Little Eau Solar Farm

Environmental Report

January 2015



Submitted on behalf of Little Eau Solar Limited

Prepared By: BE Renewables Limited

Hesketh Mount. 92-96 Lord Street. Southport PR8 1JR

PLANNING APPLICATION

SUBMITTED ON BEHALF OF LITTLE EAU SOLAR LIMITED

SOLAR FARM DEVELOPMENT:

AREA LOCATED IN THE PARISH OF SUTTON ST JAMES IN LINCOLNSHIRE, APPROXIMATELY 3.5km SOUTH WEST OF THE VILLAGE OF SUTTON ST JAMES

ENVIRONMENTAL REPORT IN SUPPORT OF PLANNING APPLICATION TO SOUTH HOLLAND DISTRICT COUNCIL

JANUARY 2015

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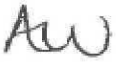
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GLOSSARY OF ABBREVIATIONS

AGL	Above Ground Level
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BERL	BE Renewables Limited
DCLG	Department for Communities and Local Government
DNO	Distribution Network Operator
EIA	Environmental Impact Assessment
EPS	European Protected Species (EU Habitats Directive)
ER	Environmental Report
EU	European Union
FRA	Flood Risk Assessment
GLNP	Greater Lincolnshire Nature Partnership
Ha	Hectare
HGV	Heavy Goods Vehicle
HV	High Voltage
IDB	Internal Drainage Boards
IPCC	Intergovernmental Panel on Climate Change
LPA	Local Planning Authority
LB	Listed Buildings
LBAP	Local Biodiversity Action Plan
LCC HER	Lincolnshire County Council Historic Environment Records
LDF	Local Development Frameworks
LDP	Local Development Plan
LTP	Local Transport Policy
LV	Low Voltage
M	Metres
MAGIC	Multi-Agency Geographical Information for the Countryside
MW	Megawatt
MWh	Megawatt hour
MWp	Megawatt 'peak'
NBN	National Biodiversity Network
NE	Natural England
NERC	Natural Environment and Rural Communities
NGR	National Grid Reference
NPPF	National Planning Policy Framework
ODPM	Office of the Deputy Prime Minister
PPG	Planning Policy Guidance
PTZ	Pan Tilt Zoom
PV	Photovoltaic
RSS	Regional Spatial Strategies
SAC	Special Area for Conservation
SAM	Scheduled Ancient Monument
SFRA	Strategic Flood Risk Assessment
SHDC	South Holland District Council
SUDS	Sustainable Urban Drainage Systems
UK	United Kingdom
UK BAP	United Kingdom Biodiversity Action Plan
UNFCCC	United Nations Framework Convention on Climate Change
WCA	Wildlife and Countryside Act 1981 Schedule 5 Species
WP	Watts of Power
WPD	Western Power Distribution

APPENDICES

Please read this report alongside the following appendices (submitted as part of the full planning application);

Appendix 1 – Site Location Plan
Appendix 2 – Site Layout Plan
Appendix 3 – Typical String Inverter
Appendix 4 – Typical Substation
Appendix 5 – Camera Mounting System
Appendix 6 – Wooden Post, Stock Proof Fence
Appendix 7 – Typical Access Gate
Appendix 8 – Typical Cable Trench Details
Appendix 9 – PV Framework Elevations
Appendix 10 – Typical Front and Piled Front Elevations
Appendix 11 – Access Track Elevations
Appendix 12 – Traffic Management Schematic
Appendix 13 – Biodiversity and Habitat Management Plan
Appendix 14 - Screening Response Letter
Appendix 15a – Public Consultation Display Boards
Appendix 15b – Public Consultation Viewpoints
Appendix 15c – Public Consultation Responses
Appendix 17a – Agricultural Land Classification Impact Assessment and Sequential Test
Appendix 17b - Development Zone Constraints Map
Appendix 17c – Agricultural Land Classification (Post Construction)
Appendix 17d - Agricultural Land Classification Report
Appendix 17e - National Soil Resources Institute Soils Report – Little Eau
Appendix 18a - Natural England's (NE) Joint Character Area (JCA) 46 - The Fens
Appendix 18b - SHDC Landscape Capacity Study - 'Peaty Fens Landscape Character Type'
Appendix 18c – Landscape Plan
Appendix 18d – Visual Amenity Plan
Appendix 18e – Mitigation Proposals
Appendix 19a – Habitat Map of Site
Appendix 19b – Site Photographs
Appendix 20a - Little Eau_Qbar_Imp_100CC_Runoff
Appendix 20b - Little Eau_Qbar_Imp_100CC_Storage
Appendix 20c - Little Eau_Qbar_Imp_FEH_PPT
Appendix 20d - Little Eau_Qbar_Imp_Rates
Appendix 20e - Little Eau_Qbar_Imp_Summary
Appendix 20f - Environmental Agency Flood Risk Assessment Enquiry
Appendix 21 – Cassini Map 1805 – 1874
Appendix 22a – Overview of Sectional Views
Appendix 22b – Sectional Views
Appendix 22c – Sectional Views
Appendix 22d – Sectional Views
Appendix 22e – Sectional Views
Appendix 22f – Sectional Views
Appendix 23a - Event Report
Appendix 23b - Monument Report
Appendix 23c - HER Map

Please note: There is no Appendix 16.

CONTENTS

A) INTRODUCTION 12

A.1 Background: **12**

A.2 Site Description: **12**

B) SITE LEVELLING WORKS 12

C) DEVELOPMENT IN RELATION TO CURRENT LAND USE 13

C.1 The Sequential Test: Development Site Identification: **13**

C.2 Site Screening – Commencing the Sequential Test: **13**

D) ASSESSMENT OF THE IMPACT UPON AGRICULTURAL LAND 14

E) GROUND MAINTENANCE 15

F) CONSTRUCTION COMPOUND 16

G) SOIL STRIPPING, STORAGE AND REPLACEMENT 16

H) ACCESS TRACKS 17

I) SECURITY FENCING / LIGHTING 17

J) SOLAR FARM COMPONENTS 18

J.1 Solar Panels / Modules: **18**

J.2 Solar Panel Frames: **19**

J.3 Inverters: **20**

J.4 Marshalling Cabinets / Combiner Box: **21**

J.5 Transformers: **21**

J.6 Substation: **22**

K) LANDSCAPE / VISUAL IMPACT 23

K.1 Introduction: **23**

K.2 Methodology: **23**

K.2.1 LANDSCAPE ASPECTS 23

K.2.2 VISUAL ASPECTS 25

K.3 Description of Baseline Conditions: **27**

K.3.1 THE EXISTING LANDSCAPE - SUMMARY 27

K.3.2 LANDSCAPE CHARACTER – LOCAL LEVEL 27

K.3.3 LANDSCAPE QUALITY 28

K.4 Development Proposals: **29**

K.4.1 SITE LAYOUT 29

K.4.2 AUXILIARY WORKS 29
K.4.3 ACCESS AND INFRASTRUCTURE 30
K.4.4 CONSTRUCTION AND DECOMMISSIONING 30
K.5 Assessment of Landscape and Visual Amenity Impacts: 30
K.5.1 CONSTRUCTIONAL PERIOD IMPACTS 30
K.5.2 OPERATIONAL PERIOD IMPACTS 30
K.6 Assessment of Landscape Impacts: 31
K.7 Assessment of Visual Amenity Impact: 32
K.7.1 VISUAL EXTENT 32
K.7.2 STUDY AREA 32
K.7.3 VISUAL AMENITY RECEPTORS 33
K.7.4 EFFECT OF DEVELOPMENT ON VISUAL RECEPTORS - BEFORE MITIGATION 40
K.7.5 LANDSCAPE AND VISUAL IMPACT - BEFORE MITIGATION 41
K.7.6 VISUAL AMENITY IMPACTS - BEFORE MITIGATION 41
K.7.7 CURRENT GUIDANCE 41
K.7.8 PROPOSED MITIGATION 42
K.7.9 RESIDUAL IMPACT 43
K.8 Conclusion 44
L) ECOLOGY 46
L.1 Introduction: 46
L.1.1 PROPOSED WORKS 46
L.1.2 LIMITATIONS AND CONSTRAINTS 46
L.2 Methodology: 47
L.2.1 DESK STUDY METHODOLOGY 47
L.2.2 FIELD SURVEY METHODOLOGY 47
L.2.3 PROTECTED SPECIES ASSESSMENT METHODOLOGY 47
L.3 Results: 48
L.3.1 DESK STUDY RESULTS 48
L.3.2 FIELD SURVEY RESULTS 48

L.3.3 PROTECTED SPECIES ASSESSMENT METHODOLOGY 49
L.3.4 DISCUSSION 50
L.3.5 OVERVIEW 51
L.3.6 RECOMMENDATIONS 51
L.4 Relevant Legislation: 52
L.4.1 EUROPEAN PROTECTED SITES 52
L.4.2 INJURIOUS WEEDS 53
L.4.3 UK BIODIVERSITY ACTION PLAN 53
L.4.4 PROTECTED SPECIES 53
L.4.5 ASSESSMENT OF DESIGNATED SITES 54
L.4.6 ASSESSMENT OF IMPACT UPON ONSITE HABITATS 54
L.5 Summary: 55
M) HISTORIC ENVIRONMENT 58
M.1 Assessment Approach: 58
M.2 Methodology: 58
M.3 Policy: 59
M.3.1 NATIONAL PLANNING POLICY FRAMEWORK 59
M.3.2 LOCAL POLICY 60
M.3.3 POLICY SUMMARY 61
M.4 the Setting of Heritage Assets: 61
M.5 Settings Assessment Methodology: 62
M.6 Consultation for HER from Lincolnshire County Council: 63
M.7 The Value of Heritage Assets: 64
M.8 The Magnitude of Development Change upon Heritage Assets: 66
M.9 The Significance of the Effect of Development: 67
M.10 Baseline Conditions: 68
M.10.1 SITE DESCRIPTION AND CONTEXT 68
M.10.2 GEOLOGY AND TOPOGRAPHY 69
M.10.3 DESIGNATED HERITAGE ASSETS 70
M.11 Archaeological Potential of the Site: 70

M.12 The Proposed Development Site: 71
M.12.1 POTENTIAL FOR CURRENTLY UNRECORDED ARCHAEOLOGICAL REMAINS 71
M.12.2 LIKELY SIGNIFICANT EFFECTS 71
M.12.3 IDENTIFICATION OF EFFECTS 71
M.12.4 EVALUATION OF EFFECTS (INCLUDING MAGNITUDE OF CHANGE) 72
M.13 Significance of Effect: 72
M.13.1 CONSTRUCTION (PHYSICAL EFFECTS) 72
M.13.2 OPERATION (NON-PHYSICAL EFFECTS) 73
M.13.3 MITIGATION AND ENHANCEMENT 73
M.13.4 RESIDUAL SIGNIFICANCE OF EFFECT 73
M.13.5 CUMULATIVE EFFECTS 73
M.14 Summary: 73
N) DRAINAGE, SURFACE WATER RUN-OFF AND FLOODING 75
N.1 Introduction: 75
N.1.1 SCOPE 75
N.1.2 INFORMATION PROVIDED 76
N.2 Existing Site: 76
N.3 Proposed Development: 77
N.5 Flood Zone and Flood Risk Tables: 78
N.5.1 FLOOD RISK VULNERABILITY 78
N.5.2 FLOOD ZONES 79
N.5.3 FLOOD RISK VULNERABILITY AND FLOOD ZONE 'COMPATIBILITY' 80
N.8 Flood Risk Assessment: 80
N.8.1 RIVER AND SEA FLOOD RISK ASSESSMENT 82
N.8.2 OTHER SOURCES OF FLOODING 82
N.9 Surface Water: 83
N.9.1 SURFACE WATER RUNOFF RATES 83
N.9.2 CLIMATE CHANGE 83
N.9.3 POST DEVELOPMENT SCENARIO 84

N.9.5 FOUL WATER DRAINAGE 86
N.9.6 SUDS MANUAL, CIRCA C697 (2007) 86
N.10 Affects Outside of the Proposed Development: 86
N.11 Conclusions and Recommendations: 86
O) GLINT AND GLARE 88
O.1 Guidance: 88
O.2 Sun Tracks – Elevation and Reflection: 90
O.3 Sun Tracks- Azimuth and Elevation: 90
O.4 Solar Panel Dimensions: 91
O.5 Solar Panel Orientation: 91
O.6 Impact on Air Traffic: 91
O.7 Impact on Traffic Movements: 92
O.8 Impact on Residential Housing: 92
O.9 Mitigation: 93
O.10 Summary: 93
P) NOISE 94
P.1 Introduction: 94
P.2 Planning: 94
P.3 Background: 95
P.4 Construction: 95
P.5 Operation: 95
P.6 Decommissioning: 96
P.7 Mitigation of Potential Noise: 96
Q) TRAFFIC AND CONSTRUCTION MANAGEMENT PLAN 97
Q.1 Transport Policy: 97
Q.1.1 SOUTH HOLLAND LOCAL PLAN (ADOPTED JULY 2006) –..... 98
Q.2 Assessment Approach: 98
Q.3 Existing Conditions: 99
Q.4 Prior to Works Commencing: 104
Q.5 Outline of Main Activities: 104
Q.6 Schedule of Works: 105
Q.6.1 CONSTRUCTION 105
Q.6.2 ROUTE OVERVIEW OF HGV No's AND SPEED LIMITS LOCAL TO THE SITE ENTRANCE 106

Q.6.3 OPERATION 107

Q.6.4 DECOMMISSIONING 108

Q.7 Proposed Access Route to the Site: 108

Q.8 Traffic Management - Protection Measures and Controls: 108

Q.9 Assessment of the Significance of the Potential Effects: 109

Q.10 Summary: 110

R) COMMUNITY INVOLVEMENT AND GAIN 111

R.1 Community Involvement: 111

R.2 Community Gain: 111

S) DURATION OF PLANNING PERMISSION 111

A) INTRODUCTION

A.1 Background:

BE Renewables Limited (BERL) on behalf of Little Eau Solar Limited is proposing to develop a solar photovoltaic (PV) power farm of ~5 Mega Watts peak (MWp) known as 'Little Eau Solar Farm' (referred to in the document as the 'project', 'site', 'development' or the 'proposal').

BERL is a UK based renewable energy developer specialising in the delivery of utility scale renewable energy infrastructure, primarily commercial solar farms. With secured funding for their developments through UK based specialist investment funds established for the purposes of developing, funding and operating commercial scale solar PV projects within the UK. BERL is currently developing several commercial scale solar PV farms across the UK.

This Environmental Report has been prepared to provide information on the project in support of the Planning Application, and to assess the potential significant environmental effects, including (but not limited to);

- Landscape and Visual Impact Assessment (LVIA),
- Noise,
- Glare,
- Ecological Assessment
- Traffic / Highway Issues
- Cultural Heritage
- Flood Risk

These were identified in the Screening Opinion, issued by South Holland District Council (SHDC) dated 21st February 2013 (Appendix 14).

A.2 Site Description:

The full description of development is for the: '*Installation of ground mounted photovoltaic (PV) solar arrays to provide ~5MWp generation capacity together with transformer stations; internal access track; electricity sub-station; landscaping; fencing; security measures; access gate; and ancillary infrastructure'*.

The site at Little Eau is located in the Parish of Sutton St James in Lincolnshire, approximately 3.5km South West of the Village of Sutton St James. It will cover an approximate gross area of 11.81 Hectares (Ha) of agricultural land, located at National Grid Reference (NGR) TF375159 (Appendix 1).

B) SITE LEVELLING WORKS

The existing topography and site contours will not be affected by the proposed solar farm development. No site levelling works are expected.

C) DEVELOPMENT IN RELATION TO CURRENT LAND USE

New planning guidance has highlighted the priority that development of ground mounted solar farms should focus on the use of brownfield, previously developed and non-agricultural land. It goes further to establish that where a development is proposed on any agricultural land, the land has to have been shown to be necessary and of poorer quality land in preference to higher quality land. Where agricultural land is proposed for development of a solar farm there should be provision for continued use of the land for agricultural production as well as to encourage biodiversity improvements.

C.1 The Sequential Test: Development Site Identification:

Selection of the proposed site for the Little Eau Solar Farm followed a review of the land throughout Lincolnshire using Geographical Information Systems (GIS). From this review a list of potential sites were identified.

These sites were assessed and grouped according to the administrative and/or planning authority areas. From this exercise, a number of sites were identified within the planning authority area of SHDC.

No brownfield sites were identified within the above screening that satisfactorily achieved the qualitative criteria for development of a solar farm.

C.2 Site Screening – Commencing the Sequential Test:

SELECTED SITES WERE REVIEWED AND SCREENED FOR:	**REASON:**
IRRADIANCE	Suitable location that benefits from sunlight levels.
GRID CONNECTIVITY	Suitable grid connection required.
LAND OWNER INTEREST	Interested in the proposed development.
SHAPE, ORIENTATION AND SIZE	Suitable to accommodate the proposal.
FINANCIAL VIABILITY	Scheme needs to be financially viable to work.
TRANSPORT ROUTES	Suitable location which is served by appropriate highway infrastructure.
LOCATIONS	Suitably available for the duration of the development proposal (25 years).
LOCAL DEVELOPMENT PLAN	Consideration of the planning vision for the site as presented within the extant and emerging development plan
FLOOD RISK	Suitable flood zone for the development.
SENSITIVE HUMAN RECEPTORS	Reduce impact on surrounding residents.
LANDSCAPE AND VISUAL IMPACT	Considerations given to any possible landscape and visual impact.
PREVIOUSLY DEVELOPED LAND	Suitable for the proposed development.
AGRICULTURAL LAND CLASSIFICATION (ALC)	Using Department for Environment, Food and Rural Affairs (DEFRA) and maps available online: http://www.natureonthemap.naturalengland.org.uk. We *try* to develop on land that is ALC 3b and below.
STATUTORY LAND AND ENVIRONMENTAL DESIGNATIONS	Areas of Natural Beauty (AONB), Site of Specific Scientific Interest (SSSI), etc., We *try* to avoid these areas.

NON-STATUTORY LAND AND ENVIRONMENTAL DESIGNATIONS	Local Nature Reserves (LNR) etc., We *try* to avoid these areas.
REVIEW OF HISTORIC ENVIRONMENT	Overview of archaeologically sensitive areas.
CURRENT LAND USE	Is the land suitable for the proposed development?
POTENTIAL FOR ON-SITE POWER USE OR USE FOR ADJOINING FACILITY.	Close to any needs?
TOPOGRAPHY	South-facing is desirable.
OVERSHADOWING	Is there much vegetation on or around the site?
SECURITY	Can the proposed development be safe and secured?

Following the conclusion of these assessments, greater discussions with landowners are began and with their permission we initiate an application for a grid connection to the local electricity distribution network organisation (DNO).

Based upon the receipt of the response from the DNO with regard to the grid connectivity, permission is then sought from the land owner to submit a 'Screening Opinion' to the local planning authority.

Throughout the sequential test process the assessment is performed against a 'qualitative' scoring matrix. Sites that fail against this matrix are rejected. The scoring matrix is reviewed regularly based upon;

- Feedback from ongoing development sites.
- Screening Opinions received.
- Subsequent pre-application responses and;
- Subsequent results of full planning applications.

For the Sequential Test Assessment please refer to Appendix 17a and Appendix 17b for the Development Zone Constraints Map.

D) ASSESSMENT OF THE IMPACT UPON AGRICULTURAL LAND

The National Planning Policy Framework (NPPF) paragraph 112 requires the presence of best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the ALC) to be taken into account alongside other sustainability considerations. The NPPF expresses a preference for development to be directed to land outside of this classification (3b, 4 and 5), but paragraph 28 also recognises the need to support diversification of agricultural land that helps to sustain an agricultural enterprise. This policy position should be taken into account when identifying sites for large scale solar panel development.

In compliance with Technical Information Note (TIN) 049[1] (which explains the Government Policy to protect agricultural land and the ALC system and uses), the site is currently used as rough, unimproved grassland. The application is submitted to operate a solar farm for a period of 25 years and is therefore of a temporary nature compatible with existing farming activities and in accordance

[1] http://publications.naturalengland.org.uk/publication/35012

with paragraph 28 of the NPPF, the project will support the diversification of agricultural land that helps to sustain an agricultural enterprise. *'…Farmers can get two crops off a solar farm, electricity and mutton, since many solar farms are now employing sheep to keep the flora cropped which helps nature conservation. Creating a solar farm is like making a nature reserve that gets better over the 25 year life of the farm and has added benefit from the start. Rarely does a solar farm go through planning without enhancements. The UK is committed to promote biodiversity ever since signing the Rio Convention in 1992 and the latest NPPF of 2012 is an excellent guide for promoting enhancements at local levels… Few developments are so environment friendly. Another great opportunity is for increased biodiversity on solar farms, as buffers are established around the site, and between the array rows – providing a large area and opportunity for the development of foraging plants for insects. Solar farms are putting back some of the wildflowers of the countryside to redress the balance of habitat loss that has been going on for the last few decades. There is no problem that solar farms are built next to nature reserves as they buffer them and keep them from development'*[2].

Little Eau ALC is Grade 3a – 3b.
Please refer to Appendix 17a-d for more details regarding agricultural land.

E) GROUND MAINTENANCE

We have a desire, both in terms of food production and the rural scene, to continue an agricultural use on the site. BERL believe that solar farms can make a positive impact on the flora and fauna of the local environment. We are dedicated to increasing and enhancing the biodiversity of the site by encouraging some of the native species, especially where the populations are currently in decline or distressed. The preparation and planting of native species for hedgerows which will be found along the perimeter of the solar farm creates margins of nectar and pollen rich grasses and flowers, encouraging and enhancing the presence of insects, nesting birds and small mammals. In addition specific provision will be made for the keeping of bees and providing appropriate roosting places for bats. Areas of log piles and hibernacula will be created to provide an environment for native reptiles and amphibians. Extreme care will be taken to ensure that we do not interfere with surrounding agricultural activities.

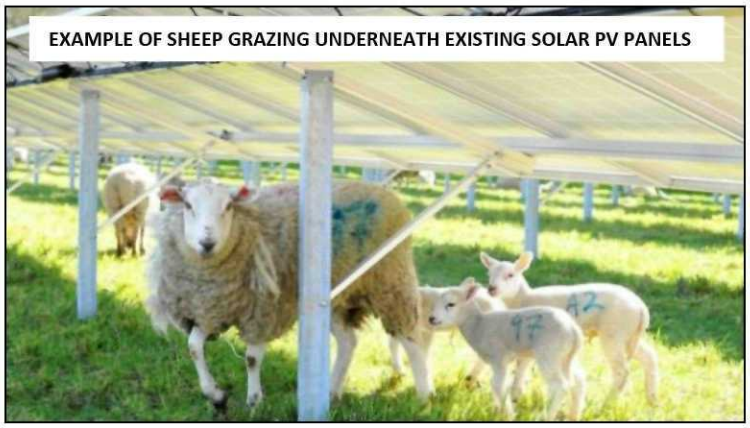
Vegetation will grow under the solar panels. It will be seeded to encourage 'species rich' grassland providing further nectar rich resources for invertebrates. This will require sowing appropriate seed mixtures to encourage these specific species and adopting a site management regime to retain flowering species.

This will require management by the applicant throughout the operational period to avoid the site becoming overgrown with noxious weeds and assist with the eventual restoration of the site, to full use agriculture. There are various techniques for managing the vegetation, these include mowing, strimming and/or mulching. Managing these opportunities and constraints are best considered using local knowledge and in conjunction with local biodiversity plans. We will also use the technical

[2] **Dr John Feltwell – Solar Farms and Biodiversity (September 2013) -**
http://www.solarpowerportal.co.uk/guest_blog/solar_farms_and_biodiversity_2356

expertise within Natural England to gain specific technical advice where this may be of benefit. Please refer to our Biodiversity Habitat Management Plan for more information (Appendix 13).

We have a number of operational sites where at various times of the year, to aid with the land management, grazing of sheep is encouraged. We propose to use areas of the inter-row grasslands for low intensity sheep grazing.



EXAMPLE OF SHEEP GRAZING UNDERNEATH EXISTING SOLAR PV PANELS

In order to facilitate grazing within the solar farm, the solar panels are positioned between 600-750mm above ground level (agl) and all cabling will be suitably protected, below ground.

F) CONSTRUCTION COMPOUND

The construction phase of the project will take approximately 4 months. It will require the delivery and storage of construction materials, plant machinery and office/welfare accommodation – therefore a temporary construction compound will be required. The compound will be carefully located in order to minimise environmental or amenity impact.

Size: ~50m x 50m (2500 sqm)

Location: Varies using the installed access track – the compound will during the course of the construction period be relocated to alternative areas adjacent to the installation works. No additional hard standing will be necessary. All construction materials will be stored in containers. These compound areas are temporary in nature and will be completely removed upon completion of the construction phase.

G) SOIL STRIPPING, STORAGE AND REPLACEMENT

For the installation of the temporary construction compound and access road to the site we propose to use proprietary road mats to minimise the excavation of topsoil.

Where as a result of installing any required permanent access tracks, cable trenches and foundations (e.g., the substation), the soils will be retained on site and distributed within the area of the site so that no soils are lost in accordance with MAFF (2000) 'Good Practice Guide For Handling Soils'[3].

H) ACCESS TRACKS

The proposed solar farm aims to;

- minimise disturbance to the agricultural land;
- be temporary, capable of removal and 'reversible'; and
- minimise the landscape/visual impact and impact on the rural scene.

During the construction works the installation and use of access tracks will be kept to an absolute minimum. The recovery of compacted soil is greatly influenced by the effects of swelling, shrinking and frost action and the effects upon the soils structure as a result of wheeled traffic is likely to persist for several years. Therefore the access tracks are provided to avoid significant impacts to the agricultural soil land structure such that the soils to do not become overly compacted from the complex interactions between soils, machinery, crops, weather conditions and field history.

