runs for 1455m, along the western bank of River Trent (PRoW_FP8);
- PRoW Sturton Le Steeple BW7, bridleway which runs for 733m, along Long Farm Lane to the north of Littleborough Road (PRoW_BW7);
- PRoW Sturton Le Steeple FP6, footway which runs for 351m, through the field to the south of Littleborough Road (PRoW_FP6);
- PRoW North Leverton with Habblesthorpe BOAT14, byway which runs for 559m, through the fields along Craikbank Lane (PRoW_BOAT14);
- PRoW Mton 67/1, footway which runs for 361m, through the field to the west of Marton;
- PRoW Mton 66/1, footway which runs for 1044m, along the eastern bank of River Trent;

- PRoW North Leverton with Habblesthorpe FP9, footway which runs for 1371m, along the western bank of River Trent (PRoW_FP9);
- PRoW North Leverton with Habblesthorpe FP20, footway which runs for 103m, through the fields from the River Trent banks in the east to PRoW_BW19 in the west (PRoW_FP20);
- PRoW North Leverton with Habblesthorpe BW19, bridleway which runs for 561m, through the field to the north of Corner Farm on Coates Road and to the west along March Lane (PRoW_BW19);
- PRoW Cottam BOAT5, byway open to all traffic which runs for 225m, along Rimes Lane to the north of Broad Lane (PRoW_BOAT5);
- PRoW North Leverton with Habblesthorpe RB25, restricted byway which runs for 660m, along Southbank Lane to the west of Headstead Bank (PRoW_RB25);
- PRoW Cottam RB4, restricted byway which runs for 356m, along Okercoal Lane, west of Wells Lane, north of Cottam (PRoW_RB4);
- PRoW Cottam RB6, restricted byway which runs for 110m, along Wells Lane to the west of Town Street, north of Cottam (PRoW_RB6);
- PRoW Treswell FP4, footway which runs for 151m, to the west of Cottam Power Station (PRoW_FP4);
- PRoW Treswell FP5, footway which runs for 255m, to the west of Cottam Power Station (PRoW_FP5);
- PRoW Rampton FP6, footway which runs for 310m, to the west of the Cottam Power Station (PRoW_FP6);
- PRoW South Leverton BOAT16, byway which runs for 658m, along Cow Pasture Lane, to the north of Outgang Lane (PRoW_BOAT16);
- PRoW Cottam BW7, Bridleway which runs for 171m, to the east of the Ash Disposal Site on Town Street (PRoW_BW7);
- PRoW Treswell BW6, bridleway which runs for 177m, to the east of the Ash Disposal Site on Town Street (PRoW_BW6);
- PRoW Treswell BW18, bridleway which runs for 733m, to the south of the Ash Disposal Site on Town Street (PRoW_BW18);
- PRoW Rampton BOAT13, byway open to all traffic which runs for 1039m to the south of Cottam Power Station (PRoW_BOAT13);
- PRoW Mton 68/1, footway which runs for 453m, through the field to the west of A1500 Stow Park Road to A156 High Road (PRoW_Mton/68/1);
- PRoW Mton 66/4, footway which runs for 351m, to the fields to the east of the River Trent, west of A156 Gainborough Road (PRoW_Mton/66/4);
- PRoW Cottam FP1, footway which runs for 567m (PRoW_FP1); and
- PRoW Cottam FP3, footway which runs for 661m, to the fields to the west of the River Trent, north of Cottam (PRoW_FP3).

13.4.12 All of the PRoW potentially impacted by the Grid Connection Corridor works will be reviewed to establish their use where possible, and to identify whether they will need to be temporarily diverted to ensure safe access for members of the public during construction and potentially operation.

Existing Cycling Facilities

Site Boundary

13.4.13 There are no on or off-road dedicated/marked cycling facilities within the immediate vicinity of the Site boundary and whilst relatively fast vehicle speeds and high traffic flows on the two A-roads (A156 and A1500) may deter cyclists, the B1421 to the north and east of the Site, as well as the smaller roads

closer and within the Site boundary itself are likely to be attractive to leisure cycling. The Site boundary could be potentially accessed by cyclists from Lea, Willingham, Stow, Upton and Brampton located within an approximate 2.5km cycle distance. There are no formal cycle facilities in the vicinity of the Site boundary - the nearest National Cycle Network route (between Harby and Lincoln) is located approximately 12km to the south.

Grid Connection Corridor Options

13.4.14 There are no on or off-road dedicated/marked cycling facilities within the immediate vicinity of the Grid Connection Corridor Options; however, a number of the smaller roads in this area, including Cottam Road have low traffic flows and would appear to be attractive to leisure cyclists. This area could be potentially accessed by cyclists from Coates, South Leverton, Rampton and Treswell, all within a 2.5km cycle distance.

Existing Equestrian Facilities

Site Boundary

13.4.15 There are no formal equestrian facilities (i.e. Bridleways) in the vicinity of the Site boundary; however, some of the surrounding roads are generally lightly trafficked and therefore would not necessarily deter equestrians.

Grid Connection Corridor Options

13.4.16 There are formal equestrian facilities in the vicinity of the Grid Connection Corridor Options. These include Bridleways, Restricted Byways and Byways Open to All Traffic (BOAT). These are listed in Section 13.4.11 above. Also, a number of the narrow single-track roads in the vicinity of the Grid Connection Corridor Options (as listed in Section 13.4.5) appear to be very low trafficked and therefore may be appealing to equestrians.

Existing Public Transport Facilities

Site Boundary

Bus

13.4.17 Bus stops are located on the A156 and B1421 (north and east) which broadly surround the Site boundary. The following bus routes serve these bus stops:

- A156 Gainsborough Road – Bus service 107 – Gainsborough to Lincoln – Two services in the AM peak and two services in the PM peak;
- B1241 Willingham Road – Bus service 100 – Scunthorpe to Lincoln – Three services in the AM peak, three services in the PM peak and otherwise one service per hour during the day; and
- B1241 Willingham Road – Bus service 105 (school days only) – Gainsborough to Lincoln – One service in the AM peak and one PM service (bus service 106 replaces 105 on school holidays and Saturdays).

Rail

13.4.18 Gainsborough is located to the north of the Site boundary and has two railway stations, Gainsborough Central and Gainsborough Lea Road.

13.4.19 Gainsborough Central Station is located approximately 6km to the north of the Site boundary and is managed by Northern Rail, running services from Sheffield to Gainsborough to Lincoln/ Cleethorpes. The only passenger services calling at the station during a weekday are two services in the AM peak and two services in the PM peak.

13.4.20 Gainsborough Lea Road Station is located approximately 4.5km to the north of the Site boundary and is served by rail services operated by both Northern Rail and East Midland Trains, running services from Sheffield to Lincoln/Cleethorpes and Peterborough to Doncaster. The two operators which serve the station run services at the following combined frequency:

- Sheffield to Lincoln/Cleethorpes – two services in each of the AM and PM peaks, a total of 22 services a day in each direction (Monday to Friday); and
- Peterborough to Doncaster – four services a day in each direction (Monday to Friday).

13.4.21 Saxilby Station is located approximately 10.5km to the south of the Site boundary and is served by the same rail services as Gainsborough Lea Road.

Grid Connection Corridor Options

Bus

13.4.22 The nearest bus stops to the potential access point on Cottam Road (to serve the Grid Connection Corridor works) are situated approximately 1.3km to the west on Cottam Lane/Green Lane on the eastern side of Tresswell. Bus Route 190 serves these stops, with the service running between Retford to Tuxford (via Rampton). There are only two daily services which run from Tuxford to Retford (during the AM peak) and only three daily services which run from Retford to Tuxford (during the PM peak).

Rail

13.4.23 Retford Station is located approximately 10.5km to the west of the Grid Connection Corridor Options.

13.5 Potential Effects and Mitigation

Introduction

13.5.1 The nature of the Scheme is such that the greatest impact is likely to occur during the construction and decommissioning phases and this will be the focus of the assessment of transport effects presented in the ES.

13.5.2 The main considerations and potential effects as a result of the Scheme during the construction and decommissioning phases are:

- Increase in HGV movements;
- Abnormal loads;
- Travel to and from site by construction employees;
- Increase in delay to vehicles, pedestrians, cyclists and equestrians due to increase in HGV movements; and
- Change in route connections and amenity for pedestrians, cyclists and equestrians due to the Scheme.

13.5.3 Although the Scheme is located close to a number of small villages/settlements including Willingham by Stow, Lea and Marton, there is not expected to be a significant portion of visitors (given the nature of the Scheme) during the construction, operational or decommissioning phases. Whilst some employees originating from larger settlements nearby (e.g. Gainsborough and Lincoln) may travel by public transport or bicycle (the distance is too far to walk) these modes are not expected to constitute a significant proportion of trips to the site.

13.5.4 Consideration will also be given to those users of local facilities which could be impacted by the Scheme.

Vehicle Access

13.5.5 The main point of vehicular access for the Site boundary during the construction and decommissioning of the Scheme is anticipated to be via the A156 which runs north to south to the west of the Site boundary. At this stage access is expected to be taken from the following locations:

- The majority of HGV trips and construction worker trips are expected to access the Site via a new priority junction on the eastern side of the A156, located approximately 2km to the north of the A156/A1500 junction in the centre of Marton and 1km to the south of the A156/Knaith Hill junction;

- A secondary access (for selected/limited HGV movements) is anticipated to be provided on the southern side of Kexby Lane (B1241), located approximately 1km to the east of the B1241/Station Road junction; and
- A minor access junction is expected to provide access to a small parcel of land to the north of Kexby Lane in the vicinity the above location.

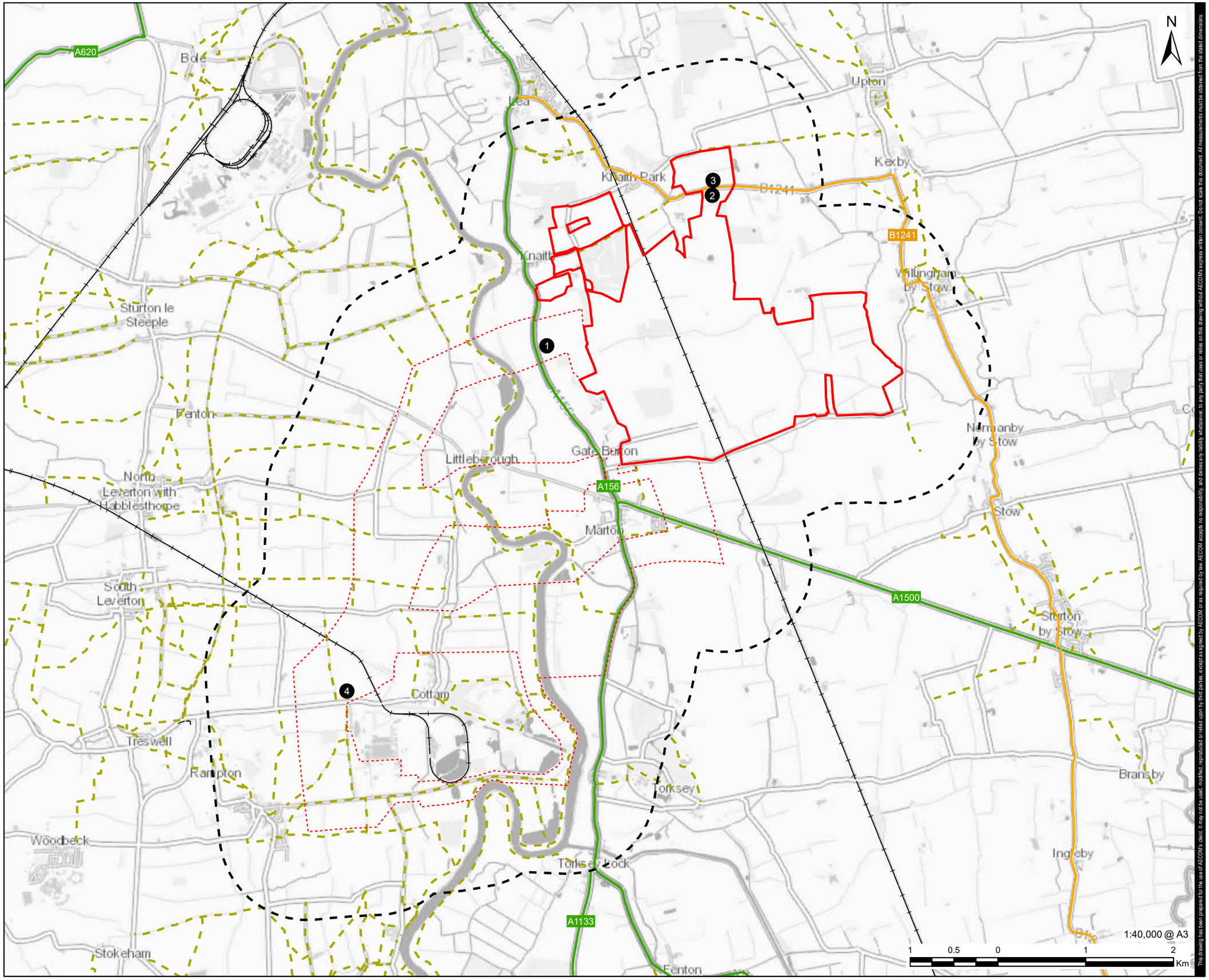
13.5.6 Further to the above, a new access is expected to be constructed in the vicinity of the existing power station access to provide construction vehicle access to the Grid Connection Corridor works in this area.

13.5.7 The operational phase access is expected to be via access/egress from Gainsborough Road (A156), via Clay Lane. The majority of routine visits by vans and four-wheel drive vehicles could utilise the Clay Lane rail underpass for access to the eastern part of the Site. If larger vehicles are required to access the eastern part of the Site, these would utilise the proposed construction access points along Kexby Lane, both of which would be retained for the operational phase. However, this will be confirmed as the Scheme design progresses and in consultation with the relevant authorities.

13.5.8 Further detail on proposed access to the Scheme will be included within the ES and the TA. Figure 13-1 identifies the transport routes and potential access arrangements.

Figure 13-1: Transport routes and potential access arrangements

Revision: 0 Drawn: VC Checked: DH Approved: WB Date: 2021-11-12



AECOM

PROJECT

Gate Burton Energy Park

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LEGEND

- Solar PV Site
- Grid Connection Corridor Options
- 1km Buffer
- Potential Indicative Construction Access Locations
- A Road
- B Road
- Public Rights of Way
- Railway Line

NOTES

ISSUE PURPOSE

EIA Scoping Report

PROJECT NUMBER

60664324

FIGURE TITLE

Existing Highway Network and Proposed Access Points

FIGURE NUMBER

Figure 13-1

Filename: F:\Projects\Gate Burton Energy Park\02_Maps\TRT_Figure13_1_TransportRoutes.mxd

Construction and Decommissioning

13.5.9 At this stage it is anticipated that, as a worst-case during the peak construction period, there could be up to 60 HGV deliveries per day. In addition, there will be Light Goods Vehicle (LGV) deliveries and vehicle movements associated with construction worker arrivals and departures. Construction worker numbers are anticipated to peak at around 600 staff per day; traffic forecasts associated with the above will be provided in the ES and TA.

13.5.10 The potential mitigation measures, which could be implemented during the construction and decommissioning phases, include the following which will also be included within the Framework Construction Traffic Management Plan (CTMP):

- Restriction of HGV movements to certain routes, days of the week and times of the day;
- Upgrading of routes where considered necessary to cater for the additional or larger vehicles;
- Positioning of suitably qualified banksmen at the site access points, to allow all vehicle arrivals and departures to be safely controlled during the construction period;
- Providing road signs and/or markings to increase awareness of the site access points during the construction phase and undertaking vegetation clearance in the vicinity of the site access points;
- Encouraging local construction staff to car share, to reduce single occupancy car trips, by promoting the benefits of car sharing such as reduced fuel costs and by providing dedicated parking spaces for those car sharing nearer to the compound;
- Implementing a shuttlebus service to transfer non-local staff to/from local worker accommodation, to reduce vehicle trips on the surrounding highway network;
- Implementing a Delivery Management System to control the bookings of HGV deliveries from the start of the construction period i.e. to regulate the arrival times of HGVs via timed delivery slots, as well as to monitor compliance of HGV routing; and
- Maintaining access to PRoW during the construction phase, or otherwise providing temporary diversion routes if required.

