Cottam Solar Project

EIA Scoping Report (Part 1 of 4)

Prepared by: Lanpro Services Ltd.

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Cottam
SOLAR PROJECT

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Issue Sheet

Report Prepared for: Cottam Solar Project Ltd.

EIA Scoping Report Submission

Cottam Solar Project: EIA Scoping Report

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1 Introduction

1.1 Background

1.1.1 Cottam Solar Project Limited ("the Applicant") has commissioned this Environmental Impact Assessment (EIA) Scoping Report, relating to the proposed Cottam Solar Project ('the Scheme'). The Scheme consists of three electricity generating stations each with a capacity of over 50 megawatts (MW) comprising of ground mounted solar arrays; and 'Associated Development' comprising of energy storage, grid connection infrastructure and other infrastructure integral to the construction, operation and maintenance of the Scheme.

1.1.2 The Scoping Report is supported by a number of appendices including site plans, parameters plans and technical reports.

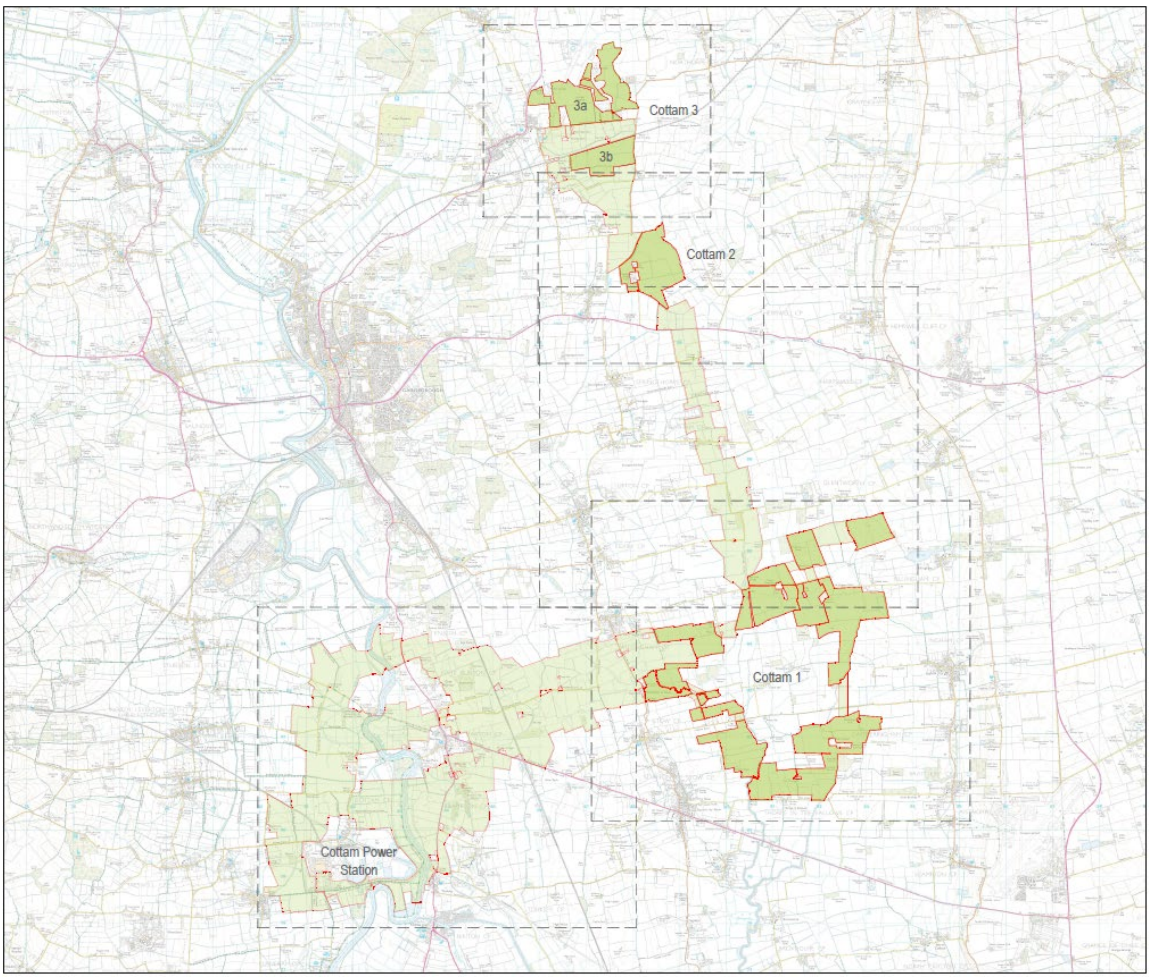
1.1.3 The Scheme comprises a number of land parcels (the 'Site' or 'Sites') described as Cottam 1, 2 and 3 for the solar arrays, grid connection infrastructure and energy storage; and the cable route corridors. The Sites are located approximately 6.5km south east and 4km north east of Gainsborough.

1.1.4 The Sites are shown on the overall Scheme plan at Figure 1.1 below and in more detail in the Figures in Appendix 3. The cable route corridor search areas are shown in light green shading on the Figures and plans. Figure 1.1 and Appendix 3 show the expected maximum extent of land that would be included within the application for a development consent order (DCO) for the solar array, grid connection and energy storage elements 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. Additional land may be included in the DCO application for mitigation works, such as highway improvement works, and ecological mitigation and enhancement measures.

1.1.5 The majority of the Scheme will be located within the administrative boundary of West Lindsey District Council and Lincolnshire County Council. The grid connection at the former Cottam Power Station and a part of the cable search corridor are located within the jurisdiction of Bassetlaw District Council and Nottinghamshire County Council.

1.1.6 The Applicant is proposing to provide an Environmental Statement (ES) in respect of the Scheme and 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) (the 'EIA Regulations').

Figure 1.1 Overall Scheme Plan



1.2 The Regulations

1.2.1 As the Scheme will generate over 50MW of electricity it is defined as a Nationally Significant Infrastructure Project (NSIP) under 14(1)(a) and 15(2) of the Planning Act 2008 ("the Act") and will therefore require a Development Consent Order (DCO).

1.2.2 The EIA Regulations stipulate which developments are required to undergo EIA and schemes which are relevant to the NSIP regime are either listed under Schedule 1 or Schedule 2. Those listed under Schedule 1 must be subject to EIA, while Schedule 2 lists development which will be subject to EIA if 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 should be made are set out in Schedule 3.

1.2.3 The Scheme is a Schedule 2 development under Paragraph 3(a) as it constitutes '*Industrial installations for the production of electricity, steam, water and hot water*'

1.2.4 Whilst EIA is not compulsory for Schedule 2 developments, the Applicant confirms that they will be providing an Environmental Statement (ES) to accompany their DCO application and this Scoping Report therefore constitutes notice under Regulation 8(1)(b) of the EIA Regulations.

1.3 Purpose of the EIA Scoping Report

1.3.1 In accordance with Regulation 10(1) of the EIA Regulations, a person who is minded to make an application for a DCO may ask the Secretary of State to state in writing their opinion as to the information to be provided in the ES (a "scoping opinion").

1.3.2 Paragraph 10(3) states that a scoping request must be accompanied by:

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

1.3.3 This Scoping Report has also taken into account the guidance highlighted in the Planning Inspectorate *Advice Note 7: Environmental Impact Assessment: Screening, Scoping and Preliminary Environmental Information* (Republished June 2020).

1.3.4 The table below sets out the topics that are considered in this Scoping Report. The Applicant is advised by a team of experienced and competent environmental consultants who have addressed each topic. The consultants are also identified below. A statement of competence will be provided within the ES for the authors of the various chapters.

Table 1.1: EIA Topics and Project Consultants

Discipline	Consultant
Planning, EIA coordinator	Lanpro
Climate Change (Chapter 6)	Lanpro
Landscape and Visual; and Arboriculture (Chapter 7)	Lanpro
Ecology and Biodiversity (Chapter 8)	Clarkson and Woods
Hydrology, Flood Risk and Drainage (Chapter 9)	Delta Simons
Ground Conditions (Chapter 10)	Delta Simons
Minerals (Chapter 11)	Clover Planning
Archaeology and Built Heritage(Chapters 12 and 13)	Lanpro
Transport (Chapter 14)	Transport Planning Associates
Noise and Vibration (Chapter 15)	Tetra Tech
Glint and Glare (Chapter 16)	Pager Power
Electromagnetic Fields (Chapter 17)	Pager Power
Light Pollution (Chapter 18)	Lanpro
Major Accidents (Chapter 19)	Lanpro
Air Quality (Chapter 20)	Tetra Tech
Socio-Economics (Chapter 21)	Lanpro
Agricultural Circumstances (Chapter 22)	Lanpro
Waste (Chapter 23)	Lanpro
Telecommunication, Utilities and TV Receptors (Chapter 24)	Lanpro

1.4 Consultation

1.4.1 The importance of consultation is key to the Planning Act 2008 and is fundamental to the success of the Scheme. The applicant has sought to engage with key stakeholders from an early stage to brief them on the Scheme, focus the environmental studies and to identify specific issues. A number of meetings have been carried out with statutory consultees to introduce the Scheme and commence discussions on detailed matters relating to the Scheme:

- West Lindsey District Council (Officers and Members);
- Lincolnshire County Council (Officers and Members);
- Bassetlaw District Council (Officers and Members);
- Nottinghamshire County Council (Officers);
- Environment Agency;
- Historic England; and
- Nottinghamshire Wildlife Trust

1.4.2 The Applicant will undertake on-going consultation with the host authorities, the stakeholders identified above and other relevant consultees and stakeholders. throughout the duration of the Scheme development and preparation of the ES.

1.4.3 In respect of the local communities affected by the development, the Applicant has already undertaken a first stage (non-statutory) of public consultation throughout November and December 2021. Consultation is on-going with local communities and individual property owners where appropriate. Further (statutory) consultation is anticipated to take place in summer through to autumn 2022. Responses to the consultations will be taken into account as part of the design process. Prior to this the Applicant will prepare the Statement of Community Consultation and consult with the host authorities as required by Section 47 of the Act.

1.5 The Applicant

1.5.1 The Scheme is being developed by the Applicant, a subsidiary of Island Green Power Limited (IGP), who is a leading international developer of renewable energy projects, established in 2013.

1.5.2 IGP has delivered 26 solar projects worldwide totalling more than 1GW of capacity. This includes 14 solar projects in the UK and Republic of Ireland. Their mission is to increase solar energy usage, making more renewable energy possible and saving thousands of tonnes of CO2 in the process.

1.5.3 IGP are also progressing the West Burton Solar Project, which is within the same locality as the Scheme. Whilst the West Burton Solar Project is being run in parallel with the Scheme, it will be the subject of a separate DCO application and is therefore the subject of a separate EIA scoping exercise.

2 Methodology

2.1 Introduction

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

2.1.2 The EIA assessment will be undertaken using a number of related activities which will include the following:

- Consultation with the relevant statutory and non-statutory consultees throughout the process;
- Consideration of local, regional and national planning policies, legislation and guidelines as relevant to EIA;
- Consideration of technical standards for the development of significance criteria;
- Review of secondary information, previous environmental studies and publicly accessible databases and information;
- Physical surveys and monitoring;
- Desk based assessment;
- Computer modelling (where appropriate and proportionate); and
- Expert opinion.

2.1.3 The main objective of the ES is to present a clear, impartial assessment of the significant beneficial and adverse environmental impacts of the proposed development including direct or indirect effects.

2.2 Assessment of Impacts

2.2.1 Each environmental topic to be considered in the ES will be given a separate chapter. Each of the technical assessments for the environmental topics will take the following approach:

- Introduction;
- Policy Context;
- Assessment Methodology and Significance Criteria;
- Baseline Conditions;
- Identification and Assessment of Key Effects;
- In-combination Effects
- Cumulative Effects;
- Mitigation Measures;
- Residual Effects; and
- Conclusion.

Baseline Conditions

2.2.2 In order to evaluate the likely environmental effects, the existing baseline conditions will need to be collected through a combination of desktop and physical surveys and monitoring. This will involve the Scheme Sites as well as the surrounding area. Once the baseline conditions are established, this will be used to assess the sensitivity of receptors on and near the Scheme and what changes may take place during the construction, operation and decommissioning of the Scheme. Any effects on these receptors will be assessed.

2.2.3 The data collected to establish the baseline conditions will be from a variety of sources which will include the following:

- Physical surveys and monitoring;
- Publicly accessible records and databases; and
- Environmental survey information that has been submitted for other development in the area.

2.2.4 The methods of data collection will be discussed with the relevant statutory and non-statutory consultees as appropriate. There will also need to be consideration of how the baseline conditions will evolve, which will be referred to as the 'future baseline'.

Identification and assessment of key effects

2.2.5 The identification of likely key effects will cover three phases of the development: construction, operation and decommissioning. During each phase there are likely to be different environmental effects likely to arise. Each technical chapter will assess the following:

- Direct and indirect effects;
- Short, medium and long term effects;
- Permanent and temporary effects;
- Likelihood of an effect occurring (i.e. very likely, likely or unlikely);
- In-combination effects; and
- Cumulative effects.

Assessment of likely effects

2.2.6 In order to provide for a consistent approach to the description of significance, a standard methodology is applied in instances where no specific criteria are required by technical guidance. The methodology for determining sensitivity will be assessed using the following criteria:

Table 2.1: Sensitivity Methodology

Sensitivity	Definition
High	The receptor or resource has little ability to absorb the change without fundamentally altering its present character or it is of international or national importance
Medium	The receptor or resource has moderate capacity to absorb the change without significantly altering its present character or is of high and more than local (but not national or international) importance.
Low	The receptor or resource is tolerant of change without detrimental effect, is of low or local importance.
Negligible	The receptor or resource can accommodate change without material effect, is of limited importance.

2.2.7 The methodology for determining the impact magnitude will be assessed using the following criteria:

Table 2.2: Magnitude Criteria

Sensitivity	Definition
Major	The total loss or major change/substantial alteration to key elements/features of the baseline (pre-development) conditions, such that the post development character/composition/attributes will be fundamentally changed
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions, such that post development character/composition/attributes of the baseline will be materially changed
Minor	A minor shift away from baseline condition. As change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation
Negligible	Very little change from baseline conditions. The change will be barely distinguishable and approximating to a non-change situation

2.2.8 The general matrix to determine effects is shown below:

Table 2.3: Degrees of Significance

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

In-combination and Cumulative effects

2.2.9 In accordance with the EIA Regulations, (paragraph 5(2) (e)) the ES will need to give consideration to the interaction between the factors referred to in paragraph 5(2) (a) to (d). These are referred to as the in-combination effects.

2.2.10 The in-combination effects which will be assessed are:

- The combination of individual effects, for example, the combined effects of noise, dust and visual effects on a particular receptor;
- The combination of individual topics, for example, the combined effects of climate change on ground conditions;
- The combination of different works of the Scheme on a particular receptor for example, the in-combination effects of the construction of the cable route and the energy storage at the same time; and
- The combined effects of the three generating stations.

2.2.11 A Summary table will be provided which sets out the in-combination effects for the Scheme as a whole.

2.2.12 In accordance with EIA Regulations, the ES will need to give consideration to the cumulative effects of the Scheme. Paragraph 5(e) of Schedule 4 of the EIA Regulations defines cumulative effects as *"the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources."*

2.2.13 In summary, the type of 'cumulative' effects which will be assessed:

- The combined effects of the Scheme with other significant and relevant committed proposals within the vicinity of the Scheme.

2.2.14 The Planning Inspectorate's Advice Note 17 identifies a four stage approach to the assessment of cumulative effects which will be followed. In summary the following process will be undertaken:

Stage 1 - Establish the Zone of Influence (ZOI) for each environmental aspect considered within the ES;

Stage 2 - Identify the 'other existing development and/or approved development' which fall into those ZOI and assign a level of certainty to them, subject to the level of detail that is available;

Stage 3 - Establish a shortlist of projects through the use of threshold criteria to ensure any projects which could have significant cumulative effects is taken forward; and

Stage 4 - Information gathering of the shortlisted projects. The information should be Secured through a number of sources including LPA websites, Planning Inspectorate (if relevant), statutory bodies and relevant applicants/developers.

2.2.15 As noted in paragraph 2.2.14, the list of shortlisted projects will be agreed with the relevant statutory bodies and LPA's etc in due course but at the current time the applicant can confirm that the following projects will be included within the known developments to be considered:

- West Burton Solar Project (currently the same timescales as the Scheme); and
- Gate Burton Solar Project (EIA scoping opinion issued December 2021).

2.2.16 Notably, the West Burton Cable Corridor partially overlaps with the land parcels in the west of the Gate Burton 'Solar PV' site and with their 'Grid Connection Corridor Options'. The Cottam scheme overlaps with the Gate Burton 'Solar PV' area more extensively (than West Burton does). The Cottam Cable Corridor options also overlay the Gate Burton 'Grid Connection Corridor Options' very closely.

2.2.17 Each technical chapter will present an assessment of the effects of the Scheme cumulatively with other identified schemes in the area.

Mitigation Measures

2.2.18 In accordance with Paragraph 7 of Schedule 4 of the EIA Regulations notes that the ES should include *"A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset and should cover both the construction and operational phases."*

2.2.19 The mitigation measures specified can relate to both methods of construction or particular design elements to be incorporated within the completed Scheme. This section of the ES will describe the recommended measures to ensure that any potential adverse impact is reduced to an acceptable level, and where possible, to enhance the effect to create beneficial outcomes.

2.2.20 Many potential mitigation measures will become integral to the design of the Scheme. Where impacts cannot be avoided, mitigation measures will be identified in order to assist in the reduction of effects to acceptable levels.

Residual Effects

2.2.21 This section will outline the significance of each environmental effect resulting, after the implementation of the mitigation measures.

2.3 Consideration of Alternatives

2.3.1 Regulation 14(2)(d) of the EIA Regulations requires an ES to include *"a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the options chosen, taking into account the effects of the development on the environment".*

2.3.2 The ES will therefore include a Chapter detailing the alternatives considered and the justification for the selection of the Sites for the Scheme.

3 The Development Site

3.1 Introduction

3.1.1 This chapter describes the proposed development site and its context.

3.1.2 The development 'Site' comprises the following elements, which are described below:

- Sites for built development (Section 3.2 below); and
- Cable route corridors (Section 3.3 below)

3.1.3 This chapter is supported by plans contained in Appendix 3.

3.2 Sites for Built Development

3.2.1 The Sites identified for built development, namely, solar panels, sub-stations and energy storage for the Scheme are located within a 19km radius of the grid connection of the former Cottam Power Station.

3.2.2 Cottam 1 Site is made up of a number of sites / fields clustered within an area of countryside centred around the village of Coates in the District of West Lindsey. Cottam 2 sits to the north of Cottam 1 and is located to the east of the village of Corringham. Cottam 3 sits to the north of Cottam 2 and is split in to two distinct areas:

- Cottam 3a, to the north-east and south-east of the village of Blyton; and
- Cottam 3b, to the east of Pilham.

3.2.3 The sites are discussed below in turn.

Cottam 1

3.2.4 Size: 894ha

3.2.5 Use: The entirety of the Cottam 1 is in agricultural use. Isolated parts of the landholding appear to be used for storing materials associated with farming.

3.2.6 Features: The topography at Cottam 1 is relatively flat and the development sites are predominantly well screened from their immediate surroundings by tall hedges around the boundaries of the Sites.

3.2.7 The fields are generally large and typically have dividing hedgerows. There are only isolated trees outside of field margins. The development Sites are interspersed with other landholdings that accommodate farmsteads. The development Sites benefit from existing farm access tracks and field accesses.

3.2.8 The River Till meanders in a predominantly north/south direction across the western portion of the landholding. In some areas the river comprises part of the red line area identified, and in others it adjoins the boundary. The banks of the river are lined with trees. A section of river, joining the River Till, in the north-eastern portion of the landholding, appears to have been canalised. Where this has taken place there are wide open river banks with only low lying vegetation.

3.2.9 There are many woodland blocks adjoining and within close proximity to the eastern portion of the landholding. Overhead lines cross parts of the Site.

3.2.10 Settlements and Roads: There is a chain of villages on the B1398, which runs north/south to the east of the Sites. The villages within close proximity of the Site are Glentworth, Fillingham, Ingham, Cammeringham, Brattleby, Aisthorpe and Scampton.

3.2.11 There is also a chain of villages on the B1241, running north/south to the west of the Site. The closest villages are Kexby, Willingham by Stow, Normanby by Stow, Stow, Sturton by Stow and Bransby.

3.2.12 Thorpe Lane runs along the southern edge of the landholding, connecting the settlement of Thorpe in the Fallows (with around five dwellings in total, with some slightly offset from the site) to Sturton by Stow, to the west, and Brattleby, to the east.

3.2.13 Ingham Road, turning into Stow Lane runs east/west through the centre of the landholding, connecting the villages of Stow and Ingham. Part of the site boundary adjoins the road. The settlement of Stow Pasture lies on this road, comprising around seven dwellings. The site boundary adjoins the gardens of some of these properties and is in close proximity to others.

3.2.14 The small settlement of Coates, comprising around ten houses is accessed off the Ingham Road, and lies within the centre of the landholding area. Whilst the settlement is in the centre of the landholding, the closest Site boundary to any dwelling is over 500m. The settlement also contains the historically important St Edith's Church.

3.2.15 The closest larger settlements are Gainsborough, approximately 7km north-west of the landholding, and Lincoln, approximately 9km south-east of the landholding. The landholding is situated in the centre of a 'square' of A roads: The A15, A57, A156 and A631. The closest of these, the A15, is approximately 4km east of the landholding.

3.2.16 Railway Lines: The railway line to the west of the landholding, connecting Lincoln and Gainsborough is over 3km from the landholding.

3.2.17 Public Rights of Way: There are public footpaths and bridleways running alongside and through the Site. The most notable of these are:

- The public footpath that connects Ingham, to the villages of Coates and Stow Pasture 'Stow/83/1' (part of which runs through the Site);
- The bridleway that connects Thorpe in the Fallows to Ingham Road 'Camm/31/1' (part of which runs through the Site);
- The bridleways extending north-west from Ingham, running alongside the Site: 'Fill/86/1' and 'Fill/85/2';
- The public footpath 'Stur/73/1' that extends to the east of Sturton by Stow terminates at the Site; and
- The public footpath running north from Broxholme 'TLFe/32/1' extends to Thorpe Lane (which runs along the south of the Site) joins the Site boundary.

3.2.18 Power Stations: The decommissioned Cottam Power Station is around 8km from the Site.

3.2.19 Airfields: There are airfields in the surrounding area including Scampton around 3.5km to the south-east of the landholding; and Sturgate around 3.5km to the north-west of the Site.

3.2.20 Rivers: The River Till meanders in a predominantly north/south direction across the western portion of the Site. In some areas the river comprises

part of the red line area identified, and in others it adjoins the boundary. The banks of the river are lined with trees. A section of river, joining the River Till, in the north-eastern portion of the landholding, appears to have been canalised. Where this has taken place there are wide open river banks with only low lying vegetation.

3.2.21 **Woodland:** There are many woodland blocks adjoining and within close proximity to the eastern portion of the Site.

3.2.22 **Political Planning Boundaries:** The landholding at Cottam 1 is distributed across the parishes of: Fillingham, Willingham, Stow, Cammeringham, Brattleby and Sturton by Stow. The land also adjoins the parishes of Thorpe in the Fallows, Kexby and Glentworth.

Historic designations

3.2.23 **Conservation Areas:** A number of the villages on the B1398, to the east of the Sites, accommodate conservation areas. The villages with conservation areas are Hemswell, Glentworth, Fillingham, Ingham, Brattleby, South Carlton and Burton-by-Lincoln.

3.2.24 In addition, the village of Springthorpe, south of the Site at Corringham, has a conservation area. There is also a small conservation area in the village of Saxilby.

3.2.25 **Listed Buildings:** There are a considerable number of listed buildings in the settlements around the Site.

3.2.26 **Archaeology:** There are two Scheduled Ancient Monuments (SAMs) in the centre of the Area, within the village of Coates, and a SAM adjoining the Site to the south.

Landscape designations

3.2.27 **Areas of Great Landscape Value (AGLV):** There is an AGLV which runs along the chain of villages on the B1398, to the east of the Sites. It extends on average between 500-900 metres from the road to the west. This AGLV comprises the B1398 'Cliff Road' and its immediate views over the landscape to the west. The Sites are generally over 1.5km west of the designation, however the undulating shape of the designation around the village of Fillingham means the closest landholding at Cottam 1 is 200 metres from the designation.

3.2.28 There is an AGLV designated around the town of Gainsborough, which encompasses woodland and surrounding farmland.

Ecological designations

3.2.29 **Biodiversity improvement areas:** A significant portion of the Cottam 1 Site is identified by Central Lincolnshire as either an opportunity for creation or an opportunity for management as part of the ecological network.

3.2.30 **Sites of Special Scientific Importance (SSSI):** There are none within close proximity to the Sites..

3.2.31 **Special Areas of Conservation (SAC):** There are none within close proximity to the Sites.

3.2.32 **Special Protection Areas (SPA):** There are none within close proximity to the Sites.

3.2.33 **Local Wildlife Sites (LWS):** There is a single wildlife site – 'Willingham to Fillingham Road Verge LWS'. It is located along road verges within the red line boundary of the Sites.

Geological designations

3.2.34 **Minerals safeguarding areas:** The majority of the Site at Cottam 1 to the north of the woodland 'Normanby Gorse', west of Normanby by Stow, is designated as a Sand and Gravel Area of Search in the Lincolnshire Minerals Local Plan. There are small parts of the Cottam 1 Site which also have this designation, around Lowfield farm and the corner of the field on the edge of the Site next to the bridge leading to Sturton by Stow from Thorpe in the Fallows.

3.2.35 The entirety of the Cottam 1 Site is designated as a Petroleum Exploration Development Licence (PEDL) Block.

Flood Risk and Drainage designations

3.2.36 **Flood Risk:** Small parts of the Site are located in flood zones 2 and 3 and are at risk from Surface Water flooding.

Cottam 2 and 3

3.2.37 **Size:** Cottam 2 is 132ha. Cottam 3 is 244ha.

3.2.38 **Use:** The entirety of the Sites are in agricultural use. This includes an area which appears to be used for storage in relation to farming.

3.2.39 **Features:** The Site at Cottam 2 is bounded by Corringham Beck to the north-west, and Yewthorpe Beck to the east. Corringham Beck appears to be canalised, with wide banks with only low vegetation. Yewthorpe Beck is a meandering river with established vegetation and trees lining its banks. There is a farmstead, and a house which are surrounded by the Site. The land is relatively flat and is predominantly well screened from its immediate surroundings by tall hedges around the boundaries of the sites. The fields are generally large and typically have dividing hedgerows. There are only isolated trees outside of field margins. The Site benefits from existing field accesses. Overhead lines cross parts of the Site.

3.2.40 Part of the Site at Cottam 3a comprises a former airfield. Two former runways running north-west/south-east and north-east/south-west cross the Site. Their positioning is still visible from aerial imagery. Kirton Road (B1205) runs along the south of the Site. Most of the boundary with Kirton Road benefits from reasonably well-established hedges. There are sections with lower hedges.

3.2.41 The remainder of the former airfield, parts of which adjoin the Site, and parts of which are surrounded by the Site, are used for motorsport and storage and distribution. There is also a house next to the storage and distribution area, which adjoins the north-western part of the Site. The Site benefits from vehicular access from Kirton Road, which is shared with these other land uses. There are two isolated houses to the south of the B1205 in the proximity of the Site.

3.2.42 The A159 Loughton Road runs north/south along the western extent of the Site. There is reasonably well established hedging with trees along the boundary.

3.2.43 The village of Blyton is approximately 250 metres to the south-west of Cottam 3a. Properties from the village may have views towards the Site. A smaller number of these towards the northern edge of the village may have views of the western extent of the Site. There are scattered isolated dwellings to the north of the landholding, all more than 500 metres from the site boundary.

3.2.44 The fields are generally large and some have dividing hedgerows. There are only isolated trees outside of field margins. Overhead lines cross parts of the Site.

3.2.45 The landholding at Cottam 3b comprises medium-large agricultural fields, approximately 400 metres east of the village of Pilham. A trainline runs along the northern border of the Site.

3.2.46 Settlements and roads: The Sites are situated approximately 5km to the east/north-east of Gainsborough. There are smaller villages between Gainsborough and the sites, including the closest villages of Blyton and Corringham. The villages of Springthorpe, Pilham, Laughton, Scotton and Northorpe are located in close proximity of the Site. There is a chain of settlements on the B1398, which runs north/south to the east of the Sites. The settlements within close proximity of the Site are the villages of Hemswell, Willoughton, Blyborough, Grayingham and the market town of Kirton in Lindsey.

3.2.47 The main roads in the surrounding area are the A159 Laughton Road which runs north/south along the western extent of Cottam 3; The A631 Corringham Road, which runs to the south of Cottam 2; and the A15 which runs north/south to the east of the Sites, beyond the chain of villages along the B1398.

3.2.48 Railway Lines: The railway line between Gainsborough and Kirton in Lindsey runs in a north-east/south-west direction in between the landholdings of Cottam 3a and 3b.

3.2.49 Public Rights of Way: There are no public footpaths or bridleways within close proximity of the Cottam 2 or Cottam 3a landholdings, although the public footpaths of note are:

- The public footpath to the north of Cottam 3 'Blyt/32/1' around 500 metres to the west of the Site where there may be views across the landscape to the Site.
- The public footpath to the north of Corringham village 'Corr/22/1', which is around 500 metres to the west of the Cottam 2 Site. It appears that the footpath may afford views across the landscape to the Site.

3.2.50 There is a public footpath 'Phil/20/1' which runs alongside and through the Cottam 3b site in an east/west direction, through the south of the Site.

3.2.51 Power Stations: West Burton Power Station is around 10km from Cottam 2 and 11km from Cottam 3. Cottam Power Station is around 14km from Cottam 2 and 16km from Cottam 3.

3.2.52 Airfields: The closest airfield is Sturgate, approximately 3km south of Cottam 2.

3.2.53 Rivers: Cottam 2 is bounded by Corringham Beck to the north-west, and Yewthorpe Beck to the east. Corringham Beck appears to be canalised, with wide banks with only low vegetation. Yewthorpe Beck is a meandering river with established vegetation and trees lining its banks.

3.2.54 Woodland: There is limited woodland in the area surrounding the Sites, save for Laughton Forest, which is around 2km north and north-west of Cottam 3.

3.2.55 Other: Cottam 3 is surrounded by an ex-airfield which is now used for motorsport and storage and distribution.

3.2.56 **Political Planning Boundaries:** The Sites are split over four parishes: Corringham; Pilham; Blyton; and Laughton. The Cottam 3a Site adjoins the parish of Northorpe.

Historic designations

3.2.57 **Conservation Areas:** There is only one conservation area close to the area, within the village of Hemswell, to the east of Cottam 2.

3.2.58 **Listed Buildings:** There are a couple of listed buildings in the rural area surrounding Cottam 3.

3.2.59 **Archaeological:** There are three SAMs in the area between the landholdings. None of these are in close proximity to the Sites.

Landscape designations

3.2.60 **Areas of Great Landscape Value (AGLV):** There is an AGLV which runs along the chain of villages on the B1398, to the east of the Sites. It extends on average between 500-900 metres from the road to the west. This AGLV comprises the B1398 'Cliff Road' and its immediate views over the landscape to the west. Cottam 2 is around 4km west of the designation.

3.2.61 There is an AGLV designated around the town of Gainsborough, which encompasses woodland and surrounding farmland. The closest land parcel of Cottam 2 is over 2km east of this designation.

3.2.62 The third AGLV of note comprises Laughton Woods AGLV, which is located to the north and west of Cottam 3. The closest part of Cottam 3 to the AGLV is around 1km, from the northernmost extent.

Ecological designations

3.2.63 **Biodiversity improvement areas:** There are no Biodiversity Opportunity Areas designated on the Sites, although an area to the north of Cottam 3 is identified for possible creation.

3.2.64 **Sites of Special Scientific Importance (SSSI):** There are SSSIs within Laughton Forest: Laughton Common SSSI; Scotton and Laughton Forest Ponds SSSI; Scotton Beck SSSI; Scotton Common SSSI; and Tuetoes Hills SSSI. Cottam 3 is in the impact risk zones for those SSSIs. Cottam 2 is outside of any impact risk zones.

3.2.65 **Special Areas of Conservation (SAC):** There are none within close proximity of the Sites.

3.2.66 **Special Protection Areas (SPA):** There are none within close proximity of the Sites.

Geological designations

3.2.67 **Minerals safeguarding areas:** The western third of Cottam 3 is designated as a Sand and Gravel Area of Search in the Lincolnshire Minerals and Waste Local Plan.

3.2.68 The fields to the west of Cottam 2 are designated as a Sand and Gravel Minerals Safeguarding Area.

3.2.69 The entirety of Cottam 2 and 3 are designated as a Petroleum Exploration Development Licence (PEDL) Block.

Flood Risk and Drainage designations

3.2.70 **Flood Risk:** A very small portion of Cottam 2 is in Flood Zone 3 and small parts are at risk from Surface Water flooding.

Agricultural Land Use Classification (ALC)

3.2.71 Initial ALC surveys of the Sites have been carried out at a reconnaissance scale. This indicates the following likely land grading across all of the Cottam Sites - Grade 1 – 2.1%; Grade 2 – 0.6%; Grade 3a – 4.1%; Grade 3b – 93.2%.

3.3 Cable Route Corridor search areas

3.3.1 The potential areas for cable route corridors are shown on the figures at Appendix 3. These are 'search areas' for a potential cable route. Only a narrow width within these corridors will be required for the cable route and its construction. Temporary construction compounds will also be required within these areas.

3.3.2 The cable route corridor search areas are shown connecting the Sites to one another and the connection point at Cottam Power Station. The Applicant is in the process of seeking to refine this corridor which will progress alongside the development of the Scheme.

4 The Development Proposal

4.1 Development Summary

4.1.1 The proposed development consists of a number of different elements which are detailed below. The operational life of the development is anticipated to be 40 years. The development will then be decommissioned.

4.1.2 The solar array sites and associated substations are connected to the National Grid at the Cottam National Grid substation at 400kV. The Scheme will connect to the National Grid Substation via a new 400kV substation constructed as part of the Scheme to provide the connections to the various solar land parcels at 132 and 33kV. The substations and cable connections will be required for the duration of the development. The substations will be decommissioned and removed at the end of the lifetime of the Scheme but the underground cables are anticipated to be decommissioned in situ to minimise environmental impacts.

4.1.3 The solar panel installations within each of the three Sites will each have a generating capacity of more than 50MW and therefore each constitute an NSIP.

Maximum Design Scenario

4.1.4 The Development Consent Order (DCO) will be seeking to incorporate flexibility into the design which is supported through a number of the National Policy Statements on energy. The ES will consider two different design options for the solar panels.

4.1.5 The ES will employ a maximum design scenario approach reflecting the principle of the 'Rochdale Envelope'. This approach allows for a project to be assessed on the basis of maximum project design parameters in order to provide flexibility and take advantage of technological improvements, assessing all potentially significant effects (positive or adverse) within the EIA process and reported in the ES.

4.1.6 As the design, environmental assessment and consultation processes (which run in parallel) evolve, the maximum parameters set out in this Scoping Report may change in order to deliver the best environmental outcomes for the Scheme..

4.2 Proposed Built Development

4.2.1 The built development elements of the Scheme are described below along with typical measurements for the different elements:

Solar Panels

Option A (Tracking panels):

4.2.2 Arrays of ground-mounted solar panels with a gross electrical output of greater than 50 megawatts.

- Panels will be bifacial monocrystalline panels mounted on a metal tracking system aligned in north-south rows with panels rotating East-West (+/- 60°).
- The maximum top height of the arrays will typically be 4.5m.
- The minimum height of the lowest part of the panel will typically be 0.4m.

- The mounting structure for the panels is a metal frame securely fixed to the ground, other than where 'feet' may be required for archaeological protection, rather than intrusive works.
- Where there are mounting posts for panels, these will be pile-driven approximately 1.5 - 2 metres into the ground for support, dependent on ground conditions.

Figure 4.1: Typical Tracking Panels

Option B (Fixed panels):

4.2.3 Arrays of ground-mounted solar panels with a gross electrical output of greater than 50 megawatts.

- Panels will be a standard Bifacial Monocrystalline type aligned in east-west rows with panels facing south (+/- 60°).
- The maximum top height of the arrays will typically be 3.5m.
- The minimum height of the lowest part of the panel will typically be 0.4m.
- Angle of the panels from horizontal will be variable.
- The mounting structure for the panels is a metal frame securely fixed to the ground other than where 'feet' may be required for archaeological protection, rather than intrusive works.
- Where there are mounting posts for panels, these will be pile-driven approximately 1.5 – 2 metres into the ground for support, dependent on ground conditions.

Figure 4.2: Typical Fixed Panels (with Conversion Unit / Inverter)

Conversion Units

4.2.4 These units contain the inverters, transformers and associated equipment to convert the Direct Current (DC) electricity produced by the arrays, into Alternating Current (AC) electricity required to import into the grid. The design principles of the cabinets are:

- Maximum dimensions will typically be 6.66m by 3.04m with a maximum height of 3.2m.
- Conversion units are housed in a container sitting on a concrete base or concrete feet.

Substations

4.2.5 There are different types of substations required across the project. The design principles of the different type of substations are:

Cottam 1 400kV Substation (Air Insulated Switchgear):

- 400kV substation sitting within an open air compound;
- Maximum compound area will typically be of 3.5ha;
- Maximum height will typically be 13m to the top of the busbars;
- Palisade fencing around the compound with a typical maximum height of 2.6m;
- Deer type wire mesh and wooden post fencing outside of the palisade fencing with a typical maximum height of 2.5m;
- Approximately 5m wide access track;

- Relay and Control Room with typical maximum dimensions of 4.7m by 14.8m and typical maximum height 3.85m;
- 33kV Switch Room with typical maximum dimensions for 6m by 23.6m with a typical maximum height of 3.85m;
- 132KV AIS busbar system, 3 No 132KV circuit breakers, disconnectors/earth switches , CTs and VTs;
- Car parking; and
- Drainage.

Figure 4.3: Typical (large 400kV) Power Transformer

Cottam 2 132kV Substation

- 132kV substation sitting within an open air compound;
- Maximum compound dimensions will typically be 64.4m by 67.9m;
- Maximum height will typically be 6.44m to the top of the busbars;
- Palisade fencing around the compound with a typical maximum height of 2.6m;
- Deer type wire mesh and wooden post fencing outside of the palisade fencing with a typical maximum height of 2.5m; and
- Relay and Control Room with typical maximum dimensions of 4.7m by 14.8m and typical maximum height of 3.85m.

Cottam 3 132kV Substation

- 132kV substation sitting within an open air compound;
- Maximum compound dimensions will typically be 64.4m by 67.9m;
- Maximum height will typically be 6.44m to the top of the busbars;
- Palisade fencing around the compound with a typical maximum height of 2.6m;
- Deer type wire mesh and wooden post fencing outside of the palisade fencing with a maximum height of 2.5m; and
- Relay and Control Room with typical maximum dimensions of 4.7m by 14.8m and typical maximum height of 3.85m.

Energy Storage

4.2.6 The candidate technology being assessed for the energy storage facility will be batteries. The battery energy storage is designed to provide peak generation and grid balancing services to the electricity grid. It will primarily allow excess electricity generated from the solar PV panels to be stored in the batteries and exported to the grid when required. There will also allow excess energy from the grid to be imported to the batteries. The energy storage will provide flexibility and grid reliability.

4.2.7 The battery storage system will require heating, ventilation and cooling systems to ensure the efficiency of the technology. These features are integrated into the units they are housed in. The battery system will comprise a DC/AC converters to control the charge of the batteries from the solar PV energy output and/or AC/DC inverters to control the charge of the batteries when drawing energy from the grid.

4.2.8 There are different design options for the batteries that will be explored through the design process but the maximum typical dimensions are listed below:

- Maximum compound area will typically be 21ha (this area will allow approximately 600MW of energy storage)
- Battery containers would have a typical maximum length of 16m, typical maximum width of 3m and a typical maximum height of 3.2m. The maximum storage capacity of a single battery unit (based on current available technology) would typically be 6MW.
- Palisade fencing around the compound with a maximum height of 3m.
- Internal access tracks with a width of 4m.
- The compound will have parking bays.
- CCTV will be installed.

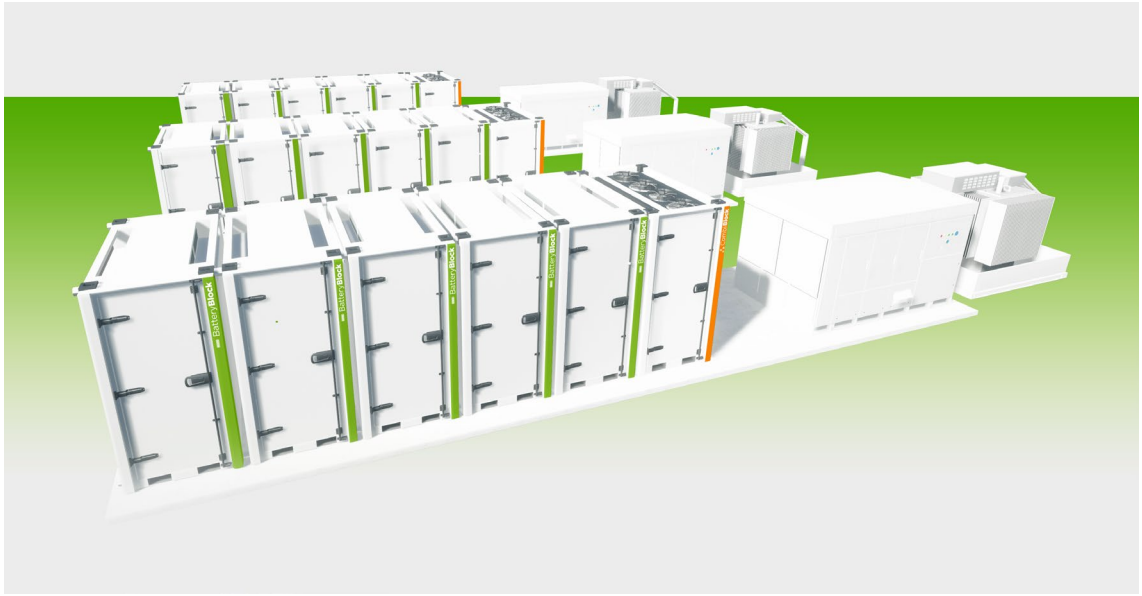


Figure 4.4: Typical Energy Storage Units

Fencing and Security

4.2.9 The design principles of the fencing and security are:

- A deer type wire mesh and wooden post fencing with a maximum height of 2.5m.
- CCTV camera on poles with a maximum height of 3m.
- CCTV poles to be galvanized steel painted green.

Figure 4.5: Typical Deer Fencing

Lighting

4.2.10 Lighting is not required within the solar arrays. Lighting will be provided within substations and within the Energy Storage site to be used only in the event of it being required for maintenance and security purposes. Down lighting would be used.

Cable corridor

4.2.11 There will be underground cables required for connection to the grid of the arrays and the energy storage.

4.2.12 The voltage of the cables and the number of circuits will affect the width of cable trenches required. The range of typical cable trench widths is from 0.32m (for 1 circuit) to 3.38m (for 4 circuits). However the width and spacing of the cable trenches may differ depending on the environmental constraints, engineering requirements or if crossing third party apparatus (e.g. railway lines).

4.2.13 In addition to the trenches, land will be required in the corridor for access and soil and cable 'lay down'. Construction compounds along this route will also be required.

Cottam 1

4.2.14 It is proposed that the 400kV substation will be located within the Cottam 1 Site. The energy storage is also proposed to be located within the Cottam 1 Site. The exact location of both of these elements of built infrastructure will be determined through the on-going iterative design process.

4.2.15 The Applicant will be considering alternatives to allow flexibility in the DCO to allow development of the proposed energy storage location to be used for that purpose or for that location to house a solar array. Both design options will be considered within the ES.

District Network Operator Connections

4.2.16 It is envisaged that local grid connections to the distribution network (operated by Northern Powergrid and Western Power Distribution) will be made for each of the energy generating stations.

4.2.17 These will allow each energy generating station to connect to the local grid network to obtain short-term auxiliary power to the substations in the event that there is a technical problem with the connection to the National Grid.

4.2.18 Discussions are ongoing with the DNOs about the best place for these connections for each energy generating station. These are likely to be via 11kV or 33kV lines either crossing the sites or in the surrounding area, depending on grid capacity.

Access and traffic

4.2.19 The greatest volumes of traffic are generated during the construction and decommissioning periods with only minimal maintenance access required during operation. A Construction Traffic Management Plan (CTMP) for each phase of the Scheme will be submitted to and approved by the relevant planning authority, to minimise disruption and impact and this will be secured by the Requirements in the DCO. The CTMP will be in accordance the Outline CTMP submitted with the DCO application.

4.2.20 The access points into the individual Sites will be designed to accommodate an articulated HGV with a maximum length of 16.5m. Existing access points are proposed to be used wherever possible with visibility splays of 2.4m x 215m. There may be some variation on visibility splays based on site specific conditions.

4.2.21 There will be a requirement for abnormal loads to the Sites for elements such as transformers. The routing and access points for these will be determined through the design process and in consultation with the appropriate statutory consultees.

4.3 Construction and Operation

Construction and Phasing

4.3.1 The Scheme currently has a grid connection date of 2028. However, it is possible that an earlier connection date may be obtained. The construction of the Scheme is proposed to be phased over a two year period and subject to the DCO consenting process, the earliest construction may start is 2024.

4.3.2 The construction period will vary across the Sites and for the larger Sites, there will be opportunities for having multiple construction crews working at the same time. The following timeframes are anticipated for the solar array elements of the Scheme:

- Cottam 1 – 28 weeks
- Cottam 2 – 18 weeks
- Cottam 3 - 20 weeks

4.3.3 The energy storage construction period is likely to be 40 weeks in duration.

4.3.4 The 400kV substation will take in the region of 18-24 months to construct. Each 132kV substation will take in the region of 12 months to construct.

4.3.5 There will be temporary construction compounds required for the Sites and the grid connection works. The temporary construction compounds will comprise:

- Compound maximum dimensions will typically be 80m by 80m;
- Temporary portacabins for construction operatives (the dimension of the portacabins would vary and the maximum size for individual units is expected to be 10m by 3m with a typical maximum height of 3m);
- Perimeter security fencing with a typical maximum height of 3m;
- Parking area for construction and workers vehicles;
- Secure compound for storage;
- Temporary hardstanding;
- Wheel washing facilities;
- Temporary gated compound;
- Storage bins for recyclables and other waste; and

- Lighting will be required during construction periods but will be temporary in nature and normal working hours are likely to be adhered to.

4.3.6 Construction activities are likely to be carried out Monday to Friday 07:00-18:00 and between 08:00 and 13:30 on Saturdays. However, some activities may be required outside of these times (such as the delivery of abnormal loads, night time working for cable construction works in public highways or horizontal directional drilling activities). Where possible, construction deliveries will be coordinated to avoid HGV movements during the traditional AM peak hour (08:00-09:00) and PM peak hour (17:00-18:00)

Construction Environmental Management Plan

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

4.3.8 The CEMP outlines the allocated responsibilities, procedures and requirements for Site environmental management. It would include relevant Site specific method statements, operating practices, and arrangements for monitoring and liaison with local authorities and stakeholders.

4.3.9 The Main Contractors undertaking the construction of the Scheme would need to adopt and comply with the CEMP, allocate environmental management responsibilities to a Site manager and ensure that all sub-contractors' activities are effectively managed in accordance with the CEMP.

4.3.10 If the Scheme and the West Burton Solar Project progress in parallel, IGP will seek to plan and co-ordinate any construction activities, via the CTMP's and CEMP's, to reduce environmental impacts, if possible and where practicable.

Operation

4.3.11 Once the Scheme is operational, traffic generated by it will be limited to that associated with occasional maintenance work.

4.3.12 Movement within the Site will be by way of quad bike or small, farm utility vehicle. Personnel will visit the Sites from time to time to check the apparatus. No on-site staff will be required to operate the Scheme but there will be limited staff facilities located in the control rooms associated with the 400 and 132kV substations. Some permanent equipment for monitoring the Sites will be located in the Relay and Control Room. Whilst this would typically be accessed remotely, it would be available for occasional physical access during routine visits.

4.3.13 Noise impact is largely limited to the construction phase of the development. There would be a small amount of noise generated by the vehicle movements across the site coupled with the installation of equipment. There will be some noise transmitted from the transformers, substations and energy storage but these levels are predicted to be below the BS8233 guideline noise intrusion criteria.

4.4 Ecology and Landscaping

Ecological Mitigation and Enhancement

4.4.1 The sites currently comprise of arable and pastoral fields with the majority of the land considered to be of low ecological value due to intensive agricultural practices.. There are features within the Sites such as hedgerows, field margins and ditches/watercourses which are considered to have some ecological value.

4.4.2 To date Preliminary Ecological Appraisals (PEA) have been undertaken on both sites along with protected species surveys which have been seasonally appropriate to carry out (please refer to accompanying PEA's). There will be further surveys carried out in the 2022 survey window. Once the full suite of species surveys is carried out any new habitat land and/or mitigation that is appropriate will be identified.

4.4.3 A number of the parcels of land fall within the Central Lincolnshire Local Plan ecological enhancement and opportunity areas. The Scheme will be looking to contribute towards this opportunity and connect up networks where necessary and where practical and appropriate.

4.4.4 As a general principle the following ecological mitigation and enhancements measures can be incorporated into solar projects:

- Land between and under the arrays to be sown as grassland and meadow management with limited cutting and a mix of some areas being grazed and others not;
- Gaps within existing hedgerows will be filled with additional native species to increase diversity, and hedgerows will be managed on a rotational basis to enable wildlife to benefit from them year-round;
- Appropriate vegetated buffers will be maintained comprising native planting; and
- Installation of bird nest and bat boxes on trees round the Site to provide opportunities for a range of species recorded within the local area.

4.4.5 Mitigation land will be provided for skylark plots. The exact quantity of this will be based on the final total area that is covered by built infrastructure. The project red line will be expanded to include these areas in due course.

Surface Water Drainage

4.4.6 Flood Risk Assessments and a Drainage Strategy are being developed as part of the design process. The assessments identify how the Scheme will manage surface water across the Sites and not increase flood risk. The drainage strategy will detail the measures to manage the surface water drainage from the Scheme and any required changes needed to existing land drainage.

Landscaping

4.4.7 Given the scale of the Scheme, the impact on the landscape context and the visual impact is a prime consideration. During this feasibility stage the Sites are being assessed to establish where the key viewpoints are into and out of the site and to identify where potential mitigation planting would be needed.

4.4.8 As a general principle the following landscape enhancements and mitigation are used on solar projects:

- The creation of new woodland blocks and belts;
- Planting new hedgerows;
- Reinforcing existing boundary hedgerows; and
- New tree planting.

4.4.9 The proposed landscape strategy will explore opportunities to enhance green infrastructure and ecological networks (as noted above). This may include enhancing Public Rights of Way or providing improved connectivity of them.

