West Burton Solar Project

Environmental Impact Assessment Scoping Report

Prepared by Lanpro

January 2022

West Burton
SOLAR PROJECT

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Report Prepared for: West Burton Solar Project Ltd.

EIA Scoping Report Submission

West Burton Solar Project: EIA Scoping Report

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Revision: 1

1 Introduction

1.1 Background

1.1.1 West Burton Solar Project Limited ("the Applicant") has commissioned this Environmental Impact Assessment (EIA) Scoping Report, relating to the proposed West Burton Solar Project ('the Scheme'). The Scheme consists of four 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, development parameters plans and technical reports.

1.1.3 The Scheme comprises a number of land parcels (the 'Site' or 'Sites') described as West Burton 1, 2, 3 and 4 for the solar arrays; land at West Burton Power Station for grid connection infrastructure and energy storage; and the cable route corridors. West Burton 1, 2 and 3 are clustered within an area of countryside located east of the River Trent, south of the A1500 and north of Saxilby, in the district of West Lindsey, Lincolnshire.

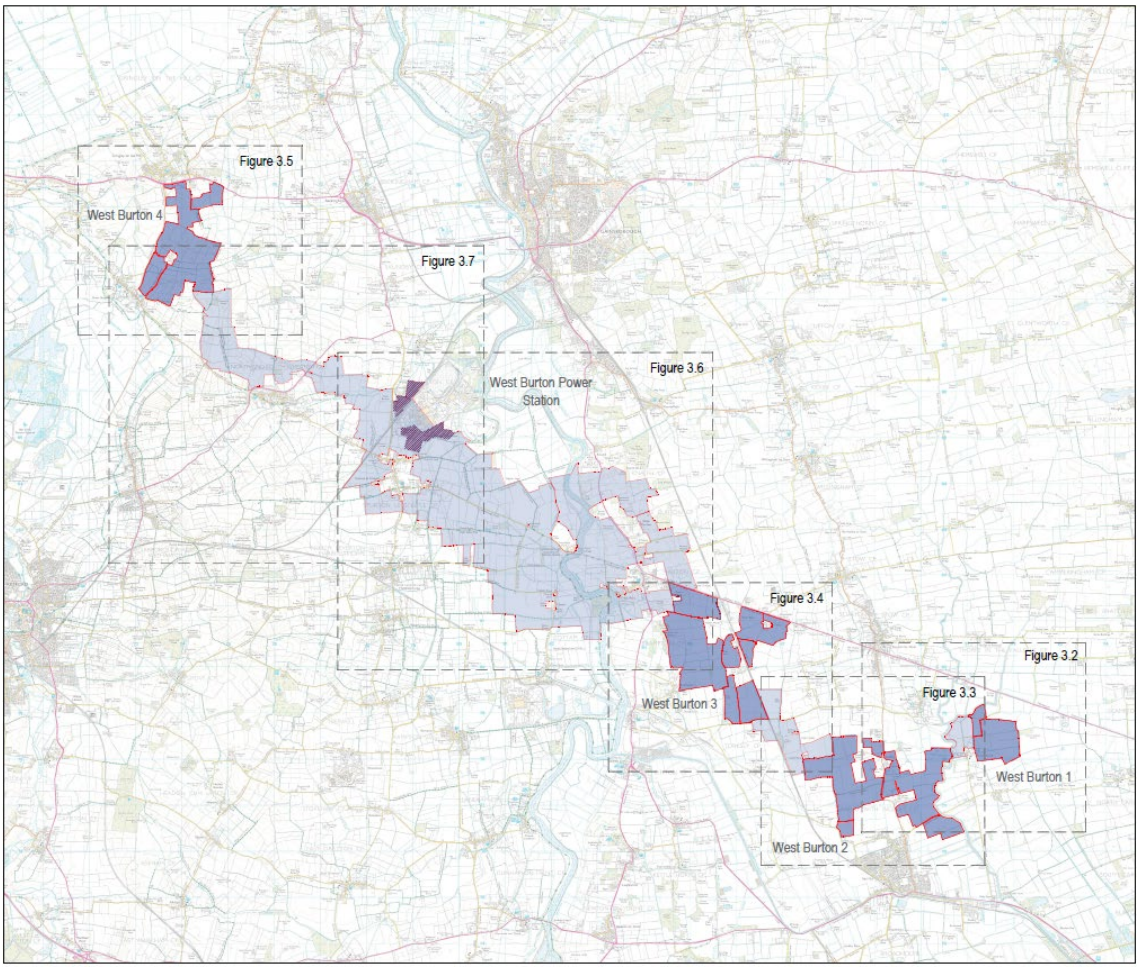
1.1.4 West Burton 4 is located circa 12km north-west of West Burton 1 between the villages of Clayworth and Gringley on the Hill, in the district of Bassetlaw, Nottinghamshire.

1.1.5 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 blue 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.

1.1.6 The majority of the Scheme will be located within the administrative boundary of West Lindsey District Council and Lincolnshire County Council; with West Burton 4 and the grid connection infrastructure and energy storage located within the administrative boundary of Bassetlaw District Council and Nottinghamshire County Council.

1.1.7 The Applicant is proposing to provide an environmental statement 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 EIA Scoping Report

1.3.1 In accordance with the 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 Regulation 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)	Liz Lake Associates / 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 of (non-statutory) 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 the statutory consultation 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 Cottam Solar Project, which is within the same locality as the Scheme. Whilst the Cottam 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 likely 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

Magnitude	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 four 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 are:

- 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 above, 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 considered:

- Cottam Solar Project (currently 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 of the ES 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 site plans and figures 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 14.5km radius of the grid connection of West Burton Power Station.

3.2.2 West Burton 1, 2 and 3 are clustered within a circa 8.5km stretch of countryside located east of the River Trent, south of the A1500 and north of Saxilby, in the district of West Lindsey, Lincolnshire.

3.2.3 West Burton 4 is located circa 12km north-west of West Burton 1 between the villages of Clayworth and Gringley on the Hill, in the district of Bassetlaw, Nottinghamshire.

3.2.4 There will also be a much smaller fifth site for the Scheme for the energy storage and the main 400kV substation. This is likely to be located close to West Burton Power Station, the location of the grid connection point.

West Burton 1, 2, and 3 (WB1, WB2 and WB3)

3.2.5 West Burton 1 - Size: 90ha; West Burton 2 – Size: 328ha; West Burton 3 – Size 370ha

3.2.6 Use: In the main, the Sites subject of the Scheme are currently being used for agricultural purposes in arable production. There appears to be a redundant farmhouse within the West Burton 3 Site which will remain and is not proposed to be redeveloped.

3.2.7 Features: The land is relatively flat and is predominantly well screened from its immediate surroundings by tall hedges around the boundaries of the sites.

3.2.8 The fields are generally large and typically have dividing hedgerows. There are only isolated trees outside of field margins. The surrounding area is interspersed with a number of farmsteads.

3.2.9 The Sites benefit from existing farm access tracks and field accesses.

3.2.10 The River Till meanders in a predominantly north/south direction between West Burton 1 and West Burton 2. Parts of both Sites adjoin the riverbanks. The banks of the river are lined with trees.

3.2.11 There are woodland blocks adjoining and within close proximity to the area. Overhead lines cross parts of the landholdings.

3.2.12 Location: All of the landholdings fall within West Lindsey District Council and Lincolnshire County Council administrative areas.

3.2.13 Settlements: The Site of West Burton 3 is located between the villages of Brampton and Marton. West Burton 2 is located north of Saxilby and West

Burton 1 is located to the east of Broxholme with the village of Bransby to the northwest.

3.2.14 Roads: The A1500 Stow Park Road/Till Bridge Lane runs along the northern boundary of West Burton 3. Cowdale Lane runs along the southern boundary. The A156 is located to the west and sits between the land and the River Trent.

3.2.15 The A1500 also runs to the north of West Burton 1 but is separated by a number of fields.

3.2.16 The B1241 Saxilby Road/Sturton Road runs north/south through West Burton 2. In the south-eastern corner of the holding, Broxholme Lane cuts across the land in an east/west direction. This lane also runs north/south between the A1500 and the A57 to the south and cuts through the northwestern corner of West Burton 1.

3.2.17 Railway Lines: The trainline between Lincoln and Sheffield runs to the south of West Burton 2 and northwards within the West Burton 3 Site.

3.2.18 Public Rights of Way (PRoW): There are no PRoW or bridleways which are located within or adjacent to West Burton 3.

3.2.19 There is a PRoW which runs from the northwest corner of West Burton 1 southwards and another which runs from the western boundary in a southwest direction.

3.2.20 There are no PRoW which are located within West Burton 2 but there is a 'Other route with Public Access' (ORPA's) which runs alongside part of the western boundary.

3.2.21 Power Stations: Cottam Power Station is a decommissioned coal fired power station and is located to the west of West Burton 3. It is located on the western side of the River Trent.

3.2.22 West Burton Power Station is located over 5km north west of West Burton 3. This coal-fired power station is due to shut in September 2022.

3.2.23 Airfields: RAF Scampton Airfield is located northeast of West Burton 1 adjacent to the A15 and is home to the Red Arrows but is due to be shut by the end of 2022.

3.2.24 Rivers: The River Trent is located to the west of West Burton 3. The River Till (as mentioned above) sits adjacent to the western boundary of West Burton 2 and runs in a north south direction up to the northern boundary of West Burton 1.

Historic designations

3.2.25 Conservation Areas: There are no conservation areas immediately surrounding or within 5km of the land.

3.2.26 Listed Buildings: There are a number of listed buildings in close proximity to the Sites. There are a number of listed buildings in Marton, Brampton, Torksey, Cottam, Stow and Sturton by Stow which are within 2km of West Burton 3 and are the closest listed buildings to the land.

3.2.27 For West Burton 2 and West Burton 3 there are listed buildings in Saxilby, Broxholme, Bransby and Stow and Sturton by Stow which are within 2km and are the closest listed buildings to the land.

3.2.28 Archaeological: There is a Scheduled Ancient Monument (SAM) located within the northeast corner of West Burton 3, which is 'The medieval bishop's palace and deer park, Stow Park'. There is another part of the

SAM along the southwest boundary of the land which is a thin strip of land running alongside the wooded area at the south of West Burton 3.

3.2.29 There is a SAM approximately in the centre of West Burton 2 which is the 'Deserted village of North Ingleby'.

3.2.30 There is a SAM adjacent to the southwestern corner of West Burton 1 which is the 'Broxholme medieval settlement and cultivation remains'.

3.2.31 Consideration of the setting of these SAM's will need to be assessed and any setbacks from them or other mitigation measures will need to be explored.

Landscape designations

3.2.32 Areas of Great Landscape Value (AGLV): The Sites do not fall within this designation. 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. West Burton 1 is the closest Site to this AGLV. The closest part is around 2km from the designation. The impact on the AGLV and the setting of the AGLV should be examined from a landscape and visual perspective.

3.2.33 There is an AGLV designated around the town of Gainsborough, which encompasses woodland and surrounding farmland and extends southward to the village of Marton. The closest Site, West Burton 3 extends to the edge of Marton, meaning the Site is 300 metres from the designation.

Ecological designations

3.2.34 Biodiversity improvement areas: A number of the fields within the Sites are designated for biodiversity opportunities which include opportunity for ecological management, opportunities for ecological creation and opportunities for joined up ecological opportunities.

3.2.35 These designations may provide a good opportunity to consider the biodiversity enhancements and net gain that can be delivered by the Scheme.

3.2.36 Sites of Special Scientific Importance (SSSI): The nearest SSSIs are Doddington Clay Woods, south of West Burton 2. The southern extent of West Burton 2 is within the Impact Risk Zone for these.

3.2.37 Special Areas of Conservation (SAC): There are no SAC's within the study area.

3.2.38 Special Protection Areas (SPA): There are no SPA's in the study area.

Geological designations

3.2.39 Minerals safeguarding areas: All of the Sites appear to be located within a Petroleum Exploration Development Licence (PEDL) Block.

Flood Risk and Drainage Designations

3.2.40 Flood Risk: There is a swathe of flood zone 3 which runs through the middle of West Burton 3 and then flood zone 2 around that. The remainder of the land is within flood zone 1.

3.2.41 West Burton 1 has a small section of flood zone 3 along the eastern side of the land and then flood zone 2 across the southern third part of the site along with the northeastern corner. The remainder of the land is within flood zone 1.

3.2.42 The eastern portion of land at West Burton 2 is within flood zone 3. A swathe of land in the western section of the land is flood zone 2. The remainder of the land is within flood zone 1 and small parts at risk from Surface Water flooding.

West Burton 4 (WB4)

3.2.43 Size: 247ha

3.2.44 Use: All of the Site is currently being used for arable purposes.

3.2.45 Features: As noted previously, the land is in arable use, and it currently made up of a number of fields which have a mix of hedgerows and scattered trees making up the field boundaries. There are two fields in the south of the holding that have some scattered trees within the fields.

3.2.46 Highfield Farm sits approximately in the centre of the landholding, but outside the Site boundary. It is accessed from Gringley Road to the west. It contains a farmhouse along with a range of agricultural buildings and barns.

3.2.47 The levels across the Site rise from the south to the north. Gringley on the Hill to the north of the Site sits higher than Clayworth to the south. Overhead lines cross parts of the Site.

3.2.48 Location: The Site falls within Bassetlaw District Council and Nottinghamshire County Council.

3.2.49 Settlements: The Site sits between Clayworth to the south and Gringley on the Hill to the north and Wiseton is located to the west.

3.2.50 Roads: The A631 runs along the northern boundary and the B1403 runs along the western boundary which connects Gringley on the Hill and Clayworth.

3.2.51 Lancaster Lane (B1403) runs in a north/south direction and leads from Gringley on the Hill over the A631 and runs through approximately the middle of the landholding. Mill Lane runs along the southern boundary.

3.2.52 Railway Lines: The Gainsborough to Doncaster line railway line is situated to the west of the Site and to the east of Beckingham. There are also train lines that run to the south and around the west of the Site which are lines that run from Gainsborough through to Retford and the East Coast Main Line.

3.2.53 Public Rights of Way: The Trent Valley Way runs along the eastern boundary of the Site; and bisects the northern part of the Site. This is a long-distance walk which starts in Long Eaton, Derbyshire and finishes in West Stockwith and extends to 124km in length.

3.2.54 There is a PRoW which runs along the southern boundary of the landholding and another which crosses through the centre in an east/west direction. From the east boundary there are a network of PRoW's which spread out eastwards.

3.2.55 To the south, west and north there is another long-distance PRoW called the Cuckoo Way which links Chesterfield to West Stockwith and is also referred to as 'The Chesterfield Canal Towpath'. This path goes through the villages of Clayworth, Wiseton and Gringley on the Hill.

3.2.56 There is a PRoW which leads out of Clayworth northwards to the west of the landholding and connects to Gringley on the Hill via the A631.

3.2.57 Power Stations: West Burton Power Station is located approximately 5km southeast of West Burton 4. This coal-fired power station is due to shut in September 2022.

3.2.58 Airfields: Whilst outside of the 5km search area, Retford Gamston Airport is located south of Retford. The runway is positioned in a north/south orientation.

3.2.59 Rivers: The River Trent is located to the east of West Burton 4 over 5km away. Chesterfield Canal is located to the south and runs to the south of Clayworth.

3.2.60 Woodland: There are a number of wooded areas around the site mainly to the east, south and west.

3.2.61 Other: Linghurst Lakes is located in Lound which is southeast of the Site and the village of Clayworth. This a restored quarried area which was handed over to the Parish Council and is a nature reserve with walking routes and wooded areas.

3.2.62 There are a number of polytunnel and fruit growing farms with frames and plastic sheeting to the east and southeast of the Site.

3.2.63 Political Planning Boundaries: The landholdings at West Burton 4 are split over two parishes; Clayworth and Gringley on the Hill.

Historical designations

3.2.64 Conservation Areas: West Burton 4 is bounded by two conservation areas: Clayworth conservation area to the south, and Gringley on the Hill conservation area to the north. Wisetown & Drakeholes conservation area is also located within close proximity of the site, approximately 1.5km to the west of the Site. The landscape and heritage work will need to look at the potential impacts on the conservation areas and their settings.

3.2.65 Listed Buildings: There are a few listed buildings within the above-mentioned conservation areas. There are also a few listed buildings spread along the A631 to the north of the Site. The views and impacts on setting of these buildings will need to be considered.

3.2.66 Archaeological: The closest Scheduled Ancient Monument (SAM) is located in the Gringley on the Hill conservation area and is the 'Beacon Hill camp'.

Landscape designations

3.2.67 Areas of Great Landscape Value (AGLV): Bassetlaw District Council does not have AGLVs in their Local Plan.

Ecological designations

3.2.68 Sites of Special Scientific Importance (SSSI): The closest SSSI's to the Site are located at the Ling Hart Lakes which is southwest of the site at Lound.

3.2.69 Special Areas of Conservation (SAC): There are no SAC's within the study area.

3.2.70 Special Protection Areas (SPA): There are no SPA's within the study area.

Geological designations

3.2.71 Minerals safeguarding areas: From the information available to date the Site is designated as oil and gas resource. The full extent of any designations relating to mineral safeguarding will need to be confirmed by the appointed specialist.

Flood Risk and Drainage designations

3.2.72 Flood Risk: There is a small section of flood zone 2 in the southwestern portion of the Site, all of the other land within the Site is in flood zone 1. Additionally, small parts are at risk from Surface Water flooding.

Agricultural Land Use Classification (ALC)

3.2.73 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 West Burton Land Parcels – Grade 1: 2.5%; Grade 2: 2.3%; Grade 3a: 12.3%; Grade 3b: 82.5%; Non-Agricultural 0.2%.

West Burton Substation

3.2.74 There are two potential areas of land where a 400kV substation and energy storage facility can be built in proximity to the West Burton Power Station. The areas comprise mostly of agricultural land with some hedgerows towards the edge of the fields. The likely land take required for the substation and energy storage will be 5 Ha.

3.2.75 The exact location is still to be determined and will be refined through the design process. Currently some technical disciplines have undertaken baseline work on these sites whilst others haven't. This will be distinguished in each of the technical chapters of the Scoping Report.

3.3 Cable Route Corridor Search Areas

3.3.1 The potential areas for cable route corridors are shown on the plans in 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. The cable route corridors are shown connecting the Sites together and the connection point at West Burton 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 West Burton 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 Sites 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 four 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 elements of built development which will comprise 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 6.1m by 2.5m with a typical 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:

West Burton 400KV Substation (Air Insulated Switchgear):

- 400KV substation sitting within an open-air compound;
- Maximum compound area will typically be 3.5 Ha;
- 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 of 3.85m; and
- 33kV Switch Room with typical maximum dimensions of 6m by 23.6m and a typical maximum height of 3.85m.

Figure 4.3: Typical (large 400kV) power transformer

West Burton 1 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.

West Burton 2 132kV Substation (Air Insulated Switchgear):

- 132kV substation sitting within an open-air compound;
- Maximum compound dimensions will typically be 71.7m 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.

West Burton 3 132kV Substation (Air Insulated Switchgear):

- 132kV substation sitting within an open-air compound;
- Maximum compound dimensions will typically be 94.3m by 66m;
- 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.

West Burton 4 132KV Substation (Air Insulated Switchgear):

- 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.

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 1.5 Ha (this area will allow approximately 20MW of energy storage);
- Battery units 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 currently available technology) would typically be 6MW;
- Palisade fencing around the compound with a typical maximum height of 2.6m;
- Internal access tracks with a width of approximately 4m;
- The compound will have parking bays; and
- CCTV will be installed.

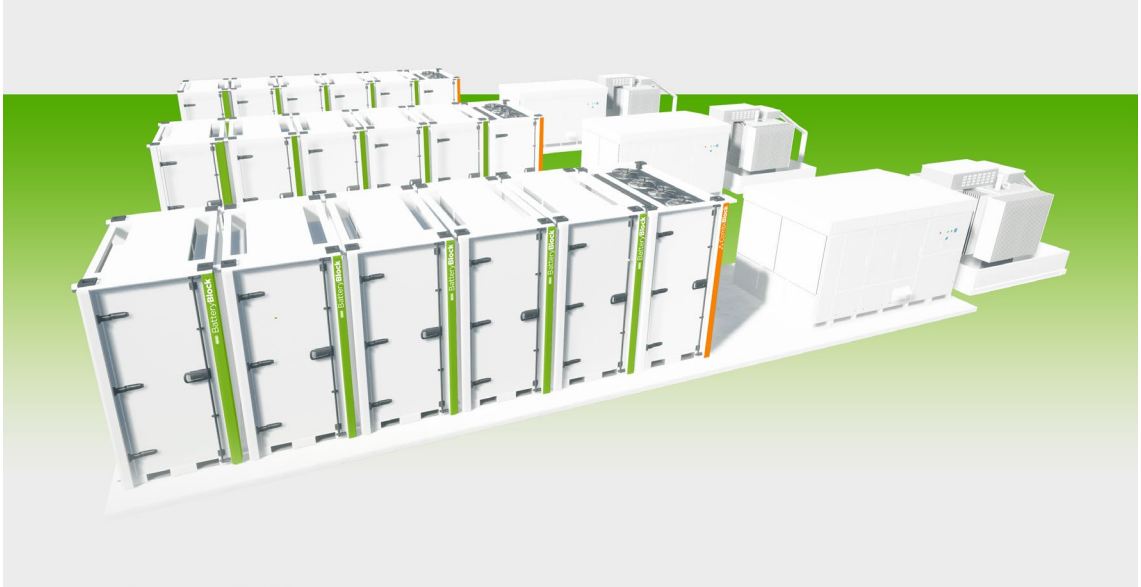


Figure 4.4: Typical Energy Storage Units

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 for the solar array;
- CCTV camera on poles with a maximum height of 3m; and
- 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 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.

District Network Operator Connections

4.2.14 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.

4.2.15 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.

4.2.16 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

4.2.17 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 with the Outline CTMP submitted with the DCO application.

4.2.18 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.

4.2.19 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 2029. 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:

- West Burton 1 – 11 weeks
- West Burton 2 – 41 weeks
- West Burton 3 – 44 weeks
- West Burton 4 – 29 weeks

4.3.3 The energy storage construction period is likely to be 3 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 direction 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 Cottam 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 Sites 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 the 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 are 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 practical and appropriate.

4.4.4 As a general principle the following ecological mitigation and enhancement measures are used on 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 will be retained around 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.

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.

The proposed landscape strategy will also be seeking to increase the green infrastructure and link up ecological networks (as noted above). This may include enhancing Public Rights of Way or providing improved connectivity of them.

5 Legislative Context

5.1 Primary Legislation

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 application 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)

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; and
  - Sturton by Stow and Stow Neighbourhood Plan.
- 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

The Site and Context

6.2.1 The Scheme is expected to generate approximately 480MW and is expected to supply enough electricity to power 144,000 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 Nottinghamshire 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 life cycle 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 qualitative assessment will be carried out to assess the Scheme's resilience to climate change. 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

6.3.11 The assessment will consider how the surrounding area around the Scheme will be impacted by cumulative impacts, resulting from other developments, such as the Cottam 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 heatwave, flooding events and strong winds, as these factors have the potential to damage the Scheme and reduce its efficiency.