13.5.11 Potential impacts during the construction and decommissioning phases are typically considered as short term, as defined in Chapter 5: Environmental Impact Assessment Methodology, as enduring for up to 12 months after construction.

13.5.12 The TA and Access Strategy will consider the impact of any other committed developments and/or highways improvement schemes in the vicinity which may be considered to have a cumulative impact during the construction of the Scheme.

Operation

13.5.13 During the operational phase, the Scheme will be manned by a nominal amount of people across the Site (three permanent staff per day), predominantly undertaking maintenance tasks. In addition, there is expected to be approximately 10 to 20 visitors per week (equating to 2 to 4 visitors per day) for deliveries, and replacement of any components that fail. Staff vehicles and those used for maintenance will primarily be four wheeled drive vehicles and vans, with HGVs rarely accessing the site during this phase. Therefore, due to the low level of trips likely to be generated within the network peak hours (with up to seven arrivals and seven departures expected daily), it is proposed to exclude operational phase transport effects from the EIA. Further detail of the operational stage transport arrangements will be set out in the ES and TA to support this approach.

13.6 Assessment Methodology

Sources of Baseline Information, Scenarios and Consultation

13.6.1 To inform the assessment of the Scheme, information from a number of sources will be collected. The sources which will be used are set out below:

- Local travel and network information from various sources including LCC, NCC and local rail and bus operators;
- Personal Injury Accident (PIA) data from LCC and NCC;
- OS/Architectural Base Mapping to ascertain an accurate geographical representation of the areas in the vicinity of the Scheme;
- Highway boundary information from LCC and NCC;
- Mode share data from the 2011 Census (or 2021 data if available and considered appropriate given the context of COVID-19); and
- Various traffic count and speed survey data where required (see below).

13.6.2 Peak hour traffic flows will be identified from historic data held by LCC (and NCC with respect to Cottam Road) or traffic survey company databases if available. In addition, traffic counts will be undertaken, if considered necessary (and subject to any Covid-19 Pandemic restrictions) at locations in the vicinity of the Scheme to determine the baseline traffic conditions of the surrounding highway network. The extent of the traffic data and scope for any traffic surveys that may be required will be agreed with the County Highways Authorities, as statutory consultees, where possible.

13.6.3 To determine the impact of the Scheme, a number of scenarios will be assessed using the information collated above. The scenarios considered appropriate for assessment are:

- Baseline (2022) – AM, PM and Daily; and
- Peak Construction Year (2026) With and Without Development – AM, PM and Daily.

13.6.4 The peak construction year of 2026 is considered appropriate at this stage as it corresponds with the anticipated peak construction year for the purpose of the EIA, as described in Chapter 5: Environmental Impact Assessment Methodology, of this Scoping Report.

13.6.5 For the purposes of the EIA, the decommissioning assessment year is considered to be 2087 (60 years from opening). This year will not be considered in the TA in terms of the highway impact assessment or any junction assessments as it is considered too far into the future to be able to accurately predict traffic flows or junction forms.

13.6.6 The TA Scoping Report will be formally presented to LCC and NCC as statutory consultees in order to seek to agree the scope of the TA. It is possible that some junction capacity analysis will be required, and this will be discussed and agreed with LCC and NCC, where necessary.

Impact Assessment Methodology

13.6.7 In accordance with the IEMA guidance for assessing the environmental impacts of road traffic (Ref. 171), the following criteria will be considered in this assessment.

- Severance;
- Driver delay;
- Pedestrian delay;
- Pedestrian and cyclist amenity;
- Fear and intimidation;

- Accidents and safety; and
- Hazardous loads.

13.6.8 The significance of effect is determined through consideration of two elements; the magnitude of the impact and the sensitivity of the receptor. The following sections outline the approach that would be used to determine these factors.

13.6.9 The overall effect will be determined by measuring the magnitude of the impact following 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.

13.6.10 The IEMA guidelines (Ref. 171) state that the magnitude of each impact should be determined as the predicted deviation from the baseline conditions. This will be undertaken for the construction and decommissioning phases.

13.6.11 IEMA (Ref. 171) sets out a number of criteria by which the magnitude of impact can be measured. These are outlined below. Many of the criteria do not provide specific thresholds by which such impacts can be measured, and as a result will be measured qualitatively where necessary. These are described below.

13.6.12 **Severance** is defined in the IEMA guidelines (Ref. 171) 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 impeded pedestrian access to essential facilities. IEMA guidelines suggest that a 30%, 60% and 90% increase in traffic flows will result in a low, medium, and high change in severance respectively.

13.6.13 **Driver Delay** will be determined through the analysis of junction capacity assessments, contained within the TA, which will be measured in terms of change in delay per vehicle (in seconds) from the baseline situation. This criterion is considered to be applicable to all modes of transport using the public highway, namely cars, motorcycles, pedal cycles and buses.

13.6.14 **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.

13.6.15 **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.

13.6.16 **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"*.

13.6.17 A detailed assessment of **Accidents and Safety** will be undertaken by examination of road traffic accident data for the most recent five-year period available (excluding any periods affected by Covid-19 restrictions). This analysis will be included in the TA 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.

13.6.18 With regard to **Hazardous and Dangerous Loads**, the guidance indicates that "*the Statement should include a risk or catastrophe analysis to illustrate the potential for an accident to happen and the likely effect of such an event*." Analysis of the road network within the study area indicates that there are no

particular features, such as a significant vertical drop immediately beyond the carriageway, which would suggest that the transfer of materials poses a particular risk beyond that which would be expected on the general highway network. It is concluded that the impacts of Hazardous and Dangerous Loads do not warrant further consideration in the preparation of the ES. The projected impacts of the Scheme will be measured separately, dependent upon the receptor, for the construction and decommissioning periods of the Scheme.

13.6.19 In terms of **Severance, Pedestrian Delay, Pedestrian/Cycle Amenity** and **Fear and Intimidation**, the links within easy walking/cycling distance of the Site will be used as receptors. For the construction impacts, the sensitivity of pedestrian routes and cycle routes is based on a qualitative assessment of the 2022 baseline scenario, taking into consideration the importance and attractiveness of the route and the destinations served. The thresholds are defined as:

- **Neutral Sensitivity:** Rural road with no pedestrian/cycle facilities provided;
- **Low Sensitivity:** Strategic vehicular route in a rural setting with pedestrian/cycle facilities;
- **Medium Sensitivity:** Main vehicular route with pedestrian / cycle facilities provided in built up area; and
- **High Sensitivity:** Lightly trafficked route provided in town centre setting.

13.6.20 In terms of **Driver Delay, Accidents and Safety and Hazardous Loads**, the impacts of the Scheme, both construction and decommissioning will be assessed at junction level. The sensitivity of these receptors will be expressed in terms of Ratio to Flow Capacity (RFC) or Degree of Saturation (DoS). The worst-case peak hour junction assessments from the TA for the 2026 With and Without Scheme scenarios will be assessed, for the junctions agreed with the County Highway Authorities.

13.6.21 The thresholds for sensitivity of junctions have been defined as:

- **Low Sensitivity:** RFC / DoS below 90%
- **Medium Sensitivity:** RFC / DoS between 90% and 95%
- **High Sensitivity:** RFC / DoS above 95%

13.6.22 In order to determine the effect on specific receptors, both the sensitivity of receptors and the magnitude of impact, as outlined above, are considered. The matrix that will be used to determine the effect category is identified within Table 5-1. Effects which are classified as major or moderate are considered to be significant and feature a shaded background.

Deliverables

13.6.23 The following deliverables are anticipated to be required in support of the submission:

- Transport Scoping Report;
- Transport Assessment (TA);
- PEI Report – Transport and Access Chapter;
- ES/EIA – Transport and Access Chapter; and
- Framework CTMP.

13.6.24 It should be noted that the CTMP will include a chapter on construction worker travel patterns and measures to encourage travel by alternative modes to the single occupancy vehicle. A standalone Travel Plan is not expected to be required, as this document typically applies to the operational phase of a development. As set out above, due to the low level of trips likely to be generated within the network peak hours, it is proposed to exclude operational phase transport effects and therefore a Travel Plan from the EIA.

13.7 Assumptions, Limitations and Uncertainties

13.7.1 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 the respective Highway Authorities. The area proposed as part of this Scoping Report is determined by AECOM's understanding of the road network and where the likely impacts will be; however, it is anticipated that this will be formally agreed with LCC and NCC. Any additional assessment scope demanded will be assessed as part of both the TA and the ES. Given the distance of the Scheme from the strategic motorway and trunk road network, the expected relatively low traffic attraction of the Scheme, and the fact there are multiple routes between the Scheme and the strategic road network over which traffic could disperse it is not considered that discussions with National Highways will be required, however this will need to be confirmed.

14. Human Health

14.1 Introduction

14.1.1 This section sets out the scope and methodology for the Human Health assessment of the Scheme.

14.1.2 The Human Health Impact Assessment will comprise all human health receptors in surrounding areas which may have potential to be impacted by the Scheme. It should be noted, however, that it is not always possible to determine the catchment area for community facilities. Residents of an area may utilise facilities located within different districts, counties or regions without regard for statutory boundaries.

14.1.3 The study area for 'human health' comprises five wards (Rampton and Sturton in Bassetlaw District, and Lea, Stow and Torksey in the West Lindsey District). These have been identified based on their proximity to the Scheme conferring a high likelihood that they could experience effects arising from construction activities and traffic, and the Scheme in operation and decommissioning.

14.2 Planning Policy Context and Guidance

National Planning Policy

14.2.1 The EIA for the Scheme must have regard to the relevant policies of the NPPF and relevant NPSs. Key aspects of the NPPF and relevant NPSs are outlined below.

14.2.2 NPS EN-1 (Ref. 6) with specific reference to Section 4.13 which acknowledges access to energy is clearly beneficial to society as a whole, the production, distribution, and use of energy may have negative impacts on some people's health. The policy requires the decision maker to consider potential effects of development proposals on human health, stating "where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate." Negative effects could include direct impacts on health including increased traffic, air or water pollution, dust, odour, hazardous waste and substance, noise, exposure to radiation, and increases in pests; and the indirect health impacts of access to key public services, transport or the use of open space for recreation and physical activity

14.2.3 NPPF (Ref. 7) with specific reference to Section 8 promoting healthy and safe communities which sets out the need for planning policies to promote healthy, inclusive and safe places. This includes provision of social, recreational and cultural facilities which the community needs. The NPPF recognises the importance of high-quality open spaces and opportunities for sport for the health and wellbeing of communities, and it calls for planning policies to be based on robust assessments of such provision. Furthermore, the NPPF states that planning policies should protect and enhance PRoW and access, including provision of better facilities for users. Section 9 also expects planning policies to provide for walking and cycling facilities and encourage sustainable transport solutions.

National Guidance

NHS Long Term Plan 2019

14.2.4 The NHS Long Term Plan 2019 (Ref. 172) sets out a ten-year programme of phased improvements to the NHS. The plan outlines how the NHS will attempt to reduce health inequalities through wider preventative action in deprived areas and improved integrated community-based care systems. This includes funding support to programmes which help to reduce smoking, obesity and air pollution in vulnerable communities.

Spatial Planning for Health: An evidence resource for planning and designing healthier places (2017)

14.2.5 In 2017, Public Health England published 'Spatial Planning for Health: An evidence resource for designing healthier places' (Ref. 173).

14.2.6 The review provided public health planners and local communities with evidence informed principles for designing healthy places. The review addresses the relationship which exists between public health and the built environment. It identifies five aspects of the built and natural environment which can be influenced by local planning policy:

- Neighbourhood design;
- Housing;
- Healthier food;
- Natural and sustainable environment; and
- Transport.

14.2.7 For each aspect identified above, the review provides the evidence base underpinning why they are important determinants of public health. It also sets out principles which public health professionals and planners should follow to ensure healthier places.

14.2.8 The two aspects deemed most relevant to the Scheme are 'neighbourhood design' and 'natural and sustainable environment'. For 'neighbourhood design', the review states that *"Neighbourhoods are places where people live, work, and play and have a sense of belonging. The design of a neighbourhood can contribute to the health and well-being of the people living there. Several aspects of neighbourhood design (walkability and mixed land use) can also maximise opportunities for social engagement and active travel. Neighbourhood design can impact on our day-to-day decisions and therefore have a significant role in shaping our health behaviours" (PHE,* Spatial Planning for Health 2017, pg. 11 (Ref. 173)).

14.2.9 For the 'natural and sustainable environment', the review states "*there is a very significant and strong body of evidence linking contact and exposure to the natural environment with improved health and wellbeing. For the purpose of this review, the natural and sustainable environment is comprised of neighbourhood ecosystems and the resulting co-benefits between the environment and health. Protecting the natural environment is essential to sustaining human civilization" (PHE,* Spatial Planning for Health 2017, pg. 38 (Ref. 173)).

14.2.10 In 2020, Public Health England published the 'Public Health England Strategy 2020 to 2025 strategy' (Ref. 174) which states their objectives over the next five years. The document also states the importance of planning in healthy communities and references the Spatial Planning and Health document described above in providing an evidence base for this.

Planning Practice Guidance

14.2.11 Accompanying the NPPF, the National Planning Practice Guidance (PPG) (Ref. 155) provides guidance on planning and provides a web-based resource in support of the NPPF. The PPG offers guidance on health and wellbeing in planning and planning obligations, and covers:

- The role of health and wellbeing in planning; and
- The links between health and wellbeing and planning.

14.2.12 The PPG suggests that local authority planners should consult with the Director of Public Health on mitigation measures for any planning applications that are likely to have an impact on the health and wellbeing of the local population or particular groups. A health impact assessment is a useful tool to use when assessing expected significant impacts.

14.2.13 The guidance states that: *"plan-making authorities may work with public health leads and health organisations to understand and take account of the health status and needs of the local population, including the quality, quantity of and accessibility to healthcare and the effect any planned growth may*

have on this. Authorities should also assess quality, quantity of and accessibility to green infrastructure, sports, recreation and places of worship including expected future changes, and any information about relevant barriers to improving health and well-being" (See 'Plan-Making' Guidance, Paragraph 46).

Local Planning Policy

West Lindsey District Council

14.2.14 WLDC joined with three other local authorities (City of Lincoln Council, North Kesteven District Council and Lincolnshire County Council) in 2009 to form the Central Lincolnshire Joint Strategic Planning Committee (CLJSPC) which was established in October 2009 and the Central Lincolnshire Local Plan Team was established in May 2010.

14.2.15 The Central Lincolnshire Local Plan adopted in April 2017 (Ref. 156) makes reference to health in the following policies:

- **Policy LP9: Health and Wellbeing:** this states that the potential for achieving positive and physical health outcomes will be taken into account when considering all development proposals;
- **Policy LP13: Accessibility and Transport**: this states that development proposals should contribute towards an efficient and safe transport network, where the use of sustainable transport modes are maximised;
- **Policy LP15: Community Facilities:** this states that all development proposals should recognise the community facilities as an integral component in achieving and maintaining sustainable, well integrated and inclusive development;
- **Policy LP18. Climate Change and Low Carbon Living:** this states that development proposals will be considered more favourably if the scheme would make a positive and significant contribution towards one or more of the following: reducing demand; resource efficiency; energy production; and carbon off-setting;
- **Policy LP19: Renewable Energy Proposals:** this states that proposals for non-wind renewable technology will be assessed on their merits, with the impacts considered against the benefits of the Scheme; and
- **Policy LP21: Green Infrastructure Network**: this states that the Central Lincolnshire Authorities will aim to maintain and improve the green infrastructure network by enhancing, creating and managing multifunctional green space within and around settlements that are well connected to each other and the wider countryside.