5 Legislative Context and Energy Policy

5.1 Introduction

5.1.1 The ES will contain a chapter on Legislative Context and Energy Policy. Regard will be had to primary legislation and Energy Policy, national planning policies and guidance, and local planning policies in establishing receptors, likely effects and potential mitigation.

5.1.2 A summary of key legislative and policy provisions is provided below and considered in more detail in Appendix 5.

5.2 Primary Legislation

5.2.1 The Planning Act 2008 sets out the process for the consenting of NSIPs and the basis for the decision whether to grant development consent.

5.3 Energy Policy

5.3.1 National Policy Statements (NPS) set out the policy basis for NSIPs. They form the basis for determination of decisions. At present, there is no NPS which specifically deals with ground mounted solar, however there are aspects of three NPSs, which are relevant to decision making and are important material considerations. National and local planning policies are material considerations but do not override the policies set out in NPSs. The DCO applications must primarily therefore demonstrate accordance with the relevant aspects of the following:

- National Policy Statement for Energy (EN-1);
- National Policy Statement for Renewable Energy Infrastructure (EN-3); and
- National Policy Statement for Electricity Networks (EN-5)

5.3.2 The Department for Business, Energy and Industrial Strategy is currently undertaking a review of the six NPSs for energy infrastructure. Consultation on the revised draft NPSs closed on 29 November 2021. As drafted NPS EN3 on renewable energy has been expanded to provide policy on solar development. It is anticipated that the draft NPS will (as amended) be adopted by the time of submission of the DCO application for the Scheme. The revised EN3 addresses a range of matters including:

- Design Flexibility;
- Temporary nature of solar farms;
- Site Selection;
- Irradiance and site topography and capacity of a site;
- Proximity of a site to dwellings;
- Grid connection;
- Accessibility;
- Agricultural Land Quality;
- Site Layout, Design and Appearance;
- Landscape and Arboriculture;
- Ecology and Biodiversity;

- Built Heritage and Archaeology;
- Flood Risk and Drainage;
- Highways and Access; and
- Glint and Glare.

5.4 Other Planning Policies

5.4.1 The planning policies considered relevant to the Scheme are identified below, and will be considered as part of the assessment.

5.4.2 National Planning Policy Framework (NPPF) (as amended July 2021) February 2019)

5.4.3 Planning Practice Guidance (PPG) (as amended March 2015):

- Paragraph ID 5-013 – Impacts of Solar Farms

5.4.4 Host Authority Planning Policies from the following documents:

- Central Lincolnshire Local Plan 2012-2036 (Adopted 2017);
- Neighbourhood Plans:
  - Saxilby with Ingleby Neighbourhood Plan;
  - Sturton by Stow and Stow Neighbourhood Plan;
  - Corringham Neighbourhood Plan (emerging); and
  - Laughton Neighbourhood Plan (emerging).
- Bassetlaw District Council Core Strategy (Adopted 2011);
- Nottinghamshire Minerals Local Plan (2021) ;
- Lincolnshire Minerals and Waste Local Plan (Core Strategy & Development Management Policies (June 2016) and Site Locations (Dec. 2017) documents);
- Greater Lincolnshire Enterprise Partnership Strategic Economic Plan;
- Growth Strategy for Lincoln;
- Lincolnshire Joint Health and Wellbeing Strategy;
- Lincolnshire Joint Strategic Needs Assessment;
- Corporate Plans for City of Lincoln, North Kesteven and West Lindsey;
- Lincolnshire Biodiversity Action Plan;
- Lincolnshire Local Transport Plan and local transport strategies; and
- Joint Lincolnshire Flood Risk and Drainage Management Strategy.

6 Climate Change

6.1 Introduction

6.1.1 This chapter of the scoping report considers effects arising as a result of the proposed development, including prior to and post mitigation, in relation to:

- Greenhouse gas emissions (GHG);
- In-combination climate change impact (ICCI) assessment; and
- Climate Change resilience.

6.2 Baseline and Initial Surveys

The Site and Context

6.2.1 The Scheme is expected to generate approximately 600MW and is expected to supply enough electricity to power 180,000 homes annually. Additionally, compared to a conventional gas-fired power station, the Scheme will save approximately 540,000 tonnes of CO_2[1].

6.2.2 Microclimate impacts will be assessed at a local area level in relation to GHG emissions arising from the production, construction, maintenance, and decommissioning of the Scheme. Consideration will be given to the wider and national impacts of the Scheme including the carbon budget targets developed for the United Kingdom, and the Scheme's overall contribution to climate change.

Greenhouse gas emissions

6.2.3 The GHG emissions produced over the scheme's lifecycle will be assessed by comparing estimated GHG emissions against reduction targets and carbon budgets implemented by The Climate Change Act (2008), including climate commitments issued by the districts of Bassetlaw and West Lindsey and Lincolnshire and Nottingham County Councils.

In-combination climate change impact assessment

6.2.4 The in-combination climate change impact receptors are those receptors that are 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 will be determined using the climate change projections data.

6.2.5 An initial review of UK Climate Projections 2018 (UKCP18) data for the 12km grid square within which each of the Sites are located suggests that on average across the Sites by the 2050s time period, the area could experience the hottest summer day temperature of around 37.1°C if global warming increases by 2°C. If global temperatures rise by 4°C it could increase to around 40.5°C. The hottest summer day of the last 30 years has been 35.5°C .

6.2.6 In regard to the warmest winter day temperature it could be around 18.4°C if global warming increases by 2°C. If global temperatures rise by 4°C it could increase to around 20.2°C. The warmest winter day of the last 30 years has been 17.8°C .

[1]Based on alternative generation from CCGT at 365 KgCO2(e)/MWh (https://www.parliament.uk/documents/post/postpn_368-carbon-footprint-electricity-generation.pdf)

Climate Change resilience

6.2.7 The potential impacts of climate change namely increased average temperatures and incidence of heatwaves; increased frequency of heavy precipitation events; increased risk of flooding in respect of sea level rises; increase in strong wind events, are relevant factors for consideration and with particular regard to data from the UKCP18[2], (which considers future climate change conditions). Clearly some of these matters are considered in other technical topics within the ES, such as flood risk.

6.3 Assessment Methodology

6.3.1 It is anticipated that the assessment will include reference to the following:

- National Policy Statements for Energy (adopted and emerging): EN-1; EN-3;
- National Planning Policy Framework (NPPF);
- National Planning Policy Guidance 2019 (NPPG);
- Lincolnshire County Council Carbon Management Plan (2019);
- Nottinghamshire County Council Carbon Management Plan (2007);
- West Lindsey and Bassetlaw District Council planning policies in relation to Climate Change;
- Climate Change Act 2008[3]; and
- Carbon Budgets Order 2009[4].

Greenhouse gas emissions

6.3.2 The current use of the Sites predominantly consists of arable land and managed trees and hedgerows. The baseline agricultural GHG are dependent on the soil and vegetation types present and the fuel used for the operation of any plant and machinery on the Sites.

6.3.3 The assessment will establish the baseline which will consider the factors above and will then consider the GHG emissions over the Scheme lifetime.

[2]UK Climate Impacts programme (UKCIP) (2018) UK Climate Projections 2018 (UKCP18). Available at: https://www.metoffice.gov.uk/research/collaboration/ukcp [Date Accessed: 11/03/2019].
[3]HMSO (2008). Climate Change Act 2008. Available at: http://www.legislation.gov.uk/ukpga/2008/27/pdfs/ukpga_2008027_en.pdf [Date Accessed: 08/12/2021]
[4]The Carbon Budgets Order 2009. Available at: http://www.legislation.gov.uk/uksi/2009/1259/pdfs/uksi_20091259_en.pdf [Date Accessed: 08/12/2021]

6.3.4 With reference to the GHG Kyoto Protocol guidelines, the following GHG emissions will be considered within the assessment over the Scheme's lifecycle:

- Carbon dioxide;
- Methane;
- Nitrous oxide;
- Sulphur hexafluoride;
- Hydrofluorocarbons;
- Perfluorocarbons; and
- Nitrogen trifluoride.

6.3.5 In line with good industry practice, GHG emissions created over the Scheme's lifecycle will be calculated using an appropriate assessment method, which is aligned with the GHG protocol. The method of assessment is still yet to be defined and will be discussed with stakeholders. The assessment will also consider the emissions avoided as a result of the Scheme, for example, the soil not being cultivated through arable processes.

In-combination climate change impact assessment

6.3.6 An ICCI assessment identifies how the resilience of identified receptors in the surrounding receiving environment is affected by future climate change conditions and the impact of the Scheme. It is proposed to scope this out of the ES because climate change impacts relevant to the Scheme will be assessed through the other relevant topics of the ES. For example, how an increase in rainfall may lead to a higher risk of flooding, will be covered in the Hydrology, Flood Risk and Drainage chapter.

6.3.7 At this stage, it is not possible to say conclusively which environmental topics will cover which factors as there is insufficient data available on likely effects. However, the following factors are likely to be considered under the following environmental topic chapters. The approach to this will be reviewed throughout the iterative design process.

Table 6.1: Climate change factors for ICCI assessment

Factor	Scoped In/Out	Justification
Temperature Change	In	This will be considered in the Hydrology, Flood Risk and Drainage, Ecology, Cultural Heritage and Landscape chapters.
Precipitation change	In	This will be considered in the Hydrology, Flood Risk and Drainage, Ecology, Cultural Heritage and Landscape chapters.
Extreme weather conditions (wind)	In	This will be considered in the Landscape chapter.
Sea level rise	Out	The Scheme is not located in an area that is susceptible to sea level rise.

Climate Change resilience

6.3.8 A Climate Change Resilience Assessment will be undertaken to inform the ES. The assessment will consider future climate conditions and the impact this will have on the scheme. The following factors will be included in the assessment of the Scheme's resilience to climate change:

- Increased average temperatures and incidence of heatwaves;
- Increased frequency of heavy precipitation events; and
- Increase in strong wind events.

6.3.9 The assessment will be carried out in conjunction with the project team and other environmental disciplines by considering climate projections for the geographical area and the operational lifetime of the Scheme.

6.3.10 The Chapter will describe how the Scheme has been designed to be as resilient as is reasonably practicable to future climate change.

Cumulative and In-Combination Effects

6.3.10 The assessment will consider how the surrounding area around the Scheme will be impacted by cumulative impacts, resulting from other developments, such as the West Burton Solar Project, and the Gate Burton Energy Park and future climate conditions.

6.4 Conclusions on Scoping

6.4.1 GHG emissions will be created over the lifetime of the project (from production to decommissioning) and therefore it is scoped in. Any amount of GHG emissions produced will result in impacts to both the local microclimate and global climate. In order to comply with the UK's carbon budgets, it is necessary to scope GHG emissions in, as this is important for reaching net-zero emissions by 2050. Notwithstanding, given the nature of solar farm developments, it is anticipated that effects are likely to be positive in this regard.

6.4.2 In terms of climate change resilience of the Scheme, increased average temperatures and incidence of heatwaves, increased frequency of heavy precipitation events and increase in strong wind events will need to be scoped in. The Scheme is vulnerable to extreme weather events, including heatwaves, flooding events and strong winds, as these factors have the potential to damage the Scheme and reduce its efficiency. Therefore, adaptation measures using projections from UKCP18 will need to be further addressed in the ES.

6.4.3 The ES will include a proportionate climate change chapter given that it is unlikely the Scheme in-combination with projected changes, will cause significant adverse impacts; and overall, the Scheme's contribution to climate change is likely to be a positive one.

7 Landscape and Visual

7.1 Introduction

7.1.1 The landscape and visual impact assessment (LVIA) chapter of the ES will consider the impact of the Scheme and the likely significant effects of the change resulting from the Scheme on landscape and visual receptors during the construction, operation and decommissioning phases. The chapter will describe the methodology used in the LVIA, the existing baseline scenario within a defined study area, and the nature of change. It will identify the effects upon receptors arising as a result of the Scheme and the significance associated with identified effects based on the sensitivity of these receptors to change and the magnitude of any change that will likely occur. It also defines whether an effect is beneficial, adverse or neutral.

7.1.2 The LVIA will be undertaken in accordance with the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3) 2013 which defines the meaning of landscape and visual receptors as:

1. Assessment of landscape effects: assessing effects on the landscape as a resource in its own right;
2. Assessment of visual effects: assessing effects on specific views and on the general visual amenity experienced by people[5].

Appendices

7.1.3 This chapter is supported by the following Figures contained in Appendix 7:

- Figure 7.1 Site Location and Study Area
- Figure 7.2 Aerial Photography
- Figure 7.3 Landform
- Figure 7.4 Landscape Character - National
- Figure 7.5 Landscape Character - Regional
- Figure 7.6 Landscape Receptors
- Figure 7.7 Visual Receptors
- Figure 7.8 Cottam 1 Bare Earth ZTV
- Figure 7.9 Cottam 2 Bare Earth ZTV
- Figure 7.10 Cottam 3 Bare Earth ZTV
- Figure 7.11 Cottam 1 Augmented ZTV (including viewpoint locations)
- Figure 7.12 Cottam 2 Augmented ZTV (including viewpoint locations)
- Figure 7.13 Cottam 3 Augmented ZTV (including viewpoint locations)

[5] Landscape Institute and Institute of Environmental Management and Assessment, Guidelines for Landscape and Visual Impact Assessment, Third Edition, 2013 (GLVIA3) (2013)

Study Area

7.1.4 As described in the preliminary baseline assessment in section 7.3, the landscape is relatively flat with some undulating landform to the northeast of Cottam 1. Due to the nature of this landform alongside the extensive existing vegetation in the form of hedgerows, trees, and woodland the Sites are relatively well contained. Views are available across the landscape surrounding the site but will likely be limited to localised effects. The landform to the east rises in a distinguishable landform that runs north to south across the landscape. This landform whilst offsite is elevated above the surrounding landscape and affords visibility across the wider landscape with views of West Burton and Cottam Power Stations in the distance providing useful reference points.

7.1.5 GLIVA3 states that the study area must be reasonable and proportionate and must ensure that the focus in defining the appropriate study area is on likely significant effects upon landscape and visual receptors; together with likely significant cumulative effects. The preliminary study area will be further assessed as part of the iterative design process and through consultation with the Local Planning Authority's Landscape officers and consultants at West Lindsey District Council and Lincolnshire County Council.

7.1.6 It is proposed that the preliminary LVIA study area will extend to a core study area of a 5 km radius from the Scheme for Landscape receptors. The LVIA will assess the likely effects on landscape character within this 5 km radius which includes likely effects upon the three areas of West Lindsey Area of Great Landscape Value (AGLV) located to the east, west and northwest of the Scheme.

7.1.7 5 km radius has been chosen as it is considered that beyond this distance based on the desk-based assessment, field work and professional judgement and experience on similar sites, that even with good visibility, the Scheme would be barely perceptible in the composite landscape and would not give rise to likely significant effects on landscape receptors due to the local landscape context and the nature of the Scheme. This initial study area would be assessed through the EIA process and refined where necessary subject to agreement with the LPA landscape officers/consultants.

7.1.8 Whilst for the majority of the site a preliminary visual study area of 2km is considered appropriate given the nature of the landscape, due to the elevated nature of the landscape to the east it is assessed that likely significant effects upon visual receptors may be possible from this area and therefore a preliminary study area of 5km is assessed to be appropriate to assess the effects of the Scheme from potentially sensitive visual receptors. This initial study area would be assessed through the EIA process through fieldwork and viewpoint photography from viewpoints proposed or yet to be agreed with the LPA and refined where necessary subject to agreement with the LPA landscape officers/consultants.

7.1.9 The preliminary LVIA study area from the cable route search corridor is 500m. This initial study area would be assessed through the EIA process and refined where necessary subject to agreement with the LPA landscape officers/consultants.

7.2 Planning Policy Context and Guidance

7.2.1 The following policy provisions are relevant to the Landscape and Visual assessment.

National Planning Policy

7.2.2 The following are relevant:

- National Policy Statement (NPS) EN-1 (emerging and adopted).
- NPS EN3 (emerging and adopted).
- NPS EN-5 (emerging and adopted).

National Planning Policy Framework (NPPF):

- 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 180c in relation to siting development that is appropriate for its location alongside ancient/veteran trees.

Planning Practice Guidance

- Planning Practice Guidance (PPG), Natural Environment (Landscape), paragraph 37
- Planning Practice Guidance, Renewable and Low Carbon Energy

Local Planning Policy

Central Lincolnshire Local Plan

- Policy LP17: Landscape, Townscape and View
- Policy LP18: Climate Change and Low Carbon Living
- Policy LP19: Renewable Energy Proposals
- Policy LP20: Green Infrastructure Network
- Policy LP21: Biodiversity and Geodiversity
- Policy LP25: The Historic Environment
- Policy LP26: Design and Amenity
- Policy LP38: Protecting Gainsborough's Setting and Character
- Policy LP55: Development in the Countryside

West Lindsey Local Plan 2006.

Gainsborough Neighbourhood Plan including Gainsborough Heritage and Character Assessment and Green Infrastructure Strategic Plan.

Green Infrastructure Study for Central Lincolnshire (2011) and associated Biodiversity Opportunity Mapping study (2013).

7.3 Preliminary Baseline Assessment

7.3.1 The sites are situated within a series of land parcels across a large geographic area. Each site is separated by several kilometres (km) of distance and therefore from a landscape and visual perspective each land parcel is considered to be relatively isolated with limited interconnecting effects on the local landscape and visually. As such each land parcel has been listed below as illustrated on Figure 7.1 at Appendix 7 and the associated baseline described in turn within 2 km of the sites where effects are most likely and up to a 5 km study area:

- Cottam 1
- Cottam 2
- Cottam 3

Cottam 1

7.3.2 Cottam 1 covers an area of approximately 894 Ha. and is located across a series of fifteen field parcels surrounding the small hamlet of Coates.

7.3.3 Cottam 1 is located roughly between the city of Lincoln approximately 10 km to the southeast of the site, and the town of Gainsborough approximately 8.7 km to the northwest of the site. Cottam 1 lies within the parishes of Fillingham; Cameringham; Thornton in the Fallows; Sturton by Stow; Stow; and Willingham.

7.3.4 A series of rural villages are located surrounding the site including Fillingham (approximately 1 km); Ingham (approximately 1.6 km); and Cammeringham (approximately 1.5 km) to the east of the site. Thorpe in the Fallows (approximately 100m); Sturton by Stow (approximately 1.15 km); and Bransby (approximately 1.9 km) lie to the south and southwest of the site. Stow (approximately 840m); Normanby by Stow (adjacent); and Willingham by Stow (approximately 960m) lie to the west of the site, and Kexby lies approximately 1.6 km to the northwest of the site.

7.3.5 The site comprises a series of agricultural field parcels that follow the surrounding field patterns and consist of predominantly arable and grazing land use. The sites are generally flat or gently sloping, with levels ranging from approximately 10m AOD to the southwestern boundary and rising to approximately 20m AOD to the north eastern boundary towards the village of Fillingham.

7.3.6 The landscape consists of fields separated by hedgerows with trees, and drainage ditches that feed into the River Till. The River Till runs through and borders a number of the western site parcels as it meanders through the landscape. Further landscape features include geometric shaped shelterbelts and woodland plantations consisting of predominantly native species with large poplar specimens in shelterbelts to the east of the site.

7.3.7 Surrounding the site is open agricultural land punctuated by small rural roads running in a predominantly east west orientation across the landscape. With the exception of the villages/hamlets mentioned above the area is relatively sparsely populated with isolated residential properties and farmsteads dotted throughout the surrounding countryside.

7.3.8 To the east the land rises to form a distinctive sloping ridge forming a prominent landform. Along this landform lie a linear line of small villages (listed above). In the east the road arrangement formalises and changes to a linear north to south alignment called Middle Street Road. This is reinforced further to the east by the A15 following a linear and former

Roman Road. To the southwest lies the A1500 a linear road again following the alignment of a former Roman Road and orientated in a roughly northwest to southeast arrangement running diagonally across the landscape and adjoining the more organic highway alignment of Gainsborough Road (A156) to the west.

Cottam 2

7.3.9 Cottam 2 consists of a single land parcel and covers an area of approximately 132 Ha.

7.3.10 Cottam 2 is located roughly between the town of Gainsborough approximately 6.5 km to the southwest, and the village of Willoughton approximately 4 km to the north east of the site and approximately 5.5 km to the northwest of the land parcel at Cottam 1. Cottam 2 lies wholly within the Parish of Corringham which is surrounded by the parishes of Pilham, Blyton, Northorpe, Blyborough, Willoughton, Hemswell, Harpswell, Springthorpe, Upton, Lea, Gainsborough and Thornock.

7.3.11 The closest settlements to Cottam 2 include the settlements of Corringham located approximately 600m to the southwest. Pilham is located approximately 2.2 km to the northwest, Blyton is located approximately 3.6 km to the northwest, beyond which lies Laughton. Northorpe is located approximately 4 km to the northeast, beyond which lies Scotton and Scotter. Yawthorpe is located approximately 590m to the east of the site, Willoughton is located approximately 4 km to the northeast, Hemswell is located approximately 4 km to the southeast, Harpswell is located approximately 5 km to the southeast, Springthorpe is located approximately 1.9 km to the south with Heapham and Upton located beyond Springthorpe to the southeast.

7.3.12 The site comprises of a series of agricultural fields in a compact single land parcel with two residential steadings located towards the centre, namely, Corringham Grange Farm and The Cottage. These properties are accessed by a linear access road in a broadly north-northwest to south-southeast arrangement. Two metalled access tracks lead off the main access road running perpendicular to the access road and defining field parcels in a geometric form. Land use consists of predominantly arable land use. The sites are generally flat, with levels of approximately 20m AOD across the site.

7.3.13 The landscape consists of small to medium sized fields separated by hedgerows with some trees, and drainage ditches that feed into the wider drainage network of the River Till. Corringham Beck forms a larger watercourse and forms the north-eastern boundary of the land parcel. The hedgerows are generally uniform and gappy in places with very few hedgerow trees and some small areas of scrub.

7.3.14 Surrounding the site is open agricultural land with hedgerows and watercourses synonymous with the site and punctuated by small rural roads running in a predominantly east west and north south orientation across the landscape. With the exception of the villages/hamlets mentioned above the area is relatively sparsely populated with isolated residential properties and farmsteads dotted throughout the surrounding countryside. Small woodlands are located to the northeast identified as coverts and are broadly rectangular or angular shaped by field pattern. Wharton Wood and Birch Wood are large areas of woodland to the west with Wharton being the largest and part of which is Ancient Woodland. These form part of the wider green infrastructure network of woods, plantations and coverts within the local landscape.

7.3.15 To the east the land rises to form a distinctive sloping ridge forming a prominent landform. This ridgeline is a distinctive feature in the surrounding landscape and prevalent across all three land parcels. Along this landform lie a linear arrangement of small villages some of which are listed above. In the east the road arrangement curves through the landscape in a broadly north-south alignment of the A1398. The road alignment formalises further east by the A15 following a linear and former Roman Road. To the south of Cottam 2 lies the A631 running in a southeast-east to northwest-west orientation approximately 447m from the site boundary.

Cottam 3

7.3.16 Cottam 3 covers an area of approximately 250 Ha and is located across a series of five field parcels to the west, northwest and southwest of the village of Blyton.

7.3.17 Cottam 3 is located approximately 6.7 km to the northeast of the town of Gainsborough. Cottam 3 lies within the parishes of Laughton, Blyton and a small section within the parish of Pilham and lies immediately to the boundary of Northorpe Parish.

7.3.18 A series of rural villages are located surrounding the site with the closest being Blyton located approximately 970m to the to the south west, Laughton located approximately 1.7 km to the northwest, Scotton and Scotter located approximately 2.5 km and 4 km respectively to the north east and Northorpe approximately 2 km to the east. Willoughton is located approximately 5 km to the southeast, and Pilham located approximately 470m to the southwest.

7.3.19 The main land parcels are located on the former Blyton airfield site and adjoining arable land use to the northeast and west. The airfield is interspersed with arable land use and a series of concrete roads and large open concrete areas are found throughout the site. The site is generally flat, with levels approximately 20m AOD similar to Cottam 2 although there is some minor undulation of landform to the northeast of the site at Cottam 3.

7.3.20 The landscape consists of predominantly open fields within the site with boundaries and structures associated with the old airfield and current uses for motor racing and carting. The site boundaries are enclosed to the south, east and west by hedgerows with trees, and drainage ditches leading to Northorpe Beck in the northeast. There are small pockets of woodland within and adjacent to the site and Laughton Woods approximately 2 km to the northwest of the site forms a prominent woodland feature in the landscape running to the west into Laughton Common and Owlet Plantation and forming a significant element of green infrastructure within the wider landscape.

7.3.21 Overhead power lines run across the western portion of the site in a northeast to southwest alignment defining the largest vertical elements on site and in the wider landscape. A wind turbine is located near the entrance to the airfield, near the parcel's southern boundary and this forms the only other significant vertical element in the local landscape.

7.3.22 Surrounding the site is open agricultural land punctuated by small rural roads linking villages, with the B1205 defining the southern boundary and running in a predominantly east to west orientation across the landscape turning to a broadly north to south alignment for a short section to the east before returning to the main east to west alignment. The A159 is

located to the west of the site running through Blyton and northward before turning northeast towards the village of Scotter. A main line railway runs between two of the larger land parcels with sites located to the north and south of the railway line. The line serpentines through and around Gainsborough and cuts through the landscape surrounding the site in linear form and orientated southwest-west to northeast-east before turning to a southwest to northeast orientation towards the edge of Kirton in Lindsey. Land to the south of the railway line is more rural in character with pasture land surrounded and divided by hedgerows and trees.

7.3.23 With the exception of the villages/hamlets mentioned above the area is relatively sparsely populated with isolated residential properties and farmsteads dotted throughout the surrounding countryside. The landscape to the south of the railway line is well contained and similar in character to Cottam 2. To the north of the railway line the landscape is heavily influenced by the airfield and to the northeast of the site is more open and less vegetated responding closely to subtle landform, open field boundaries and irregular field patterns.

7.3.24 To the east of the site the land rises to form a distinctive sloping ridge forming a prominent landform. Along this landform lie a linear line of small villages. In the east the road arrangements formalise and change to a linear north to south alignment called Grayingham Low Road. This is reinforced further to the east by the B1398 and the A15 further east following a linear and former Roman Road.

7.3.25 Within the wider study area the landscape is also influenced by existing and redundant airfields with existing airfield at Sturgate and Scampton and the redundant airfield on site at Cottam 3. Cottam and West Burton Power Stations are also located within the wider landscape to the west forming visible landmarks in the wider landscape within and outside the 2 km and 5km study areas.

Cable Route Corridor Search Areas

7.3.26 The cable route search corridors are 'search areas' for a potential cable route. Only a narrow width within these corridors will be required for the cable route and its construction. The cable route corridors are shown connecting the land parcels together and the connection point at Cottam Power Station. The applicant is in the process of seeking to refine this corridor which will progress alongside the design process.

National Landscape Character

7.3.27 The sites are located within two National Character Areas (NCA's)[6] as defined by Natural England and as illustrated on Figure 7.4 in Appendix 7.

- NCA Profile: 45 Northern Lincolnshire Edge with Coversands (NE554); and
- NCA Profile: 48 Trent and Belvoir Vales (NE429).

7.3.28 Cottam 1 and 2 are predominantly located within NCA 48 with a small portion of a northeast land parcel located within NCA 45. Cottam 3 lies wholly within NCA 45.

7.3.29 Within a portion of the 2 km study area around Cottam 3 and within the wider 5 km study area to the northwest there is a further NCA as follows:

[6] www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles

- NCA Profile: 39 Humberhead Levels (NE339).

Regional Landscape Character

7.3.30 The sites are located within a single Regional Landscape Character Type (RLCT)[7] as defined by Natural England and as illustrated on Figure 7.5.

- RLCT Profile: 4a Unwooded Valleys

7.3.31 Within the 5 km study area there are further RLCT's as follows:

- RLCT Profile: 6a Limestone Scarps and Dipsolpes
- RLCT Profile: 4b Wooded Valleys
- RLCT Profile: 2b Planned and Drained Fens and Carrlands
- RLCT Profile: 3a Floodplain Valleys.

7.3.32 The study area also contains areas defined as 'Built Up Area' which is associated with large settlements including Gainsborough, Blyton, Scotter, Scampton, Saxilby and Sturton by Stow, and main highway corridors including the A1500 (Tillbridge Road), A15 (Ermine Road), A631 (Harpswell Lane), and the A159 (Gainsborough Road). Two land parcels to the west of the site at Cottam 3 lie partially within this Built-Up Area.

Local Landscape Character

7.3.33 The Sites are located within a Local Landscape Character Area (LLCA)[8] as defined by the West Lindsey Landscape Character Area Assessment:

- LLCA 3 The Till Vale

7.3.34 Within the 5 km study area there are further LLCA's as follows:

- LLCA 1 Laughton Woods;
- LLCA 2 Trent Valley; and
- LLCA 4 The Cliff.

7.3.35 This LCA was undertaken in August 1999 and therefore it is proposed to undertake a review of the West Lindsey Landscape Character Area Assessment to ensure it is relevant to the current baseline.

Landscape Planning Designations

7.3.36 The study area of the site, the grid route, and substation do not contain any National landscape designations such as National Parks or Areas of Outstanding Natural Beauty (AONB).

7.3.37 The following designations are assessed within each land parcel (Cottam 1-3) and within 2 km of the site and within the 5 km study area.

7.3.38 West Lindsey District contains a local landscape designation, the West Lindsey Area of Great Landscape Value (AGLV) which comprises of different and disparate parts. These different areas are not named but all classed as the AGLV. Therefore, for clarity, in the descriptions below we have named the areas as follows - AGLV1 The Ridge; AGLV2 Gainsborough AGLV and AGLV3 Laughton Wood AGLV.

[7] http://publications.naturalengland.org.uk/publication/5635681403535360
[8] Landscape Character Assessment | West Lindsey District Council (west-lindsey.gov.uk)

Cottam 1

7.3.39 **Scheduled Monuments**: There are no Scheduled Monuments on the site.

7.3.40 The closest Scheduled Monument is Thorpe medieval settlement (List Entry Number: 1016978) in Thorpe in the Fallows hamlet which borders the site to the south. The hamlet of Coates lies to the centre of Cottam 1 and contains two areas of defined Scheduled Monuments, Coates medieval settlement and moated site (List Entry Number: 1016979) located approximately 560m from the site boundary. There is a further Scheduled Monument in the village of Brattleby called Cross on St Cuthbert's Chruchyard (List Entry Number: 1018288) just within 2 km of the site.

7.3.41 **Listed Buildings**: There are no Listed Buildings on the site.

7.3.42 The closest listed building in proximity to the site is located at Thorpe le Fallows which is: Thorpe in the Fallows farmhouse (List Entry Number: 1308921). The Grade I; Church of St Edith (List Entry Number: 1146742) lies in the hamlet of Coates at the centre of Cottam 1. There are a large number of further listed buildings within 2 km of the Site and these are found predominantly within local villages and settlements.

7.3.43 **Conservation Area**: There are no Conservation Areas on site.

7.3.44 There are a number of Conservation Areas within the surrounding landscape including Glentworth, Fillingham, Ingham, and Brattleby. These are all located on rising ground to the east of the site at the base of the prominent landform running north to south.

7.3.45 **Registered Parks and Gardens**: There are no Registered Parks and Gardens on site.

7.3.46 The closest Parks and Gardens lies at the edge just within 2 km of the site namely Filllingham Castle (List Entry Number: 1000977) which is a grade II listed Park and Garden.

7.3.47 **Ancient Woodland**: There are no areas of Ancient Woodland on site or within the 2 km of the Site.

7.3.48 **Ecological Designations**: There are no Local Nature Reserves, Local Wildlife Sites or Sites of Special Scientific Interest on site or within 2 km of the Site

7.3.49 **Areas of Great Landscape Value (AGLV)**: There are no areas of the site that are located within an AGLV.

7.3.50 An AGLV is located to the east of the site running in a north to south orientation through the landscape associated with the distinct landform ridge that runs to the east of the site. This AGLV will be referred to as the Ridge AGLVA for the purposes of this report. The Ridge AGLV is at its closest point to the site approximately 200m from the site near the village of Fillingham. The AGLV covers a considerable distance and extends from the villages of Grayingham in the north to South Carlton in the south.

Cottam 2 and 3

7.3.51 **Scheduled Monuments**: There are no Scheduled Monuments on the site.

7.3.52 The closest Scheduled Monument is Gilby medieval settlement and cultivation remains (List Entry Number: 1016795) which lies approximately 1.3 km to the northwest of the site. The Deserted village of Dunstall (List Entry Number: 1004996) lies approximately 0.75 km to the northeast of Cottam 2. Southorpe medieval settlement and cultivation remains (List

Entry Number: 1016794) lies approximately 1.35 km to the east of Cottam 3 northeast of the site. There is a further Scheduled Monument namely the Cross in St Martin's churchyard (List Entry Number: 1018291) which lies approximately 940m to the southwest of Cottam 3.

7.3.53 Listed Buildings: There are no Listed Buildings on the site.

7.3.54 The closest in proximity to the site is the Grade II; Old Railway Station (List Entry Number: 1359454) located 0.32 km to the west of the lowest field parcel of Cottam 3 to the south of the railway line. There are a number of listed buildings in the surrounding landscape including at Pilham which are predominantly Grade II with a Grade II*; Church of All Saints (List Entry Number: 1317137). Blyton contains a number of listed buildings including the Grade I; Church of St Martin (List Entry Number: 1064159) located 660m to the southwest of Cottom 3. There are further listed buildings at Laughton including the Grade I listed Church of All Saints (List Entry Number: 1317208) located 1.66 km from Cottam 3. The Grade II; Mount Pleasant Farmhouse (List Entry Number: 1317186) lies to the north of Cottam 3 approximately 600m to the north of Cottam 3. There are further listed buildings at Northorpe including Grade I; Church of St John the Baptist (List Entry Number: 1165812). Two isolated buildings are located in relatively close proximity to the site near Cottam 2, Grade II; Old Hall (List Entry Number: 1165535) lies 400m to the west of the site, and Grade II; Corringham Windmill (List Entry Number: 1359417) lies 580m to the south of the site. There are further listed buildings within the village of Corringham and Springthorpe.

7.3.55 Conservation Area: There are no Conservation Areas on Site and only one conservation area at Springthorpe within 2 km of the sites.

7.3.56 Registered Parks and Gardens: There are no Registered Parks and Gardens on site or within 2 km of the sites.

7.3.57 Ancient Woodland: There are no areas of Ancient Woodland on site or within 2 km of the sites.

7.3.58 Ecological Designations: There are no Local Nature Reserves, Local Wildlife Sites or Sites of Special Scientific Interest on site. Scotton Beck Fields Site of Special Scientific Interest (SSSI) and Scotton Common SSSI are located approximately 1.5 km to the north of the site within the 2 km study area. Laughton Common SSSI lies just within 2 km of Cottam 3 to the north west.

7.3.59 Areas of Great Landscape Value (AGLV): There are no areas of the site that are located within the site.

5km Study Area

7.3.60 Scheduled Monuments: There are a number of Scheduled Monuments beyond 2 km and within the wider 5 km study area including sites at Willoughton, Harpswell, to the west of Fillingham, Broxholme, Ingleby, between Sturton by Stow and Marton, Knaith Park, and Springthorpe.

7.3.61 Listed Buildings: There are a number of listed buildings within the wider study area in the following locations: Scotter, Scotton, Willoughton, Hemswell, Harpswell, Hemswell Cliff, Aisthorpe, Scampton, North and South Carlton, Broxholme, Saxilby, Ingleby, Brampton, Marton, Gate Burton, Upton, Heapham, Gainsborough; together with a number of isolated and grouped buildings outside of settlements.

7.3.62 Conservation Area: There are Conservation Areas at Hemswell, and South Carlton at the edge of the study area.

7.3.63 Registered Parks and Gardens: There are no Registered Parks and Gardens within the wider study area. Grade II; Hackthorn Hall lies just outside the study area to the east of Cottam 1.

7.3.64 Ancient Woodland: There are numerous Ancient Woodlands located within the wider study area. These are located to the west of Cottam 1 and 2.

7.3.65 Ecological Designations: There are three further SSSI's located to the northwest of Cottam 3 associated with Laughton Wood and one Local Nature Reserve to the west of Blyton.

7.3.66 Areas of Great Landscape Value (AGLV): The three AGLV's referenced above are also found extensively within the wider study area, to the east of Cottam 1, 2 and 3 and to the west of Cottam 1 and 2 and to the northwest of Cottam 3.

7.3.67 Areas of Great Landscape Value (AGLV): There are three separate AGLV located within 5km of Cottam 1, 2 and 3. These will be referred to as the Ridge AGLV, the Gainsborough AGLV and the Laughton Wood AGLV (please refer to Figure 7.6) The Ridge AGLV is located east of all three sites and runs in a north to south orientation from Grayingham in the north to South Carlton. The Gainsborough AGLV runs in a north to south orientation from Gainsborough down to Marton and is located west of Cottam 1 and 2, and southwest of Cottam 3. The Laughton Wood AGLV covers an extensive area of woodland surrounding Laughton and is located north of Cottam 1, 2 and 3.

7.3.68 The Gainsborough AGLV is located approximately 3.1km west of Cottam 1, 2.3km west of Cottam 2 and approximately 1.9km southwest of Cottam 3.

7.3.69 The Ridge AGLV is located approximately 200m east of Cottam 1, 3.7km east of Cottam 2 and 4.8km east of Cottam 3.

7.3.70 The Laughton Wood AGLV is located beyond 5km north of Cottam 1, 4.7km northwest of Cottam 2 and 2km west of Cottam 3 at its closest point.

Visual Amenity

Cottam 1

7.3.71 Scheduled Monuments, Listed Buildings and Conservation Areas and Registered Parks and Gardens: These designations have been identified above as landscape receptors as they influence the landscape character. Visual receptors to these designations are sensitive to change in the landscape as their appreciation of the asset is based on the setting of the site. The cultural heritage chapter will deal with the setting of listed buildings and the LVIA will deal with the effect on visual receptors visiting these heritage assets.

7.3.72 Area of Great Landscape Value (AGLV): These designations have been identified above and would form part of the visual baseline to be assessed via representative viewpoints from within the AGLV.

7.3.73 Ecological Designations: There are no Local Nature Reserves, Local Wildlife Sites or SSSI's on site or within 2 km of the Site.

7.3.74 Settlements: There are a number of settlements including villages and hamlets located within 5 km of the site as identified above including a number of isolated properties and farm steads. It is unlikely that significant

effects would arise from the Scheme beyond 1 km from the Cottam 1 due to the low nature of the Scheme and intervening vegetation.

7.3.75 Public Rights of Way (PRoW): There are three PRoW which run through the site as follows:

- Public Bridleway TLFe/31/2 which runs through the southern portion of the site;
- Public Footpath Stow/83/1 which runs through the central portion of the site; and
- Public Bridleway Fill/86/1 which runs along the north western boundary of the site.

7.3.76 There are also a large number of PRoW within the wider landscape consisting of predominantly footpaths and bridleways with a number of restricted byways and green lanes. There are likely to be significant effects upon PRoW within the site and within 1-2km of the site based on fieldwork undertaken to date. Likely significant effects beyond 2km and up to 5km are also considered possible from elevated locations predominantly to the east of the site.

7.3.77 Highways (PRoW): There are a number of large road systems and an extensive network of smaller local roads within the identified study area and as listed above. There are likely significant effects upon these receptors within 1 km of the site.

7.3.78 Water Courses: The River Till runs through the site at three locations and is navigable along its length. The general level of the watercourse is low which restricts any visibility of the site. The watercourse does flood bringing the water level to the top of banks when visibility is theoretically visible. This will be assessed as part of the LVIA to determine the right of access and likely visibility and resultant effects.

Cottam 2 and 3

7.3.79 Scheduled Monuments, Listed Buildings and Conservation Areas and Registered Parks and Gardens: These designations have been identified above as landscape receptors as they influence the landscape character. Visual receptors to these designations are sensitive to change in the landscape as their appreciation of the asset is based on the setting of the site. The cultural heritage chapter will deal with the setting of listed buildings and the LVIA will deal with the effect on visual receptors visiting these heritage assets.

7.3.80 Area of Great Landscape Value (AGLV): These designations have been identified above and would form part of the visual baseline to be assessed via representative viewpoints from within the AGLV.

7.3.81 Ecological Designations: There are a number of ecological designations within the study area including Local Wildlife Sites and Sites of Special Scientific Interest. An assessment of views from these locations would be undertaken as part of the LVIA.

7.3.82 Settlements: There are a number of settlements including villages and hamlets located within 5 km of the site as identified above including a number of isolated properties and farm steads. It is unlikely that significant effects would arise from the Scheme beyond 1 km of the Site based on the low nature of the Scheme and the prevailing landscape character.

7.3.83 Public Rights of Way (PRoW): There is one PRoW on site as follows:

- Public Footpath Pilh/20/1 which runs through the site in the southern portion of Cottam 3

7.3.84 There are also a large number of PRoW within the wider landscape consisting of predominantly footpaths with a number of bridleways and Byways Open to All Traffic (BOAT's). There are likely to be significant effects upon PRoW within the site and within 1-2 km of the site based on fieldwork undertaken to date. Likely significant effects beyond 2 km and up to 5 km are considered unlikely due to the distance from elevated ground to the east.

7.3.85 Highways (PRoW): There are a number of large road systems and an extensive network of smaller local roads and farm tracks within the identified study area and as listed above. There are likely significant effects upon these receptors within 1 km of the site.

7.3.86 Railways: There is a railway line located adjacent to the southern portion of Cottam 3. There is a potential for significant visual effects from receptors on this route.

7.4 Assessment Methodology

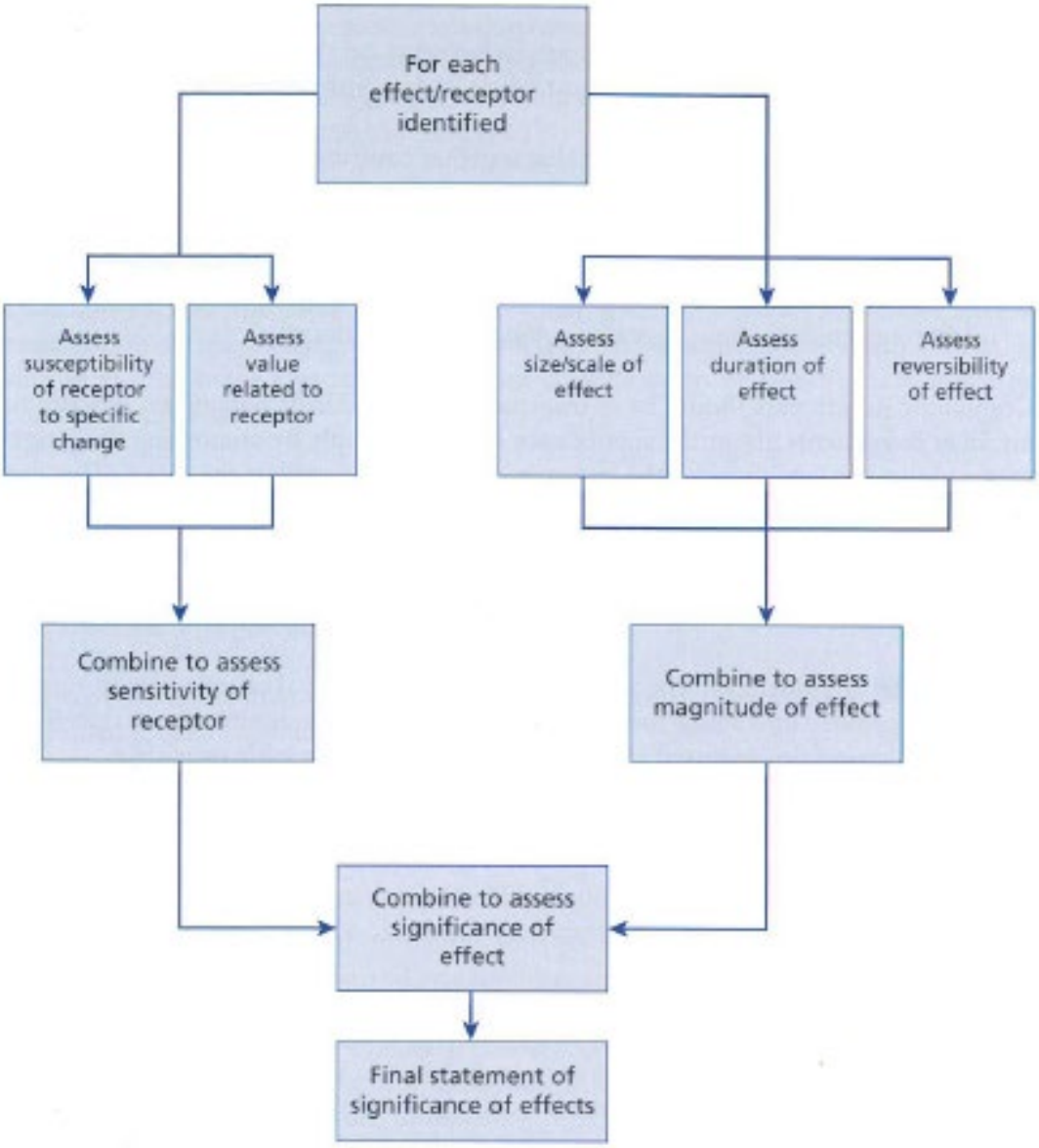
7.4.1 The LVIA will be undertaken in line with the following guidance which represents the standard approach and guidance relevant to LVIA for renewable energy developments within the UK:

- Landscape Institute and Institute of Environmental Management and Assessment 'Guidelines for Landscape and Visual Effect Assessment', 2013 (GLVA3)[9];
- An Approach to Landscape Character Assessment (October 2014)[10];
- Landscape Institute Technical Guidance Note 06/19, Visual Representation of Development Proposals (17 September 2019)[11];
- Landscape Institute Technical Guidance Note 02/19, Residential Visual Amenity Assessment (RVAA) (March 2019)[12]; and
- Landscape Institute Technical Guidance Note 02/21, Assessing landscape value outside national designations (May 2021)[13].

[9] Landscape Institute and Institute of Environmental Management and Assessment, 2013, *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, Routledge, London.
[10] Natural England, An Approach to Landscape Character Assessment, October 2014, by Christine Tudor, Available at: landscape-character-assessment.pdf (publishing.service.gov.uk)
[11] Landscape Institute Technical Guidance Note 06/19, Visual Representation of Development Proposals (17 September 2019. Available at: TGN-06-19-Visual_Representation (windows.net)
[12] Landscape Institute Technical Guidance Note 02/19, Residential Visual Amenity Assessment (RVAA) (March 2019). Available at: Residential Visual Amenity Assessment | Landscape Institute
[13] Landscape Institute Technical Guidance Note 02/21, Assessing landscape value outside national designations (May 2021(, 1.9.6tgn-02-21-assessing-landscape-value-outside-national-designations.pdf (windows.net)[13] Landscape Institute Technical Guidance Note 02/21, Assessing landscape value outside national designations (May 2021), Available at: tgn-02-21-assessing-landscape-value-outside-national-designations.pdf (windows.net)

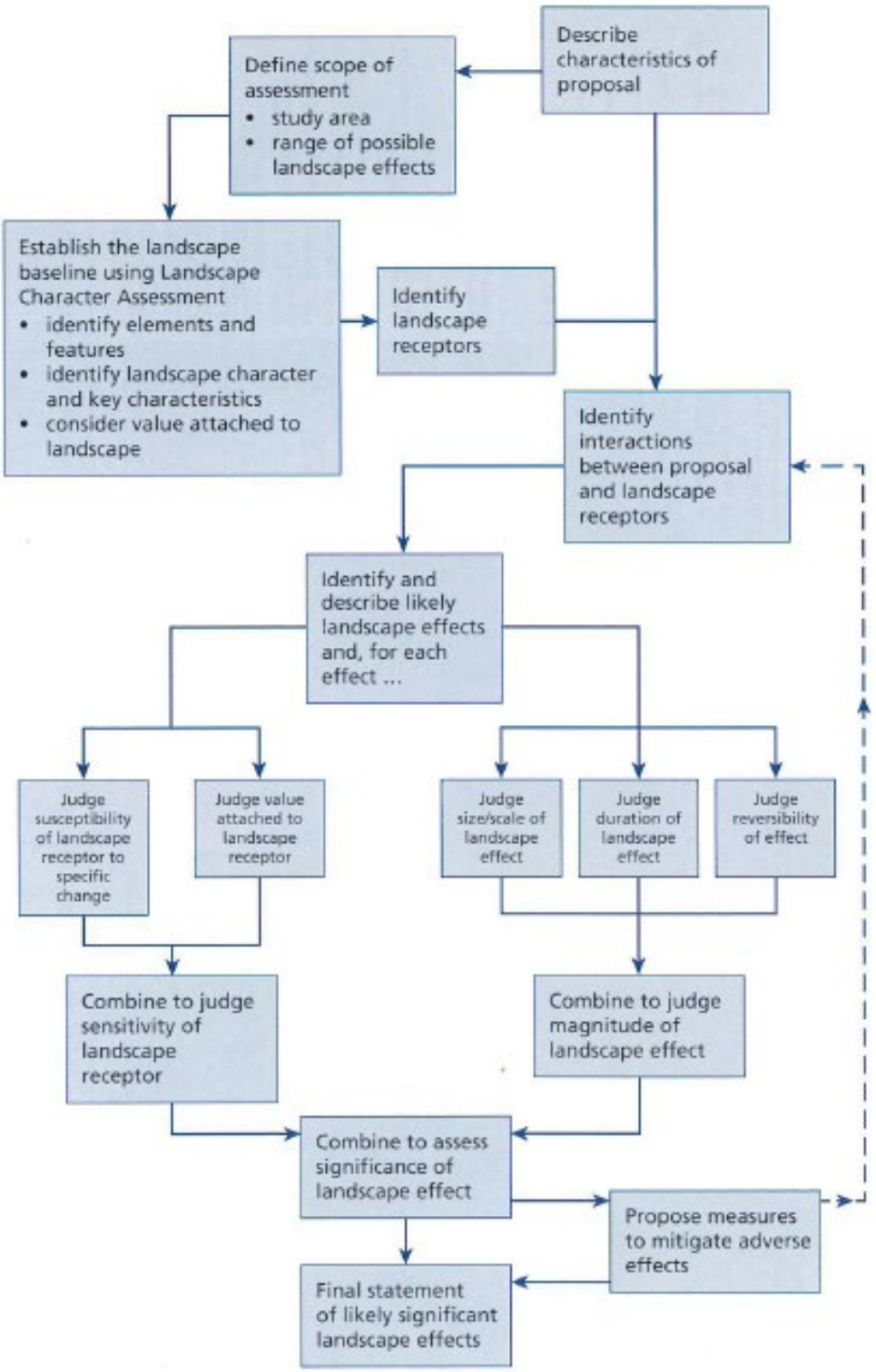
7.4.2 The methodology adopted to undertake the LVIA is defined in table 3.5 of GLIVIA3 as shown in the figure below.

