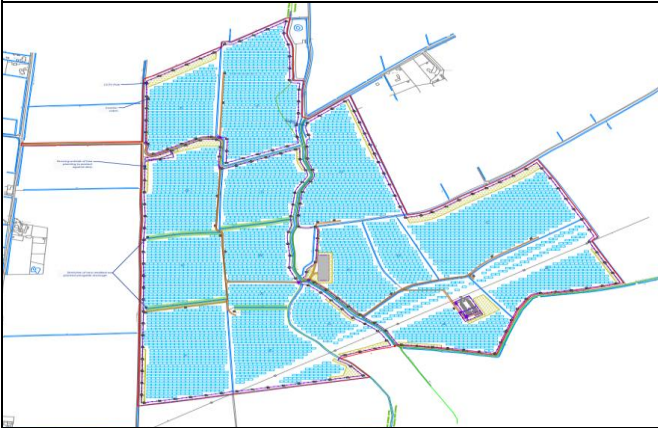


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Document Control Sheet

Report Details

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Executive Summary

Floodline Consulting has been commissioned by PACE Titan Energy Limited to produce a Flood Risk Assessment (FRA) report for a proposed Solar Renewable Energy Facility to be located at Guanock Farm, (site no. UKZ157 Tydd Solar), Guanockgate Road, Spalding, Lincolnshire, PE12 0LW, within the boundaries of South Holland and Fenland District Councils.

The existing agricultural site is approximately 141.6 hectares (350 acres) in plan area and surrounded by agricultural fields on all sides. The nearest major settlement is Wisbech located approximately 10 kilometres to the southeast.

This FRA addresses the requirements of National Planning Policy Framework (NPPF), South-East Lincolnshire Strategic Flood Risk Assessment (SFRA) and Fenland District Council's SFRA, level 1, as the site straddles both council boundaries for South Holland District Council and Fenland District Council. It was produced to carry out an initial assessment of flood risk at the site and check potential constraints to ensure the proposed development is safe from flooding for its lifetime and the proposed solar farm does not make flooding worse elsewhere.

Using the collected data, a comprehensive assessment of existing flood risk sources including fluvial, tidal, groundwater, reservoirs, sewers and surface water run-off has been carried out. There is no risk of groundwater, sewer or reservoir flooding as there are no known sources close to the site.

The risk of flooding from surface water run-off (from roads and surrounding areas) is low as the impact of the facility on the permeable nature of the greenfield site is negligible.

Pre-application meetings have been held with both the EA and LLFA. The EA's 'Product 4' data and the SFRA confirm the entire site as being located in Flood Zone 3, however, there are no records of flooding from the sea or rivers at this location. The whole coastline and main river network benefit from sea and tidal defences offering a minimum of 150yr protection which exceeds the life expectancy, 30-40yrs, of the solar farm and 75yrs assessment as required for commercial proposals within the NPPF. The assessment was undertaken following initial consultation with the key stakeholders in the planning process.

The Environment Agency have confirmed the site is not at risk of flooding from the sea or from the main rivers within the Nene catchment. However, as the site is located in Flood Zone 3, a flood warning and evacuation plan will be required for the site.

In response to the LLFA pre-application meeting a separate Surface Water Management Plan, ref. FCL/644/SW01 is also submitted in support of this application. There is no tangible change to the surface water and foul water drainage networks therefore there is no requirement for additional on-site attenuation at the proposed site.

The facility is classified as 'Essential Infrastructure' but as the site is located in Flood Zone 3, Sequential and Exceptions Tests will be required to support a full planning application supplemented by a site-specific FRA report (with detailed flood mapping data obtained from the EA), a surface water management plan in accordance with the guidance provided by the Lead Local Flood Authority, Cambridge County Council.

Sequential Test for a site of this magnitude is highly unlikely to result in a classification lower than the existing 'low risk' classification for the proposed site. Therefore, sequentially testing the site would not result in finding a more suitable site based on exposure to flood risk.

An Exception Test is likely to be passed due to the environmental benefits of solar power as a sustainable energy source and the wider sustainability benefits this development proposal offers.

As provided within the NPPF all essential infrastructure in Flood Zone 3 shall be designed to remain operational and safe in times of flood.

The site ground levels shall remain unaltered with no ground raising proposed. All fencing in these flood zones shall be permeable to allow free passage of overland flows.

The existing and post-development flood risk has been analysed and the overall risk remains low in both scenarios. Access and egress is available in all areas of the site at all times, the development is safe for its lifetime and flood risk is not increased elsewhere upstream or downstream of the site. The change of use from ploughed to a managed site provides betterment in terms of overland flows off the site.

Consequently, all installations including plant and equipment at the site shall be built on concrete plinths or steel frames at least 300mm above existing ground level to allow free passage of water underneath.

This FRA demonstrates that the overall flood risk to the site is low and will remain low following installation of the proposed solar farm.

1 Introduction

1.1 Background

Floodline Consulting has been commissioned by PACE Titan Energy Limited to produce a Flood Risk Assessment (FRA) report for a proposed Solar Farm at Guanock Farm, (site ref. no. UKZ157 Tydd Solar), Guanockgate Road, Spalding, Lincolnshire, PE12 0LW.

The proposed development site is located within the boundary of South Holland and Fenland District Councils (see **Figure 1a** below) and is accessible via Guanockgate Road to the west and Broad Drove West road to the east.

The existing agricultural site is approximately 141.6 hectares (350 acres) in plan area and surrounded by agricultural fields on all sides. There is an existing watercourse 'Lady Nunn's Old Eau' which intersects the site north to south before draining into the North Level Main Drain to the south of the site. The fields are also served by a network of ditches which drain to the main watercourses.

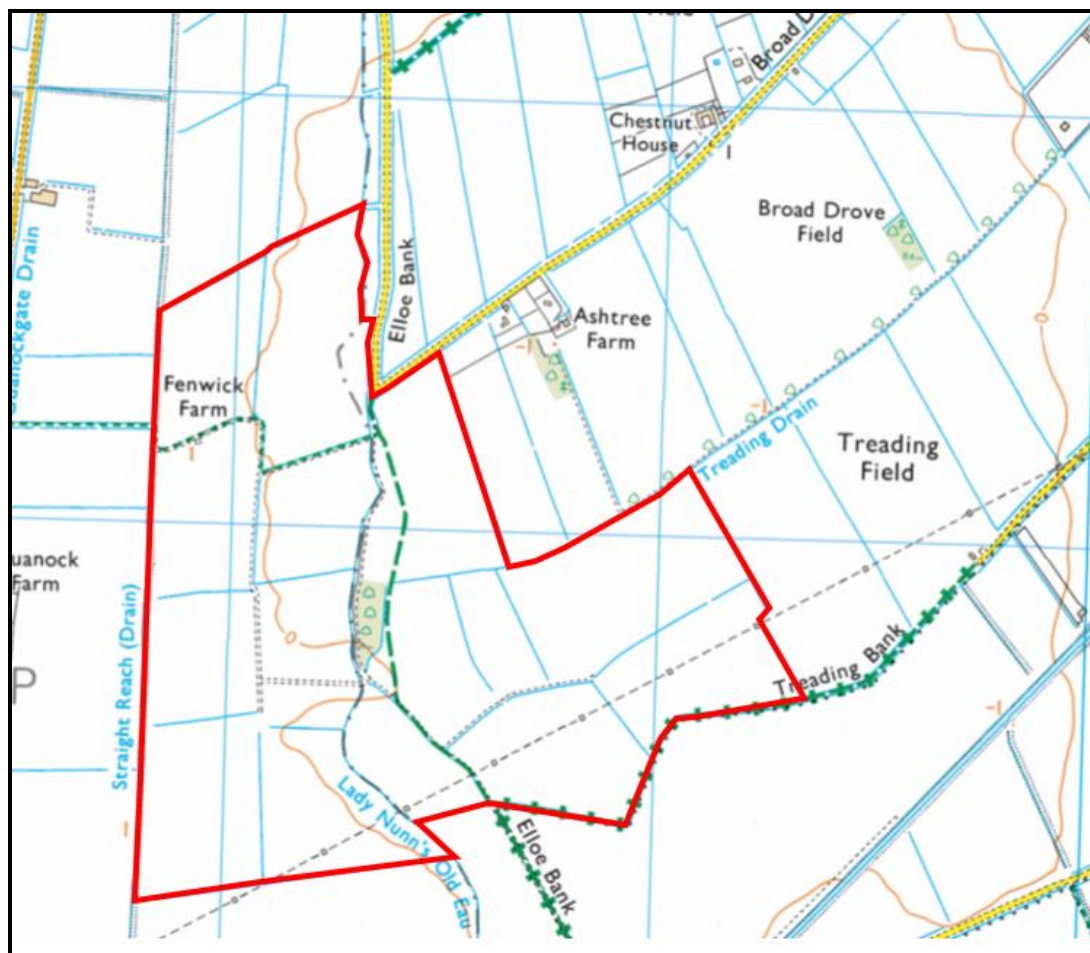


Figure 1a: Site Location Plan

The contours in **Figure 1a** show site levels varying from approximately **-1.0m AOD** at the eastern boundary to **+1.0m AOD** at the western perimeter of the site. The site gently slopes from west to east.

Figure 1b below shows the site boundaries provided by the client.