The access tracks will be constructed on a permeable weed resistant membrane using permeable graded stone materials in accordance with Appendix 11.

Only agricultural vehicles, including tractors, quad bikes and forklift trucks using low ground pressure tyres or cage wheels will typically be used to service the facilities on a daily basis. These vehicles on a limited basis will be able to access areas of the works beyond the constructed access tracks. A typical access gate can be seen in Appendix 7. There will be a buffer strip of ~5m set back from the solar panels to the proposed fencing around the perimeter of the site. This will encourage and promote ecological and biodiversity opportunities.

During the operational phase the need to access the site will be of very low frequency. It is expected to be ~1 small transit van, every 6 months for maintenance and cleaning purposes. Any vehicle traffic will only use the permanent access tracks. Please refer to Section Q: Traffic and Construction Management Plan (TCMP) for more details.

I) SECURITY FENCING / LIGHTING

There is a need to ensure solar PV installations are adequately secured, however it should not result in an unacceptable landscape and visual impact.

The basic principle of all crime prevention is to provide layers of defence to whatever is in need of protection. In this case the protection will be the existing vegetation and proposed fencing alongside the utilisation of appropriate technology in the form of Closed-Circuit Television (CCTV).

[3] http://www.sustainableaggregates.com/library/docs/l0301a_sheet01.pdf

Please note: We do **not** propose to use security lighting at the Little Eau Solar Farm. This removes any glare, light pollution and impacts on biodiversity, in particular bats that can be affected by inappropriate security lighting.

We will require vehicular access to the site. The physical security guarding this access will be robust.

We are proposing to use a Wooden Post, Stock Proof Fence (Appendix 6) as security fencing around the perimeter of the site. It will be ~1.8m in height and offset ~5m from the extent of the solar PV modules (for access / shadow gap). We will utilise the existing features (and enhance where necessary), such as hedges and landscaping, to screen the security fencing.

The fence indicates the extent of the solar farm development. Please note: It does not indicate the planning application boundary. (The extent of the solar farm development and fence is offset from the planning application boundary this being left as buffer zone – either undeveloped or developed by enhancing existing flora and fauna. Please refer to Appendix 1 for the different offset distances).

Two types of CCTV security will be installed on site (Appendix 5);

- 3 pole mounted pan tilt zoom (PTZ) cameras will be installed to provide CCTV coverage of the site. The poles will be installed with a maximum height of 3m. The positioning of the cameras has been selected to minimise their visual impact (Appendix 2). Camera views will be restricted to ensure that there are no views into neighbouring properties. They will incorporate passive infra-red to avoid the need for lighting to be necessary at certain times of the day. These cameras will be located close by the perimeter fence.
- 1 number plate recognition camera will be used to cover the access and egress from the site. These are insurance requirements for the facility. The cameras will be set back from the points of entry and exit, ensuring that they will not be able to inadvertently monitor any passing local traffic. The mounting height of the security cameras will be agreed with the local planning authority in line with the above restrictions.

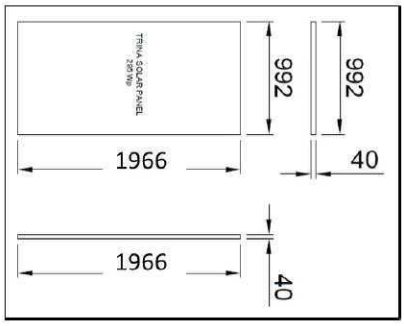
In addition, we will include for the use of non-intrusive additional security measures to secure the photovoltaic panels and string inverters. The security proposals are also referred to in the Environmental Statement (as required by Department for Communities and Local Government (DCLG) Circular 1 / 2006 paragraph 87).

J) SOLAR FARM COMPONENTS

J.1 Solar Panels / Modules:

The solar farm comprises of the installation of a number of solar panels (number varies subject to the final design, the size of the module and the capacity of the module) mounted to steel and aluminum frame structures, using typically 3-4 row landscape, at an angle of between ~25-35 degrees. The frames are arranged into rows set south facing, at ~3m apart. *Please note: this distance may vary slightly as a result of final design, size and capacity of the modules*.

The solar PV module is made up of 60, 72 or 90 - 156 x 156mm polycrystalline silicon cells (dependent upon its capacity and size). The surface of each panel is constructed from toughened glass, beneath which is a non-reflective layer, electrical connections, silicon and a backing layer, all set in an aluminium frame. The layers of silicon comprise of primarily negatively charged electrons, 'n-type', and positively charged electron silicon, 'p-type', contacting each other in the solar panel. When these are exposed to sunlight, the sun's energy 'excites' these electrons making them move from one layer to another and this movement results in the generation of electricity. The different layers of silicon are designed to absorb different wavelengths of irradiation (i.e. the sunlight). The frame consists of anodized aluminium. The solar PV module will be dark grey/blue in colour and have anti-reflective coating to minimise glare.



EXAMPLE OF TYPICAL 72 CELL SOLAR MODULE – IN LANDSCAPE ORIENTATION

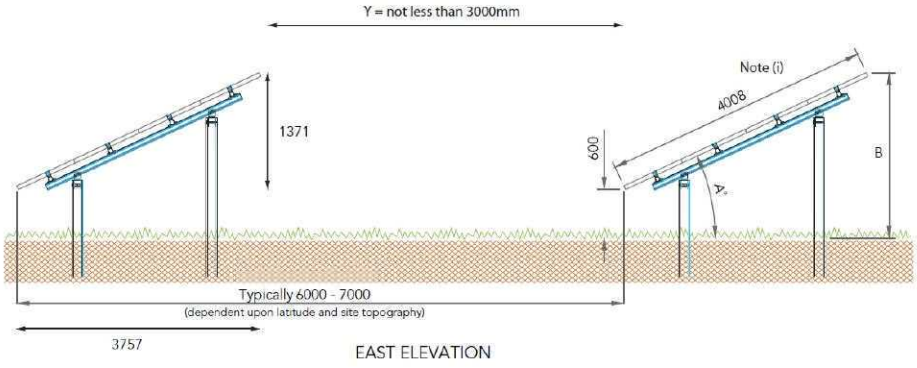
J.2 Solar Panel Frames:

An extract of Appendix 9 - Side Elevation is shown below and a Site Layout Plan can be viewed in Appendix 2 showing further details of the layout of the proposed scheme. The frame structures consist of steel uprights and aluminum cross bars. The uprights are 'augured' or 'pushed' into the ground to a depth of approximately 1.5m, dependent upon ground conditions. Typically the uprights are not driven into the ground for two reasons;

- To ensure the development is 'reversible' as this method allows the site to be easily restored to a more intensive agricultural use.
- To mitigate the production of construction noise.

(Typical Section through 3-4 Row Landscape 72 Cell Module Arrangements at 25-35°)

A (Angle)	B (Height)
25-35	< 2000-2400



EAST ELEVATION

The rows of panels are inset from the perimeter site security fence to prevent overshadowing (Appendix 2) and to permit the construction of the perimeter access track (Appendix 11). There is a separation gap between each row, to ensure that the panels are not overshadowed and that access can be gained between each row.

In the unlikely event that site conditions or studies dictate that penetrating into the subsoil's would not be an inappropriate support system then concrete 'shoes' would be employed as an anchoring system for the solar frames. These shoes would be placed on top of the existing ground level and thereby avoid any damage to any unrecorded artefacts or below ground interest that may be present. This may be required if the location of one of the support posts interferes with any of the existing below ground drainage or cabling within the fields.

The solar panels are fixed and do not track the path of the sun.

J.3 Inverters:

The solar module arrays are connected to an internal electrical collection system, which is suspended from the support tables;



EXAMPLE: SOLAR MODULE ARRAYS CONNECTED TO AN INTERNAL ELECTRICAL COLLECTION SYSTEM

These cables are then connected to each solar arrays string inverter which are mounted to the rear, behind the rows of solar modules;



EXAMPLE: STRING INVERTERS WITHOUT COVER

A string inverter will connect to each row of PV panels to convert the direct current (DC) output to alternating current (AC). The inverters are manufactured with cabinets with an appropriate IP rating to resist the environmental conditions in which they are housed.

The inverters dimensions are approximately 1061mm x 702mm x 292mm. They are solid state and do not emit any noise.

J.4 Marshalling Cabinets / Combiner Box:

Each string inverter will be connected to a marshalling cabinet by the installation of below ground cables in accordance with the trenching details as shown in Appendix 8. The marshalling cabinets terminate the connection of multiple string inverters. This marshalling cabinet enables the combined output of numerous sting inverters to be connected to the adjacent transformer(s) which are then be connected to the substation by installation of further below ground cables.



EXAMPLE: MARSHALLING CABINET / COMBINER BOX ON SITE

J.5 Transformers:

The proposed transformers are mounted adjoining the identified substation compound. The final design of the size and number of transformers has not been completed but typically we would expect there to be no more than 3 transformers, each of ~2MVA. Typical size being 2000mm x 1350mm x 1950mm (high). The transformer will be mounted on a small concrete pad within a permeable compound.



EXAMPLE: TRANSFORMER ON SITE

J.6 Substation:

This is primarily a requirement of the DNO to enable the generation from the solar farm to be exported and connected to the regional electricity network system, as operated under their license.

A new single sub-station will be built as part of the development to facilitate connection of the solar power farm to the national grid network via the existing transmission facilities. The substation will be to standard specification of the DNO to meet their requirements. It will house the Western Power Distribution (WPD) High Voltage (HV) Grid Protection Switches and the applicant's metering and consumer side HV switch. The building will also accommodate a small store room.

It is proposed that the substation will be located north west of the pond near the boundary of the proposed development as shown on the enclosed site layout plan (Appendix 2). The proposed substation is approximately 5200mm x 8300mm 3900mm (high). Building materials for the substation containment are to be agreed with the local planning authority during the planning process. Details of the substation are as shown in Appendix 4.

K) LANDSCAPE / VISUAL IMPACT

Please read this chapter alongside Appendix 18a-e and Appendix 22a-f.

K.1 Introduction:

The site is not located within or in close proximity to an Area of Outstanding Natural Beauty (AONB) or National Park.

With reference to the South Holland Local Plan 2006[4] the main policies with relevance to this development include:

- **Policy SG18: Landscaping of New Development** - should where appropriate incorporate landscaping proposals as an integral part of their design and layout.

The landscape assessment and proposed mitigation have been undertaken with local planning policy in mind.

K.2 Methodology:

Whether within villages, towns or in the countryside, landscape encompasses the whole of the external environment. It includes the visual perception of a combination of landform, vegetation cover and buildings, as well as the history, land use, human culture, wildlife and seasonal changes of an area. The landscape can be seen as a resource in its own right (providing food, cultural heritage, clean air, etc.,) and as a visual amenity (views, walks or recreational pursuits). As a result, the assessment considers both 'Landscape' and 'Visual' aspects in turn.

K.2.1 LANDSCAPE ASPECTS

LANDSCAPE AS A RESOURCE - In order to understand how a development will affect the landscape, it is necessary to identify the landscape's character. This is what makes an area unique. It is defined as '*a distinct, recognisable and consistent pattern of elements, be it natural (soil, landform) and/or human (for example settlement and development) in the landscape that makes one landscape different from another, rather than better or worse'*[5].

The pattern reflects a particular combination of geology, landform, soils, vegetation, land use and human settlement and creates a particular sense of place. Landscape Character is identified though the process of characterisation which classifies maps and describes areas of similar character at different scales. The whole of England has been characterised at the national level, but characterisation at the county, district and local level are still in the process of being completed in many counties.

[4] South Holland District Council Local Plan (2006)
[5] http://www.naturalengland.org.uk/ourwork/landscape/englands/character

IMPACT ASSESSMENT - Assessing the impact on the landscape resource is achieved by assessing the changes in the landscape by the removal or addition of features, as a result of a new development. These can be;

- Positive (beneficial – e.g. creating a woodland)
- Negative (adverse – e.g. putting up pylons),
- Direct,
- Indirect,
- Secondary cumulative,
- Either permanent or temporary (short, medium or long term).

The quality of the existing landscape is important in understanding the significance of the changes as a result of the new development. The features are then rated in terms of their significance, and their sensitivity to change within a landscape (for example - open skies would be considered significant and a key characteristic of open moorland, but hedgerows would not be). The effects arising from a proposed development are then considered in terms of potential magnitude of impact and an overall conclusion generated.

LANDSCAPE QUALITY - Landscape quality is based on judgements about the physical state of the landscape and about how much it is intact, from visual, functional and ecological perspectives. It also reflects the state of repair of individual features, which make up the character in any given area.

Exceptional / Very good	Areas that exhibit a strong positive character with value features that combine to give the experience of unity, richness and harmony. These are landscapes that may be considered to be of particular importance to conserve and which many be sensitive or very sensitive to change.
Good / Medium	Areas that exhibit positive character, but which may have evidence of degradation/erosion of some features. Change may be unlikely to be detrimental.
Poor / Very Poor	Areas generally negative in character with few, if any, valued features. Scope for positive enhancement.

LANDSCAPE SENSITIVITY - The degree to which a particular landscape type can accommodate change arising from a particular development without detrimental effects on its character is an important factor in determining impact. This involves the evaluation of each key feature or characteristic that is likely to be affected;

- Quality,
- Value,
- Contribution to character *and the degree to which it can be*;
- Replaced or substituted (i.e. species rich grassland cannot easily be replaced as it takes years of careful management to create the diverse habitat. It is also of significant value in terms of biodiversity and as an historical feature. In contrast a dry-stone wall or fence can be easily replaced).

DETERMINATION OF MAGNITUDE - The magnitude of a landscape effect is about understanding the scale, extent and duration of change a new development will have on the inherent character of the landscape;

High	Total loss or major alteration to key elements / features / characteristic of the inherent landscape character.
Medium	Partial loss or alteration to one of more key elements / features / characteristics of the inherent landscape character.
Low	Minor loss of or alteration to one or more key elements / features / characteristics of the inherent landscape character.
Negligible	Very minor loss or alteration to one or more key elements / features/ characteristics of the inherent landscape character.

K.2.2 VISUAL ASPECTS

VISUAL EFFECTS - Visual effect is concerned with two parts;

- the changes that a new development may bring to the available views of a particular landscape and;
- the changes in the visual amenity from key visual receptors (i.e. the value of a particular view in terms of what is seen and by whom this change affects – local residents or visitors).

IMPACT ASSESSMENT - Assessing the overall impact on visual amenity is achieved by relating the sensitivity of the visual receptors or features, to the potential magnitude of change to a particular view.

Residents may be particularly sensitive to changes in their visual amenity, however most land use planning regimes consider that public views are of greater value than views from private properties. However, the cumulative effects on a number of residents may be considered to give rise to an effect on the community.

People travelling through or past the affected landscapes in cars, on trains or other transport routes may also be important, depending on extent or scale of view and duration.

The criteria in understanding the sensitivity of a visual receptor is given below;

High Sensitivity	Users of outdoor recreational facilities including public rights of way whose attention of interest is focused on the landscape / communities where the development results in changes in the landscape settling or valued views enjoyed by the community / occupiers of residential properties with views affect by the development
Medium Sensitivity	A mix of high sensitivity and low sensitivity uses.
Low Sensitivity	Likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

MAGNITUDE OF VISUAL EFFECT - The magnitude of a visual effect is about understanding the scale, extent and duration of visual change a new development will have on a view;

None	No part of the development, or work or activity associated with it is discernible.
Negligible	Only a very small part of the proposal is discernible and /or they are at such a distance that they are scarcely appreciated. Consequently they have very little effect on the scene.
Slight	The proposals constitute only a minor component of the wider view, which might be missed by the casual observer or receptor. Awareness of the proposal would have a marked effect on the overall quality of the scene.
Moderate	The proposals may form a visible and recognisable new element within the overall scene and may be readily noticed by the observer or receptor.
Substantial	The proposals form a significant and immediately apparent part of the scene that affects and changes its overall character
Severe	The proposals become the dominant feature of the scene to which other elements become subordinate and they significantly affect and change its character.

SIGNIFICANCE OF VISUAL EFFECT - Significance of visual effect can be assessed by relating the magnitude of effect to the sensitivity of the viewpoint and an overall assessment generated;

Substantial adverse/ beneficial impact	Where the scheme would cause a significant deterioration / improvement in the existing view.
Moderate adverse/ beneficial impact	Where the scheme would cause a noticeable deterioration / improvement in the existing view
Slight adverse / beneficial impact	Where the scheme would cause a barely perceptible deterioration / noticeable improvement in the existing view.
No Change	No discernible deterioration or improvement in the existing view.

MITIGATION - Mitigation is to avoid, reduce and where possible remedy or offset, any significant effects on the environment arising from the proposed development. There are several measures that can be taken:

- Avoidance - Achieved through careful siting, planning and design.
- Reduction - Where negative effects cannot be avoided, the reduction of any remaining conflict with the landscape and other environmental constraints requires detailed consideration of site characteristics.
- Remediation - Mitigation measures that rely solely on 'add-on' or cosmetic landscape measures such as screen planting to remedy the negative effects of an otherwise fixed scheme design.
- Compensation - Where a negative effect cannot be mitigated to an acceptable degree, other compensatory measures or related environmental improvements may offset or compensate for unavoidable residual effects.
- Enhancement - Measures may be able to enhance the quality of the environment for local people and visitors.

K.3 Description of Baseline Conditions:

K.3.1 THE EXISTING LANDSCAPE - SUMMARY

Little Eau Farm is located south west of Sutton St James, near Spalding, Lincolnshire. It lies within Natural England's (NE) Joint Character Area (JCA) 46 - The Fens (Appendix 18a).

Key characteristics of this area, (as applicable to the landscape context of the site) are:

- Large-scale, flat, open landscape with extensive vistas to level horizons and huge skies.
- A hierarchy of rivers, drains and ditches provide a strong influence throughout the area.
- Woodland cover sparse. Occasional avenues to roads, elsewhere isolated field trees have marked significance. Shelter belts including poplar, willow and leylandii hedges around farmsteads.

The South Holland District Landscape Capacity Study[6] identified the site as located within the 'Peaty Fens Landscape Character Type' (Appendix 18b).

Key Characteristics of this area are:

- Flat topography dissected by long straight roads, rivers, ditches and drains, often on raised banks (1-3m high). A strong linear pattern.
- Geometric / linear fields, linear settlement and isolated farmsteads with associated shelterbelts.
- Simple, open, not as intensive as 'Settled Fens'.

K.3.2 LANDSCAPE CHARACTER – LOCAL LEVEL

The field survey assessed in more detail the proposed site and its immediate surroundings in relation to the existing district and country-wide landscape character assessments. The survey was undertaken in winter, on a wet and windy day with moderate to poor visibility.

The landscape character of the proposed solar park at Little Eau Farm and immediate surroundings exhibited similar features to those described in the Peaty Fens Landscape Character Type[7] (Appendix 18c).

Although of similar character to the 'Settled Fens' and Cambridgeshire Fenlands close by, this landscape is notably lower-lying, and more exposed than other landscape types. There are no settlements within close proximity of the proposed solar park. (Sutton St Edmund and Sutton St James are located just beyond the 3.5km radius). The area is dotted with isolated farmsteads, which form virtual islands of vegetation (conifer and broadleaved shelterbelts around farmsteads) amongst a sea of farmland. Unoccupied farm buildings and sheds are mainly not surrounded by trees; they blend into the background and re-confirm the inhospitable and remoteness of the area. The peaty soils form a rich, dark brown colour which is distinctive and noticeable in this simple landscape, as are the isolated trees

[6] Strategic Landscape Capacity Study (John Campion Associates)
[7] Cambridgeshire Landscape Guidelines 1991 – Fenlands Area 8

(mainly Ash and scattered scrub along roads) which provide notable point/ reference features and local interest.

FIGURE ONE: THE TYPICAL LANDSCAPE CHARACTER OF THE AREA AROUND THE SOLAR PARK AND OF THE 'PEATY FENS LANDSCAPE CHARACTER TYPE'



The significant landscape elements (key characteristics) of this landscape type as assessed from the desk top study and during the site survey are listed below:

PRIMARY -

- Flat topography, dominated by the horizon with virtually uninterrupted skyline.
- Strong linear pattern of roads, ditches and drains.
- Sunken landscape of arable fields, with some localised pasture associated with linear fields and farmsteads.
- Mixed shelter belts around residential farmsteads, creating islands of vegetation amongst a sea of farmland.

SECONDARY -

- Unoccupied buildings left bare.
- Ditches define field boundaries, hedgerows associated with residential farms along roads.
- Scattered farmsteads.
- Scattered Ash trees and Hawthorn scrub along roads and in the corner of fields.

K.3.3 LANDSCAPE QUALITY

The landscape surrounding the solar park development site has for a significant time been wholly agricultural in character, due to the fertile, high productivity and value to farming. Originally the area would have been marshland, however little of this character remains to be seen. Arable farming now dominates leaving little semi-natural vegetation present.

South Holland District, around Sutton St James, is a remote region and does not attract outside people to come visit. As a result, other land uses are absent. This was confirmed during the site survey.

A line of tall Poplars in association with Hall Gate and Coronation Farm have introduced uncharacteristic, visually prominent vertical elements into a landscape that is strongly horizontal in character. Electricity pylons are also present, but these are located further south, away from the solar park area.

The traditional farms appear as large, prominent units most likely due to building modifications and modernisation. Broadleaved trees would be traditional as at Guanock House, but now these have been supplemented with alien conifer trees and tall linear shelterbelts.

Scattered scrub along roads may suggest remnant hedgerow lines, however, their solitary form is visually noticeable within the flat landscape and have become obsolete in this intensively managed arable landscape.

Scattered semi-mature trees, mainly Ash (likely to be self-seeded), are noticeable point features and reflect the less tendered nature of the land.

As a result, the quality of the landscape around the solar park site is considered **Good / Medium**. (For explanation, please refer to K.2 Methodology).

K.4 Development Proposals:

The full description of development is for the: '*Installation of ground mounted photovoltaic (PV) solar arrays to provide ~5MWp generation capacity together with transformer stations; internal access track; electricity sub-station; landscaping; fencing; security measures; access gate; and ancillary infrastructure'*.

K.4.1 SITE LAYOUT

The site at Little Eau is located in the Parish of Sutton St James in Lincolnshire, approximately 3.5km South West of the Village of Sutton St James. It will cover an approximate gross area of 11.81 Hectares (Ha) of agricultural land, located at National Grid Reference (NGR) TF375159 (Appendix 1).

K.4.2 AUXILIARY WORKS

The proposal includes;

	PLEASE REFER TO SECTION … FOR MORE DETAILS
Solar Panels / Modules	J.1
Solar Panel Frames	J.2
String Inverters	J.3
Marshalling Cabinets	J.4

Transformers	J.5
Substation	J.6

K.4.3 ACCESS AND INFRASTRUCTURE

No additional road improvements or car-parking space is required. Vehicle activity to the site is only required at intervals; for ground maintenance, in this case sheep grazing is proposed, cleaning of the solar panels or if a fault or intruder has been highlighted.

K.4.4 CONSTRUCTION AND DECOMMISSIONING

The constructional period is likely to take 2-3 months to complete and will require an estimated 32 HGV movements of varying laden weights to and from the site.

The solar park is planned to be in operation for 25 years, after which, the solar panels can be dismantled, poles removed and the land put back to arable farming. Underground cables can be disconnected and remain in situ.

Landscaping proposals have been addressed in the conclusion to mitigate any residual landscape and visual amenity impacts.

K.5 Assessment of Landscape and Visual Amenity Impacts:

K.5.1 CONSTRUCTIONAL PERIOD IMPACTS

Arable farming uses large modern combine harvesters and tractors, which can generate significant noise and vibrations. As the solar park site is located in a predominantly arable landscape and the construction period impacts are temporary and short lived, it has been considered that no particular impacts or mitigation measures are required for this aspect of the works.

K.5.2 OPERATIONAL PERIOD IMPACTS

ADVERSE - The solar park will introduce a new land-use to an agricultural landscape. This is not a permanent change, as in 25 years the field can be returned to arable or pasture. During the operational stage, sheep grazing is proposed below the solar modules.

The proposed solar park development will consist of multiple rows of solar panels with associated metal infrastructure. This will introduce an industrial type land-use into an otherwise predominantly agricultural landscape.

Although the development is low-lying and large in scale in terms of overall size of the development site, the many rows of solar modules, fencing and road signs are likely to introduce clutter into an otherwise simple, uniform landscape.

The solar park will introduce a large built form comprising of a high number of metal units and two housing units within a sparsely settled landscape. Although farm units are typically large in size, they are not as extensive and tend to be located next to the road.

Clutter is not completely absent from this landscape, but tends to be associated with the settlement fringes and not within the open fenland.

BENEFICIAL - The low-lying nature of the development is in keeping with the horizontal character of the landscape.