Bassetlaw District Council

14.2.16 Although the Solar PV Site is not located in Bassetlaw, it is located on the western border of Central Lincolnshire shared with Bassetlaw. The proposed Grid Connection Corridor Options also crosses the border between the two districts to reach the existing national grid substation in Cottam (which is within Bassetlaw District).

14.2.17 Bassetlaw's Core Strategy and Development Management Policies adopted in December 2011 (Ref. 53) makes reference to health in the following policies:

- **Policy DM3: General Development in the Countryside:** this states that the Council is mindful of the need to ensure the applications for a range of proposals, including rural economic development, in the countryside can be addressed;
- **Policy DM9: Green Infrastructure; Biodiversity and Geodiversity; Landscape; Open Space & Sports Facilities:** this states that development proposals will be expected to support the Council's strategic approach to the delivery, protection and enhancement of multi-functional Green Infrastructure, to be achieved through the establishment of a network of green corridors and assets at local, sub-regional and regional levels; and
- **Policy DM10: Renewable and Low Carbon Energy:** this states that the Council will be supportive of proposals that seek to utilise renewable and low carbon energy to minimise CO_2 emissions.

Joint Health and Wellbeing Strategy for Lincolnshire (2018)

14.2.18 The role of the Lincolnshire's Health and Wellbeing Board (Ref. 175) is to bring together key people from the health and care system to work together to reduce inequalities and improve the health and wellbeing of the people of Lincolnshire.

14.2.19 The Health and Wellbeing Board has identified a number of common aims which emerged during the engagement process which form the basis of the overarching aspirations and aims for the Joint Health and Wellbeing Strategy for Lincolnshire. These include the need for the Joint Health and Wellbeing Strategy to:

- Have a strong focus on prevention and early intervention;
- Ensure a focus on issues and needs which will require partnership and collective action across a range of organisation to deliver;
- Deliver transformational change through shifting the health and care system towards preventing rather than treating ill health and disability; and
- Focus on tackling inequalities and equitable provision of services that support and promote health and wellbeing.

14.3 Baseline Conditions

14.3.1 A human health profile of the Study Area surrounding the Scheme will be built-up focusing on key indicators identified by Public Health England at ward level including a comparison of these to national averages. Indicators deemed relevant to likely health impacts of the Scheme for each area have been identified, with data relating to these and the national (England) average figure set out in detail in Table 13-1 below.

Table 13-1: Human Health Profile

	Lea	*Stow*	*Torksey*	*Rampton*	*Sturton*	*England*
Population (2020)	2,106	2,379	2,930	2,273	2,370	55,550,138
Population aged under 16 (%) (2020)	13	16	11	14	18	19
Population aged over 65 (%) (2020)	33	28	40	23	27	19
Unemployment (% working age population claiming out of work benefits)	1.4	1.5	2.3	1.1	0.9	2.8
Long-Term Unemployment-rate per 1,000 working age population	4.3	3.4	3.3	0.0	0.0	3.2
General Health – bad or very bad (%)	4.4	5.2	6.4	5.6	4.2	5.5
Long term illness or disability (%)	20.6	19.5	25.2	25.3	16.5	17.6

	Lea	*Stow*	*Torksey*	*Rampton*	*Sturton*	*England*
Obese adults (%)	N/A	N/A	N/A	N/A	37.5	20.4
Obese children (reception year) (%)	N/A	N/A	20.0	N/A	25.0	22.6
Emergency hospital admissions for COPD (SAR)	51.6	63.0	77.8	76.6	53.4	100
Deaths from respiratory diseases, all ages (SMR)	80.6	83.4	77.3	41.5	41.7	100

14.4 Potential Effects and Mitigation

14.4.1 The Scheme may generate a range of health effects, some of which would be temporary, whilst others would be permanent. For the purposes of this ES, due consideration will be given to the Scheme in terms of the following:

- Impact on access to healthcare and other social services due to accessibility restriction and/or increase in traffic during construction, operational and decommissioning phases;
- Impact during the construction and decommissioning periods on emission of dust, noise, vibration, and odours;
- Impact on air/noise pollution linked with traffic during construction, operational and decommissioning phases and on air/noise pollution linked with onsite activities during operational phase;
- Impact of the Scheme on accessibility to open space and on active travel both during construction and decommissioning phases (temporary impact) and operational phase;
- Impact of the Scheme on access to employment and training, particularly for local residents; and
- Contribution to social cohesion and engagement with existing communities to encourage social interaction.

14.5 Assessment Methodology

Sources of Baseline Information and Consultation

14.5.1 The assessment will seek to establish the potential social, economic and land use effects of the Scheme and assesses these against the current baseline conditions at the Site boundary and in the surrounding area. Baseline data illustrating the existing conditions surrounding the Site boundary has been collected through a desk-based research exercise using publicly available sources, documents and web-based applications. These sources include:

- ONS Census 2011 (Ref. 157);
- Mid-Year Population Estimates (Ref. 158);
- Annual Population Survey (Ref. 162);
- Indices of Multiple Deprivation (Ref. 159);
- Public Health England; Health Profiles (Ref. 176);
- Practice List Size and GP count (Ref. 177); and

- Business Register and Employment Survey (Ref. 160).

Impact Assessment Methodology

14.5.2 There is no consolidated methodology or practice for the assessment of effects on human health. Best practice principles are provided in NHS England's Healthy Urban Development Unit's Rapid Health Impact Assessment (HIA) Toolkit 2019 (Ref. 178) and forms the basis of the approach to be adopted to assess impacts on health and wellbeing. In addition, consideration will be given to the Health and Well-being checklist of the Wales Health Impact Assessment Support Unit (WHIASU) to help with the identification of which health determinants are relevant. Based on this, the impacts of the Scheme on human health are assessed qualitatively using professional judgement, best practice and draw upon other assessments within the ES and therefore, the methodology does not follow the proposed methodology outlined in Chapter 5: Environmental Impact Assessment Methodology of this Scoping Report.

14.5.3 The qualitative assessment of human health effects will consider the following health and well-being determinants of relevance:

- Access to healthcare services and other social infrastructure;
- Access to open space and nature;
- Air quality, noise and neighbourhood amenity;
- Accessibility and active travel;
- Access to work and training;
- Social cohesion and neighbourhoods; and
- Climate change.

14.5.4 The assessment will consider the potential consequences for health and wellbeing from the construction, operation and decommissioning phases of the Schemes and draw upon the information reported within:

- Air Quality (see Section 15.2 of this Scoping Report);
- Land Quality (see Chapter 15.4 of this Scoping Report);
- Noise and Vibration (see Chapter 11 of this Scoping Report);
- Transport and Access (see Chapter 13 of this Scoping Report);
- Socio-Economic and Land Use (see Chapter 12 of this Scoping Report); and
- Landscape and Visual Amenity (See Chapter 10 of this Scoping Report.

14.5.5 Due to the diverse nature of health determinants and outcomes which are assessed, the assessment of human health effects describes the likely qualitative health outcomes and it is not possible to quantify the severity or extent of the effects. The methodology set out in the HUDU Toolkit does not include a temporal scale of considerations of the effects. It does not provide a methodology for assessing the significance of outcomes or effects and as such none is proposed here. The potential health effects during construction, operation, and decommissioning are described using the criteria as outlined in Table 13-2. Where an impact is identified, actions will be proposed to mitigate any negative impact on health, or to realise opportunities to create health benefits. It should be noted that in many cases, mitigation is embedded within the Scheme and the implementation of this is an underlying assumption of the assessment.

Table 13-2: Human Health Impact Categories

Impact Category	*Impact Symbol*	*Description*
Positive	+	A beneficial impact is identified
Neutral	0	No discernible health impact is identified
Negative	-	An adverse impact is identified
Uncertain	?	Where uncertainty exists as to the overall impact

14.6 Assumptions, Limitations and Uncertainties

14.6.1 The Human Health Impact Assessment is based on professional judgment and considers both the adverse and the beneficial impacts that the Scheme will have on the surrounding receptors. It provides an indication of human health and well-being effects on people and the local community.

14.6.2 In the absence of a detailed construction programme at the ES stage, all temporary effects during construction and decommissioning will be assessed as occurring simultaneously and for a programme of approximately 24 to 36 months. Whilst a phased construction may be possible, the approach taken to assuming a 24 to 36 month programme ensures that the likely 'worst-case' is assessed, which may result in the overestimation of predicted health effects. Should the construction phase be extended or delivered in phases the predicted effects would be the same or less than those outlined in this chapter. Similarly, should parts of the Scheme be decommissioned in advance of the main decommissioning phase the predicted effects would be the same or less than those outlined in this ES chapter; the assessment of a 24 to 36-month decommissioning period would therefore represents a worst case.

15. Other Environmental Topics

15.1 Introduction

15.1.1 The aim of the scoping stage is to focus the EIA on those environmental aspects that may be significantly affected by the Scheme. The following section provides a summary of other environmental topics which have been considered during the preparation of this Scoping Report. It is proposed that these topics can be addressed relatively briefly, without requiring individual standalone chapters. The Other Environmental Issues chapter of the ES will include a brief assessment of each of the topics identified below, supported by a technical note that will be appended to the ES that will contain further information that evidences the ES section conclusion. The EIA methodology set out in Chapter 5: Environmental Impact Assessment Methodology, of this Scoping Report, will not apply to this chapter; it may not be necessary for example to outline an assessment methodology or baseline conditions if a preliminary or screening assessment identifies that the impacts will be none or negligible.

15.1.2 For clarity, these topics are not scoped out of the EIA. Rather, they are addressed proportionately within the ES in relation to the likelihood for significant effects based on the scoping work undertaken to date.

15.2 Air Quality

15.2.1 WLDC undertakes routine ongoing monitoring of ambient air quality monitoring as part of their Local Air Quality Management responsibilities under Part IV of the Environment Act (1995) (Ref. 179) at 12 locations in the District.

15.2.2 There are no Air Quality Management Areas declared in WLDC. Concentrations of nitrogen dioxide (NO_2) and fine particulate matter (PM_{10}) are considered to be very good across the District, which is rural with no large conurbations.

15.2.3 All existing NO_2 diffusion tube monitoring sites operated by WLDC recorded concentrations below the relevant annual mean objective value of 40 micrograms per cubic metre ($\mu g/m^3$) since monitoring began. Monitoring locations are in Gainsborough and Market Rasen. There are none in Gate Burton or otherwise near the Site boundary.

15.2.4 The potential air quality impacts of the Scheme are considered to be:

- Impacts of dust arising during the construction and decommissioning phases of the Scheme; and
- Impacts of vehicle and plant emissions during the construction and decommissioning phases of the Scheme.

15.2.5 No effects are anticipated during operation due to the low number of anticipated vehicle movements and nature of the Scheme.

15.2.6 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 EIA.

15.2.7 The potential impacts from dust emissions arising from activities during the construction and decommissioning phases of the Scheme will be considered as part of the ES using an approach based on the Institute of Air Quality Management's (IAQM) guidance (2014) (Ref. 180) for assessing impacts from such activities. This is a screening assessment and 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.

15.2.8 As part of this assessment, potential sensitive receptors will be identified for the construction and decommissioning of the Scheme based on a review of aerial photography, construction and decommissioning phasing plans and Ordnance Survey (OS) mapping, and with consideration to current guidance, including:

- Institute of Air Quality Management (IAQM) (2014) Guidance on the Assessment of Dust from Demolition and Construction (Ref. 180); and
- Defra (2018) Local Air Quality Management Technical Guidance (TG16) (Ref. 181).

15.2.9 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 boundary based on the scale of construction that will occur and the number of plant vehicles that will be required. However, suitable mitigation measures for plant and motorised equipment will be recommended based on advice prescribed in in the IAQM (2014) (Ref. 180) guidance and incorporated into the Framework CEMP.

15.2.10 The anticipated number of vehicles that will be in operation during the construction and decommissioning phases of the Scheme have been considered in the context of the guidance published by Environmental Protection UK (EPUK) / IAQM (2017) (Ref. 182), IAQM (2014) (Ref. 180) and EPUK (2010) (Ref. 183). 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." As such, the predicted construction flows are well below the criteria and as such are not expected to adversely affect air quality. It is therefore proposed that construction traffic is scoped out.

15.2.11 It is therefore anticipated that incorporating air quality mitigation measures into the Framework CEMP will negate the need for a specific air quality chapter in the ES.

15.3 Glint and Glare

15.3.1 Glint and glare in this context 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. 184).

15.3.2 There are no published guidelines setting out a particular methodological approach to assessment, but the receptors of interest are specified in the guidance issued by the DCLG (Ref. 134) which states:

> *"Particular factors a local planning authority will need to consider include… the effect on landscape of glint and glare and on neighbouring uses and aircraft safety."*

15.3.3 As described in Section 10.6, the effect of glint and glare on landscape will be considered in the EIA and presented within the LVIA chapter of the ES.

15.3.4 Aviation receptors identified in the wider area are listed below:

- Sturgate Airport - approximately 2.45km north-east; and
- RAF Scampton - approximately 10.3km south-east.

15.3.5 Other potential receptors include nearby motorists, residential dwellings, railways, and PRoW.

15.3.6 Construction and decommissioning activities will be undertaken in accordance with a CEMP/Decommissioning Environmental Management Plan (DEMP), respectively. This will include information on how reflective surfaces are to be treated during construction and decommissioning phases with a view toward their final placement across the Site. It is expected that avoidance of the effects of glint and glare will be considered as part of construction and decommissioning planning. Further, the scale of the Site is such that the full areas will not be occupied for the duration of these phase activities and the movement of reflective surfaces will be temporarily localised to smaller areas on a rolling basis until works are complete. Based on the nature of the activities, the distances to receptors and the implementation of the CEMP, construction and decommissioning effects are proposed to be scoped out of the assessment.

15.3.7 Operational effects are considered to be fixed and will last for the duration of the Scheme. The interaction of PV panels with locations such as vehicular junctions or pedestrian crossings on roads is primarily influenced by their position, siting and choice of materials, where more reflective, or specular surfaces create a higher chance of creating distraction through glare.

15.3.8 The setback mounting of the PV panels within the Site from its boundaries combined with the distance to potential receptors, limited orientation for angling of solar panels to west/east and angling of the panels from horizontal will contribute to limiting how and where potential occurrences of glare could be created. Further, a dark colour and a matt material finish of the solar PV panels helps to minimise potential occurrences of reflected light, reducing the likelihood that glare conditions could be created from the panels themselves.

15.3.9 Based on the implementation of design measures such as those described above, along with the potential for screening and distance to sensitive receptors, significant effects are not considered likely. Nevertheless, as the design develops, consideration will be given to the potential for solar reflections to impact on sensitive receptors. This will include undertaking calculations to determine if glare could occur at the identified receptor locations and whether it is likely to be a significant nuisance or hazard. If it is likely to be a nuisance or hazard, mitigation will be proposed.

15.3.10 The results and recommendations of the glint and glare calculations will be incorporated into the Scheme design and presented as a technical appendix to the ES. It is considered that this will negate the need for a specific glint and glare chapter in the ES.

15.4 Ground Conditions

15.4.1 The Environment Agency's Land Contamination Risk Management (LCRM) Guidance (Ref. 185) identifies that the first step, known as Stage 1, Tier 1, in evaluating land contamination risks is a Preliminary Risk Assessment (PRA). The objective of the PRA is to identify and evaluate potential land quality risks and development constraints associated with the Scheme and to construct an initial conceptual site model that can be used to inform future decision making and the design of future ground investigation and or mitigation, should it be required.