Figure 7.1: Extract from GLVIA3



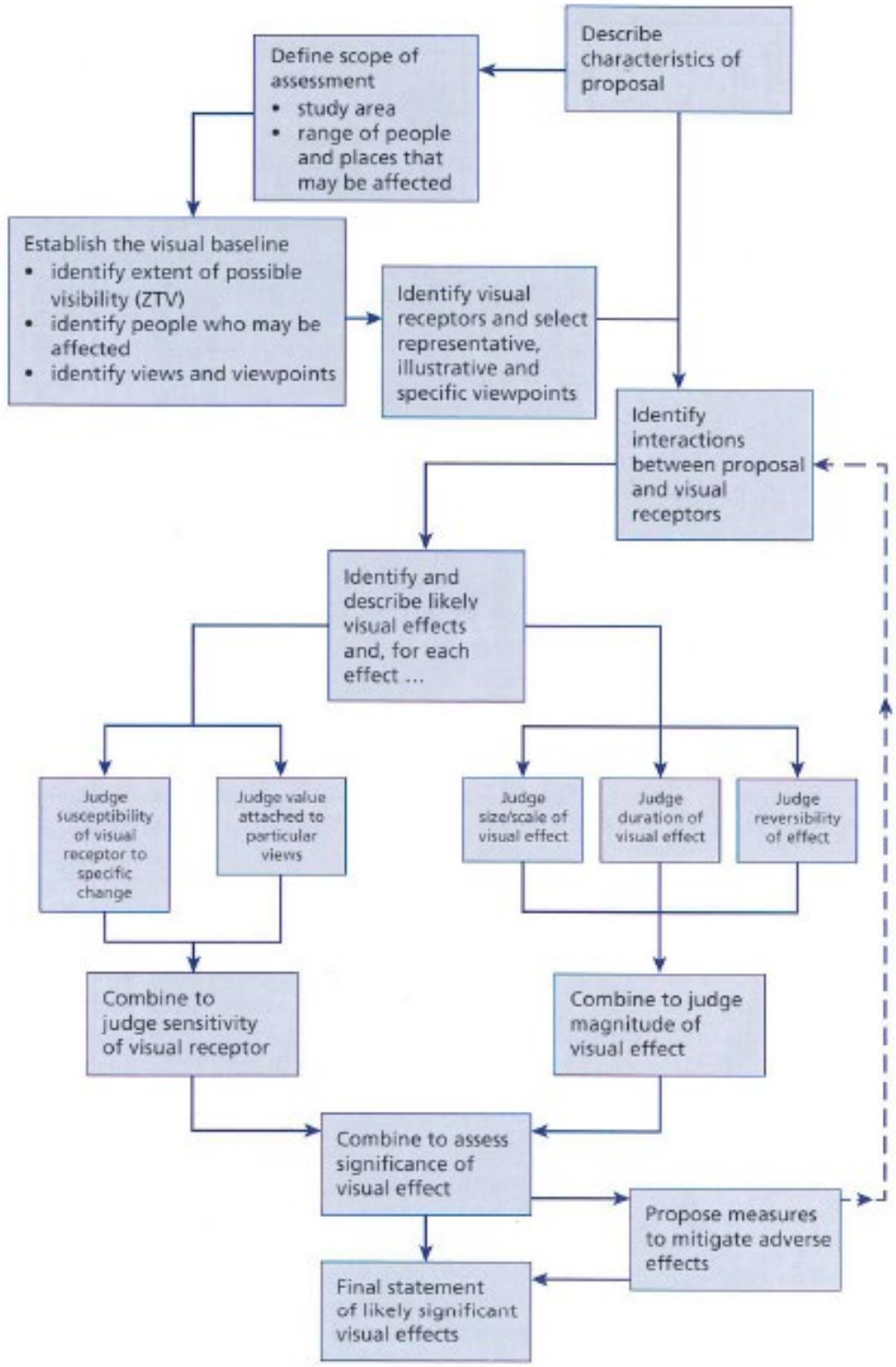
7.4.3 The following stages of assessment are undertaken in order to assess the significance of landscape effects as defined in table 5.1 of GLIVIA3 as shown in the image below.

Figure 7.2: Extract from GLVIA3



7.4.4 The following stages of assessment are undertaken in order to assess the significance of visual effects as defined in table 6.1 of GLIVIA3 as shown in the image below.

Figure 7.3: Extract from GLVIA3



7.4.5 The LVIA would include the following stages:

- A desk study would be undertaken to assess the landscape and visual baseline including a review of published landscape character assessments identified above. This process would be supported by a suite of landscape figures similar to those listed in the appendices. This process helps to identify the landscape and visual receptors to be assessed and subject to approval by the LPA;
- Detailed fieldwork would also be undertaken to confirm aspects of the desk study and to ground truth proposed viewpoint locations;
- An assessment of the sensitivity (nature of the receptor) of landscape and visual receptors is undertaken. This is defined through a combination of their value and susceptibility to change;
- An assessment of the magnitude of impact (nature of effect) of the Scheme during the construction period (winter), operation at year 1 (winter) and operation at year 15 summer) and at decommissioning phase (winter). The magnitude of impact will be assessed in relation to the size, scale, duration and reversibility of the effect;
- An assessment of the significance of the effect to the landscape and visual receptors for the three stages of the Scheme (construction, operation and decommissioning) would be undertaken. This process systematically and transparently assesses the likely significant effects identified;
- Mitigation proposals would be produced to prevent/avoid, reduce, and where possible offset/compensate any significant adverse landscape and visual effects;
- Re-evaluation of the significance of effect would be undertaken based on the mitigation approach to identify any residual landscape and visual effects; and
- Preparation of a Landscape and Biodiversity Management Plan which would be produced and would prescribe how the mitigation measures identified and proposed can be implemented and managed in perpetuity to ensure the effectiveness and certainty in achieving the objectives of the mitigation strategy. This would be undertaken in conjunction with the ecology and arboricultural consultant.

Assessment of Landscape and Visual Sensitivity

7.4.6 The level of landscape and visual effect is determined through consideration of the 'nature of receptor' (sensitivity) to change assessed together with the 'nature of effect' (magnitude) that would occur as a result of the Scheme. The combination of sensitivity and magnitude are used to assess significance of effect alongside professional judgement.

7.4.7 The nature of receptor (sensitivity) on all identified landscape and visual receptors, will be described as high, medium, low or very low as set out in Tables 7.1 and 7.2 below and is based on a combination of the value of the receptor and the susceptibility to change. The category 'very high' has not been used as the site does not include any International or National Designations such as World Heritage Sites, National Parks or Areas of Outstanding Natural Beauty.

Table 7.1 Sensitivity of Landscape Receptors

Landscape Resource Sensitivity	Characteristics
High	Landscape character, characteristics, and elements where, through consideration of the landscape resource and characteristics, there would generally be a lower landscape capacity or scope for landscape change or positive enhancement, and higher landscape value and quality. Often includes landscapes which are highly valued for their scenic quality, including most statutorily (nationally / internationally designated landscapes). Elements/features that could be described as unique or are nationally scarce. Mature vegetation with provenance such as ancient woodland or mature parkland trees, and/or mature landscape features which are characteristic of and contribute to a sense of place and illustrates time- depth in a landscape and if replaceable, could not be replaced other than in the long term.
Medium	Landscape character, characteristics, and elements where, through consideration of the landscape resource and characteristics, there would be a medium landscape capacity or some scope for landscape change. Often includes landscapes of medium landscape value and quality which may be locally designated. Areas that have a positive landscape character but include some areas of alteration/degradation/or erosion of features. Perceptual/aesthetic aspects has some vulnerability to unsympathetic development; and/or features/elements that are locally commonplace; unusual locally but in moderate/poor condition; or mature vegetation that is in moderate/poor condition or readily replicated.
Low	Landscape character, characteristics and elements where, through consideration of the landscape resource and characteristics, there would be higher landscape capacity or scope for landscape change or positive enhancement. Damaged or substantially modified landscapes with few characteristic features of value. Capable of absorbing major change, and landscape elements/features that might be considered to detract from landscape character such as obtrusive man-made features (e.g. power lines, large scale developments, etc.).
Very Low	Landscape character, characteristics and elements where there is a high landscape capacity or a planned desire for landscape change. Usually applies to landscapes with a lower landscape susceptibility or higher landscape capacity for the development. May also apply to derelict landscapes, spoil heaps, and de-graded urban fringe areas that require restoration or re- development / re-planting. Areas that are relatively bland or neutral in character with few/no notable features. A landscape that includes areas of alteration/degradation or erosion of features, and/or landscape elements/features that are common place or make little contribution to local distinctiveness. Opportunities for the restoration of landscape through mitigation measures associated with the proposal.

Table 7.2 Sensitivity of Visual Receptors

Value	Criteria
High	A well-balanced view containing attractive features and notable for its scenic quality with no or very few/minimal visual detractors . A view which is an important reason for receptors being there. A view which is experienced by a large number of people and/ or recognized for its qualities. A view with a medium – high susceptibility to change and experienced by visual receptors of a high value.
Medium	An otherwise attractive view that includes some attractive or discordant features/visual detractors. A view which plays a part in the reason why a receptor would be there. A view which is locally recognized. A view with a low - medium susceptibility to change and experienced by visual receptors of a low - medium value.
Low	A view that is simplistic and contains few attractive or notable features or a number of visual detractors which may dominate the view A view which plays a small part in the reason why a receptor would be there. A view with a low susceptibility to change, and a low value.
Very Low	A view that is unattractive, discordant and/or contains many visual detractors. A view which is unlikely to be part of the receptor's experience. A view with a very low susceptibility to change, and very low sensitivity.

Assessment of Magnitude of Change

7.4.8 The nature of effect (magnitude) is determined by combining an assessment of the size or scale of change likely to be experienced as a result of each effect, the geographical extent of the area likely to be influenced and the duration and reversibility of effects. The nature of effect for landscape and visual receptors is described as high, medium, low or very low and no change as set out in Tables 7.3 and 7.4 below.

Table 7.3 Assessment of Overall Magnitude of Landscape Change

Category	Description
Large	A large extent of existing landscape elements would be lost / adjusted, the proportion that this represents within the landscape is considerable and the resultant change to the landscape character resulting from such a loss is large. Large scale alteration of the aesthetic and perceptual aspects of the landscape such as the removal of existing components of the landscape or by addition of new ones – for example, removal of hedges may change a small scale, intimate landscape into a large-scale, open one, or introduction of new buildings or tall structures may alter open skylines. The effect changes the key characteristics of the landscape & landscape, which are critical to its distinctive character. The change would affect all of the landscape receptors being assessed, as the development would occupy a large geographical extent, e.g., the change would be on a large scale, influencing several landscape types or character areas. The effects are either of a long duration, permanent, or irreversible /reversible change to the landscape.
Medium	A medium extent of existing landscape elements would be lost / adjusted, the proportion that this represents within the landscape is medium and the resultant change to the landscape character resulting from such a loss is medium. Medium scale alteration of the aesthetic and perceptual aspects of the landscape such as the removal of existing components of the landscape or by addition of new ones. The effect changes some of the key characteristics of the landscape & landscape, which are critical to its distinctive character. The change would affect a medium extent of the landscape receptors being assessed, as the development would occupy a moderate geographical extent, e.g., at the scale of the landscape type or character area within which the proposal lies. The effects are either of a long / or medium duration, permanent, or irreversible /reversible change to the landscape.
Low	A small extent of existing landscape elements would be lost / adjusted, the proportion that this represents within the landscape is low and the resultant change to the landscape character resulting from such a loss is low. Small scale alteration of the aesthetic and perceptual aspects of the landscape such as the, removal of existing components of the landscape or by addition of new ones. The effect changes a small number of the key characteristics of the landscape & landscape, which are critical to its distinctive character. The change would affect a small part of the landscape receptors being assessed, as the development would occupy a small geographical extent, e.g., at the level of the immediate setting of the site. The effects are either of a Medium / or short duration and reversible change to the landscape.
Very Low	A barely perceptible extent of landscape features and elements of importance to the character of the baseline are lost / adjusted. There is a barely discernible change to aesthetic and / or perceptual attributes of landscape & landscape character and such changes occurs across a very limited geographical area and / or proportion of the landscape receptor. The effect changes a barely discernible number of the key characteristics of the landscape, which are critical to its distinctive character.

Category	Description
	The change would affect only a negligible part of the landscape receptors being assessed, as the development would occupy a limited geographical extent, e.g., the site level, within the development site itself. The effects are of short duration and reversible.
No Change	The proposals would not affect any of the landscape receptors being assessed

Table 7.4 Assessment of Overall Magnitude of Visual Change

Magnitude evaluation	Size, scale and nature	Geographical Extent	Duration & Reversibility
High	Occupies an extensive proportion of the view and may even obstruct a significant portion of the view. Views may become the dominant feature. Considerable change to the majority / many existing landscape elements and/or landscape character; fundamental changes the surroundings and baseline to a large extent; very noticeable.	Ranging from notable change over extensive area to intensive change over a more limited area.	Long term; permanent / non- reversible or partially reversible.
Medium	Occupies much of the view but would not fundamentally change its characteristics. Changes would be immediately visible but not a key feature of the view. Some change to existing landscape elements and /or landscape character; discernible changes the surroundings of a receptor, such that its baseline is partly altered; readily noticeable.	Moderate changes in a localised area.	Medium term; semi-permanent or partially reversible.
Low	Occupies a small portion of the view and therefore would not result in a change to the view's composition. Small change to existing landscape elements and/or landscape character; slight, but detectable impacts that do not alter the baseline of	Minor changes in a localised area.	Short term / temporary; partially reversible or reversible.

Magnitude evaluation	Size, scale and nature	Geographical Extent	Duration & Reversibility
	the receptor materially not readily noticeable.		
Very Low	Occupies a small portion of the view and therefore would not result in a change to the view's composition. Small change to existing landscape elements and/or landscape character; slight, but detectable impacts that do not alter the baseline of the receptor materially not readily noticeable	Minor changes in a localised area.	Short term / temporary; partially reversible or reversible.
No Change	There are no changes to the existing view.		

Significance of Effects

7.4.9 The level of landscape and visual effect and whether it is significant or not would be assessed based on a combination of the sensitivity of the receptor, and the magnitude of change, alongside the professional judgement of a chartered landscape architect.

7.4.10 The combined sensitivity and magnitude used to determine the level of effect and whether significant or not is summarised within Table 7.5 below. The nature of Landscape and Visual effects can be either beneficial, neutral or adverse in nature.

Table 7.5 Assessment Matrix for Determining Significant Effects

		Sensitivity (susceptibility/value)			
		High	Medium	Low	Very low
Magnitude of change Medium	High	Major	Moderate-Major	Minor-Moderate	Negligible
	Medium	Moderate-Major	Moderate	Minor	Negligible
	Low	Minor-Moderate	Minor	Negligible-Minor	Negligible
	Very Low	Negligible	Negligible	Negligible	Negligible
	No change	No Change	No Change	No Change	No Change

7.4.11 In accordance with Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, it is important to determine whether the predicted landscape and visual effects arising from the Scheme are likely to be significant. Landscape and visual effects which result in a Major, Moderate – Major, and Moderate landscape or visual effect are considered to be significant.

7.4.12 The Scheme has the potential to affect landscape and visual resources during each development phase of the Scheme: construction, operation, and decommissioning. Such effects may be significant resulting in adverse effects of a temporary nature over a long duration of time and across a large geographical area. Such effects may also in combination with cumulative sites give rise to significant cumulative effects of a similar nature and duration. The below describes the potential and likely effects of the Scheme at the three stages of the project life cycle as set out above.

7.4.13 Construction: During the construction process there will be an introduction of construction traffic and movement visible within the landscape over and above that experienced by agricultural vehicles working on the land, and construction traffic would be of an industrial nature. Visible structures will begin to appear within the landscape on site and will be visible partially completed in conjunction with associated construction vehicles and movement. The appearance will change over time and the current agricultural land use on site will be replaced by the Scheme. Construction operations will likely result in a loss of tranquillity through construction operations and a change in land use across a large area of the site and within a rural context. This has the potential for significant landscape effects on the site itself and the associated indirect effects on landscape character within the wider landscape. This also has the potential for significant visual effects through a change in land use and the introduction of solar development within the landscape and the resultant change in views from a variety of receptors identified above.

7.4.14 Operation: The Scheme has the potential for significant landscape and visual effects at operation due to the change in land use and view composition. The completed Scheme whilst appearing more settled than through the construction stage will introduce a new man-made feature into the site and landscape. The quantum of development and associated massing would change the land use on site and have the potential to effect landscape character and views of the landscape from visual receptors present within the study area. The Scheme at this point would be reversible but of a long-term duration.

7.4.15 Decommissioning: The decommissioning phase also has the potential for significant landscape and visual effects in a similar way to the construction phase with the introduction of construction plant and associated traffic and noise. This has the potential to reduce tranquillity and temporarily effect landscape character and visual amenity. The effects whilst potentially significant are likely to be less than those experienced during the construction phase as the site at this stage would benefit from mitigation and enhancement measures implemented during the start of the operation stage having now matured within the landscape.

7.4.16 Cumulative Effects: The Scheme has the potential for significant cumulative landscape and visual effects at construction, operation and decommissioning stages including in-combination effects in relation to solar arrays, grid connection and energy storage. There are a number of other large-scale developments within the surrounding landscape currently known at the time of writing, including the West Burton Solar Project and Gate Burton Energy Park, and others that may come forward during the EIA process. We would assess schemes at the following stages of planning: scoping, in planning and consented. We would utilise cumulative ZTV's to understand cumulative effects and undertake full cumulative assessments in line with the above prescribed methodology and guidance (GLIVIA 3). These developments may affect both landscape

and visual receptors alike and may include temporary or permanent changes to the landscape which in combination with the Scheme may give rise to significant cumulative effects. Such effects may include intensification of land use similar to the Scheme, a reduction in landscape features or landscape character, changes to views in combination with other developments, incremental changes to the landscape and visibility of cumulative sites whilst travelling through the landscape where several developments are experienced either in combination or sequentially.

7.4.17 The following landscape and visual resources may be affected during construction, operation, and decommissioning and the significance of impacts on these will be assessed and reported in the LVIA Chapter of the Environmental Statement:

- Physical features and elements of the landscape within the site (alteration and / or removal of such features);
- Landscape character of the Scheme and the surrounding area;
- The visual amenity of people in the surrounding area from settlements, public rights of way, views from listed buildings, scheduled monuments, conservation areas and listed parks and gardens, viewpoints, roads, railways, rivers and waterways;
- The visual amenity of residents; and
- Landscapes designated for their special qualities or scenic beauty (West Lindsey Area of Great Landscape Value).

Viewpoints and Visualisations

7.4.18 A suite of viewpoints have been identified through desk studies which have been ground-truthed through fieldwork. Their positions would be subject to consultation with the Local Planning Authorities (LPA) and fixed prior to photography being undertaken. Viewpoint selection would follow good practice guidance and in particular paragraphs 6.18 to 6.20 of GLVIA3. The viewpoints proposed will be used to aid the description of effects on both landscape and visual resources and would be utilised for visual assessment purposes.

7.4.19 The selection of viewpoints was made on the basis of the following types of publicly accessible viewpoints, as follows:

- Representative viewpoints (representative of views from a particular PRoW);
- Specific viewpoints (such as key views from a specific visitor attraction);
- Illustrative viewpoints (chosen to demonstrate a particular effect/specific issue);
- Any important sequential views, for example, along key recreational or transport routes; and
- Any additional agreed viewpoints that have been requested by consultees and the LPA.

7.4.20 For the purposes of the LVIA, all of the viewpoints are proposed to be taken from publicly accessible land and once photography has been agreed these would be undertaken in both summer and winter to ensure a worst-case scenario is assessed and illustrated.

7.4.21 In order to assist with viewpoint selection and to appreciate the potential influence of the Scheme in the wider landscape, preliminary ZTV figures are used to illustrate the area from where it may be theoretically possible to view all, or part, of the Scheme. The ZTV'S produced are both Bare Earth (landform only) to illustrate a worst-case scenario and augmented ZTV figures which illustrate the effects of landform, built form and vegetation in both summer and winter.

7.4.22 The ZTVs provide a starting point in the assessment process and therefore provide a 'worst case' illustration of theoretical visibility and assume that if any of the Scheme is visible it will be shown on the ZTV.

7.4.23 Further ZTV's would be undertaken through the iterative design process to help understand the impacts of changes to the designs. The ZTV would be produced using ArcGIS Pro 2.1 software, and the calculations were based on the Scheme at 4.5m above ground level (AOD).

7.4.24 Augmented ZTV's would also be produced through the iterative design process to illustrate with greater accuracy the theoretical visibility of the Scheme. A ZTV would also be run to illustrate the screening effects of vegetation at year 15 (summer).

7.4.25 Further to the above viewpoints a series of photomontages are proposed to be produced to show the effects of the Scheme at locations where significant effects are assessed. At these locations it is proposed to undertake photomontages to AVR (Actual Visual Representation) Type 4 Photomontage (survey / scale verifiable) in both winter and summer months. This ensures that the effects of reduced vegetation are illustrated and where the colours of panels change with the light at different times of the year (winter/summer). Such montages are also proposed to be utilised if required at the time of assessment for cumulative photography where the effects of the Scheme would be seen in combination with another scheme. At present no cumulative photography has been defined and it is proposed that this would be accessed and agreed in consultation with the LPA.

Table 7.6: Proposed viewpoint locations

No.	Viewpoint Title	Receptor Represented by the Viewpoint	Distance to nearest Scheme Boundary (approximate)
1	Tillbridge Lane Viewpoint	Viewpoint observers, Walkers, Motorists	4km
2	Scmp/195/2 (Footpath)	Walkers	2.5km
3	Scmp/31/1 (Bridleway)	Walkers, Horse riders, Motorists, Residents	1.11km
4	Thorpe Lane, Bridge	Walkers, Horse riders, Motorists	6m
5	TLFe/31/2 (Bridleway)	Walkers, Horse riders, Residents	Adjacent
6	War Memorial, off Thorpe Lane	Residents, Motorists	38m
7	Thorpe Bridge, TLFe/32/1 (Footpath)	Walkers, Motorists	10m
8	Stur/80/1 (Footpath)	Walkers	417m
9	Fleets Road, Stur/79/1 (Footpath)	Walkers, Motorists, Residents	1.14km
10	Stur/73/1 (Footpath)	Walkers, Motorists	38m
11	TLFe/31/2 (Bridleway)	Walkers, Horse riders	Adjacent
12	Camm/31/1 (Bridleway)	Walkers, Horse riders	Adjacent
13	Fleets Lane, Stow Pasture	Walkers, Motorists	Adjacent
14	Route, Off Ingham Road with public access	Walkers, Horse riders	Adjacent
15	Squire's Bridge	Walkers, Motorists	138m
16	Ingham Road, Furze Hill	Walkers, Motorists, Residents	428m
17	Stow/83/1 (Footpath)	Walkers	247m
18	St Ediths's Church and Coats Hall	Residents	650m
19	Bridge over the River Till	Walkers	Adjacent
20	Normanby Road	Walkers, Motorists, Residents	Adjacent

No.	Viewpoint Title	Receptor Represented by the Viewpoint	Distance to nearest Scheme Boundary (approximate)
21	Stow/83/1 (Footpath)	Walkers	Within the Cottam 1
22	Ingh/27/5 (Footpath)	Walkers	391m
23	Ingh/27/5 (Footpath), off Stow Lane	Walkers, Motorists, Residents	117m
24	B1398	Walkers, Motorists, Residents	1.5km
25	Stow Lane and Lincoln Road Crossroads	Walkers, Motorists, Residents	1.65km
26	Ingh/24/2 (Bridleway)	Walkers, Residents, Horse riders	1.64km
27	Junction of Church Hill and the B1398	Walkers, Motorists	3km
28	Junction of Ingh/18/2, Ingh/18/1, Ingh/17/1 and Ingh/17/2 (Footpaths)	Walkers	1.3km
29	Ingh/17/2 (Footpath) just off the B1398	Walkers, Motorists	2.1km
30	Junction of High Street and the B1398	Walkers, Motorists, Residents	2km
31	Fill/87/1 (Footpath) just off Willingham Road	Walkers, Motorists	1.3km
32	Fill/86/1 (Bridleway)	Walkers, Horse riders	Adjacent
33	Fill/86/1 (Bridleway) off Willingham Road	Walkers, Horse riders, Motorists	140m
34	Fill/85/2 (Footpath)	Walkers	300m
35	Junction of Fill/85/1, Fill/85/2 and Fill/767/1 (Footpaths)	Walkers	338m
36	Fill/767/1 (Footpath)	Walkers	Adjacent
37	Junction of Gipsy Lane and Willingham Road	Walkers, Horse riders, Motorists	Adjacent
38	South Lane	Motorists, Residents	106m

No.	Viewpoint Title	Receptor Represented by the Viewpoint	Distance to nearest Scheme Boundary (approximate)
39	Junction of Cot Garth Lane and Stone Pit Lane	Motorists	41m
40	Junction of Fillingham Lane and Stone Pit Lane	Motorists, Residents	360m
41	Gltw/85/1 (Bridleway) just off Kexby Road	Walkers, Horse riders, Motorists, Residents	575m
42	Gltw/88/1 (Bridleway)	Walkers, Horse riders	1.4km
43	Owmb/5/2 (Footpath) just off the A15	Walkers, Horse riders, Motorists, Residents	3.2km
44	Junction of School Lane and Chapel Lane	Walkers, Motorists, Residents	1.7km
45	A361	Walkers, Motorists	680m
46	Corringham Windmill	Walkers, Motorists	1.1km
47	Junction of Mill Mere Road and Pilham Lane	Walkers, Motorists	1.2km
48	East Lane	Walkers, Motorists, Residents	350m
49	East Lane	Walkers, Motorists	Adjacent
50	Yawthorpe	Walkers, Motorists, Residents	530m
51	Wltn/13/1 (Footpath)	Walkers, Residents	3.9km
52	Pilham Lane	Walkers, Motorists	1.7km
53	Corr/22/1 (Footpath)	Walkers	844m
54	Unnamed road just north of Corringham Beck	Walkers, Motorists	222m
55	Pilham Lane	Walkers, Motorists, Residents	390m
56	Pilh/20/1 (Footpath)	Walkers, Residents	100m
57	Bonsdale Farm	Walkers, Motorists, Residents	420m
58	Junction of Pilh/20/1 (Footpath) and Unnamed	Walkers, Motorists	Adjacent

No.	Viewpoint Title	Receptor Represented by the Viewpoint	Distance to nearest Scheme Boundary (approximate)
	road		
59	Blyton Level Crossing	Walkers, Motorists, Trains	Adjacent
60	Kirton Road	Motorists	Adjacent
61	B1205	Motorists	Adjacent
62	Kirton Road	Walkers, Motorists, Residents	144m
63	Laughton Road	Walkers, Motorists, Residents	Adjacent
64	A159	Walkers, Motorists, Residents	1.6km
65	Scotton Common Nature Reserve	Walkers, Motorists	1.55km
66	Nthp/504/1 (BOAT)	Walkers, Horse riders, Motorists	725km
67	Monson Road	Walkers, Motorists, Residents	1.8km

Residential Visual Amenity Assessment

7.4.26 Current guidance on Residential Visual Amenity Assessment (RVAA) is contained within the Landscape Institute's Technical Guidance Note (TGN) 2/19.

7.4.27 Steps 1-3 of RVAA guidance align with the standard LVIA based approach defined in GLIVIA3 to assess the effects on residential amenity as follows:

- Step 1 – Definition of study area and scope of the assessment
- Step 2 – Evaluation of Baseline Visual Amenity
- Step 3 – Assessment of likely change to visual amenity of properties
- Step 4 – Forming the RVAA judgement

7.4.28 Stage 4 of the RVAA is defined as being required as follows:

"In this final step, and only for those properties where the largest magnitude of effect has been identified, a further judgement is required."

7.4.29 It is therefore proposed to undertake steps 1-3 as part of the LVIA for the Scheme and if following assessment of affects upon residential properties at year 15 there remain significant effects at the highest magnitude of significance (major) then a full RVAA would be undertaken for those properties affected.

Glint and Glare

7.4.30 The LVIA will consider the conclusions of the Glint and Glare Assessment in association with an assessment of the magnitude of landscape and visual impacts using the methodology prescribed above.

Lighting

7.4.31 The LVIA will clearly explain the construction, operational and decommissioning lighting strategy on Site including details of directionality, intermittent lighting, and an assessment of associated effects. It will also describe any measures necessary to avoid or mitigate lighting effects.

Cultural Heritage

7.4.32 The LVIA will focus on likely significant effects of views from heritage assets but would not comment upon the setting of such assets. This would be undertaken as part of the cultural heritage chapter of the EIA; however, consultation would be undertaken with the cultural heritage consultant through the LVIA process to help inform landscape character.

Arboriculture

7.4.33 The LVIA will consider the findings of any tree surveys undertaken and consider any effects upon landscape and visual receptors should vegetation removal be required as part of the Scheme. Due to the nature of the Scheme, it is considered that existing vegetation on site would be retained and any removal to accommodate elements associated with construction or access would be subject to a BS5837:2012 tree survey and associated Arboricultural Impact Assessment which would inform the LVIA. Mitigation associated with any such tree loss associated with the Scheme would be included in the landscape mitigation plans forming part of the LVIA. We would work closely with the arboricultural consultant throughout the application process to ensure local arboreal assets and character inform the LVIA and associated mitigation plans.

Ecology

7.4.34 The LVIA will consider the findings of the ecological reports and close liaison with the ecology consultant would form a key part of the LVIA mitigation strategy. Whilst ecological effects would be dealt with wholly in the ecological chapter of the EIA this approach ensures that the landscape mitigation proposed for landscape and visual requirements is considered holistically with ecological requirements to maximise the benefits of the Scheme in terms of green infrastructure scale interventions in line with the Biodiversity Opportunity Mapping Study undertaken by the Greater Lincolnshire Nature Partnership Central[14] in order to maximise habitat creation and ecological mitigation as well as landscape and visual mitigation.

7.5 Conclusions on Scoping

7.5.1 The Scheme has the potential to affect landscape and visual receptors across a large area which has been assessed based on the application boundary, including ZTV's produced in Appendix 7. The preliminary study areas proposed would be further refined through the LVIA process. The following elements are proposed for consideration at scoping stage as follows:

[14] Greater Lincolnshire Nature Partnership - Greater Lincolnshire Nature Partnership (glnp.org.uk)

- A preliminary study area beyond 5 km is scoped out of the assessment for landscape effects (including cumulative) as beyond this distance the Scheme is unlikely to have significant effects upon landscape character.
- A preliminary visual study area beyond 5 km (including cumulative) is scoped out of the assessment. Given the elevated ridgeline present to the east of the Scheme affording elevated views of the Scheme. There are no likely effects considered beyond this distance as the Scheme would be screened by landform or would appear barely perceptible within the landscape due to the low nature of the Scheme and the effect of distance upon visibility of low structures within an expansive landscape.

7.5.2 The following limitations within the LVIA are proposed:

- Fieldwork within the study area would be undertaken from publicly accessible locations only.
- Assessment of effects upon residential properties would be undertaken from the curtilage of residential properties where publicly accessible unless other arrangements are agreed with individual residents to gain access to their property. Professional judgement would be used to assess views from residential properties aided by the ZTV, aerial photography and LVIA figures.

7.5.3 Effects of duration in relation to magnitude of change assessment would be based on the following:

- Short-term: between 0-2 years;
- Medium-term: between 2-10 years; and
- Long-term: more than 10 years.

7.5.4 Agreement of viewpoints would be based on those set out in Table 7.6 and shown in Figures 7.11 to 7.13 and any additional ones proposed by the LPA and other stakeholders based on consultation through the LVIA process.

7.5.5 Photography would be verifiable in line with TGN 2/19 and would be captured in both winter and summer months.

7.5.6 Photomontages are proposed to be produced to show the effects of the Scheme at locations where significant effects are assessed. Photomontages where significant effects are not assessed to occur subject to agreement with the LPA, are proposed to be scoped out.

7.5.7 Assessment of effects at construction, operation and decommissioning will be assessed as follows:

- Construction – Assessment would be based on the construction of Cottam 1-3 and associated infrastructure including energy storage, substation and cable corridor as set out in section 4.3, and assessment would be undertaken in winter to assess a worst-case scenario.
- Operation (Year 1) - Assessment would be based on Cottam 1-3 and associated infrastructure being operational at the same time and assessed in winter without the benefit of full vegetation in order to assess a worst-case scenario.

- Operation (Year 15) - Assessment would be based on Cottam 1-3 and associated infrastructure being operational at the same time and assessed in summer with vegetation in leaf offering maximum screening potential. This would assume a uniform growth of trees, shelterbelts and woodland mitigation planting of 5m since operation at year 1 representing uniform growth of 1m every 3 years for proposed trees, shelterbelts and woodland. This would also assume a uniform growth of hedgerow mitigation planting of 4m since operation at year 1 representing uniform growth of 1m every 3.75 years. Existing hedgerows would be assumed to have reached their prescribed management height by year 15 of between 3-5m.
- Decommissioning – Assessment would be based on a similar process to that of construction with the scheme being no longer operational. It would assess the site in winter but would assume retention of existing and mitigating green infrastructure on site.

7.5.8 Effects of the Scheme are assumed to be adverse unless stated otherwise (neutral/beneficial).

7.5.9 The following ZTV's are proposed to be produced for Cottam 1-3:

- Bare earth ZTV (Year 1 of operation and a 5 km study area);
- Augmented ZTV - summer and winter scenarios (Year 1 of operation and a 2 km study area);
- Augmented ZTV – Mitigation (Year 15 of operation and a 2 km study area).

7.5.10 The full extent of the Scheme within the application site is not yet known and would be developed through the LVIA assessment in an iterative way in line with GLVIA3.

7.5.11 The assessment process includes iterative design and re-assessment of any remaining, residual effects that could not otherwise be mitigated or 'designed out'. The type of effect is also considered and may be direct or indirect; temporary or permanent (reversible); cumulative. The landscape and visual assessment unavoidably involves a combination of both quantitative and qualitative assessment and wherever possible a consensus of professional opinion would be sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

8 Ecology and Biodiversity

8.1 Introduction

8.1.1 The Ecology and Biodiversity chapter of the ES will consider the likely effects of the Scheme on ecological features during its construction, operation and decommissioning phases.

8.1.2 Ecological features which will form the basis of the assessment will include:

- Statutory and non-statutory sites designated for nature conservation at international, national and local levels;
- Habitats and species of principal importance for the conservation of biodiversity; and
- Other legally protected, red-listed or notable species of conservation interest.

8.1.3 The chapter will describe an ecological baseline derived from extensive site and desk-based surveys and assess the relative level of effects likely to arise, together with any avoidance, mitigation and compensation measures necessary to reduce these in accordance with nature conservation legislation and planning policy. Proposals for ecological enhancement to contribute to local conservation priorities and achievement of Biodiversity Net Gain (BNG) in line with the Environment Act 2021 (if applicable) and national and local policies will also be presented.

Appendices

8.1.4 This chapter is supported by the following appendices:

- Appendix 8.1 Preliminary Ecological Appraisal, Cottam Solar Project – Clarkson and Woods, August 2021.
- Appendix 8.2 Extended Phase 1 Habitat Survey Maps, Cottam Solar Project – Clarkson and Woods, August 2021.

8.2 Baseline Conditions and Potential Impacts

8.2.1 This section aims to provide ecological background information and a summary of desk study and preliminary survey information, together with a summary of the kinds of impacts on ecological features which may arise from the proposals.

The Site and Ecological Context

8.2.2 The Scheme comprises three sites. At present, the final cable route is yet to be determined and there are 'search areas' for the potential cable route. Only a narrow width within these corridors will be required for the cable route and its construction. At this stage, we anticipate the locations of these elements will be refined prior to statutory consultation and submission of the DCO application. Therefore, the survey work undertaken for these elements to date is in general less advanced.

8.2.3 Cottam 1, 2 and 3 predominantly comprise large, open and generally flat arable fields characterised by winter-sown cereal crops with some fields of permanent pasture (Cottam 1), bounded by a network of managed hedgerows and ditches with narrow field margins, where present. The Sites' habitats are very much typical of the surrounding landscapes which are dominated by arable farmland and occasional pasture grassland that is interspersed with small settlements and farmsteads linked by minor and

single track roads. The landscape surrounding Cottam 1 – 3 is mostly flat but to the east of the Sites lies the 'Lincoln Cliff', a significant north-south escarpment, located 3km east of Cottam 1. The River Trent is located 5km west of Cottam 1 as it flows north towards the Humber Estuary, itself some 22km north of Cottam 3.

8.2.4 While no significant woodland is present within the Sites, several small stands of managed and unmanaged woodland are present adjacent and in the surrounding landscape, often the result of historical game management. Permanent standing water is generally absent from the Sites and the surroundings following the in-filling of traditional livestock drinking ponds, save for a very small number of agricultural pools/pits, decoy ponds or managed recreational fishing ponds. Flowing water occurs occasionally in the form of various feeder streams for more significant local watercourses and are managed as agricultural drainage ditches within or adjacent to the Sites, many of which regularly dry out. The River Till runs adjacent to the western boundary of Cottam 1, while the Corringham and Yawthorpe Becks bound much of Cottam 2, and then Northorpe Beck forms the eastern boundary of Cottam 3.

Survey Effort and Scope

8.2.5 To date, the following surveys have been carried out:

- Extended Phase 1 Habitats Survey of all land within Cottam 1-3 Sites (completed April/May 2021).
- Desk study of ecological records from the Sites and their surroundings supplied by the Lincolnshire Environmental Records Centre (LERC). See paragraph 8.2.10 for search radii for different designations.
- Four breeding bird survey visits of all land within the solar array site boundaries (May - July 2021). Method follows British Trust for Ornithology (BTO) Common Bird Census techniques as informed by http://birdsurveyguidelines.org.
- One nocturnal/crepuscular bird survey visit (focus on quail and owls) of all land within the solar array site boundaries (late June to early July 2021). Method follows recommendations in Royal Society for the Protection of Birds (RSPB) Bird Monitoring Methods.
- Great Crested Newt (GCN) eDNA survey of all accessible ponds within the site boundaries and land within 250m under same land ownership (June 2021). Follows Natural England eDNA survey guidance.
- Monthly static bat detector surveys utilising 42 detector locations per month between June and September 2021 inclusive. Follows Bat Conservation Trust Good Practice Guidelines.
- Autumn survey of all water courses and ditches within site line boundaries for water vole and otters. Follows Water Vole Field Signs and Habitat Assessment guidance by Mike Dean and The Water Vole Mitigation Handbook by The Mammal Society.
- Ground-based assessment of all trees within site boundaries for potential to support roosting bats (December 2021). Follows Bat Conservation Trust Good Practice Guidelines as informed by the Bat Tree Habitat Key.

8.2.6 Surveys currently planned to be carried out at the Site are:

- Extended Phase 1 Habitats Survey and desk study of refined cable route corridor (estimated Q1 2022).
- Desk study of ecological records from the cable route search area and substation area and their surroundings supplied by the Lincolnshire Environmental Records Centre (LERC) and Nottinghamshire Biological and Geological Record Centre (NBGRC) (Q1 2022).
- Additional early-season breeding bird survey visits of all land within the site boundaries (April-May 2022).
- Six wintering bird surveys of all land within site boundaries (November 2021 to February 2022). Method follows BTO Common Bird Census techniques as informed by http://birdsurveyguidelines.org.
- GCN eDNA survey of all accessible ponds within 250m of site boundaries on third-party land (Mid-April - June 2022).
- Daytime inspections of all buildings within the site boundaries for their potential to support roosting bats (January 2022). Follows Bat Conservation Trust Good Practice Guidelines.
- Spring survey of all water courses and ditches within the site boundaries for water vole and otters (May 2022).

8.2.7 The survey effort and scope presented above reflects what is believed at the time of writing to be appropriate to inform the evaluation of baseline conditions for this project based on our professional judgment. As Ecological Impact Assessment and scoping are iterative processes, the scope may be extended or modified in due course as influenced by emerging survey results as well as through consultation with stakeholders, local planning authorities and nature conservation organisations.

8.2.8 Cable routes will be assessed in the EIA, albeit disturbance will be limited jn extent given the narrow width of cable trench required, that directional drilling is intended to be used wherever possible to cross linear habitat features and the fact that the land will be reinstated following a short construction period. Walkover surveys of final cable routes will be carried out.

Potential Sources of Impact

8.2.9 The following sources of impacts given here to provide context in the scoping assessment may affect the various ecological features and give rise to significant effects. The examples given are not exhaustive.

8.2.10 Chartered Institute of Ecology and Environmental Management (CIEEM) guidance draws a necessary distinction in Ecological Impact Assessment between 'impacts' and 'effects'. An 'impact' is an action resulting in changes to an ecological feature, whereas an 'effect' is the outcome to an ecological feature from an impact. Impacts are discussed here while potential effects and potential options for mitigation are discussed later in this chapter.

Construction Phase

- Habitat Loss and Habitat Change: Limited habitat loss (for example at hedgerows) may occur where access for construction and operation is required where existing field accesses cannot be used or need to be widened. Other examples include clearance to facilitate any permanent hard standing such as foundations or footings. Habitat change will principally be associated with the reversion of arable fields to grassland and other habitats through management, as well as habitat creation where valuable habitat creation opportunities are identified.
- Killing and Injury: Habitat clearance and the actions of plant during construction has the potential to cause direct harm to species.
- Fragmentation: Described by CIEEM as, "The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function". Potentially in combination with habitat loss and habitat change, fragmentation can reduce the function of a habitat as well as impede the ability of a species to disperse and maintain a viable population. Installation of fencing or culverting streams may also cause fragmentation, as well as through excessive light and noise disturbance.
- Disturbance: Pressures or changes in the environment acting on individuals of a species so as to alter their behaviour may arise through noise, movement and vibration during construction operations, as well as increased human presence.
- Pollution and Habitat Degradation: Release of chemical, sediment or dust pollution can interfere with the normal function of habitats and directly harm species, while processes such as erosion, compaction and alteration of soil/water chemical composition cause the degradation of habitat quality. The construction phase risks the release of pollutants through vehicle and plant movement/operation as well the introduction of new materials onto and into the soil. Protection of sensitive features will be important in safeguarding them throughout the life of the scheme.
- Habitat Creation and Enhancement: Beneficial effects are likely to arise from the creation of new woodland, grassland, hedgerow and wetland habitats on site, as well as the enhancement of retained habitats through development-free buffer zones and increased habitat connectivity. Beneficial effects may also be derived from the cessation of cultivation, chemical treatments and soil inputs.

Operational Phase

- Habitat Loss and Habitat Change: Significant impacts from these are not anticipated as operation will be largely benign, unless major unexpected maintenance or repair events are required. Ongoing habitat maintenance will seek to ensure favourable condition and enhancement of all newly created and retained habitat for the life of the scheme. Ecological monitoring will be key to realising this.
- Killing and Injury: Routine operational works are unlikely to give rise to these effects although there is the risk of direct harm to

species from the movement of vehicles around the site, or the trapping of certain species within the fencing or fenced area.

- Fragmentation: The presence of a solar project is anticipated to be habituated to by most species, especially with the creation of new, and enhancement of retained, habitats. Typical perimeter fencing is not considered to impede the movement of most mammals, although movement of deer is likely to be impacted. Migrating birds and bats may interact with or be perturbed by the surfaces of the solar array so this should be considered.
- Disturbance: Operational disturbance may occur through the routine movement of vehicles and personnel on site, as well as the presence of low-level noise associated with electrical equipment. Light reflection may be another factor.
- Pollution and Habitat Degradation: The risk of these impacts during operation are very low. Good maintenance practice will be key to avoid further pollution events or degradation of adjacent habitats.
- Habitat Creation and Enhancement: Ecological benefits can be maximised through the implementation of a habitat management and monitoring scheme for the life of the development. Beneficial effects may also be derived from the cessation of cultivation, chemical treatments and soil inputs.

Decommissioning Phase

8.2.11 Considering the anticipated 40yr lifespan of the Scheme, the accurate prediction of decommissioning effects is challenging and can only be informed by the legal, policy and conservation constraints and priorities present at the time of application.

- Habitat Loss and Habitat Change: It is assumed that the fields will be able to be returned to agricultural use upon decommissioning, therefore this habitat change will need to be considered, including impacts on any newly created habitats.
- Killing and Injury: As per the construction phase, risks for direct harm to species should be discussed.
- Fragmentation: While the removal of development infrastructure as a reversal of the construction phase is unlikely to result in habitat fragmentation, the reversion to agriculture may impact the habitats and species which have arisen as a result of the Scheme.
- Disturbance: Disturbance impacts are likely to be the same as the construction phase.
- Pollution and Habitat Degradation: Pollution and habitat degradation risks are likely to be the same as the construction phase.

Designated Sites

8.2.12 Statutory and non-statutory sites designated for nature conservation were identified within the desk study and are summarised for each land parcel in Tables 1-2 in Appendix 8.1, which also provides maps showing the relationship between the designated sites and the development parcels. The search radius from each parcel for 'International' designated sites these sites used was 10km; there are also no International designated sites

within 20km of the proposed site for which migratory birds or bats are listed as a qualifying feature. 'National' sites and Local Nature Reserves (LNR) were searched for within 5km. Local sites were searched for within 2km. These search radii are standard distances used in ecological impact assessment for projects of this nature and scale. It is considered unlikely that the Scheme would give rise to impacts on designated sites beyond these ranges. The chosen, standard, search radii are considered to remain appropriate when considering the potential for cumulative impacts from other solar development proposals, (such as Cottam and Gate Burton projects).

8.2.13 Searches for designated sites within the cable route search area will be forthcoming.

Cottam 1

8.2.14 As shown in Appendix 8.1, three non-statutorily designated sites were identified within 2km of Cottam 1. These comprise a length of road verge that supports a diverse range of grassland species, two fields containing a moderately diverse floral assemblage, and a series of road verges with a high species-richness. There is a low chance of habitat degradation impacts associated with pollution events occurring during construction activities, including haulage movements. Impacts will be considered as part of the EIA process.

Cottam 2

8.2.15 No designated sites were identified in proximity to Cottam 2 within the desk study. Therefore no impacts on designated sites are capable of occurring as a result of the proposals.

Cottam 3

8.2.16 As shown in Appendix 8.1, five SSSIs and one LNR were located at least 1.5Km north of the Site. The SSSIs were components of a complex of sites within Laughton Woods and Scotton common which are large, contiguous Forestry Commission woodland sites which contain important habitats and reserves for protected habitats (heathland, wetland, grassland and woodland) and species (reptiles, invertebrates, birds – woodlark, nightjar, and plants). Similarly, the six Local Wildlife Sites (LWSs) given are also associated with the above SSSI sites, overlapping with, or augmenting them.

Priority Habitats

The following Priority Habitats all occur either on at least one of the Sites or cable route search area, or in significant areas within 2km from them and are therefore considered capable of being impacted by the proposals.

Woodland

8.2.17 Woodland cover on the proposed site is sparse and limited to occasional copses, spinnies and shelter belts, although what woodland is present is ubiquitously broadleaved in species composition. The majority of this woodland cover is associated with Cottam 1, as its current management includes a partridge shoot. Relatively larger stands of woodland occur in the local area although these are still discontinuous and linked only by the local hedgerow network. Although no direct loss of woodland is anticipated, indirect habitat degradation impacts through potential construction-phase pollution events or root compaction etc. are a potential risk.

Hedgerows and Hedgerow Trees

8.2.18 The Sites contain a network of approximately 75km of managed hedgerows, roughly half of which contain mature and semi-mature trees. Several hedgerows are considered species rich, although the majority are not and are dominated by blackthorn and hawthorn. A large proportion of the hedgerows also contain a drainage ditch which dries out for a portion of the year. These hedgerow networks often comprise the most important ecological features within the Sites and provide foraging, dispersal and sheltering habitat for a variety of invertebrates, mammals, birds and other species groups. Consequently, the potential for loss, damage and degradation impacts arising from construction as well as ongoing operation will need to be examined, with protection and enhancement measures given.

Arable Field Margins and Notable Grasslands

8.2.19 Uncultivated field margins range between being very narrow or absent (Cottam 2 and 3) to moderately wide (parts of Cottam 1 – 3-7m), although all are predominantly species-poor, thus are not examples of this habitat in a favourable condition. Similarly, the small number of permanent pasture fields were all considered to contain species-poor semi-improved grassland. However, there are a small number of species-rich grassland patches in uncultivated areas at edges of fields or at headlands close to watercourses such as the River Till. These are of greater ecological interest and so the effects of the construction of a Scheme on or near them need to be considered, along with opportunities for their enhancement, where possible.

Rivers

8.2.20 The River Till runs adjacent to Cottam 1, while other minor watercourses and drains are present at Cottam 2 and 3. As mentioned, the hedgerow network often contains associated ditches, some of which contain water for longer periods of time and so contribute to the hydrology and riparian habitats present on and off site. The Corringham, Yawthorpe and Northorpe Becks are located in proximity to Cottam 2 and 3, and along the cable route search area. Consequently, the likelihood of pollution impacts and habitat loss from cabling or culverting, if required, should be determined within the EIA and sufficient mitigation, protection and enhancement given.

Ponds and Standing Water

8.2.21 Waterbodies were very thinly distributed on site with no in-field ponds being present. A small number of ponds are located within scrub and woodland blocks within Cottam 1 and 3, although exclusively outside of the development footprint. These habitats are rare in the local area, often support rare or protected species and are susceptible to pollution and habitat degradation during the construction phase, as well as discharge of pollutants during the operational phase. Measures for their safeguarding and enhancement will be discussed.

Protected and Priority Species

8.2.22 This section outlines the key impacts considered potentially applicable to various protected and priority species. It has been informed by the results of species-specific surveys relating to the Site for Cottam 1-3, as well as the desk study, for which species records within 2km of the boundary of the Site for Cottam 1-3 were obtained. The results of the desk study and several species surveys are contained within Appendix 8.1.

8.2.23 Searches for records of protected and priority species within the cable route search area will be undertaken prior to statutory consultation.

Badgers

8.2.24 Main badger setts were recorded at Cottam 1 and 3, with the majority of activity located at Cottam 1 as it contained, or was adjacent to, the greatest blocks of woodland and scrub. One smaller sett was located at Cottam 3. All setts within the Cottam sites were located at field boundaries.

8.2.25 Badgers may be adversely impacted by the proposed development through loss of habitat in which to build setts, direct harm during construction, disturbance by vehicles and personnel or the compaction of soil around setts. Badgers are likely to benefit from improved abundance of favoured food items within the permanent grassland under the arrays as perimeter fencing is not considered to be a barrier to badger movement. Further benefits include reduced disturbance or habitat degradation due to cessation of agricultural activities and increased sheltering and dispersal habitat cover due to new hedgerow, tree and grassland habitat creation.

Bats

8.2.26 Preliminary survey data analysis indicated that a relatively moderate diversity of species was present across the Sites. The majority of activity was made up of common and soprano pipistrelle, noctule bat and several Myotis species, which was expected. Brown long-eared bat is another relatively common species which featured regularly within the assemblage. Two rarer species featured sporadically and in very low numbers, which were barbastelle and Nathusius' pipistrelle. The Sites are located at the northern edge of the range for these two species. Barbastelle bats are rare and Nathusius' pipistrelle uncommon in Lincolnshire according to the Lincolnshire Biodiversity Action Plan (BAP). It is considered probable that roosts for all the more regularly-recorded species recorded within the dataset occur either in trees within the Sites, or in trees and buildings in proximity to the Sites. Initial fieldwork determined that the quality of habitats for bats across the Sites was generally low, being dominated by monoculture arable and a simple network of managed hedgerows.