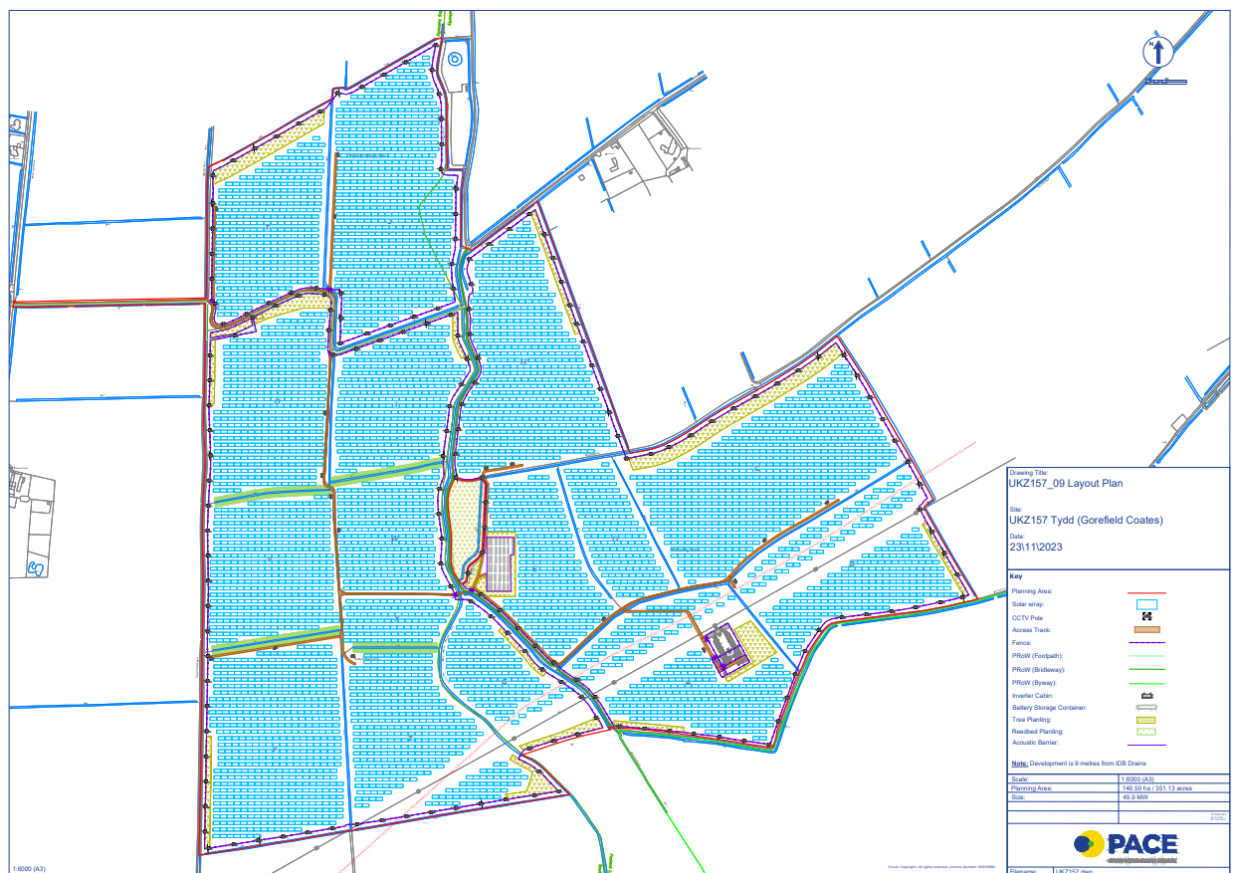


Figure 1b: Site Boundary Plan

The site is formed 100% with permeable, exposed grassed surfaces as shown in the aerial view (**Figure 2**) below.



Figure 2: Aerial View of the Site

1.2 Study

The overall objective of this Flood Risk Assessment report (FRA) is to carry out a detailed assessment of flood risk at the site and check potential constraints to ensure the proposed solar farm development is safe from flooding for the lifetime of the development and the energy recovery facility does not make flooding worse elsewhere. To achieve this aim, the following key actions were carried out:

- Undertake initial consultation with the EA (See **Appendix A**)
- Review LIDAR and flood risk data to identify the existing flood risk posed to the site from all sources
- Review and assess the surface water run-off generated at the site and identify suitable measures to manage drainage from the proposed development
- Identify suitable mitigation measures to protect the development site against flooding.

1.3 Scope of Work

In order to meet the above objectives, the following scope of work and tasks were undertaken;

Task 1: Data Collection

The latest relevant information on the nature of the flood risk at the site was collected from key stakeholders including, South Holland and Fenland District Councils, South-East Lincolnshire Council SFRAs, Cambridgeshire County Council, Environment Agency, DEFRA Magic Map, OS and LIDAR DTM survey data.

The EA's latest flood maps have been reviewed and compared with the flood data provided in the South East Lincolnshire Council and Fenland District Council's Level 1 SFRAs, produced in March 2017 and June 2022 respectively (**Ref. 1a and 1b**), to assess extents of the flood zone boundaries. Detailed flood maps and modelling datasets have also been procured from the Environment Agency for this FRA to enable us to undertake a preliminary analysis of site constraints with respect to flood risk.

Task 2: Identification of Current and Post-Development Flood Risk

Flood risk for the existing and post-development scenarios have been considered in this FRA report from the data collected in Task 1. The assessment identifies risk from all potential sources of flooding and includes consideration of the impact of climate change.

Task 3: Assessment of Site Drainage

The site is currently greenfield and includes 'Lady Nunn's Old Eau' watercourse which intersects the site north to south into which local ditches drain. A site-specific Surface Water Management Plan for the development, ref FCL/644/SW01, is also provided under separate cover which complies with NPPF and the requirements of the both the LLFA and the Environment Agency.

1.4 Key Criteria for the Proposed Development

- A Solar Farm is considered 'Essential Infrastructure' in the EA's Development Vulnerability classification as defined in Table 2 – Flood Risk Vulnerability Classification, Paragraph: 066 Reference ID: 7-066-20140306 of NPPG
- A Solar Farm is defined as a 'Major Development' in The Town and Country Planning Development Management Procedure (England) Order 2015
- The 'fluvial flooding – peak river flows' allowance in NPPG is the 'Higher Central – 2080 epoch' for the lifetime of the development
- Solar farm have a design life of 30 to 40 years. According to latest planning practice guidelines, the 1 in 75 year storm return event must be applied to commercial facilities when considering flood risk for the lifetime of this development
- The appropriate allowance to assess off-site impacts and calculate floodplain storage compensation depends on land uses in affected areas. The higher central allowance is applied for essential infrastructure
- The peak rainfall allowances map shows anticipated changes in peak rainfall intensity. The 2070s epoch is used for development with a lifetime between 2061 and 2125
- The site benefits from existing flood defence to protect from fluvial and tidal flood risk.

2 Flood Risk Data

2.1 Flood Map for Planning - Flood Risk to the Site from Rivers and Sea

The Environment Agency's indicative floodplain map shows the entire site located in Flood Zone 3 (high risk) as presented in **Figure 3a below**. Fenland District Council SFRA 2022 and South-East Lincolnshire SFRA 2017 classifies the site as being in FZ3a in **Figure 3b below**. The Fenland District Council's Level 1 SFRA, representing the best available data, offers guidance for a site-specific flood risk assessment as well as the application of the Sequential and Exceptions Tests.

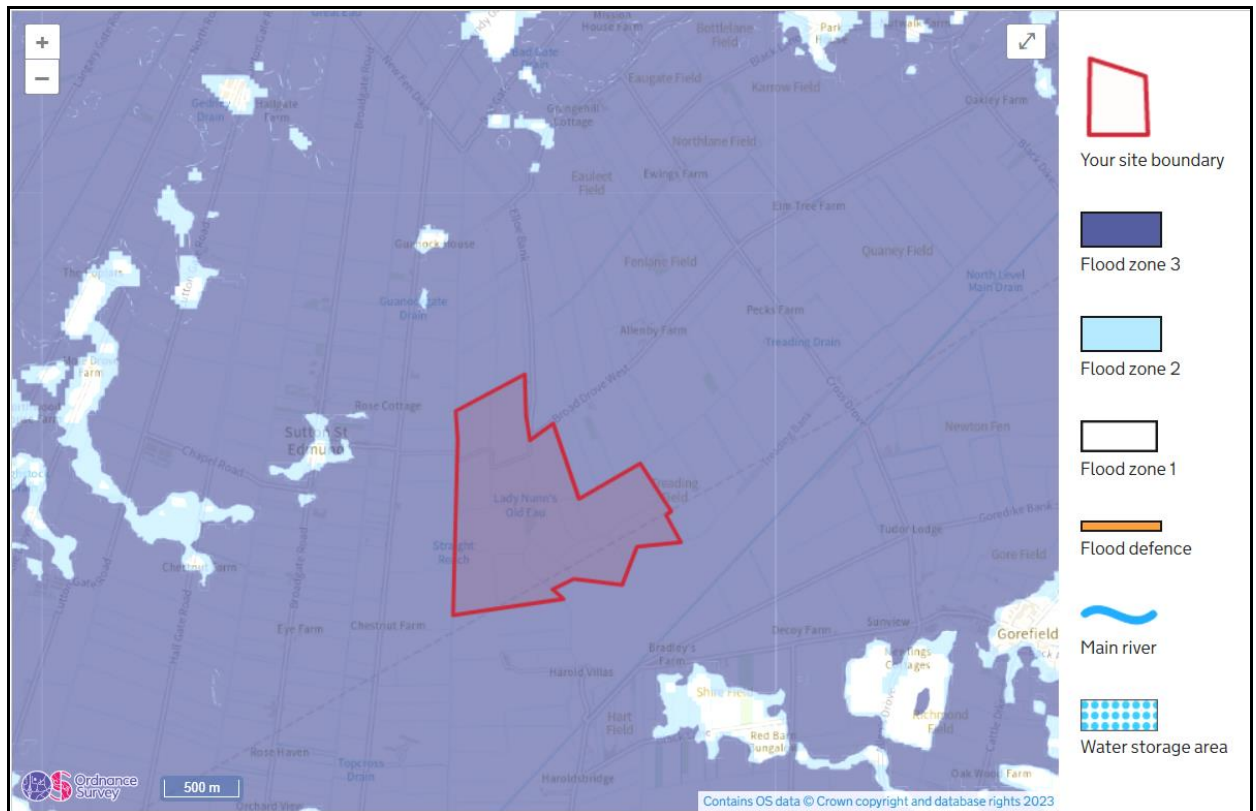


Figure 3a: Site Located in Flood Zone 3 (High Risk): Source, Environment Agency

The EA recognise that in some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands.