15.4.2 A PRA report is being prepared, covering land within the Site. The PRA report will be presented as a technical appendix to the ES.

15.4.3 The PRA will include the following:

- Details of land within the Site and surrounding area including development history, geology, hydrogeology, hydrology, soil and groundwater quality and environmental setting;
- A review of the environmental data report provided by Landmark Information Group;
- Details of land designated for Mineral Safeguarding;
- Details of any available site investigation reports for land within the Site;
- Details from a site walkover documenting:
  - The existing layout, current operations and condition of land within the Site, the property boundaries and immediately surrounding land;
  - The visual inspection of any potential indicators of any land contamination, for e.g.: spillages, disturbed ground; and
  - The visual inspection of any geohazards or ground conditions constraints.
- A conceptual site model (CSM) and an evaluation of potential contamination linkages; and
- Conclusions and recommendations based on the findings.

15.4.4 Based upon the PRA, a number of environmental design and management measures will be employed as standard best practice to minimise impacts to both human health and controlled waters during the construction and decommissioning phases of the Scheme, including those listed in Table 15-1 below. These will be incorporated into the Framework CEMP which will be provided alongside the ES as part of the DCO application.

15.4.5 Potential environmental impacts that will be avoided, prevented, reduced or offset through the implementation of these mitigation measures include:

- Human exposure through direct contact/inhalation/dermal uptake of contaminants potentially present in soil and groundwater;
- Creation of preferential pathways and mobilisation of contamination;
- Contamination of natural soils, driving of contamination into an aquifer during piling, contamination of groundwater with concrete, paste or grout;
- Pollution and degradation of water quality of any underlying aquifer;
- Infiltration and / or runoff into the local drainage/sewerage network - pollution of drainage and sewerage network and any adjacent surface water features;
- Run-off and infiltration of contaminants from material stockpiles;
- Contamination of drainage and sewerage network and/or groundwater; and
- Spread of nuisance dusts and soils to the wider environment and local roads.

Table 15-1: Environmental Design and Management Measures to be included in the CEMP

Environmental Design and Management Measures
Regulatory / Guidance
1. Work will be carried out in accordance with relevant Construction Design Management Regulations 2015 (Ref. 186), details of these measures will be presented within the Health and Safety Plan (H&SP), and the CEMP.
2. The CEMP will be prepared prior to commencement of works, setting out the management, monitoring, auditing and training procedures, and the mitigation measures that will be put in place during enabling works and construction, to maintain compliance with the applicable regulations. In order to reduce the likelihood of contamination and protect human health and controlled waters from effects related to ground conditions, the CEMP will include mitigation measures such as those presented here.
3. A Pollution Response Plan will be drafted prior to the commencement of works on-site. The plan will outline key pollution mitigation measures including a Control of Substances Hazardous to Health (COSHH)/fuel inventory and key contacts to be notified in the event of a significant pollution incident, which may subsequently lead to the contamination of controlled waters. Any fuel and COSHH chemicals will be stored in accordance with the relevant Environment Agency Pollution Prevention Guidance (PPG) notes (while these guidance notes have been withdrawn, they are still considered to provide a useful data source). Tanks and dispensing pumps will be locked when not in use to prevent unauthorised access. Information regarding spill prevention and disposal of COSHH items will be provided as part of the standard site induction presentations and during regular toolbox talks and the works progress.
4. Piling will be carried out in accordance with Environment Agency Guidance Note on Piling/Penetrative Ground Improvement Methods on Land Affected by Contamination (Ref. 187) and ground investigations will inform the Foundation/Piling Works Risk Assessment which will define the appropriate piling methods and foundation design to mitigate risk.
5. Specification of concrete used in foundations and building structures will be selected based on the results of the chemical composition of the site soil and groundwater. Guidance is provided by the BRE series 'Concrete in Aggressive Ground' (Ref. 187).
Waste
6. Waste materials will be disposed of by the contractor(s) to appropriate recycling facilities or appropriately licensed landfills in line with the Site Waste Management Plan. The appropriate landfill for the disposal of any contaminated soil off-site will depend on the waste classification determined from the chemical analysis or Waste Acceptance Criteria testing as necessary. Where possible, non-contaminated excavated material will be reused.
7. Waste effluent will be tested for appropriate physical and chemical parameters and, where necessary, disposed of at the correctly licensed facility by a licensed specialist contractor(s).
Construction Related
8. Oils and hydrocarbons will be stored in designated locations with specific measures to prevent leakage and release of their contents, include the siting of storage area away from surface water drains, on an impermeable base with an impermeable bund that has no outflow and is of adequate capacity to contain 110% of the contents. Valves and trigger guns will be protected from vandalism and kept locked up when not in use. Details of appropriate storage and handling measures will be presented within the CEMP.
9. Vehicles will be well maintained to prevent accidental pollution from leaks. Static machinery and plant will include drip trays beneath oil tanks / engines / gearboxes / hydraulics, which will be checked and emptied regularly via a licensed waste disposal operator.
10. The Lead Flood Authority (LFA) and the appropriate utility company will be consulted on the potential requirement for an oil interceptor and sediment trap at the point where site surface water runoff enters any sewerage network.
11. A spillage Emergency Response Plan (ERP) will be produced (and could form part of the CEMP), which site staff will be required to have read and understood. On-site provisions will be made to contain a serious spill or leak through the use of booms, bunding and absorbent material.

Environmental Design and Management Measures

12. Appropriate handling and disposal of concrete pastes and/or grouts during the laying of foundations.
13. During the enabling and construction stage of work, the contractor(s) will employ dust suppression measures when necessary to prevent the potential mobilisation of contaminated dust particles and their migration off-site.
14. Stockpiles and material handling areas will be kept as clean as practicable to avoid nuisance from dust. Dusty materials will be dampened down using water sprays in dry weather or covered.
15. The length of time materials are stockpiled on-site before being removed for re-use, recycling or disposal is to be kept to a minimum and stockpiles are to be covered with tarpaulins prior to disposal.
16. Dust generating equipment and screening equipment will be located to minimise potential nuisance impacts to receptors, as far as practicable.
17. Complaints about dust will be investigated at the earliest opportunity and appropriate action taken to control the source or remedy the impact as appropriate.
18. Access roads will be regularly cleaned and damped down with water.
19. All vehicles entering and leaving the site during the construction period will pass through a wheel washing facility. Vehicles used to transport materials and aggregates will be enclosed or covered in a tarpaulin. Vehicle movements will be kept to a minimum and vehicle speeds within the site will be limited.
20. Appropriate use of personal protective equipment (PPE) and implementation and adherence to Health & Safety Protocols, Plans and Procedures. Construction workers will remain vigilant of ground conditions at all times and will report to the Principal Contractor any suspect areas of potential contamination.
21. Potentially contaminated made ground will be quantified prior to removal from from excavations.
22. Advice will be sought by an environmental specialist should materials suspected of being contaminated be uncovered.

15.4.6 On-site activities when the development is complete and operational will be limited to the maintenance of the infrastructure. During maintenance activities there may be the need to use oils, grease, fuels, lubricants or cleaning agents on-site. There is a small risk of chemical pollution arising from accidental spillages during these operations. An Operational Environmental Management Plan (OEMP) will be prepared following grant of DCO to address all operational related issues. This will include a spillage ERP, which maintenance staff will be required to have read and understood. On-site provisions will be made to contain a serious spill or leak through the use of booms, bunding and absorbent material. Operational activities are proposed to be scoped out of the assessment.

15.4.7 It is anticipated that the results and recommendations of the PRA report, once incorporated into the Framework CEMP, along with the environmental design and management measures above, for the construction, operation and decommissioning phases, will negate the need for a specific ground conditions chapter in the ES.

15.5 Major Accidents or Disasters

15.5.1 The EIA Regulations (Ref. 1) has introduced a requirement to consider major accidents or disasters. It is considered likely that the original changes to the EIA Directive (Ref. 189) to consider major accidents or disasters were made in order to bring certain other statutory requirements, mainly other EU Directives, within the overall 'wrapper' of EIA and the ES. The Directive and domestic Regulations cite two specific directives as examples of risk assessments to be brought within EIA, these are Directive 2012/18/EU of the European Parliament and of the European Council (which deals with major accident hazard registered sites) (Ref. 190) and Council Directive 2009/71/Euratom (which deals with nuclear sites) (Ref. 191). Neither of these Directives are relevant to the Scheme.

15.5.2 'Accidents' are considered to be an occurrence resulting from uncontrolled developments in the course of construction and operation of a development (e.g. major emission, fire or explosion). 'Disasters' are considered to be naturally occurring extreme weather events or ground related hazard events (e.g. subsidence, landslide, earthquake).

15.5.3 In the absence of established guidance on this topic, the following methodology has been adopted. 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.

15.5.4 An initial scoping exercise has been undertaken to identify all possible major accidents or disasters that could be relevant to the Scheme. This list was drawn from a number of sources, including the UK Government's Risk Register of Civil Emergencies (Ref. 192). Major accidents or disasters with little relevance in the UK were not included. The long list of major accidents or disasters is presented in Appendix B.

15.5.5 This long list was then screened to identify the third group of major accidents or disasters listed above, to form a shortlist of events to be taken forward for further consideration.

15.5.6 Although the majority of the major accidents or disasters on the long list are already considered under other legislative or design requirements, this is not considered to be sufficient reason to automatically eliminate the major accident or disaster from any 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 do not need to be considered in EIA. However, where it is concluded that the need for compliance is so fundamental, and the risk of any receptors being affected differently so remote, major accidents or disasters on the long list are not included on the shortlist.

15.5.7 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. 193);
- The Management of Health and Safety at Work Regulations 1999 (Ref. 194);
- The Workplace (Health, Safety and Welfare) Regulations 1992 (Ref. 195); and
- Construction (Design and Management) (CDM) 2015 Regulations (Ref. 22).

15.5.8 Table 15-2 presents a short list of major accidents or disasters that are considered to need further consideration. Where the major accidents and disasters identified are not already being considered within the scope of existing technical assessments, they will continue to be reviewed with the design team to ensure the risks are understood and addressed through design as necessary. However, it is considered highly likely that as the design of the Scheme evolves in preparation of the DCO application, it will become clear that there is no real risk or serious possibility of the event interacting with the Scheme. In that eventuality, we would propose to scope out from the ES the assessment of such major accidents or disasters. The ES would note and explain where this approach has been taken.

Table 15-2: Major Accidents or Disasters Shortlisted for Further Consideration

Major accident or disaster	*Potential receptor*	*Comments*
Floods	Property and people in areas of increased flood risk.	Both the vulnerability of the Scheme to flooding, and its potential to exacerbate flooding, will be covered in the Flood Risk Assessment, and also reported in ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme.
Fire	Local residents, habitats and species.	There may be some potential for fire as a result of the battery storage element of the Scheme. However, the battery energy storage system will include cooling systems, which are designed to regulate temperatures to within safe conditions to minimise the risk of fire.

Major accident or disaster	*Potential receptor*	*Comments*
Road accidents	Aquatic environment	The risk of road collisions and accidents will be addressed in the Transport Assessment.
	Road users	The risk posed by spillage from hazardous loads as a result of a road traffic accident during construction or decommissioning will be considered in the Flood Risk, Drainage and Water Resources chapter of the ES.
		The potential for glint and glare to affect road users will be considered within a technical appendix to the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.
Rail accidents	Rail users	The Sheffield to Lincoln rail line passes through the centre of the Site. The potential for glint and glare to affect trains will be considered within a technical appendix to the ES if any risks are identified. The potential for glint and glare to affect trains will be considered within a technical appendix to the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.
Aircraft disasters	Pilots and aircraft	The potential for glint and glare to affect aircraft will be considered within a technical appendix to the ES if any risks are identified. Mitigation will be considered and, where necessary, incorporated into the Scheme design.
Flood Defence Failure	Employees	This will be covered in the Flood Risk Assessment and will also be reported in the ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme.
Utilities failure (gas, electricity, water, sewage, oil, communications)	Employees and local residents	The Scheme has the potential to affect existing utility infrastructure above and below ground. To identify any existing infrastructure constraints, both consultation and a desk based study will be undertaken. It is known that there is an overhead electricity line located within the Site.
Plant disease	Habitats and species	New planting may be susceptible to biosecurity issues, such as the increased prevalence of pests and diseases, due to climate change. The planting design will take account of biosecurity risks through a wider mix of species including some non-natives.

15.5.9 Where further design mitigation is unable to remove the potential interaction between a major accident or disaster and a particular topic, the relevant ES chapter 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.

15.5.10 The potential receptors of effects resulting from major accidents or disasters will be reported in the relevant topic chapter, and as such it is considered that this will negate the need for a specific major accidents or disasters topic chapter in the ES. Nevertheless, there will be signposting of major accident or disaster impacts in the ES to enable these to be identified.

15.6 Telecommunications, Television Reception and Utilities

15.6.1 Solar farms have the potential to affect existing utility infrastructure below ground, but are not at a height to affect above ground telecommunications. To identify any existing infrastructure constraints, both consultation and a desk-based study will be undertaken. Consultation with relevant telecommunication and utilities providers is a routine part of development and consultees will include water, gas and electricity utilities providers and telecommunications providers as appropriate. Information obtained from consultation will be used to inform the Scheme design and appropriate protective provisions will be included in the DCO to ensure the protection of apparatus wherever any existing infrastructure has the potential to be affected by the Scheme.

15.6.2 Taking the above into account, relevant measures will be captured within the Scheme design, therefore a separate utilities ES chapter is not considered to be required.

15.7 Waste

15.7.1 The types of wastes generated during 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.

15.7.2 The PV modules, racks, inverters and other supporting equipment will be manufactured off-site to the specified sizes, and wastage during installation is expected to be minimal.

15.7.3 Large-scale earthworks are not expected, and therefore there is not expected to be either a surplus or shortfall of fill material requiring either export or import.

15.7.4 A Site Waste Management Plan (SWMP) will be prepared as part of the Construction Environmental Management Plan (CEMP), which will set out:

- The waste streams that will be generated;
- How the waste hierarchy will be applied to these wastes;
- Good practice measures for managing waste; and
- Roles and responsibilities for waste management.

15.7.5 All management of waste will be in accordance with the relevant regulations and waste will be transported by licensed waste hauliers to waste management sites which hold the necessary regulatory authorisation and/or permits for those wastes consigned to them.

15.7.6 During operation, waste generation is expected to be negligible, since PV panels do not generate any waste as part of the energy production process.

15.7.7 At the end of the Scheme's operational life, it will be decommissioned. As this is expected to be at least 60 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.

15.7.8 However, an Outline Decommissioning Environmental Management Plan (ODEMP) will be prepared as part of the EIA, that will set out the general principles to be followed in the Detailed Decommissioning Plan that will be prepared prior to decommissioning occurring.

15.7.9 Considering the above, it is concluded that significant waste impacts are not expected during either construction, operation or decommissioning, and hence the need for a separate waste chapter has been scoped out of the EIA.

16. Structure of the Environmental Statement

16.1.1 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.

16.1.2 **ES Volume 1: Main Report** – this will form the main body of the ES, detailing the results of the environmental assessment, likely significant effects arising from the Scheme, and the proposed mitigation measures. The ES will also identify opportunities for social and economic benefits and environmental enhancement. The ES will be divided into a number of background and technical chapters, each being supported with figures and tabular information. ES Volume 1 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 and Biodiversity;
- 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;
- Chapter 14: Human Health and Wellbeing; and
- Chapter 15: Other Environmental Topics.