8.2.27 While generally not anticipated, any severance of dispersal or foraging habitats, or loss of trees capable of supporting roosting bats, could result in direct harm, population fragmentation and habitat degradation. The installation of panels may impact movements by bats due to the imposition of hard, reflective surfaces into the environment causing disturbance or fragmentation. For similar reasons, the abundance of prey invertebrate species may change. The potential for the installation to emit potentially-disturbing ultrasound should also be examined. Beneficial effects are likely to arise from the increased capacity of grasslands to support flying invertebrates compared to arable thereby improving access to foraging resources. The planting of trees, hedgerows and other new habitats, as well as the enhancement of those being retained, would increase the permeability of the landscape and overall habitat diversity and quality for bats.

Otters and Water Voles

8.2.28 Desk study records indicate otter and water vole presence at a low or moderate density on all Sites and in the local area. Preliminary site survey results show otter presence at Cottam 1 and 3. For water voles, results so far indicate water vole presence at Cottam 1 and 2.

8.2.29 Records are associated with the most permanently wet, and higher quality ditches. There are no major watercourses on any of the Sites, rather intermittently-drying ditches and minor streams/drains with fewer food items than rivers. It is assumed that otters and water voles will be present within the more suitable watercourses at least sporadically through the year, with the likelihood of there being otter holts being low (none have been confirmed so far). However, the River Till lies close or adjacent to Cottam 1 which can be expected to increase the likelihood of a regular presence thereon. Otters and water voles are unlikely to cover open ground, with otters remaining relatively inactive for most of the daylight hours. Both species are restricted to ditch and stream corridors and nearby scrub, thickets and dense vegetation.

8.2.30 Otters and water voles may be impacted through direct harm during any construction activity affecting ditches, watercourses and associated adjacent scrub, hedgerows or woodland habitat. Barriers to movement in the form of severed or blocked/culverted watercourses and linear natural features may cause population fragmentation. Construction activities and, potentially, routine operation and maintenance may cause disturbance to otters within shelter. Riparian habitat quality is at risk of degradation through pollution or physical harm during construction.

Dormice

8.2.31 While dormice receive special legal protection, they are not known to be present in the Lincoln to Gainsborough area and are only very locally distributed in Lincolnshire at all. No records for dormice were revealed by the desk study. Habitats on the Site were considered poor for dormice, being restricted to managed simple hedgerow networks alone. It is highly unlikely that the Site could be functionally linked to any populations of dormice, therefore this species should be scoped out of future assessment.

Other Mammals

8.2.32 Other Priority-Species mammals potentially present on site and capable of being impacted include hedgehog, harvest mouse, polecat and brown hare. Of these, no polecat records were revealed by the desk study and records in Lincolnshire are extremely sparse, with their strongholds being Wales and the west of England. Feral ferret records do exist, increasing the likelihood of polecat being recorded were they present. Therefore, it is considered that polecat should be scoped out of the assessment.

8.2.33 Brown hare are ubiquitous across the site, present in relatively high numbers within the arable fields and field edges. Hedgehogs and harvest mouse have not been seen during site visits but can be assumed to be present at least at low density within the hedgerow, woodland and field margin habitats, with many records of both species present in the desk study data.

8.2.34 Potential impacts on brown hare and hedgehog are only likely to result from any necessary removal of field boundary habitats and temporary disturbance during the construction phase. No ongoing loss of habitat is likely through the operation of the scheme. Harvest mouse may also be affected by the above impact, being a species more of hedgerows, long uncultivated grass, ditch banks and field boundaries, rather than open arable fields. However, the loss of this amount of arable field cumulatively may cause a residual effect on harvest mouse. The perimeter fencing is not considered to be a barrier to movement by these species as confirmed by monitoring at other solar sites.

8.2.35 No deer species receive special legal protection or are considered priority species of conservation concern, however the creation of a perimeter fence is likely to impede their movement through the landscape.

Reptiles and Amphibians

8.2.36 Habitats for reptiles are generally limited in quality and extent across all the Sites, being restricted to hedgerow bases, tussocky field margins and woodland edges. Almost universally, the development will be sited on land of poor habitat quality for reptiles. The desk study data shows a lack of records for reptile species within 2km of the sites, with an absence generally within 250m. The only significant number of reptile records in proximity to the sites are derived from Laughton Forest some 2km north of Cottam 3. The only reptile sighting on site to date was of a single grass snake on the banks of the River Till in Cottam 1.

8.2.37 Great crested newt eDNA surveys of 26 ponds on site have been undertaken which found one positive pond within Cottam 1. Several great crested newt desk study records were derived from the surrounding area. Habitat for great crested newt is localised and limited to the hedgerow and woodland network as well as the limited extent of scrub and uncultivated grassland within the site. The arable fields are considered to be highly suboptimal for this species. Other amphibian species recorded within the desk study included common toad, common frog and smooth newt.

8.2.38 Reptiles and amphibians may be impacted by the proposals through direct harm, habitat degradation and habitat loss should any clearance of hedgerows or other field boundary habitats be required for access or cable trenching, although this is likely to be very limited as the intention is to use existing field accesses wherever possible. Ponds are understood to be retained. Wetland habitats are at a risk of pollution events during construction. The vast majority of the construction phase is considered to impact arable fields which are of very low suitability for amphibians.

Birds

8.2.39 Farmland and woodland birds appear strongly within the desk study data, with species of note such as corn bunting, quail, barn owl and turtle dove as well as waders and raptors. Habitats on site of greatest value to breeding birds were generally restricted to the hedgerows, woodland and any uncultivated field margins, tussocky grassland, scrub and game cover crop. The arable fields and pasture were generally sub-optimal for most species, although some species such as skylark, yellow wagtail and yellowhammer forage within the arable fields, among other habitats.

8.2.40 Following preliminary surveys, species recorded on or adjacent to the site considered most vulnerable to habitat loss and change impacts would be ground-nesting species, principally skylark, lapwing and yellow wagtail as they almost exclusively nest within the arable and cultivated fields and require long, unbroken sightlines for predator avoidance. Their displacement may lead to population fragmentation and increased intra-specific pressures on surrounding arable and grassland habitat. Skylark and yellow wagtail territories were recorded typically regularly across all Sites, while lapwing occurred only sporadically and breeding could not be confirmed.

8.2.41 Other ground nesting species likely to be impacted by reversion from arable habitat include grey partridge and quail, although it is considered that their nest habitat requirements are less particular and are able to

exploit scrub, woodland-edge and field boundary habitats as well as those within an array installation.

8.2.42 Species which breed in field boundary and woodland-edge habitats such as tree sparrow, yellowhammer, linnet, common and lesser whitethroat, reed bunting, and great spotted woodpecker are less likely to be impacted by the proposals beyond any removal of field boundary habitat.

8.2.43 Several birds of prey were noted to breed on site, including barn owl, short-eared owl, little owl, peregrine, hobby and kestrel. Nesting sites of these birds are capable of being harmed by certain habitat clearance activities.

8.2.44 Preliminary wintering bird survey results indicate that the Sites are of limited value to winter thrushes and potentially negligible value to waders and wildfowl, while numbers of meadow pipit and skylark persist in the fields for cover and foraging purposes.

Invertebrates

8.2.45 At Cottam 1, records of 27 species of notable invertebrate species (three butterfly and 24 moth species), were revealed by the Desk Study. All species were recorded beyond 250m of the Site boundary. No invertebrate records within 2km of Cottam 2 were present in the Desk Study. The only records of invertebrates given within 2km of Cottam 3 were of hazel pot beetle, wall butterfly and two moth species all between 500m and 2km north of the Sites.

8.2.46 The only invertebrate species to feature on the Lincolnshire BAP is white-clawed crayfish. This species is restricted to a 27km stretch of the upper River Witham, in south Lincolnshire near Grantham, and in three river catchments in western Nottinghamshire (Erewash, Leen and Maun) significantly distant from Cottam 1.

8.2.47 The principal habitats present at the Sites, arable fields and species-poor semi-improved grassland, along with managed and minor hedgerows, ditches streams, are not considered to be of special conservation value for invertebrates or likely to support notable communities of invertebrate species. Considering their often regular maintenance in the form of trimming and dredging, together with overspray and run-off of pesticides and other treatments, the network of boundary hedgerows, margins and drainage ditches which make up the remainder of the site are most likely to support only common invertebrate assemblages typical of the local arable farming landscape. Furthermore, the nature of the proposals are such that these habitats will be retained by and large in their entirety, with development activities taking place within the fields and away from these habitats. Indeed, further avoidance measures will be put in place to minimise risks of pollution or habitat degradation at field boundaries for a variety of species groups. The mitigation anticipated to be required to avoid and minimise impacts on bats, otters and water voles, reptiles and amphibians and birds (see Section 8.4) has significant, if not complete overlap with habitats utilised by invertebrates. Taking these factors into account, it is not considered necessary to conduct detailed field survey for terrestrial or aquatic invertebrates. However, given the potential for benefits to invertebrate fauna within these habitats and beyond from the cessation of intensive agriculture and habitat enhancement at field margins and habitat creation under the panels and elsewhere, invertebrates should remain within the scope of the assessment.

Plants

8.2.48 Only one notable plant species occurs within the desk study data which was bluebell, in proximity to Cottam 1 and 2. Greater water parsnip appears on the Lincolnshire BAP but has not been recorded on or near the site.

8.2.49 The habitats on site are considered typical in diversity and quality for their surroundings, resulting from highly managed farming practises and management. Some hedgerows and patches of uncultivated grassland may be of elevated interest above others on site, however it is considered unlikely that notable botanical communities are present within them. Indeed, none have been recorded by the experienced surveyors who have been regularly surveying the site. These habitats will be retained undeveloped and protected as part of the Scheme, and will be enhanced through favourable management in the absence of the farming practices, including cultivation, herbicide and chemical treatments which have hitherto dominated. The botanical diversity of the retained habitats and those within the developed areas where the solar array and energy storage facility and substation will be built stands to gain. Furthermore, the assessment of effects upon individual habitats is considered to be a more appropriate and proportionate method which would encompass an assessment of botanical effects. For these reasons, it is considered that no specific botanical communities survey is necessary, although due to the likely benefit to floral diversity this species group should remain within the scope of the assessment.

Fish

8.2.50 A small number of records of European eel, barbell and spined loach derived from the waterways close to Cottam 1 and 3 occur within the desk study data which are priority species. While these waterways do not form part of the Sites themselves, the Sites and cable route search area lie within the catchment for them and contain drains or streams which flow downstream into this catchment zone. The only source of potential impacts on these species may be from pollution events during construction, although it is considered that these would have to be of a high severity or duration to cause significant impacts, which is thought unlikely due to the avoidance precautions which will be taken to safeguard wetland environments. Furthermore, the cable installation process, which is likely to be required to cross underneath these rivers as well as the Trent, will utilise directional drilling methods which does not risk any direct harm or emissions into these watercourses. Consequently, it is considered that fish species should be scoped out of the assessment.

8.3 Assessment Methodology

8.3.1 The standard approach applied in the UK to Ecological Impact Assessment (EcIA) is that developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) in 2018 and revised in 2019[15]. This methodology will be used to evaluate existing conditions, and to assess the significance of likely effects on ecological features that may arise during construction, operation and decommissioning of the Scheme. This involves determining the relative importance of each ecological feature and undertaking an impact assessment pre and post-implementation of mitigation measures. From this, any residual effects likely to occur can be identified along with an appreciation of their significance.

[15] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. CIEEM, Winchester.

Baseline Evaluation

8.3.2 When evaluating the baseline biodiversity importance of natural features found on the site (those listed in 8.1.2), the following characteristics are considered:

- Animal or plant species which are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems which provide the habitats required by the above species;
- Species that are afforded legal protection;
- Endemic or locally distinct sub-populations of a species;
- Habitat diversity, connectivity and/ or other synergistic associations;
- Priority Species and Habitats under the Environment (Wales) Act 2016;
- Notably large populations or concentrations of animals considered uncommon or threatened in a wider context;
- Plant communities that are considered to be typical of valued natural/ semi-natural vegetation types;
- Species at the edge of their range; and
- Species-rich assemblages of plants or animals.

8.3.3 Habitats, species and sites identified in the baseline conditions will all be attributed with an ecological importance. The importance or potential importance of an ecological feature will be described in a geographical context (i.e. International, National, Regional, County, District and Local importance). Furthermore, a category of 'Site' importance will be applied to a feature which is present or potentially present at the site, but where the importance to nature conservation of the feature is of relatively low value in the context of the wider landscape. A further 'Negligible' category will be assigned to features of no particular intrinsic nature conservation importance.

8.3.4 In line with the guidelines set out by CIEEM, the impacts of the Scheme will only be assessed on those Important Ecological Features (IEFs) with importance equal to, or higher than Local level, or where mitigation is required for non-IEFs where it is necessary to ensure legal compliance. Habitats or species which are present for which there may be a potential breach of legislation will be considered to be IEFs, even if the feature itself is not considered to be of significant intrinsic nature conservation importance. Non-statutory designated sites will also be identified as IEFs where these lie within the Zone of Influence of the project.

8.3.5 Published selection criteria, contained within the selection of Biological Sites of Special Scientific Interest (SSSI), can also be referred to aid the assessment of importance. Where significant habitats, such as Ancient Woodland, do not carry a designation, these are nevertheless considered at a specified geographic level.

Characterisation of Impacts

8.3.6 When assessing the impact of the development and impacts on baseline conditions, predictions will be made which focus solely on the Zone of Influence for each IEF in the context of the lifetime of the development. The Zone of Influence will be assessed separately for each individual feature. Features considered when defining the Zone of Influence of the Scheme on each IEF include the vulnerability of sites and habitats to the effects of construction and operation of the array, the mobility of species both on and surrounding the site, the sensitivity of species to noise and disturbance, the impacts on transient or migratory species and the importance of any particular species or habitats as keystone features within local ecological networks.

8.3.7 Each potential impact on an IEF will be assessed at its respective geographical scale. Where appropriate, the following parameters will be used in characterising effects:

- Positive or Negative (whether the impact will have a Positive or Negative effect);
- Magnitude (the size of the impact);
- Extent (area over which impact occurs);
- Duration (time impact expected to last before recovery);
- Reversibility (an impact may be permanent or temporary); and
- Timing and frequency (impact may be seasonal e.g. bird nesting season).

Application of The Mitigation Hierarchy and Biodiversity Net Gain

8.3.8 The stepwise approach avoidance, mitigation and compensation will be followed when reducing potential impacts.

8.3.9 Negative impacts can be avoided through fundamental scheme design choices, such as which fields to include within the final scheme and the extent of the final development site boundary. Avoidance of impacts can also be part of the mitigation package, such as the imposition of protective buffer zones from sensitive features kept free of all development activity. A distinction is made between avoidance undertaken in deciding the fundamental size and location of the scheme and avoidance undertaken in the mitigation process when designing the detailed scheme (such as fencing and buffer zones). Fundamental avoidance is included in the characterisation of impacts 'pre-mitigation', while all other measures are taken into consideration when characterising impacts in the light of proposed mitigation.

8.3.10 Mitigation measures are typically given where likely adverse impacts are identified upon the IEFs. The mitigation measures will aim to reduce the overall impact value, typically at the location at which the impact occurs. An assessment of residual effects which takes account of the proposed mitigation is then made. Due consideration is given to the reliability of mitigation measures and the likelihood that they will achieve their stated goals, using the terms defined above.

8.3.11 Mitigation measures are also identified for species which did not qualify as IEF but which are afforded legal protection under the Wildlife and Countryside Act (1981) or other legislation, and as such will require certain precautionary methodologies to avoid offences being committed.

8.3.12 Compensation measures may be appropriate for IEFs which are likely to experience significant effects once mitigation options have been exhausted. Compensation measures seek to offset these residual effects, for example through the provision of alternative habitat either elsewhere within or outside of the scheme boundary. An examination of the uncertainty in achieving successful compensation will take place. Finally, any remaining residual effects can then be assessed.

8.3.13 Ecological monitoring is likely to form a key role in the success of any proposed mitigation or compensation measures.

8.3.14 Ecological enhancement measures are those which are not expressly required in order to deliver mitigation or compensation but are included to provide further benefits for nature conservation. The Environment Act 2021 contains provisions that require that at least a 10% net gain for biodiversity be demonstrated through a Biodiversity Net Gain assessment (using Defra's Biodiversity Metric 3.0 or later). It is noted that these provisions are not currently in force for NSIPs, however, a Biodiversity Net Gain assessment will form part of the ES chapter.

Assessment of Residual Effects and Significance

8.3.15 Following the methodology described by CIEEM, an ecologically significant effect is defined as "*an effect that 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*".

8.3.16 In line with CIEEM guidance, significance of residual effects will be described as being 'significant' or 'not significant'. As CIEEM guidance discourages the use of the matrix approaches to assign categories (e.g. minor, moderate, major) to residual effects, 'significant' residual effects will be qualified with reference to the appropriate geographical scale at which the effect is considered to be felt.

Cumulative and In-Combination Effects

8.3.17 In-construction, consented or emerging proposals of sufficient size, scale and development nature to cause or increase effects upon IEFs in combination with the Scheme will be examined. Cumulative effects may be additive or synergistic and result from individually non-significant but collectively significant impacts. Implications for further mitigation or compensation will be considered, as well as changes to any likely residual effects. This includes, principally, the associated proposal for the West Burton Solar Project as well as the Gate Burton Energy Park.

8.3.18 Please refer to Section 2.0 within this Scoping Report for information regarding the process for establishing which schemes will form part of this assessment.

8.3.19 The cumulative impacts arising from the Scheme will be assessed in combination with other relevant development. The list of cumulative developments to be considered will be compiled in consultation with stakeholders.

8.3.20 Identification of any effects on ecological receptors in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

Legislation, Policy and Guidance

8.3.21 Key national legislation relevant to biodiversity and nature conservation which will inform the assessment process includes:

- The Environment Act 2021;
- The Conservation of Habitats and Species Regulations 2017 (as amended);
- The Wildlife and Countryside Act 1981 (as amended);
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Countryside Rights of Way Act 2000;
- The Protection of Badgers Act 1992; and
- The Hedgerows Regulations 1997.

8.3.22 Key planning policy relevant to biodiversity and nature conservation which will inform the assessment process includes:

- The National Planning Policy Framework Section 15; and
- Central Lincolnshire's Local Plan (adopted 2017).
- Bassetlaw Core Strategy (2011)

8.3.23 Key guidance relevant to biodiversity and nature conservation which will inform the assessment process includes:

- Natural England Standing Advice regarding Protected Species
- Lincolnshire Biodiversity Action Plan
- Nottinghamshire Biodiversity Action Plan.
- Biodiversity Opportunities Mapping for Lincolnshire
- Nature Recovery Strategy for Lincolnshire
- Defra's Biodiversity Metric v3

8.4 Potential Mitigation, Enhancement and Residual Effects

8.4.1 This section outlines some of the principal methods to be employed in order to avoid or minimise potential adverse impacts as far as possible and to achieve legal and policy compliance.

Designated Sites

8.4.2 The Sites and cable routes will be sited so as to avoid any direct loss or harm to any protected sites.

8.4.3 Ensuring retention and protection of watercourses, hedgerows and woodland edges and through development-free buffers, together with replacement of any habitat lost for access or cabling will ensure indirect impacts to bird species at nearby designated sites are avoided.

8.4.4 Pollution events and degradation of habitats at designated sites adjacent or near to the site can be avoided and minimised by controlling the haulage routes and access points used between and within the Sites, as well as good practice when using and storing plant and fuels. This can be assured through the implementation of a Construction Environmental Management Plan (CEMP) and Traffic Management Plan.

8.4.5 Development-free buffers to protect retained field-boundary habitats will be implemented throughout construction and maintenance to minimise any pollution or habitat degradation effects further.

8.4.6 Several Local Wildlife Sites are located in proximity to the Sites (Cottam 1 and 3) as well as the cable routes. Many of these sites are in unfavourable condition and opportunities for their enhancement through ongoing sympathetic management, planting and monitoring will be investigated.

8.4.7 Residual effects on these sites are considered likely to be neutral and/or non-significant, with considerable scope for significant beneficial effects.

Priority Habitats

8.4.8 Impacts on all priority habitats can be expected to be avoided except in potentially a very small number of cases where a vehicular access point or cable route through, for example, a hedgerow will be necessary as none already exists. Even in these cases, the location will be chosen to minimise impacts on habitats as far as possible, by retaining hedgerow trees or avoiding hedgerows with ditches, for example.

8.4.9 Cable installation will utilise directional drilling techniques at a depth beneath any roots or channels wherever possible, thereby avoiding above-ground disturbance.

8.4.10 Undeveloped buffer zones will be maintained around all priority habitats to avoid habitat degradation such as root compaction or direct damage and these will also minimise the risk of any pollution events affecting them due to the distances between habitats and the development zone. The CEMP will detail responsible best practice to be adopted during construction.

8.4.11 Opportunities for ecological habitat enhancement and creation (BNG) will be explored with reference to and consultation with key stakeholders including the Greater Lincolnshire Nature Partnership, the Biodiversity Opportunities Mapping and the emerging Nature Recovery Strategy to identify the most pertinent and valuable habitat creation options.

8.4.12 Significant new hedgerow and tree planting is anticipated as well as the adoption of hedgerow and tree management with the aim of improving height and/or form of these features in a departure from typical agricultural management. Opportunities for the reinstatement of historical hedgerows will be explored as well as the choice of locally-appropriate tree and shrub species.

8.4.13 All existing areas of uncultivated and un-grazed grassland will be retained with the intention of maintaining or creating a variety of diverse and valuable grassland habitats. This includes tussocky grassland, meadow and scrub-grassland matrix. The imposition of undeveloped buffer zones will allow the expansion and diversification of grassland within existing arable field margins.

8.4.14 Opportunities will be taken to diversify grassland habitat beneath the arrays through the use of cutting rather than grazing to create meadow habitat.

8.4.15 Opportunities for the creation of wetland habitat such as ponds and reedbeds will be explored where ground conditions and topography allow, while targeted positive management of ditches and their banks can improve the biodiversity within them.

8.4.16 Residual effects on these habitats are considered likely to be neutral and/or non-significant, with considerable scope for significant beneficial effects.

Protected and Priority Species

Badgers

8.4.17 Unlawful disturbance of badgers and damage to their setts will be ensured through repeated investigation of the site for new badger setts and the avoidance of them through development-free exclusion zones for the life of the scheme.

8.4.18 Badgers are likely to benefit from improved abundance of favoured food items (earthworms and soil invertebrates) within the permanent grassland under the arrays as perimeter fencing is not considered to be a barrier to badger movement. Further benefits include reduced disturbance or habitat degradation due to cessation of agricultural activities and increased sheltering and dispersal habitat cover due to new hedgerow, tree and grassland habitat creation.

8.4.19 Residual effects on badgers are considered likely to be neutral, with scope for significant beneficial effects.

Bats

8.4.20 Any tree or building considered potential roost habitat will be fully investigated for bats should impacts upon them be likely. All necessary steps to avoid impacts will be taken including, as a last resort, licensed mitigation and compensation.

8.4.21 Undeveloped buffer zones, the width of which will be informed by assessments of habitat quality and roost potential investigations will ensure linear natural features remain accessible to bats.

8.4.22 Beneficial effects are likely to arise from the increased capacity of grasslands to support flying invertebrates compared to arable land, thereby improving access to foraging resources. The planting of trees, hedgerows and other new habitats, as well as the enhancement of those being retained, would increase the permeability of the landscape and overall habitat diversity and quality for bats.

8.4.23 Residual effects on bats are considered likely to be neutral and/or non-significant, with scope for beneficial effects, although the potential disturbance or fragmentation caused by the introduction of hard surfaces requires further investigation and research.

Otters and Water Voles

8.4.24 Otter and water vole habitat will be retained undisturbed wherever possible. Incursion into hedgerows or ditches are anticipated to be very rare. Directional drilling will avoid harm to these species and their habitats. Targeted further investigation and supervision by an ecologist immediately prior to and during any such work will be undertaken.

8.4.25 Undeveloped buffer zones will be implemented around all potential otter and water vole habitat, the width of which will be informed by habitat suitability classifications derived from site surveys.

8.4.26 Otters and water voles stand to gain from the cessation of agricultural inputs and chemical treatments running off into water courses, as well as from the creation of new wetland, hedgerow, ditch or dense grassland habitats for foraging, dispersal and shelter.

8.4.27 Residual effects on these species are considered likely to be neutral and/or non-significant, with scope for beneficial effects.

Other Mammals

8.4.28 Disturbance effects on mammals such as brown hare and hedgehog are possible, especially for brown hare which are more mobile and venture further away from field boundaries, however these will be largely temporary. Habitat loss and direct harm will be avoided by retaining boundary habitats in situ and any access clearance will be supervised by an ecologist to look for such species and minimise any potential harm during works. Undeveloped buffer zones will ensure ongoing habitat degradation or disturbance is minimised.

8.4.29 Brown hare have been seen to occupy active solar arrays in good numbers and potentially stand to gain from the increase in cover and shelter associated with the array. The same is potentially true for hedgehog. The increase in habitat diversity, height and width at field boundaries is likely to be of benefit to these species, including harvest mouse and largely or completely offset the loss of any use of arable fields by them.

8.4.30 Residual effects on these species are considered likely to be at least neutral and/or non-significant. A residual adverse impact on deer is anticipated through the creation of a perimeter fence. Options for improving the permeability of the fencing by deer will be explored.

Reptiles and Amphibians

8.4.31 Habitat for reptiles and amphibians will be safeguarded from pollution, harm and degradation through imposition of undeveloped buffer zones from field boundaries, the width of which will be informed by the presence of such species and the quality of habitat for them. In any cases where incursion is necessary for access etc., ecological supervision and prior investigation will be undertaken.

8.4.32 The diversity and quality of field margin, grassland, ditch, pond and hedgerow habitats will be improved through the cessation of agricultural practices as well as the ecologically-led management of retained habitat. This includes the increase in undeveloped field margins and management of long, tussocky grassland which will benefit these species in terms of sheltering, dispersal and foraging opportunities.

8.4.33 Residual effects on these species are considered likely to be at least neutral and/or non-significant.

Birds

8.4.34 Impacts on the majority bird species, including many priority species will be avoided through the retention of nesting and foraging habitat at field boundaries and creation of undeveloped buffer zones.

8.4.35 Ground nesting birds, particularly skylark, yellow wagtail and lapwing are likely to be displaced to a significant degree in terms of nesting habitat. Mitigation measures include the management of retained fields and margins as set-aside habitat which is highly productive for skylark and yellow wagtail, or open grassland for both nesting and foraging purposes. It is possible that adverse effects will not be able to be fully mitigated, therefore options for the provision of compensatory nesting habitats elsewhere will need to be explored.

8.4.36 Other ground nesting species such as grey partridge and quail can be expected to receive some adverse residual effects but, due to their broader or more flexible habitat requirements, these are not likely to be significant.

8.4.37 Many species of birds stand to benefit significantly from the reversion of arable to grassland with the attendant rise in invertebrate food abundance and diversity of grassland habitats. Sympathetic management of field boundary features is likely to improve habitat quality for many birds, including tree sparrow, yellowhammer, whitethroat and linnet. Foraging opportunities for birds of prey such as barn owl are likely to improve as the abundance of small mammals within grasslands increases. Habitat creation options, including the planting of trees and the creation of greater extents of low-input and less-intensively managed grassland stands to benefit key species such as turtle dove.

Invertebrates

8.4.38 Habitats of particular interest to invertebrates on site are the hedgerows, woodland edges, ditches, streams and areas of uncultivated grassland, all of which will be retained undeveloped save for what is anticipated to be a very small minority of locations where access is required to be created. Habitat degradation and pollution events are unlikely given the nature of the proposals and general absence of hazardous materials during construction, and will be further minimised through the adoption of undeveloped buffer zones throughout construction and operation.

8.4.39 Terrestrial and aquatic invertebrate communities on site stand to benefit from the cessation of agricultural practices and addition of chemical treatments, as well as the anticipated sympathetic management of retained habitats. An ecologically-led habitat creation and management plan will seek to increase the dimensions, form and diversity of hedgerows, as well as the quality of ditches and field margins. New grassland habitats within the array footprints will supply newly available nectar sources and vegetation for shelter and different invertebrate life stages.

8.4.40 Residual effects on these species are considered likely to be at least neutral and/or non-significant.

Plants

8.4.41 The hedgerows, woodland edges, wetland habitats and uncultivated grassland patches will be retained throughout the development save for the aforementioned small minority of potential access locations. Botanical diversity in terms of species and habitats is anticipated to increase through the cessation of agricultural practices and the adoptions of an ecologically-led management plan for the duration of the scheme. The management plan will see new grassland habitats created for their ecological potential within the arrays as well as new hedgerows, trees and wetland habitats created elsewhere.

8.4.42 Residual effects on these species are considered likely to be at least neutral and/or non-significant.

8.5 Conclusions on Scoping

8.5.1 The table below summarises the results, in our considered opinion, of the scoping assessment. Please note, while the final assessment within the ES will deal with each likely impact and Important Ecological Feature individually, this table gives a broad indication of the overall residual effects considered likely.

Table 8.1: Likely Overall Residual Effects on Ecological Features

Ecological Feature	Likely Overall Residual Effects	Scoped In / Out
International, National and Local Designated Sites	Likely neutral or beneficial depending on protected site	In
Priority Habitats	Likely neutral or beneficial depending on habitat	In
Badgers	Likely neutral or beneficial	In
Bats	Likely neutral or beneficial according to current research	In
Otters and Water Voles	Likely neutral or beneficial	In
Dormice	n/a	Out
Other mammals	Likely neutral or beneficial	In
Reptiles and Amphibians	Likely neutral or beneficial	In
Birds	Likely neutral or beneficial for most species. For skylark, yellow wagtail and lapwing, there remains the potential for significant adverse effects. For some other species such as quail, grey partridge there remains the potential for non-significant adverse effects.	In
Invertebrates	Likely neutral or beneficial	In
Plants	Likely neutral or beneficial	In
Fish	n/a	Out

9 Hydrology, Flood Risk and Drainage

9.1 Introduction

9.1.1 The Hydrology, Flood Risk and Drainage chapter of the ES will consider the likely significant effects of the proposed development on the local hydrology during its construction, and operation phases. For the purposes of this assessment, the term 'hydrology' includes risks associated with surface water and drainage and further includes an assessment of flood risk from all sources of flooding, namely:

- Tidal (flood risk from the sea);
- Fluvial;
- Surface water;
- Groundwater; and
- Artificial Sources (sewers, reservoirs and canals).

9.1.2 The Site is over 1ha in size and therefore requires a Flood Risk Assessment to support the planning application in line with NPPF guidance. Surface water management is also a key consideration at the Site with regards to both surface water and water quality control.

Appendices

9.1.3 This chapter is supported by the following appendix: :

- Appendix 9.1 Flood Risk Screening Report including site specific reports relating to Cottam 1, 2, 3a and 3b .

9.2 Baseline

The Site and Context

9.2.1 The baseline conditions for each of the sites has been detailed in the Flood Risk Screening Reports included in Appendix 9.1.

9.2.2 The risk of fluvial flooding has been interpreted from the Environment Agency's (EA) online Flood Map for Planning[16]. The risk of surface water flooding has been assessed from the EA Long Term Flood Risk Map (Surface Water)[17].

9.2.3 The Site is situated within both the Anglian and Humber River Basin Management Plan (RBMP) areas. Within the Anglian RBMP the Site is further situated within Witham Management Catchment and within the Humber RBMP the Site is Lower Trent and Erewash Management Catchment. Local land drainage feed into local watercourses several of which are WFD surface waterbodies.

9.2.4 As described in Chapter 4, the Scheme comprises three Sites plus cable routes. At present, the final cable route is yet to be determined and there are 'search areas' for the potential cable route. Only a narrow width within these corridors will be required for the cable route and its construction. The locations of these elements will be refined prior to submission of the DCO application. Therefore, the survey work undertaken for these elements to date is in general less advanced.

[16] https://flood-map-for-planning.service.gov.uk
[17] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

9.2.5 Cottam 1 consists of three parcels (North, South and West as indicated in Figure 1 in Appendix 9.1) and therefore, the assessment of each parcel has been undertaken separately. Furthermore Cottam 1 North and West are further divided into a three further parcels each, as described in the appendices.

Cottam 1 (North)

9.2.6 The EA's Flood Risk Map for Planning indicates that the eastern and western boundaries of Parcel 1 are within the extents of Flood Zone 3. A minor extent of the north-western corner of Parcel 2 is located in Flood Zone 3. Parcel 3 is covered by the extents of Flood Zone 3 in the predominantly in the west and in the southern corner.

9.2.7 Flood Zone 3 defined as land assessed as having a 1 in 100 or greater >1% Annual Exceedance Probability annual probability of river flooding.

9.2.8 Fluvial risk across the Parcels within the Site is associated with a series of land drains and an Ordinary Watercourse to the west of Parcel 3 which is discharges into the River Till (Main River – responsibility of the EA to maintain) approximately 1.7 km south-west of the Site.

9.2.9 The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the Site.

9.2.10 Parcel 1 has High Risk areas associated with some land drains that cross the Parcel is the east and a topographical low point in the west. Parcels 2 and 3 have High Risk areas associated with the route of the River Till. There are multiple flow paths in the surrounding area that flow towards the Site

Cottam 1 (South)

9.2.11 The EA's Flood Risk Map for Planning indicates that the northern, western and a minor portion of the south-eastern extent of the Site are within Flood Zone 3.

9.2.12 Fluvial risk across the Site is associated with the River Till which flows southwards through the Site, the risk extents along some land drains in the north of the Site. The South Spinney/Beck Spinney is an Ordinary Watercourse (responsibility of the LLFA to maintain) and runs along the part of the south-eastern Site boundary.

9.2.13 The EA's Spatial Flood Defences dataset indicates that formal EA Flood Defences are present along the length of the River Till that runs through the Site. The defences are shown as 'embankments' on the dataset which upon inspection of Google Streetview appear to be raised grassy banks. The Standard of Protection (SoP) of the defence is shown as up to the 1 in 10 year event. The upstream crest level of the defence is stated as 7.62 m AOD and the downstream crest level as 7.20 m AOD.

9.2.14 The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the western and eastern extents of the Site. The surface water extents shown on the EA Flood Map concur with the course of the watercourses that run through the west of the Site and along the eastern periphery.

Cottam 2 (West)

9.2.15 The EA's Flood Risk Map for Planning indicates that Parcels 2 and 3 are partially located within Flood Zones 2 and 3 associated with the River which flows in a south-easterly direction through Parcels 2 and 3.

9.2.16 The EA's Spatial Flood Defences dataset indicates that formal EA Flood Defences are present along the length of the River Till that runs through the Site. The defences are shown as 'embankments' on the dataset which upon inspection of Google Streetview appear to be raised grassy banks. The Standard of Protection (SoP) of the defence is shown as up to the 1 in 10 year event. The upstream crest level of the defence is stated as 10.45 m AOD and the downstream crest level as 8.41 m AOD.

9.2.17 The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the Site. Parcel 1 has High Risk areas associated with some land drains that cross the Parcel is the east and a topographical low point in the west. Parcels 2 and 3 have High Risk areas associated with the route of the River Till. There are multiple flow paths in the surrounding area that flow towards the Site.

Cottam 3a

9.2.18 The EA's Flood Risk Map for Planning indicates that the Site is located wholly within Flood Zones 1.

9.2.19 The EA's Long-Term Flood Risk Map indicates that the majority of the Site is at Very Low to Low (<0.1 - 1%) risk of Surface Water flooding. Isolated areas of the Site are at Medium to High Risk (1 - 3.3< % Annual Probability), notably on the north-eastern boundary of the Site for approximately 1 km. This forms a Surface Water flow path, running along the boundary and away from the Site northwards. Other isolated areas of Medium to High Risk on the Site are associated with minor topographic depressions which infill during rainfall events.

Cottam 3b

9.2.20 The EA's Flood Risk Map for Planning indicates that the Site is located wholly within Flood Zones 1.

9.2.21 The EA 'Flood Risk from Surface Water' map (Figure 2) indicates that the Site is largely at Very Low risk (<0.1% annual probability) of surface water flooding. However, there are some small areas throughout the Site which are at Low to High risk (0.1 - ≥ 3.3% annual probability) of surface water flooding; these areas are generally confined to the north-east and south-western extents

Potential and Likely Environmental Effects

9.2.22 The Potential and Likely Environmental Effects relating to Chapter 9 Hydrology, Flood Risk and Drainage as a result of the Scheme comprise the following (during the construction, operational and decommissioning phases):

- Possible surface water pollution during the construction and operational phases;
- Effect on surface water attributes, including water quality;

- Increased on and off-site surface flood risk;
- Impact on the public drainage network (foul and surface water), both in terms of water quality and capacity; and
- Assessment of cumulative and in-combination impacts where relevant.

Legislative and Policy Framework

9.2.23 Legislation and policy specifically relevant to this topic area is outlined below.

European Legislation

9.2.24 The Water Framework Directive 2000/60/EC establishes a framework for community action in the field of water policy. The Water Framework Directive (WFD) seeks to enhance the status of aquatic ecosystems, promotes sustainable water use, and contributes to mitigating the effects of flood and drought. It is a requirement of the WFD that member states classify major rivers and their tributaries in terms of their ecological status with reference to biological, chemical and hydro-morphological quality indicators.

9.2.25 The Groundwater Directive (80/68/EEC as amended) addresses the protection of groundwater against pollution caused by certain dangerous substances and places an obligation on member states to prevent pollution of groundwater by substances including hydrocarbons and control the introduction of named metals, including copper.

9.2.26 The Groundwater Daughter Directive (2006/118/EC), the "Daughter Directive" to the WFD, establishes specific measures as provided for in the WFD to prevent and control groundwater pollution. It defines criteria for the assessment of good groundwater chemical status.

9.2.27 The EU Directive on the assessment and management of flood risks [2007/60/EC] (the 'Floods' Directive), came into force late in 2008. The Directive requires member states to develop and update a series of tools for managing all sources of flood risk, in particular:

- preliminary flood risk assessments (PFRAs);
- flood risk and flood hazard maps;
- flood risk management plans;
- co-ordination of flood risk management at a strategic level;
- improved public participation in flood risk management; and
- co-ordination of flood risk management with the WFD.

9.2.28 The Nitrates Directive (91/676/EEC) aims to reduce nitrate concentrations from agriculture entering water systems.

UK Legislation

9.2.29 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 implements the WFD.

9.2.30 The Groundwater (Water Framework Directive) (England and Wales) Regulations 2009 and Groundwater (Water Framework Directive) (England) Direction 2014 transpose the Groundwater Daughter Directive.

The Daughter Directive requirements have been transposed into UK law by the Environmental Permitting (England and Wales) Regulations 2016.

9.2.31 The requirements of the Flood Directive were initially met by the Flood Risk Regulations 2009, which was consolidated into the Flood and Water Management Act 2010. The Flood and Water Management Act (2010) clarifies responsibilities for land drainage and flood risk management and transfers some key responsibilities to local authorities.

9.2.32 The Water Resources Act 1991 (and Land Drainage bylaws) require the prior written consent of the EA for any works or structures, in, over under or within 8 metres of any watercourse designated as a 'main river'.

9.2.33 The Nitrates Directive is implemented by the Nitrate Pollution Prevention Regulations 2015, which include:

- a requirement to designate Nitrate Vulnerable Zones (NVZs);
- a requirement to plan nitrogen applications on agricultural land;
- the setting of limits on nitrogen fertiliser applications;
- the establishment of closed periods for spreading; and
- controls on the application and storage of organic manure.

9.2.34 The Land Drainage Act 1991 places responsibility for maintaining flows in watercourses on landowners. Classified watercourses maintained by the EA are termed "Main Rivers." The EA has powers to control works in, over, under, on the banks of, within 7 to 10m of the top of the bank of the river, and of all floodplain areas through the issuing of Land Drainage Consents.

9.2.35 The EA is responsible for assessing farmers' compliance with measures in NVZs.

National Planning Policy

9.2.36 The revised National Planning Policy Framework (NPPF) was last updated on 20th July 2021 (superseding the original NPPF published in 2012 which superseded the Planning Policy Statement 25 (PPS25)) along with previous updates in 2018 and 2019. It is supported by the National Planning Practice Guidance (NPPG), which is a 'live' document.

9.2.37 The NPPF seeks to ensure that climate change is considered for long term factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape. New development should therefore be planned to avoid increased vulnerability to the range of effects arising from climate change. Where new development is brought forward in areas which are vulnerable to the range of effects arising from climate change, care should be taken to ensure that flood risk can be managed through sustainable adaptation measures.

9.2.38 In relation to flood risk, inappropriate development in areas at high risk of flooding should be avoided by directing development away from areas at the highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere and considering the effects of climate change.

9.2.39 NPPF states that a Site-specific Flood Risk Assessment (FRA) is required for the following scenarios:

- Proposals of 1 hectare or greater in Flood Zone 1;
- All proposals for new development in Flood Zones 2 and 3;

- Proposals in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the EA, and
- Any Proposed Development or a change of use to a more vulnerable use, on land in Flood Zone 1 which may be subject to other sources of flooding.

National Standards for Sustainable Drainage Systems (2015)

9.2.40 The National Standards for Sustainable Drainage Systems published by DEFRA set out the technical standards, which are non-statutory, to be utilised in conjunction with the NPPF and associated NPPG.

Non-Statutory Technical Standards for Sustainable Drainage (2015)

9.2.41 LASOO (Local Authority SuDS Officer Organisation) published the Non-Statutory Technical Standards for Sustainable Drainage in 2015, this establishes the principles for considering sustainable drainage at a planning stage to include:

- Layout;
- Density;
- Site Access;
- Topography;
- Ground Conditions, and
- Discharge Destination.

The Water Resources Act (1991)

9.2.42 Under the Water Resources Act 1991 (Section 85) it is an offence to cause or knowingly permit poisonous, noxious, or polluting matter, or any solid waste matter to enter controlled waters (which include rivers). The consenting regime for discharges to controlled waters is set out in the Environmental Permitting (England and Wales) Regulations 2016.

The Flood and Water Management Act (2010)

9.2.43 The Flood and Water Management Act 2010 intends to provide better, more comprehensive management of flood risk for people, homes and businesses. In particular, it encourages the uptake of sustainable drainage systems by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt Sustainable Drainage Systems (SuDS) for new developments and redevelopments.

EU Floods Directive and the Flood Risk Regulations (2009)

9.2.44 The Flood Risk Regulations 2009 transpose the EU Floods Directive into law in England and Wales. The EU Floods Directive aims to provide a consistent approach to flood risk management across all of Europe. Under these Regulations, there are a series of requirements which take place as part of a six-year cycle in the following order:

- At the beginning of the cycle, Lead Local Flood Authorities (LLFAs) need to prepare or review their Preliminary Flood Risk Assessment (PFRAs) to determine and identify Flood Risk Areas. Then LLFAs have a duty to prepare or review their flood hazard and flood risk maps for each of their Flood Risk Areas;

- By the end of the cycle, LLFAs must prepare flood risk management plans in order to manage significant flood risk in their Flood Risk Areas. These flood risk management plans should set objectives for flood risk management and outline measures for achieving these objectives; and
- PFRAs, flood hazard and flood risk maps, and flood risk management plans are published by the EA.

Building Regulations Part H

9.2.45 Buildings Regulations Part H provide guidance in terms of foul drainage, wastewater treatment systems and cesspools, rainwater drainage, building over sewers, separate systems for surface water and foul waste disposal.

9.2.46 In relation to flood risk, Buildings Regulations Part H sets out a hierarchy of where surface water should discharge. This hierarchy should be followed where practicable and is listed below.

9.2.47 Infrastructure protocol states that a designer should consider the following in order of preference before finalising a surface water design statement for the development.

- Discharge to SuDS devices, e.g. an adequate soakaway or some other adequate infiltration system;
- Discharge to a watercourse or where this is not reasonably practicable, and
- Discharge to a public sewer network.

Local Planning Policy

9.2.48 The Scheme crosses two administrative county boundaries Lincolnshire and Nottinghamshire and two administrative district boundaries West Lindsay and Bassetlaw. The following local policies are relevant to this topic sheet.

West Lindsey District Council

9.2.49 The West Lindsey Local Plan (First Review) was adopted on 19 June 2006 and formally replaced by the Central Lincolnshire Local Plan on 24th April 2017.

9.2.50 The Central Lincolnshire Local Plan 2012-2036 was adopted by the Central Lincolnshire Joint Strategic Planning Committee (CLJSPC) on 24th April 2017, and it now replaces the Local Plans of the City of Lincoln, West Lindsey and North Kesteven District Councils. The Local Plan includes several relevant policies including; Policy LP14 (Managing Water Resources and Flood Risk), and LP20 (Green Infrastructure Network).

Bassetlaw District Council

9.2.51 Bassetlaw District Council formally adopted its Core Strategy & Development Management Policies DPD (Core Strategy for short) and Local Development Framework Proposals Map on 22 December 2011. The document includes policy DM12 (Flood Risk, Sewerage and Drainage) relevant to this topic sheet.

9.2.52 Bassetlaw District Council are currently consulting on the Draft Bassetlaw Local Plan 2020 – 2037. The draft local plan includes the following policies relevant to this topic paper, Policy ST51 (Renewable Energy Generation), Policy ST52 (Flood Risk and Drainage) and Policy ST53 (Protecting Water Quality and Management).

Lincolnshire County Council SuDS Guidance

9.2.53 The Lincolnshire County Council 'Sustainable Drainage Design and Evaluation Guide' was produced to facilitate 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 Assessment Methodology

Assessment Process

9.3.1 An initial desktop analysis of the available data has been undertaken to inform this scoping study. Further data will be collected as part of a Flood Risk Assessment (FRA) report. The assessment should identify and assess the risks of all forms of flooding to and from the proposed scheme and demonstrate:

- Identify and evaluate the significant effects and receptors at risk.
- Consultation with the Environment Agency, Lead Local Flood Authority, IDB and other stakeholders.
- Whether the proposed scheme is likely to be affected by current or future flooding from any source.
- Whether it will cause increased flood risk elsewhere.
- Whether the measures proposed to deal with these effects and risks are appropriate.
- Completion of the Sequential Test and, if required, the Exception Test.
- Sustainable Drainage Systems (SuDS) will be examined for mitigating the increases in site runoff. Requirements for this will be determined with consultation with the Environment Agency and Lincolnshire County Council as Lead Local Flood Authority.

9.3.2 A hydrological assessment will be undertaken to establish local drainage catchments and overland flow routes. The Hydrology, Flood Risk and Drainage ES Chapter will include a review and summary of relevant legislation and national, regional and local planning policy relevant to the water environment. Assessment in the form of a drainage assessment in accordance with the CIRIA guidance 'The SuDS Manual C753' will be undertaken by:

- Site visit and hydrological/drainage surveys;
- Baseline hydrological assessment, data acquisition and regulatory consultation;
- Hydrological analysis (considering climate change);
- Sustainable drainage system design; and
- Surface water quality risk assessment & pollution control review.

9.3.3 This chapter will consider potential impacts to the site and the surrounding area over the lifetime of the development and propose appropriate mitigation measures if required. The assessment of the significance of

impact will be informed by the valuation of the watercourse and the magnitude of impact. In line with the DMRB guidance, the magnitude of impact will be determined only for residual impacts following mitigation.

9.3.4 Flood risk and surface water drainage will be summarised in the ES in accordance with guidance in the DMRB Volume 11, Section 3, Part 10 (HD 45/09).

9.3.5 Consultation is required with the Environment Agency, Lincolnshire County Council (Lead Local Flood Authority) and the Internal Drainage Boards (IDB's) to assess the risk from all sources of flooding to and from the proposed development to ensure flood risk is not exacerbated.

9.3.6 The ES chapter will summarise the findings and recommendations of the Drainage Strategy. Recommendations will be made for mitigation measures in order to minimise the potential effects of the proposed development on water quality and drainage. Any residual effects will be identified as well as the potential for relevant cumulative effects associated with any other developments nearby.

9.3.7 A Screening and Scoping WFD Assessment will be undertaken. 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 biological, hydromorphological and physio-chemical parameters. 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.

Approach and Method

9.3.8 As summarised in Tables 9.1, 9.2 and 9.3 magnitude is considered in relation to the potential impact on the receptor with magnitude defined in a range from Negligible to Major. The receptor sensitivity is defined as Low, Medium or High depending on the specific receptor character and its ability to tolerate change. The significance of the effect is defined in relation to both the magnitude of the impact and receptor significance. If the significance of the potential effect is 'Moderate Adverse' or higher, then mitigation measures may need to be considered.

Table 9.1: Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	WFD Classification – Good or High Site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar Site); European Designated salmonid fishery (or salmonid & cyprinid fishery); Important social or economic uses such as water supply, navigation or mineral extraction. Floodplain or defence protecting 1 or more residential properties or industrial premises from flooding.
Medium	WFD Classification: Moderate May be designated as a local wildlife Site. May support a small / limited population of protected species. Limited social or economic uses. Floodplain or defence protecting 10 or fewer industrial properties from flooding.
Low	WFD classification – Poor No nature conservation designations. Low aquatic fauna and flora biodiversity and no protected species. Minimal economic or social uses. Floodplain with limited constraints and a low probability of flooding of residential and industrial properties.

Table 9.2: Methodology for determining impact magnitude

Magnitude of Impact	Examples of Receptor
Major (adverse)	Loss of Protected Area. Pollution of potable sources of water abstraction. Deterioration of a water body leading to a failure to meet Good Ecological Status (GES) under the WFD and reduction in Class (or prevents the successful implementation of mitigation measures for heavily modified or artificial water bodies). Significant potential increase in peak flood level (1% annual probability).
Moderate (adverse)	Loss in production of fishery. Discharge of a polluting substance to a watercourse but insufficient to change its water quality status (WFD class) in the long term. No reduction in WFD class, but effect may prevent improvement (if not already at GES) or the successful implementation of mitigation measures for heavily modified or artificial water bodies. Moderate potential Increase in peak flood level (1% annual probability) .

Magnitude of Impact	Examples of Receptor
Minor (adverse)	Noticeable effect on features, or key attributes of features, on the Protected Areas Register. Measurable changes in attribute but of limited size and / or proportion, which does not lead to a reduction in WFD status or failure to improve. Minor potential increase in peak flood level (1% annual probability).
Negligible	No effect on features, or key attributes of features, on the Protected Areas Register. Discharges to watercourse but no significant loss in quality, fishery productivity or biodiversity. No effect on WFD classification or water body target. Negligible change in peak flood level (1% annual probability).
Beneficial	Improvement on features, or key attributes of features, on the Protected Areas Register. Improvement in fishery production or biodiversity. Improvement in WFD classification or water body target. Potential reduction in peak flood level (1% annual probability).

Table 9.3: Methodology for determining impact magnitude

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

9.3.9 In considering the significance of the effect account is taken of an effect's duration; reversibility and compatibility with relevant environmental policies and standards. Effects can be temporary or permanent. Temporary effects are largely associated with the construction phase and permanent effects are largely associated with the operational phase.