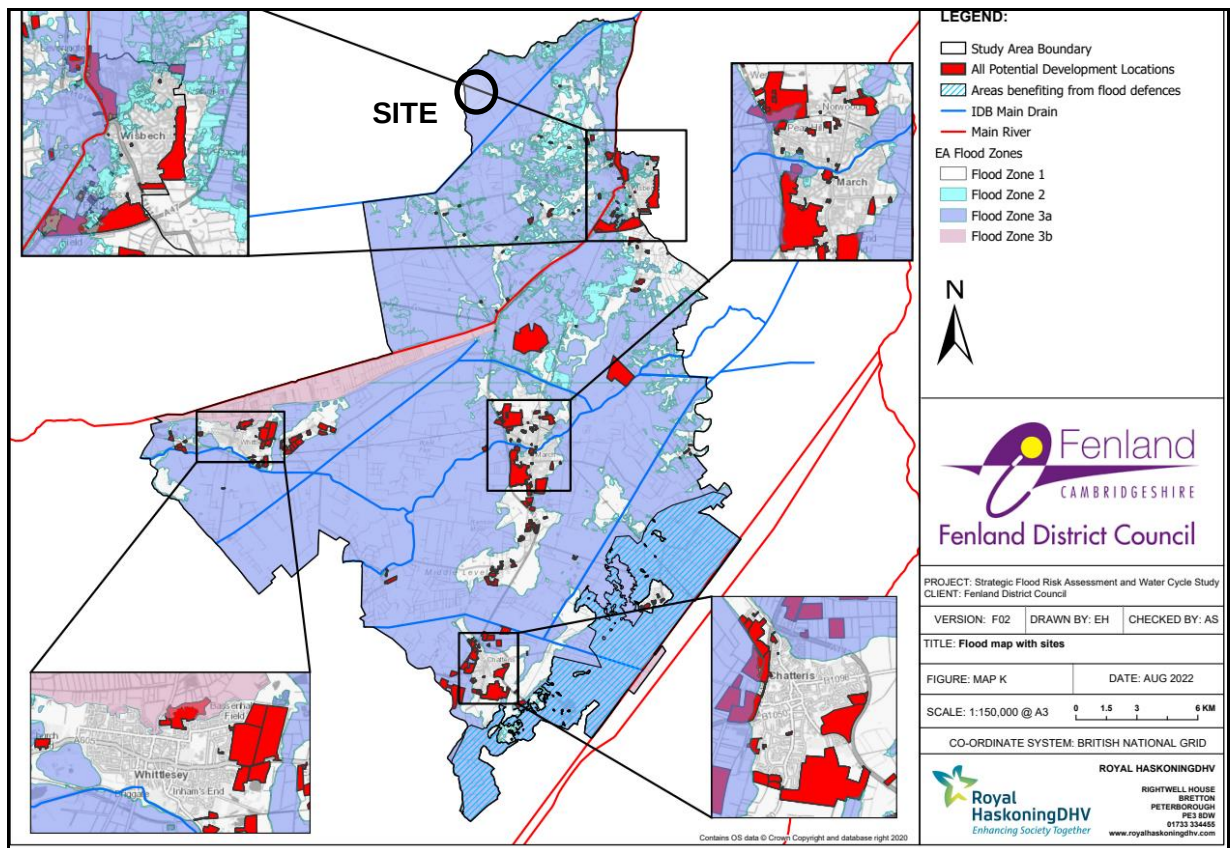


Figure 3b: Site Flood Risk Classification FZ3a: Source, Fenland District Council Level 1 SFRA 2022

2.2 Flood Map for Planning - Flood Risk to the Site from Surface Water

The EA's Surface Water Flood Risk map in **Figure 4** below shows there is a very low risk of surface water (overland) flooding in the medium risk scenario.

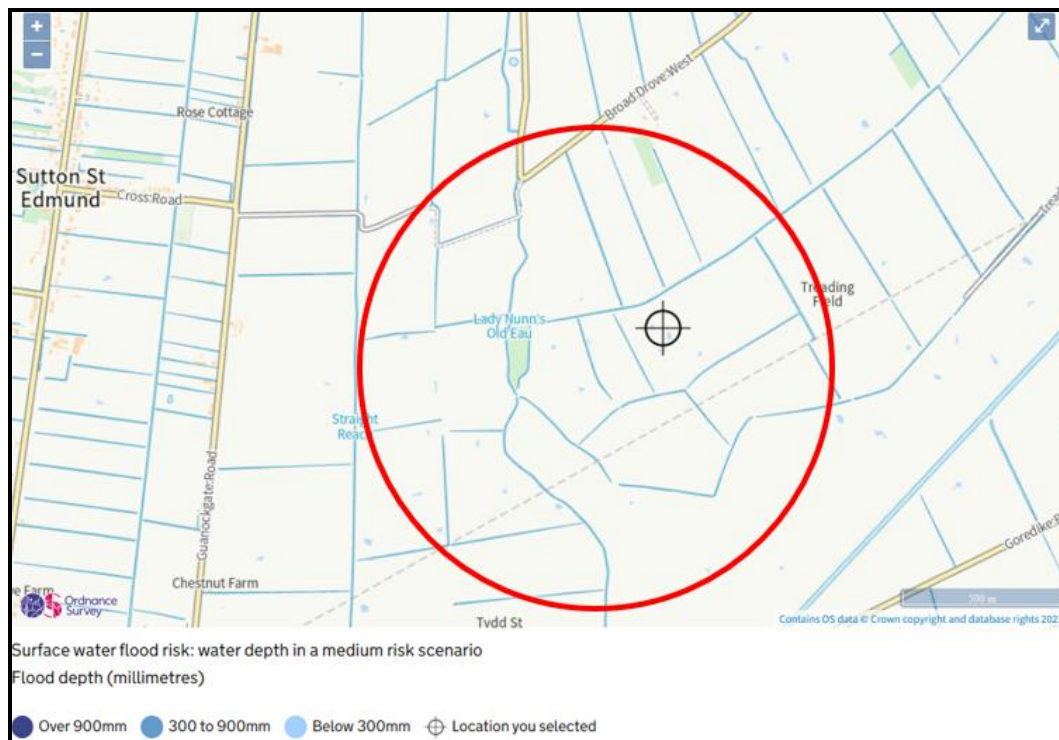


Figure 4: Surface Water Flood Risk Map: Source, Environment Agency – Medium Risk 1 in 100yr

Overall, there is very low risk of floodwater impacting the proposed facility and the development itself will not make flooding worse elsewhere.

This detailed site-specific FRA report is provided to support a full planning application for the major development as the site plan area is greater than 1 hectare. This FRA complies with the relevant national planning guidance as set out in the National Planning Policy Framework (NPPF) updated on 05 September 2023 (**Ref. 2**) and its Guidance Notes PPG updated on 25 August 2022 (**Ref. 3**).

The report is focused on tidal and surface water management aspects of the development as laid out in Cambridgeshire County Council's Surface Water Management Plan, Final Report, produced by Hyder, dated 2014 (**Ref. 4**).

2.3 Sequential and Exception Tests

A Solar Farm is considered 'Essential Infrastructure' in the EA's Development Vulnerability classification. Fenland District Council SFRA 2022 and South-East Lincolnshire SFRA 2017 classifies the site as being in FZ3a. All developments in this FZ3a require a site-specific FRA. It is the Local Authority to determine if the Sequential and Exceptions Tests are passed.

Table 1 below shows that Essential infrastructure are only permitted in Flood Zone 3a if they pass the Exception Test and the infrastructure should be designed to remain operational in times of flood.

Table 2: Flood risk vulnerability and flood zone ‘incompatibility’

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 †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *

Key:

✓ Exception test is not required

X Development should not be permitted

Notes to table 2:

- This table does not show the application of the [Sequential Test](#) which should be applied first to guide development to the lowest flood risk areas; 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 those developments set out in [National Planning Policy Framework footnote 56](#). The Sequential and Exception Tests should be applied to ‘major’ and ‘non major’ development;
- 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 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.

Paragraph: 079 Reference ID: 7-079-20220825

Revision date: 25 08 2022

Table 1: Flood risk vulnerability and flood zone compatibility

2.3.1 Current Guidelines for Sequential and Exceptions Tests

Current Defra/EA planning and development guidelines state, 'You do not need to do a Sequential Test if either of the following apply (as detailed in Footnote 56 in the NPPF and Planning Practice Guidance Notes dated 25 August 2022):'

1. Your householder development is a 'minor development', where this is categorised as involving;
 - minor non-residential extensions: *industrial/commercial/leisure etc extensions with a footprint less than 250 m², or*
 - alterations: *development that does not increase the size of buildings, eg alterations to external appearance.*
2. Your development involves a change of use (eg from commercial to residential) unless your development is a caravan, camping chalet, mobile home or park home site where Exceptions Tests should be applied as appropriate.

However, in the event of a redevelopment of the premises the requirements for a Sequential Test and subsequently the Exceptions Test as provided by the NPPF and PPG would apply.

Paragraph 161 of the NPPF states that:

All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

- a) *applying the sequential test and then, if necessary, the exception test;*
- b) *safeguarding land from development that is required, or likely to be required, for current or future flood management;*
- c) *using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and*
- d) *where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.*

Paragraph 162 of the NPPF states that:

'The aim of the sequential test is to steer new development to areas with the lowest risk of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.'

Paragraph 163 of the NPPF states that:

'If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3'.

Once the Sequential Test it passed it will be necessary to pass the Exceptions Test (see **Table 1**).