K.6 Assessment of Landscape Impacts:

The field survey recorded and assessed the sensitivity of the landscape elements, from various locations in the landscape. The results have been summarised below;

Landscape		Effects of Proposed Development		
Element	Sensitivity	Negative	Positive	Conclusion
Landform	MEDIUM flat land is a key point, but not considered sensitive to change	NO CHANGE	NO CHANGE	NO IMPACT
Water	MEDIUM key feature but not considered sensitive to change	NO CHANGE	NO CHANGE	NO IMPACT
Woodland	LOW not a key feature	NO CHANGE	NO CHANGE	NO IMPACT
Agriculture	HIGH a key point considered sensitive to change	MODERATE CHANGE loss of large area of arable land, but reversible, field to be grazed by sheep	NO CHANGE	MODERATE NEGATIVE IMPACT
Boundaries	LOW not a key feature	MODERATE CHANGE perimeter fencinsing is proposed	NO CHANGE	MODERATE NEGATIVE IMPACT
Other Use	MEDIUM other land uses absent, considered sensitive to change	MODERATE CHANGE addition of new land use – big scale, industrial, multiple components	NO CHANGE	MODERATE NEGATIVE IMPACT
Settlement	MEDIUM Isolated farm houses but not considered sensitive to change	MINOR CHANGE substation will be built	NO CHANGE	MINOR NEGATIVE IMPACT
Point Features	MEDIUM shelter belts, some trees and shrubs but not considered sensitive to change	NO CHANGE	NO CHANGE	NO IMPACT
Horizontal Lines	HIGH big horizon and flat	MINOR CHANGE solar park will introduce	NO CHANGE	MINOR NEGATIVE IMPACT

	open land is key point. they are sensitive to change. Vertical lines detract from inherent character	built form into large area (however all at low level)		
Experience	MEDIUM Exposed, simple, uniform, isolated, sensitive to change	MINOR CHANGE addition of large scale development – will clutter landscape	NO CHANGE	MINOR NEGATIVE IMPACT

K.7 Assessment of Visual Amenity Impact:

K.7.1 VISUAL EXTENT

The solar park development is considered to be a low-profile development due to the solar modules and fencing reaching a maximum height of 2400mm. Close up it is likely that the rows of solar modules would be visible behind the mesh fencing and may appear cluttered or industrial in character (not dissimilar from an electricity substation). From a distance, the development is likely to resemble an elongated band of green, merging into a blur with other vegetation on the horizon. The nature of solar voltaic panels is to absorb, not reflect sunlight, so glare off the panels is unlikely.

K.7.2 STUDY AREA

The visual influence of the development was considered unlikely to extend beyond a 2km radius of the development site. This was partly due to the lack of suitable vantage points, the flat topography and the limited number of visual receptors. The desktop study showed the important historical receptors within 2km of the proposed development (Appendix 18c);

Historical Receptor	Type	Location	Distance from site	Direction from site
Cross (remains of)	Scheduled ancient monument	Broadgate - South of Poplar Farm	Circa – 800m	North East
Guanock House	Listed building	Guanock Gate	Circa – 800m	South East
Sandy Gate Farmhouse	Listed building	Sandy Gate Farm	Circa – 800m	North East
Yarwood House	Listed building	Lutton Gate Road	Circa - 2km	South West

The nearest Conservation Area to the development site is approximately 4km south east, at Tydd St Giles. At this distance, the historic features of the town will *not* be compromised by the new development.

K.7.3 VISUAL AMENITY RECEPTORS

Six visual amenity receptors were identified (Appendix 18d) and the sensitivity of the view point / the magnitude of the proposed solar park assessed for each one. These included;

- Visual Amenity Receptor 1 (VR1): the view from New Fen Dyke looking south-east towards the solar park site
- VR2: The view from Broadgate Road looking north-east towards site.
- VR3: The view from Broadgate Road (further south) looking north-east towards site.
- VR4: The view from the Colreta looking south-west towards site.
- VR5: The view from Chestnut House looking south towards site.
- VR6: the view from Priory Cottage looking south-east towards site.

VR1: VIEW FROM NEW FEN DYKE LOOKING SOUTH-EAST TOWARDS SOLAR PARK SITE



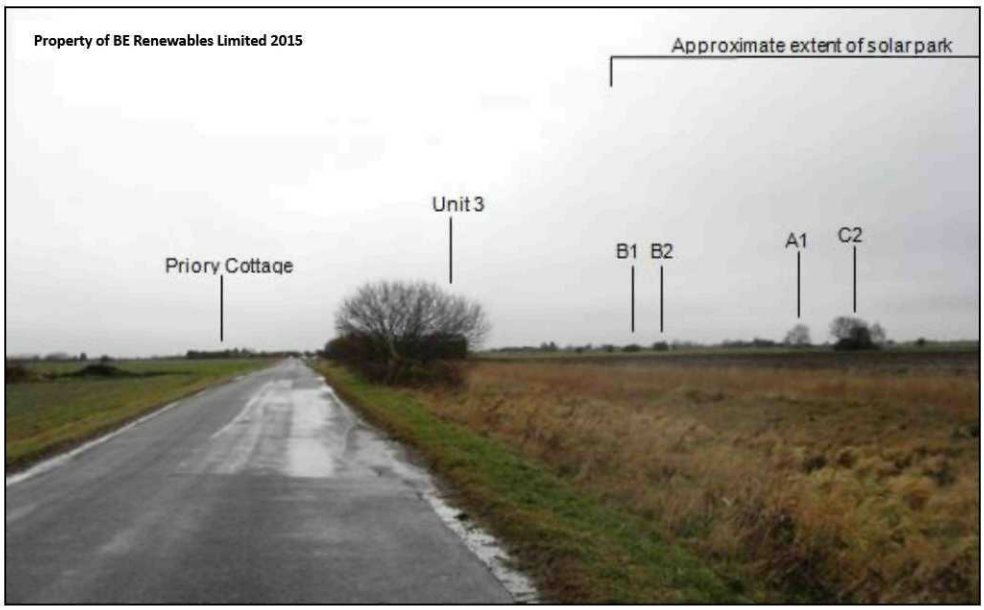
- At this view point, the solar park would be viewed by drivers turning onto New Fen Dyke or Broadgate Road.
- There were a few people who drove past during the site survey, so although remote, Broadgate Road is considered to be a significant route through the area. As a result, this location it is considered of moderate sensitivity.
- The solar park would be quite visible from this direction and proximity, spanning across most of the view. However it would still be at a relatively low level, the fencing at a height of 2.4m (maximum 3.0m) would not be any higher than the Hawthorn shrub on Goochgate Road, which is approximately 3m high.
- It would cover a large part of the view and is likely to obscure the skyline behind.
- The magnitude of visual impact of the solar park is considered **moderate**.

VR2: THE VIEW FROM BROADGATE ROAD LOOKING NORTH-EAST TOWARDS SITE



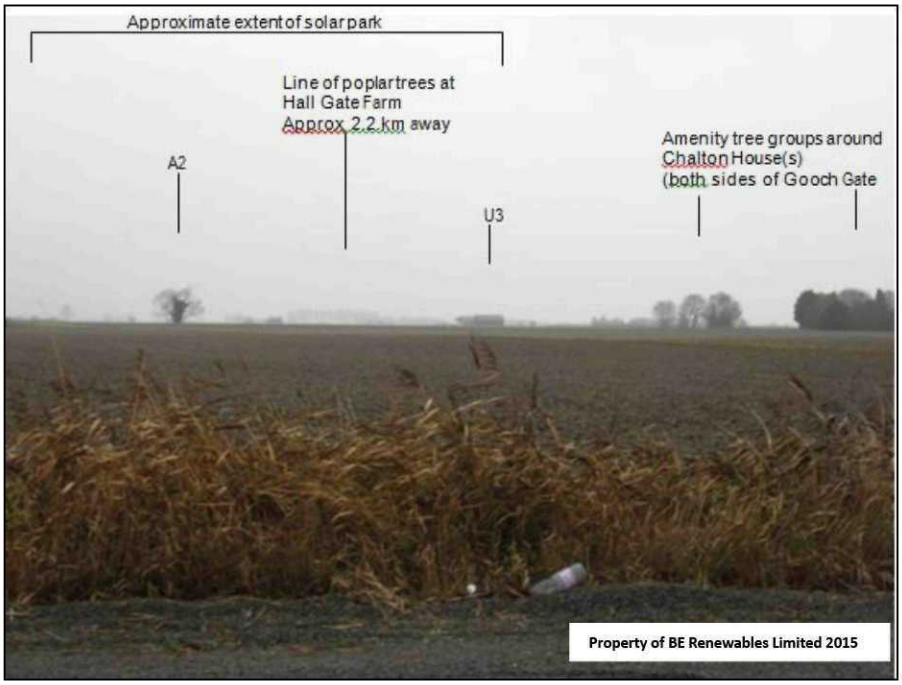
- This view was taken south of the site from Broad Gate Road and considered of moderate sensitivity.
- Drivers would be able to view the solar park as they drive close by, but the solar park would form only a small part of the wider view (both sides of the road).
- Scattered bushes along Broad Gate and along New Fen Dike would filter views of the solar park. Blackthorn bushes 'B1' and 'B2' are approximately 3m high and would be taller than the 3m high (maximum height) solar modules and fencing.
- The rows of solar modules would form a narrow band of dark – light grey and are likely to obscure the vegetation on the skyline beyond.
- The magnitude of visual impact of the development site is considered **moderate**.

VR3: THE VIEW FROM BROADGATE ROAD (FURTHER SOUTH) LOOKING NORTH-EAST TOWARDS SITE



- This view was taken further south on Broad Gate Road and is also considered of moderate sensitivity.
- From approximately 480m away, drivers are unable to distinguish much on the horizon.
- The solar park is likely to appear as a short, narrow band of dark grey on or just below the horizon.
- Scattered Blackthorn bushes – 'B1' and 'B2' are approximately 3m high and would be taller than the up to 3m high solar panels.
- As a result, the magnitude of visual impact of the development site is considered **slight**.

VR4: THE VIEW FROM THE COLRETA LOOKING SOUTH-WEST TOWARDS SITE



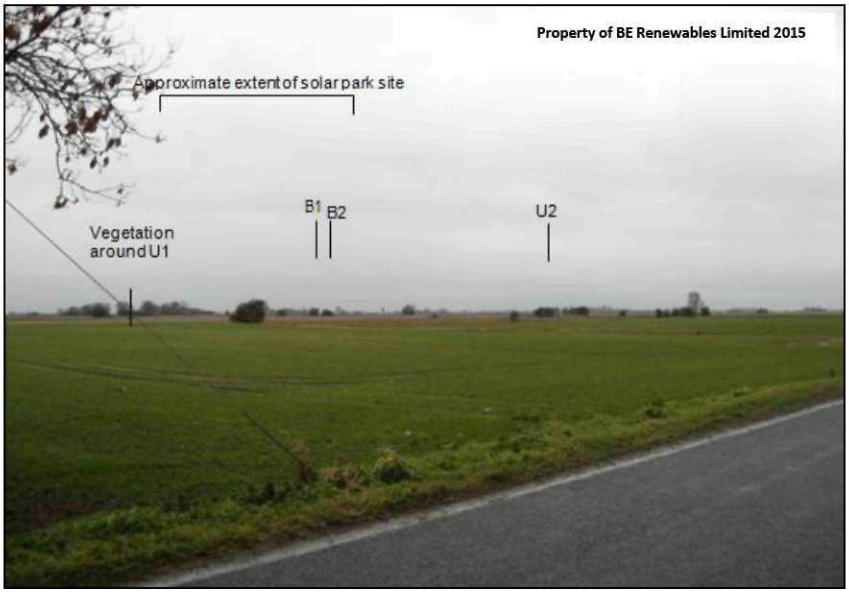
- Chapel Gate road is likely to be frequently used due to a number of residential properties located along it so it is considered of moderate sensitivity.
- The site is approximately 3.5km to the south-west and even on a misty day, the visibility across the landscape is quite substantial.
- The solar park is likely to sit on the horizon line as a narrow band of dark grey, but is unlikely to be discernible due to its low level.
- As a result the magnitude of visual impact of the solar park from this location is considered **negligible**.

VR5: THE VIEW FROM CHESTNUT HOUSE LOOKING SOUTH TOWARDS SITE



- The view is taken from Broad Gate Road, south of Chestnut House – a relatively busy road in the area. It is considered of moderate sensitivity.
- The site is approximately 850m (to its nearest point). Unit 3 'U3' in the middle ground is approximately 560m away and at approximately 4m high, it gives an idea of how visible the solar park is likely to be at this distance.
- As a result the magnitude of visual impact of the solar park from this location is considered **negligible**.

VR6: THE VIEW FROM PRIORY COTTAGE LOOKING SOUTH-EAST TOWARDS SITE



- This view is taken from Broad Gate Road opposite Priory Cottage.
- It is a relatively busy road in the area and is considered of moderate sensitivity.
- The residential property, has limited views of the solar park due to tall shelterbelt vegetation that surrounds its boundaries.
- From this view point, the solar park occupies a small proportion of the whole view and will not extend higher than the bush in the foreground 'B1' and 'B2' but may extend higher than the vegetation on the horizon (to the right).
- As a result the magnitude of visual impact of the solar park from this location is considered **slight**.

OTHER VIEWPOINTS - The presence of mature amenity shelterbelts and the nature of its flat landscape around farmsteads significantly reduce the extent of visibility of the development, as well as the number of visual receptors within the immediate area. This includes Charlton House, Sandgate Farm, Coronation House, Alanray and Priory Cottage. Other groups of buildings, named 'U1' and 'U2' (on the photographs) are unoccupied and have no amenity shelterbelts surrounding them.

There is one footpath within 2km of the solar park and this is located at Guanock House approximately 900m from the nearest point. VR3 is at a distance of 480m, and so at this greater distance it is highly unlikely that any views of the solar park are possible from the footpath. Broadleaved trees surround the north and east of Guanock House.

Other routes exist including a bridleway along the length of Bad Gate, (approximately 400m away from the eastern edge of the solar park) and byways and other routes with public access over 1.5km away.

During the study, visibility became very poor and conditions were not suitable for taking photographs. It was not possible to get representative visual receptor photographs from Grangehill Farm or the bridle way on Bad Gate Road. As a result these are discussed below (based on desk top survey and observations in the field):

Grangehill Farm is located southeast of the solar park site at approximately 800m. At this distance and with no suitable vantage point, the solar park is unlikely to be discernible, bearing in mind that at a distance of 480m for VR3 the magnitude of visual impact was considered to be **slight**.

Gooch Gate and Sandy Gate road are likely to be of low sensitivity as their use is as an access roads rather than through-fares. However their close proximity to the solar park (similar to VR2) suggests that the magnitude of visual impact is likely to be **moderate**.

Bad Gate Bridleway is likely to have a similar magnitude of visual impact as VR6 – **slight**.

K.7.4 EFFECT OF DEVELOPMENT ON VISUAL RECEPTORS - BEFORE MITIGATION

The photographs VR1-6 and subsequent evaluations illustrate the likely magnitude of effect. The overall impact the solar park will have on visual receptors is summarised;

		VISUAL								ASSESSMENT OF SIGNIFICANCE
		SENSITIVITY OF RECEPTOR (PLEASE REFER TO TABLE THREE)			MAGNITUDE OF EFFECT (PLEASE REFER TO TABLE FOUR)					
PHOTO	RECEPTOR	H	M	L	S	S	M	S	N	
VR1	Corner of New Fen Dyke		X				X			Moderately Adverse
VR2	Broad Gate Road		X				X			Moderately Adverse
VR3	Broad Gate Road (Further South)		X					X		Slightly Adverse
VR4	Colreta (Chapel Gate Road)			X					X	Negligible
VR5	Chestnut House (Broad Gate Road)		X						X	Negligible
VR6	Priory Cottage (Broad Gate Road)		X					X		Slightly Adverse

OTHER (without photographs) - Broad Gate Road was considered to be moderate sensitivity, due to the frequency of traffic that was observed during the site survey. It is used as a local route linking Sutton St James to Sutton St Edmund.

Other roads in the area were considered to be of low sensitivity due to the remote character of the area. These are likely to be used for access only.

The magnitude of effect increases in near distant views and reduces with distant views due to the low level nature of the development.

SUMMARY - The assessment of significance and overall impact on visual amenity has been assessed evenly between 'moderately adverse', 'slightly adverse' and 'negligible' due to the distance of visual receptors from the solar park.

Most of the visual receptors are likely to be travelling through the landscape rather than being residents within it.

Views will be brief as drivers will view the development as part of the wider view whilst concentrating on driving.

K.7.5 LANDSCAPE AND VISUAL IMPACT - BEFORE MITIGATION

The landscape assessment has confirmed that the proposed development will not have any direct impact on any significant historical or cultural features or their setting within 2km of the development site.

The landscape assessment assessed that the solar park would introduce a 'negative moderate change' to the landscape character of this part of the 'Peaty Fens Landscape Character Type' in connection with the loss of arable land to an uncharacteristic land-use and the erection of perimeter fencing, which will add an uncharacteristic feature to a predominately boundary free landscapes.

'Negative minor changes' have been assessed in connection to the erection of the transformer and substation; a large scale industrial style development into an open, uniform landscape.

K.7.6 VISUAL AMENITY IMPACTS - BEFORE MITIGATION

The solar park is a low profile development. As a result, available views from nearby roads and farmsteads are limited due to shelterbelt vegetation, crops and by the lack of suitable vantage points.

Close up views of the solar park are considered to be 'moderately adverse' due to the open character of the fenlands and large scale nature of the development.

K.7.7 CURRENT GUIDANCE

There is currently no published landscape mitigation guidance in Lincolnshire; however Cambridgeshire has some relevant information for the 'Fenland Landscapes'[8];

'Attempts at screening (in relation to new agricultural buildings) need to be equally bold to succeed. However it is not necessary to surround the development with trees. Planting up a one side will significantly help to soften the hard outlines and combine to form visual islands within the open fenland.

Planting of avenue / tree belts is likely to appear out of place on its own, within an open landscape and should not be undertaken unless within areas already characterised by similar features.

Isolated trees which grow on drove edges, road verges, ditch banks and adjacent to buildings is characteristic, but needs a willingness to tolerate lone trees in an arable environment to perpetuate their presence'.

Landscaping of the scheme is restricted due to the shadowing effect that tall vegetation may have on the solar panels.

[8] Guidelines for Landscape and Visual Impact Assessment - The landscape Institute, Institute of Environmental Management & Assessment (2002)

Any vegetation will need to be planted outside the security fencing close to the ditches and roads.

K.7.8 PROPOSED MITIGATION

Mitigation proposals have the potential to reduce the landscape and visual impacts of the solar park. For this particular development the mitigation opportunities are limited due to;

- the fixed nature of the scheme,
- the size of the site
- the character of the landscape that it is situated in.

Hedgerow planting is recommended in appropriate locations;

Hedgerows are a locally prominent feature of the 'Peaty Fenlands Landscape Character Type' and are likely to be viewed by the general public as a 'slight beneficial' improvement to the landscape.

Although hedgerows are not present in the immediate area, they provide the most appropriate low-level form of screening, without drawing attention to the development or compromising the effectiveness of the solar modules.

There are biodiversity benefits, hedgerows are important habitats for reptiles, birds and bats.

Hedgerow planting is therefore proposed along the south, west and north sides of the solar park for landscape and visual amenity reasons (Appendix 18e). However, full perimeter hedging is not required, due to the lack of views from the south, east and west.

The proposals will:

- Screen the industrial, cluttered appearance of the solar park which detracts from the inherent simplicity of the landscape.
- Screen close up views of the solar park from Broad Gate Road.

It is recognised that planting of hedgerows will not be immediately effective. Therefore advanced planting would be recommended to help establish the hedgerows before the solar park is constructed. Visibility of the solar park will also vary at different times of the year, with winter time when the fields and hedges are bare, being the most visible. Planting a thick hedge with spring flowers /early growth may be preferable to improve screening at these times. Planting of conifer /evergreen hedging is not recommended as this is likely to detract from the character of the local landscape.
A suitable hedgerow mix, consisting of species of local provenance has been recommended. Please refer to Appendix 18e – Mitigation Proposals.

K.7.9 RESIDUAL IMPACT

Residual Impacts are the impacts that will, or may, arise as a consequence of the project after implementation of the mitigation measures. The results of the landscape and visual impact assessment of the solar park development suggest that mitigation will be necessary to reduce, avoid or remedy any significant negative effects (greater then negligible) on the environment arising from the proposed solar park. Taking those landscape and visual receptors which scored greater then negligible (please refer to table six and eight), the residual impact can be assessed after mitigation has been proposed and is summarised below;

Effects of Proposed Development				
Element	Significance	Impact (before mitigation)	Proposed mitigation (positive)	Residual Impact after mitigation
Agriculture	HIGH a key point considered sensitive to change	MODERATE CHANGE loss of large area of arable land, but reversible, field to be grazed by sheep	NO CHANGE	MODERATE NEGATIVE IMPACT
Boundaries	LOW not a key feature	MODERATE CHANGE perimeter fencing is proposed	SLIGHTLY BENEFICIAL hedging will screen fencing from some locations	MINOR NEGATIVE IMPACT
Other use	MEDIUM other land uses absent, considered sensitive to change	MODERATE CHANGE addition of new land use – big scale, industrial, multiple components	SLIGHTLY BENEFICIAL hedging will screen industrial element from some locations	MINOR NEGATIVE IMPACT
Settlement	MEDIUM Isolated farm houses but not considered sensitive to change	MINOR CHANGE transvertor and invertor housing will be built	SLIGHTLY BENEFICIAL if located wisely, it will be viewed as a solar park but keep within the existing buildings	NEGLIGIBLE NEGATIVE IMPACT
Horizontal Lines	HIGH big horizon and flat open land is key point. they are sensitive to change. Vertical lines detract from inherent character	MINOR CHANGE solar park will introduce built form into large area (however all at low level)	SLIGHTLY BENEFICIAL hedging will screen solar park from most accessible view points	NEGLIGIBLE NEGATIVE IMPACT
Experience	MEDIUM	MINOR CHANGE	SLIGHTLY	NEGLIGIBLE NEGATIVE

	Exposed, simple, uniform, isolated, sensitive to change	addition of large scale development – will clutter landscape	BENEFICIAL hedging will screen clutter from most views	IMPACT

ASSESSMENT OF RESIDUAL VISUAL IMPACT				
PHOTO	RECEPTOR	ASSESSMENT OF SIGNIFICANCE	PROPOSED MITIGATION (hedging around west, south and north sides of site)	RESIDUAL VISUAL IMPACT (with mitigation)
VR1	Corner of New Fen Dyke	Moderately Adverse	Moderately beneficial (hedging would screen views of solar park)	Slightly beneficial
VR2	Broad Gate Road	Moderately Adverse	Moderately beneficial	Slightly beneficial
VR3	Broad Gate Road (Further South)	Slightly Adverse	Slightly beneficial	Slightly beneficial
VR4	Colreta (Chapel Gate Road)	Negligible	Negligible	Negligible
VR5	Chestnut House (Broad Gate Road)	Negligible	Negligible	Negligible
VR6	Priory Cottage (Broad Gate Road)	Slightly Adverse	Slightly beneficial	Slightly beneficial

K.8 Conclusion

Mitigation proposals have reduced the impact on landscape of the solar park, from 'moderate' to 'minor' negative impact on two receptors;

- Boundaries
- Other use

...and reduced the negative impact from 'minor' to 'negligible' on three receptors;

- Settlement
- Horizontal
- Experience

'Agriculture' remains the only key landscape receptor at 'moderate negative change'. However, this is *not* a permanent change and the site will partly retain its agricultural land-use by the proposed grazing of sheep underneath the solar modules.

In addition, any change to landscape character, will only affect the immediate area of the solar park development, located at the northern periphery of the 'Peaty Fens Landscape Character Type' and not the whole area. Subtle changes are typical of this area, due to the merging of three different landscape types and the county boundary to Cambridgeshire is also within 5 km.

Hedgerows are a local feature of the 'Peaty Fens Landscape Character Type' and are likely to be viewed by the general public as a 'slight beneficial' change to the landscape of the solar park.

Mitigation proposals have reduced the visual impact of the solar park from 'moderately adverse' for two key visual receptors to 'slightly beneficial';

- VR1
- VR2

... and reduced one key receptor from 'slightly adverse' to 'slightly beneficial';

- VR3

With the proposed mitigation, close up views of the solar park are now considered to be 'slightly beneficial impact' due to the planting of hedgerows screening views of the development form Broad Gate Road.

L) ECOLOGY

Please read this chapter alongside Appendix 19a-b.

L.1 Introduction:

The site at Little Eau is located in the Parish of Sutton St James in Lincolnshire, approximately 3.5km South West of the Village of Sutton St James. It will cover an approximate gross area of 11.81 Hectares (Ha) of agricultural land, located at National Grid Reference (NGR) TF375159 (Appendix 1).

This chapter assesses the potential impacts of the proposed PV Solar Farm on the ecological and nature conservation value of the site. This is achieved by assessing the potential impacts on the ecological value of the site during the construction and operational stages of the proposed development.

The following is an Extended Phase 1 Habitat Survey and Protected Species Assessment has taken place, combined with a detailed desk study. The site consists of three arable fields with perimeters and a central network of ditches. In the southern most corner of the site was a small area of bare ground, mature trees and a derelict brick building.

L.1.1 PROPOSED WORKS

The full description of development is for the: '*Installation of ground mounted photovoltaic (PV) solar arrays to provide ~5MWp generation capacity together with transformer stations; internal access track; electricity sub-station; landscaping; fencing; security measures; access gate; and ancillary infrastructure*'.

The proposed works are limited to arable land only since the boundary hedges, shrubs and isolated trees will remain unaffected by the proposed development. The retained trees, shrubs and hedgerows will be appropriately protected during construction. The standard prevention measures will be in place to protect the inter-field, boundary ditches and the adjacent habitats from the potential effects associated with potential increase in sedimentation run-off. The applicant proposes that this will be achieved by retaining the existing perimeter field ditches which will act as shallow swales along the site boundary. These ditches (swales) will intercept overland surface water flows and reduce run-off potentially associated with site operations. Please refer to Section N) Drainage, Surface Water Run-Off and Flooding for more details.

L.1.2 LIMITATIONS AND CONSTRAINTS

The survey followed standard methodologies and survey protocols. The results provide an accurate account of broad habitat types and potential presence (or absence) of protected species due to survey method and effort. At the time of year when the surveys were undertaken, evidence for confirming Water Vole (Arvicola Amphibius) presence were unreliable, however we have identified that they may be present.

L.2 Methodology:

Two types of methodology have been carried out for this environmental report;

- Desk Study Methodology
- Field Survey Methodology (including):
  - Habitat Survey
  - Protected Species Assessment

L.2.1 DESK STUDY METHODOLOGY

A desk study was carried out to identify statutory and non-statutory designated sites within 5km and records of any protected or otherwise notable species that exist within 1km of the site boundary.