6.4.3 The ES will include a proportionate climate change chapter given that 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 West Burton 1 Bare Earth ZTV
- Figure 7.9 West Burton 2 Bare Earth ZTV
- Figure 7.10 West Burton 3 Bare Earth ZTV
- Figure 7.11 West Burton 4 Bare Earth ZTV
- Figure 7.12 West Burton 1 Augmented ZTV (including viewpoint locations)
- Figure 7.13 West Burton 2 Augmented ZTV (including viewpoint locations)
- Figure 7.14 West Burton 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)

- Figure 7.15 West Burton 4 Augmented ZTV (including viewpoint locations)

Study Area

7.1.4 As described in the preliminary baseline assessment in section 7.2 the landscape varies across the four Sites. Landform across West Burton 1 – 3 is relatively flat with some localised undulating topography. Due to the nature of this landform alongside the extensive existing vegetation in the form of hedgerows, trees, and woodland the site is relatively well contained. Views are available across the landscape surrounding the site but will likely be limited to localised effects. West Burton 4 is located on sloping landform which falls from north to south and although there are no woodlands on the Site itself, the landscape surrounding the Site is peppered by numerous woods and coverts which visually combine to form wooded horizons and provide enclosure to the landscape.

7.1.5 Wider topography to the east of West Burton 1-3 rises to a distinguishable ridge 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.

7.1.6 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, Bassetlaw District Council, Nottinghamshire County Council and Lincolnshire County Council.

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

7.1.8 5km 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.

7.1.9 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.

7.1.10 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
- POLICY NBE 10

Nottinghamshire County Council Local Plan (2020)

- Policy EN6 Biodiversity
- Policy EN7 Trees

West Lindsey Local Plan (2006)

Bassetlaw District Local Development Framework (2011).

7.2.3 POLICY DM9: Green Infrastructure; Biodiversity & Geodiversity; Landscape; Open Space & Sports Facilities

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 varying distances and therefore from a landscape and visual perspective each land parcel is considered to have varying interconnecting effects on the local landscape and visually. The Sites are illustrated on Figure 7.1 (Appendix 7) and the associated baseline described in turn below.

West Burton 1

7.3.2 The Site is located to the north east of the small village of Broxholme in the West Lindsey district of Lincolnshire. The village is situated approximately 10km northwest of the county town of Lincoln. Around 2.5km to the north west lies the settlement of Sturton by Stow and the larger village of Saxilby is located approximately 2.5km to the south west of the Site. To the west the hamlets of Bransby (approximately 1km) and Ingleby (approximately 2km), and to the east lies the village of North Carlton (approximately 2.0km).

7.3.3 The Site comprises a series of agricultural field parcels that that follows the surrounding field patterns and hedgerows. The Site covers an area of approximately 90ha and is currently being used for agricultural purposes. The Site is divided into two separate areas by Broxholme Lane, which crosses the north western corner of the Site. It is flat and is sited at approximately 5mAOD.

7.3.4 The smaller, northern parcel is bounded on the northern edge by an agricultural drainage ditch that feeds into the River Till approximately 400m west of the Site. The western boundary is marked by an established hedgerow and the eastern and southern are marked by a combination of existing hedgerows and Broxholme Lane.

7.3.5 The parcel to the south of Broxholme Lane is larger and comprises flat, open arable fields, again separated by straight hedgerows and drainage ditches. Immediately to the east of the Site is North Carlton Covert, a small block of woodland immediately adjacent to the Sites eastern boundary.

7.3.6 Surrounding the Site is open agricultural land, within which is the small village of Broxholme located to the south west of the Site. Existing tree belts and mature vegetation wrap around the settlement, providing enclosure from the surrounding arable farmland and the Site. Occasional isolated residential properties and farmsteads are dotted throughout the surrounding countryside.

West Burton 2

7.3.7 The Site forms part of a network of agricultural land interspersed with farms and villages, alongside the larger settlements of Saxilby and Sturton

by Stow. The landform is relatively flat with a gentle slope to the east towards the River Till.

7.3.8 The Site is located alongside the hamlet of Ingleby in the West Lindsey district of Lincolnshire. The hamlet is situated less than 1.5km north of the village of Saxilby and approximately 1.5km south of the village of Sturton by Stow. Sturton Road / Saxilby Road connects the settlements. The Site is located approximately 500m west of the West Burton 1 Site. Ingleby and Sturton Road are located on an elevated landform and sits at approximately 15m AOD.

7.3.9 The Site is divided into three separate areas, with Sturton Road cutting through the centre of the Site in a north south direction. The Site to the east of Sturton Road falls east down towards the River Till and the flat alluvial farmland alongside. Broxholme Road crosses the southern area of this part of the Site. To the west, the landform remains more elevated but is more undulating. Here, the Site falls towards the railway line at approximately 10m AOD. There is a small isolated Site parcel located between Ingleby and Ingleby Chase.

7.3.10 The Site covers an area of approximately 328ha and is currently being used for agricultural purposes.

7.3.11 Towards the centre of the Site, the Site boundary cuts around three properties located within Ingleby. Those properties include Wood Farm and Ingleby Hall Farm to the north of centre and Ingleby Grange to the south of centre.

West Burton 3

7.3.12 The Site occupies the agricultural land to the south of the A1500. It covers an area of approximately 370ha and is currently being used for agricultural purposes. It is located between the hamlet of Marton and the village of Brampton in the West Lindsey district of Lincolnshire. The Site is approximately 2km north west of the West Burton 2 Site and 2.5km east of the village of Sturton by Stow. The Sheffield – Lincoln and Doncaster – Lincoln railway line cuts diagonally through the middle of the Site effectively separating the Development Site into two distinct areas, one to the east, and one to the west of the railway. The Eastern area is located between the railway line and the A1500, which runs along the majority of the northern Site boundary. The A1500, (Stow Park Road) is an old Roman Road which runs between Marton and the A15 on the ridgeline to the north of Lincoln. Within the middle of the eastern area of the Site is Moat Farm. Moat Farm is the site of a Scheduled Monument; *The medieval bishop's palace and deer park, Stow Park*.

7.3.13 The western area of the Site occupies the area of elevated land to the east of the River Trent, between 10m and 15m AOD. To the west of the Site the landform quickly drops away down to 5m AOD alongside the A156 and the River Trent. Embankments alongside the Trent help elevate it above of the surrounding lowland arable farmland. A series of woodland blocks occupy the sloping landform and merge with woodland surrounding the Lincoln Golf Club at Brampton. This vegetation mostly contains the small hamlet of Brampton, however a small number of residential properties on the eastern edge of the settlement are located adjacent to the south western corner of the Site.

7.3.14 Located within the middle of the Site and straddling the railway line is Stow Park Farm and Marton Moor Farm, two large farmsteads with associated

outbuildings and sheds that occupy the arable farmland to the south of the A1500.

7.3.15 To the immediate north west of the Site is the settlement of Marton which occupies the hillside leading down from the arable plateau to the lower lying landform alongside the River Trent. A small number of residential properties on Adams Way and Spafford Close are located alongside the north western corner of the Site.

West Burton 4

7.3.16 The Site is located on the arable farmland between the villages of Clayworth and Gringley on the Hill, in the district of Bassetlaw, Nottinghamshire. Clayworth, to the south west of the Site, is a small village 9.7km north-east of Retford. Gringley on the Hill is to the north of the Site, between Bawtry Village and Gainsborough Town on the A631 Road. Gainsborough is situated 29km north west of Lincoln, 24km south west of Scunthorpe, and 56km east of Sheffield. The Site covers an area of approximately 247ha and is currently being used for arable purposes.

7.3.17 Towards the centre of the Site is Highfield Farm with associated access from Gringley Road to the west, and Toft Dyke Lane (a small track that is also a bridleway) to the south, both of which and Highfield Farm fall outside of the Site.

7.3.18 Apart from a few small fields at the northern end, Gringley Road runs along most of the western boundary of the Site. The road is predominantly well vegetated with roadside vegetation along both sides for the majority of the length of the road. The Site also excludes Lancaster Road within the north eastern extents of the Site. This creates a division in the Site boundary, creating a separate parcel of land to the north east to the south east of Green Farm. Lancaster Road is only passable by vehicle for a short distance south of Green Farm, at which point the public highway ends and the route continues as a Public Footpath. The footpath runs along the eastern Site boundary and is predominantly enclosed by existing vegetation, however there are some locations where it is not, and this allows for views south west across the Site and the surrounding countryside. This footpath is also the route of the Trent Valley Way, a Recreational Route which continues south beyond the Site and into the wider countryside. A section of Bridleway crosses the Site between Toft Dyke Lane and the Trent Valley Way and continues across the arable farmland to the east of the Site towards Clayworth Woodhouse. Where it meets the Trent Valley Way there are long distance views south west across the Site. The southern boundary of the Site is formed by a section of Mill Lane and agricultural field boundaries. Mill House, a large detached residential property is located to the immediate south of the Site and is accessed from Mill Lane. The property's domestic gardens extend south of the property and Mill Lane.

7.3.19 To the north is the village of Gringley on the Hill, separated from the Site via the A631, which forms the northern Site boundary between Clayworth Road and Green Farm. Gringley on the Hill occupies an elevated position within the landscape at approximately 65m AOD. The village itself is located behind the A631 and is well hidden behind established vegetation along the road as well as on the southern edge of the village. However, there are a small number of residential properties and the church which benefit from a more exposed position and can be seen from within the landscape to the south of the settlement, including from the Site and the surrounding PRoW.

7.3.20 The landform falls away from the A631 and west towards Gringley Road and Clayworth. The village of Clayworth sits alongside the Chesterfield Canal at approximately 15m AOD. Again, the village is well enclosed by surrounding vegetation on the edge of the village, which predominantly hides it within the countryside but there are locations, notably in views back from Toft Dyke Lane where there is a greater appreciation of the edge of the settlement.

7.3.21 Although there are no woodlands on the Site itself, the landscape surrounding the Site is peppered by numerous woods and coverts which visually combine to form wooded horizons and provide enclosure to the landscape.

West Burton Substation

7.3.22 There are two potential parcels of land, where a substation and energy storage facility can be built around the West Burton Power Station. The parcels comprise mostly of agricultural land with some hedgerows towards the edge of the fields.

7.3.23 The exact location is still to be determined and will be refined through the design process.

Cable Route Corridor Search Areas

7.3.24 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 West Burton Power Station. The applicant is in the process of seeking to refine this corridor which will progress alongside the design process.

National Landscape Character

7.3.25 The Sites are located within one National Character Area (NCA)[6] as defined by Natural England and as illustrated on Figure 7.4:

- NCA Profile: 48 Trent and Belvoir Vales (NE429).

7.3.26 All four sites are located within NCA 48 and West Burton 4 is located just outside NCA 39 Humberhead Levels.

Regional Landscape Character

7.3.27 The Sites are located within two Regional Character Landscape Character Types (RLCT)[7] as defined by East Midlands Regional Landscape Character Types (RLCT) and as illustrated on Figure 7.5:

- RLCT Profile: 4a Unwooded Valleys; and
- RLCT Profile 5B Wooded Village Farmlands

7.3.28 Within the 5km study area there are further RLCA'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.

[6] www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles
[7] http://publications.naturalengland.org.uk/publication/5635681403535360

- RLCT Profile 3b: Planned and Drained Fens and Carrlands

7.3.29 The study area also contains areas defined as 'Built Up Area' which is associated with large settlements including, Skellingthorpe, Scampton, Saxilby and Sturton by Stow, Clarborough, North and South Wheatley, Miserton and Walkeringham. Main highway corridors include the A57 (Gainsborough Road), A156 (Lincoln Road) A1500 (Tillbridge Road), A631, A620 and A161.

Local Landscape Character

7.3.30 The Sites are located within several Local Landscape Character Areas (LLCA)[8] as defined by the West Lindsey Landscape Character Area Assessment and Bassetlaw District Landscape Character Assessment:

- West Burton 1 – LLCA 3 The Till Vale
- West Burton 2 – LLCA 3 The Till Vale
- West Burton 3 – LLCA3: Till Vale and LLCA 2: Trent Valley
- West Burton 4 – The Site is mostly within Mid-Nottinghamshire Farmlands but also in the Idle Lowlands. The Mid-Nottinghamshire Farmlands region has been divided into 62 Landscape Description Units (LDU's) of which identify the Site as lying within Policy Zone 01 Gringley-on-the-Hill and Policy Zone 03 Beckingham. In terms of the section of the Site that lies on Idle Lowlands, the assessment for Mid-Nottinghamshire Farmlands corresponds to Policy Zone 06, Wiseton.

7.3.31 Within the 5km study area there are further LLCA's which will be considered as part of the LVIA.

7.3.32 The West Lindsey Landscape Character Area Assessment was undertaken in August 1999 and the Bassetlaw District Landscape Character Assessment was undertaken in 2009 and therefore it is proposed to undertake a review of both assessments to ensure it is relevant to the current baseline.

Landscape Planning Designations

7.3.33 The study area for the Sites, the cable route search corridor and the West Burton Substation do not contain any National landscape designations such as National Parks or Areas of Outstanding Natural Beauty (AONB).

7.3.34 The following designations are assessed within each land parcel (West Burton 1-4) and within the 5km study area. A general description of designations within the 5km study area is included to provide a rounded assessment of designations within the wider landscape.

7.3.35 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.

[8] Landscape Character Assessment | West Lindsey District Council (west-lindsey.gov.uk)

West Burton 1

7.3.36 Scheduled Monuments: There are no Scheduled Monuments on the Site.

7.3.37 The closest Scheduled Monument is *Broxholme medieval settlement and cultivation remains* (List Entry Number: 1016797), located directly southwest of the Site. The *Deserted Village of North Ingleby* (List Entry Number: 1003570) is approximately 2km west of the Site. *The Thorpe medieval settlement* (List Entry Number: 1016978) in Thorpe in the Fallows hamlet is approximately 1.5km north. (Refer to Figure 7.6: Landscape Receptors).

7.3.38 Listed Buildings: There are no Listed Buildings on the Site.

7.3.39 The closest in proximity to the Site are located to the south west within Broxholme village. Those are: *Church of All Saints* (List Entry Number: 1064095) Grade II; *the Old Rectory* (List Entry Number: 1147028) Grade II; *the Boontown Cottage* (List Entry Number: 1147027) Grade II; *the Farm Building at Manor Farm* (List Entry Number: 1147032) Grade II. (Refer to Figure 7.6: Landscape Receptors).

7.3.40 Sites of Special Scientific Interest (SSSI): There are no SSSI's on or within 5km of the Site.

7.3.41 Registered Parks and Gardens: There are no Registered Parks and Gardens on or within 5km of the Site. *Riseholme Hall* (Listed Number 1000989) is the closest to the Site at 6.5km.

7.3.42 Conservation Areas: The Site is not located in a Conservation Area. There are three Conservation Areas within the 5km study area. These include Brattleby Conservation Area located 3.1km northeast of the Site, South Carlton Conservation Area located 3.2km southeast of the Site and Saxilby Conservation Area located 3.1km southwest of the Site.

7.3.43 Environmental Designations: There are no Environmental Designations on the Site or within 5km of the Site. However, an Area of Great Landscape Value (AGLV) in West Lindsey District is located approximately 2.3km east of the Site. The AGLV forms a 20km fringe running north to south from Grayingham village at B1205 in the north and ends in South Carton at School Lane. (Refer to Figure 7.6: Landscape Receptors).

7.3.44 Local Landscape Designations: Located approximately 2.1km to the east of AGLV1. All other AGLV's are beyond 5km from the Site.

West Burton 2

7.3.45 Scheduled Monuments: There is one Scheduled Monument on the Site, *The Deserted village of North Ingleby* (List Entry Number: 1003570), located on Sturton Road in the middle of the Site.

There are 12 Scheduled Monuments within 5km of the Site. The closest are three Scheduled Monuments within 2km of the Site. To the northwest is *The Medieval bishop's Palace and Deer Park, Stow Park* (List Entry Number: 1019229). To the northeast, in the Thorpe in the Fallows hamlet is *Thorpe medieval settlement* (List Entry Number: 1016978); and eastward, in Broxholme, is *Broxholme medieval settlement and cultivation remains* (List Entry Number: 1016797). (Refer to Figure 7.6: Landscape Receptors).

7.3.46 Listed Buildings: There are no Listed Buildings on the Site. The closest in proximity is Grade II Listed Ingleby Chase (Listed Number: 1147263), located to the Site's northern boundary. Within a 5km proximity there are further Grade I and II Listed Buildings, including to the south of the Site within the town of Saxilby, where the Grade I Church of St Botolph (Listed Number:

1359490) and Grade II* The Old Hall (Listed Number 1064072) are located. (Refer to Figure 7.6: Landscape Receptors).

7.3.47 **Sites of Special Scientific Interest (SSSI):** The Site is not covered by any SSSI's. The closest SSSI to the Site is the *Doddington Clay Woods*, which lies approximately 4.8km south of the Site.

7.3.48 **Registered Parks and Gardens:** There are no Registered Parks and Gardens on the Site or within 5km. *Doddington Hall* (Listed Number 1000975) is the closest located approximately 5.6km south of the site.

7.3.49 **Conservation Areas:** The Site is not located within a Conservation Area. However, within a 5km radius of the Site there are three Conservation Areas. These include Saxilby Conservation Area located 1.2km south of the Site, South Carlton Conservation Area located 4km east of the Site and Brattleby Conservation Area located 4.7km northeast of the Site. The closest to the Site is *Bridge Street* at Saxilby Conservation Area. This Conservation Area includes most of Bridge Street's buildings from the latter half of the nineteenth century. Architecturally, they are a mixture of sizes, use and material. Where red brick is predominant, few of the buildings are in their original form as built but must show evidence of rebuilding. The most important architectural buildings are two public houses: The Sun Inn and The Ship. Both are well maintained and attractive buildings.[9] (Refer to Figure 7.6: Landscape Receptors).

7.3.50 **Environmental Designations**: There are no Environmental Designations across or within 5km of the Site. However, AGLV1 is located 3.7km east of the Site. The AGLV forms a 20km fringe running north to south from Grayingham village at B1205 in the north and ends in South Carton at School Lane. (Refer to Figure 7.6: Landscape Receptors). All other AGLV's are beyond 5km from the Site.

West Burton 3

7.3.51 **Scheduled Monuments:** There are no Scheduled Monuments on the Site itself however, *The medieval bishop's palace and deer park, Stow Park* (List Entry Number: 1019229), is located adjacent to the Site. The designations are however wholly outside of the proposed development area.

There are also a number of Scheduled Monuments within 5km of the Site including: Roman fort, south of Littleborough Lane (List Entry Number: 1004935) approximately 1.7km northwest of the Site and Torksey Castle (List Entry Number: 1005056) and the Site of medieval town (List Entry Number: 1004991) approximately 1.4km southwest of the Site, in Torksey hamlet. (Refer to Figure 7.6: Landscape Receptors).

7.3.52 **Listed Buildings:** There are no Listed Buildings on the Site. In closest proximity to the Site are Grade II *Signal Box at Stow Park* (List Entry Number: 1146606) and *Stow Park Station* (List Entry Number: 1064058) located 50m north of the Site. Grade II *Manor Farmhouse* (List Entry Number: 1064084), *Priory Cottage* (List Entry Number: 1064082) , *Richards-Havecross Cottages* (List Entry Number: 1064081), the *Beeches* (List Entry Number: 1064080), and *The Hermitage* (List Entry Number: 1064080) are approximately 50m southwest of the Site.

There are approximately 102 Listed Buildings within 5km of the Site, most of them Grade II, however, the most relevant Listed Buildings are: Grade II* *Torksey Viaduct over River Trent* (List Entry Number: 1359456), and the *Church of St Peter* (List Entry Number: 1064078) southwest of the Site in

[9] Saxilby Bridge Street, Conservation Area Appraisal, July 1988, p.7-9

Torksey hamlet, and *The Gate* Burton Hall (List Entry Number: 1359458) located 1.5km north of the Site. (Refer to Figure 7.6: Landscape Receptors).

7.3.53 Sites of Special Scientific Interest (SSSI): The Site and within 5km of it is not covered by any SSSI's.

7.3.54 Registered Parks and Gardens: There are no Registered Parks and Gardens on the Site or within 5km of the Site.

7.3.55 Conservation Areas: The Site is not located within a Conservation Area however Saxilby Conservation Area, is within 5km and located approximately 4.5km southeast of the Site.

7.3.56 Environmental Designations: There are no Environmental Designations on the Site, however there are Local Wildlife Sites and AGLV1 is located within 286m north west of the Site. All other AGLV's are beyond 5km from the Site. (Refer to Figure 7.6: Landscape Receptors).

West Burton 4

7.3.57 Scheduled Monuments: There are no Scheduled Monuments on the Site but there are three within 5km of the Site. The Market Cross 70m west of the Church of St Peter and St Paul (List Entry Number: 1016790) and the Beacon Hill Camp (List Entry Number: 1003241), are located approximately 225m north of the Site within the village of Gringley on the Hill and Hayton Castle moated site and fishpond (List Entry Number: 1008630) located approximately 1.2km south of the Site. (Refer to Figure 7.6: Landscape Receptors).

7.3.58 Listed Buildings: There are no Listed Buildings on the Site, however there are numerous within 5km of the Site, predominantly located within the local settlements of Gringley on the Hill, Clayworth and Wiseton. The closest in proximity to the Site is Grade II Listed The Green, conservatory and Boundary Wall (List Entry Number: 1370396), approximately 70m north of the Site. Other notable Listed Buildings within 2km of the Site include: Grade I Church of St Peter (List Entry Number: 1212157), approximately 530m south west of the Site in Clayworth; and Grade II* Church of St Peter and Paul (List Entry Number: 1370395), approximately 220m north of the Site in Gringley on the Hill. (Refer to Figure 7.6: Landscape Receptors).

7.3.59 Sites of Special Scientific Interest (SSSI): The Site is not covered by any SSSI's, however there are two within 5km of the Site - the Chesterfield Canal SSSI, which lies 550m west and south of the Site, and the Sutton and Lound Gravel Pits SSSI approximately 2.1km west of the Site. (Refer to Figure 7.6: Landscape Receptors).

7.3.60 Registered Parks and Gardens: There are no Registered Parks and Gardens on or within 5km of the Site.

7.3.61 Conservation Areas: The Site is not located within a Conservation Area, but there are two within the Site's immediate context at Gringley on the Hill and Clayworth and a further one within 2km at Wiseton. Gringley on the Hill Conservation Area lies directly north of the Site and Clayworth Village Conservation Area lies directly to the south west corner of the Site. Approximately 1.7km to the west of the Site lies the Wiseton and Drakeholes Conservation Area.