Paragraph 164 of the NPPF states:

'The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and*
- b) 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.'*

The Fenland District Council Level 1 SFRA qualifies the approach for the application of the Sequential Test; When assessing sites not identified in the Local Plan, the following procedure should be followed:

Identify whether the Sequential Test is required. It is not needed for minor development or change of use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site), development sites which have been allocated through the Local Plan or for sites in Flood Zone 1 at low risk from flooding from other sources as shown by the maps in this SFRA and set by criteria set out in section

If the Sequential Test is required, the LPA should agree the area of search with the applicant. This should be guided by the requirement for the proposed development in a particular area.

Determine whether there are any other 'reasonably available' sites within Flood Zone 1 and away from other sources of flood risk, or whether the sequential approach can be used to move all of the development within the site boundary to Flood Zone 1 and away from other sources of flood risk.

If there are found to be other reasonably available sites at a lower risk of flooding, then the development has failed the Sequential Test and planning permission should be refused. If there are no other reasonably available sites, then the development can be deemed as passing the Sequential Test and the Exception Test may be required as set out in Table 3 of the PPG.

The Council does not require the Sequential Test to be applied for minor development, changes of use or development sites which have been allocated through the Local Plan. However, applications for these development types should still meet all requirements for site-specific flood risk assessments, including consideration to Local Plan policies on flood risk, the West Berkshire SuDS SPD, and the requirements of the LFRMS.

3 Planning Policy

3.1 National Planning Policy Framework (NPPF)

NPPF sets out what needs to be taken into account by developers to assess whether a proposed facility is likely to be at risk of flooding or has the potential to increase flood risk elsewhere.

The NPPF is supported by Planning Practice Guidance, 25 August 2022 and references to earlier guidelines such as Planning Policy Statement 25: Development and Flood Risk, 2010 (**Ref. 5**).

The overall objective of the policy is to reduce flood risk through development opportunities. The policy aims to ensure flood risks have been taken into account and appropriate measures put in place to ensure that;

- The development is safe
- Where possible, the flood risk overall is reduced
- Increased flood risk does not occur elsewhere
- Appropriate mitigation measures are employed to deal with these effects and risks.

The proposed solar farm contributes to the aims of prevailing planning and energy policy and is proposed on a suitable site.

3.2 Strategic Flood Risk Assessment (SFRA)

South-East Lincolnshire Level 1 SFRA and Fenland District Council's Level 1 Strategic Flood Risk Assessment report were produced in March 2017 and June 2022 respectively.

The SFRA is primarily a planning tool. It is a pragmatic, risk-based assessment of flood risk to inform the spatial planning process. The areas of the district council that are most vulnerable from flooding have been considered in these SFRAs.

3.3 North Level District Internal Drainage Board (IDB)

Drainage in this area of the Fens is managed by The North Level District Internal Drainage Board. It manages an area in the heart of the Fens that is mainly reliant on pumped drainage to evacuate surplus water from agricultural, industrial and urban properties, discharging to the adjacent main rivers. The LLFA have confirmed consent to discharge into a main river may be conditioned as part of a planning consent.

3.4 Flood and Water Management Act (FWMA) (2010)

The 2010 Flood and Water Management Act (**Ref. 6**) requires upper tier local authorities to create local flood risk management strategies, carry out flood risk management work and develop a register of structures or features which may have a significant impact on local flooding.

Under the FWMA, Lead Local Flood Authorities (LLFAs) are required to produce a Local Flood Risk Management Strategy (LFRMS) reports. This document provides a framework for flood risk management within the boundary of the authority, setting policies and outlining a plan of deliverable actions.

3.5 Local Flood Risk Management Strategy (LFRMS)

A ten year plan for the management of flooding from 'local' sources is detailed in Cambridgeshire County Council's Local Flood Risk Management Strategy 2021-2027, (**Ref. 7**).

The LFRMS seeks to improve;

- Local knowledge regarding flood risk
- Protection from flooding
- Resilience to flooding
- The environment
- Communications about flooding issues.

The summary shown in **Figure 5** below outlines what is classified as local flooding and what is not.

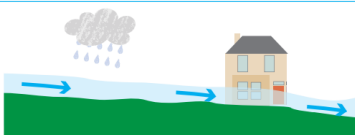
Local flooding includes:				
Surface water flooding				
		Surface water flooding (also referred to as pluvial flooding or flash flooding), is rainwater, snow and other precipitation which runs across the surface of the ground and pools in low lying areas. To be classed as surface water flooding it must not have entered a watercourse, drainage system or public sewer. This type of flooding often occurs quickly during, or shortly after, a high intensity storm.		
Groundwater flooding				
		Groundwater flooding occurs where the water levels in rock and soil become high enough for the water to appear near to or above the ground surface. This may happen, for example, where there are underlying gravels, or porous or fractured rocks, allowing water to pass through. Flooding from natural springs would be classed as a form of groundwater flooding. Slow response means that groundwater flooding can occur a long time after prolonged or heavy rainfall and can last for a long time (often several weeks or months).		
Ordinary Watercourse flooding				
		Ordinary watercourse flooding , also referred to as fluvial flooding, occurs when water overtops the banks of a stream or smaller watercourse. This can occur because there is more water draining into the channel than it can hold, or because it is blocked. Flooding from Main Rivers, (as defined by the Environment Agency) is not classed as 'local' flooding.		
Local Flooding does not include:				
Main River flooding	Coastal flooding	Sewer flooding	Reservoir flooding	Flooding caused by burst water mains

Figure 5: Local and Non-Local Flooding Sources

3.6 Lead Local Flood Authorities (LLFAs)

Cambridgeshire County Council is appointed as LLFA and their duties include;

Lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses (often described collectively as 'local flood risk').

- A pre-application meeting has been held with the LLFA with their written response attached in **Appendix B**
- Local Flood Risk Management Strategy (LFRMS): LLFAs must develop, maintain, apply and monitor an LFRMS to outline how to manage flood risk, identify areas vulnerable to flooding and target resources where they are needed most

- Flood investigations: when appropriate and necessary LLFAs must investigate and report on flooding incidents. In Breckland, this is defined as “where five or more residential properties are flooded, or one or more non-residential, or where critical services or infrastructure are flooded. Other incidents may be investigated subject to resources”
- Asset register: LLFAs must establish and maintain a register of structures or features which, in their opinion, are likely to have a significant effect on flood risk in the LLFA area, and a record of information about each structure or feature, including information about ownership and state of repair
- Designation of features: LLFAs may exercise powers to designate structures and features that affect flood risk, requiring the owner to seek consent from the authority to alter, remove or replace it
- Consenting (Section 23 of the Land Drainage Act 1991²³): Where appropriate, LLFAs, acting as the Land Drainage Authority, will perform consenting of works on ordinary watercourses.

On 18 December 2014, a Written Ministerial Statement led by the Secretary of State for Communities and Local Government set out changes to the planning process that would apply to major development from 6 April 2015. In considering planning applications, planning authorities should consult the LLFA on the management of surface water, and ensure, through use of planning conditions or obligations, that there are clear arrangements in place for ongoing maintenance over the lifetime of the installation.

In March 2015, the LLFA was made a statutory consultee to the planning system, which came into effect on 15 April 2015. As a result, Cambridgeshire County Council is required to provide technical advice on surface water drainage strategies and designs put forward for new major developments.

Major development is defined within the Town and Country Planning Order 2015 as:

- a) The mining and working of minerals or the use of land for mineral-working deposits.
- b) Waste development.
- c) The provision of dwelling houses where;
 - (i) the number of dwelling houses to be provided is 10 or more; or
 - (ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known where the development falls within sub-paragraph (c)(i).
- d) The provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
- e) Development carried out on a site having an area of 1 hectare or more.

3.7 Surface Water Management Plan (SWMP)

Cambridgeshire County Council’s Surface Water Management Plan, final report, was produced by Hyder dated September 2014, and provides general guidance to be used as an overarching framework to assist with the identification and management of flood risk from local sources within the council’s area boundary.

This guidance document should be read in conjunction with the Local Flood Risk Management Strategy (LFRMS) and the Strategic Flood Risk Assessment (SFRA) reports to assist with dealing with flood risk in the local area.

3.8 Climate Change

The latest climate change allowances identified in the Cambridgeshire County Council's LFRMS have been considered in the tidal and fluvial flood risk assessments undertaken by the Environment Agency for watercourses within the council's boundaries.

4 Site Details and Study Aims

4.1 Site Description

4.1.1 Site Location and Topography

The proposed development site is located straddling the boundaries of South Holland District Council and Fenland District Council (see **Figure 1a**) and is accessible via Guanockgate Road to the west and Broad Drove West road to the east.

The existing agricultural site is approximately 141.6 hectares (350 acres) in plan area and surrounded by agricultural fields on all sides. There is an existing watercourse 'Lady Nunn's Old Eau' which intersects the site north to south before draining into the North Level Main Drain to the south of the site. The fields are also served by a network of ditches which drain to the main watercourses.

The contour map in **Figure 6** below shows overall contours and falls across the site. The ground levels fall gently from west **+1.0m AOD** to east **0m AOD** towards Lady Nunn's Old Eau and to Treading Drain on the eastern boundary. The central part of the site forms a low area at **-1.0m AOD** as shown on the Lidar map in **Figure 7**.