The following sources were consulted:

- Lincolnshire Biodiversity Partnership[9]
- Local Biodiversity Action Plan[10]
- Multi-Agency Geographical Information for the Countryside - MAGIC[11]
- National Biodiversity Network[12]
- UK Biodiversity Action Plan – UKBAP[23]

L.2.2 FIELD SURVEY METHODOLOGY

HABITAT SURVEY METHODOLOGY- a Phase 1 Habitat survey was conducted based on techniques and methodologies in the Handbook for Phase 1 Habitat Survey[13] and using the nomenclature of Stace[14]. Habitats on site were recorded on a field map (Appendix 19a).

L.2.3 PROTECTED SPECIES ASSESSMENT METHODOLOGY

The presence of, or potential for, protected species was noted on a field map during the survey conducted (Appendix 19a).

[9] www.lincsbiodiversity.org.uk/
[10] www.ukbap.org.uk
[11] www.magic.gov.uk
[12] www.nbn.org.uk
[13] JNCC (2007) Handbook for Phase 1 Habitat Survey. A technique for environmental audit (reprint). Joint Nature Conservation Committee, Peterborough
[14] STACE C (2005) New British Flora of the British Isles. Cambridge University Press

L.3 Results:

L.3.1 DESK STUDY RESULTS

Locations with statutory nature conservation designations within 5km of the site;

Site Name	Designations	Distance From Nearest Site Boundary	Direction From Site
South Holland Main Drain	Site or Nature Conservation Interest (SNCI)	5km	North East

Closest records of selected protected or notable species recorded within 1km of the site;

Species	Designations	Distance from Site	Direction from Site
Barn Owl	WCA, UKBAP	<1km	South
Brown Long-eared Bat	WCA, UKBAP, EPS	<2km	North
Pipistrelle Bat	WCA, UKBAP, EPS	<2km	North

Key –

- EPS = European Protected Species (EU Habitats Directive)
- UKBAP = UK Biodiversity Action Plan Priority Species
- WCA = Wildlife and Countryside Act 1981 Schedule 5 Species

L.3.2 FIELD SURVEY RESULTS

Habitat Survey (Please refer to Appendix 19b – Site Photographs)

- **Arable cultivated/ disturbed land (A) -** The site is composed of three arable fields. All fields were planted with a winter cereal crop and did not have notable field margins. Each of the fields had a perimeter of wet ditches. Scattered trees were present around the western and southern boundaries.
- **Standing Water (SW) -** Wet ditches bounded each of the arable fields on three sides and intersected the site. The fields were ploughed directly up to the ditch ridge. All but one of the ditches had standing water at the time of the survey; the plant species present indicated that all ditches are wet on an annual basis. The ridges of the ditches were dominated by Cocksfoot (Dactylis glomerata) and Common Nettle (Urtica dioica), locally abundant Bramble (Rubus fruticosus agg), Common Reed (Phragmites australis) abundant Cleavers (Galium aparine), and occasional Ground Ivy (Glechoma hederacea), Hogweed (Heracleum sphondylium), Cow Parsley (Anthriscus sylvestris),Spear Thistle (Cirsium vulgare), Herb Robert (Geranium robertanium),Creeping Buttercup (Rununculus repens), with rare Ribwort Plantain(Plantago lanceolata), Common Ragwort (Senecio jacobaea), and Yarrow (Achillea millefolium). Please refer to Photo 2 in Appendix 19b.

- **Bare ground (BG) and Other Habitat –** In the extreme southern corner of the site was an area of bare ground including soil heaps and patches of Bramble with occasional Mugwort (Artemisia vulgaris) and Oilseed Rape (Brassica napus). A derelict brick building and a mature Ash tree with an Owl box attached were also present in this area. Please refer to Photo 7 in Appendix 19b.

Target Notes;

TARGET NOTE as noted in Appendix 19a	HABITAT / FEATURE	DETAILS
1	WET DITCH	Dominated by Nettle, Cocksfoot with locally abundant Common Reed. Tussocky vegetation on ditch ridge good for ground nesting birds. Ditch had potential for Water Voles.
2	WET DITCH	Wide wet ditch with grassy banks and sedentary flow at time of survey. Potentially suitable to support Water Voles, mammalian burrows noted during survey.
3	CONCRETE CULVERT	Culvert over a wet ditch at the intersection with Sandy Gate access road. Any cracks within or around the culvert have potential to be utilised by roosting bats.
4	ASH TREE	Mature decaying Ash tree with cavities in the trunk and branches potentially suitable for roosting bats. The Ash tree also had an owl nest box fixed to its northern side.
5	OTHER HABITAT AND BARE GROUND	Soil heaps, grass tussocks, trees and scrub and a dilapidated farm outbuilding present within an area of bare ground. Habitats potentially suitable for nesting birds. The derelict building had potential to be utilised by roosting bats, and Barn Owls had previously been seen within the building. Vegetation dominated by Cocksfoot, with abundant Cleavers and Common Nettle. Occasional Elder, Ash and Hawthorn also present.
6	SCATTERED TREES	Occasional trees and scrub along the ditch and road verge. Species present included Ash, Hawthorn and Rose. Potentially suitable for nesting birds.

L.3.3 PROTECTED SPECIES ASSESSMENT METHODOLOGY

- **White-Clawed Crayfish -** The ditches could potentially support White-clawed Crayfish (Austropotamobius pallipes).
- **Great Crested Newts -** Due to the nature of the surrounding land use (farming), the apparent lack of suitable hibernation sites and their chocked nature, the ditches are unlikely to support Great Crested Newt (Triturus cristatus).
- **Reptiles -** Due to the nature of the surrounding land use (arable farming), the apparent lack of suitable hibernation sites and the limited extent of tussock grass along the ridges of the wet ditches, the site as a whole is unlikely to support reptiles and they will not occur in the cropped field area.
- **Birds -** Grey Partridge (Perdix perdix) were observed on the site. It is very likely that these and other species could be present during the breeding season. The trees, Brambles and Reeds offer potential nesting sites.

The Ash tree on the perimeter of the bare ground in the southern corner of the site had an owl nest box attached, and paired with the suitability of the derelict brick building, it is possible that Barn Owls utilise the site for nesting. There are known sightings of Barn Owls within the site. Please refer to Photo 6 and 7 in Appendix 19b.

- **Bats –** Due to cracks within the tree and crevices in the brick work and under the eaves of the building, the Ash tree and brick outbuilding on the perimeter of the bare ground had potential to support roosting bats. Any cracks and crevices within the concrete culvert on the eastern boundary at the road intersection along Sandy Gate have a negligible likelihood of being utilised by bats. Please refer to Photo 5, 6 and 8 in Appendix 19b.
- **Brown Hare -** Brown Hare (Lepus eauropeaus) were observed within the site during the assessment.
- **Hazel Dormouse -** There was no suitable habitat for Hazel Dormouse (Muscardinus avellanarius) on the site.
- **Water Vole -** The wet ditches, due to their steep banks and heavily vegetated nature, could potentially support Water Voles. Small mammal burrows were seen at the time of the survey within the banks of the larger eastern ditch, however the grass vegetation had been mowed and no further field signs were visible.
- **Badger -** There were no Badger (Meles meles) setts or other field signs on the site.
- **Otter -** There were no Otter (Lutra lutra) holes or field signs on the site. (However Otters can use all types of watercourse).

L.3.4 DISCUSSION

The main habitat on site was cultivated arable land. This had little ecological value but for the potential to be utilised by ground nesting birds and Brown Hares (depending on the cropping regime in any particular year). This is the area that will be affected by the proposed development.

Depending on the crop being grown, the arable fields could be utilised by ground nesting birds, and Skylarks (*Alauda arvensis*), a UKBAP and LBAP species, in particular. Any works taking place on the site during the period March to August inclusive have the potential to impact on other nesting birds.

Barn Owls could use the nest box in the Ash tree in the southern corner of the site. There are records for Barn Owls within 2km. It is an offence to disturb nesting Barn Owls, however the southernmost corner of the site is not to be developed with PV panels therefore there are not likely to be any impacts on nesting Barn Owls.

The Ash tree and derelict building in the southern corner of the site had potential to be utilised by roosting bats. There are records of bats within 2km of the site.

Brown Hare are a Local BAP species, and were observed nearby to the site during the assessment.

Brown Hares, a UKBAP and LBAP species may occur depending on the annual cropping regime. Their peak breeding season is March-July inclusive; it is possible that breeding Hares may be disturbed if site works take place during this period.

The ditches could potentially support White-clawed Crayfish, Common Frogs (*Rana temporaria*) (an LBAP species) and Water Voles, and be utilise by Otters. The banks and ridges of the ditches could be used by a variety of nesting birds, including Grey Partridge a UKBAP and LBAP species that were observed during the survey. It is understood that no development will take place within 5m of the ditch tops and that the ditches will not therefore be affected by the works.

L.3.5 OVERVIEW

It is understood that the site is to be converted to sheep-grazed pasture, harvesting haylage or potentially growing low density and low intensive root crops during the operational period. The change from arable farming to grassland is an ideal opportunity to enhance and enrich the biodiversity of the site. The site should ideally be sown to a good quality seed mix, including wildflowers, to increase the biodiversity of the site.

Areas of log piles and hibernacula will be created to provide an environment for native reptiles and amphibians along with bird and bat boxes.

Maintaining low stocking density of sheep will enable the site to enhance (or still remain) value to ground nesting birds and small mammals.

L.3.6 RECOMMENDATIONS

Site work, including vegetation clearance, should commence outside the main bird nesting period (considered to be March to August inclusive), or immediately preceded by detailed inspection for nests. Any nests found would need to be left undisturbed until they cease to be used.

To avoid potentially disturbing any young Brown Hares it is recommended that construction occurs outside of the Brown Hare peak breeding season (March - July inclusive). If this is not possible, if young Brown Hares are encountered they should be left undisturbed where they are found. If the stocking density of sheep is kept low the site should still be of value to Brown Hares.

Due to the potential presence of White-clawed Crayfish, Water Voles and Otters, as well as their intrinsic ecological value, the ditches should be protected from pollution events. A number of steps are recommended to safeguard the wet ditches during construction;

- Temporary facilities for storage and other structures should not be located near the ditches

- Safeguards should be put in place to ensure that there is no risk from accidental spills or leakages. This should include measures to collect contaminated run-off from construction activities and prevent it from entering the watercourse.

- Spoil, aggregates and fill materials should not be allowed to contaminate the watercourse.

- Contractors should operate to the Code of Environmental Good Practice.

- Drainage design should ensure that any potential pollutants arising from the operational phase of the development are prevented from getting into the watercourse through run-off.

It also recommended that a 5m buffer should be left between the construction site and the ditches.

Inappropriate management e.g. close grazing by sheep, of the ditch-banks could affect Water Voles (if present).

If the ditches are to be affected by construction then Water Voles will require consideration and a survey is recommended. The optimal survey period for Water Voles is March – October inclusive.

The area of bare ground with its associated features in the southern corner of the site will be unaffected by the development. During the development phase it should be protected with a temporary fence to prevent machinery and personnel entering the area. This area should not be used as site compound or for material storage.

Measures are to be put in place to ensure that the ecological value of the site is managed and its quality maintained. This should include the periodic visits of an ecologist to monitor the works and ensure that the contractor(s) comply with the Code of Environmental Good Practice. It is recommended that a further survey for protected species is undertaken prior to the works commencing and measures re-visited within the Site Construction Management Plan.

L.4 Relevant Legislation:

L.4.1 EUROPEAN PROTECTED SITES

Habitats of European-wide importance (other than for birds) are listed under Annex I of the Council Directive 92/43/EEC (1992) on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive). Habitats designated under this Directive are Special Areas of Conservation (SAC's). Habitats of European-wide importance for birds are listed under the EC Wild Birds Directive (1982). Habitats designated under this Directive are Special Protection Areas (SPA).

L.4.2 INJURIOUS WEEDS

Five weeds are classified under the Weeds Act 1959: Common Ragwort (Senecio jacobaea), Spear Thistle (Cirsium vulgare), Creeping Thistle (Cirsium arvense), Broad-leaved Dock (Rumex obtusifolius) and Curled Dock (R. crispus). It is not illegal to allow these weeds to grow on land however they must not be allowed to spread to agricultural land, particularly grazing areas or land which is used to produce conserved forage.

L.4.3 UK BIODIVERSITY ACTION PLAN

Certain species and habitats are listed under Section 74 of the Countryside and Rights of Way (CROW) Act 2000. Section 74 provides statutory underpinning to the UKBAP[15] and thus, all habitats and species listed under the UKBAP are also Section 74 habitats and species.

Section 40 of the Natural Environment & Rural Communities (NERC)[16] Act 2006 places a duty upon all local authorities in England to promote and enhance biodiversity in all of their functions. Section 41 lists habitats and species of principal importance to the conservation of biodiversity. Fifty-six habitats and 943 species of principal importance are included on the Section 41 list. These are all the habitats and species in England that have been identified as requiring action in the UK BAP. These species and habitats are a material consideration in the planning process.

NPPF details the Government's policies for the conservation of England's natural heritage. It embodies the Government's commitment to sustainable development and to the conservation of wildlife. The guidance advocates the protection of statutorily designated sites and sites of particular nature conservation importance (e.g., Sites of Special Scientific Interest (SSSI)). It lays down a number of provisions that proposed developments need to consider with regard to designated sites, non-designated sites and species protection. This includes LBAP species and habitats. These should be regarded as material considerations during the planning process.

L.4.4 PROTECTED SPECIES

- **White-clawed Crayfish -** White-clawed Crayfish are protected under the Wildlife and Countryside Act 1981 (as amended). It is an offence to intentionally take White-clawed Crayfish from the wild or to sell them.
- **Common Reptiles -** Slow-worm, Adder, Grass Snake and Common Lizard are protected under the Wildlife and Countryside Act 1981 (as amended). It is illegal to kill or injure them. It is not illegal to capture, disturb or to damage their habitats. However, the reptiles themselves are protected so any works to damage their habitat could risk causing harm to reptiles and hence could be illegal.
- **Birds -** Wild birds are protected under the Wildlife and Countryside Act 1981 (as amended). It is illegal to take or harm them, their nests (whilst in use or being built) or their eggs. Additionally for some species it is an offence to intentionally or recklessly

[15] www.ukbap.org.uk
[16] UKBAP - http://jncc.defra.gov.uk/page-5155

disturb the adults while they are in and around their nest or intentionally or recklessly disturb their dependent young. The arable land within the application site, together with the isolated shrubs, trees and the field boundaries are likely to support a suite of breeding birds typical of farmland and woodland habitats for the region. The trees and shrubs have the potential to be used for nesting birds in the breeding season. It is also possible that the application site and the surrounding fields may provide the habitat for ground-nesting birds such as Skylark Alauda Arvensis; however the improved nature for the arable land reduces the potential of the habitats to be used for most ground nesting species and it is therefore unlikely that significant populations are present. No significant bird assemblages were recorded within the application site during the field surveys.

- **Bats -** Bats are protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010. It is illegal to kill or injure bats, cause disturbance at their resting places or to block access to, damage or destroy their roost sites.
- **Water Voles -** Water Voles are protected under the Wildlife and Countryside Act 1981 (as amended). It is illegal to deliberately kill, injure, capture or disturb them or to destroy, damage or obstruct access to any places used for shelter or protection.
- **Badgers -** Badgers are protected under the Protection of Badgers Act 1992. It is illegal to kill, injure or take Badgers or to interfere with a Badger sett. Interference with a set includes blocking tunnels or damaging the set in any way. No evidence of badger activity (e.g. setts, latrines or prints) was identified on or surrounding the application site.
- **Otters -** Otters are protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010. It illegal to take, injure, kill or sell an otter. It is also an offence to damage, destroy or obstruct access to a resting place or disturbs or harms an otter at any time. No impacts on these species are anticipated and with the provision of protection measures and buffer zones that are discussed elsewhere within this report the need for any further assessment within this report is not considered necessary.

L.4.5 ASSESSMENT OF DESIGNATED SITES

No sites of international, national, regional or local nature conservation designations would be affected. No offsite affects are predicted, as field drainage will be unaffected and during the operational stages there will be none to negligible disturbance with regard to noise, dust or activity. There will be no change in air quality.

L.4.6 ASSESSMENT OF IMPACT UPON ONSITE HABITATS

During the site walk-over the areas of the ditch banks and the perimeter margins to the edge of the roads were considered to be areas that could be of interest for provision of species rich habitats. However the current agricultural activity is likely to reduce the importance of these habitats. The proposed screening and provision of buffer and inter solar panel row grassland will significantly benefit the importance of the area and increase the species rich nature of the onsite habitat. The existing arable habitat is considered of negligible importance, in terms of its vegetation and there is no evidence that the vegetation supports

nesting Skylark, which is something that could be encouraged through the enhanced biodiversity plans within the solar farm.

No offsite affects are predicted, as field drainage will be unaffected and in the operational stages there will be none to negligible disturbance with regard to noise, dust or activity. There will be no change in air quality.

The impact of change from arable land use to grassland with livestock grazing of sheep would have a positive and beneficial impact with nature conservation – grassland is generally a rarer habitat in the area compared to arable land. Grassland also supports a greater number of species compared to arable land. The provision of log piles and herbancula will increase biodiversity also.

The impact of the development will be neutral, with the provision of the grassland and proposed hedgerow screening proving to be beneficial. There will be minor beneficial impact for reptiles and invertebrate through the managed habitat of log piles and herbanicula.

L.5 Summary:

The assessment of potential solar farms on the ecology and bio-diversity of a particular site is primarily guided by Technical Note 101 published by NE[17]. It states that '*like any type of development, solar parks have the potential to affect the landscape, natural habitats, soils and geological and archaeological features*'. TIN101 discusses this potential risk of damage as a result of the construction, operation and decommissioning of the solar farm, highlighting the potential for cumulative impacts to occur when parks are cited in close proximity to each other. However it highlights that '*well located and designed solar farms*' can not only avoid negative environmental impacts but deliver an overall net gain and benefit for biodiversity, in addition to making a positive contribution to the reduction in greenhouse gases and the production of low carbon energy. As a result of the selected location of the application site there are no direct, nor indirect impacts on any statutory or non-statutory designed sites anticipated. The proposed site is not located close to a site of high wildlife value and is therefore unlikely to have an impact on or compromise any of the objectives for these sites designations.

The proposed habitat enhancement measures of converting arable fields to species rich grassland will be maintained around the panels. The planting of native species hedgerows will provide an ecological gain over its current arable use and ensure maximum wildlife benefits. The planting of hedgerows will increase significantly the nesting, roosting, foraging and commuting opportunities for birds, bats and other wildlife.

There is a potential impact for loss of suitable habitat for ground nesting birds. However the site is not considered to provide optimal nesting habitat for much ground nesting bird species due to its lack of longer vegetative cover anyway. It is unlikely that the site supports a significant population of ground nesting birds. Overall the impact is considered **low**. To avoid impacts on nesting birds and to ensure compliance with the provisions of the Birds

[17] http://publications.naturalengland.org.uk/publication/32027

Directive and the Wildlife and Countryside Act 1981 (as amended), it is considered that any initial ground works and associated vegetation removal will take place outside of the bird breeding season (March to August inclusive). If any vegetation works are required during the bird breeding season the, suitable nesting habitat will be hand searched by appropriately experienced ecologists prior to any of the works commencing.

Therefore in conclusion, the majority of the site is composed of arable land. All of the remaining native flora species and habitats were generally common in the local, county and national context. Using the criteria below, the habitats on the site as a whole are considered to be of Parish/Neighbourhood Value due to the presence of the ditches.

DEFINITIONS OF THE LEVEL OF HABITAT VALUE	
Geographic Level of Value	Examples
International value	Ramsar Sites, Special Protection Areas, Biosphere Reserves, Special Areas of Conservation. Sites supporting populations of internationally important species.
National value	SSSIs or non-designated Sites meeting SSSI selection criteria, NNRs, Marine Nature Reserves, NCR Grade 1 Sites. Sites containing viable areas of key habitats identified in the UK Biodiversity Action Plan.
Regional value	Sites containing viable areas of threatened habitats listed in a Regional BAP (or some Natural Areas), comfortably exceeding SINC criteria, but not exceeding SSSI criteria.
County / Metropolitan	Sites meeting the criteria for county or metropolitan designation (SINC, CWS, etc.). Ancient semi-natural woodland, LNRs or viable areas of key habitat types listed in county BAPs/Natural Areas.
District / Borough	Undesignated Sites or features considered to appreciably enrich the habitat resource in the District or Borough.
Parish / Neighbourhood	Undesignated Sites or features which appreciably enrich the habitat resource within the Parish or Neighbourhood.
Negligible value	Low grade and widespread habitats.

The site is typical of the local area and graded as having a habitat value at a negligible (low grade and widespread habitats) level. If nesting Barn Owls or Grey Partridge, or roosting bats, or Brown Hares, use the site the species value could appreciably enrich the habitat resource within the Parish or Neighbourhood.

DEFINITIONS OF THE LEVEL OF SPECIES VALUE	
Geographic Level of Value	Examples
International value	Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.
National value	Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP). A regularly occurring,

	regionally or county significant population/number of any nationally important species.
Regional value	Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation; A regularly occurring, locally significant number of a regionally important species.
County / Metropolitan	Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan "red data book" or BAP on account of its regional rarity or localisation; A regularly occurring, locally significant number of a County/Metropolitan important species.
District / Borough	A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation; A regularly occurring, locally significant number of a District / Borough important species during a critical phase of its life cycle.
Parish / Neighbourhood	Species that are not threatened but are valued at a local level on intrinsic appeal.
Negligible value	Common or widespread species.

Due to its location, extent and the surrounding environment the proposed development is unlikely to adversely impact on nearby nature conservation sites. Providing the wet ditches and area of bare ground including the brick outbuilding are to be left unaffected, no further protected species surveys are recommended.

The following recommendations are suggested to mitigate against the development:

- Protect the water courses from construction impact and pollution.
- Preserve any surrounding trees to prevent potential disturbance to nesting Barn Owls or roosting bats.

Conduct any vegetation clearance outside of the bird nesting season (March-August inclusive) or conduct pre-construction bird nest checks.

M) HISTORIC ENVIRONMENT

Paragraph 128 of the NPPF states that all proposals should be informed by a consultation with the Historic Environment Record (HER). We requested a HER from Lincolnshire County Council (LCC). The results of these can be seen in Appendix 21a and 21b. This section considers the likely significant effects of the Proposed Development in terms of the Historic Environment, including cultural heritage and archaeology. It describes - the assessment methodology; the baseline conditions currently existing at the site and surroundings; the likely significant environmental effect during the construction, operation and decommissioning phases of the proposed development; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

M.1 Assessment Approach:

Heritage assets are defined by the NPPF (NPPF Annex 2) 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. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing*)'[18].

Designated Heritage Assets include:

- World Heritage Sites;
- Scheduled Monuments;
- Listed buildings;
- Protected Wreck Sites;
- Registered Parks and Gardens;
- Registered Battlefields; and
- Conservation Areas.

Non-Designated Heritage Assets include:

- Sites held on the HER, as well as
- Other elements of the landscape understood to have a degree of heritage value.

Within the scope of this desk-based assessment an area of search of 2km from the centre of the site has been considered appropriate.

M.2 Methodology:

The desk-based assessment involved consultation of readily available archaeological and historical information from documentary and cartographic sources. The desk-based assessment was prepared in line with the Standard and Guidance for Historic Environment Desk-Based Assessment issued by the Institute for Archaeologists (IFA 2012).

The major repositories of information consulted comprised:

[18] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

- UNESCO World Heritage Site list
- English Heritage's National Heritage List England (NHLE). List of Buildings of Special Architectural or Historic Interest; list of Scheduled Monuments; Register of Parks and Gardens of Historic Interest; and Register of Historic Battlefields
- English Heritage Archives list of archaeological sites and events, including published and unpublished documentary sources (including the English Heritage library housed at EHA Swindon)
- DEFRA - MAGIC website datasets
- Historic aerial photographs held at the English Heritage Archives, Swindon
- Historic Environment Record (HER). Information on known archaeological sites and find spots; published and unpublished documentary sources (including development control site reports)
- A variety of sources for access to historic mapping and other documentation.
- A site walkover survey was undertaken in order to examine current land use and topography, and to assess the visible cultural heritage resource

M.3 Policy:

M.3.1 NATIONAL PLANNING POLICY FRAMEWORK

In the NPPF, a 'heritage asset' is defined as a building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage assets are a valued component of the historic environment and include both designated heritage assets and non-designated heritage assets. Designated heritage assets include World Heritage Sites, Scheduled Monuments, Listed buildings, Registered Parks and Gardens, Registered Battlefields, and Conservation Areas. Non-designated heritage assets include those identified by the local planning authority during the process of decision-making or through the plan making process (including local listing). The significance of a heritage asset is defined as the value of a heritage asset to this and future generations because of its heritage interest. Policies relate to both the treatment of the assets themselves and their settings, both of which are a material consideration in development management decision making.

The NPPF states that '*the purpose of the planning system is to contribute to the achievement of sustainable development*' and that there are '*three dimensions to sustainable development: economic, social and environmental*'. The role the environment will play is described as '*contributing to protecting and enhancing our natural, built and historic environment; and as part of this, helping to improve biodiversity, use of natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy*'.

Within the over-arching roles that the planning system will play, a set of 12 '*core land-use planning principles*' have been developed to underpin place-shaping and decision making. The 10th principle is '*conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations*'.

When determining planning applications local planning authorities should take account of:

- *'the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;*
- *the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and*
- *the desirability of new development making a positive contribution to local character and distinctiveness'.*

Further to this, local planning authorities can request that the applicant should describe '*the significance of any heritage assets affected, including any contribution made by their setting*'. The level of detail required in the assessment should be '*proportionate to the assets importance and no more than is sufficient to understand the potential impact of the proposal on their significance*'. '*Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation*'.