Assumptions and Limitations

9.3.10 The methodology for assessment of potential water resource and flood risk effects has incorporated the following assumptions:

i. That the Scheme will be low impact with access roads and footways surfaced with permeable surfacing and therefore assumed to be effectively permeable;

ii. Any runoff from waste materials would be collected, contained and prevented from direct entry to local water courses;

iii. That all clean roof drainage would be discharged directly to the nearest surface water drainage feature;

iv. Analysis of flood extents is reliant on the accuracy of the published EA Flood Map for Planning and EA flood data. No new hydraulic modelling has been undertaken as part of this study; and

v. Given the Scheme is anticipated to be unmanned, with infrequent attendance for maintenance, on-Site welfare facilities will be limited or non-existent. Therefore, no foul water discharge from the Scheme and no mains connected foul water drainage systems are likely to be necessary. 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.

Mitigation and Enhancement

9.3.11 Potential mitigation measures (where required) will be fully assessed on completion of Flood Risk Assessment, Drainage Strategy, WFD Assessment and Environmental Statement chapters. It is likely that any potential flood risk to the Site will be mitigated by sequentially locating development to areas of lowest risk. Where the flood risk cannot be avoided flood resistance and resilience measures will be utilised. The solar panels themselves can withstand up to 1 m depth of flooding.

9.3.12 Following completion of the Drainage Strategy it will be confirmed that the existing drainage regime of the sites will not be altered. Solar panels will shed water to the undeveloped surface as per the existing situation. Infrastructure such as switches and substations will be surrounded by gravel filled trenches (french drains) to stop horizontal migration of surface waters and promote infiltration, mimicking the existing situation.

9.3.13 Construction stage effects will be managed through a CEMP.

Cumulative and In-Combination effects

9.3.14 Cumulative and In-Combination effects will be assessed as part of the Flood Risk Assessment, Drainage Strategy. In general. local and national policy ensures that the proposed development cannot have a detrimental impact offsite with regards to local Hydrology, Flood Risk and Drainage. Therefore, at this stage the risk of cumulative effects occurring is considered to be negligible.

9.4 Conclusions on Scoping

9.4.1 The following table provides an assessment of the key issues relating to Hydrology, Flood Risk and Drainage and whether they should be scoped in.

Table 9.4: Summary of Assessment Scope

	Impact	Potential Effect	Scoped In / Out
Potential Construction Phase Impacts	Increased contaminated surface runoff volumes due to the stripping of soil, with secondary impacts on flooding	Temporary adverse	In
	Siltation of the nearby water bodies and un-named watercourse during soil-stripping, compound preparation, soil storage and other earthworks, due to loosening of sediment	Temporary adverse	In
	Water pollution from silt-laden runoff (and enhanced nutrient loading of watercourses) if allowed to drain into the un-named watercourse untreated	Temporary adverse	In
	Harm to aquatic ecology if siltation occurs where topsoil sediment contains organic particulates, due to reduced oxygen levels and increased oxygen demand	Temporary adverse	In
	Direct adverse impact upon water quality due to the release of any site substances (e.g. fuel, de-icer) as the result of an accidental spill, leading to harm to aquatic ecology	Temporary adverse	In
	Contamination of groundwater if contaminants are mobilised, pass onto permeable land and percolate down to contaminate the groundwater	Temporary adverse	In
Potential Operational Phase Impacts	Permanent changes to existing drainage patterns and overland flow routes (due to permanent changes in land use) both upstream and downstream. This could increase the surface water flood risk by exacerbating and/or restricting surface water runoff	Permanent adverse	In
	Uncontrolled discharge of surface water runoff from hard standing surfaces could result in temporary localised flooding on the site and in areas downstream	Permanent adverse	In

10 Ground Conditions and Contamination

10.1 Introduction

10.1.1 The chapter will describe potential effects in respect of ground conditions and contamination, arising as a result of the Scheme, including prior to and post mitigation, in with regard to human health impacts and impacts on controlled waters. This assessment and chapter has been produced by Delta-Simons Environmental Consultants Limited.

Appendices

10.1.2 This chapter is supported by the following appendices:

- Appendix 10.1: Delta-Simons Preliminary Geo-Environmental Risk Assessment (PRA) Reports for Cottam 1 (CO1), Cottam 2 (CO2) and Cottam 3 (CO3).

10.2 Baseline

10.2.1 The baseline conditions associated with the soil and groundwater conditions have been obtained from a desktop review (Preliminary Geo-Environmental Risk Assessment (PRA), for CO1, CO2 and CO3 including the identification of the environmental setting, a review of historical and present-day maps and a review of regulatory information. The Environmental setting information has been obtained from a variety of sources including; British Geological Survey (BGS) online data, Environment Agency (EA) data, a Landmark Envirocheck® Report for the assessment sites, Coal Authority (CA) online data and information provided by West Lindsey and Bassetlaw District Councils. Delta-Simons' PRAs for the three development Sites are included as Appendix 10.1 and should be read in conjunction with this chapter.

10.2.2 At present, the final cable route is yet to be determined and there are 'search areas' for the potential cable route. Only a narrow width within these corridors will be required for the cable route and its construction. The cable route will be refined prior to statutory consultation and submission of the DCO application. Therefore, the survey work undertaken for this element to date, is in general less advanced.

Site and Surrounding Area Description

Cottam 1

10.2.3 Cottam 1 consists a series of agricultural fields (Fields A to G as shown in the Preliminary Geo-Environmental Risk Assessment for Cottam 1 at Appendix 10.1) separated by hedgerows, lands drains and occasional trees. The fields are access via existing farm tracks. The Site is centred around the village of Coates.

10.2.4 A number of farmyards, residential dwellings and woodland areas are encompassed by the Site in the southern are northern areas. Overhead electrical powerlines and associated pylons are present across Fields D and E in the southern and western areas.

10.2.5 The surrounding area is predominantly rural agricultural land with the villages of Willingham by Stow, Sturton by Stow and Normandy by Stow to the west, Ingham to the east and Scampton to the south east.

Cottam 2

10.2.6 Cottam 2 consists of a series of agricultural fields separated by hedgerows, lands drains and occasional trees. The fields are access via

existing farm tracks. A farmyard and residential house are present in the central area with associated vehicular access route, adjacent to the Site.

10.2.7 Corringham Beck and Yewthorpe Beck are present along the northern and eastern boundaries, respectively. The surrounding area predominantly comprises rural agricultural land with the village of Corringham to the west.

Cottam 3

10.2.8 Cottam 3 consists of a series of agricultural fields (Fields J and K as shown in the Preliminary Geo-Environmental Risk Assessment for Cottam 3 at Appendix 10.1) separated by hedgerows, lands drains and occasional trees. The fields are access via existing farm tracks.

10.2.9 Field K historically formed Blyton Airfield, prior to reclamation as agricultural land in the 1990's. An access road is present in the southern area of Field K which leads to a hay storage area.

10.2.10 The surrounding area is semirural with agricultural land to the east and south. Commercial properties are present to the north of Field K associated with distribution. The wider former airfield is in use as a motorsport track and driving centre. The village of Blyton is present to the south west.

Geology

Cottam 1

10.2.11 Published British Geological Survey (BGS) data indicates Cottam 1 to be underlain by superficial Till (Diamicton), Alluvium (Clay, Silt, Sand and Gravel), Glacio-fluvial Deposits (Sand and Gravel) and River Terrace Deposits (Sand and Gravel), as follows:

- Field A - Till across the majority of the area with Alluvium in the north west;
- Field B - Till across the majority of the area with Alluvium in the east and west;
- Field C - Till in the south and east with a band of Alluvium running through the central area in an east-west orientation. River Terrace Deposits may encroach along the south western boundary;
- Field D - Till in the south and east with a band of Alluvium in the north east and running through the western area in a north-south orientation. Glacio-fluvial deposits are mapped in the west. No superficial deposits are mapped in some wester and easter areas;
- Field E - No superficial deposits mapped across the majority of the area with a band of Alluvium along the east and northern boundaries;
- Field F - No superficial deposits are mapped across the majority of the area with a band of Alluvium running through the central area in a south east to north west orientation; and
- Field G - No superficial deposits are mapped across the majority of the area with River Terrace Deposits in the south east.

10.2.12 The bedrock is mapped as the Charmouth Mudstone Formation across the eastern areas (Field A, B, C and the majority of D and most eastern area of E) and the Scunthorpe Mudstone Formation (Mudstone and

Limestone) across the western areas (Field F, G, most western area of D and majority of E).

10.2.13 Made Ground is anticipated in the three concrete storage areas, however, is likely to be limited in thickness.

Cottam 2

10.2.14 Published BGS data indicates Cottam 2 to be underlain by superficial Till (Diamicton) across the majority of the Site with superficial Alluvium (Clay, Silt, Sand and Gravel) along the eastern and north eastern area.

10.2.15 The bedrock is mapped as the Scunthorpe Mudstone Formation (Mudstone and Limestone).

Cottam 3

10.2.16 Published BGS data indicates Cottam 3 to be underlain by superficial Till (Diamicton) across the majority of the Site with superficial Glacio-fluvial (Sand and Gravel) deposits along the western boundary.

10.2.17 The bedrock is mapped as the Scunthorpe Mudstone Formation (Mudstone and Limestone). Made Ground is anticipated in developed areas, although is likely to be limited in thickness.

Hydrogeology

Cottam 1

10.2.18 The Environment Agency (EA) classify the superficial Till as a Secondary Undifferentiated Aquifer and the Alluvium, Glacio-fluvial and River Terrace Deposits as Secondary A Aquifers.

10.2.19 Bedrock of the Charmouth Mudstone Formation as Secondary Undifferentiated Aquifer and the Scunthorpe Mudstone Formation is classified as a Secondary B Aquifer.

10.2.20 The EA also indicate that Cottam 1 is not located within a Groundwater Source Protection Zone (SPZ). There are no licensed groundwater abstraction records located within 500 m of Cottam 1.

Cottam 2

10.2.21 The EA classify the superficial Till and Alluvium as Secondary Undifferentiated and Secondary A Aquifers, respectively. Bedrock of the Scunthorpe Mudstone Formation is classified as a Secondary B Aquifer.

10.2.22 The EA also indicate that Cottam 2 is not located within a Groundwater Source Protection Zone (SPZ).

10.2.23 There are three licensed groundwater abstraction records within 500 m of Cottam 2. All of which are located approximately 480 m north east and relate to extraction for use in the petrochemical industry.

Cottam 3

10.2.24 The EA classify the superficial Till as a Secondary Undifferentiated Aquifer and the Glacio-fluvial Deposits as a Secondary A Aquifer.

10.2.25 Bedrock of the Scunthorpe Mudstone Formation is classified as a Secondary B Aquifer. The EA also indicate that Cottam 3 is not located within a Groundwater Source Protection Zone (SPZ).

10.2.26 There are no licensed groundwater abstraction records located within 500 m of Cottam 3.

Hydrology

Cottam 1

10.2.27 There are a series of unnamed land drains across the assessment area and along the boundary.

10.2.28 The River Till is present in the western area and dissects or is present along the Site boundary along Fields D, E and F.

Cottam 2

10.2.29 There are a series of unnamed land drains across the assessment area and along the boundary. Corringham Beck and Yewthorpe Beck are present along the western and eastern boundaries, respectively.

Cottam 3

10.2.30 There are a series of unnamed land drains across the assessment area and along the boundary.

Mining

Cottam 1

10.2.31 Coal Authority data indicates the assessment area is not within a Coal Mining Report Area. As such a Coal Mining Assessment is not required under the planning regime.

10.2.32 There are no BGS recorded mineral sites on or in the immediate area.

Cottam 2

10.2.33 Coal Authority data indicates the assessment area is not within a Coal Mining Report Area. As such a Coal Mining Assessment is not required under the planning regime.

10.2.34 There are no BGS recorded mineral sites on or in the immediate area.

Cottam 3

10.2.35 Coal Authority data indicates the assessment area is not within a Coal Mining Report Area. As such a Coal Mining Assessment is not required under the planning regime.

10.2.36 There are no BGS recorded mineral sites on or in the immediate area.

10.3 Assessment Methodology

10.3.1 The baseline assessment data has been used to develop a Conceptual Site Model as part of the Preliminary Geo-Environmental Risk Assessments (PRAs) for the assessment Site, included as Appendix 10.1.

10.3.2 The underlying principle is the evaluation of pollutant linkages via the Conceptual Site Model in order to assess whether the presence of a source of contamination could potentially lead to harmful consequences. A pollutant linkage consists of three elements:

- A source of contamination or hazard that has the potential to cause harm or pollution.
- A pathway for the hazard to move along/ generate exposure.
- A receptor which is affected by the hazard.

Assessment Process

10.3.3 Following the Preliminary Risk Assessment, the sensitivity and magnitude of impact has been determined by considering the nature of the change, its severity, the duration of an effect, the likelihood of an effect occurring, and the relative extent of the effects of contamination to the receptor. Therefore, the risk assessment has been based on a qualitative assessment and professional judgement. Potential effects in terms of ground conditions tend to be local, therefore, the effects have not been considered in relation to different geographical contexts.

Assessment of Sensitivity

10.3.4 The sensitivity is based on the relative importance of the receptor, as detailed in Table 10.1

Table 10.1: Sensitivity Criteria

Sensitivity	Definition
High	Land to be used for human consumption (e/g agricultural, allotments), highly sensitive ecosystems (eg. SPA, SAC, SSSI, NNR) and the receptor being a public drinking water supply.
Medium	Parks and open spaces, regional or locally sensitive ecosystems and water bodies of medium quality.
Low	Commercial or industrial land uses, low to non-sensitive ecosystems (e.g derelict land and Solar Farms), water bodies of low quality and not a public water supply.

Assessment of Magnitude of Impact

10.3.5 The magnitude of impact on the receptor is detailed in Table 10.2.

Table 10.1: Magnitude of Impact

Magnitude	Definition
High	The proposal will cause the release of large areas of contaminations which are significantly above guideline values or release hazardous contamination for the operational timescale of the develop. Remediation will be required.
Medium	The proposal will cause the release of small areas of contamination close to the guidance values during construction or operational timescale of the development. Remediation may be required.
Low	The proposals will cause the release of contamination that are below the guideline values for short period of time. Remediation will be not required; however, mitigation measures may be used to reduce the potential impact.
Negligible	Contaminants found at very low concentrations. Remediation not required.

10.3.1 The key receptors have been identified as follows: construction workers; third parties during construction (adjacent site users and adjacent residents), future site users including maintenance workers, controlled waters including on and off-Site land drains, adjacent rivers and the underlying aquifers and the built environment (new buildings and infrastructure/utilities).

Environmental Receptor: Construction Workers

10.3.2 Groundworkers may be exposed to contamination through direct dermal contact, ingestion and inhalation. Limited potential sources of contamination have been identified within the PRAs. As such groundworkers are classed as high sensitivity, however the magnitude of impact is considered negligible.

Environmental Receptor: Adjacent Site users and adjacent residents

10.3.3 Adjacent site users may be exposed to comminated soils via windblow dust. Limited potential sources of contamination have been identified within the PRAs. As such adjacent site users are classed as high sensitivity, however the magnitude of impact is considered negligible.

Environmental Receptor: Controlled Waters

10.3.4 Groundwater could become contaminated via the mobilisation of existing contamination during construction, however limited potential sources of contamination have been identified within the PRAs. Controlled waters could also become contaminated via the potential for spillages or leakages of temporary fuels and chemicals during constriction or fires/ damage to the storage batteries and associated subsequent fire ash deposition/ extinguishing fire waters. A such, controlled waters are considered to be of moderate sensitivity and low to medium impact magnitude.

Environmental Receptor: Future Site users and Built Environment

10.3.5 There is a potential for hazardous ground gases to accumulate and migrate into buildings with subsequent asphyxiation or future site users or the potential for explosion. Limited potential sources of ground gas have been identified and the potential for hazardous ground gases to accumulate in proposed solar farm infrastructure is considered very low. As such, future site users are considered to be of high sensitivity, but the impact is considered to be negligible. The built environment is considered to be of moderate sensitivity and negligible impact.

Significance

10.3.6 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the impacts can be positive or negative. The Significance matrix is set out in Table 10.3.

Table 10.3: Impact Significance Matrix

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

10.3.7 Based on the above, the overall significance (using Table 10.3) for each receptor is as follows:

- Construction Workers – Moderate/Minor
- Adjacent site users or residents – Moderate/Minor
- Controlled waters – Minor to Moderate

- Future site users - Moderate/Minor
- Build Environment – Minor

10.3.8 Prior to mitigation, the potential impact for construction, operation, management and decommissioning are of a moderate/minor or minor significance.

Methodology

The baseline conditions associated with the soil and groundwater conditions have been obtained from a desktop review (Preliminary Geo-Environmental Risk Assessment (PRA)), for CO1, CO2 and CO3 including the identification of the environmental setting, a review of historical and present-day maps and a review of regulatory information. The Environmental setting information has been obtained from a variety of sources including; British Geological Survey (BGS) online data, Environment Agency (EA) data, a Landmark Envirocheck® Report for the assessment sites, Coal Authority (CA) online data and information provided by West Lindsey and Bassetlaw District Councils.

10.4 Legislation and Guidance

10.4.1 The main legislation with regards to the clean-up of historic contamination is set out in Part 2A of the Environmental Protection Act (EPA) 1990 (HMSO, 1990). Section 78A(2), EPA 1990, provides the definition of contaminated land for the purposes of Part 2A, which is: 'any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused or there is a significant possibility of such harm being caused; or significant pollution of controlled water is being caused; or there is a significant possibility of such pollution being caused'. In Section 78A (4), EPA 1990, harm is defined as meaning 'harm to the health of living organisms or other interference with the ecological systems of which they form part and in the case of man includes harm to his property'.

10.4.2 The statutory government guidance to Part 2A (DEFRA, 2012), describes the concept of the 'contaminant linkage' in Sections 3.8 to 3.11. A contaminant linkage is formed when there is a linkage between a contaminant source and a receptor by means of a pathway. If any one aspect is missing no linkage is formed. A contaminant linkage which gives rise to a level of risk sufficient to justify a piece of land being determined as contaminated land is termed a 'significant contaminant linkage' with the 'significant contaminant' forming part of a significant contaminant linkage. The guidance also mentions that its broader approach may include using the planning system to ensure land is made 'suitable for use'.

10.4.3 The government website for 'Land affected by contamination', updated in July 2019, provides guiding principles on how planning can deal with land affected by contamination, essentially when a site is not covered by other legislation (such as Part 2A, Building Regulations Environmental Permitting Regulations). As well as causing harm to human health, property and the wider environment, it mentions that land contamination can undermine compliance with the Water Environment Regulations 2017. Guidance is provided as to how to determine if land is contaminated through the use of several recommended data sources (such as River Basin Management Plans, National Land Use Database, Historical Ordnance Survey Maps, Local Planning Authority Records and Natural England's MAGIC site).

10.4.4 In addition to the above, Sections 161 to 161D of the Water Resources Act 1991 gave powers to the Environment Agency to take action to prevent or remedy the pollution of controlled waters. The normal enforcement mechanism is a "works notice" served under Section 161A, which specifies what actions have to be taken and in what time periods. This is served on any person who has "caused or knowingly permitted" the potential pollutant to be in the place from which it is likely to enter controlled waters, or to have caused or knowingly permitted a pollutant to enter controlled waters.

10.4.5 The Environment Agency's 'Managing and reducing land contamination: guiding principles', issued in March 2010 and updated in April 2016, sets out how to undertake a risk assessment focusing on risks to water, how to undertake a remediation options appraisal and how to implement remediation.

10.4.6 This assessment has been undertaken in general accordance with guidance on Land Contamination: Risk Management pages of the GOV.UK web pages, the relevant requirement of the National Planning Policy Framework (NFPP) (as revised 2021)(paragraphs 174 & 183-184) and the Planning Practise Guidance (Land Affected by Contamination).

Mitigation and Enhancement

10.4.7 A Construction Environmental Management Plan will be compiled as part of the DCO application, which will describe the construction related mitigation measures outline below. The plan will clearly set out best practise to ensure any environmental impacts during construction and in terms of land contamination are minimal. No further surveys or investigations are considered to be required.

10.4.8 Limited potential sources of contamination have been identified at the Sites. Site workers will be made aware of the possibility of encountering localised contamination through toolbox talks and good standards of personal hygiene, including welfare facilities on-site and the use of appropriate levels of personal protective equipment (PPE), will be enforced.

10.4.9 Site workers will adhere to health, safety and environmental precautions in order to reduce the potential for any accidents and incidents. A hotspot protocol should be drawn upon to ensure that any contamination identified during construction is assessed by a specialist in land contamination.

10.4.10 Methods will be used to reduce the amount of due, e.g. washing down of vehicle's wheels, dampening down, etc.

10.4.11 Any bulk fuels or chemical used on the construction site should be stored appropriately, within an impervious bund of 100% of the volume of the container in order to reduce the potential for any contamination source in the event of a container failure/ leak of battery fire and associate fire waters. Also, any spillages will be promptly addressed by appropriate measures, such as spill kits.

Cumulative and In-Combination effects

10.4.12 Identification of other developments that may give rise to cumulative effects will be agreed with the relevant statutory bodies and any cumulative effects arising from will be considered and described.

10.4.13 Given modern methods of construction and the low sensitivity end use, there is not considered to be any cumulative effects to human health or

controlled waters. Therefore, the risk of cumulative effects occurring is considered to be negligible.

10.4.14 Identification of any effects on ground conditions in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

10.5 Conclusions on Scoping

10.5.1 Limited potential sources of contamination have been identified from the Preliminary Risk Assessments for Sites CO1, CO2 and CO3. With standard mitigation measures incorporated into the CEMP, at the EIA scoping stage it is considered that any potential impacts will be negligible and it is proposed to scope this topic area out of the ES.

10.5.2 Given that baseline information is not yet available on the cable route search corridor it is proposed to scope these into the ES at this point. If during discussions with statutory consultees it is agreed they can be scoped out then this will be justified in the ES.

10.5.3 The relevant ground conditions reports will be submitted in support of the DCO application in any event.

11 Minerals

11.1 Introduction

11.1.1 The EIA Regulations require consideration to be given to the use of natural resources, in particular land (including land take). In this case the Scheme would occupy a large surface area and consideration needs to be given to the impact this may have on the existing geology and identified mineral resources.

11.1.2 An assessment is required of the relative level of effects likely to arise, primarily based on desk-based surveys, and consider any avoidance and mitigation measures necessary.

Appendices

11.1.3 This chapter is supported by the following appendices:

- Appendix 11.1: Preliminary Mineral Resource Assessment Cottam Solar Project Clover Planning, December 2021.

11.2 Baseline

The Site and Geological Context

11.2.1 Surface bedrock is a series of sedimentary mudstone beds dating from the Jurassic and Triassic periods; the strata getting progressively older moving from east to west. The bedrock is overlain in places by quaternary superficial deposits of alluvium, clays, silts, sand and gravels principally of fluvial or glacial origin.

11.2.2 Some of the superficial deposits have been identified as being of mineral interest by the British Geological Survey and are safeguarded mineral resources in the Lincolnshire Minerals and Waste Local Plan Core Strategy and Development Management Policies (June 2016).

11.2.3 At present, the final cable route linking the sites has yet to be determined and there exists a much wider 'cable route search area' within which options are being examined for the final route. Only small sections of cable route corridor will be required for the Scheme.

Initial Surveys

Potential Sources of Impact

11.2.4 Minerals are important national resources and adequate and steady supplies are vital for development and sustaining the economy and society. Minerals are a finite natural resource that can only be worked where they are found. A key aspect of sustainable development is the conservation and safeguarding of non-renewable resources for future generations. As such it is important that other 'non mineral related' development does not needlessly prevent the future extraction of mineral resources.

11.2.5 The whole of the Cottam Site is within a Petroleum Exploration and Development License (PEDL) area where oil and gas extraction are licensed under the Petroleum Act 1998 by the Oil and Gas Authority.

Cottam 1

11.2.6 Approximately 50 hectares of Cottam 1 is identified in the Lincolnshire Minerals and Waste Local Plan as being within two sand and gravel mineral safeguarding areas. The proposed Scheme therefore has the potential to sterilise an identified mineral deposit.

Cottam 2

11.2.7 Approximately 25 hectares of the Cottam 2 Site is identified in the Lincolnshire Minerals and Waste Local Plan as being within a sand and gravel mineral safeguarding area. The proposed development therefore has the potential to sterilise an identified mineral deposit.

Cottam 3

11.2.8 Approximately 46 hectares of the Cottam 3 Site is within an identified area of search (sand and gravel) in the Lincolnshire Minerals and Waste Local Plan. A small part of the Site within the allocated area of search also lies within a sand and gravel mineral safeguarding area. The proposed Scheme therefore has the potential to affect future mineral extraction within Lincolnshire and sterilise an identified mineral deposit.

Potential and Likely Environmental Effects

11.2.9 Any built development has the potential to sterilise underlying mineral deposits by effectively preventing access for future exploitation.

11.2.10 Non mineral development occurring within areas allocated for future mineral extraction have the potential to interrupt the supply of minerals.

Surface minerals

11.2.11 There are no permitted or proposed mineral extraction sites within close proximity of any of the Sites that might be affected by the development of the Scheme. In the case of Cottam 1 and 2 the Mineral Planning Authority has identified an isolated area of mineral resource that requires safeguarding. In the case of Cottam 3, the Mineral Planning Authority has identified sand and gravel mineral resources within an area of search and an area that requires safeguarding. Current assessments report that there is no need for new sites to come forward during the Plan period up to 2031. Furthermore, due to the proposed decommissioning of the Scheme any at the end of its operational life any minerals that are beneath the Sites, will not be sterilised on a long-term basis and would be available to exploit if required at a future date. Thus, there is not considered to be any conflict with the mineral safeguarding policy.

Oil and gas

11.2.12 Oil and gas deposits are found at much greater depths than other minerals and therefore surface development has less potential impact in terms of exploiting the resource. No mineral safeguarding areas for hydrocarbons have been identified within the Cottam Sites, as prospects can only be identified after extensive exploration activity. Existing oil fields are identified and safeguarded with mineral consultation zone around each. None of the Cottam Sites affect an existing oil field or comes within a mineral consultation zone.

11.2.13 All of the three Sites may contain an economic deposit of shale gas, there is an effective national moratorium on hydraulic fracturing for shale gas and until there is change in policy, these deposits if they exist, will not be exploited.

11.2.14 It is not considered that the proposed Scheme would have any implications for existing or proposed exploitation of oil and gas resources.

Cumulative and In-Combination Effects

11.2.15 The cumulative impacts arising from the Scheme will be assessed in combination with other relevant developments, including other solar related development. The list of cumulative developments to be considered will be compiled in consultation with stakeholders.

11.3 Conclusions on Scoping

11.3.1 The protection of mineral resources is of national significance and this proposal does affect areas of safeguarded mineral. However, the proposed Scheme is for a temporary period of relatively short duration. In addition, it would have minimal direct impact on any identified mineral deposit and if required all proposed structures could be removed to make the identified mineral resources available for exploitation in the future. On this basis the proposal is unlikely to result any significant environmental effects in relation to safeguarding or working mineral resources. It is therefore proposed to scope further consideration of the Cottam 1, 2 and 3 sites out of the ES.

11.3.2 Further assessment will be undertaken on the cable search corridor and is scoped into the ES.

12 Archaeology

12.1 Introduction

12.1.1 This chapter sets out the proposed approach to the assessment of potential effects on archaeology during construction, operation and decommissioning of the Scheme. Potential effects on built heritage are addressed in Chapter 13. This scoping assessment considers the potential for the survival of archaeological remains within the three Sites of the Scheme, together with an initial assessment of the potential significance of such remains and the impacts that the proposed development could have on these.

12.1.2 A description of the sites and proposed development can be found in Chapter 3 and 4 of this Scoping Report. The Cottam Solar Project is divided across three separate areas; Cottam 1, 2 and 3. Cottam 1 has been sub-divided into seven parcels (A-G) and Cottam 3 into two parcels (3a and 3b). The final cable route is yet to be determined and there are 'search areas' for the potential cable route. Only a narrow width within these corridors will be required for the cable route and its construction. Therefore, the survey work undertaken for these elements to date is in general, less advanced.

Appendices

12.1.3 This report is supported by the following Appendices:

- Appendix 12.1: Archaeological Site Plans;
- Appendix 12.2: Historical Mapping;
- Appendix 12.3: Initial geophysical survey greyscale plots;
- Appendix 12.4: Gazetteer of heritage assets within 1km of each Site of the Scheme;
- Appendix 12.5: Heritage / Archaeology Policy and Guidance;
- Appendix 12.6: Archaeological Baseline.

12.2 Baseline Overview

Search Area

12.2.1 All records held on the Lincolnshire Historic Environment Record (HER) and the National Heritage List for England (NHLE) were collated for within a 1km search area of the boundaries of the Scheme comprising the Cottam Solar Project. Details of these records are provided in a gazetteers in Appendix 12.4 and their locations marked on plans in Appendix 12.1.

The Site and Context

Cottam 1

12.2.2 The Cottam 1 Site does not contain any designated heritage assets upon which development could potentially have a direct impact.

12.2.3 There are three Scheduled Monuments within the 1km search area; 'Thorpe medieval settlement' (NHLE 1016978) situated immediately adjacent to the southern edge of Parcel D, 'Coates medieval settlement and moated site' (NHLE 1016979) situated approximately 625m from the Cottam 1 Site at its nearest point, and the 'Site of a college and Benedictine Abbey, St Mary's Church' (NHLE 1012976), situated within the historic core

of the village of Stow, around 740m to the west of the Site at its nearest point.

12.2.4 The majority of the Cottam 1 Site has been subject to modern ploughing and drainage schemes, which may have impacted any previously unrecorded sub-surface archaeological remains. The construction and demolition on the 19th century farmsteads within Parcel D (Appendix 12.1) will also have impacted any earlier sub-surface remains in their vicinity.

Cottam 2

12.2.5 The Cottam 2 Site does not contain any designated heritage assets upon which development could potentially have a direct impact. There is one Scheduled Monument situated within the wider search area, the site of the 'Deserted medieval village of Dunstall' (NHLE 1004996), situated approximately 730m to the north-east of the Cottam 2 Site.

12.2.6 The Cottam 2 Site has been subject to modern ploughing and drainage schemes, which may have impacted any previously unrecorded sub-surface archaeological remains.

Cottam 3

12.2.7 The Cottam 3 Site does not contain any designated heritage assets upon which development could potentially have a direct impact. There is one Scheduled Monument situated wholly within the search area, the Cross in St Martin's Churchyard (NHLE 1018291) in the village of Blyton, situated approximately 950m to the west of Cottam 3 Site Parcel A. Two other Scheduled Monuments are located partially within the search area; the northern end of the Gilby medieval settlement and cultivation remains (NHLE 1016795) 975m to the south-west of Parcel B, and the very western corner of the 'Deserted medieval village of Dunstall' (NHLE 1004996), almost 1km from Parcel B's south-eastern edge.

12.2.8 The majority of the Cottam 3 Site has been subject to modern ploughing and drainage schemes, which may have impacted any previously unrecorded sub-surface archaeological remains.

12.2.9 The central area of Parcel 3a of the Cottam 3 Site has been impacted by the construction, and subsequent removal, of the runways serving the former RAF Blyton, as well as associated field boundary loss.

Legislation, Policy and Guidance

12.2.10 The central area of Parcel 3a of the Cottam 3 Site has been impacted by the construction, and subsequent removal, of the runways serving the former RAF Blyton, as well as associated field boundary loss.

12.2.11 The following legislative provisions, policy and guidance, as well as the EIA Regulations, provide the context for the archaeological assessment to be undertaken in the EIA

- The applicable legislative framework is the Ancient Monuments and Archaeological Areas Act (AMAAA) 1979.
- The Overarching National Policy Statement for Energy (EN-1).
- National Policy Statement for Renewable Energy Infrastructure (EN 3) (adopted (July 2011) and emerging draft (September 2021));
- National Policy Statement for Electricity Networks Infrastructure (EN-5) (adopted (July 2011) and emerging draft (September 2021)
- National Planning Policy Framework revised July 2021.

- The Central Lincolnshire Local Plan (adopted on 24 April 2017).
- The Core Strategy and Development Management Policies Development Plan for Bassetlaw (adopted on 22 December 2011).
- Planning Practice Guidance.
- Hedgerows Regulations.
- Chartered Institute for Archaeologists (CIfA) *Standard and Guidance for Historic Environment Desk-based Assessment* (2020).
- *Historic Environment Good Practice Advice in Planning 2: Managing Significance in Decision Taking in the Historic Environment* (2015)
- Conservation Principles (English Heritage 2008).

12.2.12 A review of the above provisions is provided in Appendix 12.5 of the Scoping Report.

Initial Baseline Assessment and Potential Environmental Effects

Information Sources

12.2.13 The following sources of information have been consulted in line with the guidance laid down by the CIfA (2020) and the requirements of section 2.53.3 of NPS EN-3.

- Historic Environment Record: All records held on the Lincolnshire Historic Environment Record (HER) were collated for within a 1km search area of the boundaries of the Scheme comprising the Cottam Solar Project. Details of these records are provided in a gazetteer in Appendix 12.4 and their locations marked on plans in Appendix 12.1.
- National Heritage List for England: All records of nationally designated heritage assets held on the Historic England National Heritage List for England (NHLE) were collated for within a 1km search area of the boundaries of the Scheme comprising the Cottam Solar Project. Details of these records are provided in a gazetteer in Appendix 12.4 and their locations marked on plans in Appendix 12.1.
- Historical Documentary and Cartographic Sources: Relevant and accessible archives, together with on-line repositories, were consulted for historical maps and plans, and relevant documentary sources.
- Relevant Publications: A range of published and unpublished material has been consulted, including the regional research framework, *East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands* (Knight *et al.* 2012).

Walkover Survey

12.2.14 Site visits across the Sites (Cottam 1, 2 and 3) comprising the Cottam Solar Project were undertaken between July and November 2021, to provide an assessment of the character of the Sites and appraise the potential impact of the proposed development on any heritage assets. The majority of the area of the Sites is under arable cultivation and no previously unrecorded archaeological surface features were identified.

Geophysical Survey

12.2.15 An archaeological geophysical (gradiometer) survey is in the process of being undertaken across the Cottam 1, 2 and 3 Sites. This work began in July 2021 and is due to be completed by March 2022. This scoping report is informed by the results of the geophysical survey as produced up to the end of November 2021 (see Appendix 12.3).

Cottam 1: Review of relevant archaeological assets and initial assessment of their significance

12.2.16 The proposed development will have no direct impacts upon any designated heritage assets.

12.2.17 Prehistoric and Roman Periods: Despite the lack or limited nature of previously recorded evidence for prehistoric and Roman period activity within the Cottam 1 Site, the results of the geophysical survey have identified concentrations of anomalies that could represent settlements and enclosures of a late prehistoric or Roman period date based on their morphology (Appendix 12.3). The largest concentration of these has been identified in Field G4 of Parcel G, where various phases of probable enclosures, trackways and associated features have been recorded. Further, but less extensive, features have been identified within Field G1 to the north-west. To the south of this, the southern corner of a possible enclosure has been recorded adjacent to the northern side of Parcel F (Field F4), while another concentration of similar features has been recorded within Parcel F's southern edge, in Field F2. An area of anomalies identified within the survey data within the western side of Parcel C (Field C5) was initially considered to be geological but, given that these correspond with an area in which Roman period pottery and possible building stone were recovered in the 1930s (MLI51104), it is possible that these anomalies are archaeological in origin.

12.2.18 If archaeological remains dating to the prehistoric or Roman periods are present in the Site, the significance of these would be vested in their evidential value and the potential contribution these could make to national and regional research agendas. There is no evidence, however, to suggest the presence of any remains of a greater than local significance, based on the criteria used in this assessment (see Table 12.3).

12.2.19 Early Medieval and Medieval Periods: It is considered that there may be some limited potential for the survival of previously unrecorded remains relating to Early Anglo-Saxon period activity away from the pattern of later settlements, although no anomalies of a potential early medieval date have been identified in the results of the geophysical survey at the time of writing. There is potential for the survival of evidence of Anglo-Saxon and medieval settlement within those parts of the Site that directly abut the shrunken settlements at Normanby by Stow to the west of Parcel F, where probable medieval features have been identified, and to the north of Thorpe Le Fallows in Parcel D.

12.2.20 If archaeological remains representing early and later medieval settlement are present in the Cottam 1 Site, the significance of these would be vested in their evidential value and the potential contribution these could make to national and regional research agendas. There is no evidence to suggest the presence of any remains of a greater than local significance, based on the criteria used in this assessment (see Table 12.3).

12.2.21 It is considered that the majority of the Cottam 1 Site remained in agricultural use throughout the early medieval and later medieval periods,

and this is supported by the results of the geophysical survey. Therefore, the majority of any potential buried archaeological features dating to the early or later medieval period within the Cottam 1 Site are likely to relate to agricultural activity, such as ploughing, field boundaries and drainage, and would be considered to be of negligible significance.

12.2.22 Post-Medieval Period: The Cottam 1 Site has remained in primarily agricultural use throughout the post-medieval period. Across the majority of the Site, any potential buried archaeological features dating to the post-medieval period would likely relate to agricultural activity, such as ploughing, field boundaries and drainage, and would be considered to be of negligible significance.

12.2.23 Two possible farmsteads are recorded on the western side of Parcel D on the HER (MLI118759; MLI116510), as well as on the First Edition Ordnance Survey map of 1885, together with another building to their north. These continued to exist until at least the 1950s, and it is possible that related sub-surface remains could survive, although it is considered that if these were present, it would be unlikely that any such remains would be of greater than local significance.

Summary

12.2.24 The baseline assessment has established that there may be potential for the survival of buried remains of a prehistoric and/or Roman period date within specific areas of the Cottam 1 Site that could be impacted by the proposed development. For example, in Fields C5, G1, G4 and F4, as identified through geophysical survey and from previous archaeological records.

12.2.25 There is some limited potential for the survival of sub-surface features relating to early medieval, medieval and post-medieval agricultural activity within the Cottam 1 Site, such as ploughing, drainage or former field boundaries, which could be impacted by the proposed development, but any such remains would be considered to be of negligible significance.

12.2.26 There is also potential for the proposed development to impact sub-surface remains relating to the former 19th century farmsteads, and agricultural building recorded on Ordnance Survey mapping, until the 1950s, but it is considered that if these are present, it would be unlikely that any such remains would be of greater than local significance.

Cottam 2: Review of relevant archaeological assets and initial assessment of their significance

12.2.27 The proposed development will have no direct impacts upon any designated heritage assets.

Potential Sub-Surface Archaeological Remains

12.2.28 Prehistoric and Roman Periods: Despite the lack or limited nature of previously recorded evidence for prehistoric and Roman period activity within the Cottam 2 Site, the results of the geophysical survey from other areas of the Cottam Solar Project have identified previously unrecorded remains dating to these periods, and the presence of such remains within the Cottam 2 Site cannot be discounted. If archaeological remains dating to the prehistoric or Roman periods are present in the Cottam 2 Site, the significance of these would be vested in their evidential value and the potential contribution these could make to national and regional research agendas. There is no evidence, however, to suggest the presence of any

remains of a greater than local significance, based on the criteria used in this assessment (see Table 12.3).

12.2.29 Early Medieval and Medieval Periods: It is considered that there may be some limited potential for the survival of previously unrecorded remains relating to Early Anglo-Saxon period activity away from the pattern of settlements that may have emerged in the Middle to Late Anglo-Saxon periods. It is, however, likely that the Cottam 2 Site remained in primarily agricultural use throughout the early medieval and medieval periods. Therefore, the majority of any potential buried archaeological features dating to the early or later medieval period within the Cottam 2 Site are likely to relate to agricultural activity, such as ploughing, field boundaries and drainage, and would be considered to be of negligible significance.

12.2.30 Post-Medieval Period: The Cottam 2 Site has remained in agricultural use throughout the post-medieval period. Any potential buried archaeological features dating to the post-medieval period would likely relate to agricultural activity, such as ploughing, field boundaries and drainage, and would be considered to be of negligible significance.

Summary

12.2.31 The assessment has established that, based on the limited previously recorded evidence for prehistoric, Roman period and early medieval activity within the Cottam 2 Site and the wider search area, there appears to be low potential for the survival of remains dating to these periods within the Site. At the time of writing, however, a geophysical survey had not been undertaken of the Cottam 2 Site and, based on the identification of previously unrecorded possible prehistoric and/or Roman period remains within the Cottam 1 Site to the south, the presence of such remains which could be impacted by the proposed development cannot be discounted.

12.2.32 There is some limited potential for the survival of sub-surface features relating to medieval and post-medieval agricultural activity within the Cottam 2 Site, such as ploughing, drainage or former field boundaries, which could be impacted by the proposed development, but any such remains would be considered to be of negligible significance.

Cottam 3: Review of relevant archaeological assets and initial assessment of their significance

12.2.33 The proposed development will have no direct impacts upon any designated heritage assets.

Potential Sub-Surface Archaeological Remains

12.2.34 Prehistoric and Roman Periods: There is a lack of recorded evidence for prehistoric and Roman period activity within the Cottam 3 Site, and evidence for these periods from the wider search area is limited. It is, however, possible that features relating to a late prehistoric and/or Romano-British settlement previously identified outside, but adjacent to, the north-east boundary of Parcel 3a of the Cottam 3 Site could extend westwards into the Site, or that the remains of similar activity dating to these periods could survive within other areas of the Site. The prehistoric/Roman period remains identified during the archaeological investigations to the Site's north-east are not, however, considered to be of greater than local significance based on the criteria used in this assessment (see Table 12.3).

12.2.35 If archaeological remains dating to the prehistoric or Roman periods are present in the Site, the significance of these would be vested in their evidential value and the potential contribution these could make to national and regional research agendas. There is no evidence, however, to suggest the presence of any remains of a greater than local significance, based on the criteria used in this assessment (see Table 12.3).

12.2.36 Early Medieval and Medieval Periods: It is considered that, although there may be some limited potential for the survival of previously unrecorded remains relating to Early Anglo-Saxon period activity away from the pattern of settlements that may have emerged in the Middle to Late Anglo-Saxon periods, it is likely that the Cottam 3 Site remained in primarily agricultural use throughout the early and later medieval periods.

12.2.37 Therefore, the majority of any potential surviving buried archaeological features dating to the early or later medieval period within the Cottam 3 Site are likely to relate to agricultural activity, such as ploughing, field boundaries and drainage, and would be considered to be of negligible significance.

12.2.38 Post-Medieval and Modern Periods: The Cottam 3 Site has remained in agricultural use throughout the post-medieval period. Across the majority of the Site, any potential buried archaeological features dating to the post-medieval period would likely relate to agricultural activity, such as ploughing, field boundaries and drainage, and would be considered to be of negligible significance.

12.2.39 It is possible that some buried remains relating to former airfield structures could survive in places, but any runway surfaces and other structures within the arable fields will have been removed since the 1950s to allow for arable cultivation. It is considered that if any Second World War structures survive, these may help to inform our understanding of the functioning of RAF Blyton, but are unlikely to be of greater than local significance.

Summary

12.2.40 The Cottam 3 Sites will have no direct impacts upon any designated heritage assets.

12.2.41 The assessment has established that there may be some potential for the survival of buried remains of a prehistoric and/or Roman period date within the Cottam 3 Site that could be impacted by the proposed development.

12.2.42 There is potential for the survival of sub-surface features relating to early medieval, medieval and post-medieval agricultural activity within the Cottam 3 Site, such as ploughing, drainage or former field boundaries, which could be impacted by the proposed development, but any such remains would be considered to be of negligible significance.

12.2.43 It is likely that any structures relating to the airfield within the Parcel 3a of the Cottam 3 Site will have been removed in the 1950s to allow for the area to be returned to arable cultivation. If associated remains did survive, however, these could potentially be impacted by the proposed development, but are unlikely to be of greater than local significance.

12.3 Methodology for Further Assessment

Assessment Process

12.3.1 An initial baseline assessment of the significance and potential impacts of the proposed development on archaeological heritage assets has been undertaken to inform this scoping report, together with the ongoing archaeological geophysical survey.

12.3.2 It is proposed that further detailed assessment of the archaeological potential of the Cottam Solar Project, including the proposed cable routes, battery storage and substations, will be carried out, comprising assessment of the significance of any archaeological remains within these sites, and the magnitude of any change that the proposed development may have on these. This will be informed by the final results of the archaeological geophysical survey. The proposed assessment methodology is outlined below.

12.3.3 The assessment of likely significant effects as a result of the proposed development will take into account both the construction and operational phases. No standard criteria exist to identify the significance of archaeological sites or identify the potential for their survival. The identification of the significance of archaeological features to be used in further assessment will follow that outlined in this chapter in Table 12.3.

12.3.4 The scale proposed to be used to determine archaeological potential as part of further detailed assessment is included in Table 12.1.

Table 12.1 Criteria Proposed to Determine Archaeological Potential of Areas

Archaeological Potential	Criteria
High	Existing heritage assets that are readily visible as standing structures or earthworks that survive in a good state of preservation. Known sites comprising buried archaeological remains. Areas where numerous sites of certain dates or periods are known within the vicinity, indicating similar sites are likely to be present within a site area. Areas where an archaeological feature of findspot is known which are likely to be associated with further buried archaeological remains.
Medium	Areas where a few assets of certain date or period are known within the vicinity, indicating similar sites may be present within a site area. Areas where numerous sites of certain dates or periods are known within the vicinity, but where the site area has been subject to some previous development or disturbance.

Low	Areas where very few assets of certain date or period are known within the vicinity, indicating similar sites may possibly be present. Areas where numerous sites of certain dates or periods are known within the vicinity, but where the site area has been subject to extensive previous disturbance through modern development or industrial processes.
Negligible	Areas where no known archaeological remains have been identified through previous archaeological investigations. Areas where previous disturbance through modern development or industrial activity has completely removed archaeological remains that was known or may have been present.
Unknown	Where there is no available archaeological information that can be used to indicate the presence or absence of archaeological remains.

Assessment of Sensitivity

12.3.5 The identification of the magnitude of change proposed to be used in further detailed assessment is outlined in Table 12.2. This table indicates a guide by which impact might be calculated, though this may be varied based on the individual heritage asset being assessed.

Table 12.2 Criteria Proposed to Determine Magnitude of Change

Scale	Magnitude of Change
High	High loss of archaeological material (>60% by area) or loss of specific areas of material which contribute directly to the understanding of the asset concerned; or Circumstance within which it is not possible to determine the precise level of change in this way.
Medium	Moderate loss of archaeological material (>40% by area) or loss of small specific areas of material which contribute to the understanding of the asset concerned. Indicative modification of high magnitude of change following best practice mitigation strategy.
Low	Loss of archaeological material (>10% by area). Indicative modification of medium magnitude of change following best practice mitigation strategy.
Negligible	No change. Indicative modification of low magnitude of change following best practice mitigation strategy.

Significance

12.3.6 Paragraph 5.8.2 of the NPS EN1 (2011) defines the significance of heritage assets as being 'The sum of the heritage interests that a heritage asset holds'. This is in line with the former PPS5 (now superseded by NPPF) definition of 'significance' being 'The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic.' (PPS5 Annex 2).

12.3.7 Paragraph 5.9.11 of the Draft NPS EN-3 (2021) and Paragraph 194 of the NPPF (2021) state that planning decisions should be based on the significance of the heritage asset, and that the level of detail supplied by an applicant should be proportionate to the importance of the asset and should be no more than sufficient to review the potential impact of the proposal upon the significance of that asset.

12.3.8 It is recognised that not all parts of a heritage asset will necessarily be of equal significance. In some cases, certain elements could accommodate change without affecting the significance of the asset. Change is only considered harmful if it erodes an asset's significance. Understanding the significance of any heritage assets affected and any contribution made by their setting (paragraph 194, NPPF 2021) is therefore fundamental to understanding the scope for and acceptability of change.

12.3.9 Assessment of significance has been undertaken in accordance with the Historic England guidance *Statements of Heritage Significance. Analysing Significance in Heritage Assets* (2019).

12.3.10 No standard criteria exist to identify the significance of archaeological sites or identify the potential for their survival. The identification of the significance of archaeological and features used in this assessment is therefore based on the differentiation of designated heritage assets provided in Paragraph 200 of the NPPF (2021) as well as professional judgement.

Table 12.3: Significance Criteria

Heritage significance	Description
International (Very High)	World Heritage Sites
National (High)	Scheduled Monuments Grade I and II* Listed Buildings Grade I and II* Registered Historic Parks and Gardens
Regional/ National (Medium)	Grade II Listed Buildings Grade II Registered Historic Parks and Gardens Conservation Areas
Local (Low)	Locally listed buildings Non-designated archaeological sites of local value, and/or potential to contribute to local research objectives
Negligible / Nil	Heritage assets with very little or no surviving research value

12.3.11 Appendix 12.6 includes a detailed description of the archaeological baseline relating to the three Cottam land parcels with plans identifying historical records at Appendix 12.1. The baseline is considered below for each land parcel, to identify the potential for significant environmental effects to arise and how these will subsequently be addressed in the EIA.

12.3.12 It is proposed that the criteria provided in Table 12.4 below are used to allow a determination of impact significance prior to the implementation of any mitigation. This would take into account that a low magnitude of change on heritage asset of national importance may equate to an effect of moderate importance, while for an asset of local importance the equivalent effect would be less. As the matrix indicates, there is a degree of overlap between the matrix categories, and professional judgement is applied to the matrix result to ensure it is commensurate with unique factors which might apply to the heritage assets concerned.

Table 12.4 Impact Matrix

Current Significance	Magnitude of Change			
	High	Medium	Low	Negligible
High – National or International	Substantial	Substantial / Moderate	Substantial / Moderate	Negligible
Medium - Regional	Substantial / Moderate	Moderate	Minor	Negligible
Low - Local	Moderate / Minor	Minor	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Methodology for further Evaluation and Mitigation

Cottam 1, 2 and 3

12.3.13 Following detailed assessment, where it is identified that there may be potential for the proposed development to impact heritage assets or previously unrecorded archaeological remains, a suitable programme of further archaeological evaluation will be undertaken to determine the character and significance of any such remains, in the form of targeted evaluation.

12.3.14 Where possible, any direct impacts on potential archaeological remains will be mitigated by the design of the proposed development. This could include the siting of any intrusive infrastructure, such as substations and cable trenches, which will be present in each area, and battery storage which will be sited within Cottam 1, beyond any areas shown to contain potential archaeological remains based on the results of the geophysical survey. This may also involve the placement of solar panels on non-intrusive concrete feet across targeted areas determined to have archaeological potential.

12.3.15 The Scheme could have potential to alter drainage patterns and this could indirectly affect below ground heritage assets (such as the ground conditions allowing the survival of waterlogged organic remains). The ES will provide an assessment of the likelihood of indirect impacts on heritage

assets to arise and outline any necessary mitigation measures to address significant effects where they are likely to occur.

12.3.16 Where it is not possible to avoid possible direct impacts upon non-designated heritage assets, a suitable scheme of archaeological mitigation will be undertaken (e.g. investigation and recording via targeted excavation, or through observation and recording during groundworks as part of a watching brief). It is envisaged that any archaeological mitigation would be carried out as part of a Requirement in the DCO.