7.3.62 Environmental Designations: There are no Environmental Designations across or within 5km of the Site, however there are a number of Local Wildlife Sites to the north, east, south and west. (Refer to Figure 7.6: Landscape Receptors).

Visual Amenity

West Burton 1

7.3.63 The nearest settlement is the small village of Broxholme located immediately to the south west of the Development Site. Around 2.5km to the north west of the Site lies the settlement of Sturton by Stow and the larger village of Saxilby is located approximately 2.5km to the south west of the Site. To the west the hamlets of Bransby (approximately 1km) and Ingleby (approximately 2km), and to the east lies the village of North Carlton (approximately 2.0km).

7.3.64 Broxholme Lane runs directly through the Site with Carlton Lane crossing through the flat arable farmland to the south of the Site. The A1500 runs east- west to the north of the Site between the A15 on the ridge and the larger settlements of Marton and Sturton by Stow. The A15 runs north south along the prominent ridgeline to the east of the Site allowing for elevated views west across the flat landscape that incorporate the Site and the West Burton and Cottam Power Stations and numerous modern wind turbines.

7.3.65 There are no Public Rights of Way that cross the Site, however there are numerous PRoW's that run within 5km of the Site and to the Site boundaries. Public Footpath Brox/198/1 is located to the south west corner of the Site and runs from Broxholme Lane to Carton Lane. Public Footpath Brox/197/1 lies directly to the west of the Site connecting Broxholme Lane to the Site boundary. Public Footpaths Brox/196/1 and Scmp/196/1 lie to the west and north west of the Site, connecting Broxholme Lane with the outskirts of Thorpe in the Fallows. A Public Bridleway, TLFe/31/1, is also located to the north west as well as a Public Bridleway, NCar/225/1, located to the east. Further PRoW are located within Bransby to the north west and North Carlton to the south east. (Refer to Figure 7.7 Visual Receptors).

West Burton 2

7.3.66 The nearest settlements to the Development Site are the small hamlet of Ingleby, which the Site is directly alongside, the village of Saxilby to the south and west of the development Site and the village of Sturton by Stow approximately 1.5km north of the Site. There is also a small hamlet to the north of the Site at Bransby, (approximately 1km north). Numerous farmsteads, farm sheds and associated cottages are dotted throughout the arable farmland surrounding the Site.

7.3.67 Sturton Road / Saxilby Road run directly through the Site and is a busy highway connecting the local settlements. Broxholme Road also runs across the Site. Church Lane leads out of the back of Saxilby past the new Lovell and Taylor Wimpey residential developments, connecting with Sykes Lane to the south of the Site. Sykes Lane continues north west along the south western site boundary and continues through the arable farmland underneath the railway line and towards the village of Torksey.

7.3.68 Cowdale Lane crosses through the open landscape to the north and the Sheffield to Lincoln and Doncaster to Lincoln railway line.

7.3.69 There are no Public Rights of Way across the Site. In closest proximity are the Public Footpaths Brox/198/1 and Brox/197/1, located about 700m east of the Site. Public Footpaths Saxi/203/1, Saxi/207/1 and Saxi/208/1, are all located approximately 700m to the south of the Site. (Refer to Figure 7.7: Visual Receptors).

West Burton 3

7.3.70 The nearest settlements are the small village of Marton to the north west of the Site, and the small hamlet of Brampton to the south west. The larger settlement of Sturton By Stow is located approximately 1.8km east of the Site. Along the A1500 there are occasional residential dwellings as ribbon development as well as a cluster of houses alongside the railway crossing.

7.3.71 Located within the middle of the Site and straddling the railway line is Stow Park Farm and Marton Moor Farm, two large farmsteads with associated outbuildings and sheds that occupy the arable farmland to the south of the A1500. Poplar Farm is located within the north western corner of the Site alongside Marton. Numerous other farmsteads are dotted across the arable farmland surrounding the Site, including High Wood Farm, The Grange Farm and Danes Farm.

7.3.72 One Public Footpath crosses the Site, Mton/68/1, in the north west corner, running from High Street to Stow Park Road. There are no other PRoW that cross the Site, however there are a number of PRoW within 5km of the Site.

To the north, just outside of Marton, lies Mton/69/1, to the east Stow/71/2, Stow/71/4, Stow/74/2, Stur/75/1 and Stur/75/2 connect Stow with Sturton by Stow and the surrounding landscape. To the south there are no PRoW other than at the south west corner of the Site where Tork/957/1, Tork/779/1 and Tork/96/1 are located between Brampton and Torksey. To the west lies Bram/99/1, Mton/66/4, Mton/66/1 and the long distance trail of the Trent Valley Way. (Refer to Figure 7.7: Visual Receptors).

West Burton 4

7.3.73 The nearest settlements are the small villages of Gringley on the Hill and Clayworth located to the north and south of the Site respectively. Dotted throughout the immediate are a small number of farmsteads and rural properties such as Topley Farm, Highfield Farm, and Mill House and Clayworth Woodhouse.

7.3.74 Gringley Road / Clayworth Road runs immediately along the western Site boundary, and the busy A631 runs along the northern boundary. Mill Lane, a rural track giving access to Mill House and Wheatley Grange runs along the southern edge of the Site. Wheatley Road and Clayworth Common cross the arable farmland to the south east of Clayworth and Wiseton Road heads north west from the settlement connecting with Wiseton and ultimately the B6045 to the north west.

7.3.75 There are a number of PRoW that cross the Site. These include Clayworth BW7 in the south west from Mill Lane, along Toft Dyke Lane, Clayworth FP11 in the west from Gingley Road to Toft Dyke Lane, Gringley on the Hill FP16 in the north east along Lancaster Road, and Gringley on the Hill FP5 in the north west from Clayworth Road to the A631. The Trent Valley Way long distance footpath also runs along the eastern Site boundary before crossing into the Site along Lancaster Road in the north east.

7.3.76 There are numerous other PRoW that are in a 5km vicinity of the Site linking the villages of Clayworth, Wiseton, Gringley on the Hill, Beckingham, Saundby and North & South Wheatley. (Refer to Figure 7.7: Visual Receptors)

7.4 Assessment Methodology

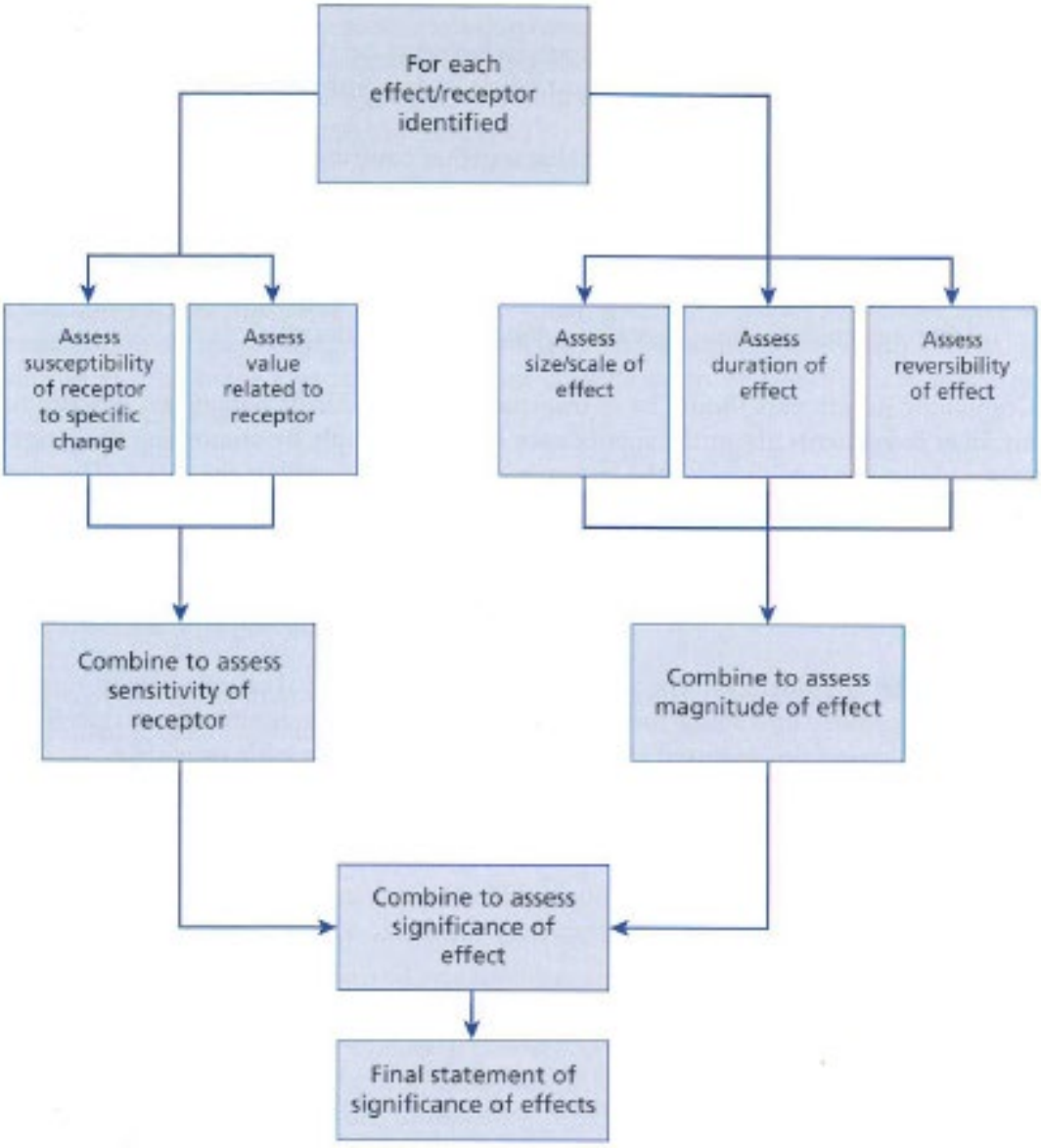
7.4.1 The LVIA will be undertaken in line with the following guidance which represents the standard approach and guidance relevant to LVIA for renewable energy developments within the UK:

- Landscape Institute and Institute of Environmental Management and Assessment 'Guidelines for Landscape and Visual Effect Assessment', 2013 (GLVA3)[10];
- An Approach to Landscape Character Assessment (October 2014)[11];
- Landscape Institute Technical Guidance Note 06/19, Visual Representation of Development Proposals (17 September 2019)[12];
- Landscape Institute Technical Guidance Note 02/19, Residential Visual Amenity Assessment (RVAA) (March 2019)[13]; and
- Landscape Institute Technical Guidance Note 02/21, Assessing landscape value outside national designations (May 2021)[14].

[10] Landscape Institute and Institute of Environmental Management and Assessment, 2013, *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, Routledge, London.
[11] Natural England, An Approach to Landscape Character Assessment, October 2014, by Christine Tudor, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691184/landscape-character-assessment.pdf
[12] Landscape Institute Technical Guidance Note 06/19, Visual Representation of Development Proposals (17 September 2019. Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf
[13] Landscape Institute Technical Guidance Note 02/19, Residential Visual Amenity Assessment (RVAA) (March 2019). Available at: https://www.landscapeinstitute.org/technical-resource/rvaa/
[14] Landscape Institute Technical Guidance Note 02/21, Assessing landscape value outside national designations (May 2021), Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2021/05/tgn-02-21-assessing-landscape-value-outside-national-designations.pdf

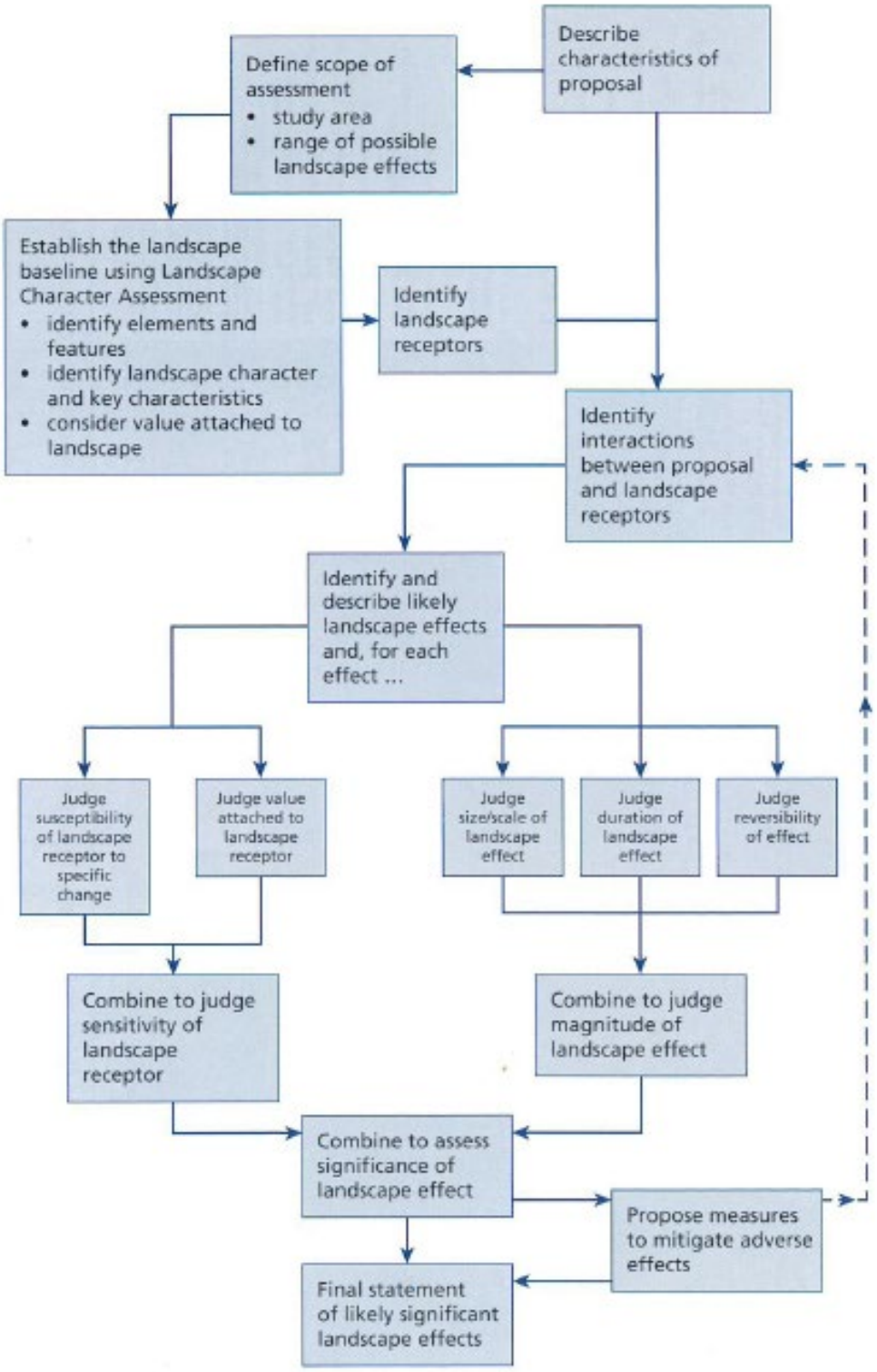
7.4.2 The methodology adopted to undertake the LVIA is defined in table 3.5 of GLIVIA3 as shown in the Figure below.

Figure 7.1: Extract from GLIVIA3



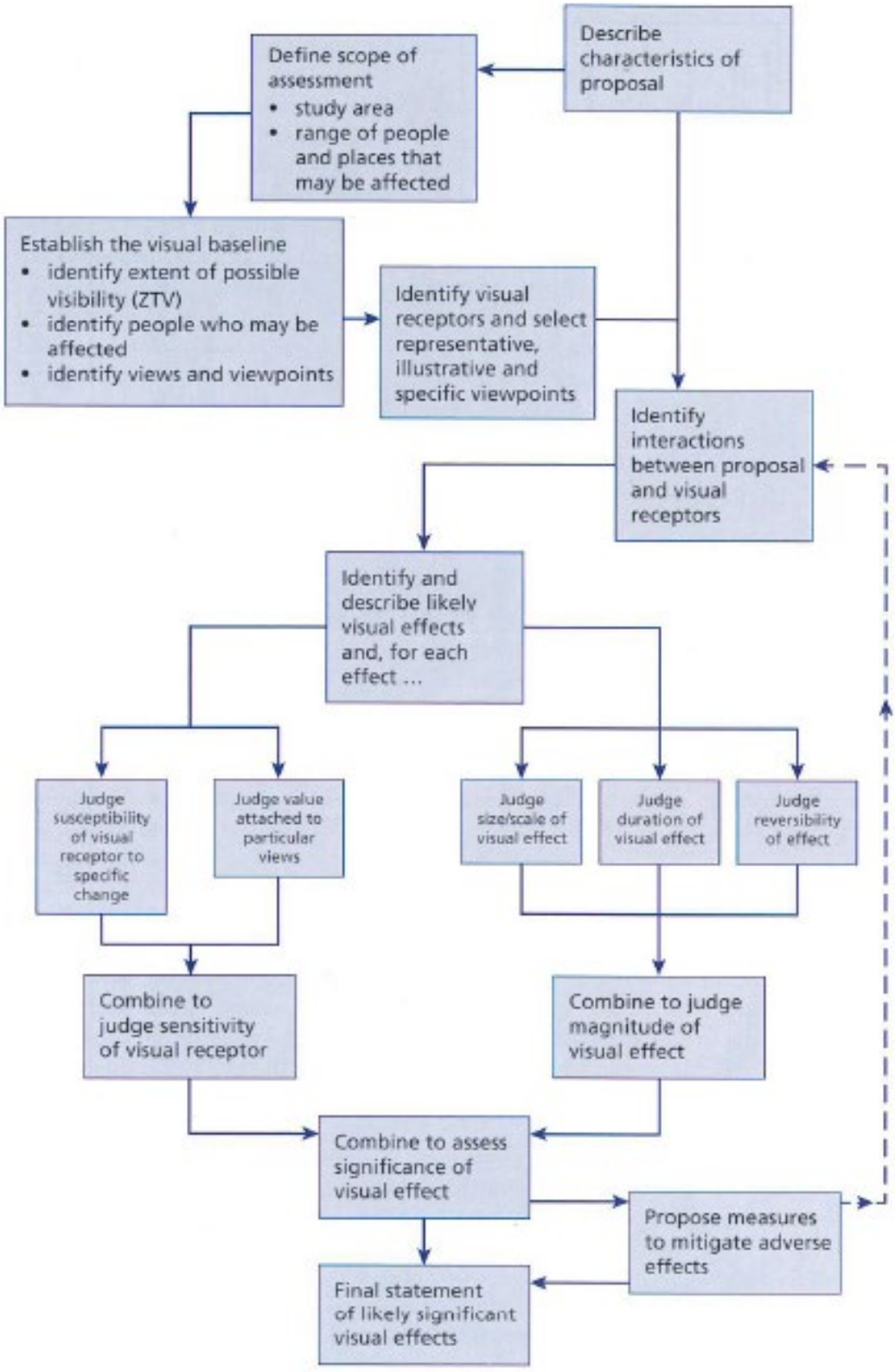
7.4.3 The following stages of assessment are undertaken in order to assess the significance of landscape effects as defined in table 5.1 of GLIVIA3 as shown in the Figure below.

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 Figure 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;
- 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 the receptor materially	Minor changes in a localised area.	Short term / temporary; partially reversible or reversible.

Magnitude evaluation	Size, scale and nature	Geographical Extent	Duration & Reversibility
	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 the EIA Regulations, 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 affect 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 Cottam 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 (see Appendix 7 Figures 7.12 -7.15) . 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 the Scheme Boundary (approximate)
1	Brox/198/1	Walkers	200m
2	Brox/198/1	Walkers, Motorists, Residents, Pedestrians	700m
3	North Carton Bridge	Road users	1km
4	NCar/225/1 and Carton Lane	Walkers, ride Horses Motorists	1.1km
5	NCar/225/1	Walkers, ride Horses	1.4km
6	Tillbridge Lane	Road users	500m
7	Broxholme Ln	Road users	200m
8	Broxholme Ln and Brox/197/1	Walkers, Motorists, Residents, Pedestrians	200m
9	Brox/196/1	Walkers	250m
10	Brox/196/1	Walkers	30m
11	Brox/196/1	Walkers	400m

12	TLFe/31/2 and Thorpe Lane	Walkers, ride Horses Motorists	2km
13	Church Lane - next to Low Farm	Road users	2km
14	Aist/37/1	Walkers	3km
15	B1398 and Tillbridge Lane	Road users	3.5km
16	NCar/187/1	Walkers	1.4km
17	Carton Ln and Boxholme Ln	Road users, Residents,	800m
18	Sturton Road	Road users, Residents	2km
19	Permissive path at Cowdale Ln	Walkers	1km
20	Broxholme Lane	Road users, Walkers, Residents	39m
21	Broxholme Lane	Road users, Walkers, Residents	309m
22	Church Lane	Road users, Walkers, Residents	420m
23	Sykes Lane	Walkers, Road users	175m
24	Sykes Lane and other route with public access	Walkers, Road users	6m
25	Sykes Lane	Road users, Walkers	600 Site
26	Sturton Road	Road users, Walkers	Adjacent
27	Sturton Road	Road users, Walkers	Adjacent
28	Sturton Road	Road users, Walkers	Adjacent
29	Walklands Farm at Cowdale Lane	Road users, Walkers, Residents	800m
30	Saxilby Road and Stur/81/1	Road users, Walkers, Residents	1.2m
31	Stur/75/1	Walkers	1.6km
32	West Syke Lane and Gorwick Lane	Road users, Walkers, Residents	1.7km
33	Cowdale Lane	Road users, Walkers, Residents	700m
34	Cowdale Lane	Road users, Walkers	950m
35	Fossdyke Navigation	Road users, Walkers, Residents	1.3km
36	Sykes Lane	Road users, Walkers, Residents	1.5km
37	River Bank Farm entrance	Road users, Walkers, Residents	1.4km
38	Marton Road	Road users	2km
39	Willingham Road	Road users	820m
40	Stow/71/2	Walkers, Residential properties	1.1km
41	Stow Park Road	Road users, Residential properties	500m
42	Mill Lane	Road users	1.2km
43	Cowdale Lane	Road users	1.6km

44	Cowdale Lane	Road users	220m
45	Cowdale Lane	Road users	Adjacent
46	Cowdale Lane	Road users	400m
47	Highwood Farm entrance	Road users, Farmsteads	1.8km
48	Headstead Bank and Cottam FP3	Road users, Walkers, Residential properties	2.4km
49	Cottam FP1 next to River Trent	Walkers and users of river	1.4km
50	Mton/66/4	Walkers	1.0km
51	Brampton Lane	Road users	500m
52	A156 and Bram/66/1	Walkers, Road users	450m
53	A1500	Road users, Walkers, Residential properties	Adjacent
54	A1500	Road users, Residential properties, railway line	Adjacent
55	A1500	Road users, Residential properties	Adjacent
56	A1500	Road users, Residential properties	50m
57	Mton/69/1	Walkers, Road users	650m
58	Gringley On The Hill FP5	Walkers	Adjacent
59	A631 and High St	Road Users	200m
60	A631	Road Users	150m
61	Beckingham FP3	Walkers	1.2km
62	Gringley On The Hill FP16	Road Users, Walkers	90m
63	Gringley On The Hill FP16	Road Users, Walkers	Within Site
64	Clayworth FP9	Walkers	Adjacent
65	Clayworth FP9	Walkers	Adjacent
66	Clayworth BW7	Walkers	400m
67	North Wheatley FP7 and other route with public access	Walkers	500m
68	North Wheatley FP1#1	Walkers	750m
69	Trent Valley Way	Walkers	780m
70	Mill Lane	Road Users, residential properties	3km
71	Clayworth Common	Road Users	900m
72	Clayworth FP10	Walkers	600m
73	Mill Lane and Clayworth BW7	Road Users, Walkers	Adjacent
74	Gringley Road	Road Users, residential properties	80m
75	Gringley Road	Road Users, Walkers	Adjacent
76	Clayworth FP3	Walkers	700m
77	Gringley On The Hill FP4	Walkers	800m

78	Gringley On The Hill FP4	Walkers	200m
79	High St	Road Users, residential properties	220m
80	Clayworth Rd	Road Users,	Adjacent
81	North Wheatley FP7	Walkers, residential properties	3.5km
82	Lound FP6	Walkers	3.3km
83	Hayton BOAT21	Walkers,	3km

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[15] in order to maximise habitat creation and ecological mitigation as well as landscape and visual mitigation.