Local planning authorities should take this assessment into account when considering the impact of a proposed development, '*to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal*'.

A key policy within the NPPF is that '*when considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation. The more important the asset, the greater the weight should be'*. Further, '*significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated heritage assets of the highest significance, notably scheduled monuments, protected wreck sites, battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional*'.

However, where a proposed development will lead to '*less than substantial harm to the significance of a designated heritage asset*', this harm should be weighed against the public benefits of the proposal.

With regard to non-designated heritage assets specific policy is provided in that a balanced judgement will be required having due regard to the scale of any harm or loss and the significance of the heritage asset affected.

M.3.2 LOCAL POLICY

The Conservation and Enhancement of the Historic Environment Policies - EN4, EN7 and EN12, following a Direction by the Secretary of State, as of 18/07/2009 are no longer valid planning policies within South Holland District Council (SHDC).

'The settlements of South Holland reflect the evolution of the District. The centres of many settlements contain fine examples of older buildings and historic street patterns demonstrating the social, religious, economic, political and physical circumstances which have shaped their development. Spalding is the largest town in the District and has origins dating back to the eleventh century'.

Overall, the proposed development will not have any significant effect upon any archaeological remains and provisions are made within the proposal to safeguard buried archaeological artefacts.

The visual influence of the development is considered unlikely to extend beyond a 2km radius of the development site. This is partly due to the lack of suitable vantage points, the flat topography and the limited number of visual receptors. It found that there are three listed building locations associated with the study area. However, the assessment has shown that here would also be no significant effect to the setting and perception of the listed buildings within the wider landscape.

The LVIA has demonstrated that the anticipated residual effect upon landscape character would be minimal due to the scale of the development and the effective screening function of existing vegetation, mitigation planting and surrounding topography. The proposed development would not modify the existing topography or field patterns and would not require the removal of significant existing vegetation to accommodate the development.

In addition, the proposed development is not within a conservation area and does not have any significant effect upon scale and style of surrounding buildings with the conservation area.

M.3.3 POLICY SUMMARY

Consultation with HER alongside this assessment indicates that there is a low / negligible likelihood of a significant effect as a result of the proposed development.

The development of a solar farm using 'string inverters' is a low impact development that does not require extensive excavation, particularly where 'concrete shoes' are used for mounting the solar module tables.

M.4 the Setting of Heritage Assets:

The methodology for assessing potential development effects through the alteration of a heritage asset's setting has followed that recommended in the English Heritage publication the Setting of Heritage Assets (SHA)[19]. The document provides guidance on setting and development management, including assessing the implications of development proposals.

SHA defines 'setting' as '*the surroundings in which an asset is experienced. All heritage assets have a setting, irrespective of the form in which they survive and whether they are*

[19] https://www.english-heritage.org.uk/publications/setting-heritage-assets/setting-heritage-assets.pdf

designated or not. 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'[20].

The guidance notes that '*the extent and importance of setting is often expressed by reference to visual considerations*' but also notes that setting also comprises other elements that contribute to how one experiences a heritage asset, including factors such as noise, dust and vibration; by spatial associations; and by an understanding of historic relationships. Therefore setting comprises one element of the overall 'value' of a heritage asset.

M.5 Settings Assessment Methodology:

Initial appraisal of designated heritage assets within the wider environs of the Application Site was carried out using information provided by the National Heritage List, England. A 2km study area was utilised during the settings assessment. The settings assessment was informed by a ZVI centred on the site. The ZVI demonstrated potential visibility of the site in the landscape and was designed to take into account the potential screening effect of landscape features. Designated heritage assets outside of the ZVI were removed from the assessment.

The following designated heritage assets are located within the 2km of the study area and were identified as being potentially affected by development:

- Grade 2 Listed Building - Reference 25374-MLI94515 – Grade 2 Listed Building – Guanock House - dating from 1669, with modern 20 Century adaptions.
- Grade 2 Listed Buildings - Reference 252-ML194389 – Grade 2 Listed Farmhouse post medieval to modern, 1750AD. Building mostly dating from the 18th Century.
- Reference ML120507 – evidence of crop marks that maybe depicting or indicating the presence of a past Roman Drove Road or Dyke, near and just north- north-west of Guanock House.
- Reference 20505 – ML120505 – site at Guanock House where is thought to be the site of MONKDOLES, where the coin hoard was found within a rectangular double moat.
- Reference 20502 – double ditch linear feature which may be indicating a stretch of RB Drove Road or dyke, adjoining the current day Hallgate Farm.
- Reference 20500 – double ditch linear feature which may be a line of RB Drove Road or dyke. This appears as an extension of the listing near Hallgate Farm.
- Reference EL12167 – record of geophysical survey undertaken for Fenndyke Solar farm – no magnetic anomalies found.

In assessment of the above listings there is no intervisibility between the above locations and the proposed development as a result of the intervening built infrastructure, the topography of the landscape and the surrounding shelter belts that provide screening to the listed buildings. To the SAM of Sun Cross, immediately beyond the north-west boundary of

[20] EH 2011

the proposed development there is no intervisibility as a result of the built environment and the topography of the landscape.

There are a cluster of further Listed Buildings within the village of Sutton St James in excess of 3km from the site. There again is no intervisibility between these locations and the proposed development as a result of the intervening built infrastructure, the intervening built environment and the topography.

There are no World Heritage Sites, Registered Parks and Gardens of Special Historic Interest or Registered Battlefields within the Application Site or its vicinity.

The second step of the English Heritage guidance is to assess whether, how and to what degree these settings make a positive contribution to the value of the heritage asset(s), i.e. 'what matters and why'. This includes a consideration of the key attributes of the heritage asset itself, then considers:

- the physical surroundings of the asset, including its relationship with other heritage assets
- the way the asset is appreciated
- the asset's associations and patterns of use.

The third step is to assess the effect of the proposed development on the value of assets through the consideration of the key attributes of the proposed development in terms of it's:

- location and siting
- form and appearance
- additional effects
- permanence

The fourth step is to maximise enhancement and minimise harm and step five is making and documenting the decision and monitoring outcomes.

The applicant has assessed and included the consideration of steps 1 to 3 with respect to the heritage assets listed above.

M.6 Consultation for HER from Lincolnshire County Council:

Consultation with Lincolnshire County Council Historic Environment Records (LCC HER) has identified records within the search area that maybe affected by the proposed development. These records and location of reference to the monuments are provided within Appendix 23a-c. Review of these HER indicate that all findings are identified as remote from the site. None are registered as being found within the boundary of the proposed site.

M.7 The Value of Heritage Assets:

The significance of effect of the proposed development has been assessed with reference to the value of the cultural heritage and historic environment resource being affected and the magnitude of the change. This includes both physical effects of development and non-physical effects, such as the visual alteration within a heritage asset's setting. The methodology employed in the assessment of the significance of the effect of the development is based upon that outlined in HA 208/07. This is recognised as the most up-to-date and rigorous methodology available for cultural heritage assessment, and the only one adopted by a government agency. The methodology is also based on English Heritage's *Conservation Principles* (EH 2008) and *The Setting of Heritage Assets* (EH 2011).

As described in the Policy Framework section below the 'significance' of a heritage asset is defined in NPPF as the value of a heritage asset to this and future generations because of its heritage interest. With regards to the policy given in the NPPF, the significance of a heritage asset is termed 'value' in this report to avoid potential confusion with the term 'significance of effect'.

The assessment of value has been primarily guided by the policies and guidance contained in 'Conservation Principles'. The value of a heritage asset (termed 'place' within Conservation Principles) is defined with reference to four areas of value:

- **EVIDENTIAL VALUE** derived from '*the potential of a place to yield evidence about past human activity*'[21] and primarily associated with physical remains or historic fabric.
- **HISTORICAL VALUE** derived from '*the ways in which past people, events and aspects of life can be connected through a place to the present*'[5]. This can derive from particular aspects of past ways of life, or association with notable families, persons, events or movements;
- **AESTHETIC VALUE** derived from sensory and intellectual stimulation and including design value, i.e. *'aesthetic qualities generated by the conscious design of a building, structure or landscape as a whole'*[5]. It may include its physical form, and how it lies within its setting. It may be the result of design, or an unplanned outcome of a process of events; and
- **COMMUNAL VALUE** derived from '*the meanings of a place for the people who relate to it*'[5]. Communal value derives from the meanings that an historic asset has for the people who relate to it, or for whom it's in their collective experience or memory. It may be commemorative or symbolic, such as meaning for identity or collective memory.

Further relevant guidance on informing judgement of heritage value includes the aims and objectives set out in the publication The Archaeology of South West England: South West Archaeological Research Framework Resource Assessment and Research Agenda[22] and Tables 5.1, 6.1 and 7.1 of Annexes 5, 6 and 7 respectively of HA 208/07.

[21] https://www.english-heritage.org.uk/publications/setting-heritage-assets/setting-heritage-assets.pdf
[22] Webster 2007

The NPPF also identifies designated heritage assets of 'the highest significance' namely:

- Scheduled Monuments;
- protected wreck sites;
- Registered Battlefields;
- Grade I and II* Listed buildings;
- Grade I and II* Registered Parks and Gardens; and
- World Heritage Sites.

Criteria for assessing heritage asset value are set out below;

TABLE M.1: CRITERIA FOR ASSESSMENT OF THE VALUE OF HERITAGE ASSET(S)	
VALUE OF RESOURCE	**DESCRIPTION**
HIGH	World Heritage Sites and heritage assets of acknowledged international importance, or that can contribute significantly to acknowledged international research objectives. Historic landscapes of international sensitivity (designated or not) and extremely well preserved historic landscapes with exceptional coherence, time depth, or other critical factor(s). Scheduled Monuments and undesignated assets of Schedulable quality and importance, according to the non-statutory criteria for scheduling ancient monuments utilised by the Secretary of State. Heritage assets displaying considerable evidential, historic, aesthetic or communal value as identified by Conservation Principles. Heritage assets or groups of assets that can contribute substantially to acknowledged national research objectives. Historic landscapes exhibiting considerable coherence, time depth or other critical factors and displaying considerable evidential, historic, aesthetic and communal value as identified by Conservation Principles. The landscape may or may not be associated with Scheduled Monuments. Grade I and II* Listed buildings or other Listed buildings that can be shown to have exceptional qualities in their fabric or associations not adequately reflected in their Listing grade, or undesignated structures of clear national importance. Conservation Areas containing very important buildings
MEDIUM	Heritage assets that are not Scheduled and that do not meet the criteria for Scheduled Monuments according to the non-statutory criteria for scheduling ancient monuments utilised by the Secretary of State. Heritage assets displaying evidential, historic, aesthetic or communal value as identified by Conservation Principles. Heritage assets, or groups of assets or landscapes, that contribute to regional research objectives, particularly those identified in the Regional Research Framework for the South-West of England. Historic landscapes exhibiting reasonable coherence, time depth or other critical factors (including degree of preservation) and displaying evidential, historic, aesthetic and communal value as identified by Conservation Principles. Grade II Listed buildings or historic buildings. Conservation Areas containing important buildings which contribute significantly to their historic character or historic townscapes with important historic integrity.
LOW	Heritage assets displaying limited evidential, historic, aesthetic or communal value as identified by Conservation Principles Heritage assets, or groups of assets, that contribute to a limited degree to regional research

	objectives, particularly those identified in the Regional Research Framework for the South-West of England Historic landscapes exhibiting limited coherence, time depth or other critical factors and displaying evidential, historic, aesthetic and communal value as identified by Conservation Principles. Historic landscapes whose sensitivity is limited by poor preservation and/or poor survival of contextual associations.
NEGLIGIBLE	Heritage assets with very little or no surviving archaeological interest, and little or no evidential, historic, aesthetic or communal value as identified by Conservation Principles. Heritage assets or groups of assets that cannot appreciably contribute to acknowledged regional research objectives. Historic landscapes exhibiting little or no coherence, time depth or other critical factors and displaying evidential, historic, aesthetic and communal value as identified by Conservation Principles. Buildings of no architectural or historical note and buildings of an intrusive character.
UNCERTAIN	The importance of the resource has not been ascertained. Archaeological resources the importance of which cannot be ascertained. Buildings with some hidden (i.e. inaccessible) potential for historical significance.

M.8 The Magnitude of Development Change upon Heritage Assets:

The classification of the magnitude of change on heritage assets is rigorous and based on consistent criteria. This takes account of such factors as the physical scale and type of disturbance anticipated to affect them and whether features or evidence would be lost that are fundamental to their historic character and integrity. Changes may be adverse or beneficial. Depending on the nature of the change and the duration of development, effects can be temporary and/or reversible or permanent and irreversible. The magnitude of the change is assessed using the criteria in Table M.2. This is based on Tables 5.3, 6.3 and 7.3 of Annexes 5, 6 and 7 respectively of HA 208/07.

The descriptions of change describe the ways in which an asset or elements of its setting may be modified or removed by the proposed development, and will include the consideration of such issues as which and how many elements of an asset are affected; whether the change physically modifies the asset or whether it comprises changes in visual aspects, noise or access that would alter its setting; and whether the change in the significance of an asset will be adverse or beneficial.

TABLE M.2: THE ASSESSMENT OF MAGNITUDE OF CHANGE	
MAGNITUDE OF CHANGE	**DESCRIPTION**
HIGH	Change to most or all key archaeological or historic building elements, such that the asset is totally altered. Total changes to setting of archaeological or historic building assets. Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to the character of a historic landscape area.
MEDIUM	Changes to many key archaeological or historic building elements, such that the asset is noticeably modified

	Changes to setting of archaeological or historic building assets, such that it is noticeably modified Changes to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to the character of a historic landscape area.
LOW	Changes to key archaeological or historic building elements, such that the asset is slightly modified Changes to setting of archaeological or historic building assets, such that it is slightly altered and noticeably changed Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; limited changes to noise levels or sound quality; slight changes to use or access; resulting in limited changes to the character of a historic landscape area.
NEGLIGIBLE	Very minor changes to archaeological or historic building elements or setting Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in very small change to the character of a historic landscape area.
UNCERTAIN	No change to archaeological elements or historic building fabric and setting No change to elements, parcels or components; no visual or audible changes; no changes arising from amenity or community factors

M.9 The Significance of the Effect of Development:

Following the evaluation of the value of the cultural heritage and historic environment resource and the magnitude of the change, the significance of the effect after mitigation is assessed using the matrix shown below in Table M.3. This is based on Table 5.1 of HA 208/07. Where two alternatives are given in the table, professional judgement is used to decide which best reflects the significance of the effect of the impact identified. The significance of effect may be adverse or beneficial.

TABLE M.3: DETERMINATION OF THE SIGNIFICANCE OF EFFECT

		VALUE OF RECEPTOR			
		HIGH	**MEDIUM**	**LOW**	**NEGLIGIBLE**
MAGNITUDE OF CHANGE	**HIGH**	Major	Major	Moderate	Negligible
	MEDIUM	Major	Moderate	Minor to Moderate	Negligible
	LOW	Moderate	Minor to Moderate	Minor	Negligible
	NEGLIGIBLE	Negligible	Negligible	Negligible	Negligible

The significance of the judged effect is then discussed, in line with qualitative description of the significance of effect (Table M.4), which summarises the 'qualitative' effect with reference to key planning policy. Key principles that are considered are whether the change comprises substantial harm or total loss, and whether the asset is of a significance that such a change should be exceptional, or indeed wholly exceptional.

TABLE M.4: QUALITATIVE DESCRIPTION OF THE SIGNIFICANCE OF EFFECT	
Major Adverse	Substantial harm or total loss of the value of a designated heritage asset (or

	asset worthy of designation) such that Development should not be consented unless substantial public benefit is delivered by the Development. Total loss of a non-designated heritage asset of medium value (i.e. which may contribute to regional research objectives) without compensatory mitigation measures agreed with statutory consultees
Moderate Adverse	Less than substantial harm or total loss of the value of a designated heritage asset (or asset worthy of designation) such that the harm should be weighed against the public benefit delivered by the Development to determine consent. Total loss of a non-designated heritage asset of medium value (i.e. which may contribute to regional research objectives) with compensatory mitigation measures agreed with statutory consultees Harm to a non-designated heritage asset, of a greater degree than that perceived of as Minor Adverse, which should be taken into account in determining an application.
Minor Adverse	Harm to a non-designated heritage asset that can be adequately compensated through the implementation of a programme of industry standard mitigation measures. Less than substantial harm to the value of a designated heritage asset, of a lesser degree than that perceived as Moderate Adverse, but which should still be weighed against the public benefit delivered by the Development to determine consent.
Neutral / not significant	Effect that is nil, imperceptible and not significant.
Minor Beneficial	Development will deliver a positive contribution and / or better reveal the value of a non-designated heritage asset.
Moderate Beneficial	Development will deliver a positive contribution and / or better reveal the value of a designated heritage asset (or asset worthy of designation) such that an application should be treated favourably.
Major Beneficial	Development will deliver a positive contribution and / or better reveal the value of a heritage asset of recognised international value such that an application should be treated very favourably.

M.10 Baseline Conditions:

M.10.1 SITE DESCRIPTION AND CONTEXT

The proposed development is located in a rural area within the Parish of Sutton St James, Lincolnshire. To the north-west and south west of the site are the local roads of Goochgate and New fen Dike respectively the other perimeter boundaries are either drainage ditches or agricultural land. The land is relatively level but does have intermediate high spots and the variation in level is just over a metre, ensuring that views across the site are limited by the natural topography of the site.

The proposed development site consists of three separate fields, occupying a gross land area of approximately 11.81 Ha.

There are no Public Rights of Way (PROWs) affected within the site.

M.10.2 GEOLOGY AND TOPOGRAPHY

The site falls within National Landscape Character, NCA 46 The Fens, and more relevantly the local Landscape Character Area, LCA Landscape Character Area, published by LDA Design as, Group 2 Fenland and Fenland Margins, and is on the boundary of the Regional Landscape Character Type 2g – Planned and Drained Fens and Carrlands.

The LCA is broadly comprised of the large scale flat open landscape with extensive vistas, distant horizons and big skies. Flat horizons are noted within the character assessment but horizons within the local landscape study area are broken by tall trees and distant views to the west of, electricity pylons and built form, e.g. wind turbines. The majority of the small settlement of Sutton St James is within the study area, but this is soon absorbed into the remoteness and isolation of the landscape. The intervening shelter belts and built form do not permit any intervisibility between the proposed site and the Sutton St James settlement. There is a hierarchy of rivers, drains and ditches that provide a strong influence throughout the area. The rivers, drains and ditches are laid out in a regular pattern which adds some symmetry into the landscape. There is sparse woodland cover ensuring isolated field trees have a marked significance. Where woodland cover is present it typically forms a shelter belt to isolated farmsteads or forms a tree-lined avenue. Shelter belts including poplar, willow and non-native leylandii and hedgerows around isolated farm buildings and houses are common in the landscape.

The landscape is generally formed of well managed agricultural holdings, used for; growing arable crops, grazing and glass-house horticultural businesses. Fields are typically rectilinear and of medium to small scale, however there are frequent local variations to this that comprise clusters of intimate open fields and the occasional broader open fields. Field boundaries are generally a mix of grass verges and field perimeter ditches with isolated shrubs and trees. Boundary hedges and tall trees provide enclosure to a variety of agricultural activities and isolated farmsteads and dwellings including, but not limited to; deer, turkey, sheep farms and private gardens with some tall shelter belts to farmsteads.

Settlement patterns and character within the area mainly date from the 18th and 19th Century as they are first shown on the Cassini Map 1805-1874 (Appendix 21). This indicates the mix of village settlement development and ribbon expansion along specific road corridors (Sutton St James); as well as the sporadic isolated farm holdings scattered across the area. The villages, located on isolated higher ground islands, generally remain hidden within the modern day landscape by the underlying flat topography and the intervening built form and shelter belts.

There is an absence of any major arterial transport corridor, rural road corridors of Old Fen Dike, Fishers Gate and Broad Gate are the main transport links to the adjoining villages of Sutton St Edmund and Tydd St Giles. The influence within the landscape is significant, often elevated ensuring that movement of vehicles within the wider rural landscape is visible. Otherwise the network of rural lanes leaves large expanses of intact countryside.

There is clutter within the wider landscape as a result of built form, electricity pylons, timber mounted telephone and electricity lines. Sutton Bridge Power Station and wind turbines can be seen on the horizon to the east. More locally isolated farm scale wind turbines are visible.

M.10.3 DESIGNATED HERITAGE ASSETS

Scheduled Monuments

No Scheduled Monuments are located within the site or within the study area.

Listed Buildings

No Listed Buildings are located within the site, other than Sandygate and Guanock House. The setting of both of these Grade 2 listed buildings will be unaffected as a result of the existing tree and hedgerow screening, both of the site and their existing boundaries. The impact is assessed as moderate adverse.

Local Designations

There are no conservation areas within the study area. The 'harm' to any conservation areas beyond the study boundary is considered to be negligible.

M.11 Archaeological Potential of the Site:

The entire village of Sutton St James is a medieval settlement.

Throughout the medieval period the town continued to prosper as an important port, until it became landlocked by silt in the 15th and 16th centuries.

Settlement patterns and character within the area mainly date from the 18th and 19th Century as they are first shown on the Cassini Map 1805-1874 (Appendix 21). This indicates the mix of village settlement development and ribbon expansion along specific road corridors (Sutton St James); as well as the sporadic isolated farm holdings scattered across the area. The villages, located on isolated higher ground islands, generally remain hidden within the modern day landscape by the underlying flat topography and the intervening built form and shelter belts.

There is an absence of any major arterial transport corridor, rural road corridors of Old Fen Dike, Fishers Gate and Broad Gate are the main transport links to the adjoining villages of Sutton St Edmund and Tydd St Giles. The influence within the landscape is significant, often elevated ensuring that movement of vehicles within the wider rural landscape is visible. Otherwise the network of rural lanes leaves large expanses of intact countryside.

As a settlement of great age with still a relatively high level of usage it is regarded as a village of historic value. The broad scale of this makes it somewhat hard to classify the sensitivity. As an entire village it would most likely have been visible from some distance away, however, it is highly unlikely that this was the intention. Whilst there are a number of assets of substantial historic value in the village the built environment has been subject to great

amounts of change since it was established, meaning the village is thought to be of medium sensitivity.

The solar farm is a low profile development. As a result, available views from nearby roads and farmsteads are limited due to shelterbelt vegetation, crops and by the lack of suitable vantage points. Close up views of the solar farm are considered to be 'moderately adverse' due to the open character of the fenlands and large scale nature of the development. This means the historical setting and character of the village will remain predominantly unharmed by the solar farm with the significance of change being deemed to be moderate / minor.

There is clutter within the wider landscape as a result of built form, electricity pylons, timber mounted telephone and electricity lines. Sutton Bridge Power Station and wind turbines can be seen on the horizon to the east. More locally isolated farm scale wind turbines are visible.

M.12 The Proposed Development Site:

M.12.1 POTENTIAL FOR CURRENTLY UNRECORDED ARCHAEOLOGICAL REMAINS

There is potential for unrecorded heritage assets to exist within the site. Evidence for activity prior to the medieval period is extremely limited within the study area, and while this may in part be explained by a lack of archaeological investigation, this pattern mirrors the wider archaeological resource of the region. From the medieval period onwards, the site appears to have had a history of quarry workings, however in recent times the land has been in permanent use of rough unimproved grassland. With previous evidence of quarry activity there is likely to have been considerable disturbance, as noted with nearby archaeological investigations and we would not expect to yield significant unrecorded archaeological remains.

M.12.2 LIKELY SIGNIFICANT EFFECTS

Recorded Heritage Assets and Their Value

No designated heritage assets or non-designated heritage assets recorded by English Heritage, Lincolnshire HER or the NMR lie within the Application Site. There are no Field marks and Boundaries registered relating to former field boundaries and possible field ridges and furrows are not recorded to the east and north of the proposed development site.

M.12.3 IDENTIFICATION OF EFFECTS

Construction (Physical Impacts)

The Proposed Development has a highly limited footprint. Approximately 30% of the area within the proposed development site would be covered by solar panels although considerable areas of grassland are proposed bordering and underneath the panels. The solar panels would stand no more than 2m in height and will be set out in 'strings' linked to inverters and a substation. The construction of solar panels requires the uprights to be 'augured' or 'pushed' into the ground to a depth of approximately 1.5m, dependent upon

ground conditions (or use of concrete shoes mounted at ground-level). Concrete shoes require no excavation works beyond the depth of a plough and will only be used in areas where there is a likelihood of significant effect to any buried archaeological artefact. Cables linking the panels are installed in cable tray below the modules and the high voltage cables are buried below ground in narrow trenches (Appendix 8). These cables link the panels to the transformers and substation which are constructed on surface foundations without extensive groundwork. Likewise the access tracks would require very limited movement of topsoil and no ground work at any depths.

Operation (Non-Physical Effects)

Development may also have non-physical effects, including visual alterations to the settings of designated heritage assets. The potential contribution of 'setting' to the value of heritage assets is identified in the NPPF (section 12) and in heritage guidance including the English Heritage publication 'SHA: English Heritage Guidance'.

M.12.4 EVALUATION OF EFFECTS (INCLUDING MAGNITUDE OF CHANGE)

Construction (Physical Effects)

No significant heritage assets have been recorded within the proposed development site therefore the development will have no physical impact on any known heritage assets.

Operation (Non-Physical Effects)

The effect of the Proposed Development upon the value of designated heritage assets within a minimum 2km study area, through the alteration of their setting, was assessed in accordance with English Heritage guidance. All of the registered built heritage assets were noted as Grade II Listed building(s) hence all are considered to be a heritage asset of **Medium** value.

However there is no intervisibility between these assets and the proposed development as a result of their shelter belts. Hence for all the magnitude of change is therefore considered to be **Low**.