16.1.3 In addition to the above, the following chapters will be produced as part of the ES:

- Chapter 1: Introduction;
- Chapter 2: The Scheme;
- Chapter 3: Alternatives and Design Evolution;
- Chapter 4: Consultation;
- Chapter 5: Environmental Impact Assessment Methodology;
- Chapter 16: Effect Interactions; and
- Chapter 17: Summary of Environmental Effects.

16.1.4 **ES Volume 2: Figures** – A complete set of figures will be provided for reference which support the assessments in ES Volume 1.

16.1.5 **ES Volume 3: Technical Appendices** – A complete set of appendices will be provided for reference. These comprise of background data, technical reports, tables, figures and surveys which support the assessments in ES Volume 1.

16.1.6 **ES Non-Technical Summary (NTS)** – The NTS will be presented in a separate document and provides a concise description of the Scheme, the considered alternatives, baseline, assessment methodology, potential environmental effects and mitigation measures. The NTS will be designed to provide information on the Scheme in an accessible format which can be understood by a wide audience and to assist interested parties with their familiarisation of the project.

17. Summary and Conclusions

17.1.1 This 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.

17.1.2 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.

17.1.3 For clarity, Table 17-1 presents a summary of the proposed scope of the technical topics as well as which elements of these topics that are to be scoped out and the rationale behind this decision.

Table 17-1: Scope of Technical Topics and Elements to be Scoped Out

Environmental 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. A statement on resilience of the Scheme to future climate changes will be provided.	In-combination impacts of temperature, sea level rise, precipitation change, and changes in wind patterns are proposed to be scoped out of the in combination climate impact assessment. Sea level rise is proposed to be scoped out of the climate change resilience review.	The Site is not located in an area that is susceptible to sea level change, and no on combination effects with other environmental disciplines is predicted.
Cultural Heritage	It is proposed to undertake an assessment of impact on both physical effects on heritage assets, and effects on their setting including changes to visual intrusion, noise, air quality, severance, access and amenity. Further archaeological work may be required, the extent and scope of which will be determined following completion of a cultural heritage archaeological desk-based assessment, and in consultation with Historic England and the County Archaeologists for Lincolnshire and Nottinghamshire. Effects of connection to the National Grid on the setting of heritage assets	None	N/A
Ecology	The EcIA will include consideration of designated sites and protected and/or notable habitats and species. Effects considered include habitat loss, disturbance and indirect impacts such as watercourse pollution during construction. Operational effects include disturbance during maintenance, security lighting and management of on-site and adjacent habitats. A Preliminary Ecological Appraisal (PEA) has been undertaken, and further surveys will be undertaken as follows: botanical surveys, aquatic species, reptiles, Great Crested Newt, breeding and wintering birds, bats, badgers and riparian mammals (water vole and otter). A habitat conditions assessment will also be carried out on land within the Site in order to perform a biodiversity net	None	N/A

Environmental Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
	gain assessment. Effects of connection to the National Grid on ecological receptors during operation will also be assessed should an over-ground option be taken forward.		
Flood Risk, Drainage and Surface Water	Qualitative assessment of the effects of the Scheme, considering the risk to surface and groundwater bodies resulting from construction or decommissioning works or future operation activity using a source-pathway-receptor approach and development of mitigation to control potential effects. The assessment criteria will follow those outlined in the Design Manual for Roads and Bridges (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 Preliminary WFD assessment will be undertaken. A Surface Water Drainage Strategy and FRA will be prepared.	None	N/A
Landscape and Visual Amenity	Assessment of likely effects on landscape features and character, and views and visual amenity during construction, operation and decommissioning. Photomontages from key viewpoints will be prepared for both year 1 and year 15 of operation.	Lighting Assessment	Any lighting during the construction phase would be temporary and lighting during operation will also be on temporarily.
Noise and Vibration	Baseline noise monitoring will be undertaken at locations representative of surrounding noise-sensitive receptors. An assessment of construction and decommissioning plant noise, and operational plant will be undertaken. Road traffic noise during the construction and operational phases of the Scheme.	Ground-borne vibration from the construction, operation and decommissioning of the Scheme.	No major vibration sources are envisaged to be introduced as part of the Scheme and as such there will be no associated vibration effects. It is proposed that ground-borne vibration is scoped out of any further assessment
		Operational noise effects associated with the Grid Connection	It is not anticipated that the cabling will produce any operational noise emissions.
Socio-Economics and Land Use	Assessment of effects including temporary employment during construction and decommissioning, and gross value added, creation of long term employment opportunities during the operational phase including consideration of any existing uses on-site, and change of land use including displacement of agricultural land and impacts on recreation, open space (including PRoW) and community facilities. An Agricultural Land Classification (ALC) survey of the Site boundary	None	N/A

Environmental Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out	Rationale for Scoping Out
	will be undertaken with reference to the Ministry of Agriculture, Fisheries and Food guidelines.		
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 and road safety. Criteria/ requirements for the above assessments to be considered and discussed with the LHA given these will be temporary construction impacts. Any mitigation measures to be recommended.	Operational vehicle movements due to low numbers of vehicles.	Scoped out due to low vehicle numbers
		Hazardous loads	There are no nearby road features which suggest that the transfer of materials poses a risk beyond that which would be expected on the general highway network.
		Assessments for the decommissioning phase due to uncertainties in relation to future traffic flows and transport infrastructure.	Scoped out due to uncertainties in relation to future traffic flows and transport

17.1.4 Table 17-2 summarises the approach taken to the topics discussed in Chapter 15: Other Environmental Topics, of this Scoping Report.

Table 17-2: Scope of Approach to Other Environmental Topics

Environmental Topic	Proposed Approach
Air Quality	Qualitative dust assessment to identify measures to be included in a Framework CEMP. Suitable mitigation measures for construction and decommissioning plant and motorised equipment will be included in the Framework CEMP. Effect of Scheme operation and operational traffic on air quality is proposed to be scoped out.
Glint and Glare	An assessment will be undertaken to identify the potential for solar reflections to impact on sensitive receptors for both orientation options to inform design development.
Ground Conditions	A PRA will be included in the ES and the results and recommendations of this will be incorporated into the Framework CEMP. Maintenance activities during the operational phase will be managed through an Operational Environmental Management Plan and are proposed to be scoped out of the assessment.
Human Health	Human health (including air quality, land quality, noise, transport and access and visual amenity) will be covered elsewhere in the ES with appropriate signposting in the ES to enable these to be identified; EMFs are proposed to be scoped out.
Major Accidents and Disasters	Where the major accidents and disasters identified are not already being considered within the scope of existing technical assessments, they will continue to be reviewed with the design team to ensure the risks are understood and addressed through design as necessary. However, it is considered highly likely that as the design of the Scheme evolves in preparation of the DCO application, it will become clear that there is no real risk or serious possibility of the event interacting with the Scheme. In that eventuality, we would propose to scope out from the ES the assessment of such major accidents or disasters. The ES would note and explain where this approach has been taken.
Telecommunications	Consultation and a desk based study to identify any existing infrastructure constraints and this information will be used to inform the Scheme design.
Waste	Description of the potential streams of construction, operation and decommissioning waste and estimated volumes will be described within the description of development chapter of the ES.

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19. Glossary

Air Quality Management Area (AQMA)	Places where air quality objectives are not likely to be achieved. Where an AQMA is declared, the local authority is obliged to produce an Action Plan in pursuit of the achievement of the air quality objectives.
Baseline conditions	The conditions against which potential effects arising from the Scheme are identified and evaluated.
Battery energy storage system	Proposed development of a battery storage installation and associated development to allow for the storage, importation and exportation of energy to the National Grid.
Cables	The cables, which transmit electricity from the transformers to the project substation.
Construction Environmental Management Plan (CEMP)	A site specific plan developed to ensure that appropriate environmental management practices are followed during the construction phase of a project.
Cumulative Effects	Effects upon the environment that result from the incremental impact of an action when added to other past, present or reasonably foreseeable actions. Each impact by itself may not be significant but can become a significant effect when combined with other impacts.
Energy Park	Proposed generating station comprised of solar PV modules mounted on racks and connected via associated infrastructure to the national grid.
Environmental Impact Assessment (EIA)	A process by which information about environmental effects of a proposed development is collected, assessed and used to inform decision making. For certain projects, EIA is a statutory requirement.
Environmental effect	The consequence of an action (impact) upon the environment such as the decline of a breeding bird population as a result of the removal of hedgerows and trees.
Environmental impact	The change in the environment from a development such as the removal of a hedgerow.
Environmental Statement	A document produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations to report the results of an EIA.
Preliminary Ecological Appraisal (PEA)	Comprises a desk study, Phase 1 Habitat Survey (which categorises habitats to a broad level using the methodologies set out by JNCC (1993 as amended) guidelines) and Protected Species Scoping survey (which includes preliminary survey work to identify the presence or potential presence of legally protected species).
Flood Zone 3	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone 2	This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Flood Zone 1	This is land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability (AEP)).
Geophysical survey	Geophysical survey is a non-intrusive pre-construction archaeological evaluation technique that exploits a variety of physical or chemical characteristics of rocks and soils etc, in an attempt to locate underground features of archaeological interest. Types of geophysical survey include magnetometer survey, magnetic susceptibility survey and resistivity survey.
Grid Connection Corridor Route Options	Corridor options which represent the maximum extent of land within which the cable route would be located.
Heavy Goods Vehicle (HGV)	Vehicles with 3 axles (articulated) or 4 or more axles (rigid and articulated).
Historic Environment Record	The record of archaeological and built heritage features in a county or district, usually held and maintained by the relevant County Council.
Interface cables	Buried high-voltage cables linking the on-site electrical infrastructure to the National Grid.
Inverter	Inverters convert the direct current (DC) electricity collected by the PV modules into alternating current (AC), which allows the electricity generated to be exported to the National Grid. 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 grid.
Jointing pit	Underground structures constructed at regular intervals along the cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Mitigation	Measures including any process, activity, or design to avoid, prevent, reduce, or, if possible, offset any identified significant adverse effects on the environment.
NPS	National Policy Statement. National Policy Statements are produced by government. They comprise the government's central policy documents for the development of nationally significant infrastructure.
Nationally Significant Infrastructure Projects (NSIP)	NSIPs are large scale developments such as certain new harbours, power generating stations (including wind farms), highways developments and electricity transmission lines, which require a type of consent known as 'development consent' under procedures governed by the Planning Act 2008 (and amended by the Localism Act 2011).
On-site substation	A compound containing electrical equipment to enable connection to the National Grid. We are currently thinking that the system would be HVAC (high voltage alternating current) at 132kV but this needs research to be final decision.
Preliminary Environmental Information (PEI)	PEI is defined in the EIA Regulations as: *"information referred to in Regulation 14(2) which –* *(a) has been compiled by the applicant; and* *(b) is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)."*

Preliminary Risk Assessment	Report that presents a summary of readily-available information on the geotechnical and/or geo-environmental characteristics of the site and provides a qualitative assessment of geo-environmental and/or geotechnical risks in relation to the proposed development.
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
Receptor	A component of the natural or man-made environment that is affected by an impact, including people.
Scheme	The Gate Burton Energy Park comprising solar PV and battery storage and associated development for connection to the national transmission system via Grid Connection, for which options are to be assessed and determined.
Setting	The surroundings within which a heritage asset is experienced and any element, which contributes to the understanding of its significance.
Site / Site Boundary	The maximum extent of land potentially required temporarily and/or permanently for the construction, operation and maintenance of the Scheme.
Source Protection Zone (SPZ)	SPZs show the risk of contamination from any activities that might cause pollution to groundwater sources such as wells, boreholes and springs used for public water supplies. The closer the activity, the greater the risk. SPZs can comprise of up to three main zones (inner, outer and total catchment). A fourth zone of special interest can also occasionally be applied to a groundwater source.
Sustainable drainage systems (SUDS)	Surface water drainage systems developed in line with the ideals of sustainable development (e.g. swales, ponds, basins, filtration flow control, etc).
Transformers	Transformers control the voltage of the electricity generated across the site before it reaches the electrical infrastructure.
Visual receptors	People with views of the development or associated activities. These are located within the visual envelope and are typically residents, motorists, pedestrians, recreational users in residential areas on publicly accessible roads, footpaths and open spaces.
Water Framework Directive	The Water Framework Directive ("WFD") introduced a new system for monitoring and classifying the quality of surface and ground waters. The Directive requires that Environmental Objectives be set for all surface waters and groundwater to enable them to achieve Good Ecological Potential/Status by a defined date.
Zone of Theoretical Visibility	The zone within which views of a proposed development may be experienced, as determined by analysis of OS data and field survey. It is influenced by many factors including topography and intermediate visual intrusions, such as blocks of woodland and buildings.

20. Abbreviations

AC	Alternating current
AEP	Annual Exceedance Probability
agl	Above ground level
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BAP	Biodiversity Action Plan
BRE	Building Research Establishment
BRES	Business Register and Employment Survey
BS	British Standard
BGS	British Geological Survey
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
BOAT	Byways Open to All Traffic
BOD	Biological Oxygen Demand
BPM	Best Practicable Means
CCTV	Closed circuit television
CDM	Construction Design Management
CEMP	Construction Environmental Management Plan
CH_4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute of Archaeologists
CO_2	Carbon dioxide

COPA	Control of Pollution Act 1974
COSHH	Control of Substances Hazardous to Health
CLJSPC	Central Lincolnshire Joint Strategic Planning Committee
CSM	Conceptual Site Model
DC	Direct current
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
DoS	Degree of Saturation
EcIA	Ecological Impact Assessment
EC	European Commission
EEA	European Economic Association
EIA	Environmental Impact Assessment
EPS	European Protected Species
EQS	Environmental Quality Standards
EPUK	Environmental Protection UK
ERP	Emergency Response Plan
ES	Environmental Statement
EU	European Union
FRA	Flood Risk Assessment
GHG	Greenhouse gas
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GRP	Glass reinforced plastic
GVA	Gross Value Added
GWDTE	Groundwater Dependent Terrestrial Ecosystem

ha	hectare
H&SP	Health and Safety Plan
HDD	Horizontal Directional Drilling
HER	Historic Environmental Record
HFCs	Sulphur hexafluoride
HGV	Heavy goods vehicle
HIA	Health Impact Assessment
HLC	Historic Landscape Characterisation
HSI	Habitat Suitability Index
HMSO	Her Majesty's Stationery Office
HRA	Habitat Regulation 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
IEMA	Institute of Environmental Management and Assessment
IHBC	Institute of Historic Building Conservation
INNS	Invasive Non-Native Species
km	Kilometre
kV	Kilovolt
LCA	Landscape Character Area
LCC	Lincolnshire County Council
LFA	Lead Flood Authority
LGV	Light Goods Vehicle
LLFA	Lead Local Flood Authority

LNR	Local Nature Reserve
LRN	Local Road Network
LSE	Likely significant Effects
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographical Information for the Countryside
MHCLG	Ministry of Housing, Communities and Local Government
MW	Megawatts
N_2O	Nitrous oxide
NCA	National Character Area
NCC	Nottinghamshire County Council
NERC	The Natural Environmental and Rural Communities
NF_3	Nitrogen trifluoride
NGR	National Grid Reference
NHLE	National Heritage List for England
NO_2	Nitrogen Dioxide
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
NVS	Nitrate Vulnerable Zone
ONS	Office for National Statistics
OS	Ordnance Survey
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report

PFCs	Perfluorocarbons
PINS	Planning Inspectorate
PM_{10}	Particulate matter
PPE	Personal protective equipment
PPG	Pollution Prevention Guidance
PRA	Preliminary Risk Assessment
PRoW	Public Right of Way
PV	Photovoltaic
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathways
RFC	Ratio to Flow Capacity
SF_6	Sulphur hexafluoride
SoCC	Statement of Community Consultation
SoS	Secretary of State
SPD's	Supplementary Planning Documents
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
SWMP	Site Waste Management Plan
TA	Transport Assessment
tCO2e	Tonnes of carbon dioxide equivalent
UK	United Kingdom
UKBAP	UK Biodiversity Action Plan
UKCP18	UK Climate Projections 2018
UKCIP	UK Climate Impacts Programme

W	Watts
WCA	Wildlife and Countryside Act 1981
WFD	Water Framework Directive
WHIASU	Wales Health Impact Assessment Support Unit
WLDC	West Lindsey District Council
WTN	Waste Transfer Note
ZOI	Zone of influence
ZTV	Zone of Theoretical Visibility

21. Appendices

Appendix A Transboundary Effects Screening Matrix

A.1 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.