7.5 Conclusion 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 7.1. 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:

- A preliminary study area beyond 5km 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 5km (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.

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

- 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 7.12 to 7.15 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 West Burton 1-4 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 West Burton 1-4 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 West Burton 1-4 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 West Burton 1-4:

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

7.5.10 The full extent of the Scheme within the application site is not yet know 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, West Burton Solar Project – Clarkson and Woods, August 2021; and
- Appendix 8.2 Extended Phase 1 Habitat Survey Maps, West Burton 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 four Sites named West Burton 1 to 4 (WB 1-4). 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. In addition, there is a search area, known as West Burton Substation, in proximity to West Burton Power Station for the siting of a substation and an energy storage facility. 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 WB 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 (WB 2), bounded by a network of managed hedgerows and ditches with narrow field margins, where present. WB 4

comprises generally smaller fields with a mixture of arable and permanent pasture characterised by fields of winter-sown cereal, legumes and sheep grazing that are bounded by a network of managed hedgerows and ditches with narrow field margins, where present.

8.2.4 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 WB 1 – 3 is mostly flat but to the east of the Sites at the 'Lincoln Cliff', a significant north-south escarpment, located 3km east of WB 1. The River Trent is located west of WB 1 – 3 and east of WB 4 and is located 1.4km from WB 3 at its closest point as it flows north towards the Humber Estuary, itself some 36km north of WB 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 eastern boundary of WB 2 and 0.4km west of WB 1, the River Trent running 1.4km west of WB 3 and the River Idle running 1.8km west of WB 4.

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 West Burton 1-4 Sites completed April/May 2021).
- Desk study of ecological records from the land parcels and their surroundings supplied by the Lincolnshire Environmental Records Centre (LERC) and Nottinghamshire Biological and Geological Record Centre (NBGRC). 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 the site 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 red line 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 Sites are:

- Extended Phase 1 Habitats Survey and desk study of West Burton Substation and refined cable route 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 the 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 red line boundaries on third-party land (Mid-April - June 2022).
- Daytime inspections of all buildings within red line 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 red line 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 in 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 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 proposed development, 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 proposed development.
- 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 1-3 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 proposed development 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 and WB-Sub will be forthcoming.

WB 1

8.2.14 No designated sites were identified in proximity to WB 1 within the desk study. Therefore no impacts on designated sites are capable of occurring as a result of the proposals.

WB 2

8.2.15 As shown in Appendix 8.1, one Site of Special Scientific Interest (SSSI), Doddington Clay Woods SSSI, was identified during the desk study which was located 4.7km south of WB 2 and supports several types of woodland that are scarce in Britain as well as supporting a notable assemblage of breeding birds (including a heronry, warblers and woodcock) and ground flora. Indirect disturbance and fragmentation impacts may therefore arise should the change of land use or habitats associated with the proposals affect access to foraging or other supporting habitats for the bird species listed. However, the distance involved is likely to mean any effects are limited and direct impacts on the SSSI's habitats and flora are avoided.

8.2.16 Three non-statutorily designated Sites were identified within 2km of WB 2 which comprise a disused railway embankment that supports a diverse range of flora within a mosaic of habitats and two sites of species-rich agricultural grassland. 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.

WB 3

8.2.17 As shown in Appendix 8.1, no statutorily protected sites were found during the desk study within the search radiuses set out above for International and National designated sites. However, seven non-statutorily designated Sites were identified within 2km of WB 3, all designated for their notable grassland or woodland edge habitats, with one including wetland associated with the River Trent. Two of these sites are located within 100m of WB 3 while the others are under 900m away, therefore habitat degradation impacts associated with pollution arising from the construction phase should be considered during the EIA process.

WB 4

8.2.18 As shown in Appendix 8.1, three statutorily protected sites and fifteen non-statutorily designated Sites were identified in proximity to WB 4 and are described in Table 3 in Appendix 8.1. The three SSSIs were wetland sites, with the closest – 300m away – being designated for its habitats and flora, while the others – 2-5km away – being designated for wildfowl and wetland birds. Consequently, examination of the potential for both habitat loss and degradation effects, as well as fragmentation of, and disturbance to, bird populations arising from the construction and operation proposed development will be required.

8.2.19 The fifteen non-statutory designated sites are all listed for their notable grassland and woodland habitats and plant communities, with six located within 600m. Therefore, the potential for habitat degradation impacts arising primarily from construction-related pollution should be considered.

Priority Habitats

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

Woodland

8.2.20 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. 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

8.2.21 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 land parcels 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

8.2.22 Uncultivated field margins are generally very narrow or absent throughout the Sites and 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

8.2.23 The River Till runs adjacent to WB 1 and 2, while other minor watercourses and drains are present at WB 3 and 4. 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 River Idle is located several kilometres from WB 4, while the River Trent lies to the west of WB 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

8.2.24 WB 2 features the most actual in-field ponds, located within semi-improved grassland fields, while WB 3 also had a small number of substantial waterbodies. 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

8.2.25 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 Sites for West Burton 1-4 as well as the desk study, for which species records within 2km of the boundary of Sites for West Burton 1-4 were obtained. The results of the desk study and several species surveys are contained within Appendix 8.1.

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

Badgers

8.2.27 Main badger setts were recorded at WB 2-4, with the majority of activity located at WB 4. No setts were recorded at WB 1, although the desk study recorded several local badger setts historically. 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

8.2.28 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 land parcels was generally low, being dominated by monoculture arable and a simple network of managed hedgerows.

8.2.29 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

8.2.30 Preliminary desk study and site survey results so far indicate otter presence at a low or moderate density on all Sites and in the local area. For water voles, results so far indicate water vole presence at WB 1-3, with anecdotal evidence from WB 4. 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 WB 1 and 2 respectively 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.

8.2.31 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

8.2.32 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 Sites 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

8.2.33 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 of West Burton 1-4 Sites and records in Lincolnshire and Nottinghamshire 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.

8.2.34 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.

8.2.35 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.

8.2.36 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

8.2.37 Habitats for reptiles are generally limited in quality and extent across all the land parcels, 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. A grass snake and a common lizard were observed within grass field margins on WB 3.

8.2.38 Great crested newt eDNA surveys of 26 ponds on site have been undertaken which found two positive ponds within WB 3. 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.

8.2.39 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

8.2.40 Farmland and woodland birds appear strongly within the desk study data, with records in proximity to WB 4 containing wetland species associated with the Idle Valley protected sites (Sutton and Lound Gravel Pits SSSI). 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.

8.2.41 Following preliminary surveys, species 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 land parcels, while lapwing occurred only sporadically and breeding could not be confirmed.

8.2.42 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.

8.2.43 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.

8.2.44 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.

8.2.45 Preliminary wintering bird survey results indicate that the land parcels 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

8.2.46 No records of protected or priority invertebrate species were revealed by the desk study. The only invertebrate species to feature on the Lincolnshire BAP is white-clawed crayfish, also appearing on the Nottinghamshire BAP. 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 WB 4.

8.2.47 Three other invertebrate species occur on the Nottinghamshire BAP; green hairstreak, dingy skipper and hazel pot beetle. All of these species occur in relatively restricted ranges in Nottinghamshire significantly distant from the Sites, and are not associated with the general habitat types which dominate the site.

8.2.48 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

8.2.49 Only two notable plant species occur within the desk study data, which were: three records of tubular water dropwort (a plant of wetlands) in proximity to WB 2, and one record of annual knawel (a plant of farmland and heathland) in proximity to WB 3, neither of which have been recorded on site. Greater water parsnip appears on the Lincolnshire BAP but has not been recorded on or near the site. Black poplar, Deptford pink and Nottingham autumn and spring crocuses appear on the Nottinghamshire BAP but none have been recorded on or near the site.

8.2.50 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

8.2.51 Several records of European eel and spined loach derived from the River Till (WB 1 and 2) and River Idle (WB 4) occur within the desk study data which are priority species. While these rivers 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 the River Till 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[16]. 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 proposed development. 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.

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;

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

- 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 proposed development 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 red line 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 proposed development 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 Cottam Solar Park 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
- 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
- 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 and Nottinghamshire (emerging)
- 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 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 land parcels, 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 land parcels (WB 3 and 4) 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 appendices:

- Appendix 9.1 Flood Risk Screening Report including site specific reports relating to West Burton 1, 2, 3 and 4.

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 at Appendix 9.1.

9.2.2 The risk of tidal / fluvial flooding has been interpreted from the Environment Agency's (EA) online Flood Map for Planning[17]. The risk of surface water flooding has been assessed from the EA Long Term Flood Risk Map (Surface Water)[18]. We have not considered the risk of groundwater flooding or from artificial sources such as reservoirs and / or canals at this stage.

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 four Sites named West Burton 1 to 4 (WB 1-4). 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. In addition, there is a search area, known as 'West Burton Substation', as identified on Figure 3.1, in proximity to West Burton

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

Power Station for the siting of a substation and an energy storage facility. 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.

9.2.5 The baseline conditions of each site are described below. The West Burton 3 Site is split over two parcels and considered separately below.

9.2.6 West Burton 1

9.2.7 The EA's Flood Risk Map for Planning Site indicates that the northern and eastern Site boundaries are slightly encroached by Flood Zone 3. The Site is also partly located within Flood Zone 2 in the north-east and south. Flood Zone 3 is defined as a High Probability of fluvial flooding with a 1 in 100 or greater annual probability, whereas Flood Zone 2 is defined as Medium Probability with a 1 in 100 and 1 in 1000 annual probability of fluvial flooding. Fluvial risk to the Site is associated with the River Till.

9.2.8 The EA's Long-Term Flood Risk Map indicates that the surface water risk across the Site is predominately Very Low (<0.1%). Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present within topographic depressions, in the northeast boundary, the southeast boundary and in the central section of the Site. The Medium Risk flow path in the west is associated with a land surface drain that runs through the Site, flowing north towards the River Till.

9.2.9 West Burton 2

9.2.10 The EA's Flood Risk Map for Planning indicates that the eastern extent of the Site is partly situated within Flood Zone 3 which forms part of the Till Washland (Flood Storage Area). The west and south-west of the Site is situated within Flood Zone 2. The EA Long Term Flood Risk Map generally concurs with this, with areas in the Site varying from Very Low risk (the central section) to Medium risk (the east area adjacent to the River Till).

9.2.11 The nearest watercourse is the River Till which flows directly to the east of the Site, at the closest point, in a southwest to northeast direction of flow. The Fossdyke Canal is also located 2km southwest of the Site and flows in a northwards direction. The Fossdyke Canal connects to the River Trent at Torksey in Lincoln, approximately 3km west from the closest point of the Site. Fluvial flooding could occur if the River Till overtopped or breached its banks during or following an extreme rainfall event.

9.2.12 The EA's Long-Term Flood Risk Map (Surface Water) indicates that the majority of the Site is at Very Low Risk (< 0.1%) from surface water flooding. Areas of Medium (1% - 3.3%) and High (≥ 3.3%) risk are present in the west and southwest. The High risk flow path in the west is associated with a land surface drain that runs through the Site.

9.2.13 West Burton 3

9.2.14 The EA's Flood Risk Map for Planning indicates that some of the eastern areas of Parcel 1 lie within the extents of Flood Zone 3 (High Probability), with areas bordering this in Flood Zone 2. A minor portion of the western extremity of Parcel 1 also clips Flood Zone 3. All other areas of Parcel 1 lie in Flood Zone 1 (Low Probability). Most (>75%) of Parcel 2 is located in Flood Zone 1, with a portion of the western area of the Site, bordering the railway line, in Flood Zone 2.

9.2.15 Fluvial risk across the Site is associated with a series of land drains, which ultimately discharge into the Foss Dyke Navigation 1.8 km southwest, and the River Till 3.5 km east of the Site. There is also a portion of flood risk

derived from the River Trent, approximately 750 m west of the Site at its closest point.

9.2.16 The EA's Long-Term Flood Risk Map indicates that the majority (>80%) of the Site is at Very Low (<0.1% Annual Probability) risk of surface water flooding. There are some isolated areas of Low to Medium (0.1 – 3.3%) risk of surface water flooding, particularly towards the eastern side of Parcel 1. The western extremity of Parcel 2 clips a High (>3.3%) risk area, although the remainder of the parcel is at Very Low risk.

9.2.17 The surface water extents shown on the EA's Long-Term Flood Risk Map largely concur with the Flood outlines shown on the EA Flood Map for Planning associated with land drains which cross the Site. Additional Surface Water Risk extents are shown along the western boundary of parcel 2 which emanates from flow paths running towards the Site from the north, west and south.

9.2.18 West Burton 4

9.2.19 The EA's Flood Risk Map for Planning indicates that the majority (>90%) of the Site is located within Flood Zone 1 (Low Probability) of flooding, with a small portion of the extreme southwest of the Site located in Flood Zone 2 (Medium Probability). Fluvial risk of the Flood Zone 2 area within the Site is associated with Chesterfield Canal, approximately 250 m south of the Site.

9.2.20 The EA's Long-Term Flood Risk Map indicates that the majority (>90%) of the Site is at Very Low (< %) risk, located in the southern portion of the Site. This risk is derived from two major surface water flow paths, one originating from higher ground in the southeast, and another from Clayworth Road, the B1403 to the north.

9.2.21 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.

9.2.40 National Standards for Sustainable Drainage Systems (2015)

9.2.41 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.

9.2.42 Non-Statutory Technical Standards for Sustainable Drainage (2015)

9.2.43 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.

9.2.44 The Water Resources Act (1991)

9.2.45 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.

9.2.46 The Flood and Water Management Act (2010)

9.2.47 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.

9.2.48 EU Floods Directive and the Flood Risk Regulations (2009)

9.2.49 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.

9.2.50 Building Regulations Part H

9.2.51 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.

9.2.52 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.

9.2.53 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

9.2.54 The development crosses two counties Lincolnshire and Nottinghamshire and two districts West Lindsay and Bassetlaw. The following local policies are relevant to this topic sheet.

9.2.55 West Lindsey District Council

9.2.56 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.

9.2.57 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).

9.2.58 Bassetlaw District Council

9.2.59 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.

9.2.60 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).

9.2.61 Lincolnshire County Council SuDS Guidance

9.2.62 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:

i. Identify and evaluate the significant effects and receptors at risk.

ii. Consultation with the Environment Agency, Lead Local Flood Authority, IDB and other stakeholders.

iii. Whether the proposed scheme is likely to be affected by current or future flooding from any source.

iv. Whether it will cause increased flood risk elsewhere.

v. Whether the measures proposed to deal with these effects and risks are appropriate.

vi. Completion of the Sequential Test and, if required, the Exception Test.

vii. 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 Construction Industry Research and Information Association (CIRIA) guidance 'The SuDS Manual C753' will be undertaken by:

i. Site visit and hydrological/drainage surveys;

ii. Baseline hydrological assessment, data acquisition and regulatory consultation;

iii. Hydrological analysis (considering climate change);

iv. Sustainable drainage system design; and

v. 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 Design Manual for Roads and Bridges (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 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.

9.3.9 Table 9.1: Sensitivity/Importance of the Identified Environmental Receptor

Sensitivity	Definition
High	Water Framework Directive (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)
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 93: 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

9.3.10 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

9.3.11 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

9.3.12 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.

9.3.13 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.

9.3.14 Construction stage effects will be managed through a CEMP.

Cumulative and In-Combination effects

9.3.15 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 Reports for WB1, WB2, WB3 and WB4.

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 West Burton 1 (WB1), West Burton 2 (WB2), West Burton 3 (WB3) and West Burton 4 (WB4) 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 four development sites; WB1, WB2, WB3 and WB4 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. In addition, there is a search area, known as West Burton Substation, in proximity to West Burton Power Station for the siting of a substation and an energy storage facility. 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.

Site and Surrounding Area Description

West Burton 1 (WB1)

10.2.3 West Burton 1 consists of a series of agricultural fields separated by hedgerows, land drains and occasional trees.

10.2.4 Main Street dissects the north western area.

10.2.5 The assessment site is generally flat and sloped from 8 m AOD in the west to 4 m AOD in the south, in accordance with the local topography.

10.2.6 The surrounding area is predominantly rural agricultural land with the village of Broxholme to the west.

West Burton 2 (WB2)

10.2.7 West Burton 2 consists of a series of agricultural fields centred around the village of Ingleby. The fields are separated by hedgerows, land drains and

tree lines. Overhead electrical power lines and associated pylons cut across the western and northern areas.

10.2.8 Sturton Road dissects the central area in a north south orientation and Broxholme Lane crosses the southern area.

10.2.9 The River Till is located adjacent to the eastern boundary.

10.2.10 The assessment site ranges from 5 m AOD in the east to 16 m AOD in the north west, in accordance with the local topography.

10.2.11 The surrounding area is predominantly rural agricultural land with residential dwellings and a care facility in the central area located off Sturton Road. The villages of Bransby and Saxilby are present to the north and south, respectively.

West Burton 3 (WB3)

10.2.12 West Burton 3 consists of a series of agricultural fields separated into two parcels in the west and east by a railway line. The fields are separated by hedgerows, land drains and occasional trees.

10.2.13 The assessment site ranges from 5 m AOD in the central area to 18 m AOD and 15 m AOD in the west and east, respectively and is in accordance with the local topography.

10.2.14 The surrounding area is predominantly rural agricultural land with the villages of Marton and Torksey to the north west and south west, respectively.

West Burton 4 (WB4)

10.2.15 West Burton 4 consists of a series of agricultural fields centred around the village of Ingleby. The fields are separated by hedgerows, land drains and tree lines.

10.2.16 Toft Dyke Drain cuts through the south western corner and subsequently runs adjacent to the boundary.

10.2.17 The assessment boundary wraps around a farmyard (Highfield Farm) in the western area off Gringley Road and Lancaster Road cuts through the central eastern area.

10.2.18 The assessment site ranges from 12 m AOD in the south to 72 m AOD in the north east, in accordance with the local topography.

10.2.19 The surrounding area is predominantly rural agricultural land. The villages of Clayworth and Gringley on the Hill are present to the south western and north western boundaries, respectively.

Geology

West Burton 1 (WB1)

10.2.20 Published British Geological Survey (BGS) data indicates the eastern area of West Burton 1 to be underlain by superficial Till (Diamicton). Superficial Alluvium (Clay, Silt, Sand and Gravel) is noted to encroach along the northern boundary. Superficial deposits are mapped as absent across the remaining area. The bedrock is mapped as the Charmouth Mudstone Formation.

West Burton 2 (WB2)

10.2.21 Published BGS data indicates that superficial deposits are absent across the majority of West Burton 2 with the exception of Alluvium along the eastern boundary. The bedrock is mapped as the Charmouth Mudstone

Formation across the eastern half of the Site and the Scunthorpe Mudstone Formation across the west.

West Burton 3 (WB3)

10.2.22 Published BGS data indicates that superficial deposits are absent across the majority of West Burton 3 with the exception of the Holme Pierrepont Sand and Gravel Member in the central area and along the western area. The bedrock is mapped as the Scunthorpe Mudstone Formation and Penarth Group in the west.

West Burton 4 (WB4)

10.2.23 Published BGS data indicates that superficial deposits are absent across the majority of West Burton 4 with the exception of Alluvium in the south west, Till in the north west and Glaciofluvial Sands and Gravels in the north. The bedrock is mapped predominantly as the Mercia Mudstone Group with a distinct band of the Clarborough Member through the central area.

Hydrogeology

WB1

10.2.24 The Environment Agency (EA) classify the superficial Till and bedrock of the Charmouth Mudstone Formation as Secondary Undifferentiated Aquifers. The Alluvium along the northern boundary is classified as a Secondary A Aquifer.

10.2.25 The EA also indicate that West Burton 1 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 West Burton 1.

WB2

10.2.27 The EA classify the superficial Alluvium as a Secondary A Aquifer. The Charmouth Mudstone Formation and Scunthorpe Mudstone Formation are classified as Secondary Undifferentiated and Secondary B Aquifers, respectively.

10.2.28 The EA also indicate that West Burton 2 is not located within a Groundwater Source Protection Zone (SPZ).

10.2.29 There are no licensed groundwater abstraction records located within 500 m of West Burton 2.

WB3

10.2.30 The EA classify the superficial Holme Pierrepont Sand and Gravel Member as a Secondary A Aquifer and the Scunthorpe Mudstone Formation and Penarth Group as Secondary B Aquifers.

10.2.31 The EA also indicate that West Burton 3 is not located within a Groundwater Source Protection Zone (SPZ).

10.2.32 There are no licensed groundwater abstraction records located within 500 m of West Burton 3.

WB4

10.2.33 The EA classify the Alluvium as a Secondary A Aquifer and the superficial Till and Glaciofluvial deposits as Secondary Undifferentiated Aquifers. The Mercia Mudstone Formation and Clarborough Member are classified as Secondary B Aquifers.

10.2.34 The EA also indicate that West Burton 4 is not located within a Groundwater Source Protection Zone (SPZ).

10.2.35 There are no licensed groundwater abstraction records located within 500 m of West Burton 4.

Hydrology

WB1

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

10.2.37 The River Till is located approximately 400 m west.

WB2

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

10.2.39 The River Till is located adjacent to the eastern boundary.

WB3

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

WB4

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

10.2.42 Toft Dyke Drain transects the south western corner.

Mining

WB1

10.2.43 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.

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

WB2

10.2.45 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.

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

WB3

10.2.47 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.

10.2.48 There are two BGS recorded mineral sites located within 500 m of the Site. The closest of which relates to the historical extraction of the Scunthorpe Mudstone Formation adjacent to the south western corner. From historical mapping this extraction is noted to encroach onto West Burton 3.