Cable Routes

12.3.1 Any direct impact upon designated heritage assets will be avoided through the cable route design. The designated heritage assets will be avoided by the final cable route.

12.3.2 Potential direct impacts upon previously recorded non-designated heritage assets will be avoided where possible through the design of the proposed development.

12.3.3 Where indirect impacts are unavoidable on non-designated heritage assets, a suitable programme of further archaeological evaluation will be undertaken to determine the character and significance of any such remains. Following evaluation, provision will be made for the cable route to be micro sited to avoid any impacts on any identified archaeology where this is feasible.

12.3.4 Where it is not possible to avoid direct impacts upon non-designated heritage assets, a suitable scheme of archaeological mitigation will be undertaken (e.g. investigation and recording via targeted excavation, or through observation and recording during groundworks as part of a watching brief). It is envisaged that any archaeological mitigation along the cable routes would be carried out as part of a Requirement in the DCO.

Cumulative and In-Combination Effects

12.3.5 Although it is not considered that there will be any cumulative or in-combination effects from the construction and operation of the Scheme on any below ground remains relating to designated or non-designated heritage assets, the ES will consider potential cumulative or in-combination effects upon these.

12.3.5.1 Identification of any effects on archaeological receptors in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

Operational Impacts

12.3.6 There will be no operational impacts from the Scheme upon any sub-surface archaeological remains relating to designated or non-designated heritage assets.

Decommissioning Impacts

12.3.7 Although it is not considered that there will be any impacts from the decommissioning of the Scheme on below ground archaeological remains relating to designated or non-designated heritage assets, following any archaeological evaluation and mitigation works undertaken prior to and during construction, the ES will consider potential decommissioning impacts.

Consultation

12.3.8 Consultation will be ongoing throughout the project with Historic England and the archaeological advisors to Nottinghamshire County Council and Lincolnshire Council, as well as any other relevant local interest groups or organisations.

12.4 Conclusions on Scoping

12.4.1 Scoped in for further assessment within ES:

- Direct impacts upon non-designated heritage assets within the whole Scheme
- Direct impacts upon designated heritage assets along proposed cable routes, and within areas proposed for the siting of substations, battery storage and construction compounds, the location of which are yet to be determined
- Indirect impacts upon designated and non-designated heritage assets from changes to drainage within the Scheme
- Cumulative and in combination impacts
- Decommissioning impacts

12.4.2 Scoped out of further assessment within ES:

- Direct impacts upon designated heritage assets within the Cottam 1, 2 and 3 Sites
- Operational impacts

12.5 References

CIfA 2020, *Standard and guidance for historic environment desk-based assessment*

DCLG 2019, *National Planning Policy Framework*

DCMS 2010, *Scheduled Monuments. Identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979.* March 2010

English Heritage 2008, *Conservation Principles*

Historic England 2015, *Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking in the Historic Environment*

Historic England 2019, *Statements of Heritage Significance. Analysing Significance in Heritage Assets*

Kain, R.J.P., Chapman J. and Oliver, R. 2004, *The Enclosure Maps of England and Wales, 1595-1918*

Lord, J. and MacIntosh, A. 2011, *The Historic Character of the County of Lincolnshire*

Mills, A.D. 2011, *A Dictionary of British Place Names*

Williams, A. and Martin, G.H. 1992, *Domesday Book. A Complete Translation*

13 Built Heritage

13.1 Introduction

13.1.1 This chapter sets out the proposed approach to the assessment of potential effects on heritage during construction and operation of the Scheme. Potential effects on archaeology are addressed in Chapter 12. This scoping assessment considers the potential for impacts on the setting and significance of all designated heritage assets (built heritage, earthworks and the historic landscape) in the search area, located within the administrative boundary of West Lindsey District Council (WLDC). It has been prepared by Lanpro Services Limited on behalf of Island Green Power.

13.1.2 A detailed description of the Sites and the Scheme can be found in Chapters 3 and 4 of the Scoping Report. The proposed Scheme is divided across three separate areas; Cottam 1, 2 and 3, all within the West Lindsey District of Lincolnshire, which make up the 'study sites' for this assessment. The cable routes for the project will connect with the National Grid at Cottam Power Station, within the Bassetlaw District of Nottinghamshire.

Appendices

13.1.3 Historical Mapping and Gazetteers of Historic Environment Records data are provided at Appendices 12.2 and 12.4 respectively and are relevant to this Chapter. This Chapter is also supported with the following Appendices:

- Appendix 13.1 Heritage Asset Site Plans;
- Appendix 13.2: Listed Building Descriptions;
- Appendix 13.3: Heritage Policy and Guidance; and
- Appendix 13.4: Heritage Baseline.

13.2 Legislation, Policy and Guidance

13.2.1 This heritage section makes reference to the relevant legislation contained within the Planning (Listed Buildings and Conservation Areas) Act 1990, the National Planning Policy Framework (NPPF) and relevant Historic England guidance, notably the recently published HEAN 12: Statements of Heritage Significance (Historic England 2019), GPA3: The Setting of Heritage Assets Historic England 2017) and Conservation Principles (English Heritage 2008).

13.2.2 The following primary and secondary legislation, policy and guidance has been considered in production of this Chapter:

- Planning Act 2008;
- Infrastructure Planning (Decisions) Regulations 2010;
- Ancient Monuments and Archaeological Areas Act 1979;
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017;
- NPS EN-1 Overarching National Policy Statement for Energy inc. Section 5.8, (2011);
- Draft NPS EN-1 Overarching National Policy Statement for Energy (2021);
- NPS EN-3 Renewable Energy Infrastructure (2011);

- Draft NPS EN-3 Renewable Energy Infrastructure (2021);
- Central Lincolnshire Local Plan, 2012;
- The Core Strategy and Development Management Policies Development Plan for Bassetlaw (adopted on 22 December 2011);
- Planning (Listed Buildings and Conservation Areas) Act 1990;
- National Planning Policy Framework 2021;
- National Planning Policy Guidance; and
- Historic England Advice Notes.

13.2.3 A review of the above provisions is provided in Appendix 13.3 of the Scoping Report.

13.3 Baseline Assessment

Initial Surveys and Potential and Likely Environmental Effects

13.3.1 This section sets out the findings of an initial assessment of the significance of heritage assets within proximity of each land parcel identified for development and the potential impact of the proposals on those assets and concludes which assets should be assessed as part of the ES and which can be scoped out.

13.3.2 The Sites at Cottam 1, 2, 3a and 3b do not contain any designated heritage assets. Heritage assets surrounding the sites are discussed in this section.

13.3.3 The study area for the identification of designated assets held on the Lincolnshire HER is defined as a 1km and 2km buffer around the site. The 1km buffer is, in this instance, defined as the immediate setting of the study area, where there is greater potential for impact on designated assets. A 2km buffer has been chosen to encompass the extent of the study area's wider setting. These search areas have been determined based on the Zone of Theoretical Visibility (ZTV) maps, prevailing circumstances within the surrounding area, the nature of the Scheme and professional judgment, as suitable for determining the potential impact of the proposed scheme on designated heritage assets.

13.3.4 The following sources of information have been consulted in line with the guidance laid down by the CIfA (2020) and the requirements of section 5.8 of NPS EN-1 and 2.53.3 of the emerging NPS EN-3:

- Historic Environment Record: All records held on the Lincolnshire Historic Environment Record (HER) were collated for within a 1km search area of the boundaries of the study sites comprising the Scheme. Details of these records are provided in a gazetteer in Appendix 12.4.
- National Heritage List for England: All records of nationally designated heritage assets held on the Historic England National Heritage List for England (NHLE) were collated for within a 1km and 2km search area of the boundaries of the study sites comprising the Scheme. Details of these records are provided in Appendix 13.2. and their locations marked on plans in Appendix 13.1.
- Historical Documentary and Cartographic Sources: Relevant and accessible archives, together with on-line repositories, were consulted for historical maps and plans, and relevant documentary sources.

- Relevant Publications: A range of published and unpublished material has been consulted, including the regional research framework, *East Midlands Heritage. An Updated Research Agenda and Strategy for the Historic Environment of the East Midlands* (Knight *et al.* 2012).
- Local Planning Authorities: West Lindsey District Council and Bassetlaw District Council both potentially hold information about conservation areas and locally Listed Buildings. West Lindsey Council does not maintain a list of locally Listed Buildings although it has produced conservation area appraisals for each conservation area. Bassetlaw Council maintains a list of locally Listed Buildings but does not have conservation area appraisals.

13.3.5 The Sites are discussed in turn, below. This scoping chapter is seeking to scope out impacts on receptors in respect of the Cottam Sites 1, 2 and 3. Further assessment is required on the impacts on receptors associated with the cable search corridor.

Cottam 1

Assessment of Significance of surrounding heritage assets

13.3.6 Within the 1km and 2km study area, there are three Scheduled Monuments, which are designated heritage assets of the highest significance. These are Thorpe medieval settlement (NHLE 1016978), Coates medieval settlement and moated site (NHLE 1016979) and the Site of a college and Benedictine Abbey, St Mary's Church (NHLE 1012976).

13.3.7 Scheduled monuments are of high significance under national policy and legislation (NPPF:200) and the deserted medieval settlements of Thorpe and Coates survive as a series of earthworks with associated open field systems. There are many deserted medieval settlements within this part of Lincolnshire, which give an insight into the lifestyle of the inhabitants and evidence for the economy of the settlement and its place in the wider medieval landscape. The remains of house plots conserve valuable evidence for domestic and economic activities on the site through both the medieval and post-medieval periods. For these reasons, the significance of the Scheduled Monument is derived from its archaeological interest.

13.3.8 Stow Minster is designated as a Grade I Listed Building and also sits on the Scheduled site of the associated Benedictine Abbey and college. Stow Minster is one of the oldest and most significant parish churches in England. A church occupied the site prior to the arrival of the Danes in 870 but the current structure was endowed in 1054. It has notable historic associations with Lady Godiva, St Hugh of Avalon and St Etheldreda.

13.3.9 The Grade I and II* places of worship within the surrounding villages are of high significance, as are the halls and manor houses associated with the early history of each settlement.

13.3.10 There are four conservation areas within the 2km study area for Cottam 1, which are designated by West Lindsey District Council. The conservation areas were designated in the 1980-90s and the existing appraisal documents date from this period (West Lindsey, 1995, 1993, 1988, 1981). To summarise, the conservation areas hold medium significance for their character and appearance as rural Lincolnshire settlements with high quality historic, vernacular buildings that hold architectural and historic special interest.

13.3.11 The conservation area villages are situated at the foot of the Lincoln escarpment, just west of the A631, facing across the Trent valley plain towards Gainsborough. There is evidence of Roman and Danish activity in the area but most of the villages are Anglo-Saxon in origins, with the earliest buildings usually being the church, with fabric dating to 11th century at the earliest. The designation boundaries generally encompass the historic core of the settlements including village greens, church, schools and domestic dwellings with 16th-19th century origins.

13.3.12 Although it is likely that the Cottam 1 study site contains hedgerows that could be considered 'important' under the Hedgerow Regulations 1997, such hedgerows are not considered to be designated heritage assets as defined by the NPPF. The NPPF describes a heritage asset as a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions because of its heritage interest. Given that hedgerows are considered 'important' due to their historic significance and that their 'important' status merits their consideration in planning decisions, they can be described as 'non-designated heritage assets' in terms of the NPPF.

13.3.13 The hedgerows contain no evidential value or archaeological interest, i.e. they do not hold any evidence for past human activity worthy of archaeological investigation. The significance of the 'important' hedgerows is, therefore, vested in their historic value in relation to the understanding and survival of the pre-1845 field pattern, i.e. the pattern of land division and allocation established by the enclosure of the parish by the mid-19th century. They are considered to be of very limited potential to add to regional or national research objectives and, as such, are considered to be of no more than local significance.

13.3.14 Development plans have not been finalised at this stage, but the aim will be to minimise any impact on 'important' hedgerows within the Cottam 1 study site and maintain the overall field pattern.

Potential Impacts to be Considered in the ES

13.3.15 Eight heritage assets within the 1km buffer of the study site are assessed as having potential to be impacted by the Scheme. These are the Scheduled deserted medieval settlement remains at Thorpe (NHLE 1016978) and Coates (NHLE 1016979), Site of the college and Benedictine Abbey at St Mary's Church, Stow (NHLE 1012976). Also, the Grade II Listed Buildings of Thorpe in the Fallows Farmhouse (NHLE 1308921), Monument 3 yards south of Church of St Edith (NHLE 1064065) and Old Rectory Home for the Elderly (NHLE 1359488), and the Grade I Listed Church of St Mary 'Stow Minster' (NHLE 1146624) and Church of St Edith, Coates (NHLE 1146742).

13.3.16 Within the wider 2km study area, the Church of St Cuthbert at Brattleby (NHLE 1063378) will be taken forward to assess the impact of Scheme on potential views of the church tower and its setting. This assessment will also be carried out for Stow Minster to ensure views of the tower (where they contribute to understanding or appreciation of significance) are not impacted.

13.3.17 The four conservation areas of Fillingham, Glentworth, Ingham and Brattleby will also be included for further assessment. The villages are situated on high ground above the Trent Valley and there may be indirect impact on setting where it contributes to understanding or appreciation of significance.

13.3.18 There will be no direct impact on any of these designated heritage assets.

13.3.19 These 13 heritage assets will therefore be taken forward to the next stage to allow a full and detailed heritage impact assessment to be carried out against detail design proposals. This will allow harm to be avoided or mitigated as part of the planning process.

13.3.20 All other assets within the 1km and 2km buffer areas have been assessed and scoped out of further consideration as there will be no direct impact on the asset or on its setting where it contributes to appreciation or understanding of significance.

Table 13.1: Initial Impact on Assets within 1km of the Study Site

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
1 and 3 Stow Road	1064030	GII	Medium	Negligible	None	Heritage asset is located within the village of Willingham and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
20 Fillingham Road	1064029	GII	Medium	Negligible	None	Heritage asset is located within the village of Willingham and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Grange Farmhouse	1308795	GII	Medium	Negligible	None	Heritage asset is located within the village of Willingham and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Willingham House	1359509	GII	Medium	Negligible	None	Heritage asset is located within the village of Willingham and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Helen	1146826	GII	Medium	Negligible	None	Heritage asset is located within the village of Willingham and is not visible from the study site, including the tower. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Old Rectory	1146841	GII	Medium	Negligible	None	Heritage asset is located within the village of Willingham and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Thorpe Medieval Settlement	1016978	SM	High	Medium	Less than substantial harm	The Scheduled site is adjacent to the southern boundary of the study area. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Thorpe in the Fallows Farmhouse	1308921	GII	Medium	Low	Less than substantial	Farmhouse is approx. 150m from the southern boundary of the study area. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Coates Medieval	1016979	SM	High	Low	Less than substantial	Scheduled Monument is approx. 790m from the nearest parcel of the study area, however, it is located within the	Take forward to next stage of

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Settlement and Moated Site					harm	centre of all parcels and will be taken forward for further assessment to understand any cumulative impact.	assessment
Monument 3 yards south of Church of St Edith	1064065	GII	Medium	Low	Less than substantial harm	Church monument is approx. 610m from the nearest parcel of the study area, however, it is located within the centre of all parcels and will be taken forward for further assessment to understand any cumulative impact.	Take forward to next stage of assessment
Church of St Edith	1146742	GI	High	Low	Less than substantial harm	Church is approx. 610m from the nearest parcel of the study area, however, it is located within the centre of all parcels and will be taken forward for further assessment to understand any cumulative impact.	Take forward to next stage of assessment
Old Rectory Home for the Elderly	1359488	GII	Medium	Low	Less than substantial harm	Listed Building is situated within Sturton by Stow but backs onto agricultural land approx. 780m from the study site. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Brickyards Cottages, 1 and 2 Brickyards	1146766	GII	Medium	Negligible	None	Heritage asset is located off the Tillbridge Road and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
21 Church Lane	1064064	GII	Medium	Negligible	None	Heritage asset is located within the village of Stow and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Mary (Stow Minster)	1146624	GI	High	Low	Less than substantial harm	Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Site of a college and Benedictine Abbey, St Mary's Church	1012976	SM	High	Low	Less than substantial harm	Scheduled earthworks are approx. 700m away from the study site but will be taken forward for further assessment due to high significance of the asset. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
9 Ingham Road	1146755	GII	Medium	Negligible	None	Heritage asset is located within the village of Stow and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Threshing Barn at Church End	1064063	GII	Medium	Negligible	None	Heritage asset is located within the village of Stow and is not visible from the study site. The development will have no direct or indirect impact on the significance of the	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Farm						heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	
Manor Farmhouse	1359486	GII	Medium	Negligible	None	Heritage asset is located within the village of Stow and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
6 Sturton Road	1064066	GII	Medium	Negligible	None	Heritage asset is located within the village of Stow and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Wesleyan Chapel	1146761	GII	Medium	Negligible	None	Heritage asset is located within the village of Stow and is not visible from the study site. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Table 13.2: Initial Impact on Assets within 2km of the Study Site

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Applegarth House	1146541	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
33 The Green	1359816	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
The Generous Britain Public house	1308905	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
School and Attached School House	1063356	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Jubilee Terrace Cottages	1359422	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of All Saints	116375	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Grange Farmhouse	1063355	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Ingham Conservation Area	n/a	CA	Medium	Low	Less than substantial harm	Conservation area is approx. 1.4km from the study site but is situated at the foot of the escarpment and there are potential long-distance views. Character and appearance of the conservation area will be considered in relation to potential impact. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Fillingham Conservation Area	n/a	CA	Medium	Low	Less than substantial harm	Conservation area is approx. 940m from the study site but is situated at the foot of the escarpment and there are potential long-distance views. Character and appearance of the conservation area will be considered	Take forward to next stage of assessment

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						in relation to potential impact. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	
Glentworth Conservation Area	n/a	CA	Medium	Low	Less than substantial harm	Conservation area is approx. 1.7m from the study site but is situated at the foot of the escarpment and there are potential long-distance views. Character and appearance of the conservation area will be considered in relation to potential impact. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Brattleby Conservation Area	n/a	CA	Medium	Low	Less than substantial harm	Conservation area is approx. 2km from the study site but is situated at the foot of the escarpment and there are potential long-distance views. Character and appearance of the conservation area will be considered in relation to potential impact. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Fillingham Castle	1000977	PAG	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
5 Chapel Lane	1063343	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
3 Chapel Lane	1063344	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Village Hall	1359848	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Lake House	1063345	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
The Old Rectory	1166037	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Monument 10 yards south	1309113	II*	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on	Yes

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
of Chancel of Church of St Andrew						setting where it contributes to appreciation or understanding of significance.	
Church of St Andrew	1359847	II*	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Manor House	1309085	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Gateway	1063346	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Scottish Farmhouse	1359851	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Old Vicarage	1359850	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Michael	1309078	II*	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Northlands House	1309058	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
12 Church Street	1063349	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Glentworth Hall	1063348	II*	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
1-4 Hall Cottages (Stable Block)	1166094	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
2 Glenworth Road	1359479	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Grange Farmhouse	1308795	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Helen	1146826	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Willingham House	1359509	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Old Rectory	1146841	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Subscription Mill	1064067	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Old Hall	1146778	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Hugh of Avalon	1146772	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Lych Gate and Wall of Church of St Hugh	1064068	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Barn at Bransby House for Retired Horses	1359487	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Till Bridge Farm Cottages	1064075	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Stables at Aisthorpe Hall	1064093	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Old Rectory	1063338	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Gate Piers at Brattleby Hall	1063337	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Cuthbert	1063378	II*	High	Low	Less than substantial harm	Church tower is 2km from the study site but there is some visibility along Thorpe Lane. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Cross in St Cuthbert's Churchyard	1018288	SM	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Stable block at Brattleby Hall	1063336	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Brattleby Hall	1063335	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Lodge Cottage	1063341	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Manor House	1165919	II*	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Gate Piers to Manor House	1359846	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Garage at the Old Post Office	1359845	II	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Michael and All Angels	1063342	II*	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Cottam 2

Assessment of Significance of Surrounding Heritage Assets

13.3.21 The Grade I Listed Church of St Lawrence in Corringham (NHLE 1064162) holds high national significance and is of exceptional interest. Built from the 11th century on the site of a previous church, it was enlarged in the 14th century. The church contains a ceiling and organ case by GF Bodley (1884) and restored choir stalls, misericords and rood screen. The tower of St Lawrence can be seen from a number of places in the surrounding countryside.

13.3.22 Other designated heritage assets of interest are a number of tower windmills (NHLE 1064163 and 1359417). There were once hundreds of these mills in Lincolnshire due to the flat, open countryside and those that survive – as ruins or converted into dwellings – offer insight into this past human activity.

13.3.23 Scheduled monuments are of high significance under national policy and legislation (NPPF: 200). The deserted medieval settlement remains at Dunstan (NHLE 1004996), and those of its open field system, survive as a series of earthworks. These earthworks conserve valuable evidence for domestic and economic activities on the site through both the medieval and post-medieval periods, giving an insight into the lifestyle of the inhabitants. The association of the village remains with those of its open fields will also preserve evidence for the economy of the settlement and its place in the wider medieval landscape.

13.3.24 Although it is likely that the Cottam 2 study site contains hedgerows that could be considered 'important' under the Hedgerow Regulations 1997, such hedgerows are not considered to be designated heritage assets as defined by the NPPF. The NPPF describes a heritage asset as a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions because of its heritage interest. Given that hedgerows are considered 'important' due to their historic significance and that their 'important' status merits their consideration in planning decisions, they can be described as 'non-designated heritage assets' in terms of the NPPF.

13.3.25 The hedgerows contain no evidential value or archaeological interest, i.e. they do not hold any evidence for past human activity worthy of archaeological investigation. The significance of the 'important' hedgerows is, therefore, vested in their historic value in relation to the understanding and survival of the pre-1845 field pattern, i.e. the pattern of land division and allocation established by the enclosure of the parish by the mid-19th century. They are considered to be of very limited potential to add to regional or national research objectives and, as such, are considered to be of no more than local significance.

13.3.26 Development plans have not been finalised at this stage, but the aim will be to minimise any impact on 'important' hedgerows within the Cottam 2 study site and maintain the overall field pattern.

Potential Impacts to be Considered in the ES

13.3.27 Four heritage assets within the 1km buffer of the study site are assessed as having potential to be impacted by the Scheme. These are the Scheduled deserted medieval settlement remains at Dunstall (NHLE 1004996), the Grade II Listed Old Hall (NHLE 1165535), the Church of St Lawrence (NHLE 1064162) and Corringham Windmill (NHLE 1359417). Gilby

medieval settlement remains (NHLE 1016795) within the 2km buffer area will also be taken forward for further assessment.

13.3.28 There will be no direct impact on any of these designated heritage assets.

13.3.29 Indirect impact may arise from the Scheme that harms the setting of these assets where it contributes to understanding or appreciation of significance. The tower of St Lawrence is visible from a number of vantage points in the surrounding countryside, including from within the study site to the east. The church will be taken forward to assess what, if any, impact this visibility will have on understanding of significance. Corringham Windmill is also visible from the study site and part of its significance is derived from its rural setting. The two Scheduled Monuments within the 1km and 2km study area will be taken forward due to their high level of significance and the rural, agrarian landscape that forms part of their setting. Although the appearance of this setting was radically altered in the 19th century following enclosure and existing hedging/low-lying land may reduce indirect impact, it will be important to understand any potential harm in detail.

13.3.30 These five heritage assets will be taken forward to the next stage to allow a full and detailed heritage impact assessment to be carried out against detail design proposals. This will allow harm to be avoided or mitigated as part of the planning process.

13.3.31 All other assets within the 1km and 2km buffer areas have been assessed and scoped out of further consideration as there will be no direct impact on the asset or on its setting where it contributes to appreciation or understanding of significance.

Table 13.3: Initial Impact on Assets within 1km of the Study Site

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Old Hall	1165535	GII	Medium	Low	Less than substantial harm	Possible impact on setting or views of Old Hall due to proximity approx. 410m away from the study site boundary to the east. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Church of St Lawrence	1064162	GI	High	Low	Less than substantial harm	Church tower is visible from within parts of the study site although at a distance of approx. 500m and there is mature tree cover reducing visibility. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Lychgate at Church of St Lawrence	1165563	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Mill at Mill House Farm	1064163	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Corringham Windmill	1359417	GII	Medium	Low	Less than substantial harm	Windmill is isolated within ploughed field to the south of the study area adjacent to the A631. Due to the flat, low-lying nature of the landscape there is potential visibility of the windmill from the study area. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Deserted village of Dunstall	1004996	SM	High	Low	Less than substantial harm	Scheduled earthworks are approx. 700m away from the study site but will be taken forward for further assessment due to high significance of the asset.	Take forward to next stage of assessment

Table 13.4: Initial Impact on Assets within 2km of the Study Site

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Springthorpe Conservation Area	n/a	CA	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Mill House Farmhouse, Stables and Barn	1165585	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Gilby medieval settlement and cultivation remains	1016795	SM	High	Low	Less than substantial harm	Scheduled earthworks are approx. 1.5km away from the study site but will be taken forward for further assessment due to high significance of the asset.	Take forward to next stage of assessment
1 High Street	1317241	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Lawrence and St George	1146616	GI	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
20 Hill Road	1064061	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Cottam 3

Assessment of Significance of Surrounding Heritage Assets

13.3.32 Farmsteads survive in the study area including Mount Pleasant Farm, Grange Farm and Blenheim Farm. Mount Pleasant is Grade II Listed (NHLE 131786) and is of medium significance. Retaining a number of farm buildings and farmhouse, the dwelling is late-18th century with 20th century alterations.

13.3.33 Listed Buildings of high significance are the two Grade I Listed churches of Blyton and Pilham, St Martin in Blyton (NHLE 1064159) and All Saints in Pilham (NHLE 1317208). Associated with St Martin's is the Scheduled churchyard cross, also of high national significance. A Unitarian Chapel and Church of St John the Baptist are within 2km of the study site and also of high significance as Grade II* Listed Buildings.

13.3.34 In the southern half of the study area are three deserted medieval villages and cultivation remains (NHLE 1016795, 1016794 and 1004996), which have high significance their open field system, survive as a series of earthworks. These earthworks conserve valuable evidence for domestic and economic activities on the site through both the medieval and post-medieval periods, giving an insight into the lifestyle of the inhabitants. The association of the village remains with those of its open fields will also preserve evidence for the economy of the settlement and its place in the wider medieval landscape.

13.3.35 Although it is likely that the Cottam 3 study site contains hedgerows that could be considered 'important' under the Hedgerow Regulations 1997, such hedgerows are not considered to be designated heritage assets as defined by the NPPF. The NPPF describes a heritage asset as a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions because of its heritage interest. Given that hedgerows are considered 'important' due to their historic significance and that their 'important' status merits their consideration in planning decisions they can be described as 'non-designated heritage assets' in terms of the NPPF.

13.3.36 The hedgerows contain no evidential value or archaeological interest, i.e. they do not hold any evidence for past human activity worthy of archaeological investigation. The significance of the 'important' hedgerows is, therefore, vested in their historic value in relation to the understanding and survival of the pre-1845 field pattern, i.e. the pattern of land division and allocation established by the enclosure of the parish by the mid-19th century. They are considered to be of very limited potential to add to regional or national research objectives and, as such, are considered to be of no more than local significance.

13.3.37 Development plans have not been finalised at this stage, but the aim will be to minimise any impact on 'important' hedgerows within the Cottam 3 study site and maintain the overall field pattern.

Potential Impacts to be Considered in the ES

13.3.38 Four heritage assets within the 1km buffer of the study site are assessed as having potential to be impacted by the Scheme. These are the Scheduled deserted medieval settlement remains at Gilby (NHLE 1016795), the Old Railway Station (NHLE 1359454), Mount Pleasant Farmhouse (NHLE 1317186) and Church of St Martin (NHLE 1064159). The Scheduled deserted medieval settlement remains at Dunstall (NHLE 1004996) and Southorpe

(NHLE 1016794) within the 2km buffer area will also be taken forward for further assessment.

13.3.39 There will be no direct impact on any of these designated heritage assets.

13.3.40 Indirect impact may arise from development that harms the setting of these assets where it contributes to understanding or appreciation of significance. A visual impact on the setting of Mount Pleasant Farmhouse seems most likely from the initial scoping assessment due to its location north of the study site within the wide, flat landscape. The farmhouse will be taken forward to assess what, if any, impact this will have on understanding of significance. The two Scheduled Monuments within the 1km and 2km study area will be taken forward due to their high level of significance and the rural, agrarian landscape that forms part of their setting. Although this setting was radically altered in the 19th century following enclosure and existing hedging/low-lying land may reduce indirect impact, it will be important to understand any potential harm in detail. There may be some intervisibility between the tower of the Church of St Martin and the study site, and with the Old Railway Station. Both will be put forward for further assessment.

13.3.41 These six heritage assets will be taken forward to the next stage to allow a full and detailed heritage impact assessment to be carried out against detail design proposals. This will allow harm to be avoided or mitigated as part of the planning process.

13.3.42 All other assets within the 1km and 2km buffer areas have been assessed and scoped out of further consideration as there will be no direct impact on the asset or on its setting where it contributes to appreciation or understanding of significance.

Table 13.5: Initial Impact on Assets within 1km of the Study Site

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Mount Pleasant Farmhouse	1317186	GII	Medium	Low	Less than substantial harm	Farmhouse is close to the northern boundary of the study site and has potential to be harmed by the Scheme within its rural, agricultural setting. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Matt Hall	1165509	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St Martin	1064159	GI	High	Low	Less than substantial harm	Possible intervisibility with church tower. Assessment required. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
The Old Windmill	1359455	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Old Railway Station	1359454	GII	Medium	Low	Less than substantial harm	Potential intervisibility between heritage asset and the study site. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Firs Farm	1309162	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church Gate and Railings	1064175	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Lime Cottage	1064132	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of All Saints	1317208	GI	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Cross in St Martin's Churchyard	1018291	SM	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Gilby medieval settlement and cultivation remains	1016795	SM	High	Low	Less than substantial harm	Scheduled earthworks are approx. m away from the study site and will be taken forward for further assessment due to high significance of the asset.	Take forward to next stage of assessment

Table 13.6: Initial Impact on Assets within 2km of the Study Site

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Laughton Hall Farmhouse	1359420	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
19 Cheapside	1260083	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Westgate Uniterian Chapel	1260218	GII*	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
4 Church Road	1064166	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Outbuilding at Laughton Post Office formerly no.2 Church Road	1317236	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Manor House	1165830	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Village Hall	1064173	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Church of St John the Baptist	1165812	GI	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Rose Cottage	1064172	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Northorpe Old Hall	1165840	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
6 Monson Road	1359421	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes
Northorpe Hall	1064174	GII	Medium	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Southorpe medieval settlement and cultivation remains	1016794	SM	High	Low	Less than substantial harm	Scheduled earthworks are approx. 1.4km away from the study site but will be taken forward for further assessment due to high significance of the asset.	Take forward to next stage of assessment
Deserted village of Dunstall	1004996	SM	High	Low	Less than substantial harm	Scheduled earthworks are approx. 1.1km away from the study site but will be taken forward for further assessment due to high significance of the asset.	Take forward to next stage of assessment

13.4 Assessment Methodology

13.4.1 The degree of impact a development could have on heritage assets is variable and can sometimes be positive rather than negative. The wide range of possible impacts can include loss of historic fabric, loss of historic character, damage to historic setting, and damage to significant views.

13.4.2 Under the requirements of EN-1, the NPPF and other relevant guidance, such as Historic England's *Conservation Principles* and *Informed Conservation*, and Good Practice Advice in Planning Notes (GPAs), the process of heritage impact assessment can be summarised as involving three parts:

- Understanding the heritage values and significance of the designated and non-designated heritage assets involved and their settings;
- Understanding the nature and extent of the Schemes;
- Making an objective judgement on the impact that the proposals may have on significance.

13.4.3 A desk-based assessment has been undertaken in order to identify the designated heritage assets in the study area. This assessment is consistent with paragraph 189 of the NPPF and 5.8.8 of EN-1, in providing a level of detail proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance.

13.4.4 Initial assessment has been carried out over a study area that encompasses all locations where effects on the historic environment may result from the Scheme. The study area is of sufficient breadth to inform the assessment of the potential for effects on as-yet unidentified assets.

Methodology for Determining Effects on Significance of designated assets

13.4.5 EN-1 defines a heritage asset as '*an element of the historic environment that is of value to present and future generations because of its historic, archaeological, architectural or artistic interest. The sum of these interests is referred to as its significance.*'

13.4.6 NPPF defines significance as '*The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting*'.

13.4.7 Historic England's *Conservation Principles* (2008) identified four high level values: evidential, historic, aesthetic and communal. A revised consultation draft of *Conservation Principles* published by Historic England in November 2017 adopts the values terminology, or interests, of the NPPF:

- Archaeological Interest: the potential of an asset to yield evidence of past human activity that could be revealed through future investigation. Archaeological interest includes above-ground structures, as well as earthworks and buried or submerged remains.
- Architectural and Artistic Interest: derives from a contemporary appreciation of an asset's aesthetics. Architectural interest is an interest in design, construction, craftsmanship and decoration of buildings and structures. Artistic interest can include the use, representation or influence of historic places or buildings in artwork.

It can also include the skill and emotional impact of works of art that are part of heritage assets or assets in their own right

- Historic Interest: the way in which an asset can illustrate the story of past events, people and aspects of life (illustrative value, or interest). It can be said to hold communal value when associated with the identity of a community.

13.4.8 These values or interests encompass the criteria that Historic England are obliged to consider when statutorily designating heritage assets. There are no single defining criteria that dictates the overall asset significance; each asset has to be evaluated against the range of criteria listed above on a case-by-case basis. These values are not intended to be restrictive but are identified in order to help establish a method for thinking systematically and consistently about the heritage values that can be ascribed to a place and contribute to a heritage asset's significance.

13.4.9 In relation to a recognised heritage asset, the heritage assessment will take into account the contribution which historic character and setting makes to the overall significance of the asset. Assessment of significance has been undertaken in accordance with the methodology outlined in Historic England's *Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision-Taking in the Historic Environment* (2015). It is recognised that not all parts of a heritage asset will necessarily be of equal significance. In some cases, certain elements could accommodate change without affecting the significance of the asset. Change is only considered harmful if it erodes an asset's significance. Understanding the significance of any heritage assets affected and any contribution made by their setting (paragraph 194, NPPF 2021) is, therefore, fundamental to understanding the scope for and acceptability of change.

13.4.10 The relative contribution of the heritage values to the significance of the asset(s) are graded as either high, medium, low, neutral or detrimental depending on their designation.

Table 13.7: Criteria Proposed to Determine Heritage Significance

Heritage significance	Description
International (Very High)	World Heritage Sites
National (High)	Scheduled Monuments Grade I and II* Listed Buildings Grade I and II* Registered Historic Parks and Gardens
Regional/ National (Medium)	Grade II Listed Buildings Grade II Registered Historic Parks and Gardens Conservation Areas
Local (Low)	Locally Listed Buildings Non-designated archaeological sites of local value, and/or potential to contribute to local research objectives
Negligible / Nil	Heritage assets with very little or no surviving research value

Methodology for Determining Effects on Setting of designated assets

13.4.11 Setting, as a concept, was clearly defined in Planning Policy Statement (PPS) 5 and was then restated in the NPPF which describe it as:

'The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.'

13.4.12 Historic England's *Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets Setting* (2017) was used to inform the methodology for this assessment which follows steps i) to iv) outlined in the guidance.

13.4.13 The production of this Scoping report has taken into account the physical and sensory surroundings of the asset, in order to understand the contribution 'setting' makes to the heritage significance of the asset(s). This has included topography and intervening development and vegetation. It also considers how the asset is currently experienced and understood through its setting, in particular views to and from the asset and the site, along with key views, and the extent to which setting may have already been compromised.

13.4.14 The setting of each heritage asset has been scoped for the potential impact the proposals may have on heritage significance. Those identified as having no impact have been scoped out of further assessment.

General Principle: Assessing Harm

13.4.15 NPS EN-1 states that the impact on the historic environment should be considered and the Secretary of State should be satisfied that substantial public benefits would outweigh any loss or harm to the significance of a

designated heritage asset. The Secretary of State should take into account the positive role that large-scale renewable projects play in the mitigation of climate change, the delivery of energy security and the urgency of meeting the national targets for renewable energy supply and emissions reductions. Impact is assessed according to different levels, from negligible to harmful or beneficial, with a range of degrees of harm, from high to limited.

13.4.16 Current guidance by Historic England is that 'change' does not equate to 'harm'. Within the NPPF and NPS EN-1, 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'. Paragraph 201 of the NPPF states that:

'Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss…'

13.4.17 Pursuant to NPS EN-1, 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 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.

Magnitude

13.4.18 The criteria for determining the magnitude of impact on heritage assets is as follows:

Table 13.8: Criteria Proposed to Determine Magnitude of Impact

Magnitude of Impact	Description
High	Change such that the significance of the asset is totally altered or destroyed. Comprehensive change to setting affecting significance, resulting in a serious loss in our ability to understand and appreciate the asset.
Medium	Change such that the significance of the asset is affected. Noticeably different change to setting affecting significance, resulting in erosion in our ability to understand and appreciate the asset.
Low	Change such that the significance of the asset is slightly affected. Slight change to setting affecting significance, resulting in a change in our ability to understand and appreciate the asset.
Negligible	Changes to the asset that hardly affects significance. Minimal changes to the setting of an asset that have little effect on significance, resulting in no real change in our ability to understand and appreciate the asset.

Further Assessment

13.4.19 An initial assessment of the significance of designated heritage assets and potential impacts of the Scheme on this has been undertaken to inform this scoping report.

13.4.20 It is proposed that further detailed assessment of potential impacts to designated heritage assets of the Scheme, including the proposed cable routes, battery storage and substations, will be carried out.

13.4.21 The assessment of likely significant impacts as a result of the Scheme will take into account both the construction and operational phases. No standard criteria exist to identify the significance of heritage assets although this methodology follows national best practice.

13.4.22 The identification of the magnitude of impact proposed to be used in further detailed assessment is outlined in Table 13.8 earlier in this section. This table indicates a guide by which impact might be calculated, though this may be varied based on the individual heritage asset being assessed.

13.4.23 It is proposed that the criteria provided in Table 13.9 below are used to allow a determination of impact significance prior to the implementation of any mitigation. This would take into account that a low magnitude of change on heritage asset of national importance may equate to an effect of moderate importance, while for an asset of local importance the equivalent effect would be less. As the matrix indicates, there is a degree of overlap between the matrix categories, and professional judgement is applied to the matrix result to ensure it is commensurate with unique factors which might apply to the heritage assets concerned.

Table 13.9: Impact Matrix

Significance (special interest)	Magnitude of impact			
	High	Medium	High	Negligible
Very High	Substantial harm	Very High	Substantial harm	Very High
High	Substantial harm	High	Substantial harm	High
Medium	Less than substantial harm	Medium	Less than substantial harm	Medium
Low	Less than substantial harm	Low	Less than substantial harm	Low
Negligible / nil	None	Negligible / nil	None	Negligible / nil

Cottam 1, 2 and 3

13.4.24 The scoping assessment has found that there will be no direct impact to designated heritage assets across Cottam 1, 2 and 3. Within the 1km and 2km buffer for each study site, each designated heritage asset has been identified, recorded and its significance assessed to aid this scoping exercise. An assessment of impact on the heritage significance of these designated heritage assets from the Scheme has been carried out, with the majority of the assets being scoped out of further consideration as there will be no impact on their setting where it contributes to appreciation or understanding of significance. This is in accordance with step i) of the Historic England setting guidance (2017).

13.4.25 A proportion of designated heritage assets within Cottam 1, 2 and 3 will be taken forward for further assessment to understand their significance and any potential impact in greater detail as part of the detailed design development. This will ensure harm is avoided or mitigated at the next stage through offsets, screening and design development. Those assets to be taken forward are generally of the highest significance or likely to be impacted by the proposals due to scale or distance from the study site.

Cable Routes

13.4.26 The final locations of cable routes outside of the Cottam 1, 2 and 3 study sites are yet to be determined.

13.4.27 On determination of a potential cable route or route options, these routes, together with a defined buffer along them, will be subject to a heritage assessment using the methodology set out in this section (Chapter 13) to identify any designated heritage assets along the routes, that could potentially be directly or indirectly impacted by the laying of cables.

13.4.28 Any direct impact upon designated heritage assets will be avoided through the route design.

13.4.29 Where indirect impacts are unavoidable, these will be mitigated through offsets, screening and design development.

Cumulative and In-Combination Effects

13.4.30 The cumulative effect of Cottam 1, 2 and 3 on designated heritage assets within the overlapping search areas of the 1k and 2km buffers have been considered as part of this assessment. Those assets within more than one parcel search radius that may be potentially impacted by the Scheme will be taken forward for additional assessment. This includes consideration of potential cumulative effects with West Burton Solar Project and Gate Burton Energy Park.

13.4.31 It is not considered that there will be any cumulative or in-combination effects from the construction and operation of the Scheme on any designated heritage assets.

13.4.32 Identification of any effects on heritage receptors in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

13.5 Baseline Assessment

13.5.1 This heritage scoping exercise has assessed the impact of the proposals for Cottam 1, 2 and 3 on designated heritage assets within a buffer of up to 2km from the study site. This includes 72 heritage assets in Cottam 1, 12 in Cottam 2 and 25 in Cottam 3. These range from nationally significant Scheduled deserted settlements to schools and windmills.

13.5.2 There will be no direct impacts upon any designated heritage assets.

13.5.3 There will be no operational impacts from the Scheme upon any heritage assets.

13.5.4 Of the 109 designated heritage assets assessed as part of this scoping exercise, the Scheme is found to have no impact on 86 of these or their setting where it contributes to appreciation or understanding of significance. 24 will be taken forward for additional assessment at the next stage to ensure any potential indirect harm can be avoided or mitigated. This includes 13 heritage assets in Cottam 1, five in Cottam 2 and six in Cottam 3.

13.5.5 It is proposed to scope out direct impacts on designated assets from the Scheme on Cottam 1-3 Sites.

13.5.6 Those assets to be taken forward are generally of the highest significance or likely to be impacted by the proposals due to distance from the study site.

13.6 References

Chartered Institute for Archaeologists (CIfA), 2020, *Standard and Guidance for Historic Environment Desk-based Assessment*

Clay, A., 1995, *Glentham Conservation Area Appraisal,* West Lindsey District Council

Clay, A., 1993, *Fillingham Conservation Area Appraisal,* West Lindsey District Council

Clay, A., 1988, *Ingham Conservation Area Appraisal,* West Lindsey District Council

Clay, A., 1981, *Brattleby Conservation Area Appraisal,* West Lindsey District Council

DCLG 2021, *National Planning Policy Framework*

English Heritage, 2008, *Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment*

English Heritage 2010, *Understanding Place*

Historic England, 2015, *Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking in the Historic Environment*

Historic England 2017 *Historic Environment Good Practice Advice Note 3: The Setting of Heritage Assets*

Historic England, 2019, *Statements of Heritage Significance: Analysing Significance in Heritage Assets*

Lord, J., and MacIntosh, A., 2011, *The Historic Landscape Characterisation Project for Lincolnshire,* Lincolnshire County Council and English Heritage

Williams, A. and Martin, G.H. 1992, *Domesday Book. A Complete Translation*

14 Transport and Access

14.1 Introduction

14.1.1 This chapter considers the likely significant effects of the Scheme on the local highway network, during its construction, operational and decommissioning phases.

14.1.2 The nature of Solar Farms is such that there are few significant effects in Transport and Access terms during the Scheme's operational phase. During this period, there are anticipated to be only a handful of visits to the site per month by vehicle for maintenance. Therefore, the focus of the Transport and Access ES Chapter will be on the effects during the temporary construction phase. The effects of the temporary decommissioning phase will be equivalent to, or less than, the construction phase.

14.2 Baseline

The Site and Context

14.2.1 The Scheme is split into three Sites; Cottam 1, 2, and 3. Each Site encompasses a number of separate land parcels.

14.2.2 All three Sites are situated to the west of the A15 between Lincoln and Scunthorpe. The southernmost point of Cottam 1 is approximately 11km to the north of the centre of Lincoln. The northernmost tip of Cottam 3 is approximately 15km to the south of the centre of Scunthorpe.

14.2.3 Cottam 1 is the largest of the three and comprises of a number of individual land parcels. The area is located to the north of the A1500, a single carriageway road running in an east to west alignment, whereby the national speed limit applies. A number of more rural roads also operate throughout the Site, including the B1398, Stow Lane and Willingham Road.

14.2.4 Cottam 2 is located to the north of the A631. Again, this is a single carriageway road running in an east to west alignment, whereby the national speed limit applies.

14.2.5 Cottam 3 is located to the north and west of the B1205 Kirton Road and the east of Blyton village. The B1205 is also a single carriageway road running in an east to west alignment, whereby the national speed limit applies.

14.2.6 A full overview of the Sites and their context will be set out in the Transport and Access ES chapter. This will include a summary of non-motorised and public transport provisions in the local area.

Initial Surveys

14.2.7 Automatic Traffic Count Surveys have been undertaken for all roads within the vicinity of the Sites. These were undertaken between 2nd November 2021 and 8th November 2021. At the time, there were no Covid-19 restrictions in place. In addition, DfT data has been reviewed for the strategic road network, including the A15 and A631. Data from the DfT has been obtained for 2019, prior to the Covid-19 pandemic. The average weekday two-way traffic count for the main roads within the vicinity of the Site is set out in Table 14.1.

Table 14.1: Baseline Traffic Flows – Average Weekday (24 hr), Two-Way

Link	Cottam Area	Total Vehicles	%HGV
A15	Cottam 1,2,3	12,661	17%
Ingham Road	Cottam 1	759	20%
Fleets Lane	Cottam 1	63	25%
East of Coates	Cottam 1	8	23%
Willingham Road	Cottam 1	122	25%
Stow Lane	Cottam 1	688	25%
Thorpe Lane	Cottam 1	83	37%
A631	Cottam 2	9,958	6%
Corringham (North of A631)	Cottam 2	70	3%
Pilham Lane	Cottam 3	92	18%
Kirton Road	Cottam 3	1,606	19%
Station Road	Cottam 3	2,159	18%

Other Baseline Data Sources

14.2.8 Other baseline data sources that will inform the Transport and Access ES Chapter are:

- Personal injury accident data;
- Highway boundary information;
- OS Mapping; and
- Topographical surveys.

14.3 Temporary Construction Phase

14.3.1 The ES Transport and Access Chapter will set out the effects of the temporary construction phase.

14.3.2 An outline Construction Traffic Management Plan (CTMP) is currently being prepared and will form an appendix to the full Transport and Access ES Chapter. The outline CTMP will provide a framework for the management of construction vehicle movements to and from the Site (including the cable route), to ensure that the effects of the temporary construction phase on the local highway network are minimised. The outline CTMP will set out construction access arrangements, construction vehicle routing, construction vehicle trip generation, and the management/mitigation measures. Any requirements for abnormal loads to be delivered to the Sites during construction (for elements such as transformers), will be determined through the design process, in consultation with the appropriate statutory consultees, and addressed in the ES.

14.3.3 The strategy is still being developed, but an overview is provided below.

Construction Vehicle Accesses

14.3.4 During the temporary construction phase, the following construction access points are anticipated to be required (although maybe subject to change as the design develops):

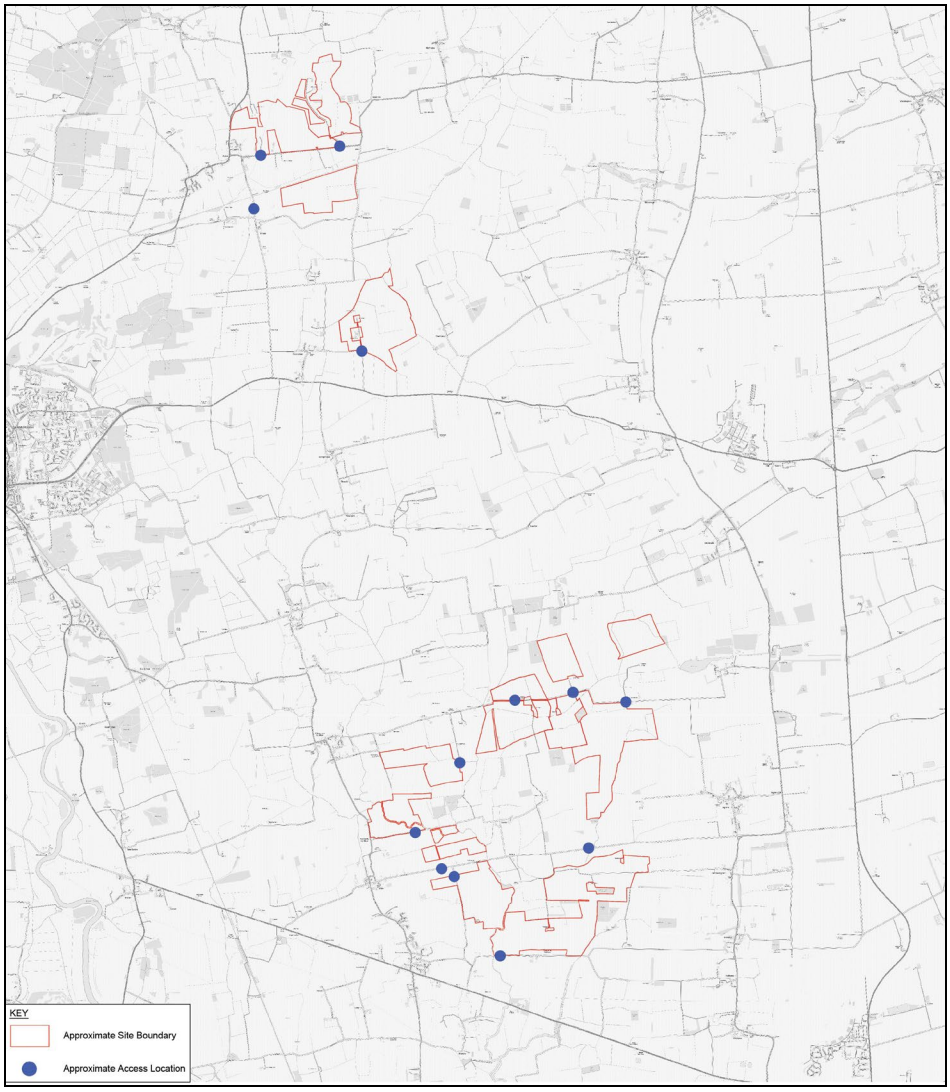
- Cottam 1: potentially 11 accesses including:
  - 1 from Thorpe Lane;

- 1 from Stow Lane;
- 1 from Ingham Road;
- 2 from Fleets Lane;
- 1 from South Lane;
- 3 from Willingham Road;
- 2 from an existing farm track to the west of Coates.

- Cottam 2: 1 access junction from the A361 to the east of Corringham; and
- Cottam 3a: 2 access junctions from the B1205, to the east of Blyton.
- Cottam 3b: 1 access junction to the west of the site.

