Tillbridge Solar

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PEI Report Volume II Appendix 10-2: Preliminary Flood Risk Assessment

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Table of Contents

Executive Summary

AECOM has been commissioned to prepare a Flood Risk Assessment (FRA) as an Appendix to **PEI Report Volume I Chapter 10: Flood Risk, Drainage and Surface Water** in relation to the Development Consent Order (DCO) application for the construction, operation and decommissioning of the Tillbridge Solar scheme (the Scheme) located approximately13km north of the city of Lincoln, near Gainsborough, Lincolnshire, UK.

The Scheme will generate solar electricity from photovoltaic (PV) panel arrays and includes a Battery Energy Storage System (BESS) for export to the national electricity transmission network.

The design life of the Scheme is anticipated to be approximately 40-60 years and decommissioning is expected to commence thereafter, albeit the operational life may extend beyond this date.

The Scheme Boundary is predominately located within Lincolnshire County Council, within West Lindsey District Council (WLDC), approximately centred on National Grid Reference (NGR); SK 90503 88862. The area within and surrounding the Scheme Boundary is a primarily rural setting, comprising open agricultural fields with sparse areas of woodland and villages.

The Scheme Boundary has two sections:

- ‘the Principal Site’, which is the location where ground mounted solar photovoltaic (PV) panels, electrical sub-stations and energy storage facilities will be installed; and
- ‘the Cable Route Corridor’, which will comprise the underground electrical infrastructure required to connect the Principal Site to the national transmission system.

This Preliminary FRA primarily relates to the Principal Site during the operational phase of the Scheme, as works within the Cable Route Corridor are underground and therefore not anticipated to have any impact on long term flood risk (i.e. there will be no permanent above ground built development). The underground cabling is inherently flood protected. Flood risk during the construction of the Scheme is to be manged by the onsite contractors through the Construction Environment Management Plan (CEMP).

The Scheme will consist of the following infrastructure:

- Solar PV panels (also known as solar modules);
- Solar stations (invertor, transformer and switchgear);
- Battery Energy Storage System (BESS);
- Battery Direct Current (DC)/DC convertors;
- On-site cabling;
- On-site sub-stations;
- Solar farm control centre;

- Equipment storage;
- Fencing, security and lighting;
- Site access and access tracks;
- Surface water drainage; and
- Electricity connection to National Grid via Cable Route Corridor. The Tillbridge circuit will be connected to an existing free bay at Cottam sub-station.

The physical infrastructure within the Scheme is described in further detail in **PEI Report Volume I Chapter 3: Scheme Description**.

This Preliminary FRA has been prepared in accordance with the requirements of the Overarching National Policy Statement (NPS) for Energy (EN-1)[(1)] and Draft NPS EN-1 (2021)[(2)], the NPS for Renewable Energy Infrastructure (EN-3)[(3)] and Draft NPS EN-3[(4)], and the National Planning Policy Framework (NPPF) [(5)]. The proposed use of the Scheme would be classed as 'Essential Infrastructure' in accordance with Annex 3 of NPPF[(5)].

The vast majority of the Principal Site lies within Flood Zone 1. Small areas of Flood Zone 2 and 3 associated with Ordinary Watercourses (surface water ditches along field boundaries) are present in areas near the boundary of the Principal Site.

Areas where the extents of Flood Zone 2 and 3 overlap with Solar PV Panels have been identified within this Preliminary FRA and are referred to as "interaction zones". No other permanent built development is located within Flood Zones 2 or 3. A Fluvial Flood Level Technical Note included in Annex B of this report provides the findings of an analysis predicting the anticipated flood levels within the two interaction zones and provides an assessment to demonstrate that there will be no increased risk from fluvial flooding to the solar PV panel infrastructure within these areas.

The River Trent and River Till, both Environment Agency designated main rivers, pass through part of the Cable Route Corridor. Large expanses of Flood Zone 2 and 3 are present associated with these main rivers and ordinary watercourses.

The flood risk summary table below indicates the overall flood risk across the Scheme. This Preliminary FRA assesses the Scheme in more detail relative to each flood risk area.