WB4

10.2.49 Coal Authority data indicates the assessment area is located within a Coal Mining Report Area, however, is not within a Development High Risk Area. As such a Coal Mining Assessment is unlikely to be required under the planning regime.

10.2.50 There are seven BGS recorded mineral sites located within 500 m of the Site.

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:

10.3.3 A source of contamination or hazard that has the potential to cause harm or pollution.

10.3.4 A pathway for the hazard to move along/ generate exposure.

10.3.5 A receptor which is affected by the hazard.

Assessment Process

10.3.6 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

10.3.7 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, Solar Farms), water bodies of low quality and not a public water supply.

Assessment of Magnitude of Impact

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

Table 10.2: 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.

10.3.9 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]

10.3.10 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]

10.3.11 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]

10.3.12 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]

10.3.13 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

10.3.14 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

10.3.15 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; and
- Build Environment – Minor.

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

Methodology

10.3.17 The baseline conditions associated with the soil and groundwater conditions have been obtained from a desktop review (Preliminary Geo-Environmental Risk Assessment (PRA)), for WB1, WB2, WB3 and WB4 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 (CEMP) will be compiled as part of any DCO application, which will describe the construction related mitigation measures outlined 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 Sites WB1-4. 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.

10.4.10 A hotspot protocol should be drawn upon to ensure that any contamination identified during construction is assessed by a specialist in land contamination.

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

10.4.12 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

10.4.13 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.

10.4.14 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.

10.4.15 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 WB1-4. 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 WB Substation site and 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 West Burton 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 relevant Minerals Plans. In case of West Burton 1, 2 and 3, this is the Lincolnshire Minerals and Waste Local Plan Core Strategy and Development Management Policies (June 2016) and in the case of West Burton 4 and West Burton Substation, the Nottinghamshire Minerals Local Plan (March 2021).

11.2.3 At present, the final cable route linking these 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. A further search area, known as West Burton Substation, in proximity to West Burton Power Station for the siting of a substation and an energy storage facility has been identified. Only small sections of cable route corridor search area and the search area for West Burton Substation 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 West Burton Scheme is within a Petroleum Exploration and Development License (PEDL) area where oil and gas extraction is licensed under the Petroleum Act 1998 by the Oil and Gas Authority.

West Burton 1

11.2.6 The Site is not identified as lying within a Minerals Safeguarding Area or Minerals Consultation Area, as shown on the Policies Map within the Lincolnshire Minerals and Waste Local Plan.

West Burton 2

11.2.7 The Site is not identified as lying within a Minerals Safeguarding Area or Minerals Consultation Area, as shown on the Policies Map within the Lincolnshire Minerals and Waste Local Plan.

West Burton 3

11.2.8 Approximately 180 hectares of the West Burton 3 Site is within an identified area of search 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.

West Burton 4

11.2.9 The Site is not identified as lying within a Minerals Safeguarding Area or Minerals Consultation Area, as shown on the Policies Map within the Nottinghamshire Minerals Local Plan.

West Burton Substation

11.2.10 The site is not identified as lying within a Minerals Safeguarding Area or Minerals Consultation Area, as shown on the Policies Map within the Nottinghamshire Minerals Local Plan.

Potential and Likely Environmental Effects

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

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

Surface minerals

11.2.13 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 West Burton 1, 2 and 4 the Mineral Planning Authorities have not identified a mineral resource that requires safeguarding on these sites. In the case of West Burton 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 at the end of its operational life any minerals that are beneath the proposed 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

11.2.14 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 West Burton site, 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 West Burton Sites affects an existing oil field or comes within a mineral consultation zone.

11.2.15 Whilst all the five 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.

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

Cumulative and In-Combination effects

11.2.17 The cumulative impacts arising from the Scheme will be assessed in combination with other relevant development, 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 West Burton 1-4 sites out of the ES.

11.3.2 Further assessment will be undertaken on West Burton Substation and the cable search corridor and is scoped into the ES at this stage.

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 four Sites of the Scheme, together with an initial assessment of the potential significance of such remains and the impacts that the Scheme could have on these.

12.1.2 A description of the sites and proposed development can be found in Chapters 3 and 4 of this Scoping Report. The proposed West Burton Solar Project is divided across five separate areas; West Burton 1, 2, 3 and 4; in addition, there is a search area, known as West Burton Substation, in proximity to West Burton Power Station for the siting of a substation and an energy storage facility. The locations of these elements will be refined prior to statutory consultation and submission of the DCO application. 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; and
- Appendix 12.6: Archaeological Baseline.

12.2 Baseline Overview

Search Area

12.2.1 All records held on the Lincolnshire Historic Environment Record (HER), the Nottinghamshire 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 West Burton 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

West Burton 1

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

12.2.3 There is one Scheduled Monument within the 1km search area, relating to the site of the Broxholme medieval settlement and cultivation remains (NHLE1016797), which lies adjacent to the south-western corner of the Site.

12.2.4 The majority of the West Burton 1 Site has been subject to modern ploughing and drainage schemes, which may have impacted any previously unrecorded sub-surface archaeological remains. The field pattern was also re-planned in the late 19th century, and there has been some boundary loss since the late 20th century.

West Burton 2

12.2.1 The West Burton 2 Site contains a single designated heritage asset, the Scheduled remains of the medieval deserted village of North Ingleby (NHLE 1003570).

12.2.2 No development work will be undertaken within the boundary of the Scheduled Monument, and there will be no direct impacts upon the Scheduled Monument.

12.2.3 The majority of the West Burton 2 Site has been subject to modern ploughing and drainage schemes, which may have impacted any previously unrecorded sub-surface archaeological remains. The field pattern was also re-planned in the early 19th century, and there has been some boundary loss since the late 20th century. The construction of Ingleby Wood Farm in the 19th century, and its demolition in the second half of the 20th century, will also have impacted any potential earlier sub-surface remains in its vicinity.

West Burton 3

12.2.4 The West Burton 3 Site contains parts of a single designated heritage asset, the Scheduled Monument of the medieval bishop's palace and deer park at Stow Park (NHLE 1019229).

12.2.5 No development work will be undertaken within the boundary of the Scheduled Monument, and there will be no direct impacts upon the Scheduled Monument.

12.2.6 The majority of the West Burton 3 Site has been subject to modern ploughing and drainage schemes, which may have impacted any previously unrecorded sub-surface archaeological remains. A series of pipelines serving a Ministry of Defence fuel depot, which is situated to the immediate north of Stow Park farm and outside of the study area, cross the western side of the Site, and have been recorded in areas that have been subject to geophysical survey (Appendix 12.3). The construction of the pipelines is likely to have destroyed any archaeological remains along their routes.

West Burton 4

12.2.7 The West Burton Site does not contain any designated heritage assets upon which development could potentially have a direct impact.

12.2.8 There are two Scheduled Monuments within the search area. The site of an Iron Age hillfort known as Beacon Hill Camp (NHLE 1003241), is situated on the eastern edge of Gringley on the Hill, approximately 215m to the north of the West Burton 4 Site at its nearest point, between which lies the dual carriageway of the A631. The Scheduled remains of a 14th century market cross (NHLE 1016790) are situated 70m to the west of the Church of St Peter and St Paul in the centre of Gringley on the Hall, and these are not intervisible with the Site.

12.2.9 The majority of the West Burton 4 Site has been subject to modern ploughing and drainage schemes, which may have impacted any previously unrecorded sub-surface archaeological remains.

Legislation, Policy and Guidance

12.2.10 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) (published and emerging draft (September 2021));
- 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); and
- Conservation Principles (English Heritage 2008).

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

Initial Baseline Assessment and Potential Environmental Effects

Information Sources

12.2.12 The following sources of information have been consulted in order to meet the requirements of the assessment and are in line with the guidelines 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 and the Nottinghamshire Historic Environment Record (HER) were collated for within a 1km search area of the boundaries of the Scheme comprising the West Burton 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 West Burton 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

12.2.13 Site visits across the Sites (West Burton 1, 2, 3 and 4) were undertaken between July and November 2021, to provide an assessment of the character of the various areas of each Site and appraise the potential impact of the proposed development on any heritage assets. The majority of the Sites was under arable cultivation throughout this period, and no previously unrecorded archaeological surface features were identified.

Geophysical Survey

12.2.14 An archaeological geophysical (gradiometer) survey is in the process of being undertaken across West Burton 1, 2, 3 and 4 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).

West Burton 1: review of relevant archaeological assets and initial assessment of their significance

Potential Sub-Surface Archaeological Remains

12.2.15 Prehistoric and Roman Periods: Although there is some evidence for prehistoric activity within the Site and wider search area, this consists of the chance discovery of Neolithic and Early Bronze Age flint implements. The geophysical survey of the West Burton 1 Site has been completed, and based on the initial interpretation of the results, no evidence for prehistoric features have been recorded (Appendix 12.3). Apart from the recorded line of the Roman road which is now followed by Till Bridge Lane to the north of the Site, there is no evidence for Roman period activity within the Site or search area, and the results of the geophysical survey have not identified any potential Roman period features. Therefore, it is considered that there is low potential for the survival of prehistoric or Roman period remains within the Site and no evidence to suggest that, if such remains were present, these would be of greater than local significance.

12.2.16 Early Medieval and Medieval Periods: It is considered that there is limited potential for the survival of previously unrecorded remains relating to early medieval period activity within the Site, and that during the later medieval period the West Burton 1 Site was situated outside of the focus of medieval settlement. Therefore, any potential buried archaeological features dating to the early or later medieval period within the West Burton 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.

12.2.17 Post-Medieval Period: The West Burton 1 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

12.2.18 The assessment has established that, based on the limited previously recorded evidence for prehistoric, Roman period and early medieval activity within the West Burton 1 Site and the wider search area, combined with the lack of any potential archaeological remains being identified by the geophysical survey, there is low potential for the survival of any remains dating to these periods within the Site which could be impacted by the proposed development.

West Burton 2: review of relevant archaeological assets and initial assessment of their significance

Potential Sub-Surface Archaeological Remains

12.2.19 Prehistoric and Roman Periods: Although the previously recorded evidence for prehistoric activity within the search area is limited, there is evidence for Neolithic activity in the area adjacent to the West Burton 2 Site. The majority of the records relating to Roman period activity within the search area represent individual chance finds of Roman coins, pottery and tile, but could potentially represent areas of former activity or settlement. The initial results of the ongoing geophysical survey have recorded a possible rectangular enclosure on the north-western side of the Site that could be of a late prehistoric or Roman date, but this represents the only potentially prehistoric/Roman period feature identified within the West Burton 2 Site by the survey at this stage. Therefore, it is considered that there may be some potential for the survival of prehistoric or Roman period remains within the Site.

12.2.20 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 12.3.1).

12.2.21 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 Anglo-Saxon period activity within the West Burton 2 Site, particularly adjacent to the former medieval village of Ingleby, the Site is likely to have remained in primarily agricultural use throughout the early medieval period.

12.2.22 Any archaeological remains within the area of the 'Deserted village of North Ingleby' Scheduled Monument (NHLE 1003570) are considered to be of national significance, while associated adjacent earthworks previously recorded by the Royal Commission on the Historical Monuments of England (RCHME) in the 1990s (Everson et al. 1991, 159-162; MLI50535; MLI54225) are considered to have regional significance, due to their direct association with the Scheduled remains.

12.2.23 There is no evidence for medieval settlement to extend beyond the area of the earthwork remains of Ingleby, and the initial results of the geophysical survey show areas of former ridge and furrow cultivation across the Site and immediately adjacent to the settlement area. Therefore, it is likely that the majority of any potential buried archaeological features dating to the early or later medieval period within

the West Burton 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.

12.2.24 Post-Medieval Period: The West Burton 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.

12.2.25 There may be potential for the survival of remains relating to the former 19th century Ingleby Wood Farm, to the south of Codder Lane Belt on the western side of the West Burton 2 Site, but it is considered that it is unlikely that any such remains would be of greater than negligible significance.

Summary

12.2.26 No development work will be undertaken within the 'Deserted village of North Ingleby' Scheduled Monument (NHLE 1003570), or the area of related adjacent extant earthworks which have previously been recorded by the RCHME (MLI50535; MLI54225). Therefore, the proposed development will have no direct impacts upon this or any other designated heritage assets.

12.2.27 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 West Burton 2 Site that could be impacted by the proposed development.

12.2.28 There is potential for the survival of sub-surface features relating to early medieval, medieval and post-medieval agricultural activity within the West Burton 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.

West Burton 3: review of relevant archaeological assets and initial assessment of their significance

Potential Sub-Surface Archaeological Remains

12.2.29 Prehistoric and Roman Periods: The evidence from the initial results of the ongoing geophysical survey of the West Burton 3 Site, combined with previously recorded evidence from within the Site itself and the wider search area, suggests that there is potential for the survival of prehistoric and/or Roman period remains in the Site.

12.2.30 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 12.3.1).

12.2.31 Early Medieval and Medieval Periods: It is considered likely that the West Burton 3 Site remained in primarily agricultural use throughout the early medieval period, and that any remains dating to this period would relate to agricultural activity, such as ploughing or drainage features, and would be considered to be of negligible significance.

12.2.32 Although only limited areas of the 'the medieval Bishop's palace and deer park, Stow Park' Scheduled Monument (NHLE1019229) extend into the Site,

any archaeological remains within this area are considered to be of national significance.

12.2.33 The Site may have potential to contain sub-surface remains associated with the former medieval settlement of Stow Park, adjacent to the area of the Bishop's palace. If archaeological remains relating to medieval settlement are present in this part of 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 that any such remains would be of greater than local significance, based on the criteria used in this assessment (see Table 12.3.1).

12.2.34 The majority of the Site is likely to have remained in primarily agricultural use throughout the medieval period. This is attested by anomalies identified by the initial results of the ongoing geophysical survey that are likely to represent former ridge and furrow within the Site. Therefore, any potential buried archaeological features dating to the medieval period are likely to relate to agricultural activity, such as ploughing or drainage features, which would be considered to be of negligible significance.

12.2.35 Post-Medieval Period: Any potential buried archaeological features dating to the post-medieval period that may be present within the West Burton 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.

Summary

12.2.36 No development work will be undertaken within the areas of 'the medieval Bishop's palace and deer park, Stow Park' Scheduled Monument (NHLE1019229). Therefore, the proposed development will have no direct impacts upon this or any other designated heritage assets.

12.2.37 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 West Burton 3 Site that could be impacted by the proposed development, which have been identified in the initial results of the ongoing geophysical survey.

12.2.38 There may be potential for the survival of buried remains relating to the medieval settlement of Stow Park on the north-eastern side of the Site, adjacent to the moated site of the Bishop's palace. At the time of writing, geophysical survey had not been undertaken across this part of the West Burton 3 Site.

12.2.39 There is potential for the survival of sub-surface features relating to medieval and post-medieval agricultural activity within the West Burton 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.

West Burton 4: review of relevant archaeological assets and initial assessment of their significance

12.2.40 The West Burton 4 Site does not contain any designated heritage assets upon which development could potentially have a direct impact.

Potential Sub-Surface Archaeological Remains

12.2.41 Prehistoric and Roman Periods: Despite the lack or limited nature of previously recorded evidence for prehistoric and Roman period activity

within the West Burton 4 Site, the initial results of the ongoing geophysical survey have identified concentrations of anomalies that could represent features of a late prehistoric or Roman period date based on their morphology. On the Site's eastern edge, possible trackways with enclosures aligned along them have been recorded within the south-western corner of Field R32, while to the west anomalies that could represent enclosures are crossed by the existing field boundary between Fields R25 and R26. Further anomalies on the north-eastern side of one of Field R30 could represent a rectilinear enclosure, perhaps of a prehistoric or Roman period date.

12.2.42 If archaeological remains dating to the prehistoric or Roman periods are present in the West Burton 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 12.3.1).

12.2.43 Early Medieval and Medieval Periods: Given the lack of evidence for early medieval activity in the West Burton 4 Site, and the limited evidence for the period from the wider search area, it is considered that there is limited potential for the survival of previously unrecorded remains relating to Early Anglo-Saxon period activity within the West Burton 4 Site, and no anomalies of a potential early medieval date have been identified in the initial results of the ongoing geophysical survey. It is considered probable that the Site remained in agricultural use throughout the early medieval period.

12.2.44 The West Burton 4 Site is situated outside the focus of any recorded medieval settlement, and it is considered that it remained in primarily agricultural use throughout the medieval period. This is supported by the initial results of the geophysical survey, which have identified anomalies representing probable ridge and furrow ploughing across large areas of the Site.

12.2.45 Therefore, the majority of any potential buried archaeological features dating to the early or later medieval period within the West Burton 4 Site are likely to relate to agricultural activity, such as ploughing, field boundaries and drainage, which would be considered to be of negligible significance.

12.2.46 Post-Medieval Period: The West Burton 4 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.

Summary

12.2.47 West Burton Sites 1-4 will have no direct impacts upon any designated heritage assets.

12.2.48 The assessment has established that there may be potential for the survival of buried remains of a prehistoric and/or Roman period date within areas of the West Burton 4 Site, that could be impacted by the proposed development, specifically within Fields R25, R26, R30 and R32, where the initial results of the geophysical survey have identified anomalies that may represent prehistoric or Roman period activity.

12.2.49 There is limited potential for the survival of sub-surface features relating to early medieval activity, and it is probable that the West Burton 4 Site remained in agricultural use throughout the medieval and post-medieval periods. Therefore, any remains dating to these periods are likely to represent ploughing, drainage or former field boundaries, and although these could be impacted by the proposed development, any such remains would be considered to be of negligible significance.

12.2.50 It is considered that any potential impact on buried archaeological remains could be mitigated by appropriate design, to remove the potential for any direct impacts on archaeological features. This could include placing solar panel arrays on non-intrusive concrete feet, which would sit on the present topsoil, and by locating any potentially ground-intrusive infrastructure, such as sub-stations, battery storage facilities, construction compounds and buried cable routes in areas in which geophysical survey, or other evaluation methods, have demonstrated these to be free of any potentially significant archaeological remains.

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 Scheme, including the proposed cable routes, energy storage and substation, 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 impacts 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 12.3.1 above.

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 below.

Table 12.1: Criteria Proposed to Determine Archaeological Potential

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 below. 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: Heritage 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 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

Construction Phase

West Burton 1, 2, 3 and 4

12.3.12 Where it is assessed that there may be potential for the Scheme 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.

12.3.13 Where possible, any direct impacts on potential archaeological remains will be mitigated by the design of the Scheme. This could include the siting of any intrusive infrastructure, such as substations, which will be present in each area, 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.

12.3.14 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.

12.3.15 Where it is not possible to avoid possible direct impacts upon non-designated heritage assets, a suitable scheme of archaeological mitigation will be undertaken. It is envisaged that any archaeological mitigation would be carried out as part of a Requirement in the DCO.

West Burton Substation

12.3.16 There will be no direct impacts upon any designated heritage assets from the construction of the West Burton substation and energy storage facilities. The designated heritage assets will be avoided through the design process. Archaeological geophysical survey will be undertaken of the option areas in which these could be located and, if any potentially significant archaeological remains are identified by this survey, any impact will be mitigated through the appropriate siting of these facilities to avoid potential impacts.

12.3.17 Further assessment of the final site of the West Burton substation and energy storage site will be undertaken once the location of this site has been determined. This will inform detailed assessment of the site to be undertaken as part of the Environmental Statement.

12.3.18 Where it is not possible to avoid possible direct impacts upon non-designated heritage assets, a suitable scheme of archaeological mitigation will be undertaken. It is envisaged that any archaeological mitigation would be carried out as part of a Requirement in the DCO.

Cable Routes

12.3.19 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.

12.3.20 Potential direct impacts upon previously recorded non-designated heritage assets will be avoided where possible through the design of the proposed development.

12.3.21 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.

12.3.22 Where it is not possible to avoid direct impacts upon non-designated heritage assets, a suitable scheme of archaeological mitigation will be undertaken. 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

12.3.23 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.

12.3.24 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

12.3.25 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

12.3.26 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

12.3.27 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 of the 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 West Burton 1, 2, 3 and 4 Sites
- Indirect impacts upon designated heritage assets within the West Burton 1, 2, 3 and 4 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*

Everson, P.L., Taylor, C.C. and Dunn, C.J. 1991, *Change and Continuity. Rural Settlement in North-West Lincolnshire*

13 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) and Bassetlaw District Council (BDC). It has been prepared by Lanpro Services Limited.

13.1.2 A detailed description of the Sites and the Scheme can be found in Chapters 3 and 4 of this Scoping Report. The Scheme is divided across five separate areas; West Burton 1, 2, 3 and 4; there is a search area, known as West Burton Substation, in proximity to West Burton Power Station for the siting of a substation and an energy storage facility. The locations of these elements will be refined prior to submission of the DCO application. 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

13.1.3 Historical Mapping and Gazetteer's 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
- 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 report:

- 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 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 Site 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 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.

13.3.3 The following sources of information have been consulted in line with the guidance laid down by the Chartered Institute for Archaeologists (CIfA) (2020) and the requirements of section 5.8 of NPS EN-1 and section 2.53.3 of the emerging NPS EN-3.

13.3.4 It is not the purpose of this document to create a detailed historical narrative of the study site, but to provide an assessment of the study site's heritage significance and impact of the proposals in accordance with the requirements of the NPSs (EN-1 and EN-3) and NPPF.

- 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 West Burton 1, 2, 3 and 4. 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 West Burton 1, 2, 3 and 4. 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 related to West Burton Sites 1-4. Further assessment is required on the impacts on receptors associated with West Burton Substation Site and the cable search corridors.

West Burton 1

Assessment of Significance of Surrounding Heritage Assets

13.3.6 The West Burton 1 study site does not contain any designated heritage assets. There are seven Listed Buildings within the 1 km search area, all of which are Grade II Listed, and all relate to late post medieval or 19th century buildings.

13.3.7 The Grade II Listed Buildings are 18th or 19th century in date and comprise: Cornhill Farmhouse (NHLE 1064096), c.800m to the south; Manor Farmhouse and barns (NHLE 1359464 and 1147032), c.350m to the south-west; Boontown Cottage (NHLE 1147027), c.100m to the west; the Old Rectory (NHLE 1147028) and the Church of All Saints (NHLE 1064095), both c.75m to the west of the study site.

13.3.8 There is one Scheduled Monument within the 1km search area, relating to the site of the Broxholme medieval settlement and cultivation remains (NHLE1016797), which lies adjacent to the south-western corner of the study site.

13.3.9 There are no other designated heritage assets (i.e. Conservation Areas, Registered Parks and Gardens, Registered Battlefields or World Heritage Sites) within the 1km search area.

13.3.10 There are six designated heritage assets within the wider 2km study area, which relate to settlements beyond Broxholme. The study area also captures the Scheduled Monuments at Thorpe in the Fallows and Ingleby. Grade II Listed Buildings are 18th or 19th century in date and comprise: Ingleby Chase (NHLE 1147263), Brickyard Cottages (NHLE 1146766), Barn at Bransby for Retired Horses (NHLE 1359487) and Thorpe in the Fallows Farmhouse (NHLE 1308921).