14.3.5 The proposed location of the access points are shown in Figure 14.1.

Figure 14.1: Proposed Construction Vehicle Access Locations



14.3.6 Where construction vehicle accesses utilise existing agricultural access points or tracks, the access points will be formalised and widened if necessary. Swept path analysis will be included within the outline CTMP to demonstrate that they can operate safely.

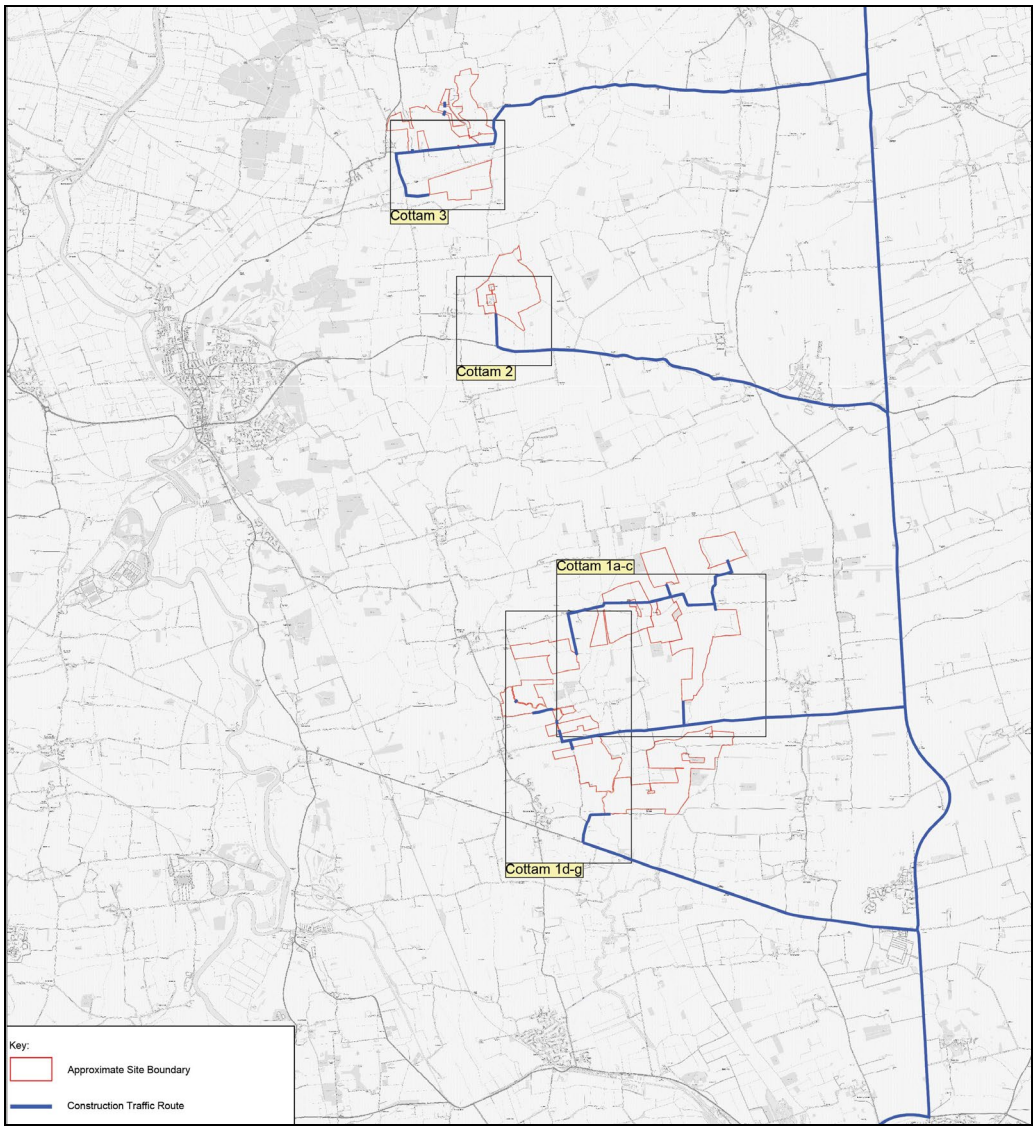
Construction Vehicle Routing

14.3.7 All construction vehicles will access the Site via the A15, from either the M180 Motorway to the north, or the A46 to the south. From the A15, construction vehicles will take the following routes to the Site:

- Cottam 1 – either the A1500 Til Bridge Lane or Ingham Lane/Stow Lane;
- Cottam 2 – A631;
- Cottam 3 – B1205.

14.3.8 The proposed construction vehicle routes are shown in Figure 14.2.

Figure 14.2: Construction Vehicle Routes



Construction Vehicle Trip Generation

14.3.9 The construction vehicle trip generation is still being calculated. Full details will be provided in the ES Chapter and outline CTMP. However, there is a general rule of thumb that there will be approximately 18 HGV deliveries per MW installed. Based on this, the forecast construction vehicle trips are set out in Table 14.2 below.

Table 14.2: Forecast Construction Vehicle Trip Generation

Area	Size	Forecast Construction Vehicle Movements	Average per Day*
Coates	600MW	10,800 (21,600 two-way)	23 (46 two-way)
Corringham	80MW	1,440 (2,880 two-way)	3 (6 two-way)
Blyton	100MW	1,800 (3,600 two-way)	4 (8 two-way)
Total	780 MW	14,040 (28,080 two-way)	30 (60 two-way)

** Based on a 78-week construction period, equating to 468 working days (six working days per week)*

14.3.10 At this stage, it is envisaged that there will be approximately 30 HGV deliveries per day over the construction period (60 two-way movements). In addition, there will also be a number of construction worker trips to the Site. It is envisaged that the majority of non-local workforce will stay at local accommodation and be transported to the Site by minibuses to minimise the impact on the strategic and local highway network.

Management/Mitigation Measures

14.3.11 A number of mitigation measures will be set out within the outline CTMP and ES Chapter. These will likely include, but will not be limited to the following:

- A commitment to avoid network peak hours for deliveries, as well as school drop off and pick up times;
- A commitment to seek to coordinate deliveries with other developments in the area;
- Signage to direct construction vehicles;
- The provision of Site Compounds will be set up, including an appropriate number of parking spaces;
- A requirement for engines to be switched off on-Site when not in use;
- Spraying of areas with water as and when conditions dictate to prevent the spread of dust;
- Vehicles carrying waste material off-Site to be sheeted;
- Banksmen to be provided at Site access points and public rights of way to ensure the safe movement of all construction vehicles;
- The contact details of the Site Manager to be provided on notice boards for the local communities;
- The provision of a wheel washing facility; and
- The agreement to undertake a pre and post highway condition survey around key junctions.

14.4 Operational Phase

14.4.1 During the Scheme's operational phase, there are anticipated to be only a handful of visits to each area of the Site per month for maintenance. These would typically be made by light van or 4x4 type vehicles. Whilst the Site compound will have been removed during the construction phase, space will remain within the Site on the access tracks for such a vehicle to turn around to ensure that reversing will not occur onto the highway.

14.4.2 In light of this, all Transport and Access effects will be negligible or neutral. Therefore, it is proposed to exclude an assessment of the transport effects of the operational phase from the ES Chapter, albeit further detail of the operational stage transport arrangements will be set out in the ES to support this approach.

14.5 Temporary Decommissioning Phase

14.5.1 The Scheme has an anticipated design life of 40 years. At the end of the life of the Scheme it will be decommissioned. The number of vehicles associated with the decommissioning phase are not anticipated to exceed that set out for the construction phase

14.5.2 In light of this, all Transport and Access effects for the decommissioning phase will be the same as for the construction phase. The effects will also be short term and temporary. Mitigation during the decommissioning phase will broadly follow what is set out for the construction phase.

14.6 Legislative and Policy Framework

14.6.1 The ES chapter will be prepared with consideration to "Guidance on Transport Assessments", prepared by the Department for Transport (DfT) in March 2007 (which is now archived but still considered relevant), "Guidelines for the Environmental Assessment for Road Traffic", Institute of Environmental Management and Assessment (IEMA) and the Design Manual for Roads and Bridges (DMRB), National Highways.

14.6.2 The proposals have also been considered in the context of the following documents:

- National Policy Statements EN3 and EN5 (adopted and emerging);
- National Planning Policy Framework (2021);
- National Planning Practice Guidelines (2019); and
- Central Lincolnshire Local Plan (2017); and

14.6.3 Policy LP19 of the Central Lincolnshire Local Plan (2017) states that "…Proposals for non-wind renewable technology will be assessed on their merits, with the impacts, both individual and cumulative, considered against the benefits of the scheme…" The policy states that assessment should take account of "safety, including ensuring no adverse highway impact"

14.6.4 Policy ST51 of the draft Bassetlaw Local Plan (August 2021) states that, "Development that generates, shares, transmits and/or stores renewable and low carbon energy, including community energy schemes, will be supported subject to the provision of details of expected power generation based upon yield or local self-consumption of electricity and by demonstrating the satisfactory resolution of all relevant wider impacts…". The impacts include, "existing highway capacity and highway safety".

14.7 Assessment Methodology

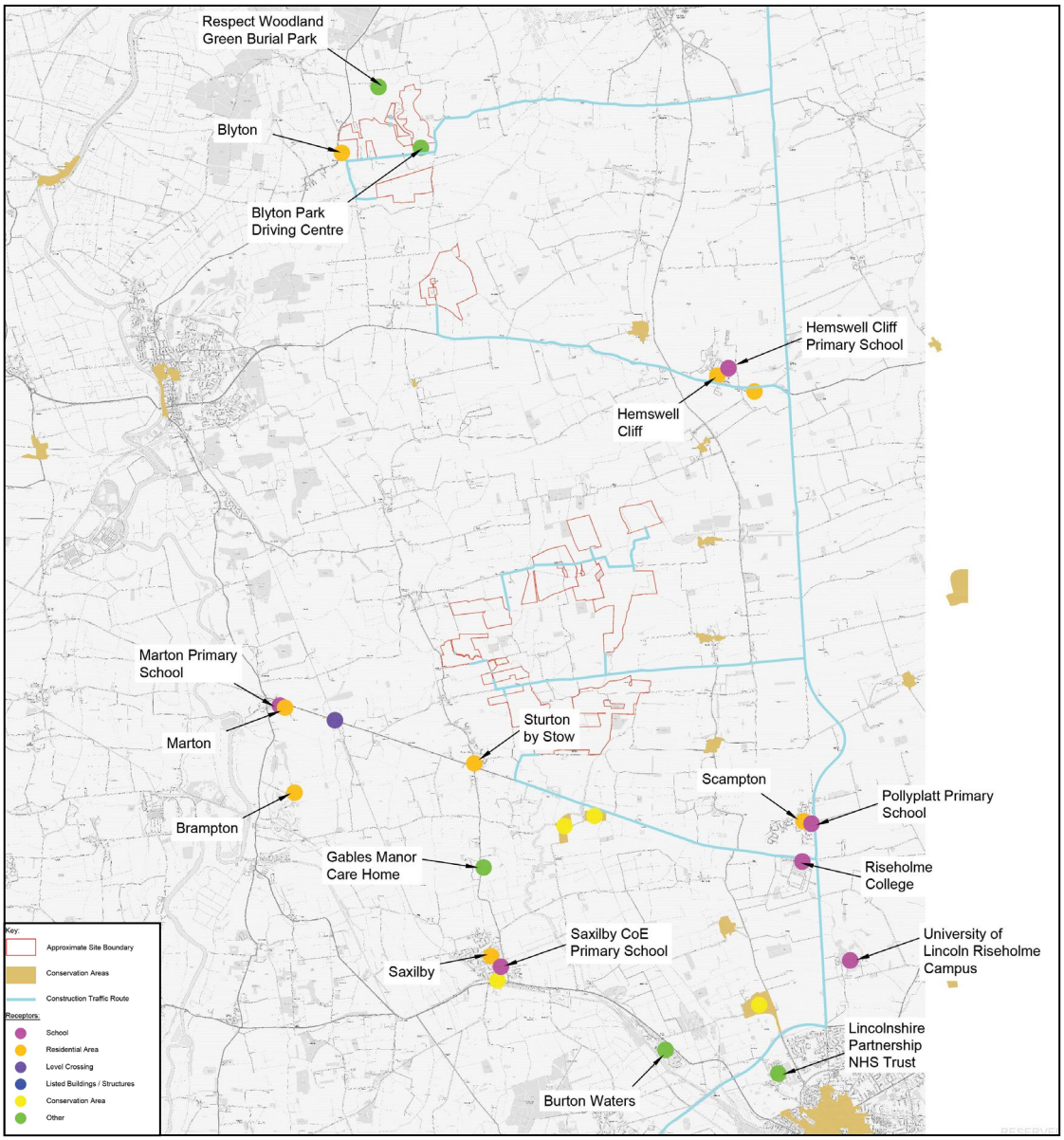
14.7.1 The assessment methodology is set out below. The assessment methodology has been prepared to be in accordance with Guidance on Transport Assessments, prepared by the Department for Transport (DfT) in March 2007 (which is now archived but still considered relevant), Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic, 1993 (the 'IEMA Guidelines') and the Design Manual for Roads and Bridges (DMRB), produced by National Highways in conjunction with the governments of Wales, Scotland and Northern Ireland.

Study Area

14.7.2 The Study Area (which includes the cable corridors) for the full ES Transport and Access Chapter will follow the proposed construction traffic routes to the Site area as indicated in blue in Figure 14.3

14.7.3 The study area, including the identified receptors within the study area, are shown in Figure 14.3.

Figure 14.3: Study Area and Identified Receptors



Types of Impact

14.7.4 The transport and access impacts that will be assessed within the full chapter are as follows:

- Accidents and Safety;
- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity (including Fear and Intimidation); and
- Hazardous Loads.
- A description of each impact is provided below.

Accidents and Safety

14.7.5 The IEMA Guidelines do not include any definition in relation to the assessment of effects on accidents and safety, advising that professional judgement should be used to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents.

Severance

14.7.6 The IEMA Guidelines define severance as '*the perceived division that can occur within a community when it becomes separated by a major traffic artery*' (paragraph 4.27) that 'separates people from places', for example, difficulties crossing existing roads or the physical barrier of the road itself.

14.7.7 There are no predictive formulae which give simple relationships between traffic factors and levels of significance. Nevertheless, there are a range of indicators for determining significance of the relief from severance. The IEMA Guidelines suggest that '*changes in traffic flow of 30%, 60% and 90% are regarding as producing slight, moderate and substantial changes in severance respectively*' (paragraph 4.31). The guidance also suggests that '*marginal changes in traffic flows are, by themselves, unlikely to create or remove severance*'.

Driver Delay

14.7.8 The IEMA Guidelines state that '*delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system*' (paragraph 4.34). As such, the impact of a proposed development on driver delay is typically considered in relation to background traffic. Junction assessment modelling can be used to estimate increased vehicle delays at junctions, if necessary.

Pedestrian Delay

14.7.9 The IEMA Guidelines state that *'changes in the volume, composition or speed of traffic may affect the ability of people to cross roads. In general, increases in traffic levels are likely to lead to increases in delay'* (paragraph 4.35). There are a range of local factors that affect pedestrian delay, including the level of pedestrian activity, visibility and general physical conditions of the site. However, the IEMA Guidelines do not set out thresholds for judging the significance of changes in levels of delay, and suggest that the assessor uses their judgement to determine whether pedestrian delay is a significant impact.

Pedestrian Amenity (Including Fear and Intimidation)

14.7.10 Pedestrian amenity is broadly described in the IEMA Guidelines as *'the relative pleasantness of a journey* (paragraph 4.39) and can be affected by traffic flow, composition and footway widths. This definition includes pedestrian fear and intimidation and can be considered a much broader category when considering the overall relationship between pedestrians and traffic. The IEMA Guidelines suggest that a threshold for judging this would be *'where the traffic flows (or its lorry component) is halved or doubled'* (paragraph 4.39).

Hazardous Loads

14.7.11 The IEMA Guidelines state that some developments include hazardous loads, and that this should be recognised by the assessment.

14.7.12 Whilst not hazardous, there will be abnormal loads to transport the transformers for the substations. An abnormal load is one where the vehicle exceeds 44 tonnes, the width is over 2.9m or the length is more

than 18.65m. Further information will be set out in the ES Chapter and outline CTMP.

Sensitivity of Receptors

14.7.13 The IEMA Guidelines set out two rules which will be used as threshold impacts to define the scale and extent of the assessment, as follows:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or where the number of HGVs will increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

14.7.14 It is notable that, on roads where baseline traffic flows are low, any increase in traffic flow may result in a predicted increase that would be higher than the two rules set out in the IEMA Guidelines. However, it is important to consider any overall increase in road traffic in relation to the capacity of the road.

14.7.15 The IEMA Guidelines state that '*For many effects there are no simple rules or formulae which define the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed up by data or quantified information wherever possible*', and '*those preparing the Environmental Statement will need to make it clear how they have defined whether a change is considered significant or not*' (paragraph 4.5).

14.7.16 The IEMA Guidelines identify general thresholds for traffic flow increases of 10% and 30%. Where the predicted increase in traffic / HGV flow is lower than these thresholds, then the significance of the effects should be considered to be low or not significant and further detailed assessment is not required. However, to ensure a robust assessment of the increase in traffic flows in environmental terms, the following criteria defined in Tables 14.3 and 14.4 will be used to determine magnitude of impact and receptor sensitivity respectively.

Table 14.3: Sensitivity/Importance of Identified Receptor

Sensitivity	Definition
High	Receptors of greatest sensitivity to traffic flows, such as schools, playgrounds, accident blackspots, retirement homes, areas with no footways with high pedestrian footfall, congested areas
Medium	Receptors with some sensitivity to traffic flow, such as conservation areas, listed buildings, tourist attractions, and residential areas
Low	Receptors with low sensitivity to traffic flows, and those distant from affected roads
Negligible	Receptors with no material sensitivity to traffic flows

Table 14.4: Magnitude of Change

Sensitivity	Definition
High	Changes to peak or 24hr traffic within the Study Area by 30% or more
Medium	Changes to peak or 24hr traffic within the Study Area by between 10% and 30%
Low	Changes to peak or 24hr traffic within the Study Area by between 5% and 10%
Negligible	Changes to peak or 24hr traffic within the Study Area up to 5%
Neutral	No Change (+/- daily Variation)

14.7.17 The magnitude of change and receptor sensitivity have been compared to determine the overall significance of effects. This is shown in Table 14.5.

14.7.18 There are five categories demonstrating the significance of the effect. These can be adverse or beneficial:

- Neutral – No change from baseline conditions;
- Negligible – Very little change from baseline conditions;
- Minor – A minor shift away from baseline conditions;
- Moderate – A material shift away from the baseline conditions; and
- Major –Substantial alteration to baseline conditions.

Table 14.5: Significance of Potential Effects

Sensitivity / Magnitude	High	Medium	Low	Negligible
High	Major	Major/Moderate	Moderate	Low
Medium	Major/Moderate	Moderate	Moderate/Minor	Low
Low	Moderate	Moderate/Minor	Minor	Negligible
Negligible	Moderate/Minor	Minor	Negligible	Negligible
Neutral	Neutral	Neutral	Neutral	Neutral

14.7.19 It is considered that only moderate and major effects are significant for the purpose of assessment.

14.7.20 The effects can be temporary or permanent and short, medium or long term in duration. The definitions of these are as follows:

- A short term effect – an effect that will be experienced for 0-5 years;
- A medium term effect – an effect that will be experienced for 5-15 years; and
- A long term effect – an effect that will be experienced for 15 years or longer.

Cumulative and In-Combination effects

14.7.21 Identification of other developments that may give rise to cumulative effects for the temporary construction and decommissioning phases will be agreed with the relevant statutory bodies and any cumulative effects arising from will be considered and described.

14.7.22 Identification of any transport effects in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

14.7.23 If the Scheme and the West Burton Solar Project progress in parallel, IGP will seek to plan and co-ordinate any construction activities, via the CTMP's and CEMP's to reduce environmental impacts, if possible and where practicable.

14.8 Limitations and Assumptions

14.8.1 A number of assumptions will be made when forecasting the traffic generation of the Development, both during construction and operation. However, these forecasts will be developed by the Applicant and their consultants based on professional judgement and derived from experience with other developments similar in scale and nature to the Development. Therefore, they will represent a realistic estimation of traffic generation.

14.9 Conclusions on Scoping

14.9.1 The expected residual effects for each phase are as follows:

Temporary Construction Phase

14.9.2 Construction phase effects are scoped in to the ES, albeit with mitigation,, temporary negligible or minor residual effects are anticipated for all criteria.

Operational Phase

14.9.3 Operational phase effects are scoped out of the ES on the basis that it is expected that there will only be a handful of visits to the Site per month for maintenance purposes, and negligible effects are anticipated on all criteria.

Decommissioning Phase

14.9.4 The Scheme has an anticipated design life of 40 years, at the end of the life of the Scheme it will be decommissioned. The number of vehicles associated with the decommissioning phase are not anticipated to exceed that set out for the construction phase

14.9.5 In light of this, all Transport and Access effects for the decommissioning phase will be the same as for the construction phase. The effects will also be short term and temporary. Mitigation during the decommissioning phase will broadly follow what is set out for the construction phase.

15 Noise and Vibration

15.1 Introduction

15.1.1 This chapter will consider the likely significant effects of the Scheme on the environment with respect to noise and vibration during its construction, operation, and decommissioning phases. The ES will focus on the relative level of effects arising as a result of the Scheme including prior to and post mitigation, in relation to noise levels at existing sensitive receptors.

Appendices

15.1.2 This chapter is supported by the following appendices:

- Appendix 15.1: Noise Survey Information

15.2 Baseline

The Site and Context

15.2.1 The Scheme comprises three Sites named Cottam 1, 2 and 3. At present, the final cable route is yet to be determined and there are 'search areas' for the potential cable route. Only a narrow width within these corridors will be required for the cable route and its construction. The location of this will be refined prior to submission of the DCO application. Therefore, the survey work undertaken for this element to date is in general less advanced.

15.2.2 The Sites and the development proposals under consideration are described in full in Chapters 3 and 4 of the EIA scoping report.

Initial Surveys

15.2.3 The baseline noise environment has been established following noise surveys undertaken at each of the three land parcels as outlined in Appendix 15.1.

Potential and Likely Environmental Effects

15.2.4 The closest sensitive receptors to the land parcels will be assessed, such as residential properties. Residential properties are considered to be of high sensitivity.

15.2.5 The effects during the construction phase have the potential to create noise from the use of mobile plant during the creation of earthworks, site preparation activities and construction of the Development. The impacts will be direct as they occur as a result of activities associated with the development, temporary as they will only occur during the construction phase, short-term because these will only arise at particular times when certain activities combine and will be reversible.

15.2.6 During the operational phase effects have the potential to create noise from the use of the Site including noise associated with the substations, inverters and transformers installed at the site. The impacts will be direct as they occur as a result of activities associated with the Development, permanent (for the life time of the Scheme), as they will occur when the site is fully operational, long-term as they will arise throughout daytime and night-time hours. Effects will however be reversible give the intention to decommission the development at the end of its operational life.

15.3 Assessment Methodology

15.3.1 The methodology for assessing impacts will follow the standard EIA procedures (i.e. screening, scoping, establish baseline, impact prediction and identity mitigation) and will involve consultation with the local authority regarding the assessment methodology and criteria.

Assessment Process

15.3.2 The study area encompasses an area of 67.7sqkm which includes the Scheme and nearby sensitive receptors that may be affected during the construction and operation of the Development.

15.3.3 The scope includes an assessment of noise effects associated with the construction, operational and decommissioning phases of the development including on-site activities. Development generated road traffic noise is considered insignificant and is scoped out.

15.3.4 It is anticipated that the assessment criteria will include the following:

- National Policy Statements (NPS) EN3 and EN5 (adopted and emerging;
- National Planning Policy Framework (NPPF);
- National Planning Policy Guidance 2019 (NPPG);
- Noise Policy Statement for England March 2010 (NPSE);
- British Standards BS7445-1:2003, BS 4142:2014+A1:2019, BS 8233:2014 and BS 5228-1:2009+A1:2014;
- World Health Organisation Guidelines for Community Noise 1999;
- IEMA (Institute for Environmental Management and Assessment) 'Guidelines for Environmental Noise Impact Assessment October 2014; and
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 – LA 111 2019.

Assessment of Sensitivity

15.3.5 The nature or sensitivity on all identified environmental receptors, as well as the magnitude of impact on those receptors will be described as very high, high, medium, low or very low. What this looks like for this topic is set out below.

Table 15.1: Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	Residential properties (permanent tenants), schools and hospitals and sensitive species
Medium	Offices, internal teaching / training spaces
Low	Commercial premises

Residential Properties

15.3.6 Residential properties are classed as being of high sensitivity.

Methodology

15.3.7 Guidance with regard to assessing the magnitude of noise effect is available within the Guidelines for Environmental Noise Impact Assessment, published by IEMA in 2014. The guidance indicates broad parameters with respect to categorising the significance of the basic noise change. For the purpose of the ES chapter, the categories outlined in the tables below form a basis to present the impact for this assessment.

Construction Assessment

15.3.8 Construction noise levels will be compared against BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration on construction and open sites – Part 1: Noise. The assessment would determine the likely effect of the construction phase on existing receptors and will recommend mitigation measures as necessary.

15.3.9 The construction assessment will assess the noise levels associated with construction operations and fixed/mobile plant. These levels will then be compared against baseline noise levels and the noise levels criteria given in the guidance document.

Magnitude

Table 15.2: Method for Assessing the Magnitude of Impact (Construction)

Impact Classification	Assessment	Noise Level Criteria
Negligible	Construction Noise	In rural areas noise levels exceed 50 dB
Low	Construction Noise	In rural areas noise levels exceed 60 dB
Medium	Construction Noise	In rural areas noise levels exceed 70 dB
High	Construction Noise	In rural areas noise levels exceed 80 dB

Operational Assessment

15.3.10 The assessment of potential noise effects from the operation of the site will take into account the baseline noise survey and be undertaken using BS 4142:2014+A1:2019 and BS 8233:2014 with reference to the 1999 WHO document "Guidance for Community Noise" as appropriate.

15.3.11 The operational noise assessment will assume the potential for 24-hour operations from the Scheme.

15.3.12 The noise survey data will be used to model ambient existing and proposed noise levels across the site, using CADNA noise mapping software. This would include noise levels arising from operational activities including noise associated with the substations, Inverters and Transformers and assessed against relevant standards and guidelines.

Table 15.3: Method for assessing the Magnitude of Impact (Operation)

Impact Classification	Assessment	Noise Level Criteria
Negligible	Operational Noise	BS4142 Score of zero or lower Noise levels are below: Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms: 35 dB $L_{Aeq,16hours}$
Low	Operational Noise	BS4142 Score of plus 5 Noise levels are at: Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms: 35 dB $L_{Aeq,16hours}$
Medium	Operational Noise	BS4142 Score greater than +5 Noise levels are exceeded: Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms: 35 dB $L_{Aeq,16hours}$
High	Operational Noise	BS4142 Score of +10 or higher Noise levels with mitigation exceed: Bedrooms: 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms: 35 dB $L_{Aeq,16hours}$

Significance

15.3.13 The level of significance of each effect is determined by combining the impact with the sensitivity of the receptor. Table 15.2 shows how the interaction of magnitude and sensitivity can be combined to determine the significance of an environmental effect.

Table 15.4: Significance of Effect Matrix

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible

Cumulative and In-Combination effects

15.3.14 Identification of other developments that may give rise to cumulative effects will be agreed with the relevant statutory bodies and any cumulative effects arising from will be considered and described. Where there are no cumulative effects, this will also be stated.

15.3.15 The potential cumulative noise impacts associated with the operational phase of the Scheme will be assessed.

15.3.16 Identification of any effects on noise receptors in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

15.4 Conclusions on Scoping

Scoped In

15.4.1 The most notable sources of noise during construction would be during periods of earthworks and remediation, construction of site infrastructure. Given the nature of such works there is the likelihood that during certain periods of the construction phase, noise would be audible at the nearby residential receptors. The level of noise with be dependent on the on the location of the construction activities on a daily basis and the equipment being used, with noise levels being attenuated as the distance between the source and receptor increases. Taking the above into account, the effects of construction noise will be scoped into the assessment.

15.4.2 During the operational phase, effects have the potential to create noise from the use of the Sites including noise associated with the substations, inverters and transformers installed at the Sites. Therefore, operational noise associated with noise generating fixed plant and equipment will be scoped into the assessment.

15.4.3 The potential cumulative noise impacts associated with the operational phase of the Scheme will be assessed in detail as part of the application.

Scoped Out

15.4.4 In terms of road traffic noise, relatively sizeable changes in traffic levels are required to cause perceptible increases in noise levels; a change in noise level of 1 dB, which represents the lowest change perceptible to the human ear, would be produced by an increase in traffic flow of approximately 25%. This assumes that other factors remain broadly unchanged (i.e. average speed and % HGVs using the road). A 3 dB change which, depending on context, could result in a significant adverse effect would be produced by an increase in traffic flow of approximately 100%.

15.4.5 The Scheme is not expected to result in increases in off-site road traffic volumes of greater than 100%. As such, there are not expected to be any adverse impacts in relation to road traffic noise that would be considered to be significant. Therefore, road traffic noise generated during the operational phase and construction of the development is unlikely to be considered significant and is scoped out of the assessment.

15.4.6 In terms of vibration, there are not expected to be any significant sources of vibration during the operational phase of the development, therefore the impact of vibration has been scoped out of the assessment.

15.4.7 The only potential significant source of vibration associated with the construction phase of the development would be during any piling works

taking place. However, previous measurements undertaken by Tetra Tech of percussive piling indicate that cosmetic damage to buildings is unlikely to occur beyond a distance of 14m. The closest sensitive properties are located at significantly greater distances to where any of the built form element of the Scheme will be located and therefore, vibration levels will be beyond the threshold where cosmetic damage may occur. As such, no significant effects with respect to vibration are expected to occur and therefore, the assessment of vibration impacts has been scoped out.

16 Glint and Glare

16.1 Introduction

16.1.1 This chapter of the Scoping Report will consider the likelihood of significant glint and glare effects created by the Scheme during its construction, operation and decommissioning phases. The chapter will describe and identify the potential level of effects arising as a result of the Scheme, including prior to and post mitigation, in relation to:

- Road users – specifically drivers of motor vehicles;
- Users of PROS at a high level;
- Occupants of surrounding dwellings;
- Railway operations and infrastructure; and
- Aviation activity surrounding RAF Scampton, Sturgate Airfield, Haxey Airfield and Kirton in Lindsey Airfield.

Appendices

16.1.2 This chapter is supported by the following appendices:

- Appendix 16.1 Glint and Glare Receptor Scoping Assessment.

16.2 Baseline

The Site and Context

16.2.1 A 1km distance surrounding the development is considered appropriate for road users and dwellings. The following receptors have been identified:

- Residential dwellings; and
- National and Regional roads.

16.2.2 A 500m distance surrounding the development is considered appropriate for rail operations and infrastructure; the 500m area surrounding the Scheme contains the following rail infrastructure:

- Sections of railway line; and
- Identified railway signals.

16.2.3 A 15km distance surrounding the development is considered appropriate for aviation considering the type of aerodromes scoped. The 15km assessment area surrounding the Scheme contains the following aviation infrastructure:

- Haxey Airfield – 8.5km north-west of Cottam 3;
- Kirton in Lindsey Airfield – 6.8km north-east of Cottam 3;
- Sturgate Airfield – 4km north-west of Cottam 1; and
- RAF Scampton – 4.1km south-east of Cottam 1.

16.2.4 The main source of irradiance in the area will be the sun, which is a more intense source of light than solar reflections from solar photovoltaic panels. Road users are already aware of safety implications when driving in bright sunlight. Dwellings will experience the most noticeable source of irradiance at sunset and sunrise.

Initial Surveys

16.2.5 No field work/site surveys were undertaken as part of this scoping report.

Potential and Likely Environmental Effects

16.2.6 The following potential effects were identified at the scoping stage for consideration in this assessment:

- Direct effects during construction and operation from glint and glare on:
  - Ground-based receptors (roads and dwellings);
  - Aviation activity associated with RAF Scampton, Sturgate Airfield, Haxey Airfield and Kirton in Lindsey; and
  - Railway operations and infrastructure (train drivers and signals).
- There are no indirect effects during construction or operation from glint and glare.

16.3 Assessment Methodology

16.3.1 There is no formal guidance with regard to the maximum distance at which glint and glare should be assessed. From a technical perspective, there is no maximum distance for potential reflections. However, the significance of a solar reflection decreases with distance. This is because the proportion of an observer's field of vision that is taken up by the reflecting area diminishes as the separation distance increases. In most instances terrain and shielding by vegetation are also more likely to obstruct an observer's view at greater distances.

16.3.2 The above parameters and extensive experience over a significant number of glint and glare assessments undertaken shows that a 1 kilometre buffer is considered appropriate for glint and glare effects on local dwellings and road users, 500m for railway operations and infrastructure and 15km for aviation activity. In most cases the assessed distance is much less than this.

16.3.3 The initial judgement is made based on high-level consideration of aerial photography and mapping i.e. receptors are excluded if it is clear from the outset that no visibility would be possible. A more detailed assessment is made if the modelling reveals a reflection would be geometrically possible.

Assessment Process

16.3.4 Pager Power's glint and glare assessment methodology has been derived from the information provided to Pager Power through consultation with stakeholders, assessment experience and by reviewing the available guidance and studies. The methodology for ground level glint and glare assessments is as follows:

- Identify the key receptors in the area surrounding the Scheme;
- Consider direct solar reflections from the Scheme towards the identified receptors by undertaking geometric calculations based on the proposed panel options as set out in Chapter 4;
- Consider the visibility of the panels from the receptor's location. If the panels are not visible from the receptor then no reflection can occur;

- Based on the results of the geometric calculations, determine whether a reflection can occur, and if so, at what time it will occur;
- For aviation receptors consider the solar reflection intensity;
- Consider both the solar reflection from the Scheme and the location of the direct sunlight with respect to the receptor's position;
- Consider the solar reflection with respect to the published studies and guidance - including intensity calculations where appropriate; and
- Determine whether a significant detrimental impact is expected in line with Pager Power's standard process and recommended methodology.

Assessment of Sensitivity

16.3.5 The nature or sensitivity on all identified environmental receptors, as well as the magnitude of impact on those receptors will be described as high, medium or low. This is set out in the context of glint and glare below.

Table 16.1: Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	The receptor has little ability to absorb change without fundamentally altering its present character or is of international importance
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character or is of high importance.
Low	The receptor is tolerant of change without detriment to its character or is of low local importance.

Environmental Receptor – Road User

16.3.6 Sensitivity and importance: For road user receptors, it is relevant to consider that road types can generally be categorized as:

- Major National – Typically a road with a minimum of two carriageways with a maximum speed limit of up to 70mph. These roads typically have fast moving vehicles with busy traffic.
- National – Typically a road with a one or more carriageways with a maximum speed limit of up to 60mph or 70mph. These roads typically have fast moving vehicles with moderate to busy traffic density.
- Regional – Typically a single carriageway with a maximum speed limit of up to 60mph. The speed of vehicles will vary with a typical traffic density of low to moderate.
- Local – Typically roads and lanes with the lowest traffic densities. Speed limits vary.

16.3.7 Local roads would be considered as 'Low' sensitivity and Regional, National, and Major National roads would be considered of 'Medium' sensitivity.

16.3.8 Magnitude of impact: The magnitude of effect upon road user receptors is predominantly dependent on the following factors:

- The distance between the receptor and the panel area – a study area of one kilometre is applied;
- The type of road – in the context of traffic speeds and likely densities;
- Whether a solar reflection is predicted to be experienced in practice; and
- The location of the reflecting panels relative to a road user's direction of travel – a solar reflection directly in front of a driver is more hazardous than a reflection from a location off to one side.

16.3.9 A 'Negligible' magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by a road user.

16.3.10 A 'Low' magnitude would occur if solar reflections would all originate from outside a road user's main field of view. Reflections originating within a road user's main field of view can be of 'Low' magnitude based on consideration of the following mitigating circumstances:

- Whether visibility is likely for elevated drivers (applicable to dual carriageways and motorways only) – there is typically a higher density of elevated drivers along dual carriageways and motorways compared to other types of road;
- The separation distance to the panel area – larger separation distances reduce the proportion of an observer's field of view that is affected by glare; and
- The position of the sun – effects that coincide with direct sunlight appear less prominent than those that do not.

16.3.11 A 'Medium' magnitude would occur if solar reflections were experienced from within a driver's main field of view and there are insufficient mitigating factors.

16.3.12 A 'High' magnitude would occur if solar reflections were experienced from directly in front of a road user's direction of travel with no mitigating factors.

Environmental Receptor – Dwelling Occupants

16.3.13 Sensitivity and tolerance to change: 'Low' because they are of local importance.

16.3.14 Magnitude of impact: The magnitude of effect upon dwelling receptors is predominantly dependent on the following factors:

- The distance between the receptor and the panel area – a study of one kilometre is applied;
- Whether a solar reflection is predicted to be experienced in practice; and
- The duration of the predicted effects, relative to the thresholds of three months per year and sixty minutes per day.

16.3.15 A 'Negligible' magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by an observer within a dwelling.

16.3.16 A 'Low' magnitude would occur when a solar reflection would be experienced for less than three months per year and for less than sixty minutes per day, or outside of these limits based on consideration of the following mitigating circumstances:

- The separation distance to the panel area – larger separation distances reduce the proportion of an observer's field of view that is affected by glare;
- The position of the sun – effects that coincide with direct sunlight appear less prominent than those that do not;
- Whether visibility is likely from all storeys – the ground floor is typically considered the main living space and has a greater significance with respect to residential amenity; and
- Whether the dwelling appears to have windows facing the reflecting area – factors that restrict potential views of a reflecting area reduce the level of impact.

16.3.17 A 'Medium' magnitude would occur if solar reflections were experienced for more than three months per year and for more than three minutes per day.

16.3.18 A 'High' magnitude would occur if solar reflections were experienced for more than three months per year and for more than three minutes per day.

Environmental Receptor – Rail Operations and Infrastructure

16.3.19 Sensitivity and importance: 'Medium' because they are of high importance.

16.3.20 Magnitude of impact: The magnitude of effect upon train drivers' receptors is predominantly dependent on the following factors:

- Whether a solar reflection is predicted to be experienced in practice;
- The location of the reflecting panels relative to a train drivers' direction of travel – a solar reflection directly in front of a driver is more hazardous than a reflection from a location off to one side; and
- The predicted workload of the driver at the location where glare is predicted i.e. is there a station or signal present.

16.3.21 A 'Negligible' magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by a road user.

16.3.22 A 'Low' magnitude would occur if solar reflections would all originate from outside a train driver's main field of view (30 degrees either side of the direction of travel). Reflections originating within a train driver's main field of view can be of 'Low' magnitude based on consideration of the following mitigating circumstances:

- The separation distance to the panel area – larger separation distances reduce the proportion of an observer's field of view that is affected by glare; and
- The position of the sun – effects that coincide with direct sunlight appear less prominent than those that do not.

16.3.23 A 'Medium' magnitude would occur if solar reflections were experienced from within a train drivers' main field of view and there are insufficient mitigating factors.

16.3.24 A 'High' magnitude would occur if solar reflections were experienced from directly in front of a train drivers' direction of travel with no mitigating factors.

Environmental Receptor – Aviation

16.3.25 Sensitivity and importance: 'Medium' because they are of high importance.

Air Traffic Control (ATC) Tower

16.3.26 The magnitude of effect upon the ATC Tower receptors is dependent on the following main factors:

- Whether a solar reflection is predicted to be experienced in practice;
- The glare intensity and duration - a reflection of greater intensities and prolonged time periods have a higher impact upon ATC Tower personnel;
- Proportion of an observer's field of vision that is taken up by the reflecting area; and
- Glare location relative to key operational areas – a solar reflection originating near sensitive areas such as the runway threshold will have a higher impact upon the ATC Tower personnel.

16.3.27 A 'Negligible' magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by ATC personnel.

16.3.28 A 'Low' magnitude would occur if solar reflections were experienced by ATC personnel but there are sufficient mitigating main factors, or the aerodrome confirmed the level of glare is acceptable.

16.3.29 A 'Medium' magnitude would occur if solar reflections were experienced by ATC personnel and effects occasionally and marginally affected the safeguarding operations.

16.3.30 A 'High' magnitude would occur if solar reflections were experienced by ATC personnel and the safeguarding operations were regularly and substantially affected.

Approach Paths

16.3.31 The magnitude of effect upon aircraft approaching a runway (also referred as approach paths) is dependent on the following main factors:

- Whether a reflection is predicted to be experienced in practice;
- The location of glare relative to the approach bearing – a solar reflection directly in front of a driver is more hazardous than a reflection from a location off to one side;
- The position of the Sun – effects that coincide with direct sunlight appear less prominent than those that do not; and
- Existing reflecting surfaces – a solar reflection is less noticeable by pilots when there are existing reflective surfaces in the surrounding environment.

16.3.32 A 'Negligible' magnitude would occur if solar reflections are not geometrically possible.

16.3.33 A 'Low' magnitude would occur under the following scenarios:

- Solar reflections originate from outside a pilot's main field of view;
- The glare has a 'low potential for temporary after-image';
- The glare has a 'potential for temporary after-image' with sufficient mitigating factors; and
- The aerodrome has confirmed the level of glare is acceptable.

16.3.34 A 'Medium' magnitude would occur if the glare has the 'potential for temporary after-image' without sufficient mitigating main factors.

16.3.35 A 'High' magnitude would occur if solar reflections if the glare has the 'potential for permanent eye damage'.

Significance

16.3.36 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity.

Table 16.2: Impact Significance Matrix

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

16.3.37 Overall, the level of effect would be considered 'Significant' if the resultant significance of effect was 'moderate' or higher.

Methodology

Ground-Based Receptors (Road users and Dwellings)

16.3.38 The assessment area for ground-based receptors (road users and dwellings) is defined by the maximum distance considered appropriate for glint and glare effects and where solar reflections are considered geometrically possible. A 1 kilometre distance is considered appropriate for road users and dwellings. Receptors within this zone are identified based on mapping and aerial photography of the region.

Rail Operations and Infrastructure

16.3.39 The assessment area for rail operations and infrastructure is defined by the maximum distance considered appropriate for glint and glare effects and where solar reflections are considered geometrically possible and by the consultation with the rail operator (this for signals only). A 500m distance is considered appropriate for rail operations and infrastructure. Receptors within this zone are identified based on mapping, aerial photography of the region and consultation with the relevant stakeholder (railway signals only).

Aviation Receptors

16.3.40 The assessment area for aviation receptors is primarily dependent on the type of aerodrome. Concerns are most often raised for developments within 10km of a licensed aerodrome. Modelling requests aviation effects at ranges of 10-20km are far less common for licensed aerodromes, and even less common for unlicensed aerodromes at this range.

16.3.41 The assessment area used for aviation receptors is therefore 15km.

Mitigation and Enhancement

16.3.42 Any predicted impacts towards the ground-based infrastructure can likely be solved with relatively simple mitigation strategies – the most common being the provision of screening at the site perimeter to obstruct views of potentially reflecting panels. Where views of reflecting panels are obstructed, no effects can be experienced. Other solutions such as layout modification can be considered but are rarely required in practice.

16.3.43 Any moderate impact upon aviation operations will have to be mitigated. Mitigation solutions might be more invasive and significantly change the Scheme's characteristics. Whilst formal guidance within the UK for quantifying impacts is sparse, the industry standard is to evaluate effects on aviation receptors based on their intensity (specifically the potential for a temporary after-image following publication of a methodology by Sandia Laboratories in the USA) as well as their duration and operational sensitivity. For tracking panels, the viability of less invasive mitigation solution can be explored. However, these options will affect the operation of the tracking system.

Cumulative and In-Combination effects

16.3.44 Identification of other developments that may give rise to cumulative effects will be agreed with the relevant statutory bodies and any cumulative effects arising from these will be considered and described. Where there are no cumulative effects, this will also be stated.

Predicted Cumulative Effects during Construction

16.3.45 Glint and glare effects can occur from any solar panels that are installed within the Developable Area. However, as not all panels will be installed simultaneously, the length and intensity of any solar reflections during construction phase will be less than or equal to the operational phase.

16.3.46 Therefore, the effects during construction will be less than or equal to effects during operation.

Predicted Cumulative Effects during Operation

16.3.47 Cumulative effects are predicted to be theoretically possible in combination with other solar developments that are consented, under construction or operational and will, therefore, be considered cumulatively within the technical impact assessment. This includes consideration of potential cumulative effects with the West Burton Solar Project and Gate Burton Energy Park.

In-combination Effects

16.3.48 Identification of any effects on glint and glare receptors in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

16.4 Conclusions on Scoping

16.4.1 Based on initial scoping work, the Scheme is predicted to have a 'moderate' degree of significance in terms of glint and glare at worst, based on a medium magnitude and medium sensitivity (worst-case) upon surrounding road users, dwellings, aviation, and railway receptors and mitigation may not be fully possible through design, therefore glint and glare will be scoped into the Environmental Statement.

17 Electromagnetic Fields

17.1 Introduction

17.1.1 This scoping report chapter considers the likelihood of significant electromagnetic field (EMF) effects created by the Scheme during its construction, operation and decommissioning phases, with particular focus on risk to human health.

17.1.2 EMFs arise from the generation, transmission, distribution and use of electricity. EMFs occur around all electronic infrastructure. In this instance, the most significant EMF sources are the cable routes and associated infrastructure which connect the Scheme to the grid.

17.1.3 The chapter will describe and identify the potential level of effects arising as a result of the Scheme. This chapter covers the proposed:

- Underground cable routes;
- Substations including inverters, transformers and switch gear; and
- Energy storage.

Appendices

17.1.4 This chapter is supported by the following appendices:

- Appendix 17.1: High-Level Electro Magnetic Field Assessment.

17.2 Baseline

The Site and Context

17.2.1 The Scheme will be located on agricultural land. The Scheme will consist of numerous solar panel areas with varying distances between them. The area will be connected to the grid via buried interconnecting underground cables. The specific location for the cable routes has not yet been decided.

17.2.2 The cables will connect into the electrical infrastructure located at Cottam Power Station. There are no above ground solar panels or other associated electrical infrastructure present within the developable area which will be used as part of the Scheme.

Initial Surveys

17.2.3 No field work/site surveys were undertaken as part of the Scoping Report.

Potential and Likely Environmental Effects

17.2.4 The following potential effects were identified at the scoping stage for consideration in this assessment:

- Direct effects during construction and operation from EMF on:
  - Local residents;
  - People located in non-residential properties; and
  - The general public.
- There are no indirect effects predicted during construction or operation from EMF.

17.3 Assessment Methodology

17.3.1 This Scoping Report and the associated technical appendix has considered the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines published in 1998. Assumptions were made regarding the type of infrastructure that is to be implemented, where required.

17.3.2 The reference limits presented within the ICNIRP guidelines have been used when determining recommended setback distance from residential and non-residential properties and other locations where the general public may congregate.

Assessment Process

17.3.3 The proposed cable route area, location of infrastructure, cable powers, and location of existing residential properties were considered. Within the technical appendix, reference calculations were undertaken to determine whether setback distances are required.

Assessment of Sensitivity

17.3.4 The nature or sensitivity of all identified environmental receptors, as well as the magnitude of impact on those receptors will be described as high, medium or low. This is set out in the context of EMF below.

Table 17.1: Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	A receptor that requires exceptional isolation or shielding from EMFs of any kind
Medium	A receptor that routinely experiences varying EMFs within a regulated range with no adverse impacts
Low	A receptor that is largely unaffected by EMFs of any kind

Environmental Receptor – local resident, people located in non-residential properties or the general public

17.3.5 Sensitivity and importance: people are of 'Medium' sensitivity because people experience EMFs from a man-made environment all the time, usually subject to commercial limits.

17.3.6 Magnitude of impact: The magnitude of effect upon a person is predominantly dependent on the following factors:

- The predicted EMF level;
- The duration a person may be subjected to the EMF; and
- The person's setting e.g. a dwelling, office, PRoW etc.

17.3.7 A 'Negligible' magnitude would occur if no EMF could be experienced by any person.

17.3.8 A 'Low' magnitude would occur if a person could be subjected to EMF which was below the reference health limit with respect to their setting as per ICNIRP guidance.

17.3.9 A 'Medium' magnitude would occur if a person could be subjected to EMF which was above the reference health limit but below the human health limit with respect to their setting as per ICNIRP guidance e.g. increased exposure limits based on a person's profession.

17.3.10 A 'High' magnitude would occur if a person could be subjected to EMF which was above the human health limit with respect to their setting as per ICNIRP guidance.

Significance

17.3.11 The significance of an environmental effect is determined by the interaction of magnitude and sensitivity. This impact significance matrix is set out below.

Table 17.2: Impact Significance Matrix

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

17.3.12 Overall, the level of effect would be considered 'Significant' if the resultant significance of effect was 'moderate' or higher.

Methodology

Receptors

17.3.13 The detailed plans for the location of the associated electronic infrastructure have not yet been confirmed. However, the technical appendix 'High-Level Electro Magnetic Field Assessment' has determined the level of clearance required, if any, from residential and non-residential properties, as well as the general public (on Public Rights of Way or recreation grounds, for example).

Infrastructure Type

17.3.14 The analysis has considered the following infrastructure:

- Cable Routes, specifically:
  - 33kV (kilovolt) underground cables;
  - 132kV underground cables; and
  - 400kV underground cables at the point of grid connection.
- Infrastructure including:
  - Substations;
  - Inverters;
  - Transformers;
  - Switch gear; and
  - Energy storage.

Technical Appendix Results Summary

- Cable Routes:
  - Levels of electromagnetic radiation are all predicted to be well below 1998 ICNIRP reference levels at all surrounding locations where public exposure levels are relevant, based on the currently proposed cable route in a worst-case configuration.
- Infrastructure:
  - Significant radiation is not predicted from other sources, including the substations and batteries because:
  - The most significant substation is more than 400 metres from any dwelling. Electromagnetic radiation levels reduce as the separation distance increases, meaning that all dwellings are at a safe distance from the substation.
  - The energy storage facility is more than 100 metres from any dwelling, meaning that all dwellings are at a safe distance.
  - All electrical equipment and installations will be fully compliant with all relevant national and international standards meaning that emissions will be at safe levels.

Mitigation and Enhancement

17.3.15 The Proposed Development will be designed in a way that will mitigate any EMF impacts with respect to human health. If for any reason this is not achievable, a suitable impact assessment will be completed and a chapter within the associated Environmental Statement will be completed.

17.3.16 Mitigating techniques will include stand-off distance between receptors, if required.

Cumulative and In-Combination effects

17.3.17 Identification of other developments that may give rise to cumulative effects will be agreed with the relevant statutory bodies and any cumulative effects arising from this will be considered and described. Where there are no cumulative effects, this will also be stated.

Predicted Cumulative Effects during Construction

17.3.18 The Scheme will not be powered during construction, or at least not operating at full capacity. Therefore, the effects during construction will be less than or equal to the effects during operation and therefore cumulative effects are not considered during construction.