Table 0-1: Flood Risk Summary

Flood Risk Source	Pre-Scheme Flood Risk Level	Post-Scheme Flood Risk Level	Comments
Fluvial	Low (majority of Principal Site and majority of Cable Route Corridor) – Medium (small area of Cable Route Corridor where crossing the River Trent)	Low (Principal Site and majority of Cable Route Corridor) – Medium (small area of Cable Route Corridor where crossing the River Trent)	Discharge from impermeable areas detailed in the Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3**) are to be restricted to Greenfield rates, mitigating increases to peak river flow rates. Solar PV Panel infrastructure within Flood Zones 2/3

Flood Risk Source	Pre-Scheme Flood Risk Level	Post-Scheme Flood Risk Level	Comments
			"interaction zones" are not envisaged to alter the existing flood extents topography and are proposed to be installed to enable sufficient freeboard during the worst case flooding scenarios. No change to flood risk level.
Tidal	Low (majority of Scheme Boundary) – High (areas associated with watercourses)	Low (majority of Scheme Boundary) – High (areas associated with watercourses)	No change to flood risk level.
Pluvial (surface water)	Low	Low	Increased surface water runoff is proposed to be managed to mimic the pre-Scheme conditions for up to and including the 1 in 100 + 40% CC event. No change to flood risk level.
Groundwater	Low	Low	The Preliminary Drainage Strategy Report (**PEI Report Volume II Appendix 10-3**) does not propose to utilise infiltration techniques to discharge increased surface water runoff. No change to flood risk level.
Sewers	Low	Low	No change to flood risk level.
Artificial sources	Low (Principal Site and majority of Cable Route Corridor) – Medium (small area of Cable Route Corridor where crossing the River Trent)	Low (Principal Site and majority of Cable Route Corridor) – Medium (small area of Cable Route Corridor where crossing the River Trent)	No change to flood risk level.

When considered within the context of national, regional and local planning policy in respect of development and flood risk, this Preliminary FRA concludes that the area of

the Scheme remains safe from this perspective, does not increase flood risk elsewhere and fulfils the Government's wider criteria for sustainable development.

1. Introduction

1.1 Background

1.1.1 AECOM has been commissioned to undertake a Preliminary FRA for the Scheme located at approximate grid reference centre SK 90503 88862 and approximate postcode DN21 5XB.

1.1.2 The Scheme Boundary and is made up of two sections:

- 'the Principal Site', covering approximately 1,400 ha which is the location where ground mounted solar photovoltaic (PV) panels, electrical sub-stations and energy storage facilities will be installed; and
- 'the Cable Route Corridor', which will comprise the underground electrical infrastructure required to connect the Principal Site to national transmission system.

1.1.3 The area within and surrounding the Scheme Boundary is a primarily rural setting, comprising open agricultural fields with sparse areas of woodland and villages. The Scheme location is described in more detail in **PEI Report Volume I Chapter 2: Scheme Location**.

1.1.4 This Preliminary FRA primarily relates to the Principal Site during the operational phase of the Scheme, as permanent works associated with the Cable Route Corridor will all be underground with no permanent above ground built development. The Cable Route Corridor is therefore considered to not have an impact on long term flood risk during the operation of the Scheme as there will be no change to contributing areas.

1.1.5 Flood risk during construction and decommissioning of the Scheme across the Principal Site and Cable Route Corridor is to be manged in-situ for the duration of works via flood risk and pollution management mitigation measures documented within the CEMP. A draft Framework CEMP is included in **PEI Report Volume II Appendix 3-1**.

1.2 FRA Objectives

1.2.1 The minimum requirements for FRAs, as outlined in the NPS EN-1[(1)] (paragraph 5.7.5). are to:

- *"Be proportionate to the risk and appropriate to the scale, nature, and location of the project;*
- *Consider the risk of flooding arising from the project in addition to the risk of flooding to the project;*
- *Take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;*
- *Be undertaken by competent people, as early as possible in the process of preparing the proposal;*
- *Consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood*

storage areas and other artificial features, together with the consequences of their failure;

- *Consider the vulnerability of those using the site, including arrangements for safe access;*
- *Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;*
- *Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;*
- *Include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project;*
- *Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems;*
- *Consider if there is a need to be safe and remain operational during a worst case flood event over the development's lifetime; and*
- *Be supported by appropriate data and information, including historical information on previous events."*

1.2.2 It should be noted that revised draft NPS EN-1[(2)] sets out an amended list of minimum requirements for FRAs. The draft NPS EN-1[(2)] has been considered within this FRA.