13.3.11 Scheduled monuments are of high significance under national policy and legislation (NPPF: 200). The deserted medieval settlement remains at Broxholme (NHLE 1016797), and those of its open field system, survive well as a series of substantial earthworks. As a result of detailed archaeological survey and documentary research, made possible by the preservation of a series of historic maps, they are unusually well understood. The remains of house plots 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.

13.3.12 For these reasons, the significance of the Scheduled Monument is derived from its archaeological interest. Its immediate setting comprises agricultural fields with the 1840s planned settlement to the north. The area of the West Burton 1 study site would likely have been within the open field system that surrounded the now deserted medieval settlement, albeit that no earthworks survive to evidence this. The Monument's rural agricultural surroundings therefore form part of its setting, contributing to the understanding of the position and context of the medieval settlement, particularly in its development in the 1840s when the settlement moved northwards to a more planned layout.

13.3.13 The Listed Buildings at Broxholme hold special architectural and historic interest as standing structures relating to the rural domestic and agrarian traditions of this part of Lincolnshire. Manor Farmhouse (NHLE 1359464) and its associated farm buildings (NHLE 1147032) date to the 1840s and retain much of their historic fabric and plan form. Together, they form an architecturally complete group of some historic interest. Their setting has been somewhat eroded through loss of historic field boundaries. Other assets, such as Boontown (NHLE 1147027) are remnants from the deserted medieval settlement (now situated just outside the Scheduled area). The dwelling contains fabric from c.1700 although is much altered. The Church of All Saints (NHLE 1064095) and Old Rectory (NHLE 1147028) form an attractive group. The church was built in 1857 by T.C. Hine, with nave, chancel, north chapel and bell turret. It contains a number of good original 1857 fittings but has been closed to public worship and is now in private ownership. The Old Rectory pre-dates the church but was much altered in 1840 and the 20th century.

13.3.14 Heritage assets within the village are well screened from the open countryside by mature tree cover, as is the north-eastern aspect of the Scheduled Monument. Tree cover diminishes to the south-east and there are wider views from the southern extent of the Scheduled Monument towards the study site.

13.3.15 Heritage assets at a distance from the settlement (such as Cornhill Farmhouse (NHLE 1064096)) are more exposed and have longer distance views across the landscape.

13.3.16 The West Burton 1 study site does not contain any hedgerows that could be considered 'important' based on the criteria laid down in the Hedgerows Regulations 1997.

Potential Impacts to be Considered in the ES

13.3.17 Six 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 Broxholme (NHLE 1016797) and

the Grade II Listed Manor Farmhouse (NHLE 1359464) and its associated farm buildings (NHLE 1147032), Boontown (NHLE 1147027), Church of All Saints (NHLE 1064095) and Old Rectory (NHLE 1147028).

13.3.18 There will be no direct impact on any of these designated heritage assets.

13.3.19 Indirect impact may arise from development that harms the setting of these assets where it contributes to understanding or appreciation of significance. While there is mature tree cover around much of the village at Broxholme, there is some minor intervisibility between the church turret (NHLE 1064095) and the study site. Manor Farmhouse (NHLE 1359464) is a greater distance away but will also have potential visibility of the study site. The Scheduled settlement remains (NHLE 1016797) and Boontown (NHLE 1147027) are well screened from their wider landscape to the north-east, but there will be a potentially impact to the south-east.

13.3.20 Overall, there will be limited impact on the immediate setting of these designated heritage assets, such as the churchyard of the church and the farmyard of the farm. However, the wider rural and agrarian landscape also forms part of this 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.

13.3.21 These six 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.

13.3.22 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
Manor Farm	1359464	GII	Medium	Low	Less than substantial harm	Proposed development will potentially be visible in the wider setting (hedged field boundaries help restrict views) Take forward to assess setting where it contributes to appreciation or understanding of significance.	Take forward to next stage of assessment
Farm buildings	1147032	GII	Medium	Low	Less than substantial harm	Proposed development will potentially be visible in the wider setting (hedged field boundaries help restrict views) Take forward to assess setting where it contributes to appreciation or understanding of significance.	Take forward to next stage of assessment
Boontown Cottage	1147027	GII	Medium	Low	Less than substantial harm	Asset is adjacent to the Scheduled deserted medieval settlement and is a remnant of this settlement. Asset is bound by dense tree cover. Assess setting for contribution to appreciation or understanding of significance. 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 All Saints	1064095	GII	Medium	Low	Less than substantial harm	Church contains small nave, chancel and porch and is well hidden within mature trees. Bound by the Rectory and tree line to the east, there is only intervisibility between the turret and the proposed development. The development may have limited impact on the significance of the heritage asset although views of the turret have landscape value rather than heritage value. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Old Rectory	1147028	GII	Medium	Low	Less than substantial harm	Asset is well hidden within mature trees and bound by modern development (swimming pool) and tree line to the east. However, due to proximity, take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Cornhill Farmhouse	1064096	GII	Medium	Negligible	None	Asset is c.850m from the proposed development across four large, modern fields and associated boundaries. While hedging is limited the topography is extremely flat and visibility of the proposed development will be minimal. No impact on setting where it contributes to appreciation or understanding of significance.	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Broxholme medieval settlement and cultivation remains	1016797	SM	High	Low	Less than substantial harm	Scheduled area of the deserted medieval settlement is bound by dense tree cover to the north-east (towards the study site) but opens out to the south-east. Minor potential for impact on setting where it contributes to appreciation or understanding of significance. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment

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
Ingleby Chase	1147263	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
Brickyard Cottages	1146766	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
Barn at Bransby for Retired Horses	1359487	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
Thorpe in the Fallows Farmhouse	1308921	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
Thorpe medieval settlement	1016978	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
Deserted village of North Ingleby	1003570	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

West Burton 2

Assessment of Significance of Surrounding Heritage Assets

Within the site boundary

13.3.23 The West Burton 2 study site contains a single designated heritage asset, the Scheduled remains of the medieval deserted village of North Ingleby (NHLE 1003570).

1km Study Area

13.3.24 Within the 1km search area there is a further Scheduled Monument relating to the site of the Broxholme medieval settlement and cultivation remains (NHLE 1016797), which lies to the east of the River Till approximately 340m to the east of the study site.

13.3.25 There are 12 Listed Buildings within the search area. These include the Grade I Listed medieval Church of St Botolph (NHLE1359490) situated on the north-eastern side of Saxilby, around 400m from the West Burton 2 study site at its closest point, and the Grade II* Listed 'The Old Hall' (NHLE 1064072) situated within Saxilby, about 985m from the study site. The Listed Building lying closest to the study site is the Grade II Listed Ingleby Chase (NHLE 1147263), a 19th century house situated around 230m to the north of the study site.

13.3.26 There are no other designated heritage assets (i.e. Conservation Areas, Registered Parks and Gardens, Registered Battlefields or World Heritage Sites) within the search area.

2km Study Area

13.3.27 Within the 2km search area there is a further Scheduled Monument relating to the remains of the medieval bishop's palace and deer park at Stow Park (NHLE 1019229). The two elements within the study area are 'West Lawn' and 'East Lawn', both of which form part of the former park pale.

13.3.28 Within the 2km study area there are also six Grade II Listed Buildings and the Saxilby Bridge Street Conservation Area.

13.3.29 Ingleby (NHLE 1003570) is one of a number of deserted or shrunken medieval settlements found in the Trent Valley in this area of Lincolnshire, including Broxholme, Gilby, Dunstall, Southorpe, Thorpe le Fallows, Coates and Torksey. These lost rural settlements often survive as earthworks visible within the landscape representing building platforms, properties boundaries, streets, hollow ways, paddocks, cultivation marks and moated manorial sites. Many are Scheduled Monuments and as such are of high significance nationally.

13.3.30 The settlement earthworks, and indeed, surviving village structures that follow historic street plans and roads, hold archaeological and historic interest by providing an understanding of past human activity. These villages were organised agricultural communities, sited at the centre of a parish or township, that shared resources such as arable land, meadow and woodland.

13.3.31 Ingleby Chase is the only other designated asset within the village and is a Grade II Listed house dating to the 1830s that holds medium significance. It has associations with Sir Bernard Theobald, the High Court judge who lived here in the late 20th century.

13.3.32 Although it is possible that the West Burton 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.

13.3.33 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.

Potential Impacts to be Considered in the ES

13.3.34 The Scheduled deserted medieval settlement remains at Ingleby (NHLE 1003570) are currently contained within the study site for West Burton 2. No development will take place within the Scheduled area to avoid substantial harm to a nationally significant monument. There will therefore be no direct impact on this, or any other, designated heritage assets.

13.3.35 In total, 14 heritage assets within the 1km buffer and seven heritage assets within the 2km buffer of the study site have been assessed at scoping stage to understand potential impact on heritage significance. Four 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.

13.3.36 The four assets that have potential to be impacted by the Scheme. are the Scheduled deserted medieval settlement remains at Ingleby (NHLE 1003570), Ingleby Chase (NHLE 1147263), the Church of St Botolph in Saxilby (NHLE 1359490) and the Manor House in Saxilby (NHLE 1308588). Particular attention will be taken at the next stage to ensure impact on the Deserted Village of North Ingleby is avoided or mitigated as far as possible.

13.3.37 Indirect impact may arise from development within the setting of these assets where it contributes to understanding or appreciation of significance. All other assets within the 1km and 2km buffer areas have been assessed and scoped out of further consideration as there will be no impact on the asset or on its setting where it contributes to appreciation or understanding of significance.

13.3.38 Heritage assets to the east within the village of Broxholme have been scoped out due to distance from the study site and reduced visibility through features including the River Till, hedges and mature tree cover. To the south is the village of Saxilby, which contains six Listed Buildings and a conservation area. There is some intervisibility between the study site and the church tower, which will be taken forward for further assessment at the next stage.

Table 13.3 Initial Impact on Assets within 1km of the Study Area

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Ingleby Chase	1147263	GII	Medium	Low	Less than substantial harm	Although well screened from the study area, this 1830s house and its immediate grounds will be taken forward for further assessment to ensure harm is avoided or mitigated at the next stage. This is due to its proximity to the study site and potential for views from upper floors.	Take forward to next stage of assessment
Deserted Village of North Ingleby	1003570	SM	High	Medium	Less than substantial harm	This deserted medieval village is contained within the study site for West Burton 2. Design proposals have already indicated that no development will take place within the Scheduled area, however there are non-designated earthworks adjacent to this that have potential for direct and indirect impact. To avoid harm, this site will be taken forward for further assessment at the next stage.	Take forward to next stage of assessment
Church of St Botolph	1359490	GI	High	Low	Less than substantial harm	Minor intervisibility between the church tower and the southern extent of the study site towards the River Till along Broxholme Lane. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
The Manor House, Saxilby	1308588	GII	Medium	Low	Less than substantial harm	Due to its proximity to the study area, this heritage asset will be taken forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
103 and pump, High Street	1308593	GII	Medium	Negligible	None	Heritage asset is located within the urban area of Saxilby 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
The Old Hall	1064072	GII*	High	Negligible	None	Heritage asset is located within the urban area of Saxilby 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
Manor Farm	1359464	GII	Medium	Negligible	None	No intervisibility due to river, hedging and tree cover. 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 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Farm buildings	1147032	GII	Medium	Negligible	None	No intervisibility due to river, hedging and tree cover. 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
Boontown Cottage	1147027	GII	Medium	Negligible	None	No intervisibility due to river, hedging and tree cover. 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	1064095	GII	Medium	Negligible	None	No intervisibility due to river, hedging and tree cover. 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	1147028	GII	Medium	Negligible	None	No intervisibility due to river, hedging and tree cover. 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
Cornhill Farmhouse	1064096	GII	Medium	Negligible	None	No intervisibility due to river, hedging and tree cover. 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
Barn at Bransby House for Retired Horses	1359487	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
Broxholme medieval settlement and cultivation remains	1016797	SM	High	Negligible	None	No intervisibility due to river, hedging and tree cover. 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 13.4 Initial Impact on Assets within 2km of the Study Area

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Saxilby Bridge Street 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
Railway Station and House	1064073	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
Saxilby Moor Mill	1064071	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
Brickyard Cottages	1146766	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 Hugh of Avalon	1146772	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
Lych Gate and Wall of Church of St Hugh	1064068	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
Subscription Mill	1064067	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

West Burton 3

Assessment of Significance of Surrounding Heritage Assets

Within the site boundary

13.3.39 The West Burton 3 study site contains a single designated heritage asset, the Scheduled remains of the medieval bishop's palace and deer park at Stow Park (NHLE 1019229). The Scheduled Monument is divided across three separate areas; the site of the Bishop's Palace which is now largely occupied by the modern farm buildings of Moat Farm, of which parts of the northern, western and southern edges of the monument fall within the study site, the 'West Lawn' which comprises the remains of part of the former park pale, the eastern edge of which falls within the study site; and the 'East Lawn', which is situated at least 250m from the study site's south-eastern corner at its nearest point.

1km Study Area

13.3.40 There are 16 Listed Buildings within the wider 1km search area. The majority of these Listed Buildings (15) are Grade II and are primarily situated within the villages of Brampton and Marton. The remainder are found along the east-west route of the A1500, which is annotated as a Roman road on the OS map. Marton also contains the Grade I Listed medieval parish church of St Margaret of Antioch (NHLE 1359484). The closest Listed Buildings to the West Burton 3 study site are the former Stow Park Station (NHLE1064058) and its associated signal box (NHLE1146606).

13.3.41 There are no other designated heritage assets (i.e. Conservation Areas, Registered Parks and Gardens, Registered Battlefields or World Heritage Sites) within the search area.

2km Study Area

13.3.42 There are 32 heritage assets within the wider 2km search area of which 24 are Grade II Listed and five are Grade I or II* listed heritage assets, including Torksey Viaduct (GII*, NHLE 1359456), Church of St Peter at Torksey (GII*, NHLE 1064078) and Gate Burton Hall (GII*, NHLE 1359458). There are three Scheduled Monuments within the 2km buffer, Torksey Castle (NHLE 1005056), site of the medieval town of Torksey (NHLE 1004991) and the Roman fort south of Littleborough Lane (NHLE 1004935).

13.3.43 Significance from the West Burton 3 site is derived largely from its historic use and associations with the medieval Bishop's Palace and deer park at Stow Park (NHLE 1019229). First documented in the late 12th century, the site contained a substantial moated enclosure, although no standing remains survive. As a Scheduled site, the extant earthworks are of high significance but have been compromised by construction of the Great Northern and Great Eastern Joint Railway line, which cut the park in half. Whilst harmful to the earlier heritage assets, there are a number of industrial railway structures of medium significance including the Stow Park signal box (NHLE 1146606) and station (NHLE 1064058).

13.3.44 Within the wider setting, Torksey was an important medieval town and contains a number of highly designated assets that range from a Viking encampment to a mid-19th century railway viaduct (NHLE 1359456).

13.3.45 The villages of Brampton and Marton are both west of the study site and contain a number of Grade II Listed Buildings. Both villages follow the

general settlement patterns of villages in the Trent Valley and are characterised by their vernacular structures and tight urban grain, facing inwards along a main street.

13.3.46 Although it is possible that the West Burton 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.

13.3.47 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.

Potential Impacts to be Considered in the ES

13.3.48 The greatest potential impact of the Scheme within the West Burton 3 study site relates to the medieval bishop's palace and deer park, Stow Park (NHLE 1019229). This Scheduled Monument is split into three Scheduled areas but is likely to encompass wider non-designated earthworks within the study area. The study site abuts the Scheduled area of Moat Farm (Bishop's Palace) and the West Lawn ditch. East Lawn is further from the study site but still holds the potential for some intervisibility. Part of the study site boundary overlaps with the Scheduled Monument but no development will take place within the Scheduled area to avoid substantial harm to a nationally significant monument. There will therefore be no direct impact on this, or any other, designated heritage assets. This highly significant heritage asset 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.

13.3.49 Three further heritage assets have potential to be indirectly impacted by the Scheme. These are all Listed at Grade II and are Stow Park Station (NHLE 1064058), Signal Box at Stow Park Station (NHLE 1146606) and Gallows Dale Farmhouse (NHLE 1146780). These heritage assets run along the A1500 at the northern extent of the study area and have potential for intervisibility to and from the study site. These will be taken forward to the next stage to allow a full and detailed heritage impact assessment to be carried out against detailed design proposals. This will allow harm to be avoided or mitigated as part of the planning process.

13.3.50 An additional 13 heritage assets within the 1km buffer and 32 heritage assets within the 2km search area associated with the study site have been assessed at scoping stage to understand potential impact on heritage significance. These have all been assessed and scoped out of further consideration as there will be no impact on the asset or on its

setting where it contributes to appreciation or understanding of significance.

13.3.51 Designated heritage assets within the villages of Marton and Brampton are characterised by their vernacular settlement character, with structures facing inwards towards a linear main street. These villages' wider setting is largely defined as a rural and agrarian landscape, although its appearance was radically altered in the 19th century following enclosure. There is not considered to be any direct or indirect impact on significance as the study area has a negligible contribution to appreciation or understanding of significance.

Table 13.5 Initial Impact on Assets within 1km of the Study Area

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Manor Farmhouse	1064084	GII	Medium	Negligible	None	Heritage asset is located within the village of Brampton 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
Priory Cottage	1064082	GII	Medium	Negligible	None	Heritage asset is located within the village of Brampton 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
Richards-Havercross Cottages	1064081	GII	Medium	Negligible	None	Heritage asset is located within the village of Brampton 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
The Beeches	1064080	GII	Medium	Negligible	None	Heritage asset is located within the village of Brampton 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
The Hermitage	1064083	GII	Medium	Negligible	None	Heritage asset is located within the village of Brampton 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
Stow Park Station	1064058	GII	Medium	Low	Less than substantial	Stow Park Station and Signal Box relate to the 19th century railway line that cuts through Stow Park. Both are enclosed by tree cover but will be taken forward for further assessment due to proximity to the study area, to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Signal Box at Stow Park Station	1146606	GII	Medium	Low	Less than substantial	Stow Park Station and Signal Box relate to the 19th century railway line that cuts through Stow Park. Both are enclosed by tree cover but will be taken forward for further assessment due to proximity to the study area, to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Gallows Dale Farmhouse	1146780	GII	Medium	Low	Less than substantial	Farmhouse east of the study site on the A1500. Views south-west across the site to the power station indicate possible intervisibility with 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
No.21 and attached Barn to Rear	1146594	GII	Medium	Negligible	None	Heritage asset is located within the village of Marton 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
Thornleigh House	1359485	GII	Medium	Negligible	None	Heritage asset is located within the village of Marton 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
25 Gainsborough Road	1308917	GII	Medium	Negligible	None	Heritage asset is located within the village of Marton 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
Ingleby Arms Public House	1064057	GII	Medium	Negligible	None	Heritage asset is located within the village of Marton 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
Wapping Lane Farmhouse and Attached Outbuilding	1146611	GII	Medium	Negligible	None	Heritage asset is located within the village of Marton 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
Cross	1146582	GII	Medium	Negligible	None	Heritage asset is located within the village of Marton 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	1359484	GI	High	Negligible	None	Grade I Listed church in Marton has been assessed for	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Margaret of Antioch						visibility 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.	
Berfoston Cottage	1064060	GII	Medium	Negligible	None	Heritage asset is located within the village of Marton 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
The medieval bishop's palace and deer park, Stow Park	1019229 Part 1	SM	High	Low	Less than substantial	The Scheduled Bishop's Palace is now situated beneath Moat Farm and archaeological assessment is required to understand the extent of earthworks or standing remains. Due to proximity to the study site (and potential overlap), this element of the Scheduled Monument will be taken forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
The medieval bishop's palace and deer park, Stow Park	1019229 Part 2	SM	High	Medium	Less than substantial	The West Lawn ditch element of the Scheduled Monument is adjacent to the study site boundary and has potential for impact. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
The medieval bishop's palace and deer park, Stow Park	1019229 Part 3	SM	High	Low	Less than substantial	The East Lawn ditch element of the Scheduled Monument is further removed from the study site but will also be taken forward for further assessment due to its significance.	Take forward to next stage of assessment

Table 13.6 Initial Impact on Assets within 2km of the Study Area

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
21 Church Lane	1064064	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
Stables and Pigeoncote at Church End Farm	1146735	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 Mary	197095	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
Threshing Barn at Church End Farm	1064063	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
Whipping Post	1064062	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
9 Ingham Road	1146755	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 Farmhouse	1359486	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 Sturton Road	1064066	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
Wesleyan Chapel	1146761	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	Yes

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						significance.	
Old Rectory Home for the Elderly	1359488	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 Hall	1146778	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 Hugh of Avalon	1146772	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
Lych Gate and Wall of Church of St Hugh	1064068	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
Subscription Mill	1064067	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
White Swan Inn	1064105	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
Barn and Pigeoncote at White Swan Farm	1064106	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
Torksey Lock and Footbridge	1147315	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
Torksey Castle	1064079	GI	High	Negligible	None	The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting	Yes

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						where it contributes to appreciation or understanding of significance.	
The Paddocks Castle View	1359495	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
Gravestone 8 paces from angle of nave of Church of St Peter	1147328 0	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 Peter	106407 8	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
Torksey Viaduct over River Trent	1359456	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
Windmill	106405 9	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
Gateway to Gate Burton Hall	106408 6	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 Rectory	1359457	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 Helen	106408 7	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

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Gate Burton Hall	1359458	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
Gate Burton Hall Cottages	1166351	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
Walled Garden at Gate Burton Hall	1472727	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
Roman fort, south of Littleborough Lane	1004935	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
Site of Medieval Town	1004991	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
Torksey Castle	1005056	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

West Burton 4

Assessment of Significance of Surrounding Heritage Assets

Within the site boundary

13.3.52 The West Burton 4 study site does not contain any designated heritage assets.

1km Study Area

13.3.53 There are 58 designated heritage assets within the 1km study area, predominantly located within the two settlements of Clayworth (south) and Gringley on the Hill (north), which are immediately adjacent to the study site boundary.

13.3.54 There are 18 Listed Buildings in Clayworth to the south-west (of which two are outside the settlement boundary to the south on the Wheatley Road), comprising 17 Grade II buildings and one Grade I building, which is the Church of St Peter (NHLE 1212157). There are seven locally listed monuments in Clayworth, including the cemetery, which are designated by Bassetlaw District Council.

13.3.55 There are 22 Listed Buildings in Gringley on the Hill to the north (of which five are outside the settlement boundary, four to the west and one to the east along the A631), comprising 21 Grade II Listed Building and one Grade II* Listed Building, which is the Church of St Peter and St Paul (NHLE 1370395). There are eight locally listed monuments in Gringley on the Hill, including the cemetery.