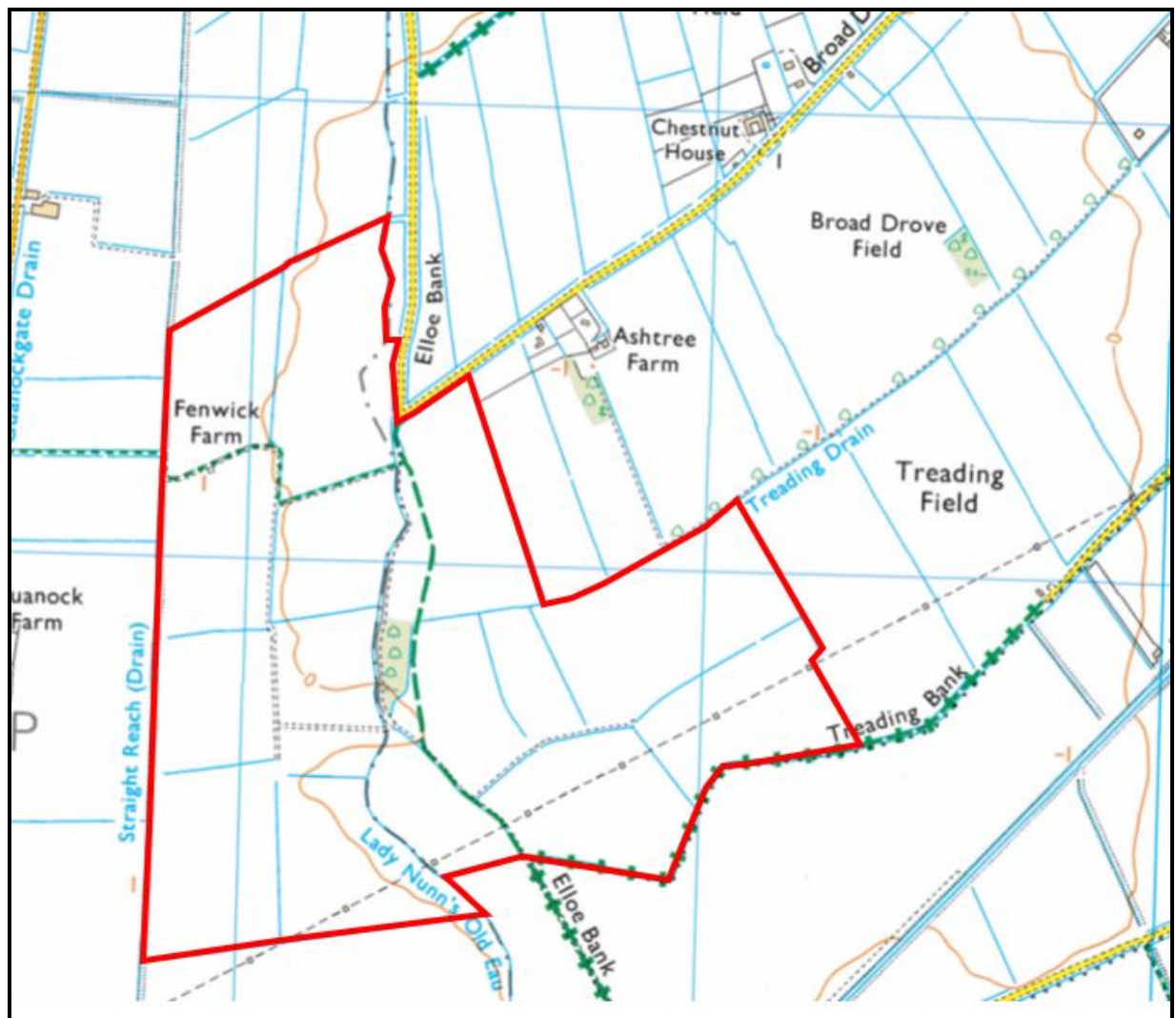


Figure 6: Contours Across the Site

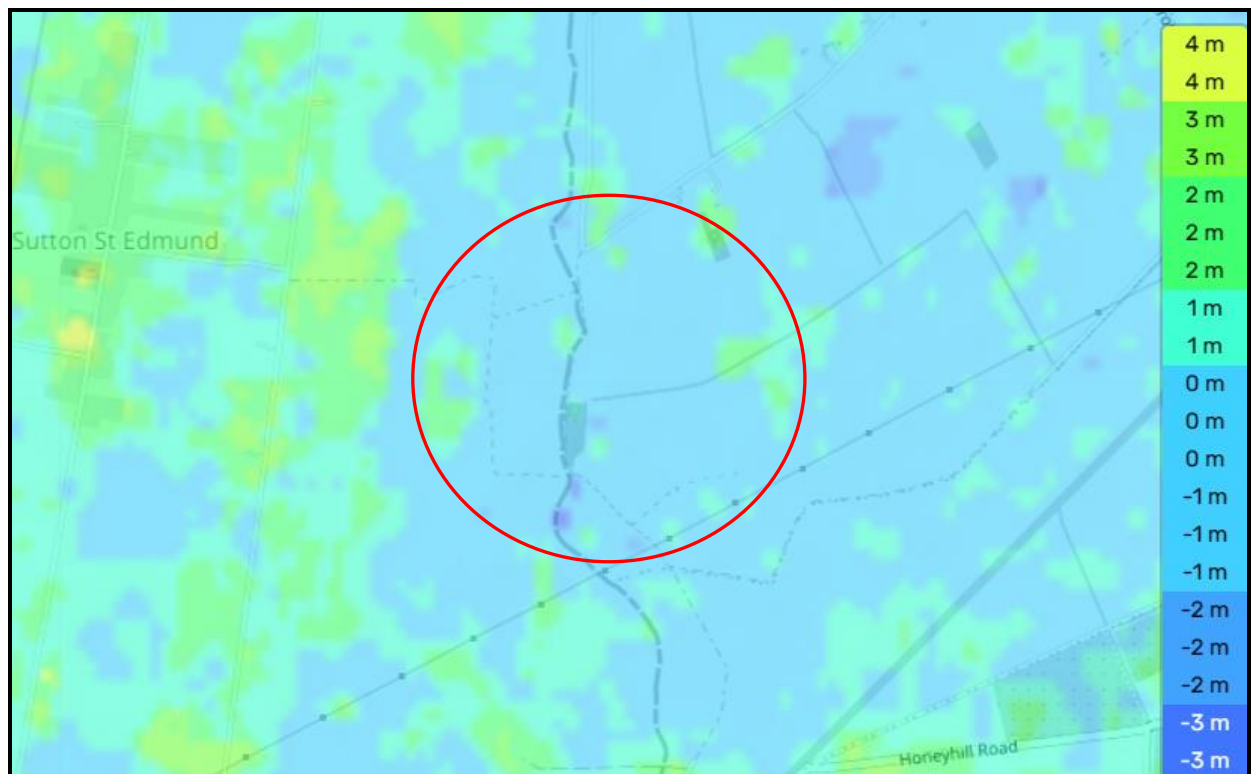


Figure 7: Lidar Ground Level Data – Site levels range from -1.0m AOD to +1m AOD

4.1.2 Geology and Hydrogeology

The DEFRA Magic Map (**Figure 8a** below) shows the site located in ‘Soilscape 21’ which are formed of ‘Loamy and clayey soils of coastal flats with naturally high groundwater’.

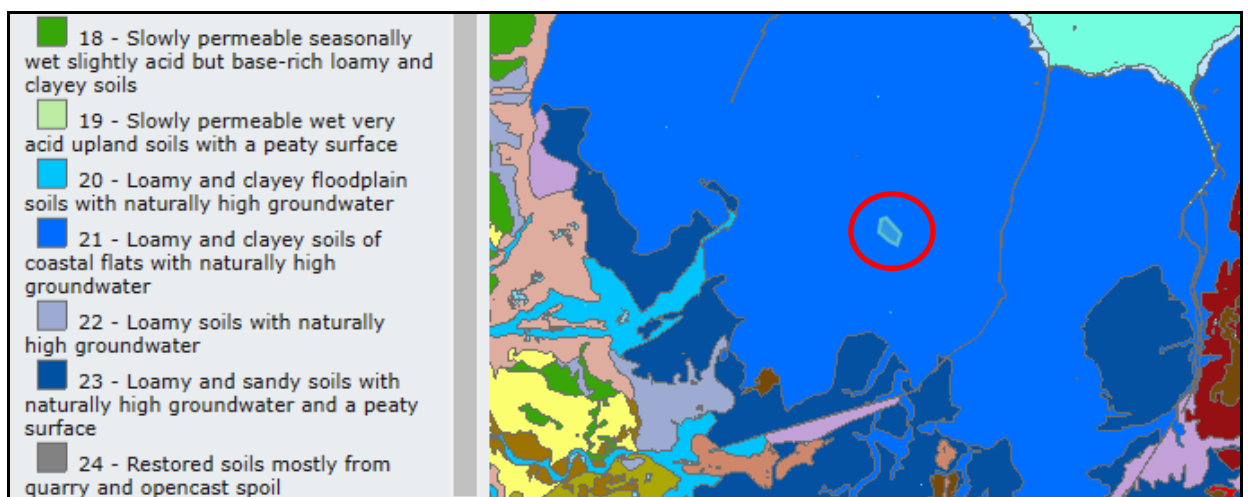


Figure 8a: Site shown in Soilscape 21: Source, DEFRA Magic Map

The Fenland District Council SFRA as shown in **Figure 8b** below shows that bespoke infiltration SuDS may be possible.

Consequently, a Surface Water Management Plan for the site would address the management of rainwater run-off from the site for the lifetime of the proposed solar farm.