A.2 Guidance upon the consideration of transboundary effects is provided in the Planning Inspectorate's Advice Note 12: Development with significant transboundary impacts consultation[4].

A.3 The following screening matrix provides the consideration of transboundary effects for the Scheme, taking guidance from Advice Note 12 (Annex).

Table A1: Screening Matrix for Possible Substantial Effects on the Environment of EEA States

Criteria and Relevant Considerations	*Commentary with Regard to Proposed Scheme*
Characteristics of the development - Size of the development - Use of natural resources - Production of waste - Pollution and nuisance - Risk of accidents - Use of technologies	The resources required for the construction of the Scheme are likely to be obtained from the global market but it is envisaged that materials would be obtained locally wherever possible. No waste, nuisances or accidents are likely to extend beyond the border of the UK. No novel technologies are proposed that have 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? (Name EEA state)? - What is the extent of the area of a likely impact under the jurisdiction of another EEA state?	The Scheme's closest EEA boundary is France, located approximately 320km to the south-east. No impacts are likely to extend beyond the jurisdiction of the UK, with the exception of potential greenhouse gas emissions (GHG). The latter is expected to be minimal given the nature of the Scheme, which will not emit GHG emissions during its operation (except for any emissions associated with maintenance vehicles and repair works).
Environmental importance - Are particular environmental values (e.g. protected areas – name them) likely to be affected? - Capacity of the natural environment. - Wetlands, coastal zones, mountain and forest areas, nature reserves and parks, Natura 2000 sites, areas where environmental quality standards already exceeded, densely populated areas, landscapes of historical, cultural or archaeological significance.	There are no European statutory designated nature conservation sites within 10km of the Scheme. It is not anticipated that there is potential for transboundary effects (and therefore any effects on important environmental receptors beyond the UK).

[4] https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/04/Advice-note-12v2.pdf

Criteria and Relevant Considerations	*Commentary with Regard to Proposed Scheme*
Potential impacts and carrier - By what means could impacts be spread (i.e. what pathways)?	The only potential transboundary environmental impact which is considered likely is from GHG emissions. These emissions would be spread by atmospheric processes and are anticipated to be minimal given the nature of the Scheme. The Scheme is expected to offset GHG emissions through the generation of clean electricity, that otherwise would have been generated from a typical fuel mix comprising technologies such as gas fired power stations for example.
Extent - What is the likely extent of the impact (geographical area and size of the affected population)?	The only potential transboundary environmental impact which is considered likely is from GHG emissions, which are known to contribute to changes on climate on a global scale. The impact of GHG emissions is considered irreversible within human lifetimes, however as above, the emissions are expected to be minimal during construction and decommissioning (in the order of one to three years) and is expected to lead to a beneficial contribution to UK GHG emissions during operation (assumed to be 60 years). The temporal pattern of GHG emissions is likely to be relatively constant during the construction and decommissioning phases. It is proposed to calculate the likely GHG emissions as part of the EIA. GHG impacts will be put into context in terms of their impact on the UK's five year carbon budgets which set legally binding targets for greenhouse gas emissions. The GHG emissions offset through the production of cleaner electricity during the operational phase will be accounted for within the GHG emissions calculations. In any event, the global nature of GHG impacts means that it is not possible to apportion or identify any impact in GHG emissions in terms of environmental effects on any particular country or state. It follows that there is no potential for significant effects on the environment of any EEA State or group of EEA States resulting from GHG emissions from the Scheme, as the environmental receptor in this regard is the global atmosphere, rather than the environment of any country or state or group of countries or states. The GHG emissions are considered at a global level, and so are captured by the assessment in any event.
Magnitude - What will the likely magnitude of the change in relevant variables relative to the status quo, taking into account the sensitivity of the variable?	
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? - Is the impact likely to relate to the construction, operation or decommissioning phase of the activity?	
Frequency - What is likely to be the temporal pattern of the impact?	
Reversibility - Is the impact likely to be reversible or irreversible?	
Cumulative impacts - Are other major developments close by?	Proposed developments within 5km of the Scheme will be taken into consideration in the Environmental Impact Assessment (EIA). However, it is not anticipated that there is potential for significant cumulative transboundary effects.

Appendix B Long List of Major Accidents or Disasters

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
1	**Geological disasters**				
1.1	Landslides	No	The risk of landslides will be considered as part of the geotechnical design, ensuring that the risk is designed out, both in terms of the vulnerability of the Scheme to these types of event; however given the flat nature of the land this risk is considered minimal. The Scheme is not anticipated to increase the risk of landslip happening onsite or elsewhere; it will not significantly change the erosion potential of the soil or stability of the land.	N/A	N/A
1.2	Earthquakes	No	The Scheme is not located in a geologically active area and as such earthquakes are not considered to be a real risk or serious possibility.	N/A	N/A

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
1.3	Sinkholes	No	The risk of sinkholes will be considered as part of the geotechnical design, ensuring that the risk is designed out, both in terms of the vulnerability of the Scheme to these types of event, and also in terms of the potential for the Scheme to increase the risk of such an event happening.	N/A	N/A
2	**Hydrological disasters**				
2.1	Floods	Yes	Both the vulnerability of the Scheme to flooding, and its potential to exacerbate flooding, will be covered in the Flood Risk Assessment, and also reported in the ES (both in terms of the risk to the Scheme and increased risk caused by the Scheme).	Property and people in areas of increased flood risk.	Chapter 9: Water Environment Mitigation will be considered and, where necessary, incorporated into the Scheme design.
2.2	Limnic eruptions	No	Not applicable as there are no lakes nearby.	N/A	N/A
2.3	Tsunami/Storm surge	No	Not applicable as the Scheme is not in a coastal location.	N/A	N/A
3	**Meteorological disasters**				
3.1	Blizzards	No	The Scheme is considered to be no more vulnerable than any other development.	N/A	N/A

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
3.2	Cyclonic storms	No	Although there are storms in the UK, their destructive force tends to be much less than in other parts of the world and the Scheme is not particularly vulnerable to any potential effects.	N/A	N/A
3.3	Droughts	No	Droughts are only considered as a disaster due to water shortages for essential services and where there are indirect impacts on food production, loss of soils etc. The Scheme is not considered to be vulnerable to drought.	N/A	N/A
3.4	Thunderstorms	No	As the Scheme includes metal components, there is a risk of lightning strikes. However, these risks will be removed or reduced through inbuilt control systems and can be scoped out at this stage.	N/A	N/A
3.5	Hailstorms	No	The Scheme is considered to be no more vulnerable than any other development.	N/A	N/A

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
3.6	Heat waves	No	While impacts are expected as a result of projected temperature increases (due to climate change), these temperature increases are not expected to have a significant impact on the Scheme. It is anticipated that the cooling systems for the battery energy storage systems, will regulate temperatures to within safe conditions.	N/A	No
3.7	Tornadoes	No	Although there are tornadoes in the UK, their destructive force tends to be much less than in other parts of the world and the Scheme is not particularly vulnerable to any potential effects.	N/A	No

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
3.8	Fires	Yes	There may be some potential for fire as a result of the battery storage element of the Scheme. However, the battery energy storage system will include cooling systems, which are designed to regulate temperatures to within safe conditions to minimise the risk of fire. In addition, the Scheme design will include adequate separation between battery banks to ensure that an isolated fire would not become widespread and lead to a major incident. Fire detection and suppression features would be installed to detect (e.g. multispectrum infrared flame detectors) and suppress fire (e.g. water base suppression systems) to minimise the effect of any fire.	Local residents, habitats and species.	Chapter 2: The Scheme

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
3.9	Air Quality Events	No	The Scheme is not located within any Air Quality Management Areas (AQMA) and there are no AQMAs within the WLDC's local authority area. Although there are likely to be emissions during construction and decommissioning of the Scheme, it is considered that these can be managed through the implementation of a Construction Environmental Management Plan. Good practice measures will be set out in a Framework Construction Environmental Management Plan to be appended to the ES.	N/A	N/A
4	**Transport**				
4.1	Road Accidents	Yes	The risk posed by spillage from hazardous loads as a result of a road traffic accident during construction or decommissioning will be considered in the Flood Risk, Drainage and Water Resources chapter of the ES. The potential for glint and glare to affect road users will be considered within a technical appendix to the ES if any risks are identified.	Aquatic environment Road users	Chapter 9: Water Environment Glint and Glare Study Mitigation will be considered and, where necessary, incorporated into the Scheme design.

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
4.2	Rail Accidents	Yes	The Sheffield to Lincoln rail line passes through the centre of the Site. The potential for glint and glare to affect trains will be considered within a technical appendix to the ES if any risks are identified.	Rail users	Glint and Glare Study Mitigation will be considered and, where necessary, incorporated into the Scheme design.
4.3	Aircraft Disasters	Yes	The potential for glint and glare to affect aircraft will be considered within a technical appendix to the ES if any risks are identified, including the potential to exacerbate 'birdstrike' (collision between a bird and an aircraft).	Pilots and aircraft	Chapter 8: Ecology and Biodivesity Glint and Glare Assessment Mitigation will be considered and, where necessary, incorporated into the Scheme design.
5	**Engineering Accidents/Failures**				
5.1	Bridge Failure	No	None nearby that would affect the Scheme.	N/A	N/A
5.2	Tunnel Failure or Fire	No	None nearby.	N/A	N/A

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
5.3	Dam Failure	No	The River Trent channel and some of its immediate riparian margin as it passes through the Scheme area is within the risk of flooding from a reservoir breach. The remainder of the Site is not at risk from reservoir flooding. There is also flood risk associated with the Power Station to the South of the Scheme	N/A	N/A
5.4	Flood Defence Failure	Yes	This will be covered in the Flood Risk Assessment and will also be reported in ES, both in terms of the risk to the Scheme and increased risk caused by the Scheme.	Property and people in areas of increased flood risk.	Chapter 9: Water Environment Mitigation will be considered and, where necessary, incorporated into the Scheme design.
5.5	Mast and Tower Collapse	No	Not applicable as there are no masts or towers nearby.	N/A	N/A
5.6	Building failure or fire	No	None nearby that would affect 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? If so, where?*
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. It is known that there is an overhead electricity lines located close to the Site.	Employees and local residents	No, however, consultation with relevant utilities providers is a routine part of solar development and consultees will include water, gas and electricity utilities providers and telecommunications providers as appropriate. Information obtained from consultation will be used to inform the layout design.
6	**Industrial Accidents**				
6.1	Defence industry	No	Not applicable as there is no defence manufacturing nearby.	N/A	N/A
6.2	Energy Industry (fossil fuel)	No	The Scheme connects with Cottam Power Station; however, the former coal plant has been decommissioned and is therefore no-longer a receptor.	N/A	N/A.
6.3	Nuclear Power	No	Not applicable as there are no nuclear power stations nearby.	N/A	N/A
6.4	Oil and gas refinery/storage	No	Not applicable as there is no relevant industry nearby.	N/A	N/A
6.5	Food Industry	No	Not applicable as there is no relevant industry nearby.	N/A	N/A
6.6	Chemical Industry	No	Not applicable as there no relevant industry nearby.	N/A	N/A

	Major accident or disaster	*Relevant for long list?*	*Why? (note if risk to the project, or project exacerbates risk)*	*Potential Receptors*	*Covered already in proposed ES? If so, where?*
6.7	Manufacturing Industry	No	Not applicable as there no relevant industry nearby.	N/A	N/A
6.8	Mining / Extractive Industry	No	Not applicable as there no relevant industry nearby.	N/A	N/A
7	**Terrorism/Crime/Civil unrest**	No	The Scheme is unlikely to be more of a target for these types of incident due to its rural location and low number of exposed targets.	N/A	N/A
8	**War**	No	The Scheme is no more vulnerable than any other infrastructure.	N/A	N/A
9	**Disease**				
9.1	Human disease	No	The Scheme is considered no more vulnerable than any other infrastructure.	N/A	N/A
9.2	Animal disease	No	The Scheme is considered no more vulnerable than any other infrastructure.	N/A	N/A
9.3	Plant disease	Yes	New planting may be susceptible to biosecurity issues, such as the increased prevalence of pests and diseases, due to climate change.	Habitats and species	Chapter 10: Landscape and Visual Amenity (including Biodiversity and Landscape Management Plan) The planting design will take account of biosecurity risks through a wider mix of species including some non-natives.

Appendix C Gazetteer of Known Heritage Assets

Non-designated Heritage Assets

Reference	*Grid reference*	*Period*	*Heritage Asset*
MLI50290	SK 8381 8317	Medieval?	Ornamental garden moat, Gate Burton Hall. A possible moat.
MLI50392	SK 8374 8470	Post-Medieval	Duck Decoy Pond, Park Plantation. A sub-rectangular decoy pond with a single pipe leading from the middle of the south side.
MLI50393	SK 8377 8456	Post-Medieval	Duck Decoy Pond, Park Plantation. A sub-rectangular decoy pond with a single pipe leading from the southwest corner.
MLI50529	SK 8314 8480	Medieval	Deserted settlement remains of Knaith. The remains of settlement earthworks, formerly part of the village of Knaith, lie on the east bank of the river Trent, at a prominent bend in the river.
MLI50544	SK 8335 8271	Roman	Possible Roman fort at Gate Burton. APs show an almost certain Roman Fort. There are no surface indications of the site but Roman finds have been found.
MLI50788	SK 8399 7890	Post-Medieval	Earthworks of former fish pond at Abbey Close, Torksey.
MLI50793	SK 8391 7869	Early Medieval	Saxon pottery found at Torksey.
MLI50795	SK 8390 7894	Medieval	Possible site of St Mary's church, Torksey. A few hundred yards east of St Peter's across Abbey Close of which nothing now remains. Its foundation walls were used as road material.
MLI51376	SK 8262 8436	Post-Medieval	Possible site of a watermill south west of Knaith Hall.
MLI51378	SK 8301 8453	Medieval	Building remains and pottery scatter, Dutch Cottage. During the Royal Commission's survey of the earthwork remains of Knaith a small quantity of medieval pottery was observer. Watching brief in the garden uncovered two undated building fragments.
MLI52263	SK 8369 7872	Early Medieval	Early medieval kilns and pottery (Torksey ware) found during exploratory excavations in 1990.
MLI52482	SK 8354 8180	Unknown	Linear cropmark, possibly agricultural.
MLI52483	SK 8382 8170	Medieval?	Possible earthworks suggesting two sides of a moat.
MLI52484	SK 8399 8148	Medieval?	Possible earthworks which could indicate a fishpond.
MLI52497	SK 8429 8110	Unknown	Mound indicated on the 1956 Ordnance Survey map.
MLI52500	SK 8393 7979	Unknown	Cropmark boundary ditch and trackway.
MLI52536	SK 8370 7922	Medieval	Gritted pottery and a little Torksey ware.
MLI52543	SK 8382 7841	Unknown	Probable unknown cropmark field boundaries and or field systems.
MLI52544	SK 8390 7915	Medieval	Medieval boundary ditch.