13.3.56 There are two Scheduled Monuments within the search area. The site of an Iron Age hillfort known as Beacon Hill Camp (NHLE 1003241), is situated on the eastern edge of Gringley on the Hill, approximately 215m to the north of the West Burton 4 study site at its nearest point, between which, lies the dual carriageway of the A631. The remains of a 14th century market cross (NHLE1016790) are situated 70m to the west of the Church of St Peter and St Paul in the centre of Gringley on the Hill.

13.3.57 There are two conservation areas, defined by Bassetlaw District Council, within the 1km study area, comprising Gringley on the Hill and Clayworth Conservation Areas. Neither conservation area has an adopted conservation appraisal or management plan available at the time of writing.

13.3.58 The Bassetlaw Local Plan defines the 20th century cemeteries at Gringley on the Hill and Clayworth as 'Unregistered Parks and Gardens', and thirteen post-medieval, 19th century or modern buildings are recorded on the Nottinghamshire HER as 'Buildings of Local Interest'. Locally Listed Buildings have only been assessed within the 1km buffer of the study site.

13.3.59 There are no other designated heritage assets (i.e. Registered Parks and Gardens, Registered Battlefields or World Heritage Sites) within the search area.

2km Study Area

13.3.60 There are 14 designated heritage assets within the 2km study area, including 12 Listed Buildings, one Scheduled Monument and one conservation area, primarily located to the west within Wiseton. The Scheduled Monument is found to the south-east at Hayton (NHLE 1008630).

13.3.61 The three most significant heritage assets within a 1km buffer zone of the West Burton 4 study area are the Scheduled earthworks of Beacon Hill Camp (NHLE 1003241) and Church of St Peter and St Paul in Gringley on the Hill (GII*, NHLE 1370396), and the Church of St Peter in Clayworth (GI, NHLE 121257). Due to their designated status (i.e. Grade I or Grade II*), each heritage asset is of national importance and, therefore, of high heritage significance. The Church of St Peter in Clayworth is of particular interest for the Traquair Murals, which were completed in 1905 by renowned artist Phoebe Anna Traquair (1852-1936). Said to be the largest works of art in the East of England, they were given by Lady D'Arcy Godolphin Osborne as a thank-offering for the safe return of her son from the Boer War.

13.3.62 Gringley on the Hill contains a number of Grade II Listed and locally Listed Buildings typical of a rural village. The heritage assets include a village cross (NHLE 1156627), Sunday School (NHLE 1302736), 18th and 19th century houses such as the Rood House (NHLE 1302784), as well as two locally listed public houses (MNT18836 and MNT18832). These heritage assets are of medium to low significance due to their Grade II designation and local listing, respectively.

13.3.63 Gringley on the Hill is set on an escarpment, with the land sloping to the north and south away from the A631. Extensive views are visible out from the southern side of the A631, although the village itself is sheltered by mature tree cover and inward facing buildings, many of which are contained on the main street that is lower in topography than the A631 to the south. The village is a conservation area designated by Bassetlaw District Council. It holds significance for its character and appearance as a rural Nottinghamshire settlement with high quality historic, vernacular buildings that have architectural and historic special interest. The majority of the conservation area is north of the A631 dual carriageway, although a small section crosses the road to encompass The Green, conservatory and boundary wall, a Grade II Listed Building (NHLE:1370396).

13.3.64 A number of designated heritage assets are found outside the settlement of Gringley on the Hill to the west, on the southern side of the A631, with views across the landscape to the south. These include the locally listed cemetery (241) and the Grade II Listed War Memorial (NHLE 1421763), Mill House (NHLE 1045107) and Windmill (NHLE 1156678). These assets hold medium to low significance.

13.3.65 Clayworth village is also a conservation area designated by Bassetlaw District Council. It holds significance for its character and appearance as a rural Nottinghamshire settlement with high quality historic, vernacular buildings that hold architectural and historic special interest.

13.3.66 The village contains a number of Grade II Listed Buildings of medium significance including 18th and 19th century houses or farms such as Rose Cottage (NHLE 1045705), the Old Rectory (NHLE 1045701) and Hall Farmhouse (NHLE 1212224). It also contains an Old Chapel (NHLE 1289620), Manor House (NHLE 1045704) and a locally listed public house of low significance (MNT19311).

13.3.67 Other than the traditional residential and agricultural uses of the village, Clayworth is bound by the Chesterfield Canal to the south, which was constructed in the 18th century. A number of structures and features associated with the canal are Grade II Listed and hold medium significance to the village and its wider setting as the canal winds across Nottinghamshire. These include a Canal Warehouse (NHLE 1268510), canal

and mileposts (NHLE 1268510 and 1269075) and Otters Bridge 68 (NHLE 1268481).

13.3.68 Beyond Clayworth and Gringley on the Hill within the 2km buffer, there is one Scheduled Monument of high significance relating to Hayton Castle (NHLE 1008630) and a number of Grade II Listed Buildings of medium significance relating to the estate at Wiseton. Additional listed mileposts and canal features are also included within this wider search area.

13.3.69 Although it is possible that the West Burton 4 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.

13.3.70 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.

Potential Impacts to be Considered in the ES

13.3.71 In total, 17 heritage assets will be taken forward for further assessment to ensure harm is avoided or mitigated at the next stage.

13.3.72 Within Gringley on the Hill, the Scheduled Monument of Beacon Hill Camp (NHLE 1003241) will be taken forward for detailed assessment of the potential impact the proposal may have on its setting as it is one of the heritage assets of the highest significance within the search area. Although there is no direct impact and unlikely to be any indirect/visual impact, further assessment will be carried out at the next stage before this can be scoped out entirely.

13.3.73 The Grade II* listed Church of St Peter and St Paul will also be considered further for any potential impact on heritage significance. The tower of the church is visible from the Gringley to Clayworth Road (B1403) and there is potential for the Scheme to impact on an understanding of this rural, agrarian setting.

13.3.74 A similar assessment will be carried out to understand the impact of the study site on the conservation area of Gringley on the Hill and Clayworth. Both conservation areas hold medium heritage significance and their rural setting forms part of this understanding. They will be taken forward for further assessment to understand the extent, if any, of the harm to setting from the proposals and how this impacts on their significance. The wider setting of the two villages is largely defined as a rural and agrarian landscape, although its appearance was radically altered in the 19th century following enclosure. This wider rural setting makes a negligible contribution to the significance of the heritage assets and our ability to appreciate that significance.

13.3.75 A number of designated heritage assets sit adjacent to the A631, outside the settlement of Gringley on the Hill, which are more likely to be impacted by development within the study site. These will be taken forward for further assessment to ensure harm is avoided or mitigated at the next stage. These are The Green, conservatory and boundary wall (NHLE 1370396), Gringley on the Hill cemetery (241), War Memorial (NHLE 1421763), Mill House (NHLE 1045107) and Windmill (NHLE 1156678).

13.3.76 Within Clayworth, heritage assets associated with the Chesterfield Canal will be taken forward for further assessment to ensure harm is avoided or mitigated. These are Canal Warehouse and Field Farmhouse (NHLE 1268511) Otters Bridge (NHLE 1268481) and two mileposts (NHLE 1268510 and 1268511). There are potential long-distance views from the canal towards the study site.

13.3.77 The Manor House (NHLE 1045704) is situated outside the main street of the settlement to the north-west and will be assessed in more detail. As a Grade I Listed Building, the Church of St Peter (NHLE 1212157) will also be taken forward, although there is unlikely to be intervisibility between the tower and the study site.

13.3.78 Within the wider 2km buffer of the study area, the Scheduled Monument of Hayton Castle (NHLE 1008630) and the Chesterfield canal milepost to the south-east of Shaw Lock (NHLE 1269075) will be assessed further to understand the indirect impact of the of the Scheme on the setting of the Chesterfield Canal and Scheduled Monument.

13.3.79 In addition to the above, 43 heritage assets within the 1km buffer and 12 heritage assets within the 2km buffer of the study site have been assessed at scoping stage to understand potential impact on heritage significance. These have all been assessed and scoped out of further consideration as there will be no impact on the asset or on its setting where it contributes to appreciation or understanding of significance.

Table 13.7 Initial Impact on Assets within 1km of the Study Area

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
GRINGLEY ON THE HILL							
CHURCH OF ST PETER AND ST PAUL, GRINGLEY ON THE HILL	1370395	GII*	High	Low	Less than substantial harm	Possible impact on setting of church in views towards church tower from Clayworth Road (B1403). Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Beacon Hill Camp	1003241	SM	High	Low	Less than substantial harm	Unlikely to be intervisibility between earthworks and study site but included 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
THE GREEN, CONSERVATORY AND BOUNDARY WALL, GRINGLEY ON THE HILL	1370396	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. The Green is located adjacent to the north-east boundary of the study site, with the land falling away to the south. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Gringley on the Hill War Memorial	1421763	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
GRINGLEY WINDMILL	1156678	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
MILL HOUSE	1045107	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Gringley On The Hill Conservation Area	n/a	CA	Medium	Low	Less than substantial harm	Possible impact on the special character and appearance of the conservation area due to proximity to the study site. Possible impact on rural/agrarian setting. Take forward for further	Take forward to next stage of assessment

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						assessment to ensure harm is avoided or mitigated at the next stage.	
Gringley On The Hill Cemetery	MNT26956	HER	Low	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Park House Farmhouse	1156681	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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 Homestead	1045106	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Sunday School	1302736	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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 Hill Cottage	1370393	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						inwards along the main street. 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.	
Pigeoncote at Gringley Vicarage	1045104	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Bleak House	1045105	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
North Beeches and South Beeches	1302764	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Ravenhill and Boundary Wall	1045103	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. The development	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						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.	
Gringley Village Cross	1156627	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Gringley Hall and boundary wall	1370397	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
1 High Street	1302781	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Coach House at Gringley Vicarage	1156632	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. The development will have no direct or indirect impact on 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
						significance of the heritage asset. No impact on setting where it contributes to appreciation or understanding of significance.	
Prospect House and boundary wall	1156671	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Gringley Vicarage and boundary wall	1370394	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Gringley Grange Farm House	1045102	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Pigeoncote, Stables and Granary at Church Farm	1156629	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						setting where it contributes to appreciation or understanding of significance.	
The Rood House	1302784	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Beacon House	MNT18831	LL	Low	Negligible	None	Heritage asset is located within the settlement of Gringley and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Pair of Cottages Next East of Fairpiece Cottage	MNT21471	LL	Low	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
House North-East of Church	MNT21472	LL	Low	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 Bluebell Inn	MNT18836	LL	Low	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
Cottage Next East of the Bluebell Inn	MNT18837	LL	Low	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 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
The White Hart Inn	MNT18832	LL	Low	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
Cottage Next East of Prospect House	MNT21737	LL	Low	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
CLAYWORTH							
Clayworth Conservation Area	n/a	CA	Medium	Low	Less than substantial harm	Possible impact on the special character and appearance of the conservation area due to proximity to the study site. Possible impact on rural/agrarian setting. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Manor House	1045704	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Rose Cottage	1045705	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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	1045701	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. The development will have no direct or indirect impact on the significance of the heritage asset. No impact on setting where it contributes to	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						appreciation or understanding of significance.	
Barn to South of Old Cider Mill	1350087	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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 Peter	1212157	GI	High	Low	Less than substantial harm	Unlikely to be intervisibility between church and study site but included 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
Monument 2m south of Church of St Peter	1212218	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Boundary wall at Church of St Peter	1045702	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
65 and 67, Town Street	1045703	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						views, rather than towards the study site. Assets face inwards along the main street. 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.	
Clayworth Hall and outbuilding	1045700	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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 Chapel	1289620	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Hall Farm House	1212224	GII	Medium	Negligible	None	Heritage asset is located within the settlement of Clayworth and is not visible from the study site. Land slopes to the north providing long distance views, rather than towards the study site. Assets face inwards along the main street. 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
Royston Manor House	1289683	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

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Chesterfield Canal, Otters Bridge 68, St Peters Lane	1268481	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Chesterfield Canal (east side), canal milepost to south east of Otters Bridge 68	1268511	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
The Grange and Boundary	1370088	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
Farm Buildings at the Grange	1212260	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
Canal Warehouse and Field Farm House	1212377	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Chesterfield Canal (east side), canal milepost to south east of Field Farm	1268510	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Clayworth Cemetery	238	LL	Low	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 Holt	MNT19302	LL	Low	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	Yes

Assets within 1km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
						appreciation or understanding of significance.	
1 Town Street and Hall Cottage	MNT21120	LL	Low	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
69 Town Street	MNT21118	LL	Low	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
53-57 Town Street	MNT21121	LL	Low	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 Blacksmiths Arms	MNT19311	LL	Low	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
House South of the Blacksmiths Arms	MNT21117	LL	Low	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

13.3.80

Table 13.8 Initial Impact on Assets within 2km of the Study Area

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Chesterfield Canal, canal milepost to south east of Shaw Lock 62	1269075	GII	Medium	Low	Less than substantial harm	Possible intervisibility/impact on setting due to location outside the village settlement boundary. Take forward for further assessment to ensure harm is avoided or mitigated at the next stage.	Take forward to next stage of assessment
Highfield Farmhouse	1156811	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
Pigeoncote and Fodder Store at Pear Tree Farm	1370368	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
Hayton Castle Cottage, Farmhouse	1234260	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
Rose Cottage, Hawthorn Cottage, Myrle Cottage and outbuildings	1045049	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
Herbert Grey College	1035047	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
Woodbine Cottage	1156877	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

Assets within 2km	NHLE	Grade	Significance (H/M/L)	Magnitude of Impact	Level of Harm	Description of impact	Scoped out of further consideration
Laurel Cottage	1045048	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
Grange Farmhouse	1156886	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
Wiseton Top Bridge	1156888	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
Ice House at Wiseton Hall	1045051	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
Gardeners Cottage at Wiseton Hall	1045050	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
Hayton Castle Moated Site and Fishpond	1008630	SM	High	Low	Less than substantial harm	Unlikely to be intervisibility between earthworks and study site but included 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

13.4 Assessment Methodology

13.4.1 The degree of impact a development could have on such 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, NPPF and of other useful 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 assessments 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 proposed developments; and
- 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 proposed development. 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 13.9 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 PPS5 and was then restated in the NPPF which describes 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 13.10 Criteria Proposed to Determine Magnitude of an 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 impact to designated heritage assets of the Scheme, including the proposed cable routes, energy 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 It is proposed that the criteria provided in Table 13.11 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 13.11 Impact Matrix

Significance (special interest)	Magnitude of impact			
	High	Medium	Low	Negligible
Very High	Substantial harm	Substantial harm	Less than substantial harm	None
High	Substantial harm	Less than substantial harm	Less than substantial harm	None
Medium	Less than substantial harm	Less than substantial harm	Less than substantial harm	None
Low	Less than substantial harm	Less than substantial harm	Less than substantial harm	None
Negligible / nil	None	None	None	None

13.4.23 The scoping assessment has found that there will be no direct impact to designated heritage assets across West Burton 1, 2, 3 and 4. 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).

13.4.24 A proportion of designated heritage assets within West Burton 1, 2, 3 and 4 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

13.4.25 The final locations of cable routes outside of the West Burton 1, 2, 3 and 4 study sites are yet to be determined.

13.4.26 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.

13.4.27 Any direct impact upon designated heritage assets will be avoided through the route design.

13.4.28 Where indirect impacts are unavoidable, these will be mitigated through offsets, screening and design development.

West Burton Substation

13.4.29 The final location of the energy storage and substation are yet to be determined.

13.4.30 On determination of the options, these locations will be subject to a heritage assessment using the methodology set out in this section (Chapter 13) to identify any designated heritage assets that could potentially be directly or indirectly impacted by the laying of cables.

13.4.31 Any direct impact upon designated heritage assets will be avoided through the design.

Cumulative and In-Combination Effects

13.4.32 The cumulative effect of West Burton 1, 2, 3 and 4 on designated heritage assets within the overlapping 1km and 2km search areas 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 the Cottam Solar Project and Gate Burton Energy Park.

13.4.33 It is not considered that there will be any cumulative or in-combination effects from the construction and operation of the Scheme on West Burton 1-4 Sites on any designated heritage assets.

13.4.34 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 Conclusions on Scoping

13.5.1 This heritage scoping exercise has assessed the impact of the proposals for West Burton 1, 2, 3 and 4 on designated heritage assets within a buffer of up to 2km from the study site. This includes 13 heritage assets in West Burton 1, 22 in West Burton 2, 49 in West Burton 3 and 72 in West Burton 4. These range from Scheduled castles to locally listed cottages.

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.

13.5.4 156 designated heritage assets were assessed as part of this scoping exercise. For 123 of these assets the Scheme is found to have no impact on their setting where it contributes to appreciation or understanding of significance. 33 will be taken forward for additional assessment at the next stage to ensure any potential indirect harm can be avoided or mitigated. This includes 6 heritage assets in West Burton 1, 4 in West Burton 2, 6 in West Burton 3 and 17 in West Burton 4.

13.5.5 It is proposed to scope out direct impacts on designated assets from the Scheme on West Burton 1-4 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*

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

Southwell & Nottingham Church History Project, n.d., Gringley on the Hill, St Peter and St Paul, Available online at https://southwellchurches.nottingham.ac.uk/gringley-on-the-hill/hhistory.php (Accessed 25/11/21)

Southwell & Nottingham Church History Project, n.d., Clayworth St Peter, Available online at https://southwellchurches.nottingham.ac.uk/clayworth/hhistory.php (Accessed 25/11/21)

Williams, A. and Martin, G.H. 1992, *Domesday Book. A Complete Translation*

14 Transport and Access

14.1 Introduction

14.1.1 This chapter will consider 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 are 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 comprises four Sites named West Burton 1 to 4 (WB 1-4). 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. In addition, there is a search area, known as West Burton Substation, in proximity to West Burton Power Station for the siting of a substation and an energy storage facility. 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.

14.2.2 West Burton 1, 2 and 3 are located to the south of the A1500 Till Bridge Lane, near Sturton by Stow. West Burton 4 is located to the south of the A631, to the south of Gringley on the Hill and north east of Clayworth.

14.2.3 West Burton 1 is the smallest of the four areas. It is located to the south of the A1500, a single carriageway road running in an east to west alignment, whereby the national speed limit applies. Access to the land is via an unclassified road to the east of Broxholme, which connects to the A1500.

14.2.4 West Burton 2 is located to west of West Burton 1, and to the south of the A1500. The area is located between Sturton by Stow and Saxilby. The B1241 Sturton Road, a single carriageway road, dissects the Site in a north to south alignment.

14.2.5 West Burton 3 is located to the north-west of West Burton 2, and to the south of the A1500. The area is situated between the villages of Marton and Sturton by Stow. The Sheffield to Lincoln Railway line dissects the Site in a south-east to north-west alignment.

14.2.6 West Burton 4 is approximately 12km to the north-west of West Burton 3. It is located to the south of the A631, which is a dual carriageway within the vicinity of the Site. Access to the area is via the B1043 Clayworth Road, a single carriageway road which connects to the A631.

14.2.7 A full overview of the Site and its 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

14.2.8 Automatic Traffic Count Surveys have been undertaken for all roads within the vicinity of WB1-4. 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	West Burton Area	Total Vehicles	%HGV
A15	WB1,2,3	12,661	17%
Unclassified Road south of A1500	WB1	183	14%
Broxholme Lane	WB2	549	21%
B1241 Sturton Road	WB2	3,852	18%
A1500 Till Bridge Lane	WB3	4,521	17%
A631	WB4	9,958	6%
B1403 Clayworth Road	WB4	1,372	18%

14.2.9

Other Baseline Data Sources

14.2.10 Other baseline data sources that will information 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 Transport and Access ES Chapter. The outline CTMP will provide a framework for the management of construction vehicle movements to and from the Sites (including the cable route and the West Burton Substation site), 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

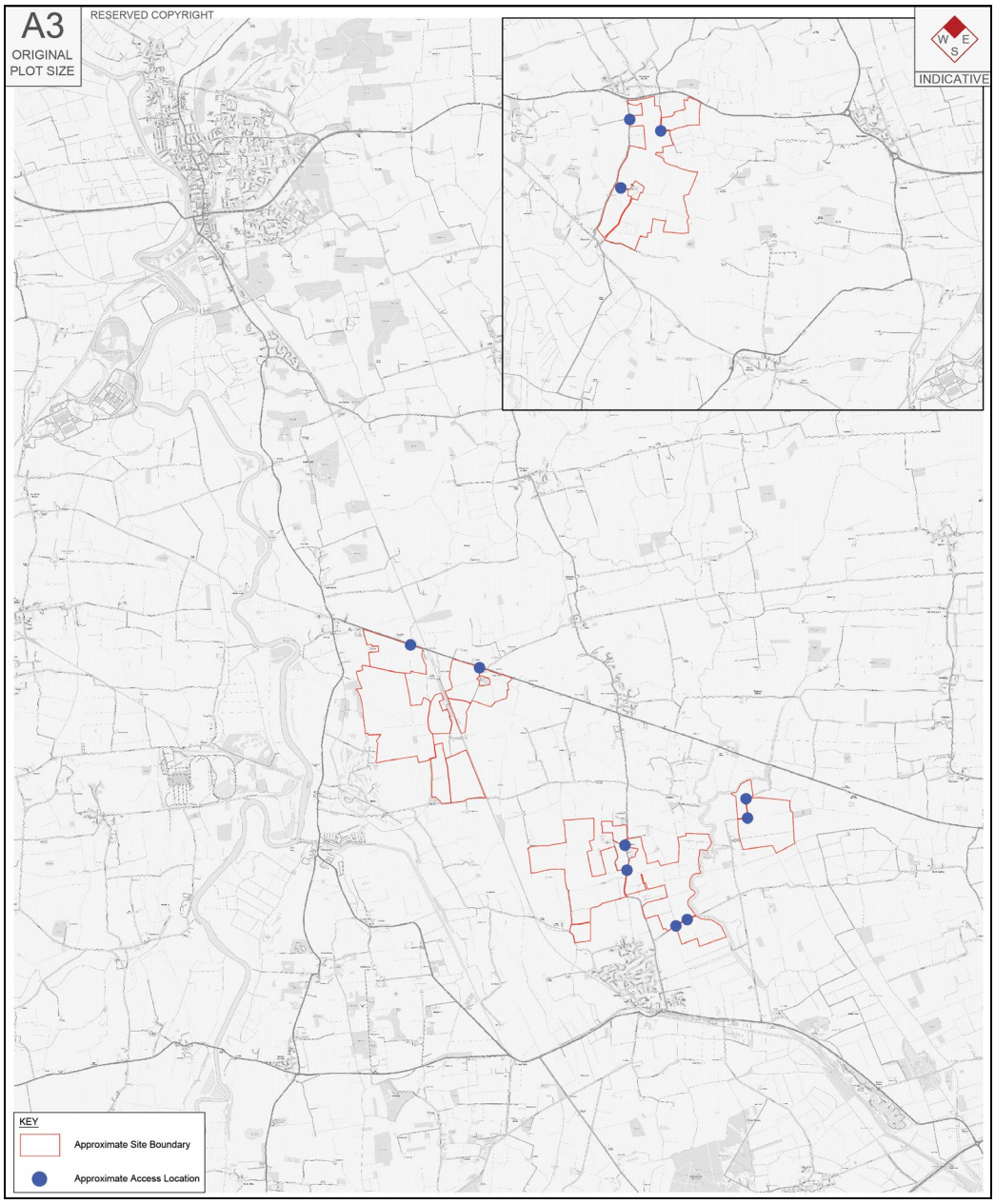
14.3.4 During the temporary construction phase, the following construction access points are anticipated to be required (although maybe subject to change as the design develops):

- West Burton 1: 2 access junctions from an unclassified road, south of the A1500;
- West Burton 2: 4 access junctions from the following locations:
  - 2 from B1241 Sturton Road;
  - 2 from Broxholme Lane.
- West Burton 3: 2 access junctions from A1500; and
- West Burton 4: 1 access junction B1403 Clayworth Road.