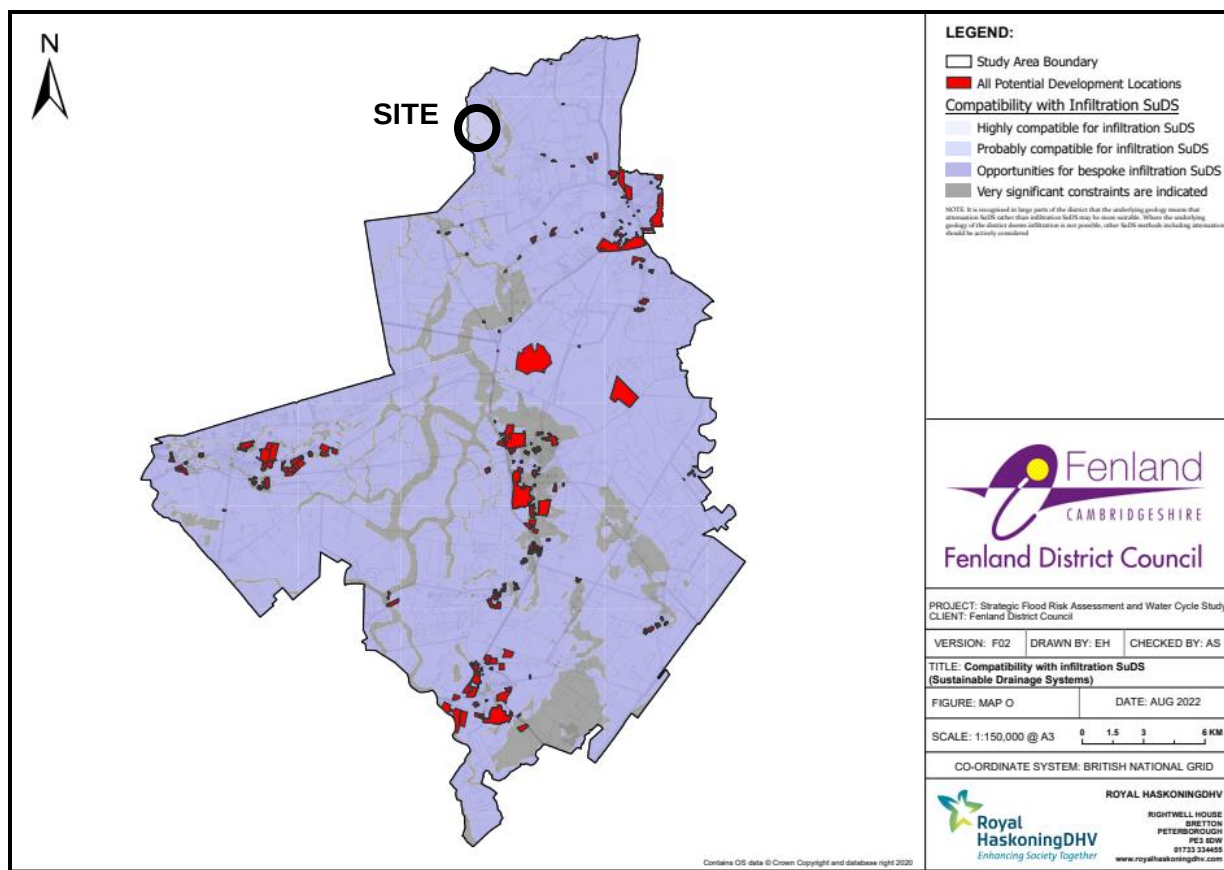


Figure 8b: Geology of the Site – Opportunities for Bespoke Infiltration SuDS – SFRA 2022

5 Solar Renewable Energy Facility

A Solar Farm is a renewable energy facility, with a proposed layout as shown in **Figure 9a** below, comprising photovoltaic (PV) equipment and supporting plant configured at a site to secure maximum benefit from solar energy.

A site may contain numerous tracker units that can be rotated/tilted around axes to derive a proper angle or fixed south facing panels that can help the panels receive maximum sunlight and performance. Example of the fixed and tracker type units is illustrated in **Figure 9b** and **9c** below.

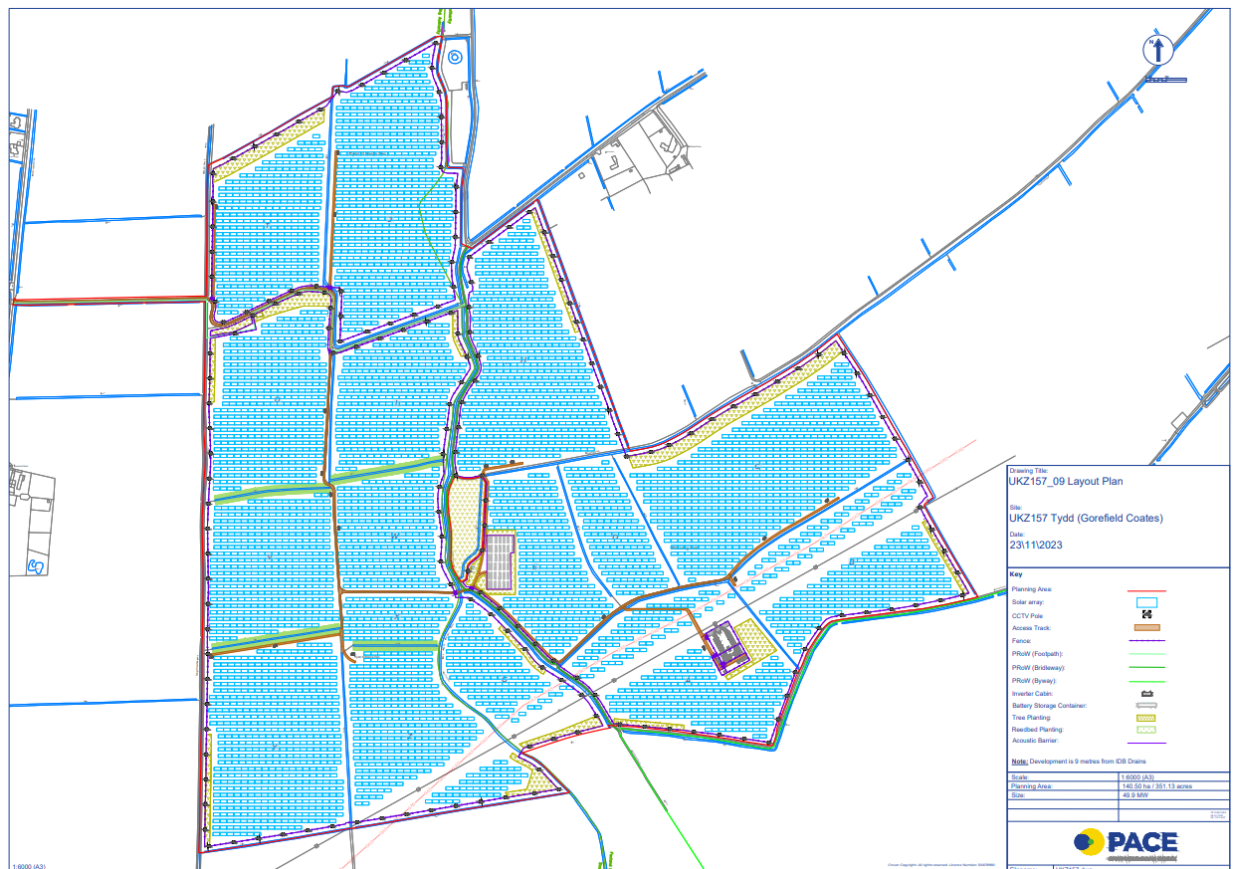


Figure 9a: Indicative Solar Renewable Energy Facility – Tydd Solar

The photovoltaic modules are supported on steel tables/racking which will be supported by a steel pile system to a depth of 2m and spaced over 5m apart to allow rainfall directly to ground without interruption. The piles are likely to be around 0.1m diameter and will elevate the tables to a minimum of 800mm above ground level, allowing vegetation to grow below the sloping panels.

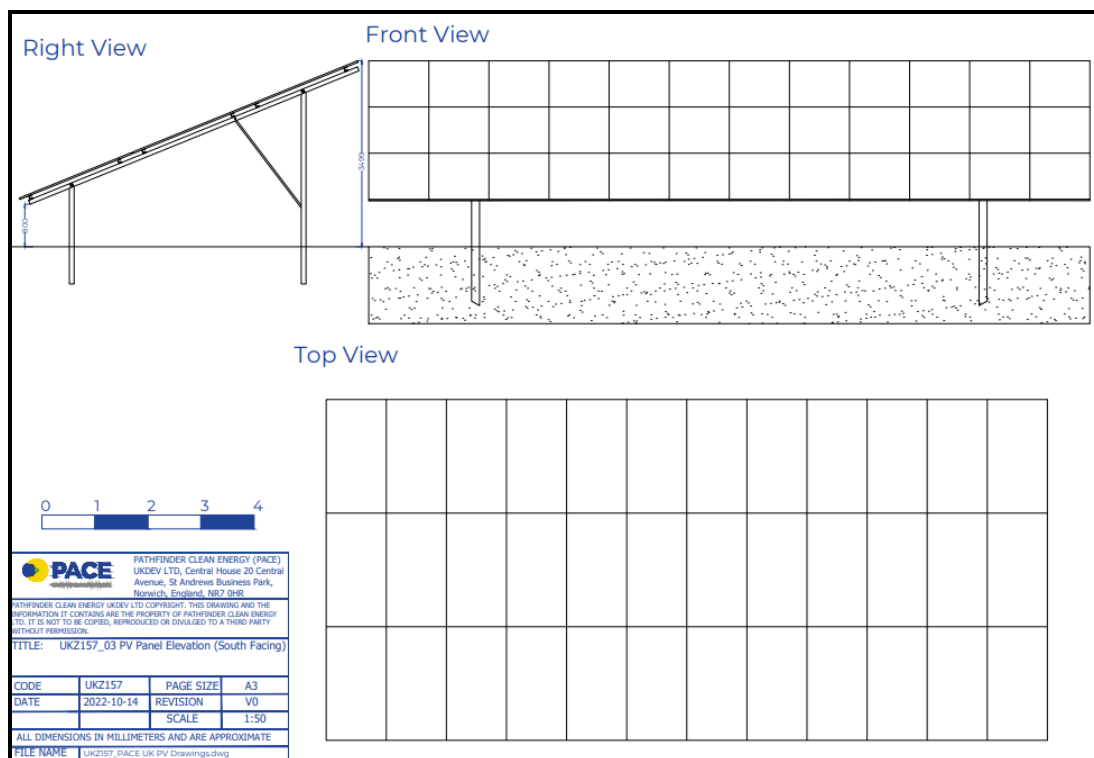


Figure 9b: Fixed Type South Facing

The module posts will be aligned horizontally in rows 5m apart. A minimum 25mm gap will allow water to drain between the modules (the 25mm gap surrounds all sides of each module). Therefore, the drainage path across the units will be a maximum of 1000mm. Surface water run-off from the modules is covered in detail in the Surface Water Management Plan ref. FCL/644/SW01.