The significance of effect is considered to be **minor adverse** for all. This reflects the fact that there is screening by the existing hedgerows and shelter belt trees and that the buildings does not have a direct view overlooking the proposed solar arrays.

M.13 Significance of Effect:

M.13.1 CONSTRUCTION (PHYSICAL EFFECTS)

The Significance of Effect of the Proposed Development is summarised in Table M.5. It has a limited footprint and will not result in the complete removal of any heritage assets beyond its site perimeter. It will have no effect of any significance on any heritage asset as there is no intervisibility between these assets and the proposed site.

M.13.2 OPERATION (NON-PHYSICAL EFFECTS)

The Significance of Effect of the Proposed Development is summarised in Table M.5. It has a limited footprint and will not result in the complete removal of any heritage assets beyond its perimeter. It will have no effect of any significance on any heritage assets as there is no intervisibility between these assets and the proposed site. Where there is some significance of effect for Quebec Farm this is summarised in Table M5.

M.5 - SIGNIFICANCE OF EFFECT				
RECEPTOR	**VALUE**	**TYPE OF CHANGE**	**MAGNITUDE OF CHANGE**	**SIGNIFICANCE OF EFFECT**
Sandy Gate Farm House	Medium	Partial loss - of wider agricultural setting	Low	Minor Adverse
Guanock House	Medium	Partial loss - of wider agricultural setting	Low	Minor Adverse
All others	Medium	No loss – there is no view	Negligible	Negligible

M.13.3 MITIGATION AND ENHANCEMENT

Investigation of the Application Site through desk-based assessment has not revealed evidence of remains that on current evidence are likely to be of any value. In areas of Proposed Development and landscaping it is likely that any below ground archaeological remains will be subject to limited disturbance.

M.13.4 RESIDUAL SIGNIFICANCE OF EFFECT

Appropriate archaeological mitigation has been identified within this section. These measures will allow both known and potential archaeological remains to be appropriately managed and recorded. The results of these measures will, in the instance of remains being present, add to archaeological knowledge of the area. It is, however, noted that such information does not reduce the identified effects of development upon remains, and thus the residual significance of effects are of the same level as identified under 'significance of effect' section above.

M.13.5 CUMULATIVE EFFECTS

There are no other operational or proposed (in the planning system) solar farms within the 2 km study area therefore there will not be subjected to any cumulative affect by this development site.

M.14 Summary:

This assessment concludes that archaeological features recorded within the site do not compromise heritage assets and construction will result in minimal below ground impacts. Physical impact of the development on known heritage assets is therefore considered to be **negligible**.

There is very limited potential for currently unrecorded heritage assets within the site. There is no evidence of human activity within the study area prior to the medieval period, although

this may be a result of a lack of study. From the medieval period onwards, the site formed part of Lincolnshire's agricultural hinterland. The potential for significant, currently unrecorded, archaeological remains to occur within the site is considered to be low.

The assessment concluded that the proposed development will not lead to '*substantial harm to or total loss of significance of a designated heritage asset*' as defined within NPPF Paragraph 133. No heritage issues have been identified that would influence or preclude development within the site and the proposed development will not conflict with national or local policy relating to the protection of heritage assets.

N) DRAINAGE, SURFACE WATER RUN-OFF AND FLOODING

Please read this chapter alongside Appendix 20a-f: Flood Risk Assessment Calculations.

N.1 Introduction:

N.1.1 SCOPE

BE Renewables, on behalf of Little Eau Solar Limited, have undertaken a Flood Risk Assessment (FRA) for the proposed development of a photovoltaic solar farm at 'Little Eau', Spalding, Lincolnshire.

This Flood Risk Assessment (Level 1)[23] has been carried out in accordance with the requirements of the National Planning Policy Framework (NPPF)[24].

NPPF sets out the framework for planning decisions made by local, regional and national government and the Environment Agency (EA). NPPF advises that FRAs are required for all developments in Flood Zones 2[25], 3a[26] and 3b[27] and for all development sites in Flood Zone 1 that are 1 hectare or greater.

The proposed development site is in Flood Zone 3a and covers an area of 11.81 hectares; therefore, a FRA is required.

The aim of this assessment is to establish the flood risk associated with the development. The objectives are summarised as follows:

- Establish whether the existing and proposed development is likely to be affected by current or future flooding,
- Assess the potential impacts of the development on flood risk elsewhere, and
- Determine any necessary mitigation measures required to manage flooding issues at the site in a sustainable way.

The FRA looks at these objectives with regard to rivers, the sea, surface water and groundwater flood risk posed to the site.

[23] FRA Level 1 is a screening study to identify whether there are any flooding or surface water management issues related to a development site that may warrant further consideration. This is based on available information including the SFRA. The screening study will ascertain whether a FRA Level 2 or 3 is required (http://www.ciria.org/downloads.htm).
[24] National Planning Policy Framework' and 'Technical Guidance to the National Planning Policy Framework', Department for Communities and Local Government (2012)
[25] Flood Zone 2 (medium probability) comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
[26] Flood Zone 3a (high probability) comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of sea flooding (>0.5%) in any year.
[27] Flood Zone 3b (functional floodplain) comprises land where water has to flow or be stored in times of flood.

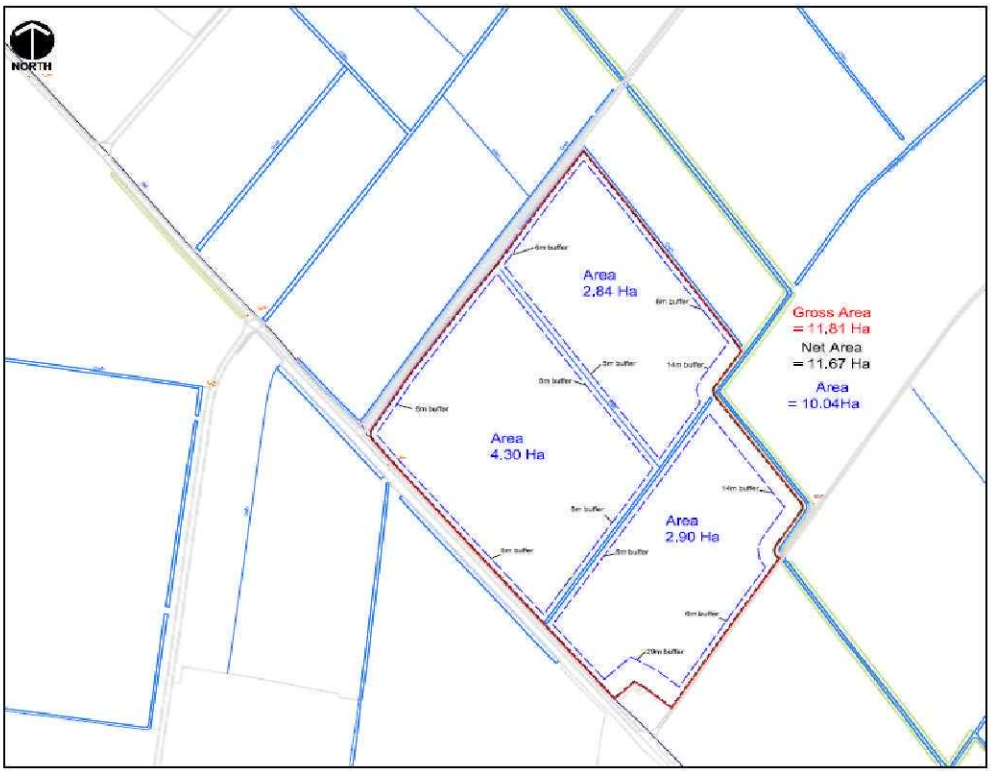
N.1.2 INFORMATION PROVIDED

The following sources/documents have been used to gather information for these calculations:

- SHDC - Update Of Strategic Flood Risk Assessment - Final Report (January 2010)[28]
- Environment Agency Data[29]
- Environment Agency Data as requested (Appendix 20f)
- Flood Estimation Handbook CD-ROM 3
- Winter Rainfall Acceptance Potential (WRAP) Map
- Sustainable Drainage Systems (SUDS) Manual (2007)
- Flood Studies Report (FSR) and Supplementary Report (FSSR)
- Institute of Hydrology Report Number 124 (1994)

N.2 Existing Site:

It will be on approximately 11.81 Ha of arable farming land located in the parish of Sutton St. James in Lincolnshire, approximately 3.5 km south west of the village of Sutton St. James. The national grid reference for the centre of the site is TF375159.



(Extract taken from Appendix 1 – Site Location Plan)

[28] http://www.sholland.gov.uk/lfra/SouthHollandUpdateofSFRAFinalReportJan2010.pdf
[29] http://maps.environment-agency.gov.uk/wiyby/wiybyController?value=PE12+0HD&submit.x=0&submit.y=0&lang=_e&ep=map&topic=floodmap&layerGroups=default&scale=9&textonly=off

Based on OS mapping contours the maximum ground level is 1m AOD in the centre of the site.

Rainfall currently falling on the existing surface infiltrates naturally into the soil. South Holland Main Drain (Minor River) is approximately 2 mile away.

N.3 Proposed Development:

It is proposed to develop a commercial scale solar PV farm. This is essentially the erection of metal support structures that in turn are supported by metal posts. The frame structures consist of steel uprights and aluminium cross bars. The uprights are 'augured' or 'pushed' into the ground to a depth of approximately 1.5m, dependent upon ground conditions. Typically the uprights are not driven into the ground meaning the existing ground conditions beneath the solar panels will be left largely undisturbed and in its existing and current state.

Based on the site layout plan (Appendix 2), the panels will be aligned in rows of typically 3 to 4-row landscape (Please note: either panel arrangement (landscape or portrait) may be arranged with no additional impact regarding flood risk. A minimum 20mm gap will allow water to drain off each module (the 20mm gap surrounds all sides of each module)).

The panels will be accessed by 4m temporary access tracks (Appendix 2 and 11), which will be constructed using permeable methods. Further landscape works are also put forward within the design proposal to ensure that the solar farm is installed in a way that protects the public water supply, wetlands and other water resource areas.

Installing solar arrays on undeveloped land can preserve the permeable nature of the land surface provided the project design minimises disturbance to natural vegetative cover, avoids concentrated runoff, and precipitation is otherwise recharged into the ground to the greatest extent practical. Water flow, as well as site specific soils and slope, is taken into account during the design and installation of the solar farm[30].

The underlying ground shall remain grassed and would be managed throughout the development's lifetime to ensure that the area of the solar farm remains suitably vegetated. The permeable nature of this would mean the existing ground characteristics for discharging rainwater would mostly remain unaffected.

[30] Ground-Mounted Solar Photovoltaic Systems – Questions and Answers – Clean Energy Results – December 2012. Massachusetts Department of Energy Resources, Massachusetts Department of Environmental Protection and Massachusetts Cleaner Energy Centre.

N.5 Flood Zone and Flood Risk Tables:

N.5.1 FLOOD RISK VULNERABILITY

In the Planning Practice Guidance[31], developments are classified according to their 'Flood Risk Vulnerability' as presented below. The Little Eau Photovoltaic Solar Farm site is classified as 'Essential Infrastructure' as it is a type of electricity generating power station.

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable • Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable • Police, ambulance and fire stations which are **not** required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water-Compatible Development • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations.

[31] http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

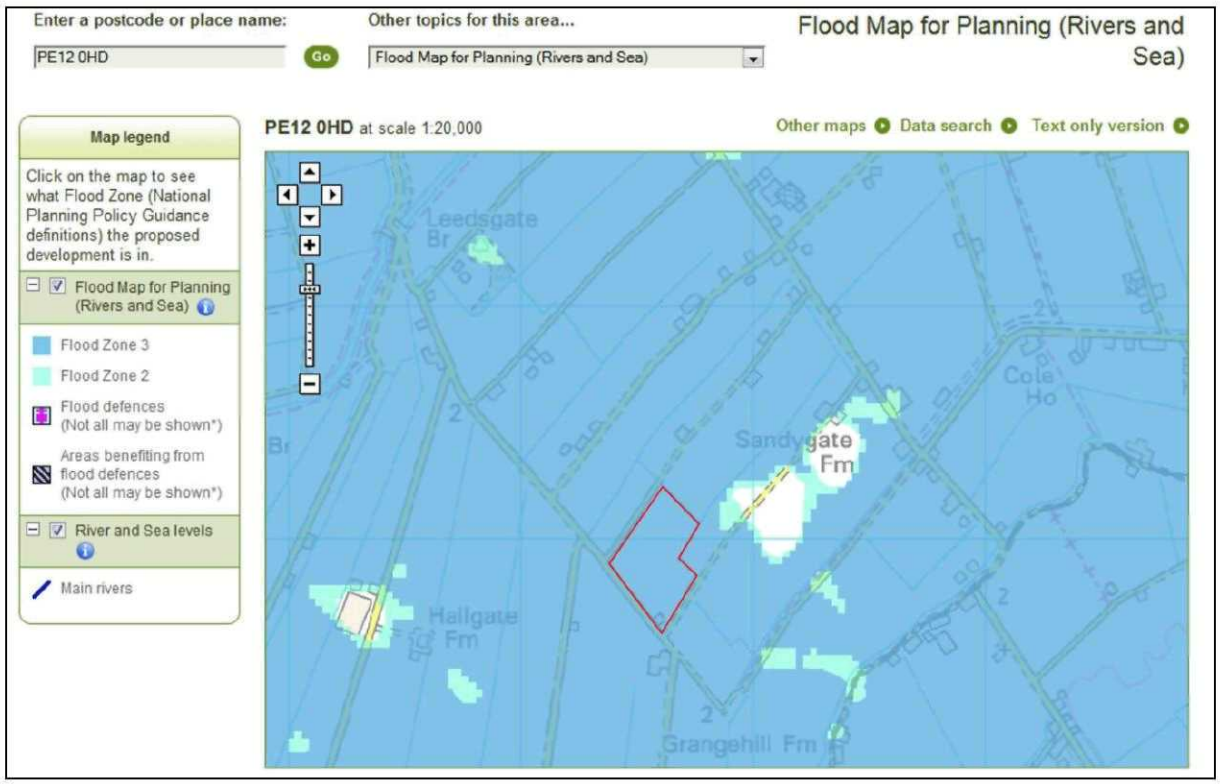
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

N.5.2 FLOOD ZONES

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the EA's Flood Map for Planning (Rivers and Sea), as indicated in the table below.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	**This zone comprises land where water has to flow or be stored in times of flood.** Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

The EA Flood Map for Planning (rivers and sea) shows the proposed development is located in Flood Zone 3a.



(Flood Map for Planning – Red Line Indicates the Location of the Proposed Development.
Courtesy of the Environment Agency © Environment Agency copyright and database rights 2013.
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N.5.3 FLOOD RISK VULNERABILITY AND FLOOD ZONE 'COMPATIBILITY'

The table below details that proposed development of this nature is acceptable following the completion of an acceptable 'exception test'. As such the project should be supported.

FLOOD ZONES	FLOOD RISK VULNERABILITY CLASSIFICATION				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

KEY:
✓ Development is appropriate
✗ Development should not be permitted.

NOTES TO TABLE 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- Not impede water flows and not increase flood risk elsewhere.

For the Exception Test to be passed:

1. it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
2. a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Both of the above are satisfied in this project.

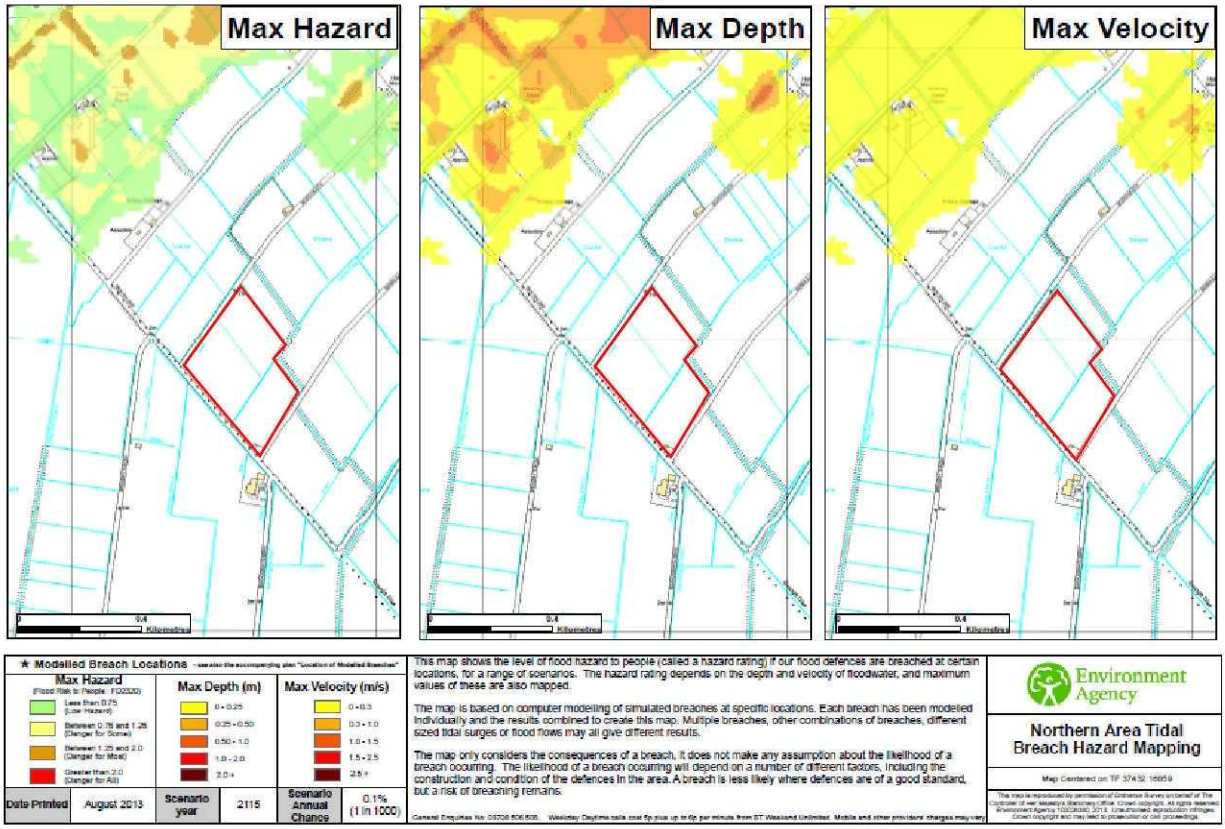
N.8 Flood Risk Assessment:

More than 50% of the District is within Flood Zone 3a. However, the actual risk of flooding in the district from primary sources such as rivers and the sea was assessed as being of

medium probability and low consequence (due to rural nature of the district) and medium probability from secondary sources such as sewers and drainage systems. However the IDB states that providing the drainage systems are operated and maintained properly, they are unlikely to pose a significant degree of flood risk.

The applicant made enquiries to the EA and as a result the EA provided the 'Flood Hazard Mapping' for the proposed Little Eau Solar Farm.

'Hazard Mapping – Breaching*: Appendix 20f encloses the plan showing the location of the breaches they modelled, together with the plan showing the maximum values of flood depth, velocity and hazard rating (danger to people) for the following scenario 'Year 2115 0.1% (1 in 1000) chance event'. Little Eau is not affected by breaching for the present day (2006) scenarios or 2115 0.5% scenarios.* ***Hazard Mapping – Overtopping****: Little Eau is not affected by overtopping for the present day (2006) scenarios or 2115 scenarios'.*



(EXTRACT FROM APPENDIX 20f - *Please note: Red Line Boundary added for illustration purposes*)

Developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, as well as the appropriate application of SUDS.

The project has been designed to retain all existing field boundaries. There are no plans to remove any existing vegetation, which will minimise any likely changes in the watercourse during the operational phase of the solar farm. The scheme does not interfere with any existing watercourse. The solar panels are angled between 25-35 degrees, so rainwater can flow off easily. SUDS will be put in place during the construction period.

The history of flooding in the area of the site has been investigated using the British Hydrological Society Database which is a historical flood events record. No specific data has been found for this site or adjacent land that has records of any flood events. Furthermore the SHDC SFRA does not record any historic flooding for the site.

N.8.1 RIVER AND SEA FLOOD RISK ASSESSMENT

The EA Flood Map for Planning (rivers and sea) shows that the site is located within Flood Zone 3a, within in an area at high risk of flooding from the rivers and sea. However, the proposed solar farm development is considered suitable in Flood Zone 3a with the key recommendations below:

• All sensitive electrical equipment should be located above predicted flood levels.

• Solar Panels should be anchored down sufficiently to avoid flotation in a flood and to prevent damage to the panels themselves or to surrounding property.

• Any ground raising should be avoided, as this could increase flood risk elsewhere.

•It is recommended that the site operator signs up to receive flood warnings from the EA to facilitate the safe management of the site during flooding incidents.

N.8.2 OTHER SOURCES OF FLOODING

- **Overland Flow** – overland flow from the surrounding areas is not considered an exposure to flood risk. The soils are consistently permeable and the pattern of field boundary drainage ditches provides an enlarged area to intercept and surface water run-off.
- **Sewer Network** – there are not known to be any local public sewers in the vicinity of the site.
- **Groundwater** – groundwater table is controlled by the North Level District IDB in maintaining a level of freeboard within their managed drains. In reference to the operating regime and responsibilities of the North Level District IDB flooding as a posed risk from groundwater is therefore a negligible risk.
- **Climate Change** – the threat of flooding as posed by increased rainfall arising as a result of changes to the rainfall pattern and intensity is not considered to be a significant threat. The site surface will be managed grassland and will provide a sustainable drainage solution similar to the existing site conditions. Any rainfall will permeate through the soil and any surface run-off will be intercepted by the pattern of field boundary ditches. These ditches are to remain and will be maintained for this purpose. The impact of climate change on rising sea levels and river levels has been considered by the EA and their response can be reviewed in Appendix 20f.
- **Coastal and River Flooding** – in response to enquiries the EA have confirmed that the site is considered to be at risk of flooding.

N.9 Surface Water:

N.9.1 SURFACE WATER RUNOFF RATES

The NPPF requires that the potential increase in flood risk elsewhere through the addition of hard (impermeable) surfaces and the effect of the proposed development on surface water runoff is assessed in the FRA. An increase in hard surfaces could increase the surface water runoff from the site to the adjoining drainage network if no mitigation measures are included.

The EA advises that proposed developments should provide a significant betterment in terms of surface water runoff rates compared to the existing site.

The surface water storage requirements for the site at Little Eau can be seen in full in Appendix 20a-e.

To summarise, the suggested maximum required storage volume for the 100 year climate change event, based on a design life of 25 years, with a 10% increase in rainfall intensity and 20% increase in river flow based on the Environment Agency guidance[32] is approximately **2.5m³**.

		RETURN PERIOD					
Impermeable Area (Ha)	**Required storage volume (m3)**	1	2	10	30	100	**100+CC**
0.002868	Restricted to Qbar based on 6hr storm duration	0.27	0.58	1.05	1.49	2.12	**2.37**

N.9.2 CLIMATE CHANGE

There is an increasing body of scientific evidence that the global climate is changing as a result of human activity. Projections of future climate change indicate that more frequent short-duration, high-intensity rainfall and more frequent periods of long duration rainfall could be expected, in addition to rising sea levels. These kinds of changes will have implications for river flooding and also for local surface water flooding.

The importance of climate change in regard to flooding and development is highlighted in the EA Guidance to support the NPPF. The climate change recommended precautionary sensitivity ranges are shown below.

[32] https://www.gov.uk/flood-risk-standing-advice-frsa-for-local-planning-authorities https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296964/LIT_8496_5306da.pdf)

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Surface water runoff accounting for the climate change was assessed to ensure that an increased risk of flooding and the consequences of climate change are anticipated and mitigated. Accounting for this, the revised undeveloped runoff values from the development site are presented below.

RAINFALL EVENT	GREENFIELD RUNOFF FOR THE SITE WITH CLIMATE CHANGE ALLOWANCE (l/s/ha)
100 year + climate change	6.05

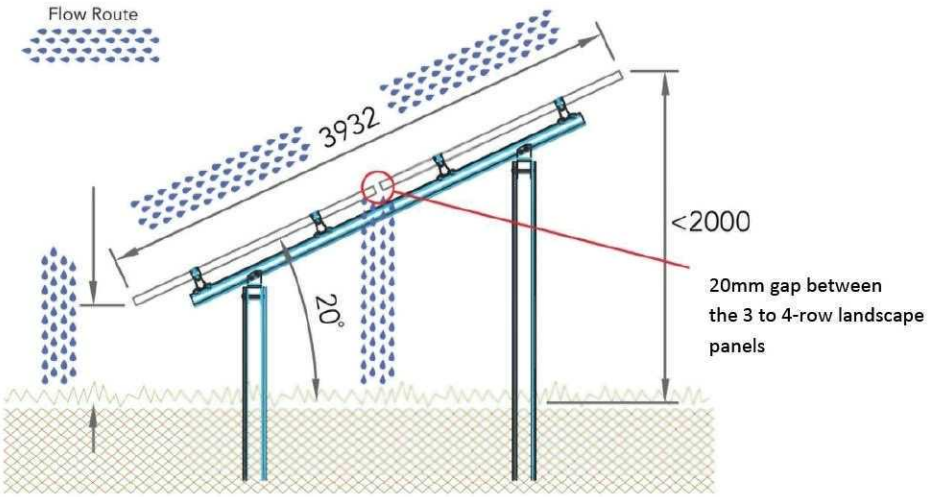
The impacts of climate change need to be taken into account when designing the new drainage infrastructure. Surface water attenuation systems need to be designed so there is no flooding to properties on or off-site for rainfall events up to 1 in 100 year return period (including the allowance for climate change).