14.3.5 The proposed location of the access points are shown in Figure 14.1.

14.3.6 The access points for construction of West Burton Substation and the cable route are yet to be determined but will be considered in the ES.

Figure 14.1: Proposed Construction Vehicle Access Locations



14.3.7 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.

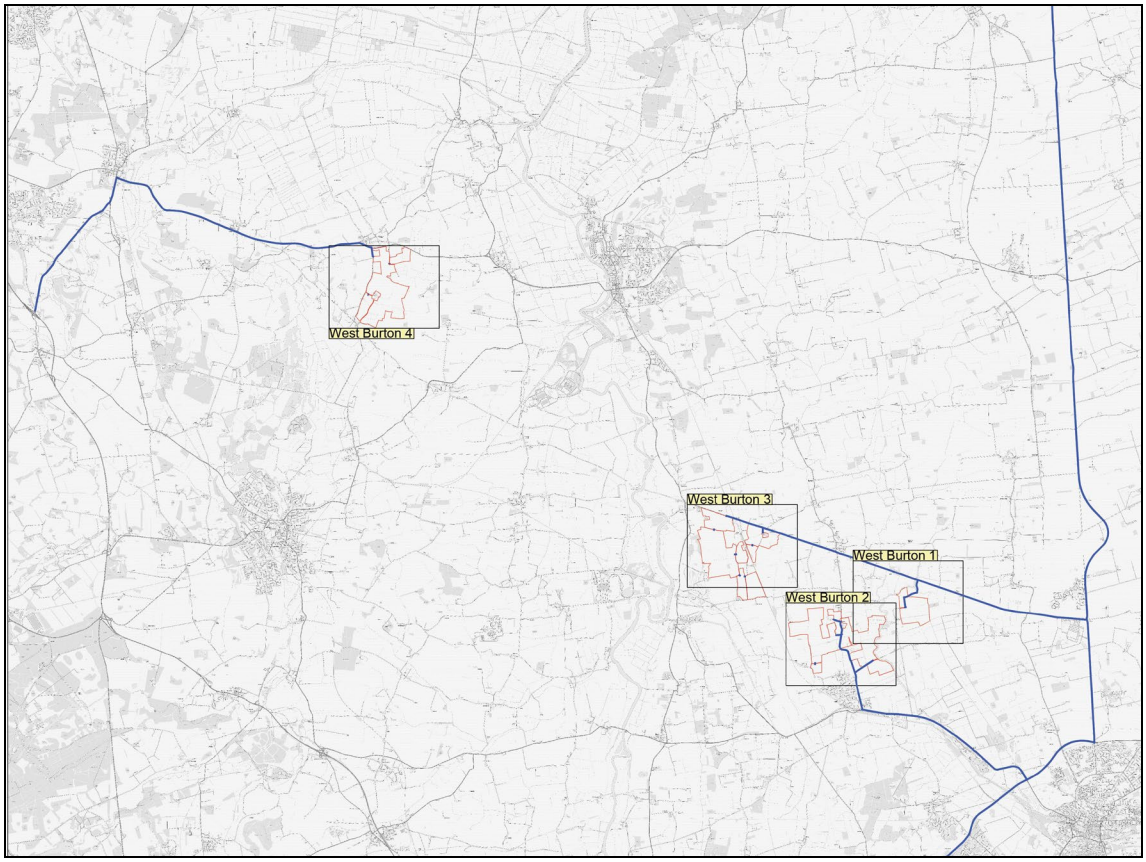
Construction Vehicle Routing

14.3.8 The proposed construction vehicle routes to each site are summarised below:

- West Burton 1 and 3 – via the A15 and A1500;
- West Burton 2 – via the A46, A57 and B1241; and
- West Burton 4 – via the A1(M), A614 and A631.

14.3.9 The proposed construction vehicle routes are shown in Figure 14.2.

Figure 14.2: Construction Vehicle Routes



Construction Vehicle Trip Generation

14.3.10 The construction vehicle trip generation is still being calculated. Full details will be provided in 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 is set out in Table 14.2 below.

Table 14.2 Forecast Construction Vehicle Trip Generation

Area	Size	Forecast Construction Vehicle Movements	Average per Day*
Broxholme	64MW	1,152 (2,304 two-way)	2 (4 two-way)
Ingleby	170MW	3,060 (6,120 two-way)	7 (14 two-way)
Brampton	210MW	3,780 (7,560 two-way)	8 (16 two-way)
Clayworth	180MW	3,240 (6,248 two-way)	7 (14 two-way)
Total	624 MW	11,232 (22,464 two-way)	24 (48 two-way)

** Based on a 78 week construction period, equating to 468 working days (six working days per week)*

14.3.11 At this stage, it is envisaged that there will be approximately 24 HGV deliveries per day over the construction period (48 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

14.3.12 A number of mitigation measures will be set out within the outline CTMP and ES Chapter. These will 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 a 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;
- The provision of a wheel washing facility;
- 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 agreement to undertake a pre and post construction 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 Scheme 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
- Draft Bassetlaw District (August 2021).

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

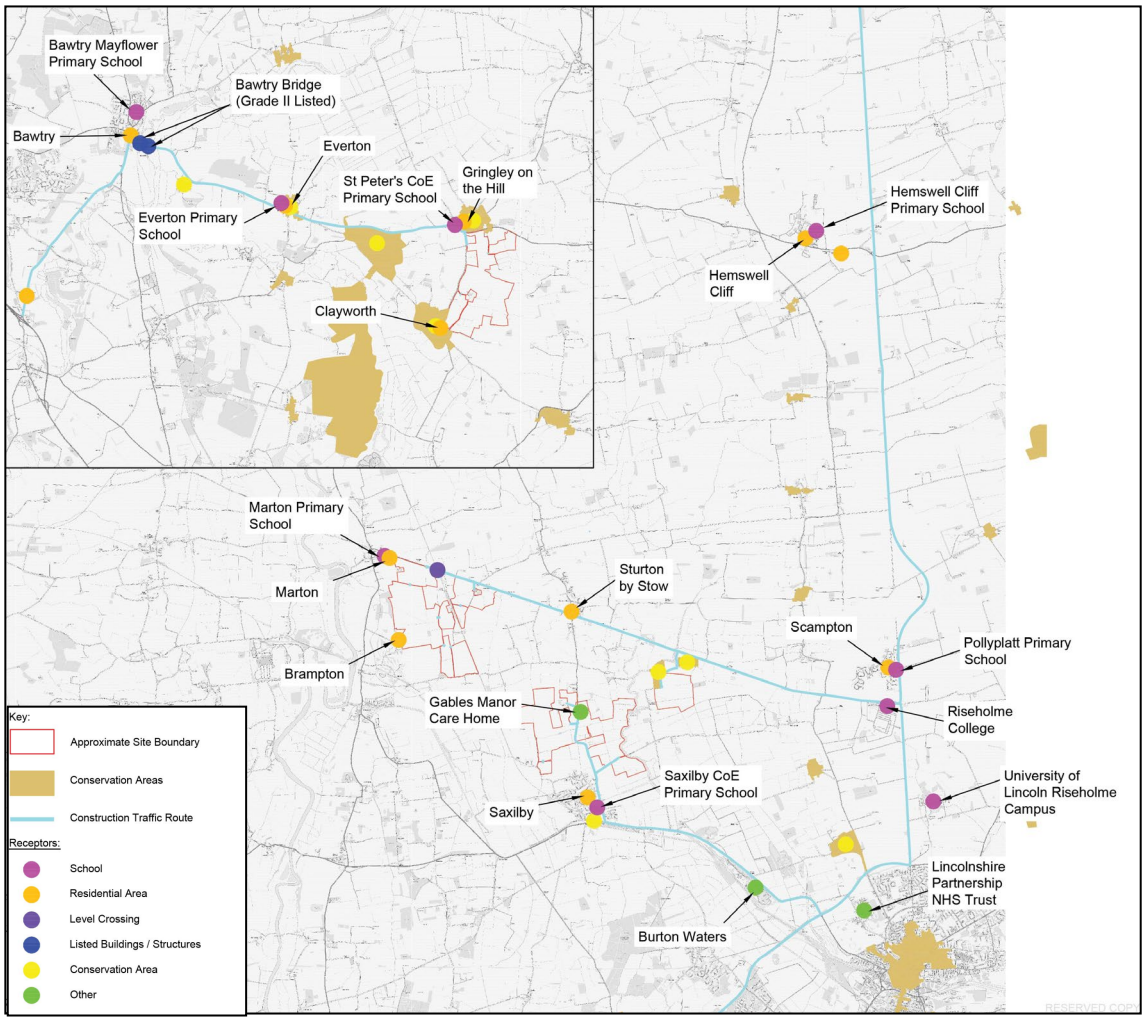
14.7.1 The assessment methodology is set out below. The assessment methodology has been prepared to be in accordance with Guidance on Transport Assessments, prepared by the Department for Transport (DfT) in March 2007 (which is now archived but still considered relevant), Institute of Environmental Management 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 areas 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.

14.7.5 A description of each impact is provided below.

Accidents and Safety

14.7.6 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

14.7.7 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.

14.7.8 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

14.7.9 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

14.7.10 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)

14.7.11 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

14.7.12 The IEMA Guidelines state that some developments include hazardous loads, and that this should be recognised by the assessment.

14.7.13 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

14.7.14 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:

14.7.15 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

14.7.16 Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

14.7.17 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.

14.7.18 The IEMA Guidelines state that 'F*or 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).

14.7.19 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 14.32 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)

14.7.20 The magnitude of change and receptor sensitivity have been compared to determine the overall significance of effects. This is shown in Table 14.5.

14.7.21 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

14.7.22 It is considered that only moderate and major effects are significant for the purpose of assessment.

14.7.23 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

14.7.24 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.

14.7.25 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.

14.7.26 If the Scheme and the Cottam 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 Scheme, 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 four Sites named West Burton 1 to 4 (WB 1-4). 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. In addition, there is a search area, known as West Burton Substation, in proximity to West Burton Power Station for the siting of a substation and an energy storage facility. 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.

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 West Burton 1, 2, 3 and 4 and at the West Burton sub-station site as outlined in Appendix 15.1.

Potential and Likely Environmental Effects

15.2.4 The closest sensitive receptors to the Sites 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 predication and identify 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 98.4km2 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;
- Institute for Environmental Management and Assessment (IEMA) '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 of 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 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 Scheme 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 15.4 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 15.3 shows how the interaction of magnitude and sensitivity can be combined to determine the significance of an environmental effect.

Table 15.3: 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. The potential

cumulative noise impacts associated with the operational phase of the Scheme will be assessed.

15.3.15 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.

15.3.16 If the Scheme and the Cottam 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.

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 will be 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 Scheme, 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 the 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, in relation to:

- Road users – specifically drivers of motor vehicles;
- Users of PROW at a high level;
- Occupants of surrounding dwellings;
- Railway operations and infrastructure; and
- Aviation activity surrounding RAF Scampton, Sturgate Airfield, and Doncaster-Sheffield Airport.

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.

12.58 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:

- Doncaster Sheffield Airport – 10.5km north-west of West Burton 4;
- Sturgate Airfield – 13km south-east of West Burton 4; and
- RAF Scampton – 4.8km north-east of West Burton 1.

16.2.3 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

16.2.4 No field work/site surveys were undertaken as part of this scoping report.

Potential and Likely Environmental Effects

16.2.5 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 Doncaster Sheffield Airport, Sturgate Airfield and RAF Scampton; 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 1km 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 the intensity of the solar reflection from the Scheme in relation to aviation activity;
- 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 tolerance to change: 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 carriageways 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 tolerance to change: '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 estimated workload of the driver at the location 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 drivers' main field of view (30 degrees either side of the direction of travel). Reflections originating within a train drivers' 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 tolerance to change: 'Medium' because they are of high importance.

16.3.26 Magnitude of impact: See below for aviation receptor types

Air Traffic Control (ATC) Tower

16.3.27 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.

16.3.28 A 'Negligible' magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by ATC personnel.

16.3.29 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.

16.3.30 A 'Medium' magnitude would occur if solar reflections were experienced by ATC personnel and effects occasionally and marginally affected the safeguarding operations.

16.3.31 A 'High' magnitude would occur if solar reflections were experienced by ATC personnel and the safeguarding operations were regularly and substantially affected.

Approach Paths

16.3.32 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

16.3.33 A 'Negligible' magnitude would occur if solar reflections are not geometrically possible.

16.3.34 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.

16.3.35 A 'Medium' magnitude would occur if the glare has 'potential for temporary after-image' without sufficient mitigating main factors.

16.3.36 A 'High' magnitude would occur if solar reflections if the glare has 'potential for permanent eye damage'.

Significance

16.3.37 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

16.3.38 Overall, the level of effect would be considered 'Significant' if the resultant significance of effect was 'moderate' or higher.

Methodology

Ground-Based Receptors

16.3.39 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 1km distance is considered appropriate for road users and dwellings for reflections towards ground-based receptors. Receptors within this zone are identified based on mapping and aerial photography of the region.

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 for aviation receptors is therefore 15km.

Railway Operations and Infrastructure

16.3.42 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).

Mitigation and Enhancement

16.3.43 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.

16.3.44 Any moderate impact upon aviation operations will have to be mitigated. 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 Effects

16.3.45 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.

Predicted Cumulative Effects during Construction

16.3.46 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.

16.3.47 Therefore, the effects during construction will be less than or equal to effects during operation and therefore cumulative effects are not considered during construction.

Predicted Cumulative Effects during Operation

16.3.48 Cumulative effects are 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 Cottam Solar Project and Gate Burton Energy Park.

In-combination Effects

16.3.49 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.

17.1.4 There is some potential that a 400kV overhead cable may be used to connect the 400kV underground cable to the West Burton Power Station. However, if required this line will not be extensive and will be installed in an environment that already contains many existing 400kV overhead lines and therefore it has not been assessed.

Appendices

17.1.5 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 West Burton A 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 on 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:
  - All substations will be more than 250 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 will be more than 250 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 Scheme 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 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 Cottam Solar Project and Gate Burton Energy Park.

In-combination Effects

17.3.20 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.

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. The northwest corner of WB3 has a less rural context with residential areas in the village of Marton adjacent to the Site which contains lit streets.

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 visual impacts 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[19]:

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.

[19] 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 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 This chapter considers the likely significant effects of the Scheme on the environment with respect to air quality pollutants during its construction, operation and decommissioning phases. The chapter will describe and identify the relative level of effects arising as a result of the proposed development, 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 ecological sensitive receptors.

20.2 Baseline

The Site and Context

20.2.1 The Sites and 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, 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.

20.3.2 The following air quality legislation, guidance and policy context 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;
- 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 Proposed Development 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 Cottam 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

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 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 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.

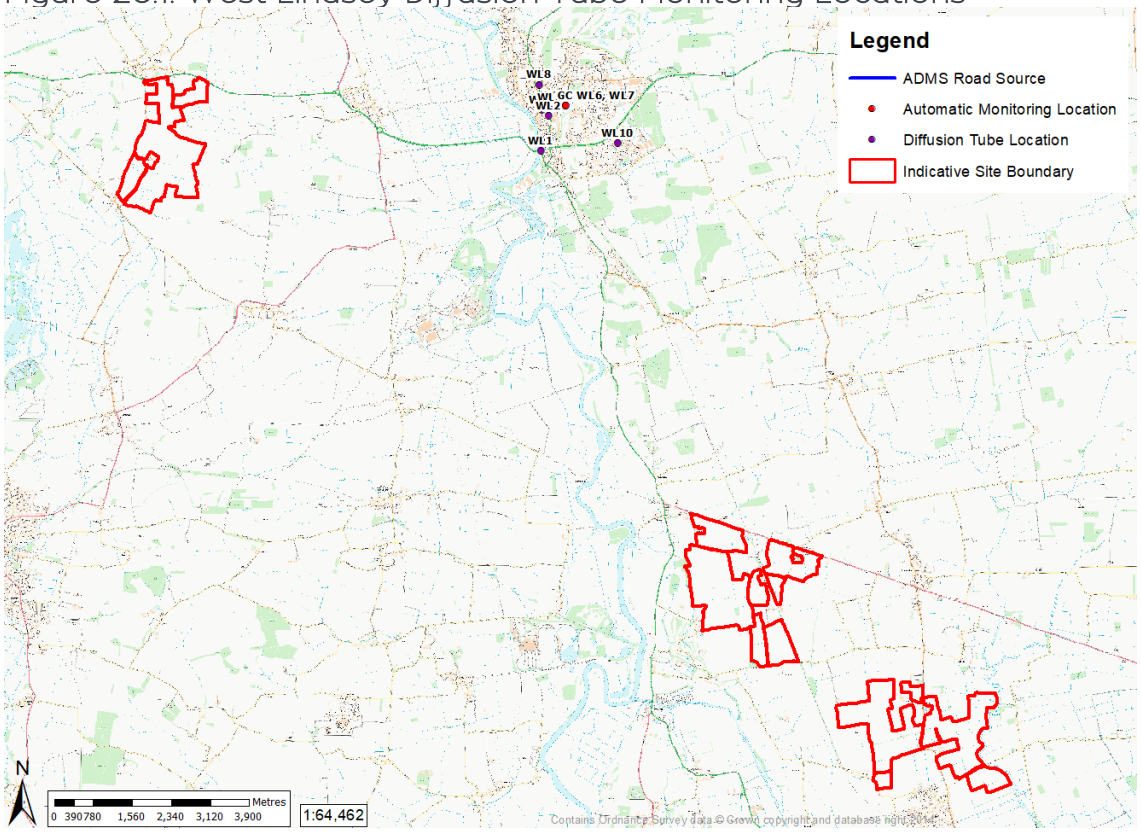
20.3.12 Chapter 14: Transport and Access states that the increase in vehicle movements during operation will be neutral or negligible as there will be a handful of vehicle trips to each area of the site per month to provide maintenance. As such, there is expected to be a 'negligible' impact from operational traffic as a result of the Scheme and therefore, operational traffic impacts are proposed to 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. West Burton 4 and West Burton Substation are located within Bassetlaw District Council (BDC), who have not declared any AQMAs.

20.3.14 Appropriate assessments will be developed for the study area, and it 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):

- 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 because of operational traffic from the proposed development.

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 Scheme means that its effects have the potential to impact a significant geographic area and the associated population. The Sites are situated across a district boundary, with WB1, WB2, and WB3 in West Lindsey District, whilst WB4, WB Sub, the majority of the cable routes, 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, 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[20], 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[21], 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 hosts a number of Public Rights of Way, and is located nearby to a small number of long-distance 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 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

[20] Bassetlaw Local Plan Publication Version, p.73
[21] 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 agricultural and farming practices and activity 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 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 and 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 business 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.

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. The Sites identified for generation are all classified as Grade 3 in accordance with the Natural England Agricultural Land Classification maps. The preliminary ALC assessment that have been carried out have added further clarity to this as noted below at paragraph 22.2.5. The cable routes are Grade 3, with the exception of a very short section of Grade 4 where the corridor crosses the River Trent.

22.2.2 According to Natural England's Agricultural Land Classification Mapping (included at Appendix 22.1 of this Report), there is higher quality grade land within the surrounding area (defined as 20km from the connection point at West Burton National Grid substation) of Grades 1 and 2. The majority of land, including the identified Sites and the proposed cable routes, is classified as Grade 3.

22.2.3 The Sites, including the cable route search area is predominantly comprised of agricultural land. The ES will include a breakdown of the agricultural land across the site.

Initial Surveys

22.2.4 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, outlined

below under Site Selection, included a review of any land of lower grade than the Sites.

22.2.5 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 (82.5%) of the land proposed for development within Sites WB1, WB2, WB3 and WB4 comprises Grade 3b agricultural land. 17.1% constitutes Best and Most Versatile (BMV) agricultural land, with 12.3% of that 3a.

22.2.6 The Applicant is not proposing to subject the cable corridor search areas to invasive survey given that the areas to be used for development will not be removed from agricultural production.

Potential and Likely Environmental Effects

22.2.7 There is potential for the temporary use of the land for the Scheme to impact the farming businesses currently operating on the Sites, as well as associated socio-economic impacts such as loss of employment and loss of food 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 associated with the land parcels. 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. 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: 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 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 Site.

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 site.

Initial Surveys

24.2.3 Initial discussions have been undertaken with utilities, telecommunications and television providers, to identify potential assets across the site. 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 WB1, WB2, WB3 and WB4. Openreach will 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. 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 WB2 Ongoing communication.

Utilities	Petroleum - Exolum	Pipeline running through WB3. Easement within the 6m maintenance strip currently being discussed with operator's consultants.
Utilities	Gas – Uniper UK Ltd	Gas pipeline running through WB3. Easement within the 26m maintenance strip currently being discussed with operator's consultants. Gas pipeline identified within cable route search area.
Utilities	Water – Severn Trent Water	No assets identified within site or cable areas.
Utilities	Sewage – Severn Trent Water	Assets identified to the west of WB3 sub-site.
Utilities	Water – Anglian Water	Assets at the edges in surrounding roads and verges of WB1, WB2, WB3 and WB4. 3.5 metre maximum offset requested.
Utilities	Electricity – Northern Powergrid	11kV underground and overhead cables on WB3. 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 at WB3. 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 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 within 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 give to cable routes	Further assessment of land parcels
Minerals		Topic to be scoped out

Environmental Topic	Proposed elements to be scoped in	Proposed elements to be scoped out
Archaeology	Direct impacts upon non-designated heritage assets of the 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	Direct impacts upon designated heritage assets within the West Burton 1, 2, 3 and 4 Sites Indirect impacts upon designated heritage assets within the West Burton 1, 2, 3 and 4 Sites Operational 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	Potential AQ impacts associated with a fire incident	Traffic emissions during construction and operation Impacts during construction – dust
Socio-Economics, Tourism and Recreation, and Human Health	Impacts during construction and operational phases	

Environmental Topic	Proposed elements to be scoped in	Proposed elements to be scoped out
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 how the proposals will impact upon these utilities, and where appropriate avoidance or mitigation measures have been incorporated into the development.