Figure 9c: PV Modules fixed to Steel Posts

The modules will be served by inverter stations and a sub-station/switchgear unit as shown in **Figure 9d** below. The sets of switchgear units do not impact on the permeability of the underlying soil and do not prevent surface water run-off over the ground.

Inverter and battery stations may be placed 300mm above ground level to allow water to pass underneath. Where appropriate, open mesh fencing will be used so not to interrupt surface water run-off across sloping fields. Where this is not possible, a swale or French Drain will be installed around the outside perimeter of the fencing to divert any excess SW water around the inverter and battery stations.



Figure 9d: Inverter and Sub-station Switchgear

The battery units used to store solar energy are supplied in container form (See **Figure 9e** below) and located on metal platforms off the ground to allow water to pass under the units. The pre-formed units significantly reduce the construction programme during installation.



Figure 9e: Inverter, Battery and Sub-station Switchgear

The batteries and inverters units require access and therefore a 4m wide track is normally constructed using permeable surfacing (using crushed stone or an alternative permeable material). The track would be accessed off the existing roads and its routing will be determined by the panel array. Any landscaping works would be proposed in due course as part of the overall design considerations.

In areas prone to flood risk the footings of the inverter and battery installations are likely to be set at least 300mm above the surrounding ground level to protect these units and to allow water to flow freely across the site.

All services (cabling etc) are designed and installed to be flood resilient and water compatible to remain operational in times of flood in accordance with the requirements of the NPPF and SFRA for essential infrastructure. This is achieved in accordance with appropriate design standards and best practise guidance. The panels will be supported by posts/piles which are adequately spaced to allow for the free flow of water between them.

The security fencing will be a mesh-type that will not impede any overland flow from the site.

Should any of the proposed foundations be installed on concrete plinths rather than steel frames, the overall area of the plinths will be less than 1% of the site area. The overall impact on potential flood routing or rainwater discharged from the predominantly greenfield site will be negligible. In the event plinths are used, French drains shall be installed around the foundations to direct rainwater to ground.

6 Existing Flood Risk

This section of the report identifies the existing risks from the different forms of flooding identified in the NPPF, Environment Agency 'Product 4' data (**Appendix A**) and supporting guidelines. Overall flood risk at the site from all sources is considered low as the site is protected by formal flood defences.

6.1 Fluvial and Tidal Flood Risk

Existing flood defence embankments and pumping stations reduce the risk of fluvial flooding to the area. The flood defences to the River Nene through Fenland are primarily designed to protect against tidal flooding. As such they provide a standard of protection against fluvial flooding which is greater than 1% EAP (1 in 100 years). The EA have confirmed the site is not at risk of flooding from main rivers. Fluvial flood risk is therefore considered 'low'.

Fenland is not at risk of flooding directly from the sea (coastal flooding), but it is at risk from tidal flooding from the River Nene. To combat the tidal flood risk in Fenland there are flood defences along the tidal Nene to protect against at least a 0.5% AEP (1 in 200yr) flood. This protection directly benefits towns such as Wisbech that have a history of flooding induced by storm surges.

The EA recognise the solar farm site is within a tidal flood zone but, assuming no tidal defences exist, the site is not at risk of tidal flooding in either an overtopping or breaching of defences scenario, today or in the future taking climate change allowance as illustrated in **Figure 10** below (taken from the South-East Lincolnshire SFRA Assessment 2017 for South Holland District Council (**Ref. 1a**)).

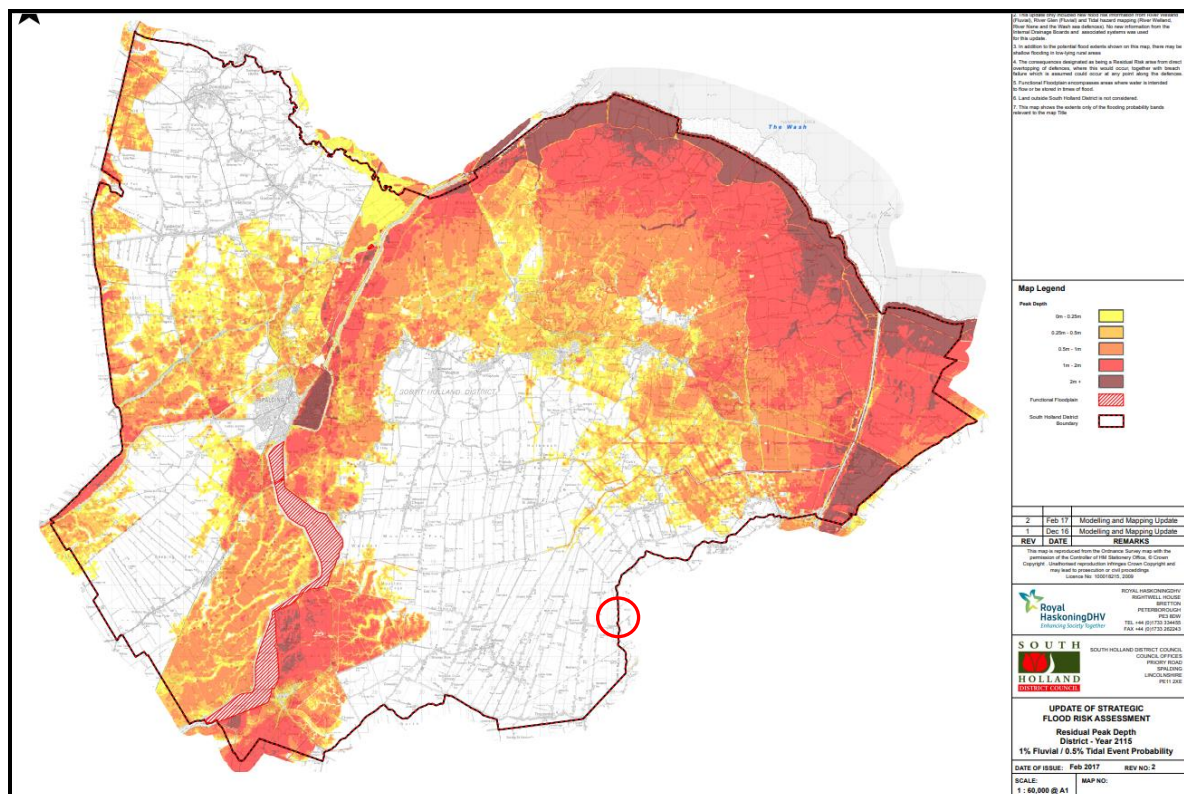


Figure 10: EA Breach Analysis for 1% Fluvial and 0.5% Tidal Event Including Climate Change 2115

The EA confirm the flood defences are in fair condition and reduce the risk of flooding (at the defence) to a 0.67% (1 in 150) chance of occurring in any year. They inspect these defences routinely to ensure potential defects are identified and the level of protection is maintained. They confirm there is no history of flooding to the site and flood risk from Tidal sources is considered 'low'.

6.2 Flooding from Groundwater

A groundwater flood event results from a rise in groundwater level sufficient for the water table to intersect the ground surface and inundate low lying land. Groundwater levels rise and fall in response to rainfall patterns and distribution, with a timescale of months rather than days and largely depends on the ground conditions.

DEFRA Magic Map confirms the risk of groundwater vulnerability to be 'unproductive'. Risk of flooding from groundwater is therefore considered 'low' for this development proposal.

6.3 Flooding from Surface Water Run-off

Surface water flooding typically arises because of intense rainfall, often of short duration, that is unable to soak into the ground and/or enter drainage systems. It can run quickly off land and result in localised flooding.

The risk of flooding from surface water is presented on the Environment Agency website at a strategic scale. As the design life of the solar farm is less than 100 years, SW flood risk is considered for up to the 1 in 100 year 'medium risk' scenario and therefore, the SW flood risk map applicable to the site would be as shown in **Figure 11** below. Based on topography and the plans provided by the EA and in the Level 1 SFRA, surface water flood risk is contained within the drainage ditch network at the site is considered 'low'.

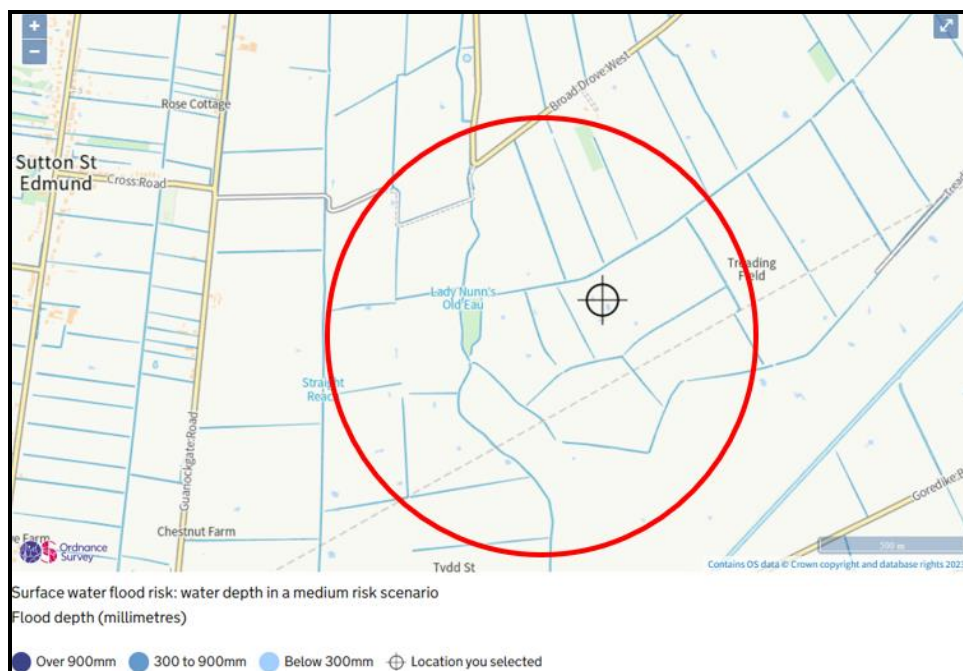


Figure 11: Surface Water Flood Risk Maps 1 in 100yr Medium Risk Scenario

Surface Water flood risk will be considered in greater detail at full planning stage and a comprehensive Surface Water Management Plan incorporating a rainwater run-off strategy from impervious areas of the site to demonstrate that surface water flood risk has been fully considered and mitigated is provided under separate cover. The aim is to offer a solution to reduce surface water flood risk in this location, where feasible, to provide a benefit to the local community.