Predicted Cumulative Effects during Operation

17.3.19 Cumulative effects are theoretically possible in combination with other solar developments that are consented, under construction or operational however, considering the results presented within the technical appendix, whereby any standoff distance would be negligible, no cumulative impact is anticipated. This includes consideration of potential cumulative effects with the West Burton Solar Project and Gate Burton Energy Park.

17.3.20 The cumulative impacts arising from the development will be assessed in combination with other relevant development. The list of cumulative

developments to be considered will be compiled in consultation with stakeholders.

In-combination Effects

17.3.21 Identification of any effects on EMF receptors in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

17.4 Conclusions on Scoping

17.4.1 The Scheme is predicted to have 'minor' impacts in terms of EMF at worst, based on a negligible magnitude and medium sensitivity upon surrounding receptors, and is proposed to be scoped out of the ES.

18 Light Pollution

18.1 Introduction

18.1.1 The approach to light pollution in the ES will consider the likely significant effects of the Scheme during its construction, operation and decommissioning phases.

18.2 Baseline

The Site and Context

18.2.1 The Scheme is located across a generally rural area where there is relatively little light pollution. Cottam 3a has a less rural context with commercial and industrial uses surrounding and interspersing the Sites, many of which contain externally lit areas.

Potential and Likely Environmental Effects

18.2.2 *Operational lighting* - As described in Chapter 4 of this report, there would be no permanent external lighting installed as part of the Scheme. Security lighting would be infrared, and the limited lighting associated with the substations and within the Energy Storage site would be used for occasional maintenance/emergency use only.

18.2.3 *Construction lighting* – This will be temporary in nature.

18.2.4 Use of artificial lighting across the site has the potential for environmental effects in relation to ecology.

18.3 Assessment Methodology

18.3.1 Any likely significant effects associated on receptors with the use of artificial lighting within the development will be assessed as part of the other environmental topics considered in the ES, for example ecology and landscape.

18.3.2 Glint and Glare from sunlight will be assessed as part of a separate chapter.

Cumulative and In-Combination effects

18.3.3 Any cumulative or in-combination effects will be assessed as part of the relevant technical chapters.

18.4 Conclusions on Scoping

18.4.1 It is not considered necessary to include a chapter on Lighting within the ES. The potential effects of lighting will be addressed within the Landscape and Visual and Ecology chapters of the ES as appropriate.

19 Major Accidents and Disasters

19.1 Introduction

19.1.1 The EIA Regulations require consideration to be given to the risk of major accidents and/or disasters relevant to the development concerned, including those caused by climate change, in accordance with scientific knowledge.

19.1.2 IEMA define Major Accidents and disasters as follows[18]:

Term	IEMA Definition
Major Accident	Events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.
Disaster	May be a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.

19.2 Baseline and Assessment Methodology

Potential risks associated with the Site and the Scheme

19.2.1 Operational solar farms are relatively benign in terms of emissions, and major accidents and hazards are generally not associated with them. Notwithstanding, the construction and operation of the Scheme could give rise to the following impacts:

- The potential to cause flooding on and off-site. The Hydrology, Flood Risk and Drainage chapter will assess any likely significant effects.
- On-site fires associated with technology such as batteries as a form of energy storage, and inverters. The technology will have built in safety features including fire resistant construction, fire detection, suppression systems, emergency stop functions and isolation monitoring. Although, rare, fires and associated explosions have the potential to cause safety concerns to human health, including anyone working on site, or within the area of fire spread/associated contamination fall out. Fires also have the potential to have an impact on the natural environment including the habitats and species on site and surrounding area.
- Road accidents could occur during the construction or decommissioning phases that involve hazardous substances. The potential environmental impacts arising from this will be explored as part of the ecological, drainage and contamination topics. Assessment of any likely significant effects will be included within the relevant ES chapters. The potential for road accidents caused by glint or glare from installed solar panels will be explored as part of the Glint and Glare assessment, which will be appended to the ES.

[18] Major Accidents and Disasters in EIA: A Primer September 2020 (IEMA)

The Glint and Glare assessment will be used to inform the proposed development and mitigation measures, where required.

- Rail accidents could occur during construction works for the cable routes, where the cables cross the railway line. Initial discussions are underway with Network Rail to design the crossings in line with their requirements and protocols. Network Rail requirements for works, together with contractor construction procedures will minimise the risk to rail users of accidents.
- Whilst the draft review of the National Policy Statement for Renewable Energy Infrastructure 'EN3' is clear that 'there is no evidence that glint and glare from solar farms interferes in any way with aviation navigation or pilot and aircraft visibility or safety' (NPS EN-3 consultation draft, Sept 2021 - para 2.52.5), the potential for aircraft disasters will be explored as part of the Glint and Glare assessment, which will form a technical appendix to the ES. Any required mitigation measures will be incorporated into the proposed design.
- The construction of the Scheme has the potential to cause utility accidents, potentially damaging or cutting off the supply of utilities such as gas, electricity, water, sewage, oil and telecommunications. Depending on the nature of the accident this could cause supply disruption to users, and/or present a risk of danger to people and the natural environment on site and in the surrounding area via contamination or potential fire or explosion. Discussions are underway with utility and infrastructure providers to ascertain the locations of all assets, and the provider's required offset distances will be implemented in the scheme design to minimise this risk. Contractor practice and working guidelines will also be implemented to minimise the risk of such accidents occurring, and to minimise the severity of an impact in the event an asset is disturbed.
- It is possible that unexploded ordnance could be disturbed during construction. The potential for the presence of UXO will be considered within the ground conditions and contamination chapter.
- There is potential for unstable ground conditions within the Sites as a result of current and past mineral mining and extraction activity. A full planning history search of the site will be checked with the Minerals authorities in relation to mining history. The ground conditions survey will inform any required mitigation in developing the design of the proposals. This will minimise the risk to people working on site, in terms of land collapse, throughout all phases of the project.
- The new planting proposed can be susceptible to disease and pests. Changing conditions due to climate change may exacerbate this. The failure of planting presents a risk to the natural environment. The landscape planting strategy will take account of the need to plant a diverse range of species that will be tolerant to climate change.

19.2.2 The vulnerability of the Scheme to a potential accident or disaster will be fully explored with utilities and infrastructure operators, and with reference to the Planning Inspectorate's Advice Note 11 Annex G (Health and Safety Executive).

19.2.3 This review will establish whether the Scheme interacts with any sources of external hazards, as noted above that may make it vulnerable to a major accident and or disaster.

Methodology

19.2.4 In addition to the resources mentioned above, and technical work referenced elsewhere in this report, information will be gathered from the following sources to inform assessment:

- Industry manufacturers regarding product specifications;
- Construction Design Management (CDM) risk register, relevant development studies such as geotechnical desk-based assessments, and System Safety Hazard Records;
- UK's current National Risk Register (NRR) of Civil Emergencies, and local community risk registers (to be discussed with local resilience forums for Lincolnshire and Nottingham and Nottinghamshire);
- The Health and Safety Executive;
- Environment Agency;
- Host Authorities (including in relation to adjacent Control of Major Accident Hazards (COMAH);
- Network Rail; and
- Highways England.

19.2.5 Construction workers are excluded from the assessment of major accidents and disasters given other legislative provisions are in place to manage health and safety risks, including:

- Health and Safety at Work etc. Act 1974 (Ref. 146);
- The Management of Health and Safety at Work Regulations 1999 (Ref. 147);
- The Workplace (Health, Safety and Welfare) Regulations 1992 (Ref. 148); and
- Construction (Design and Management) (CDM) 2015 Regulations (Ref. 134).

19.2.6 Embedded mitigation will be designed into the scheme where possible to minimise risk, and working procedures to minimise risk will be agreed as part of Requirements approval, with the Host Authorities.

Cumulative and In-Combination effects

19.2.7 The assessment will consider potential cumulative and in-combination effects related to relevant projects within the ES where they are considered to have likely to have significant environmental effects.

19.3 Conclusions on Scoping

19.3.1 Based on the above, any effects in respect of potential accidents and disasters will be assessed in other Chapters (such as traffic, human health, cultural heritage) and as such, a standalone chapter is not proposed to be produced in the ES.

20 Air Quality

20.1 Introduction

20.1.1 The Air Quality chapter will consider the likely significant effects of the Scheme on the environment with respect to air quality pollutants during its construction, operation, management and decommissioning phases. The chapter will describe and identify the relative level of effects arising as a result of the Scheme , including prior to and post mitigation, in relation to:

- Nitrogen Dioxide (NO_2) concentrations and predicted change at existing sensitive receptors;
- Particulate Matter (PM_{10} and PM_{25}) concentrations and predicted change at existing sensitive receptors; and
- Nitrogen Oxides (NO_X) concentrations and predicted change at ecologically sensitive receptors.

20.2 Baseline

The Site and Context

20.2.1 The sites and the Scheme are described in Chapters 3 and 4 respectively of the Scoping Report.

Potential and Likely Environmental Effects

20.2.2 The closest sensitive receptors to the Scheme will be assessed, such as residential properties. Residential properties are considered to be of high sensitivity.

20.2.3 The effects during the construction phase have the potential to create dust and particulate emissions during the creation of earthworks, site preparation activities and construction of the Scheme. The impacts will be direct as they occur as a result of activities associated with the Scheme; temporary as they will only occur during the construction phase; and short-term because these will only arise at particular times when certain activities combine and will be reversible.

20.2.4 During the operational phase effects have the potential to create air quality pollutant emissions from the use of the site and the traffic. The impacts will be direct as they occur as a result of activities associated with the Scheme; and experienced for the period that the development is in-situ.

20.2.5 The effects during the decommissioning phase have the potential to create dust and particulate emissions during works. The impacts will be direct as they occur as a result of activities associated with the Scheme, temporary as they will only occur during decommissioning, short-term because these will only arise at particular times when certain activities combine and will be reversible. The effects of the temporary decommissioning phase will be equivalent to, or less than, the construction phase.

20.3 Assessment Methodology

20.3.1 The methodology for assessing impacts will follow the standard EIA procedures and will involve consultation with the local authorities and other relevant stakeholders regarding the assessment methodology and criteria.

20.3.2 The following air quality policy, legislation, regulations and guidance is deemed relevant to the Scheme:

- National Policy Statements EN3 and EN5 (adopted and emerging);
- The Air Quality Standards Regulations 2016;
- National Planning Policy Framework, July 2021;
- Planning Practice Guidance, Nov 2019;
- The Environment Act 2021;
- Institute of Air Quality Management (IAQM) Guidance for Land-Use Planning & Development Control: Planning for Air Quality, 2017;
- IAQM A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, 2020;
- Local Air Quality Management (LAQM) Support Website;
- Defra, Local Air Quality Management Technical Guidance LAQM.TG16, 2021;
- West Lindsey District Council, 2020 Air Quality Annual Status Report; and
- Central Lincolnshire Local Plan (adopted in 2017).
- Bassetlaw District Council Core Strategy (Adopted 2011).
- Bassetlaw District Council 2020 Air Quality Annual Status Report.

Assessment of Sensitivity

20.3.3 Receptors can demonstrate different sensitivities to changes in their environment. For the purpose of this assessment, sensitivity will be determined as Very High, High, Medium or Low, as detailed in Table 20.1 for both the construction and operational phase of the development.

Table 20.1: Methodology for Assessing Sensitivity of Receptor

Sensitivity	Definition
Very High	• 'Do Minimum' pollutant concentration are 110% and greater than 110% of the relevant Air Quality Objectives (AQO) (Emissions). • Receptors of very high sensitivity to dust and odour, such as: hospitals and clinics, retirement homes, painting and furnishing, hi-tech industries and food processing (Construction). • Densely populated areas – more than 100 dwellings within 20m of the development site (Construction).
High	• 'Do Minimum' pollutant concentration between 103 - 109% of the relevant AQO (Emissions). • Receptors of high sensitivity to dust and odour, such as: schools, residential areas, food retailers, glasshouses and nurseries, horticultural land and offices (Construction). • Densely populated areas – 10-100 dwellings within 20m of the development site (Construction).
Medium	• 'Do Minimum' pollutant concentration between 95 - 102% of the relevant AQO (Emissions). • Receptors of medium sensitivity to dust and odour, such as: farms, outdoor storage, light and heavy industry (Construction). • Suburban or edge of town areas (Construction).
Low	• 'Do Minimum' pollutant concentration between 75-90% of the relevant AQO (Emissions) • All other dust/odour sensitive receptors not identified above (Construction). • Rural/Industrial areas (Construction).
Negligible	• Concentration less than 75% of the relevant AQO (Emissions) • Receptor more than 350m away (construction)

Effect Magnitude

20.3.4 The significance of the effects during the operational phase of the Scheme is based on the latest guidance produced by Environmental Protection UK (EPUK) and IAQM in January 2017. The guidance lays a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall significance of the air quality effects based on severity of air quality impacts.

20.3.5 Table 20.2 provides the criteria used for the classification of the magnitude of the likely significant air quality impacts.

Table 20.2: Significance of Effect Matrix

Magnitude	Description	Examples
Large	Impact resulting in a considerable change in baseline environmental conditions with severe undesirable/desirable consequences on the receiving environment.	• Air quality varies between the do minimum and do something by more than 10% of the air quality criterion (Emissions). • Substantial risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Medium	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions	• Air quality varies between the do minimum and do something by 5 - 10% of the air quality criterion (Emissions). • Moderate risk that emissions will generates statutory nuisance complaints, resulting in formal action (Construction).
Small	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated.	• Air quality varies between the do minimum and do something by 1 - 5% of the air quality criterion (Emissions). • Slight risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Imperceptible	Very low discernible change in baseline environmental conditions.	• Air quality varies between the do minimum and do something by less than 1-2% of the air quality criterion (Emissions). • Little or no cause for nuisance complaints to be made (Construction).
Neutral	No change in baseline conditions	• Air quality varies between the do minimum and do something by less than 0.5% of the air quality criterion (Emissions).

20.3.6 It is recognised that likely significant air quality impacts can operate over a range of geographical areas and therefore a geographical scale may be taken into account in describing the scale/magnitude of the likely significant impact.

Cumulative and In-Combination effects

20.3.1 Identification of other developments that may give rise to cumulative effects for the temporary construction and decommissioning phases will be agreed with the relevant statutory bodies and any cumulative effects arising will be considered and described.

20.3.2 Identification of any transport effects in-combination with other effects and/or from combined phases of work on the Scheme will be considered and described. Where there are no in-combination effects, this will also be stated.

20.3.3 If the Scheme and the West Burton Solar Project progress in parallel, IGP will seek to plan and co-ordinate any construction activities, via the CTMP's and CEMP's to reduce environmental impacts, if possible and where practicable.

Effect Significance

20.3.4 The level of significance is determined by combining the likely magnitude of impact with the sensitivity of the receptor during the construction and operational phases. Table 20.3 shows how the interaction of magnitude and sensitivity, results in the significance of an environmental impact. If the scale of the impact magnitude is negative, then the resulting impact is adverse. If the scale of the impact magnitude is positive, then the resulting impact is beneficial. If the impact is Moderate to Substantial then the change is considered to have a significant effect on the local air quality, whether positive or negative.

20.3.5 The table has been developed by Tetra Tech, but the matrix combinations and terms used correlate with the significance matrix recommended by Land-Use Planning & Development Control: Planning for Air Quality (2017).

Table 20.3 Significance of Environmental Impact

Sensitivity of Receptor	Magnitude of Impact				
	Large	Medium	Small	Imperceptible	Neutral
Very High	Substantial	Substantial	Substantial	Moderate	Negligible
High	Substantial	Substantial	Moderate	Moderate	Negligible
Medium	Substantial	Moderate	Moderate	Slight	Negligible
Low	Moderate	Moderate	Slight	Negligible	Negligible
Negligible	Moderate	Slight	Negligible	Negligible	Negligible

Methodology

Construction Assessment

20.3.6 The effects during the construction phase have the potential to result in dust nuisance complaints and surface soiling from deposition, as opposed to the risk of exceeding any air quality objectives. The impacts will be direct as they occur as a result of activities associated with the Scheme,

temporary as they will only potentially occur during construction activities, short-term because they will only arise at particular times when certain activities and meteorological conditions for creating the level of magnitude predicted combine and will be reversible.

20.3.7 Additional vehicle movements (particularly HGV movements) associated with the construction phase have the potential to generate exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$ on the local road network.

20.3.8 The likely significant effects identified for the construction phase for assessment are as follows:

- Temporary generation of dust arising from construction works leading to potential impacts on dust soiling and concentrations of particulate matter (as PM10) within 500m of the Site boundary; and
- Short-term localised increases in traffic-related emissions during construction works and as a result of any temporary vehicles operating on the Site and/or local road network, should heavy duty vehicle (HDV) movements be greater than 25 annual average daily traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA), or 100 AADT elsewhere.

20.3.9 Appropriate site-specific mitigation will be recommended in accordance with the IAQM document for inclusion in the outline Construction Environmental Management Plan submitted with the DCO application.

20.3.10 Appropriate site-specific mitigation will be included within the Construction Environmental Management Plan (CEMP) for the proposed development, which will mitigate any potential adverse impacts associated with the construction phase of the development. Following the implementation of the mitigation, it is expected there will be a 'negligible' impact as a result of the development. Therefore, detailed modelling on the construction effects of the proposed development are proposed to be scoped out of the assessment.

Operational Assessment: Detailed Air Quality Modelling Assessment Methodology

20.3.11 Although there is no set guidance to determine the extent of the study area for an air quality assessment, there are factors within guidance which aid in defining the study area. Table 6.2 within the Institute of Air Quality Management, Land Use Planning and Development Control: Planning for Air Quality, January 2017, provides the criteria for undertaking an air quality assessment. Air quality assessments should be undertaken where there is expected to be a change in light development vehicles of 100 annual average daily traffic (AADT) within or adjacent to an AQMA, or 500 AADT elsewhere. The air quality assessment study area should also include locations where there are expected to be changes in heavy duty vehicle (HDV) movements of 25 AADT within or adjacent to an AQMA, or 100 AADT elsewhere. Understanding the additional traffic flows from the Development informs the judgement to determine the road networks which need to be modelled as part of the air quality assessment and the extent of the study area.

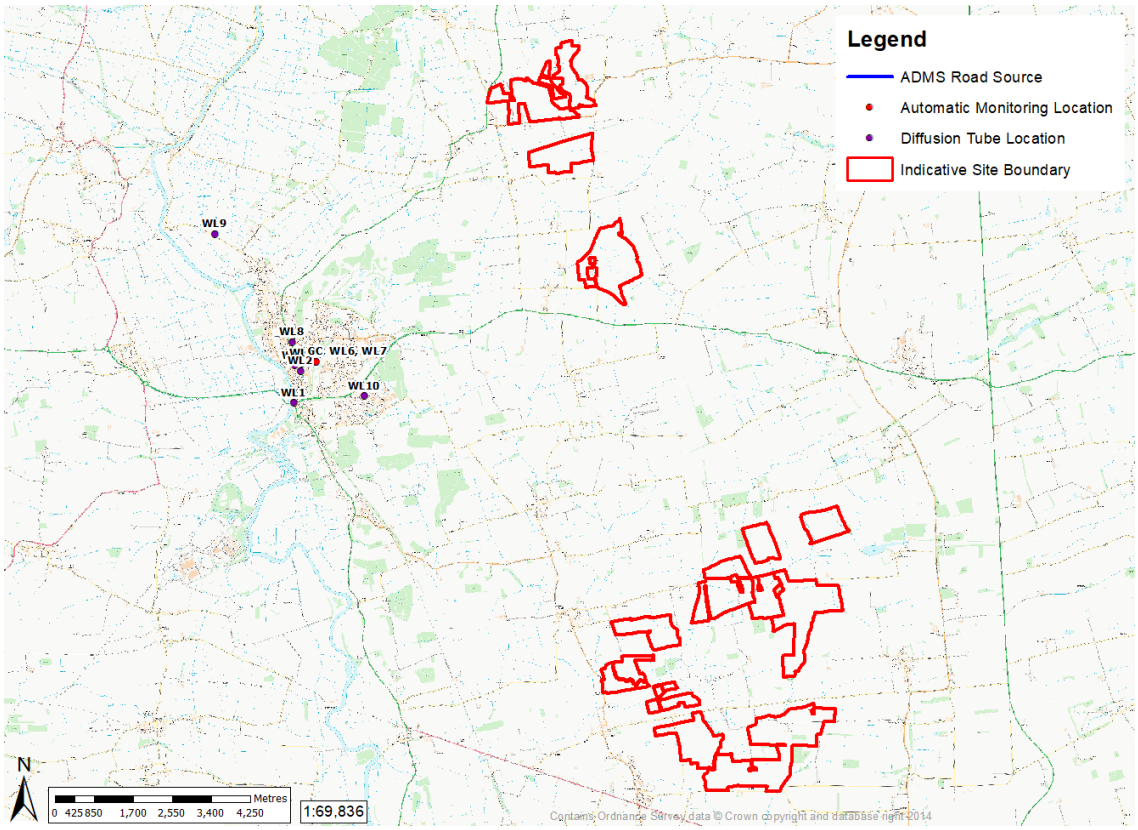
20.3.12 Chapter 14: Transport and Access states that the increase in vehicle movements will be neutral or negligible as there will be a handful of vehicle trips to each area of the site per month to provide maintenance. As a result, there is expected to be a 'negligible' impact from operational traffic as a result of the Scheme and therefore, operational traffic impacts can be scoped out of the assessment.

20.3.13 As required under Section 82 of the Environment Act 1995, West Lindsey District Council (WLDC) reviews and assesses air quality within its area of jurisdiction. WLDC have not declared any AQMAs.

20.3.14 Appropriate assessments will be developed for the study area, and will be verified using the latest monitoring published by West Lindsey District Council and Bassetlaw District Council. It is proposed to use the following monitoring locations to verify the air quality dispersion model (locations shown in Figure 20.1 below:

- Monitoring Location WL1 (22.8 µg/m^3);
- Monitoring Location WL2 (19.0 µg/m^3);
- Monitoring Location WL4 (20.7 µg/m^3);
- Monitoring Location WL8 (14.7 µg/m^3) and,
- Monitoring Location WL10 (15.0 µg/m^3).

Figure 20.1: West Lindsey Diffusion Tube Monitoring Locations



20.3.15 The verification will be undertaken in general accordance with guidance in Section 7 of the LAQM Technical Guidance TG(16). The baseline and assessment year models will include traffic data for the local road network and representative local meteorological data.

20.3.16 Additionally, the background concentrations used within the verification and assessment will be determined through an analysis of the background pollution data from Defra and local monitoring. The most representative background concentration will be utilised throughout the assessment.

20.3.17 Emissions factors for this year will be obtained from the Emissions Factor Toolkit v11 from the Defra website.

20.3.18 It is proposed to use meteorological data from 2019 at Scampton met station, which is considered representative of conditions at the site.

20.4 Air Quality Impact from a Major Fire Accident

20.4.1 '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 or fire).

20.4.2 The potential impacts on local residents from a fire accident, such as solar panel, battery storage and sub-stations fire, will be considered and assessed.

20.4.3 Particulate matter exposure is the key principle public health threat from short-term smoke exposure. Appropriate assessment will be carried out to predict the short-term concentrations of PM_{10} and $PM_{2.5}$ at residential receptors at downwind locations.

20.4.4 The potential smoke effects on residential and other sensitive receptors will be assessed and mitigation measures (if required) will be discussed where appropriate.

20.5 Conclusions on Scoping

Scoped In

20.5.1 An assessment of the effects of the construction phase will be undertaken in accordance with 'Guidance on the Assessment of the Impacts of Dust from Demolition and Construction'. This will assess potential air quality effects of the scheme during the construction phase. Mitigation will be recommended as appropriate.

20.5.2 The potential impacts and effects on local residents from a solar panel, battery storage and sub-stations fire accident will be assessed. Appropriate assessment of particulate matter impact from smoke will be undertaken to predict the short-term concentrations of PM_{10} and $PM_{2.5}$ at residential receptors at downwind locations.

Scoped Out

20.5.3 Detailed modelling and assessment of construction effects of the development. Any mitigation measures will be incorporated into the CEMP.

20.5.4 Detailed modelling and assessment of impacts associated with road traffic emissions arising from operational traffic.

21 Socio-Economics, Tourism and Recreation and Human Health

21.1 Introduction

21.1.1 The chapter will describe and identify environmental effects arising as a result of the proposed development, in relation to:

- Population demography;
- Population skill level and qualification attainment;
- Indices of deprivation;
- Economic activity and performance;
- Business profiles, sector shares and classification;
- Tourism as an economic sector;
- Agricultural Circumstances;
- Accessibility to tourism and recreational facilities; and
- Key human health impacts.

21.1.2 The EIA Regulations require the direct and indirect significant effects of the proposed development on population and human health factors to be identified, described, and assessed.

Appendices

21.1.3 This chapter is supported by the following appendices:

- Appendix 21.1: Socio-Economic Baseline Data.

21.2 Baseline

21.2.1 The scale and geographic distribution of the proposals means that its effects have the potential to impact a significant geographic area and the associated population. The Site is situated primarily in West Lindsey District, whilst part of the cable route and the connection point are within Bassetlaw District. As such, both district areas will be assessed jointly as the Local Impact Area for socio-economic, tourism and recreation, and human health impacts. Wider regional impacts from the scheme will be assessed across the East Midlands official statistical region. Receptors discussed within this chapter will also be comparatively assessed against national trends across the United Kingdom.

21.2.2 Initial baseline information has been gathered, as set out in Appendix 21.1, relating to:

Socio-Economics

- *Resident Population*
- *Skills and Qualification Attainment*
- *Deprivation*
- *Economic Activity and Unemployment*
- *Employment and Wages*
- *Working Population*

- *Business Sectors*

21.2.3 Agricultural Circumstances - The ES will consider effects in respect of changes in land use from current arable production to that of energy production, energy storage and associated electricity infrastructure. This will be informed by the Agricultural Land Classification studies that have been undertaken (see further consideration of this in Chapter 22 of this Scoping Report).

Tourism and Recreation

21.2.4 The Local Impact Area falls across two counties (Lincolnshire and Nottinghamshire), each with their own economic strategies for tourism. The Nottinghamshire visitor economy is worth approximately £1.75 billion and supports 15,000 jobs[19], within which Bassetlaw provides a small number of key attractions such as Clumber Park, Sundown Adventureland and the Harley Gallery at the Welbeck Estate. Likewise, the Lincolnshire visitor economy is worth approximately £2.4 billion[20], with West Lindsey contributing to the visitor economy through hosting attractions such as the Hemswell Antiques Centre, RAF Scampton Heritage Centre and Woodside Wildlife Park.

21.2.5 A number of the Sites host a number of Public Rights of Way, and are located nearby to a small number of recreational walking and cycling routes.

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

Human Health

21.2.7 The human health receptors most likely to be impacted by the Scheme (principally during construction) are as a result of the impacts from noise, lighting, land contamination, air pollution from construction dust and vehicle emissions, electromagnetic fields, and general site safety. These factors will be considered in detail in the relevant technical chapters of the ES.

- 9: Hydrology, Flood Risk and Drainage
- 10: Ground Conditions and Contamination
- 14: Transport and Access
- 15: Noise and Vibration
- 16: Glint and Glare
- 17: Electromagnetic Fields
- 18: Light Pollution
- 19: Major Accidents and Disasters
- 20: Air Quality
- 22: Agricultural Circumstances
- 23: Waste

[19] Bassetlaw Local Plan Publication Version, p.73
[20] VisitLincoln: About

- 24: Telecommunications, Utilities and Television Receptors

Summary

21.2.8 There is potential for the proposed development to impact the socio-economic environment of the local and regional impact areas. The likely effects are considered to be increased access to employment opportunities, increased workplace population, and increased direct and indirect economic activity. Impacts on the agricultural industry will be explored in the ES. Effects on tourism and recreation are likely to be limited to those facilities immediately impacted by the development, such as Public Rights of Way and heritage assets within close proximity to the development areas. Human health will be assessed in other chapters of the ES where applicable to receptors that are likely to be effected by topic-specific impacts.

21.3 Assessment Methodology

Assessment Process

21.3.1 The initial baseline assessment undertaken for this Scoping Report will be expanded in the ES to produce a more detailed understanding of the socio-economic conditions within the local and regional impact areas. This will include where applicable, providing additional data at District Ward level for fine-grain data.

Alongside the expanded baseline assessments, data from the relevant local authorities will be used to assess how the development will affect the socio-economic environment, tourism and recreation, and human health receptors, where not covered by other chapters within the final ES. The information sources to be used for the assessments are as follows:

- ONS Census 2011
- ONS Annual Population Survey
- ONS Local Authority and National Population Projections;
- DCLG: Indices of Multiple Deprivation Map App;
- ONS: Annual Survey of Hours and Earnings;
- ONS Business Register and Employment Survey;
- Bassetlaw Local Plan Publication Version and supporting documentation;
- Central Lincolnshire Local Plan and supporting documentation;
- National Planning Policy Framework;
- Visit Nottinghamshire;
- Visit Lincoln;
- OpenStreetMap;
- OS Explorer Map;
- Google Maps and Google Earth;
- Long Distance Walkers Association;
- Lincolnshire Ramblers Association; and
- The National Byway.

Assessment of Sensitivity and Magnitude

21.3.2 The nature of sensitivity on all identified environmental receptors, as well as the magnitude of impact on those receptors will be described as high, medium, low or very low/negligible.

21.3.3 The sensitivity of the receptors identified in this chapter will be assessed by understanding measurable indicators of the receptor's present characteristics and considering this alongside the weighted importance of the receptor in local, regional, and national policy or strategic requirements. For example, the sensitivity of number of jobs is likely to be determined from its local characteristics and how far this deviates from national trends, in consideration with the local policy requirements for the creation of new employment opportunities.

21.3.4 The methodology for determining the impact magnitude is described below, and has been determined by quantifying the predicted deviation from baseline conditions. This will be considered both with and without mitigation. The magnitude of change will be used for both beneficial or adverse impacts.

Environmental Receptors - Socio-Economic

21.3.5 The Scheme is likely to have substantial impacts on socio-economic receptors at the local and regional level, and to a more minor extent, the national level. These effects are predominantly focussed around economic impacts (particularly during construction), given the development is very unlikely to result in direct impacts on socio-demographic characteristics.

21.3.6 The Scheme is of a nationally strategic scale, and as such will provide a significant number of employment opportunities for direct and indirect sectors of the local and regional economy. These will also have knock-on impacts on other socio-economic factors such as wages, unemployment, and deprivation as a result of increased access to employment. The magnitude of these impacts will need to be quantified in full for the construction and operational phases of the Scheme, and estimated for the Scheme's decommissioning anticipated to be in the late 2060s.

21.3.7 The Scheme is likely to impact on existing economic sectors within the local and regional impact areas as a result of competition for resources, labour force, and direct and indirect conflicts with economic sectors such as the agricultural economy and in the tourism and recreation economies. Additional localised economic impacts may occur where the location of the development impacts on the operation of businesses near to or adjacent to the site where their location, landscape setting, and long views are fundamental to their economic success.

Table 21.1 Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	Receptor is likely to experience direct and significant socio-economic challenges with fundamental change to present characteristics. Accorded a high priority in local, regional or national economic regeneration policy. Receptor is of regional or national importance.
Medium	Receptor is likely to experience some socio-economic challenges, which may be indirect, but will materially change its present characteristics. Change relating to receptor has medium priority in local, regional and national economic and regeneration policy. Receptor is of significant local importance.
Low	Minor socio-economic challenges relating to receptor resulting in non-material changes to baseline conditions. Receptor is accorded a low priority in local, regional and national economic and regeneration policy. Receptor is of low importance.
Very Low/ Negligible	Very little if any discernible socio-economic issues relating to receptor or changes to receptor characteristics. Receptor is not considered a priority in local, regional and national economic development and regeneration policy.

Table 21.2 Magnitude of Change for the Identified Environmental Receptor

Magnitude	Definition
High	The total loss or major change/substantial alteration to key elements/features of the baseline conditions, such that the post-development characteristics will be fundamentally changed.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions, such that post-development characteristics of the baseline will be materially changed.
Low	A minor shift away from baseline condition. As change arising from the loss/alteration will be discernible/detectable but not material. The post-development characteristics of the baseline condition will be similar to pre-development conditions.
Very Low/ Negligible	Very little change from baseline conditions. The change will be barely distinguishable and approximating to a non-change situation.

Environmental Receptors - Tourism and Recreation

21.3.8 The Scheme is likely to have an effect on both landscape visual receptors and on local heritage assets. These impacts are likely to be felt at a local level only. The impacts have been discussed in greater depth in Chapter 7: Landscape and Visual, and Chapter 13: Built Heritage.

21.3.9 The Scheme, being located on existing agricultural land, is not anticipated to directly impact on the use and accessibility of dedicated recreational spaces and tourist attractions. The Scheme may impact on the use of Public Rights of Way which cross the development during the project's construction, but this will be addressed as part of the emerging

construction management strategy to ensure these features are retained and protected.

21.3.10 The ES will identify and assess the impact on key local tourism and recreational facilities including but not limited to:

- Public rights of way;
- Long distance walking and cycling routes;
- Navigable waterways; and
- Recreational hubs and key tourist attractions likely to be impacted by the development.

Table 21.3 Sensitivity and Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	Receptor is likely to experience significant direct and indirect tourism and economic challenges with fundamental change to present characteristics. Accorded a high priority in local, regional or national tourism and recreation policy. Receptor is of regional or national importance.
Medium	Receptor is likely to experience some direct and indirect tourism and economic challenges, that will materially change its present characteristics. Change relating to receptor has medium priority in local and regional tourism and recreation policy. Receptor is of significant local importance.
Low	Minor or indirect tourism and economic challenges relating to receptor resulting in non-material changes to baseline conditions. Receptor is accorded a low priority in local and regional tourism and recreation policy. Receptor is of low importance.
Very Low/ Negligible	Very little if any discernible tourism economy issues relating to receptor or changes to receptor characteristics. Receptor is not considered a priority in local or regional tourism and recreation policy.

Table 21.4 Magnitude of Change for the Identified Environmental Receptor

Magnitude	Definition
High	The total loss or major change/substantial alteration to key elements/features of the baseline conditions, such that the post-development characteristics will be fundamentally changed.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions, such that post-development characteristics of the baseline will be materially changed.
Low	A minor shift away from baseline condition. As change arising from the loss/alteration will be discernible/detectable but not material. The post-development characteristics of the baseline condition will be similar to pre-development conditions.
Very Low/ Negligible	Very little change from baseline conditions. The change will be barely distinguishable and approximating to a non-change situation.

21.3.11 The full impact of the Scheme is unknown at this stage, and thus will be explored in more detail in the final ES. Direct landscape visual and heritage impacts are to be considered in the relevant chapters within the ES.

Environmental Receptors - Human Health

21.3.12 The design of solar farms is carefully considered to ensure the minimisation of impacts on human health, as considered from the beginning point of construction, through the Scheme's operation, to its eventual decommissioning. This is considered through the site layout, design of site infrastructure and equipment, and the design and execution of management and maintenance plans throughout the lifetime of the development.

21.3.13 Consideration of the site layout, construction management, and management of the Scheme throughout its lifetime, will ensure that the short-term and long-term impacts to human health on neighbouring residential properties, employment centres, and on transient observers are minimised. The sensitivity and importance of receptors and magnitude of change assessment will be considered in accordance with Tables 21.1 and 21.2.

Significance

21.3.14 The degree of significance of impacts in respect of socio-economics, tourism and recreation, and human health is determined using the matrix below, taking into consideration both receptor sensitivity to change and magnitude of change to baseline conditions:

Table 21.5 Significance

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Moderate/Minor
Low	Moderate	Moderate/Minor	Minor
Negligible	Moderate/Minor	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

21.3.15 The degree of significance can be described both in terms of beneficial and adverse magnitudes of scale, and should be used to determine which impacts from the development need to be considered further in the ES, and therefore which effects require mitigation measures to be implemented in the design, construction, management, operation, and decommissioning of the Scheme.

Cumulative and In-Combination effects

21.3.16 The assessment will consider potential cumulative and in-combination effects related to relevant projects, within the ES, where they are considered likely to have significant environmental effects. These will include assessing the cumulative impact of the construction of this Scheme and its operational lifetime, against other nearby NSIPs which will also have effects within the Scheme impact areas.

21.4 Conclusions on Scoping

21.4.1 It is considered appropriate to scope in to the ES an assessment of impacts on socio-economics; tourism and recreation; and human health (albeit effects to human health will be identified and addressed in other technical chapters of the ES). The following specific matters are scoped in to the EIA:

- Socio-economic impacts during construction. There is potential for the Scheme to give rise to socio-economic effects on the local and regional impact areas. The likely effects are considered to be increased access to employment opportunities, increased workplace population, and increased direct and indirect economic activity, many of which are anticipated to be positive.
- Socio-economic impacts during operation. This will be limited to impacts on the agricultural industry through taking the land out of production for the lifetime of the Scheme.
- Impacts on tourism and recreation during construction and operation. Effects on tourism and recreation are likely to be limited to those facilities immediately impacted by the development, which are Public Rights of Way and heritage assets within close proximity to the development areas.
- Impacts on human health during construction. This will be informed by assessments in other chapters of the ES and will consider issues including construction activity / compounds, construction traffic, noise, vibration and dust.
- Impacts on human health during operation. This will be limited to the potential risk of fires associated with technology such as batteries as a form of energy storage, and inverters which, although rare have the potential to cause safety concerns to human health.

22 Agricultural Circumstances

22.1 Introduction

22.1.1 This Chapter of the Scoping Report considers the likely significant effects of the Scheme on agricultural land and farm businesses during construction, operation and decommissioning.

Appendices

22.1.2 This chapter is supported by the following appendices:

- Appendix 22.1: Natural England Agricultural Land Grading Map for the East Midlands

22.1.3 As noted previously in this scoping report, Agricultural Land Classification (ALC) reports are being finalised which provide a framework for classifying land according to its physical or chemical characteristics which may impose long-term limitations on agricultural use. The limitations can operate in one or more of four principal ways: they may affect the range of crops that can be grown, the level of yield, the consistency of yield and the cost of obtaining it.

22.1.4 The principal physical factors influencing agricultural production are climate, site and soil and the interactions between them which together form the basis for classifying land into one of 5 grades; grade 1 being of excellent quality and grade 5 being land of very poor quality. Grade 3 land, which constitutes approximately half of all agricultural land in the United Kingdom is divided into two subgrades – 3a and 3b. A full definition of all of the grades can be found at Appendix 5 of the Agricultural Land Classification Report (Appendix 22.2 of this Report).

22.2 Baseline

The Site and Context

22.2.1 Whilst the Government's draft revisions to National Policy Statement EN3, are clear that the grading of agricultural land should not dictate where solar farms are located, the Applicant has sought to avoid development on Best and Most Versatile (BMV) agricultural land where possible. According to the Natural England Agricultural Land Classification maps (included at Appendix 22.1 of this Report), the majority of land, including the identified Sites and their proposed cable routes, are classified as Grade 3. There are isolated areas of Grade 4 within the surrounding area, and a single area of Grade 5 further afield. The preliminary ALC assessments that have been carried out have added further clarity to this as noted below at paragraph 22.2.4.

22.2.2 The Sites, including the cable route search area are predominantly comprised of agricultural land. The ES will include a breakdown of the agricultural land across the site.

Initial Surveys

22.2.3 The Natural England Land Grading Classification Maps were used in site selection to direct development to avoid best and most versatile agricultural land, as described above. The initial desktop review, included a review of any land of lower grade than the Sites.

22.2.4 As noted previously in the report, initial ALC surveys of the Sites have been carried out at a reconnaissance scale and indicate that that the vast

majority (93.2%) of the land proposed for development within the Cottam 1, 2 and 3 Sites comprises Grade 3b agricultural land.

22.2.5 The Applicant is not proposing to subject the cable corridor search areas to invasive survey given that the areas used for development will not be removed from agricultural production.

22.3 Assessment Methodology

Assessment Process

22.3.1 In addition to the survey work undertaken to date, the farming circumstances of the farm businesses which currently operate on the Sites will be investigated as appropriate. This will seek to establish current farming practices, including land use; crop types; grazing patterns; fertilisers; applications and timings and agri/environmental stewardship measures and irrigation uses. The results will provide context to the existing practices carried out on the land and help to identify potential impacts of the proposed Scheme.

22.3.2 The assessment will not consider food security at a national, regional or local level. This is due to land use planning does not control how agricultural land is managed, for example there is no way of controlling or requiring farmers to grow food crops. Food security is managed through national policy on agricultural support and trade and is therefore not a planning matter.

Energy Crops

22.3.3 Using the above information we will assess the level of energy crop that is currently produced on the Sites to establish the level of energy production already being produced by the land. This will be based on calculations using industry established figures for energy generated by the following types of energy crops (as noted below):

Table 22.1 Energy Crop Efficiencies

Energy Source / Crop	MWh per acre per annum
Short rotation coppice	19 MWh per acre per annum
Miscanthus	26 MWh per acre per annum
Wheat Straw	5 MWh per acre per annum
Rapeseed oil diesel	5 MWh per acre per annum
Bioethanol (from sugar beet)	13 MWh per acre per annum
Bioethanol (from wheat)	7 MWh per acre per annum
Ground mounted arrays	186 MWh per acre per annum

Source: Source: Biomass Energy Centre, potential output of biofuels per hectare per annum

22.4 Conclusions on Scoping

22.4.1 There are potential likely significant effects in relation to agricultural land resource, soil resources and farming circumstances which cannot be ruled out at this stage. Notwithstanding, it is not proposed to produce a standalone chapter on this topic. Effects will be addressed in the Socio-Economics, Tourism and Recreation and Human Health chapter of the ES, as noted above.

23 Waste

23.1 Introduction

23.1.1 The EIA Regulations require an estimate, by type and quantity, of expected residues and emissions, with specific reference to quantities and types of waste produced during the construction and operation phases. The Planning Inspectorate stipulate that this information should be provided in a clear and consistent fashion and may be integrated into the relevant aspect assessments.

23.2 Baseline

The Site and Context

23.2.1 The construction, operation and decommissioning of solar farms create very little waste in comparison to other types of development. There is minimal waste generated from demolition or excavation. Typically, solar farms result in less than 1% of the site area containing any form of ground intrusive development.

23.2.2 During construction, types of waste materials are likely to include packing materials, additional chemicals, excess materials, waste water, welfare facility waste and potentially organic materials, including soil.

Initial Surveys

23.2.3 Potential streams of construction waste and estimated volumes will be explored by the applicant and consultant team, including the ability to recycle materials used during construction and the development itself.

Potential and Likely Environmental Effects

23.2.4 Potential streams of construction waste and estimated volumes will be included within the description of development chapter in the ES.

23.3 Assessment Methodology

Assessment of Waste

23.3.1 The approach to assessment of waste will be agreed with Lincolnshire County Council and Nottinghamshire County Council, as the Waste Authorities.

23.3.2 A Construction Environmental Management Plan (CEMP) will be developed and submitted with the application. Any likely significant effects identified by the CEMP, including cumulative impacts, will be assessed as part of the ES in the relevant chapter. This will include vehicles removing waste as part of the Transport chapter.

23.3.3 The CEMP will include measures to minimise waste, such as a waste hierarchy, and will set out site management procedures such as waste management, recycling opportunities, and off-site disposal. This will include what will happen to any soil excavated to bury cabling.

23.3.4 Recycling procedures for the development at the end of its lifetime (including any installed energy storage) will be in line with best practice industry guidelines at the time. At the present time it is envisaged almost all of the solar panels will be able to be recycled and reused. A Site Waste Management Plan (SWMP) will be prepared in outline and appended to the ES. The DCO application will confirm how the SWMP will be secured through the DCO Requirements procedure.

23.4 Conclusions on Scoping

23.4.1 This topic will be scoped out of the ES. Notwithstanding, the ES will include a description of the likely impact of component replacement (e.g. batteries and panels) and describe any implications of this in respect of waste arisings and recycling potential. The ES will also consider waste arisings at the decommissioning phase, to the extent possible at the time of assessment.

24 Telecommunications, Utilities and Television Receptors

24.1 Introduction

24.1.1 The ES will describe and identify the following:

- Above and below ground utilities infrastructure;
- Above and below ground telecommunications infrastructure; and
- Television Receptors.

24.2 Baseline

The Site and Context

24.2.1 There are a vast number of cables, pylons and pipelines crossing the Sites.

24.2.2 There are properties, including homes, schools and businesses, in the surrounding area to the Site that benefit from access to utilities, telecommunications and television connections, for which many existing utilities run across or adjacent to the Sites.

Initial Surveys

24.2.3 Initial discussions have been undertaken with utilities, telecommunications and television providers, to identify potential assets across the Sites. A schedule of the discussions undertaken to date is included below.

Table 24.1: Schedule of discussions with providers to date

Type of Provider	Provider	Discussions to date
Telecommunications	Openreach	Assets identified on the edges of CO1 and CO2 and across CO3a. Openreach will come out and mark up assets before construction. Safe dig procedure requires that mechanical borers and/or excavators shall not be used within 1 metre of apparatus or 2 metres of any pole without the supervisory presence of a Company Representative. And if for completion of the works the Contractor intends using pile driving equipment within 10 metres of Apparatus the Contractor shall advise the Company Representative, in writing, in order that any special protective measures for the Apparatus affected may be arranged.
Telecommunications	Virgin Media	Assets in the roads next to CO3a. Ongoing communication.

Utilities	Gas – West Burton Energy	Gas pipeline running through CO2. Easement within the 25m maintenance strip currently being discussed with operator's consultants. No pipelines running through CO3a. Gas pipeline identified within cable route search area.
Utilities	Water – Severn Trent Water	No assets identified within CO2. Or CO3.
Utilities	Water – Anglian Water	Assets at the edges in surrounding roads and verges of CO3a. 3.5 metre maximum offset requested.
Utilities	Electricity – Northern Powergrid	11kV powerlines running across CO2. 11kV and 132kV overhead cables on CO3a. Standard 6 metre set back from these assets requested.
Utilities	Electricity - Western Power Distribution	11kV overhead lines require a 6.6m easement either side, and underground cables require 2m easement either side. All apparatus is required to be accessible.
Utilities	DIO (MoD Abandoned Pipelines)	Oil pipeline identified within the cable route search area. Confirmation received from the operator that pipeline is disused and no separation distances are required
Television Receptors	Television Providers	Given the low height of the proposed development this is not considered to be an issue. If during consultation with telecommunication providers, it is raised as a concern it will be considered through the design process.

Potential and Likely Environmental Effects

24.2.4 Solar panels and associated development have the potential to affect above and below ground telecommunications, utilities and television receptor infrastructure. Any potential impacts are most likely to be direct: physical in-situ impacts to existing infrastructure, rather than indirect impacts as a result of development.

24.2.5 The proposed Scheme as described in Chapter 4 of this report, is unlikely to interfere with above ground television receptors.

24.2.6 Where above ground utilities and telecommunications infrastructure exists within or adjacent to the site, there is the potential for development to encroach upon the relevant safeguarded areas. This is considered to be unlikely to occur as conversations with the relevant providers, as set out in Table 24.1, above, will be concluded prior to submission of the application, meaning safeguarding distances and measures will be fully incorporated into the development parameters.

24.2.7 The same discussions with providers will allow for appropriate safeguarding and setbacks to be provided in the proposals for below ground utilities, too.

24.2.8 Further safeguarding will be provided within the DCO to protect infrastructure, alongside any relevant provisions should any infrastructure need to be re-routed.

Cumulative and In-Combination effects

24.2.9 Should any potential cumulative or in-combination effects be identified, these would be assessed as part of the relevant technical ES chapter.

24.3 Conclusions on Scoping

24.3.1 It is not considered necessary to include a chapter on Telecommunications, Utilities and Television Receptors with the ES. The ES will identify and contain information on existing utilities relevant to the Scheme. The ES will describe how the proposals will impact upon these utilities, and where appropriate avoidance or mitigation measures have been incorporated in to the development.

25 Summary

25.1 The Request

25.1.1 The Applicant confirms that they will be providing an Environmental Statement (ES) to accompany their DCO application and this Scoping Report therefore constitutes notice under Regulation 8(1)(b) of the EIA Regulations.

25.1.2 This Scoping Report also forms a request for a Scoping Opinion under Regulation 10(1) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 'EIA Regulations').

25.1.3 A summary of the issues to be scoped in and scoped out of the EIA are provided below.

25.2 Summary of Scoping

Table 25.1: Topics to be scoped in/out of EIA

Environmental Topic	Proposed elements to be scoped in	Proposed elements to be scoped out
Climate Change	Climate change resilience Greenhouse gas emissions	In-combination climate change impact assessment
Landscape and Visual	Landscape and Visual matters associated with the construction, operational and decommissioning phases	Lighting assessment Photomontages where no significant effects are anticipated
Ecology and Biodiversity	International, National and Local Designated sites Priority habitats Protected species - Badgers; Bats; Otters and Water Voles; Other mammals; Reptiles and Amphibians; Birds; Invertebrates; Plants.	Species surveys for dormice and fish
Hydrology and Flood Risk and Drainage	Construction and operational phases	
Ground Conditions and Contamination	At this stage, further consideration to be given to cable routes	Further assessment of Sites / land parcels
Minerals		Topic to be scoped out
Archaeology	Direct impacts upon non-designated heritage assets within the whole Scheme Direct impacts upon designated heritage assets along proposed cable routes, and within areas proposed for the siting of substations, battery storage and construction compounds, the location of which are yet to be determined Indirect impacts upon designated and non-designated heritage assets from changes to drainage within the Scheme	Direct impacts upon designated heritage assets within the Cottam 1, 2 and 3 Sites Operational impacts

Environmental Topic	Proposed elements to be scoped in	Proposed elements to be scoped out
	Cumulative and in combination impacts Decommissioning impacts	
Built Heritage	Impacts on the setting of some heritage assets	Impacts on the setting of some heritage assets Direct impacts on heritage assets
Transport and Access	Impacts during the construction and decommissioning phases	Impacts during the operational phase
Noise and Vibration	Noise impacts from construction activity Noise emissions from permanent plant during operation	Noise impacts from road traffic during construction and operation Vibration –Construction and operational phases
Glint and Glare	Road users, aviation and railway receptors	
Electromagnetic Fields		Topic to be scoped out
Light Pollution		Topic to be scoped out with relevant matters to be addressed in the Landscape and Visual and Ecology chapters
Major Accidents and Disasters		Topic to be scoped out with relevant matters to be addressed in other technical chapters
Air Quality	Impacts during construction – dust Potential AQ impacts associated with a fire incident	Traffic emissions during construction and operation
Socio-Economics, Tourism and Recreation, and Human Health	Impacts during construction and operational phases	
Agricultural Circumstances		Topic to be scoped out and matters in respect of impacts on farming practices to be addressed in socio economic chapter
Waste		Topic to be scoped out. The ES will include: A description of the likely impact of component replacement and implications of this in respect of waste arisings and recycling potential. A description of how waste arisings may be dealt with at the decommissioning phase, (to the extent possible at the time of assessment).
Telecommunications, Utilities and Television Receptors		Topic to be scoped out. The ES will include information on existing utilities relevant to the Scheme and describe

Environmental Topic	Proposed elements to be scoped in	Proposed elements to be scoped out
		how the proposals will impact upon these utilities, and where appropriate avoidance or mitigation measures have been incorporated into the development.