N.9.3 POST DEVELOPMENT SCENARIO

The proposed development comprises areas of impermeable surfaces such as roof and hard standing. These changes will result in an overall increase in impermeable surfacing with a reduction in permeable surfacing (greenfield area), increasing surface water runoff at the site.

The area of impermeable surfacing will become 0.00287 hectares on site following the development. The impacts of the additional surface water contribution from the increased impermeable area will need to be mitigated by attenuating the additional discharge from the site. This will ensure that there is no increase in flood risk to areas surrounding the site.

The solar panels are located on a sloped frame, approximately 600mm above ground level. The solar panels will intercept rainwater and shed it onto the ground on the lower edge of each panel, also known as the drip-line. Whilst the panels would result in a concentration of rainwater along the drip-line of each row, water would be intercepted by the grass growing in-between and underneath the panels and allowed to infiltrate into the underlying soils in much the same way as the existing site conditions. The solar panels are arranged in four-row landscape orientation with a 'rain gap' between each panel. Rain will therefore not all be collected on the bottom edge of the array.



Example of Flow Route – (Property of BE Renewables Limited)

*Please Note: The area of the solar panels that is impermeable will discharge rainwater through the rainwater gaps and along the drip line. This water will then be able to permeate through the subsoil in much the same way as the rain water does in the pre-development conditions. Therefore the area of the solar panels has not been included as an impermeable surface.

Intensification of the runoff could occur beneath the lower end of the panels where the panels are aligned at variance to the contours. This would mean a slight increase than perhaps would occur at the undeveloped site. The EA would recommend, '*where panels are sited so that they do not follow the contours of the site, then intensification of the runoff into small channels could occur. It is recommended that vegetation beneath the panels is maintained and that a buffer strip or swale be placed below the most down gradient row of panels to intercept any overland flows. During construction unnecessary soil disturbance and trafficking on soils when they are wet should be avoided to prevent compaction*.'

It is proposed to allow the development to drain naturally, through the soil surface, where infiltration into the underlying soils would occur. This would mimic the existing hydrological characteristics of the site and result in minimal ground disturbance facilitating its return to its original state after the lifetime of the development.

Runoff from the roof of the substation and control room building would be controlled in filter trench on the downslope side of the buildings, to store and infiltrate runoff during extreme rainfall events.

Due to the small increase in impermeable surface area and proposed use of infiltration SUDS, no formal offsite drainage discharge is required. The practical approach will be to promote infiltration and natural storage across the site. This involves retaining the ground vegetation cover under the cells, utilising where possible the existing field drainage network, and the provision of SUDS filter trench elements associated with the substation/control room building.

N.9.5 FOUL WATER DRAINAGE

There is no proposed foul drainage for this site.

N.9.6 SUDS MANUAL, CIRCA C697 (2007)

The SUDS Manual aims to provide comprehensive advice on the implementation of sustainable drainage techniques in the UK. It provides guidance on:

- Initial planning;
- Design through to construction;
- The management of SUDS in the context of the current regulatory framework; and
- Advice on landscaping, waste management, cost and community engagement.

N.10 Affects Outside of the Proposed Development:

As previously mentioned, the extent of the impermeable areas added to the site is extremely small. Therefore any additional affects to adjacent sites, such as runoff, will be extremely small and more adequately managed by the swales. As these additions will be oversized in terms of improved storage and interception capacity, flood risk to adjacent sites will be significantly less than when compared to the pre-development situation.

- The panels are elevated by relatively small supporting piles above the flood extreme flood level. During a flood event the swales will provide compensatory storage that will offset any infilling of the flood plain.

- All the measures that will be undertaken in the construction and operation phases will meant that the proposed development should not affect flood risk relating to nearby watercourses and neighbouring sites.

N.11 Conclusions and Recommendations:

The flood risk to the proposed development site at Little Eau Photovoltaic Solar Farm has been assessed in accordance with the National Planning Policy Framework and Planning Practice Guidance.

A review of the Environment Agency Flood Zone Maps for planning (rivers and sea) shows that the site lies within Flood Zone 3a. From the flood risk analysis, we believe the proposed development site is classified as 'Essential Infrastructure'. Applying the approach in the Planning Practice Guidance shows that the proposed development would be suitable with the application of the Exception Test, part two of which has been addressed by this FRA.

The following recommendations are made:

- Any ground raising in this area should be avoided, as this could increase flood risk elsewhere.

- Solar Panels should be anchored down sufficiently to avoid flotation in a flood and to prevent damage to the panels themselves or to surrounding property.
- Sensitive electrical equipment should also be located above predicted flood levels.
- The site operator signs up to receive flood warnings from the EA to facilitate the safe management of the site during flooding incidents.

The total site covers an area 11.81 hectares and the area of impermeable surfacing following development is 0.00287 hectares. Due to the small increase in the proportion of impermeable surfacing on site and the proposed use of infiltration SUDS, no formal offsite drainage discharge is required. The practical approach will be to promote infiltration and natural storage across the site. This involves retaining the ground vegetation cover under the cells, utilising where possible the existing field drainage network, and the provision of SUDS filter trench elements associated with the substation/control room building.

There is no need for additional compensatory storage as a result of the development.

O) GLINT AND GLARE

This section is intended to provide guidance on expected reflection effects exhibited by solar photovoltaic panels when in direct sunlight. The reflection of a surface is highly dependent on the angle of incidence and surface conditions. It is understood that as the angle of incidence increases, the amount of reflected light also increases.

- **Glint** – Also known as a 'specular reflection', is produced as a direct reflection of the sun on the surface of the PV solar panel. This is often considered a potential source of viewer distraction.
- **Glare** – A continuous source of brightness, relative to diffused lighting. This is not a direct reflection of the sun but rather a reflection of the bright sky around the sun. Glare is significantly less intense than glint.

Glare and dazzle effects due to reflection from solar panels are expected to be minimal and comparable to glass facades. Solar panels generally appear darker than glass in nearly all conditions.

Typical soiling of the solar panel surface will further reduce the observed light reflection, and this also has an effect on the efficiency of the panel.

Photovoltaic panels are designed to absorb light and not reflect it. They have a smooth surface, however, which means that incident light from a specific direction is reradiated in a specific direction. The whole concept of efficient solar power is to absorb as much light as possible while reflecting as little light as possible. This actually results in standard solar panels producing less glare and reflectance than standard window glass[33]. More specifically, in technical terms, solar panels use 'high-transmission, low-iron' glass, which absorbs more light, producing smaller amounts of glare and reflectance than normal glass. This means that photovoltaic panels can cause reflections which are however considerably less intense than direct sunlight. Photovoltaic panels can reflect as low as 2% of incident light[34] however this level of reflectance increases as the angle of incidence increases[35].

Additionally, direct solar reflections will not occur when the sun is obscured by cloud. When the sun is not shining there will be no reflection from the panel.

O.1 Guidance:

There is no specific national planning policy relating to solar farm developments and their potential effects on daylight, sunlight, overshadowing, light pollution or solar glare. The Government intends to produce planning policy relating to light pollution in the near future.

[33] US patent # 6359212 (Method for testing solar cell assemblies and second surface mirrors by ultraviolet reflectometry for susceptibility to ultraviolet degradation) www.google.ca/patents/US6359212
[34] FAA, November 2010, *Technical Guidance for Evaluating Selected Solar Technologies on Airports*
[35] Evan Riley and Scott Olson, "A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems," ISRN Renewable Energy, vol. 2011, Article ID 651857, 6 pages, 2011. doi:10.5402/2011/651857

However there are various sources of guidance with regard to glint and glare effects from solar panels. Notable sources and relevant extracts with regard to the reflectivity of panels are shown in the table below.

The table is by no means a comprehensive review of the data sources, rather it is intended to give an overview of the important parameters and considerations that have informed this assessment;

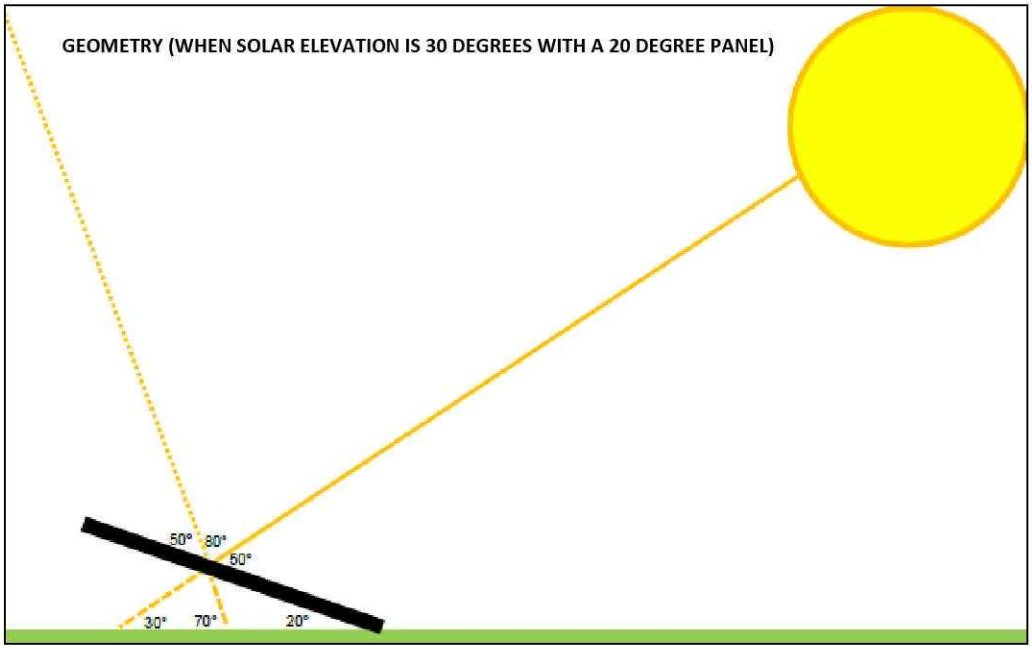
SOURCE	EXTRACT(S)	REMARKS
UK Civil Aviation Authority - Interim guidance relating to Solar Photovoltaic Systems (SPV). This guidance was issued on 17th December 2010 and was subject to a CAA information alert 2010/53. It is believed that the formal policy was cancelled on September 7th, 2012[36] however the advisory is still applicable.	It is recommended that, as part of a planning application, the SPV developer provide safety assurance documentation (including risk assessment) regarding the full potential impact of the SPV installation on aviation interests.	The document emphasises the importance of considering the potential effects on aviation but does not provide specific parameters with regard to reflectivity
USA Federal Aviation Authority - *Technical Guidance for Evaluating Selected Solar Technologies on Airports* (issued 2010)	• Today's solar panels reflect as little as 2% of the incoming sunlight meaning roughly 20 W/m2 are reflected off as typical PV panel. • PV solar panels reflect less light than other substances such as snow, vegetation and water.	
Evan Riley and Scott Olson, "A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems," ISRN Renewable Energy, vol. 2011, Article ID 651857, 6 pages, 2011. doi:10.5402/2011/651857	The theoretical glare was estimated using published ocular safety metrics which quantify the potential for a post flash glare after-image. This was then compared to the post flash glare after-image caused by smooth water. The results show that the potential for hazardous glare from flat-plate PV systems is similar to that of smooth water and not expected to be a hazard to air navigation. Portland white cement concrete (which is a common concrete for runways), snow, and structural glass all have reflectivity's greater than water and flat plate PV modules.	The study demonstrated that the reflectance of the solar cell varied with angle of incidence, with maximum values occurring at angles close to 90 degrees. The reflectance values varied from approximately 5%.

Please note that whilst the guidance summarised in the table above is related to aviation interests, the general principles apply to any receptor that could be potentially affected by glint and glare effects.

[36] http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=4370

O.2 Sun Tracks – Elevation and Reflection:

It is known in general terms that the sun rises in the east and sets in the west however this is not always strictly true throughout the year. The sun can rise in positions between north east and south east, with the sun setting in locations between the south west and North West in the UK. The location and angle of the sun in the sky will determine what angle reflections will occur at. Below simply shows how to calculate the reflection angle for a panel mounted at 20 degrees with a sun positioned at 30 degrees above the horizontal due directly south of the panel.

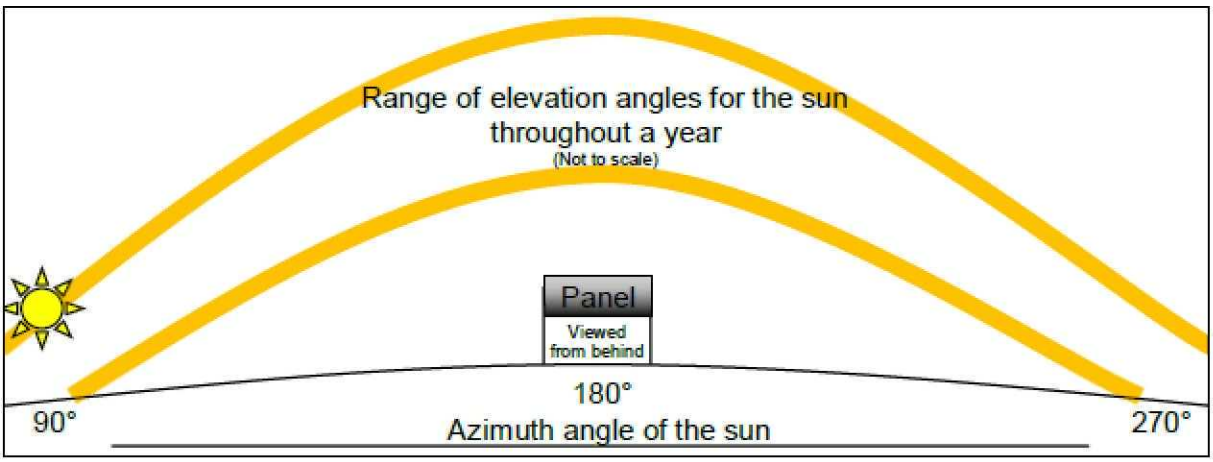


In this instance a reflection occurs at a steep angle directly behind the panel. With the sun's azimuth and elevation angle changing throughput the day, the direction and angle at which a reflection occurs will change constantly.

O.3 Sun Tracks- Azimuth and Elevation:

Above shows a simple diagram of the sun's movement across the sky as viewed by an observer facing south (in the northern hemisphere[37]). The orange lines show a simple illustration of the maximum and minimum elevation angle of the sun throughout one year as the sun travels through the sky each day. The high line illustrates the summer solstice (the longest day) and the lower line illustrates the winter solstice (the shortest day). For all other days in the year the sun would be between this maximum and minimum.

[37] The sun's azimuth angle is defined using 0° as north, heading clockwise so 180° is south and continuing round. This is reversed in the diagram as the perspective is as if viewed looking southwards.



SHOWING HOW THE AZIMUTH AND ELEVATION CHANGE THROUGHOUT A DAY/YEAR

O.4 Solar Panel Dimensions:

The proposed PV installation will be mounted to ground via a metal frame with two layers of panels per row. The panels will be mounted at a height of between 600mm and <2000mm agl. The distance between each row will be approximately 3m depending on the topography and final site design.

O.5 Solar Panel Orientation:

The panels are oriented to maximize electrical generation and will have a fixed position throughout the year. The intended panel angle is 25-35 degrees above the horizontal with the panels orientated facing southwards.

O.6 Impact on Air Traffic:

Most reflections from the site will be towards the sky. The glint is directed out as a band similar to the width to that of the solar panels running from east to west across the site. If a pilot did perceive an instance of glint during flight, the effect would be almost instantaneous while the flight path coincided with the reflected beam band. Within seconds the aircraft will have passed through the reflected path thereby negating the possibility of further impact. There is no possibility of prolonged glint impact.

Direct sunlight varies in strength and will not be incident on the panels at all times of the year. There will be periods when cloud, mist or other weather conditions might prevent any direct sunlight arriving at the panels at all.

Pilots have to deal with glint and glare from many natural and built structures on a day to day basis. There is less chance of reflection from solar panels than the pilot would be exposed to from man-made structures such as poly tunnels, glass houses or glass fronted buildings. Water features such as the ocean, reservoirs and lakes have very similar reflective properties to solar panel farms, yet these features represent much greater areas than that of the fields of the proposed development. Pilots currently fly relatively low next to water without significant adverse glint effects. For example, aircraft flying out of London Heathrow airport fly low and adjacent to many large reservoirs with no difficulty. Solar PV farms and

panels are now installed close to many UK airports such as Newquay, Gatwick, Southend and Birmingham. There have been no adverse published reports from any of these facilities. Therefore glare and glint are not expected to cause any serious impact on air traffic[38].

O.7 Impact on Traffic Movements:

Encountering glare whilst driving is not an unusual occurrence. This may be via reflections of the sun off a wet road, night time driving with the headlights on or solar glare whilst driving at sunrise or sunset in an easterly or westerly direction. It is something that a driver must safely cope with. Reflections from a solar panel will not be as bright as many of the driving glare effects encountered mainly because they are designed to absorb the light rather than reflect it. Again, direct sunlight would be incident from the same direction as the reflected light.

The assessment of significance and overall impact on traffic movements has been assessed evenly between 'moderately adverse', 'slightly adverse' and 'negligible' due to the distance of visual receptors from the solar park. Most of the visual receptors are likely to be travelling through the landscape rather than being residents within it. Views will be brief as drivers will view the development as part of the wider view whilst concentrating on driving.

O.8 Impact on Residential Housing:

Glint is most likely to affect ground based receptors when the sun is lowest in the sky near dawn and dusk. This means any effect would be restricted to early or late in the day and would be reflected towards the west at dawn and to the east at dusk. If this occurred it would be only present for a short period of time as the movement of the sun across the sky continually changes the reflected angle and direction of the glint, hence changing the impact upon any receptor.

The assessment of significance and overall impact on residential housing has been assessed evenly between 'moderately adverse', 'slightly adverse' and 'negligible' due to the distance of visual receptors from the solar park. Most of the visual receptors are likely to be travelling through the landscape rather than being residents within it. Below is an extract taken from Section K.7.9 – Landscape and Visual Impact Assessment;

Effects of Proposed Development				
Element	**Significance**	**Impact (before mitigation)**	**Proposed mitigation (positive)**	**Residual Impact after mitigation**
Settlement	**MEDIUM** Isolated farm houses but not considered sensitive to change	**MINOR CHANGE** transvertor and invertor housing will be built	**SLIGHTLY BENEFICIAL** if located wisely, it will be viewed as a solar park but keep within the existing buildings	**NEGLIGIBLE NEGATIVE IMPACT**

[38] **Spaven Consulting** – SOLAR PHOTOVOLTAIC ENERGY FACILITIES: ASSESSMENT OF POTENTIAL FOR IMPACT ON AVIATION. January 2011. Report No.10/344/RPS/1.

The LVIA concluded that the mitigation proposals will reduce the negative impact from 'minor' to 'negligible' on three receptors – one of which is settlement (i.e., residential housing). Although an awareness of the site would be possible it would not greatly intrude within views and there would be no significant changes to the setting of these and so they are very likely to be able to see the sun in a very similar location to where the reflection would originate. The sun is a much greater source of light when compared to a reflection from a solar panel. Subsequently, any solar reflection would be of lower intensity and therefore produce less glare when compared to direct light from the sun. Reflections can only be experienced if line of sight to the reflecting panels exists. It is likely that some of the dwellings will not be able to see the reflecting panels.

O.9 Mitigation:

Any shielding put up around the perimeter of the field will significantly reduce the likelihood of any reflection occurring and being visible to surrounding residents or roads.

It is recommended that the height of the shielding is equal or similar to the maximum height of the panel's agl.

O.10 Summary:

Glint and glare is unlikely to be a significant concern because:

- Road users must, and do, cope safely with direct sunshine and alternative sources of glare on a day to day basis. These sources of glare are much more intense to that of a reflection from a solar panel.
- Any residential property experiencing reflections is also very likely to be able to see the sun in a very similar location to where the reflection originates.
- Obstructed line of sight to the reflecting panels is likely to significantly reduce the likelihood of any reflection being witnessed.
- The sun is significantly brighter source of light when compared to a reflection from a solar panel.
- Overall, it is not thought that the reflection would be a significant safety concern for road users, nor will they cause a significant nuisance for local dwellings.

P) NOISE

P.1 Introduction:

Noise is often defined as sound that is undesired by the recipient. Whilst it is not possible to directly measure nuisance caused by noise, it is possible to measure the loudness of that noise. 'Loudness' is related to both frequency and sound pressure, both of which can be measured. The human ear is susceptible to a wide range of sound levels. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB (A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels from for example 50 dB (A) to 60 dB (A) would represent a doubling in 'loudness'. Likewise, a decrease in noise from 60 dB (A) to 50 dB (A) would represent a halving in 'loudness'. A change of 3 dB (A) is generally considered to be just distinguishable[39].

P.2 Planning:

Paragraph 123 of the NPPF states the following;

'*Planning polices and decisions should aim to:*

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"*[40].

BERL aims to ensure that any new developments comply with this policy. This section demonstrates that the development will adhere to current standards for both internal and external noise levels and identify any appropriate mitigation measures if necessary.

[39] **Communities & Local Government** - (1994) Planning Policy Guidance 24: Planning & Noise.
[40] **National Planning Policy Framework -**
www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

P.3 Background:

Ground mounted solar PV modules, transformers and substation are inert solid state devices which work together to convert light into electricity. BERL have included in the planning and designing of the project, the evaluation of where to place the equipment and equipment selection by exploring options to minimise noise impacts to the surrounding area even more.

P.4 Construction:

The construction and installation of the solar farm will be undertaken using a relatively small team, not expected to exceed 50 persons at any one time. There will be limited noise disturbance during this time. Heavy Goods Vehicle (HGV) movements will be staggered throughout the 4 month construction period, further reducing possible noise impact. It is not expected that local community would notice a change in the noise as a result of the project. Noise levels during the construction process will be controlled and we would not expect any noise at the boundary of the adjoining residential properties to exceed those that are commonly experienced with the current level of agricultural activity in the area. Design considerations throughout the development of this project have been made to avoid and mitigate noise generation activities, for example, the selection of the support installation system.

P.5 Operation:

The operational lifespan of Little Eau Solar Farm will be to a limited period of 25 years and the noise generated is minimal. Most commonly, the source of noise associated with ground-mounted solar PV comes from central inverters. By using string inverters, that are solid state, this source of noise has been eliminated from the project.

There are a small number of residential properties surrounding the site. The current figures by the World Health Authority Community Noise Guideline Values / BS8233[41] describe 'good' conditions as;

EXAMPLE	L (dB(A))
Dwellings Indoors In Daytime	35
Outdoor Living Area In Day Time	55
Inside Bedrooms At Night Time	45 (max)
Outside Bedrooms At Night Time	60 (max)

As the figures show the small number of residential properties surrounding the site may experience noise similar to a 'rural area' during the daytime as a result of the proposed development. Therefore the proposal will not result in any noticeable changes in noise levels.

[41] **Communities & Local Government** - (1994) Planning Policy Guidance 24: Planning & Noise.

P.6 Decommissioning:

After 25 years, the project will have reached the end of its operational life and will enter a phase of decommissioning. This will involve dismantling and removal of all materials and equipment that have been on site during the operational phase. Decommissioning will take approximately 2-3 months and will involve a lower number of HGV movements than was required during the construction phase.

P.7 Mitigation of Potential Noise:

We aim to mitigate any potential noise by;

RESTRICTION ON THE HOURS OF OPERATION	It is proposed that subject to the planning approval the site will operate as a construction site between the hours of 08.00 and 17.30 each Monday to Friday and between 08.00 and 13.00 on Saturday.
RESTRICTION ON THE HOURS OF DELIVERY	Working on Sundays and Bank Holidays will not be expected. Outside of these hours works shall be only undertaken if deemed an 'emergency'. SHDC will be notified of any requirement for emergency working, in writing, within 3 days of the occurrence. No construction traffic movement will take place outside of the above hours. Deliveries to the site will be co-ordinated to avoid the normal rush hour and school run traffic. This will ensure that the development is not detrimental to the amenity of the area and/or nearby residents by reason of undue noise including from people entering of leaving the site.
RESTRICTION ON THE HOURS FOR MACHINERY	As above. This will safeguard the amenities of nearby residential properties.
SITE BOUNDARY NOISE LEVELS	We will ensure that the rating level of noise emitted from the solar farm development shall not exceed (that as decided by SHDC) dBA above the background levels determined at all boundaries near to noise-sensitive premises. This assessment will have been made in accordance with the current version of British Standard 4142 and confirmation of the findings of the assessment shall have been submitted to, and agreed by SHDC and shall be adhered to thereafter. This will ensure that the development is not detrimental to the amenity of the area and/or nearby residents by reason of undue noise including from people entering of leaving the site.

Q) TRAFFIC AND CONSTRUCTION MANAGEMENT PLAN

This section looks at the likely significant transport issues associated with the proposed development in terms of access and traffic movements, describing the assessment methodology; the baseline existing conditions at the application site and the surroundings; the likely significant environmental effect during the construction and operation phases of the proposed development; the mitigation measures required to prevent or reduce or offset significant adverse effects; the likely effects after these measures have been deployed.

Once operational, solar farms do not give rise to any significant traffic movements, daily vehicle movements are typically reduced over the operational term of a solar farm compared to normal farming activity. It is not expected that during the operational phase there will be any significant environmental effects in terms of transport or access. Therefore the main transport and access related environmental effects will be associated with the movement of HGVs to and from the application site during the construction phase (and to a lesser degree the decommissioning phase of the proposed development). This section considers the assessment of the effects of construction traffic on the existing road network and the implications for pedestrians, cyclists and horse riders.

Q.1 Transport Policy:

Current transport policies at national and local level are built around the central themes of long-term sustainable development, sustained investment in transport and improved accessibility at all levels. It promotes continued economic growth through;

- The provision of an efficient and reliable transport system,
- A reduction in traffic congestion,
- Improvements in highway safety, and;
- Enhancements in accessibility of sustainable modes of travel.