Reference	Grid reference	Period	Heritage Asset
MLI52545	SK 8369 7879	Early Medieval	Early medieval settlement remains Torksey. Trial trenching recorded various structural features of the medieval settlement. They may indicate features relating to settlement or the Torksey pottery industry.
MLI52548	SK 8369 7872	Early Medieval	Early medieval cemetery. Geophysical survey identified.
MLI54017	SK 8345 8475	Prehistoric	Possible Prehistoric cropmark enclosures and boundary ditches.
MLI54020	SK 8293 8425	Medieval	Ridge and furrow field system.
MLI54021	SK 8279 8446	Medieval/Post-Medieval	Possible medieval earthwork platform or part of the post-medieval garden.
MLI54108	SK 8374 8076	Unknown	Undated cropmarks or an enclosure/ring ditch.
MLI54158	SK 8379 7892	Early medieval	Early medieval/Saxon burials and possible church site off Main Street, Torksey. Trial excavation on land to the east of Main Street revealed seven burials.
MLI54159	SK 8381 7892	Medieval	Post medieval remains, Torksey. Excavations on this site found mainly Torksey pottery artefacts dating from 16th - 18th century. Ploughscores and a post hole from this period were also located.
MLI54282	SK 8368 7955	Early Medieval	14 Northumbrian coins (Stycas) and other Anglo-Saxon material found in Tank field by detectorists.
MLI81717	SK8378 7875	Post-Medieval	Post-medieval settlement features, Main Street. During watching briefs on three house, a post-medieval rubbish pit and a quantity of 16th-18th century pottery and brick and tile rubble were recorded.
MLI81719	SK 8378 7873	Medieval	Late Saxon/Saxo-Norman pottery scatter, Main Street. During watching briefs on three house plots, a scatter of late ninth to eleventh century pottery was recorded.
MLI81723	SK 8377 7875	Medieval	Medieval pottery scatter, Main Street. During watching briefs on two house plots, a scatter of 13th-16th century pottery was recorded.
MLI52488	SK 8384 8112	Post-Medieval	Probable post-medieval flood defences.
MLI52488	SK 8384 8112	Post-Medieval	Probable post-medieval flood defences.
MLI84103	SK 8382 7892	Medieval	Augustinian Priory of St Leonard's, Torksey. Likely site of the Augustinian Priory of St Leonard's founded during the reign of Henry II.
MLI87214	SK 83668 78930	Post-Medieval	Former Wesleyan Methodist Chapel, Torksey. The Wesleyan Methodist Chapel in Torksey was built in the mid nineteenth century, and was still in existence in the 1950s, but had been demolished by the 1970s.

Reference	Grid reference	Period	Heritage Asset
MLI87219	SK 84076 81816	Post-Medieval	Former Primitive Methodist Chapel, Marton. Built in Marton in 1836. It was still in existence in the 1950s but had been demolished by the 1970s.
MLI89078	SK 83799 81940	Unknown	Undated ditch, Littleborough Lane, Marton.
MLI90080	SK 83775 78934	Early Medieval	Late Saxon occupation on land to the east of Main Street, Torksey.
MLI50409	SK 8290 8438	Post-Medieval	Post medieval deerpark and garden south of Knaith Hall. The earthworks immediately south of Knaith Hall and church were previously identified as the site of Heynings Priory but appear rather to be the fragmentary remains of a garden and associated park whose form would suggest a late 16th century or early 17th century date for their construction. Their partial destruction is likely to have been the result of 18th century landscaping.
MLI98360	SK 83495 83197	Post-Medieval	Parkland associated with Gate Burton Hall, Gate Burton. The landscaped parkland surrounding Gate Burton Hall may pre-date the house itself.
MLI97633	SK 8355 7830	Early Medieval	Human Remains found at Torksey Lock. The bones are believed to have come from an Anglo-Saxon or medieval burial site and may be associated with the nearby medieval settlement.
MLI98265	SK 8380 7896	Medieval	Medieval artefact scatter, Abbey Park, Torksey found during archaeological monitoring.
MLI98528	SK 83748 79236	Early Medieval	Early Medieval kiln and occupation activity, Torksey.
MLI98529	SK 8375 7917	Medieval	Medieval cemetery, Torksey. A 12th to 13th century cemetery of thirteen graves which contained nineteen inhumations was revealed. Disarticulated remains of eleven individuals were also recorded.
MLI98530	SK 83707 79264	Post-Medieval	A sand deposit which contained 16th to 18th century pottery, animal bone and fired clay fishing net weights was recorded during trial trenching.
MLI98545	SK 83678 78775	Medieval	Medieval pottery, Castlebanks, Torksey
MLI98546	SK 8359 7897	Post-Medieval	Post-medieval pottery, Torksey
MLI98858	SK 84639 81516	Post-Medieval	Late 19th century former farm buildings at Rectory Farm, Marton. Demolished in 2013.
MLI50651	SK 8438 8315	Medieval	Burton Wood, Gate Burton. An area of woodland included in the Nature Conservancy Council's 'Inventory of Ancient Woodland'.
MLI116176	SK 8370 7893	Medieval	Churchyard at the Church of St Peter, Torksey. Likely dates to at least the early 13th century, when the church it serves was built.
MLI52492	SK 8526 8177	Medieval	Earthwork remains of a former medieval ridge and furrow field system, to the east of Marton.
MLI52472	SK 8475 8186	Roman	Cropmarks of probable Romano-British activity, to the east of Marton.

Reference	Grid reference	Period	Heritage Asset
MLI52493	SK 8541 8248	Medieval	Earthwork remains of medieval ridge and furrow, at Sort Hills, Marton.
MLI116360	SK 8456 8199	Medieval	Traces of probable medieval ridge and furrow, on land off Stow Park Road, Marton.
MLI116361	SK 8454 8203	Unknown	An area of probable quarrying of uncertain date found in a widespread zone of magnetic variation was recorded in this location in February 2016, during magnetometry survey of land off Stow Park Road.
MLI116491	SK 8461 8148	Post-Medieval	Former farmhouse at Rectory Farm, Marton. Demolished in 2013.
MLI50066	SK 8466 8151	Post-Medieval	Rectory Farm, Marton. Partially extant 19th century farmstead. Regular courtyard with linked working buildings to all four sides of the yard. The farmhouse is detached from the main working complex.
MLI125067	SK 8359 8030	Early Medieval	The 872-73 Winter Camp of the Viking Great Army at Torksey. The Viking Great Army overwintered at Torksey in 872-73, as recorded by the Anglo-Saxon Chronicle, and their camp has been identified to the north of Torksey village in the parishes of Brampton and Torksey.
MLI125068	SK 8360 8055	Roman	Probable Roman farmstead at Brampton, identified from geophysical survey.
MLI125069	SK 8348 8052	Post-Medieval	A Rabbit Warren at Brampton.
MLI125070	SK 8366 7974	Post-Medieval	A Rabbit Warren at Torksey.
MLI125072	SK 8354 7982	Roman	A small scatter of Roman pottery near the site of Pottery Farm to the south of Brampton parish.
MLI125073	SK 8354 7982	Early Medieval	A late Anglo-Saxon and medieval pottery scatter near the site of Pottery Farm at Brampton.
MLI54010	SK 8342 8343	Medieval	Remains of a medieval ridge and furrow field system, to the north-west of Gate Burton.
MLI118779	SK 8354 7982	Post-Medieval	Scatter of post-medieval pottery, near the site of Pottery Farm at Brampton.
MLI52489	SK 8458 8125	Roman	Cropmarks of a probable Roman trackway and field boundaries, to the south-east of Marton.
MLI52139	SK 8401 8198	Post-Medieval	Manor Farm, Marton. Partially extant 19th century farmstead. Regular courtyard with multiple regular yards. The farmhouse is attached to a range of working buildings.
MLI125701	SK 8377 7884	Medieval	A scatter of medieval pottery wasters and kiln furniture, found on land at the Hume Arms, Torksey.
MLI50575	Linear	Roman	Till Bridge Lane. Roman road linking Ermine Street north of Lincoln to the crossing of the Trent at Marton.
MLI50455	SK 8260 7859	Bronze Age	Bronze age socketed axe.

Reference	Grid reference	Period	Heritage Asset
MLI50624	SK 8396 8177	Medieval	The remains of a 14th century churchyard cross which was re-used as a war memorial in St Margaret's Churchyard.
MLI50631	SK 8397 8175	Early-Medieval	Anglo-Saxon sculptural fragments, St. Margaret's Church
MLI50792	SK 8370 7894	Medieval	Sheila-na-gig figure in the wall of St Peter's church, Torksey. A medieval sheila-na-gig carving is re-used in the south wall of the nave of St Peter's church. The carving is about 2 ft. high and originally came from the ruins of St Mary's church.
MLI51375	SK 829 846	Medieval	A medieval jetton found at Knaith Hall
MLI52469	SK 8351 7986	Post-Medieval	Farmstead and early 19th century porcelain factory, at Pottery Farm, Brampton. A series of archaeological investigations were conducted at Pottery Farm in the late 1960s and early 1970s, immediately prior to the demolition of the remaining buildings on the site.
MLI52470	SK 8400 8185	Post-Medieval	George II pennies and clay pipes.
MLI52471	SK 8310 8170	Roman	Romano British flagon base.
MLI52481	SK 8400 8180	Medieval	The medieval village of Marton has its origins in the late Anglo-Saxon period and survives to the present.
MLI52494	SK 8405 8180	Post-Medieval	Jetton of Hans Krauwinckel. Coin.
MLI52495	SK 8332 8014	Neolithic	Portion of prehistoric stone axe.
MLI52498	SK 8360 7990	Neolithic	Stone axe.
MLI52528	SK 8350 7910	Neolithic	Polished Neolithic flint axe.
MLI52531	SK 8357 7833	Early Medieval	Anglo-saxon pottery found at kiln sites.
MLI52533	SK 8362 7855	Medieval	Medieval cemetery found during excavation in 1960-2. Upwards of 30 interments found in a grave measuring 10 feet by 6 feet.
MLI52535	SK 8375 7865	Medieval	Early medieval/medieval pottery kilns, Torksey
MLI52537	SK 8369 7880	Roman	Unfinished Jet Toggle or button. Probably of Roman date.
MLI52538	SK 8369 7880	Medieval	Medieval pottery, including shelly ware rim found during drainage operations.
MLI52539	SK 8369 7880	Post-Medieval	Post-medieval remains found during drainage operations.
MLI52541	SK 8358 7844	Neolithic	Neolithic stone axe.
MLI52542	SK 8361 7850	Medieval	Site of former Church of all Saints.
MLI52546	SK 8380 7850	Medieval	Saxon caterpillar brooch.
MLI52561	SK 8375 7865	Early Medieval/Medieval	Early medieval/medieval pottery kilns, Torksey

Reference	Grid reference	Period	Heritage Asset
MLI53578	SK 8370 7880	Early Medieval	Early medieval remains found during evaluation works. Torksey Ware and bone were recovered.
MLI53786	SK 844 807	Unknown	Bunkers hill warren.
MLI54281	SK 8376 7949	Medieval	Byzantine seal found in Tank Field, Torksey
MLI82148	SK 836 786	Prehistoric	Flint flake, from Castle Farm.
MLI90075	SK 83700 79491	Unknown	Human remains and masonry fragments found to the north of the railway, Torksey.
MLI96832	SK 8370 7893	Post-Medieval	Gravestone, Church of St Peter, Torksey. An ashlar gravestone dating from 1705.
MLI98513	SK 838 788	Prehistoric	Upper Palaeolithic or Mesolithic flint adze, Torksey.
MLI98547	SK 83601 78970	Medieval	Two fragments of Medieval pottery found during archaeological test pitting.
MLI116450	SK 8434 8201	Roman/Medieval	A redeposited and abraded pottery sherd of either Roman or medieval date, found on land to the north of Stow Park Road, Marton.
MLI118780	SK 8384 7954	Post-Medieval	Unnamed farmstead, Torksey.
L5039-MNT4982	SK 8162 8057	Unknown	An incomplete, asymmetric, curvilinear enclosure, 180m by 100m, defined in places by two parallel ditches. Three small, circular enclosures, some incomplete, and with an average diameter of 8m were recorded within the enclosure, and may be hut circles.
L5040- MNT4983	SK 806 802	Unknown	Cropmarks at south Leverton. Double linear features. Recorded from aerial photographs.
L5037-MNT4980	SK 808 818	Unknown	Cropmarks at north Leverton. Linear features possibly field boundaries. Small rectangular enclosure adjoining one line, linear features to SW. Recorded from aerial photographs.
L5038-MNT4981	SK 807 814	Unknown	Cropmarks at north Leverton. Two enclosures, one with an internal hut circle or similar feature. Recorded from aerial photographs.
L6052-MNT5989	SK 797 800	Medieval to Post Medieval	Ridge and furrow at south Leverton. Blocks of ridge and furrow, on 2 different alignments and of different widths. Recorded from aerial photographs.
M4697-MNT15343	SK 8154 7854	Medieval	Moat at fleet plantation, Rampton
M6241-MNT15983	SK 8162 8057	Iron Age to Roman	? IA/Ro settlement, Cottam
M5033-MNT15524	SK 822 827	Roman	Roman town of Segelocum
L5032-MNT4975	SK 8209 8264	Unknown	Linear features at Sturton le steeple

Reference	Grid reference	Period	Heritage Asset
L6166-MNT6103	SK 804 783	Unknown	Earthworks at east end farm, Rampton
L6229-MNT6166	SK 8087 7853	Medieval to Post Medieval	Field boundary, Rampton
MNT26616	SK 79977 78692	Post Medieval	Grounds at Rampton Hall
MNT26833	SK 80039 78912	Modern	Grounds at Rampton Manor
L6167-MNT6104	SK 798 782	Unknown	Earthworks at hall farm, Rampton
L6779-MNT6714	SK 7988 7899	Unknown	Earthwork at Rampton
243	SK 79977 78692	Post Medieval	Rampton Manor Park and Garden
22	SK 80039 78912	Post Medieval	Manor House, Rampton Park and Garden
L6242-MNT6179	SK 8180 8041	Unknown	Linear features, Cottam
MNT27156	SK 82640 80573	Neolithic	Evidence of Neolithic agriculture, Cottam, from auger survey
L5046-MNT4989	SK 8182 8005	Medieval	Church of the Holy Trinity at Cottam
L10635-MNT10521	SK 8202 7873	Iron Age	Iron age pottery from Rampton
L10636-MNT10522	SK 82011 78729	Roman	Features at Rampton: area 1
L10637-MNT10523	SK 82014 78734	Iron Age to Roman	Structure at Rampton: area 2
L10638-MNT10524	SK 82018 78720	Iron Age to Roman	Features at Rampton : area 3-5
L10639-MNT10525	SK 82035 78719	Iron Age to Roman	Ditches at Rampton: area 6
L10640-MNT10526	SK 82035 78713	Iron Age to Roman	Ditches at Rampton: area 7
L10641-MNT10527	SK 8202 7873	Roman	Roman finds from Rampton
L10642-MNT10528	SK 8202 7873	Roman	Ditches at Rampton (1965 excavation)
L10665-MNT10551	SK 822 828	Roman	Antiquarian finds at Segelocum
L10667-MNT10553	SK 822 828	Roman	Cropmarks at Segelocum
L11818-MNT11691	SK 8201 7869	Roman	Romano-British pottery from pipeline, Rampton
L11819-MNT11692	SK 8214 7869	Unknown	Ditch at Phase 1, Rampton Quarry
L11821-MNT11694	SK 820 786	Mesolithic to Bronze Age	Mesolithic to Bronze Age lithics from Phase 3, Rampton
L11822-MNT11695	SK 8195 7869	Neolithic to Bronze Age	Late Neolithic / early Bronze Age pit at Rampton
L11823-MNT11696	SK 8189 7864	Iron Age to Roman	Field system ditches (Phase 2) at Rampton Quarry
L11824-MNT11697	SK 8195 7868	Roman	Romano-British ditches and features (Phase 3) at Rampton Quarry