6.4 Foul Sewer Flooding

Flooding from foul or combined sewers occurs when rainfall exceeds the capacity of networks or during infrastructure failure. There are no sewers at the site therefore, the current risk of sewer flooding is considered to be 'very low'.

6.5 Artificial Sources of Flooding

Artificial flood sources include raised channels such as canals or storage features such as ponds or reservoirs. There are no reservoirs or canals in the vicinity of the site therefore risk of flooding from artificial sources is assessed as being 'very low'.

6.6 Summary of Current Flood Risk

- The site is in Flood Zone 3a but the plot benefits from defences managed by the Environment Agency.
- The risk of fluvial flooding is 'low' as the site is defended.
- The risk of tidal flooding is 'low' as the site is defended.
- The risk of surface water (overland) flooding is 'low'.
- The risk of groundwater flooding is 'low'.
- There is no risk of sewer flooding.
- There is no risk of flooding from artificial sources such as reservoirs, ponds etc.

Consequently, the overall risk of flooding at the site is 'low'.

7 Post-Development Flood Risk

The proposed solar farm is to be built just above existing ground levels thus preventing any impact on the permeability of the underlying soil for a site located in Flood Zone 3a. Any new access tracks are to be built using permeable surfacing and built at grade so not to impact on exceedance flow routes. The type and quantity of infrastructure being installed is minimal when compared with the magnitude of the overall site. Rainwater run-off from the site will be better controlled as detailed below.

It is anticipated that rain falling on each panel/module will run off the surface and flow/infiltrate in the sheltered rain shadow area underneath the down-slope modules. A minimum 25mm gap will allow water to drain off each module (the 25mm gap surrounds all sides of each module). The existing grass covered areas, which are likely to encourage / provide infiltration will only be marginally affected. The existing ground levels at the proposed development site would remain largely unchanged.

The proposed renewable energy facility will not be at risk of flooding and the development will not make flooding worse elsewhere.

7.1 Fluvial and Tidal Flood Risk

The site (and the proposed installation) is in Flood Zone 3a, land in this zone is assessed as having a 1 in 30yr to 1 in 100yr annual probability of river and 1 in 200yr annual probability of sea flooding in any year. However, the EA have confirmed the site is not at risk of flooding from the sea due to the presence of flood defences and is not at risk of flooding from fluvial sources. The post-development risk of fluvial and tidal flooding will remain 'low'.

7.2 Flooding from Groundwater

The site is not at risk of groundwater flooding. The proposed solar panels and supporting plant and equipment are to be built at or above ground level and existing ground levels will remain largely unchanged therefore there will be no increase in the risk of groundwater flooding at the site. The post-development groundwater flood risk will remain 'low'.

7.3 Flooding from Surface Water Run-off

A separate and dedicated surface water management plan ref. FCL/644/SW01 has been produced to support a full planning application for this renewable energy facility. The impact of a solar power generation facility on the overall permeable area of the site will be negligible and the installation would not affect exceedance flow from the sloping site during a severe storm event.

Changing the site's primary function will have several benefits regarding reduction of SW run-off rates from the site. The absence of typical farming activity will provide the following benefits which will serve to reduce runoff rates from the site:

- The fields will no longer be ploughed or furrowed
- The fields will no longer be left without vegetation cover in the winter periods
- The fields will no longer be intensively trodden by heavy animals
- The fields will no longer be regularly traversed by heavy machinery.

The Environment Agency's Land Quality Officer has shown that all the above farming activities can considerably increase the rate of runoff from a site, thereby increasing downstream flood risk in terms of water flow rates and silt pollution. As such the absence of farming activity will reduce soil

compaction on the site, allowing the soils to become naturally aerated over time. This should improve the soils water acceptance potential and reduce runoff rates from the site.

It is likely longer meadow type grasses and wildflowers will be allowed to propagate across the site over its predicted design life. Meadow type vegetation provides high levels of natural attenuation which will serve to limit flows across the site.

It is apparent that using the site for solar power generation is likely to ensure that the soil state is improved, and that vegetation cover will be established throughout the seasons. As such the run-off rates from the site will be reduced.

In addition, it is likely that infiltration rates will also be improved. The absence of typical farming activity, along with the drainage features proposed in the Surface Water Management Plan should provide betterment to the existing situation in terms of runoff rates and flood risk.

The post-development flood risk from surface run-off will therefore remain 'low'.

7.4 Foul Sewer Flooding

The post-development risk of foul sewer flooding will remain 'very low' as a new foul sewer system is not being installed.

7.5 Artificial Sources of Flooding

The risk of flooding from artificial sources will remain 'very low'.

7.6 Summary of Post-Development Flood Risk

Post-development flood risk will remain low due to the following;

- Although the site is classified as being in FZ3a, due to the distance from the sea, presence of flood defences (providing 1 in 150 year protection) and breach model analysis fluvial and tidal flood risk to the site is considered 'low'. The design life of a solar farm is 30 to 40 years.
- There is no record of any form of flooding at the site as confirmed by the EA and in the Level 1 SFRA.
- The proposed solar farm installations are not at risk from tidal or sewer flooding as they will be installed on platforms and framework raised 1.16m above existing ground level.
- The proposed development will not increase the risk of flooding to adjacent areas upstream or downstream of the site.
- The risk of flooding to the site from sewers or from artificial sources will remain very low.
- All roads will be constructed at grade and built using permeable surfacing to avoid impact on exceedance flows and to allow infiltration of rainwater directly to ground.
- Fencing in all areas shall be designed to be permeable to allow fluvial and surface water pass unhindered. Planting to be avoided near fence lines to avoid impact on floodwater exceedance routes.
- The proposed site is considered to be at low risk from groundwater flooding for this type of development.

- The risk of flooding from overland flow (surface water flooding) and pluvial flooding remains 'low' as the new structures would be located above ground, but should any be located at ground level on plinths the impact on the 141.6ha site will be negligible.
- A flood warning and evacuation plan may be requested for this site by the LLFA but is considered unnecessary due to limit no of personnel involved with Solar Farms.
- There is no tangible change to the surface water and foul water drainage networks therefore there is no requirement for additional on-site attenuation at the proposed site. French drains would be built around plinths if inverters and batteries are built on concrete plinths to divert rainwater to the undersoil to mimic the existing conditions.

8 Conclusions

By examining the available data, the existing flood risk to the site from all potential sources has been assessed. Using the proposed site boundary map, flood risk has been determined for the proposed renewal energy facility and the effect that the proposed development may have on flood risk elsewhere.

1. The site is in Flood Zone 3a; however, it is assessed that the risk of flooding from all sources is low as the site is defended by formal flood defences providing 1 in 150 year standard of protection. Design life of a Solar Farm is 30 to 40 years.
2. There is no historical record of any form of flooding at the site as confirmed by the EA and in both Councils' SFRAs.
3. An Exceptions Test is required for essential infrastructure located in Flood Zone 3a. For development in this Flood Zone the development should be constructed to remain operational and safe in times of flood.
4. A Sequential Test for a site of this magnitude is highly unlikely to result in a classification lower than the classification identified in this report due to the borough wide topography and widespread nature of perceived flooding in the area. Therefore, it is unlikely sequentially testing the site would result in finding a more suitable site based on exposure to flood risk. It is the Local Authority to determine if the Sequential and Exceptions Tests are passed.
5. Any new access tracks will be constructed at grade and using permeable surfacing to ensure existing flood exceedance routes remain uninterrupted.
6. As flood risk is low and the development is for essential infrastructure as defined in the NPPF, the proposed panels and supporting plant and equipment could be placed on concrete plinths or metal subframes at ground level or at least 300mm above ground level as their impact on surface water or groundwater flows will be negligible.
7. Fencing in all areas shall be designed to be permeable to allow fluvial and surface water to pass unhindered. Planting to be avoided near fence lines to avoid impact on floodwater exceedance routes.
8. The proposed development will not increase the risk of flooding to adjacent areas upstream or downstream of the site. The change of use of the site is expected to reduce flood risk as described in **Section 7.3**.
9. A separate Surface Water Management Strategy report is being produced for this site issued under separate cover.
10. Land drainage consent from the LLFA will not be required as no obstruction to flow of water is proposed.

9 References

- Ref. 1a** South-East Lincolnshire Council Strategic Flood Risk Assessment, March 2017
- Ref. 1b** Fenland District Council, Level 1 Strategic Flood Risk Assessment, Royal Haskoning, June 2022.
- Ref. 2** National Planning Policy Framework (NPPF), Ministry of Housing, Communities and Local Government, 05 September 2023.
- Ref. 3** NPPF Planning Practice Guidance, Ministry of Housing, Communities and Local Government, published 25 August 2022
- Ref. 4** Cambridgeshire County Council Surface Water Management Plan, Hyder, 2014
- Ref. 5** Department for Communities and Local Government, Planning Policy Statement 25: Development and Flood Risk, 2010.
- Ref. 6** Flood and Water Management Act, DEFRA, 2010.
- Ref. 7** Cambridgeshire County Council, Local Flood Risk Management Strategy, 2021 – 2027.

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11 Appendices

Appendix A – Environment Agency ‘Product 4’ Flood Data and Written Response

Appendix B – Cambridge County Council (Lead Local Flood Authority) Written Response

Appendix A

Environment Agency 'Product 4' Flood Data and Written Response

Appendix B

Cambridge County Council (LLFA) Written Response