Key objectives of transport in the NPPF[42] are for the development proposals to deliver sustainable and safe transport regimes. Section 4 of the NPPF is principally aimed at reducing transport impacts of development. Much of the guidance is therefore not directly associated with a development of this nature which does not generate significant travel or transport demand during the operational phase. However the guidance seeks to ensure that people are able to travel safely and this is considered particularly relevant during the construction phase. The NPPF identifies the need for a Transport Statement to be submitted alongside a planning application for a development that generates significant amounts of movement, but emphasises, in Paragraph 32 that development should only be prevented or refused on transport grounds where residual cumulative impacts are severe.

[42] **National Planning Policy Framework -**
www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Q.1.1 SOUTH HOLLAND LOCAL PLAN (ADOPTED JULY 2006) –

The South Holland Local Plan[43] was adopted by the Council on the 18th July 2006. It is a comprehensive statement of the areas planning policies for the development and use of land in the South Holland District until the year 2021.

It is based on the Local Transport Plan (LTP) for Lincolnshire 2006/07 - 2010/11[44] and aligns with the Government's policies for transport.

The main themes from the LTP relevant to this application (as highlighted within the South Holland Local Plan) are as follows:

- *To assist the sustainable economic growth of Lincolnshire, and the East Midlands region, through improvements to the transport network;*
- *To make travel for all modes safer and, in particular, reduce the number and severity of road casualties;*
- *To remove unnecessary HGVs from affected communities through:*
  - *Appropriate traffic management measures;*
  - *Highway improvements;*
- *Encouraging the use of alternative modes of transport; and,*
- *To maintain the transport system to standards which allow the safe and efficient movement of people and goods.*

The proposals for this development will be shown to be consistent with strategies and objectives of the LTP.

Q.2 Assessment Approach:

The assessment has been carried out with regard to the National and Local Transport Planning Policy. The magnitude of effects referred to in this assessment has been determined using the criteria set out below.

The thresholds have been derived by reference to the Institute of Environmental Management and Assessment (IEMA) guidelines, best practice and professional judgement;

	MAGNITUDE OF EFFECT			
EFFECT	**NEGLIGIBLE**	**LOW**	**MEDIUM**	**HIGH**
SEVERANCE	Change in traffic flow or HGV flow of 10% or less	Change in traffic flow or HGV flow of 10% to 30%	Change in traffic flow or HGV flow of 30% to 60%	Change in traffic flow or HGV flow of over 60%
DRIVER DELAY	No road closure	Road closure less than 10 minutes	Road closure of 10 to 30 minutes	Road closure of more than 30 minutes

[43] South Holland District Council (2006) 'South Holland Local Plan: Adopted July 2006'. http://www.sholland.gov.uk/localplan/

[44] Lincolnshire County Council (2006) 'The Lincolnshire Local Plan'.

PEDESTRIAN DELAY/AMENITY	No increase in journey time	Increase in journey time of less than 5 minutes	Increase in journey time of 5 to 10 minutes	Increase in journey time of more than 10 minutes
FEAR AND INTIMIDATION	Change in traffic flow or HGV flow of 10% or less	Change in traffic flow or HGV flow of 10% to 30%	Change in traffic flow or HGV flow of 30% to 60%	Change in traffic flow or HGV flow of over 60%
ACCIDENTS AND SAFETY	No change to personal injury accident rate	No significant change to personal injury accident rate	Personal injury accident rate changed but below national average	Personal injury accident rate changed but above national average
HAZARDOUS LOADS	No increase	No increase	Increase of less than 10%	Increase of more than 10%

The overall significant is defined as:

NEUTRAL	No noticeable effect on the locality
MINOR	Perception of worsening conditions e.g. increase in delay
MODERATE	Increased perception of worsening conditions, may require temporary change to off-site infrastructure
MAJOR	Change requiring permanent modifications to off-site infrastructure

The significance of the effects is also assessed in relation to the sensitivity of the receptor and the predicted effects are identified as positive, adverse and as temporary or permanent.

Q.3 Existing Conditions:

The site is located approximately 3.5 km by road south-west of Sutton St James, which the B1165 (Fishers Gate) passes through. This road will be suitable to support vehicles using the local road network during the construction of the project from the main trunk road network to the west of Sutton St James.

From the B1165 the route to the site will follow a right-turn into Jiggles Gate and then a left turn at the T-junction onto Old Fen Dyke and onto the Sun Cross Road and a right turn into Broadgate. The route will then follow Broadgate and take the left fork and enter New Fen Dike and shortly after the route will access the site directly off New Fen Dike.

The B1165, Jiggles Gate and Old Fen Dyke have a derestricted national speed limit of 60mph each of the roads, and are wide enough for two vehicles to pass, however it would be prudent to exercise care during their use by HGV's and avoid dual passing by HGV's. There are no designated passing places along the road but entrances to fields and verges to the side of the road provide means for vehicles to pass and these are commonly used in normal daily activities by the existing road users in an informal way. For much of the route there are is a

grass verges on either side of the road which often have wet ditches running along both sides, separating the fields from the verge and the road.

The main flow of passing traffic, that does not continue through Sutton St James leaves Old Fen Dike and enters Broadgate as a principle traffic route towards Sutton St Edmunds. New Fen Dike does not cater for a considerable volume of traffic and its use is sporadic, however during harvesting and other intensive farming activity the road supports the use of HGV vehicles and hence is suitable for the intended use.

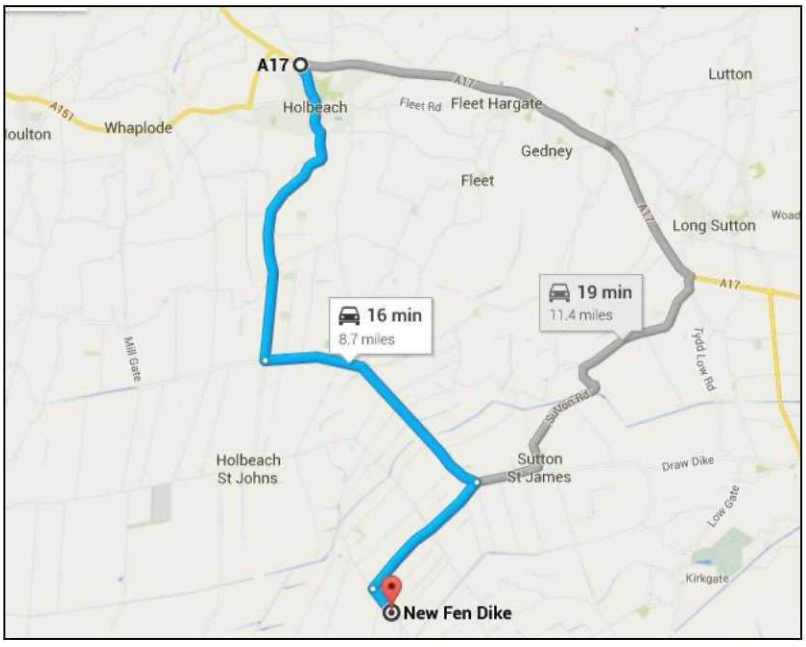
The visibility of the proposed entry and exit points of the site is good.

An access track will be required for construction vehicles and to enable maintenance vehicles to access the site during the operation of the site. The selected site access point provides good access to the proposed development fields.

The Department for Transport website has information on the daily average flow of traffic for various roads networks around the country. However there is no traffic flow information for the road leading to the proposed site, either the B1165 or Jiggles Gate and Old Fen Dyke and the other roads within the immediate vicinity of the site.

From our site inspections we have noted that the use by vehicle traffic of New Fen Dike is very low other than during periods of peak farming activity when there is significant usage for farm equipment, HGV trucks and other transport for farm workers involved in the farming activities.

The route proposed for vehicles associated with construction of the plant can be viewed (below). The route will ensure that HGVs will take use of the most suitable public highway which will cause minimal disturbance and access the wider road network as soon as practicable. Access to the B1165 will be obtained via the network of A-roads serving the area.



(Proposed Access Route to the Site © Crown Copyright and Database Rights 2013 Ordnance Survey 0100031673)

Once within the proposed site access traffic movement will be via the proposed perimeter track and the material off-loaded and distributed to the point of installation works. Distribution of the components will be undertaken by tractor and trailer using existing farm tracks and the new perimeter access track. Distribution to the areas of installation will be on an ad-hoc basis to serve the needs of the installation.

DIRECTION 1	**HEADING SOUTH:**
	From the A17at the Holbeach roundabout leave and take the 3rd exit and head south on the B1168. Photo 1a
	HEADING SOUTH:
	Stay on the B1168 to the T- junction with the B1165.
DIRECTION 2	At the T-junction with the B1165 turn east onto the B1165 – Ravens Brook. Photo 2
DIRECTION 3	At the turning for Jiggles Gate, turn right, heading south-west and enter Jiggles Gate. Photo 3a and 3b
DIRECTION 4	Follow Jiggles Gate until it becomes New fen Dike and follow New fen Dike to the entrance to the site. Photo 4

PHOTO 1(a) - showing the aerial view of the exit from the A17 to the Holbeach roundabout and the 3rd exit to the B1168.



PHOTO 1(b) - showing the exit from the Holbeach roundabout onto the B1168 heading south.



PHOTO 2 - showing the aerial view of the exit from the B1168 (Raven's Gate) and the left turn onto the B1165 heading towards Sutton St James.



PHOTO 3(a) - showing the right hand turn exit from the B1165 onto Jiggles Gate



PHOTO 3(b) - showing exit from Jiggles gate onto Old Fen Dike



PHOTO 4 - showing the exit from Old fen Dike and right turn onto New Fen Dike, leading to the site entrance.



PHOTO 5 - showing the aerial view of the entrance to the site



None of the proposed access routes selected have restricted access, weight or height restrictions. All roads have designated appropriate speed restrictions applicable for their road use and location. Inspection of the route does not highlight any aspect or infrastructure along the route that would result in the route being identified as inappropriate or at risk of creating a significant traffic effect; all currently regularly used by HGVs. The Construction Transport Management Plan (CTMP) is developed to further mitigate any transport effect that may be noticed or perceived as a result of the development.

Q.4 Prior to Works Commencing:

Prior to the commencement of works and the delivery of any construction materials to the site a review of the maximum axle loading on structures along the access route with the various road agencies would be undertaken. This would establish the suitable loads to be transported. Swept Path Assessments (SPA) would be carried out and this will be used to select the vehicles used in the delivery of the equipment and materials. This is the calculation and analysis of the movement and path of different parts of a vehicle when that vehicle is undertaking a turning manoeuver. At a basic level this includes calculating the path taken by each wheel during the turn and also calculating the space needed by the vehicle body during the turn. Any vegetation that may foul the loads would be trimmed back to allow passage. Any road works or closures that could affect the passage of the loads would be further investigated.

However considering that we will only be using standard road vehicles throughout the delivery phase of this project and these vehicles are already commonly using the identified access roads to the proposed site and surrounding area, we would consider any impacts identified by the SPA and axle loads to be unlikely.

Q.5 Outline of Main Activities:

TEMPORARY WARNING SIGNS	These will be erected to ensure that there is safe and clear access to the site. Please refer to Appendix 12 for more details.
FOUNDATION	Some minor civil engineering works will be necessary, primarily for the foundations to the substation building, where the main switchgear will be housed.
FENCING	There is a requirement for a fence to be installed around the perimeter of the solar farm. The fence is for safety reasons, to protect those unauthorized persons from the danger of high voltage equipment and to provide adequate protection so that the equipment installed can be insured. The fence proposed is a wooden post stock-proof fence and will be no more than 1.8m high. Please refer to Appendix 6 for more details.
INVERTERS AND TRANSFORMERS	The string inverters are low level solid state units that are mounted beneath the inclined solar module tables. The transformers are delivered as 'skid- units' to site and require a crane to be off-loaded and sited at an approved location, within the identified substation/switchgear area. When in the final location the termination wiring and cabling connections will be made.
MOUNTING SYSTEM	This phase consists of driving/pushing or auguring the steel piles, approximately 1.5m deep that are used to support the steel/aluminum frames that holed and support the solar PV module tables which is followed by the assembly of the frames. Finally the solar modules are mounted onto the frames.
METERING STATION	These works involve the installation of the HV voltage equipment within the substation and installing the metering station that will be sued to measure the amount of import and export electricity that is required or produced from the site.

CABLING	Following the installation of the frames the DC LV cabling, interconnecting the individual solar PV modules and the connection of the modules (formed of 24 modules) 'strings', the combiner boxes works is completed. Please refer to Appendix 8 for more details.
COMMISSIONING	At the completion of these works and on the completion of the rigorous testing the installation will be inspected by the local grid operator, WPD and the site can then be connected to the local electricity distribution network.

Q.6 Schedule of Works:

The construction period is identified for when the most potential for significant transport environmental effects will occur upon the access route to and from the proposed solar farm site and traffic movements through local highway transport routes. However the effects during the operational and decommissioning period are also assessed within this section.

Q.6.1 CONSTRUCTION

The construction of the solar farm is expected to last around 3 months (12 weeks). All traffic movements will be coordinated in accordance with this CTMP and its subsequent development which will be finalised through discussions with our Principal Contractor and the Highways Consultee Agencies.

Most of the materials are delivered in the configuration using standard lorry containers, with the materials remaining in these containers once delivered to site until they are required for installation. All deliveries will be made by vehicles that are less than 16.5m in length, i.e. standard permitted road vehicles with no abnormal loads required. Standard road containers are typically 12.2m (40ft) in length.

During the construction process it is expected that there will be approximately 30-40 construction staff and operatives on site at peak, however this will vary dependent upon the phase of the construction schedule and the progression of works. Arrangements will be made to ensure that there is dedicated construction works transport to reduce the impact of separate and individual journeys.

We aim to ensure that the following principals are employed to manage the traffic movements so that the impact is reduced to those living in the community.

There is an anticipated breakdown of the types of vehicles which will be used to transport the components for the solar farm;

ANTICIPATED VEHICLE MOVEMENTS DURING CONSTRUCTION (FIGURES ARE APPROXIMATE)		
COMPONENT	**VEHICLE**	**VEHICLE NUMBERS**
Panel Modules	HGV	22
Table Mounting System	HGV	10
Table Support System	Truck	6
Inverter	Trucks	10
Cabling	Trucks	6
Stone and sundry materials	Trucks	17

Fencing	Trucks	4

No of weekly Movements	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12	Totals
Site welfare and Facivilities	4	1											5
Fencing deliveries	1	1	1	1									4
Waste recycling lorries			1	1	1	1	1			1		1	7
Delivery of table supports		2	2	1	1								6
Delivery of Table materials			2	2	2	2	2						10
Delivery of cabling				2	2	1	1						6
Delivery of panels				4	3	3	3	3	2	2	2		22
Inverters and substation		2	2	2	2		1	1					10
Concrete materials		2											2
Stone	1	2											3
Weekly total	6	10	8	13	11	7	8	4	2	3	2	1	75
Daily average	1	2	1	2	2	1	1	1	1	1	1	1	

ANTICIPATED 12 WEEKLY VEHICLE REQUIREMENTS AND DAILY AVERAGE DELIVERIES

The total number of deliveries is estimated at **75** lorries/ trucks which will include the estimated **32** HGV vehicles. The maximum daily average of deliveries is **2** vehicles.

Q.6.2 ROUTE OVERVIEW OF HGV No's AND SPEED LIMITS LOCAL TO THE SITE ENTRANCE

There is no factual information regarding existing traffic flows along the proposed access roads local to the site. Inspection shows that the road network is more than capable of accommodating the slight and short duration of traffic required to deliver the equipment and materials. Other than traffic usage during observed peak periods of the morning and evening commuter traffic rush-hour, travelling to and from the commuting business centres traffic is free flowing.

During the construction of the solar farm it is clear that there will be a slight increase in the regularity of daily traffic. However, this increase in traffic flow will only be for a short period of time and it will be managed to ensure that arrivals of vehicles to site will be carried out:

- In a safe manner to ensure the highway used can cope with the flow of traffic;
- Minimise inconvenience for other road users and pedestrians;
- Under a strict traffic management and escort.

The existing businesses and users already contribute to relatively frequent HGV traffic movements and we would seek to limit our peak daily movements to that which has been experienced already within the community as a result of these activities and ensure that these traffic movements are for the shortest possible duration.

Prior to the construction works the Principal Contractor will finalise the CTMP which will cover the usage of all the access roads, the necessary erection of roads signs and the timing and number of traffic movements permitted throughout any period.

The CTMP will also provide information on proposed construction traffic movements that will be provided to the local residents through a liaison group. This will be a useful aid in communicating to the local community the awareness of the planned vehicle movements. These information briefings will be provided with 48 hours' notice. The information would

relate to vehicle movements on the roads surrounding the site, i.e. Old Fen Dike, New Fen Dike and Jiggles Gate, whilst we are making significant deliveries of plant and equipment.

Although as a result of the urban fringe and rural nature of the location many of the residents are familiar with large vehicle transport and this type of communication process and its implementation will assist in mitigation of any inconvenience that may otherwise result.

Temporary signage will be erected to ensure that the use of the appropriate access route is clearly indicated and provided for vehicles accessing the proposed solar farm site. Typically we would propose to use discreet access route markings and where appropriate signs from the regulatory Signs Section of the Traffic Signs Manual (Appendix 12). Any road traffic management signs would be agreed with local authority.

We would expect to have formed a local liaison with residents and would use this as one of the formats for providing this information. However we will also use direct communication through hand delivery to all dwellings that are located along the immediate access to the site within close proximity to New Fen Dike, Broadgate, Sandy Gate and Goochgate.

In addition, any road vehicle that is required to enter the highway following a visit to the site that has attracted mud or debris within its wheels will be cleaned prior to leaving the area of the site. Most vehicle movements within the site for road vehicles will use the access track located around the perimeter of the site. In case of an exceptional event that creates debris or mud on the road we will retain the services of a road sweeper to ensure that the roads are maintained in an acceptable standard.

In the unlikely event that site activities result in some slight dust arising we will take the following action so that both the human and ecological impacts are minimised;

- Most suitable will be to enclose any activity that maybe dusty;
- If this is not practicable then we will use damping down.

Overall no significant impact is anticipated either on traffic levels or on highway safety as there should be no issues regarding the use of the highway and visibility when entering or exiting the site.

Q.6.3 OPERATION

The solar farm is anticipated to have a life span of a limited period of 25 years in which the solar PV panels will operate continually.

Once the solar farm is completed there will be very few vehicle movements in and out of the site. Very few routine maintenance visits will be required. Maintenance would involve cleaning of the PV modules to ensure that any leaves or other debris which could reduce the performance of the solar PV modules is removed. Occasional technical work may also be required in case of a fault in the inverter/transformer.

The site may also be used for sheep grazing, so there may be the occasional tractor and trailer movements used to manage the onsite flock. This would not differ greatly from the existing vehicle movements associated with the agricultural use of the site. The scheme has proposed the planting of new soft-landscaping, this will require trimming and cutting in accordance with the sites Biodiversity and Habitat Management Plan (Appendix 13).

Q.6.4 DECOMMISSIONING

The transport effects associated with decommissioning are considered to be less than construction as there will be less transport movements and shorter duration associated with the decommissioning phase. It is anticipated to be approximately 2 months. Therefore the same assessment is considered appropriate for decommissioning as it is for construction.

Q.7 Proposed Access Route to the Site:

The surrounding motorway and trunk roads provide excellent transport links to the A17.

It is proposed that light industrial traffic and construction staff vehicles will also use this route but it is considered that their time of travel will be outside of times of peak congestion and the impact of this traffic, particularly with shared travel arrangements will be less of an impact.

Once within the site the vehicles will be guided to an area where they can be unloaded and then they will be prepared for exit and release from the site.

Once within the proposed site access traffic movement will be via the access track(s) and the material off-loaded and distributed to the point of installation works. Distribution of the components will be undertaken by tractor and trailer using existing farm tracks and the new perimeter access track. Distribution to the areas of installation will be on an ad-hoc basis to serve the needs of the installation.

The relationship of the field boundary hedgerows and the development are best shown in Appendix 22a-f.

This access route (where necessary) will be enhanced using a proprietary temporary road surface over the existing access route, capable of safely transporting axle loads of 40 tonne/sqm.

Q.8 Traffic Management - Protection Measures and Controls:

The key areas for 'sensitivity' within the development of the solar farm will be during the construction works. It is crucial that the activity to enable the site to be developed is robust and capable of ensuring that minimal impact is created. The applicant aims to;

- Adequately and correctly identify the frequency and regularity of other traffic movements.
- Develop adequate mitigation controls.
- Implement the controls successfully.

- Have a liaison system with the local community in place to enable communication of activities so that the local community are advised and updated with scheduled deliveries, etc.,

To successfully comply with these measures, there would be rigid control on the time, number and frequency of deliveries to the site. The applicant would propose to:

RESTRICTION ON THE HOURS OF OPERATION	It is proposed that subject to the planning approval the site will operate as a construction site between the hours of 08.00 and 17.30 each Monday to Friday and between 08.00 and 13.00 on Saturday. However this may be subject to more restrictions, when the local network of roads is less busy. This would be outside of the rush hour and outside of the traditional school commute time.
RESTRICTION ON THE HOURS OF DELIVERY	We would propose to restrict the HGV vehicle movements to the hours of 10am to 2.30pm Monday to Friday a period of 4.5 hours in each day. Deliveries will be scheduled to avoid other transport activities that may be highlighted through the liaison with the other road users through the liaison group. Working on Sundays and Bank Holidays will not be expected. Outside of these hours works shall be only undertaken if deemed an 'emergency'. SHDC will be notified of any requirement for emergency working, in writing, within 3 days of the occurrence. No construction traffic movement will take place outside of the above hours. Controls so that delivery to the site is coordinated by traffic being released from the site. This will ensure that the development is not detrimental to the amenity of the area and/or nearby residents by reason of undue health and safety including from people entering of leaving the site.

Once operational the solar farm should result in few movements. It is anticipated that no more than one visit every six months for maintenance. The site will be typically unmanned.

Q.9 Assessment of the Significance of the Potential Effects:

Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself. It can also relate to quite minor traffic flows if they impede pedestrian access to essential facilities. Severance effects could equally be applied to residents, motorists, or pedestrians (Paragraph 4.27 of the IEMA Guidelines);

ASSESSMENT OF MAGNITUDE OF EFFECTS PRE-MITIGATION ON EXISTING ROAD USE						
ROUTE	**SEVERANCE**	**DRIVER**	**PEDESTRIAN**	**FEAR &**	**ACCIDENTS**	**HAZARDOUS**

		DELAY	DELAY/ AMENITY	INTIMIDATION	& SAFETY	LOADS
A17 to Holbeach roundabout and the B1168	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
B1168 to B1165	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
B1165 to Jiggles Gate	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Jiggles gate through to New Fen Dike	Negligible	Negligible	Low	Low	Low	Negligible
New Fen Dike to the site entrance	Negligible	Negligible	Low	Low	Low	Negligible

SIGNIFICANCE OF THE EFFECTS PRE-MITIGATION ON EXISTING ROAD USE				
ROUTE	**MAJOR**	**MODERATE**	**MINOR**	**NEUTRAL**
A17 to Holbeach roundabout and the B1168				✓
B1168 to B1165				✓
Jiggles gate through to New Fen Dike				✓
New Fen Dike to the site entrance			✓	

Q.10 Summary:

This section has been prepared in order to assess the potential impact as a result of the use of the local highway system of roads for the delivery of components for the proposed development of Little Eau Solar Farm.

The assessment also considers the impact as a result of the operations, for a limited period of 25 years, followed by the decommissioning phase (approximately 2-3 months).

The assessment addresses the requirements for appropriate traffic management and signage and the need to coordinate and integrate the road use with other requirements within the rural community.

The assessment plans for use of the road network through planned routes, appropriate levels of communication to those concerned and for management of number of deliveries type of deliveries and time of deliveries so that the impact of this road use can be minimised. The applicant considers that the proposals are in accordance with the relevant highway guidance and in particular in accord with the NPPF and the overarching National Policy Statement for Energy (EN-1) [45]and the National Policy Statement for Renewable Energy (EN-3)[46]

[45] **EN-1 -** https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf
[46] **EN-3 -** https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf

R) COMMUNITY INVOLVEMENT AND GAIN

R.1 Community Involvement:

Community involvement is considered as an integral part of the development process. Please refer to the Statement of Community Involvement which details the exhibitions and presentations, any views and representations received and how any planning application was influenced and/or amended, if appropriate, with such representations.

R.2 Community Gain:

We always endeavor to work with the Parish Council and Local Community to find out what would benefit them in terms of a Community Benefit Fund (CBF). This will be a specific benefit that we establish for those hosting the solar farm. We have found that this works best through engagement with the Parish Council as to how the fund will be administered, etc. Other than providing the payment to the fund, the solar farm operator would have no active role other than holding a position of a non-executive position where the administration and use of the fund can be observed to ensure that it acts with good governance and for the benefit of the local community in accordance with the constitution and rules of the fund.

Such opportunities could include;

- Establishment of a local Environmental Trust or Community Benefits Trust, with funds being contributed annually by the developer and used for energy conservation measures.
- Local share issue.
- Local or shared community ownership.
- Investment in Green Infrastructure provision and management, especially at the landscape scale.
- Where appropriate, the development and installation of viewing areas, interpretation panels, visitor or educational facilities as part of the development proposal.

S) DURATION OF PLANNING PERMISSION

It is considered acceptable for a condition to be placed on any planning approval in relation to the temporary period that the solar farm will be operational. In addition, that once the installation is removed, the land will be restored and returned to an appropriate agricultural use. We are happy to accept a suitably worded planning condition which;

- Be for an operation period of 25 years (excluding decommissioning).
- Need to be implemented within a period of three years.
- Contain a timeframe for the completion of the construction and commissioning of the development.
- Be for a temporary period only from the commissioning of the facility.