Reference	Grid reference	Period	Heritage Asset
L11825-MNT11698	SK 8202 7869	Roman	Romano-British ditches and features (Phase 4), at Rampton
L11826-MNT11699	SK 820 787	Roman	Romano-British ditches (Phase 5) at Rampton
L11827-MNT11700	SK 820 786	Iron Age to Roman	Iron Age and Romano-British finds from Rampton Quarry
L11828-MNT11701	SK 820 787	Iron Age	Late Iron Age ditches at Rampton
L11829-MNT11702	SK 820 786	Roman	Unphased Romano-British occupation levels at Rampton
L11830-MNT11703	SK 8206 7871	Roman	Romano-British ditches and finds from Rampton
L11831-MNT11704	SK 8189 7864	Roman	Romano-British ditches at Rampton
M4698-MNT15344	SK 8202 7873	Iron Age to Roman	Late iron age and Romano-British settlement at Rampton
M4736-MNT15364	SK 8273 7878	Modern	Wharf and jetty at Rampton
M18354-MNT26008	SK 819 786	Neolithic to Bronze Age	Late Neolithic / Early Bronze Age burial at Rampton
MNT26580	SK 8344 7885	Unknown	Torksey Ferry, Rampton
L4698-MNT4641	SK 8202 7873	Roman	Roman finds from Rampton
L4736-MNT4679	SK 8273 7878	Modern	Remains of wharf at Rampton
L5855-MNT5792	SK 826 787	Palaeolithic to Bronze Age	Prehistoric flints from Laneham
L11249-MNT11122	SK 814 840	Unknown	Fire-cracked pebbles from fieldwalking, Sturton le Steeple
L11250-MNT11123	SK 814 840	Palaeolithic to Bronze Age	Flints from fieldwalking, Sturton le Steeple
L11820-MNT11693	SK 8192 7840	Iron Age	Early / Middle Iron Age post holes and pit
L12079-MNT11952	SK 816 838	Roman	Romano-British features and finds at Site C, Sturton le Steeple
L12080-MNT11953	SK 816 838	Medieval	Medieval ridge and furrow from Site C, Sturton le Steeple
M18139-MNT25800	SK 7998 7861	Medieval to Post Medieval	Manor house at rampton
M18353-MNT26007	SK 8192 7840	Iron Age	Early Iron Age settlement (phase 1) at Rampton
M18389-MNT26043	SK 816 838	Roman	Ro settlement at Site C, Sturton le Steeple
M18437-MNT26090	SK 8004 7824	Unknown	Holme Farm Barn
L4677-MNT4620	SK 7994 7858	Medieval	C13 elements of the Church of all Saints at Rampton
L5740-MNT5679	SK 79970 78592	Post Medieval	Structure at Rampton
L6230-MNT6167	SK 798 782	Medieval to Post Medieval	Field boundaries, Rampton
L10030-MNT9931	SK 7994 7850	Medieval	Early C14 Elements of the Church of all saints at Rampton

Reference	Grid reference	Period	Heritage Asset
L10031-MNT9932	SK 7994 7858	Medieval	C14 – c15 elements of the church of all saints at Rampton
L10043-MNT9944	SK 7998 7861	Medieval	Documentary reference to manor house at Rampton
L11797-MNT11670	SK 8094 7970	Roman	Romano - British pottery from Cottam Power Station, Treswell
L11798-MNT11671	SK 8094 7970	Medieval	Medieval pottery from Cottam Power Station, Treswell
L11799-MNT11672	SK 8094 7970	Post Medieval	Post medieval finds from Cottam Power Station, Treswell
L4697-MNT4640	SK 8155 7855	Medieval	Moat at Rampton
L5042-MNT4985	SK 820 814	Early Medieval	Early medieval finds from Coates, north Leverton
L6239-MNT6176	SK 8111 8015	Unknown	Sub-circular enclosure, South Leverton
L6240-MNT6177	SK 8123 8095	Medieval to Post Medieval	Linear features, Cottam/North Leverton
L6241-MNT6178	SK 8153 8050	Unknown	Curvilinear enclosure and trackway, Cottam
L6243-MNT6180	SK 8108 8162	Medieval to Post Medieval	Trackway, North Leverton
L8769-MNT8682	SK 809 813	Roman	Roman pottery from north Leverton
L8770-MNT8683	SK 809 809	Roman	Roman finds from south Leverton
L10649-MNT10535	SK 8233 8257	Roman	Excavation at site I, Segelocum
L10650-MNT10536	SK 8236 8252	Medieval	Medieval finds from Segelocum, site ii
L10651-MNT10537	SK 8236 8252	Early Medieval	E med pottery from Segelocum, site ii
L10652-MNT10538	SK 8221 8263	Roman	Cobbled surface at Segelocum, site 2
L10653-MNT10539	SK 8209 8285	Roman	Cremations at Segelocum, site 3
L10654-MNT10540	SK 8204 8288	Roman	Pit at Segelocum, site 4
L10655-MNT10541	SK 8196 8287	Roman	Road surface at Segelocum, site 5
L10656-MNT10542	SK 825 824	Roman	Roman structure at Segelocum
L10658-MNT10544	SK 826 826	Roman	Roman patera from Littleborough
L10666-MNT10552	SK 824 824	Roman	Finds after bulldozing at Segelocum
L12081-MNT11954	SK 818 834	Roman	Ro features at Site D, Sturton le Steeple
M5043-MNT15525	SK 8245 8247	Modern to Unknown	Wharf and cottage at Sturton le steeple
M6244-MNT15984	SK 8214 8309	Medieval to Post Medieval	Site of Windmill, Littleborough
M6280-MNT16017	SK 8199 8277	Medieval to Modern	White Bridge, Littleborough

Reference	Grid reference	Period	Heritage Asset
M17737-MNT25414	SK 824 826	Roman	Roman Road, RR28, Lincoln-Doncaster
M18200-MNT25858	SK 8209 8285	Roman	Cremation cemetery at Segelocum
M18201-MNT25859	SK 8254 8247	Roman	Roman ford at Segelocum
M18387-MNT26041	SK 818 834	Roman	Ro settlement at Site D, Sturton le Steeple
MNT26523-MNT26523	SK 8245 8260	Roman	Roman burial at Littleborough Church
MNT26579-MNT26579	SK 8254 8253	Post Medieval to Modern	Ferry at Littleborough
L5001-MNT4944	SK 820 826	Roman	Roman altar and carved stone from Littleborough
L5033-MNT4976	SK 8236 8252	Roman	Buildings at Segelocum: site ii
L5034-MNT4977	SK 8240 8247	Roman	Roman coins from Sturton le steeple
L5035-MNT4978	SK 826 826	Roman	Roman pottery from Sturton le steeple
L5036-MNT4979	SK 8108 8208	Unknown	Enclosures at north Leverton
L5041-MNT4984	SK 814 821	Bronze Age	Bronze age scraper from north Leverton
L5043-MNT4986	SK 8245 8247	Modern	Building and structure at Sturton le steeple
L5044-MNT4987	SK 8148 8308	Modern	Building at Sturton le Steeple
L5047-MNT4990	SK 8245 8261	Medieval	Church at Littleborough
L5884-MNT5821	SK 8245 8253	Roman	Roman coins from Sturton le steeple
L6244-MNT6181	SK 8214 8309	Medieval to Post Medieval	Cross-shaped cropmark, Littleborough
L6245-MNT6182	SK 8223 8257	Roman	Road surface, Littleborough
L6280-MNT6217	SK 8199 8277	Medieval	Documentary references to Bridge at Littleborough
L8771-MNT8684	SK 8245 8261	Roman	Roman tiles at church of St Nicholas, Sturton le Steeple

Scheduled Monuments

Reference	*Grid Reference*	*Period*	*Heritage Asset*
1003669	SK 82274 82806	Roman	Segelocum Roman town. The site of the Roman small town of Segelocum. Remains identified include building foundations; pavements; remains of timber buildings dating from the 1st century AD; two kilns; an oven; and building debris, coins and pottery dating from the late 1st to later 4th centuries. Aerial photographs indicate the site extends over an area of approximately 400m by 300m between the River Trent and the Mother Drain. Multiple roads are present defined by ditches on either side, creating quadrants and rectilinear sub-divisions. A short stretch of probable Roman road is recorded immediately to the south of the settlement.
1004935	SK8321882071	Roman	Roman fort, south of Littleborough Lane. The scheduled monument includes the buried remains of a Roman fort visible as cropmarks on aerial photographs which define three sides of the fort. It is situated on a low crest at the edge of a gentle slope, above the flood plain of the River Trent to the west. The known dimensions of the fort are 116m north to south and 83m west to east, covering an area of approximately 0.8ha.
1004991, MLI54207	SK 83658 78373	Medieval	Site of Torksey medieval town. Two fields between the modern village of Torksey and the Foss Dyke containing evidence of the remains of a medieval settlement.
1005056	SK 83619 78759	Medieval	Torksey Castle. The ruins of a 16th century Elizabethan mansion. The west façade and part of the rear wall only survive.
1008594	SK 81565 78552	Medieval	Fleet Plantation moated site. The scheduled monument includes a roughly square platform, measuring approximately 70m along each side, surrounded by a 10m wide ditch with a maximum depth of about 2m. Scattered brick and tile indicated that a 16th or 17th century building formerly stood on the site and this would have been preceded by a medieval timber building. The remains of a causeway across the moat are visible approximately mid-way along the north side.
1008685	SK 84621 85353	Medieval	Site of Heynings Priory. The scheduled monument includes the remains of the medieval nunnery of Heynings, a priory of Cistercian nuns founded after 1135 and dissolved in 1539.The remains include part of the inner precinct, most of the outer precinct and associated earthworks.

Listed Buildings

Reference	Grid Reference	Period	Heritage Asset	Location Address	Grade
1064029	SK 87674 84580	Post Medieval	20, Fillingham Road	Willingham, West Lindsey, Lincolnshire, DN21	II
1064030	SK 87462 84533	Post Medieval	1 and 3, Stow Road	Willingham, West Lindsey, Lincolnshire, DN21	II
1064050	SK 82791 84617	Medieval	Church of St Mary	Knaith, West Lindsey, Lincolnshire, DN21	II*
1064051	SK 84655 85308	Post Medieval	Park Farm South Farmhouse	Knaith, West Lindsey, Lincolnshire, DN21	II
1064057	SK 83965 81837	Post Medieval	Ingelby Arms Public House	Marton, West Lindsey, Lincolnshire, DN21	II
1064058	SK 85643 81458	Post Medieval	Stow Park Station	Marton, West Lindsey, Lincolnshire, LN1	II
1064059	SK8340981598	Post Medieval	Windmill	Marton, West Lindsey, Lincolnshire, DN21	II
1064060	SK 84042 81812	Post Medieval	Berfoston Cottage	Marton, West Lindsey, Lincolnshire, DN21	II
1064078	SK 83699 78951	Medieval	Church of St Peter	Torksey, West Lindsey, Lincolnshire, LN1	II*
1064079, MLI54206	SK 83614 78781	Medieval	Torksey Castle	Torksey, West Lindsey, Lincolnshire, LN1	I
1064085	SK 82997 83419	Post Medieval	Burton Chateau	Gate Burton, West Lindsey, Lincolnshire, DN21	II*
1064086	SK 83780 82599	Post Medieval	Gateway to Gate Burton Hall	Gate Burton, West Lindsey, Lincolnshire, DN21	II
1064087	SK 83890 82899	Post Medieval	Church of St Helen	Gate Burton, West Lindsey, Lincolnshire, DN21	II
1146582	SK 83979 81777	Medieval	Cross	Marton, West Lindsey, Lincolnshire, DN21	II
1146594	SK 83996 82004	Post Medieval	No 21 and attached barn to rear	Marton, West Lindsey, Lincolnshire, DN21	II
1146606	SK 85661 81465	Post Medieval	Signal Box at Stow Park Station	Marton, West Lindsey, Lincolnshire, LN1	II
1146611	SK 84122 81812	Post Medieval	Wapping Lane Farmhouse and attached outbuilding	Marton, West Lindsey, Lincolnshire, DN21	II

Reference	Grid Reference	Period	Heritage Asset	Location Address	Grade
1146826	SK 87423 84514	Medieval	Church of St Helen	Willingham, West Lindsey, Lincolnshire, DN21	II
1146841	SK 87421 84471	Post Medieval	Old Rectory	Willingham, West Lindsey, Lincolnshire, DN21	II
1147328	SK 83706 78936	Post Medieval	Gravestone 8 paces from SE angle of nave of Church of St Peter	Torksey, West Lindsey, Lincolnshire, LN1	II
1166351	SK 83724 83098	Modern	Gate Burton Hall Cottages	Gate Burton, West Lindsey, Lincolnshire, DN21	II
1212380	SK 81825 80071	Medieval	Church of Holy Trinity	Cottam, Bassetlaw, Nottinghamshire, DN22	II
1216860	SK 82454 82619	Medieval	Church of St Nicholas	Sturton Le Steeple, Bassetlaw, Nottinghamshire, DN22	I
1233878	SK 79986 78593	Post Medieval	Manor Farmhouse and attached outbuilding and wall	Rampton, Bassetlaw, Nottinghamshire, DN22	II
1233879	SK 79950 78580	Medieval	Church of All Saints	Rampton, Bassetlaw, Nottinghamshire, DN22	I
1275674	SK 81476 83076	Post Medieval	Littleborough Cottage	Sturton Le Steeple, Bassetlaw, Nottinghamshire, DN22	II
1275698	SK 82491 82543	Post Medieval	Ferry House	Sturton Le Steeple, Bassetlaw, Nottinghamshire, DN22	II
1276406	SK 80084 78570	Post Medieval	Rose Cottage The Cottage	Rampton, Bassetlaw, Nottinghamshire, DN22	II
1276407	SK 79972 78590	Post Medieval	Gateway from Manor Farm to Churchyard and attached walls 7 metres west of Manor Farmhouse	Rampton, Bassetlaw, Nottinghamshire, DN22	I
1308795	SK 87389 84579	Post Medieval	Grange Farmhouse	Willingham, West Lindsey, Lincolnshire, DN21	II
1308917	SK8400581912	Post Medieval	25, Gainsborough Road	Marton, West Lindsey, Lincolnshire, DN21	II
1359456, MLI52559	SK8361979151	Post Medieval	Torksey Viaduct over River Trent	Torksey, West Lindsey, Lincolnshire, LN1	II*

Reference	Grid Reference	Period	Heritage Asset	Location Address	Grade
1359457	SK 83829 82859	Post Medieval	Old Rectory	Gate Burton, West Lindsey, Lincolnshire, DN21	II
1359458	SK 83691 83040	Post Medieval	Gate Burton Hall	Gate Burton, West Lindsey, Lincolnshire, DN21	II*
1359480	SK 82827 84611	Medieval	Knaith Hall	Knaith, West Lindsey, Lincolnshire, DN21	II
1359484	SK 83970 81759	Medieval	Church of St. Margaret of Antioch	Marton, West Lindsey, Lincolnshire, DN21	I
1359485	SK8401481942	Post Medieval	Thornleigh House	Marton, West Lindsey, Lincolnshire, DN21	II
1359495	SK 83654 78914	Post Medieval	The Paddocks Castle View	Torksey, West Lindsey, Lincolnshire, LN1	II
1359509	SK 87396 84496	Post Medieval	Willingham House	Willingham, West Lindsey, Lincolnshire, DN21	II
1370089	SK 81838 80067	Medieval	Font half a metre east of south porch at Church of Holy Trinity	Cottam, Bassetlaw, Nottinghamshire, DN22	II
1472727	SK8378483078	Post Medieval	Walled Garden at Gate Burton Hall	Gate Burton, West Lindsey, Lincolnshire, DN21	II