1.2.3 The amended list of minimum requirements for FRAs outlined in the revised draft NPS EN-1[(2)] have similar wording generally, however, it includes specific additional requirements for information regarding Sustainable Drainage Systems (SuDS) and the following additional point:

- Identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management.

1.2.4 The principal objectives of the FRA, taking into account the above, are to:

- Identify potential forms of flooding, including rivers, watercourses, surface water flooding, groundwater flooding, flooding from sewer systems and other forms of flooding, relevant to the Scheme;
- Establish the risk of flooding in relation to the Scheme;
- Determine the effects of the Scheme on flooding elsewhere either through displacement of floodwaters or increased runoff; and
- Suggest appropriate flood mitigation measures for the Scheme, including a strategy for disposal of surface water run-off following the principles of SuDS.

1.2.5 The robust and comprehensive detail assessed and included in the Preliminary FRA and the accompanying Preliminary Drainage Strategy will be sufficient to support a DCO application for the Scheme.

1.3 Scope of Work

1.3.1 In preparing this Preliminary FRA, AECOM has:

- Obtained relevant data and information from statutory and other authorities;
- Considered the potential sources of flooding;
- Assessed the risk of flooding to the Scheme;
- Assessed the impact of off-site flooding (displaced water) on third parties;
- Considered the impact of climate change; and
- Considered likely mitigation requirements and any residual risk.

1.4 Scheme Description

1.4.1 The Scheme is for the construction, operation (including maintenance) and decommissioning of ground mounted solar PV panel arrays to generate solar electricity and store this within a BESS for export to the national electricity transmission network.

1.4.2 **PEI Report Volume I Chapter 3: Scheme Description** provides further details of the proposed key activities and programme for site preparation, construction, and decommissioning works.

1.5 Scheme Extent

1.5.1 The Scheme is made up of two sections, the Principal Site and the Cable Route Corridor.

1.5.2 The Principal Site is located to the south of Harpswell Lane (A631), to the west of Middle Street (B1398) and largely to the north of Kexby Road and to the east of Springthorpe. The Principal Site covers an area of approximately 1,400ha and is located entirely within the administrative area of WLDC.

1.5.3 The Principal Site comprises numerous field parcels used for arable farming. The fields are large with limited hedgerows and trees. Where there are hedgerows, these generally form the boundaries of fields as they adjoin roads. There are also some small scattered areas of woodland located within the Principal Site, as well as some rural dwellings and agricultural buildings dispersed across the area.

1.5.4 The Scheme will deliver power to Cottam National Grid sub-station located approximately 16km to the southwest of the Principal Site at the decommissioned Cottam Power Station in Cottam on the Nottinghamshire border.

1.5.5 The electrical connection between the Principal Site and Cottam Power Station will comprise underground cables within the Cable Route Corridor.

1.5.6 **PEI Report Volume I Chapter 2: Scheme Location** provides a detailed description of the existing conditions of the land within and surrounding the Scheme.

1.6 Existing Land Use

1.6.1 The Principal Site consists mostly of greenfield agricultural land, with some rural dwellings as well as agricultural buildings dispersed across the area.

1.6.2 The Cable Route Corridor consists of similar land use to the Principal Site, with the addition of crossings under the River Till and River Trent as well as various existing roads. Further details of the Principal Site and Cable Route Corridor are provided within **PEI Report Volume I Chapter 2: Scheme Location**.

1.6.3 The Principal Site Boundary has been set to only occupy natural landscape, avoiding existing developments and buildings. It is estimated to cover less than 1% impermeable area. Therefore, land within the Principal Site Boundary is considered 100% permeable (0% impermeable) for the purposes of this assessment. This represents a worst case approach to the existing catchment surface water greenfield runoff rates.

1.6.4 As mentioned above; it is not anticipated that there will be a change to contributing areas, i.e. no change in existing permeable/impermeable areas following installation of the Cable Route Corridor. Therefore, only the Principal Site has been assessed in detail to ensure the Scheme remains safe from future flood risk, does not increase flood risk elsewhere, and fulfils the Government's wider criteria for sustainable development.

1.6.5 Table 1-1 below provides the existing site permeable and impermeable areas of the Principal Site:

Table 1-1: Contributing Areas of the Existing Principal Site

	Permeable Area (ha)	Impermeable Area (ha)	Percentage Impermeable
Principal Scheme Boundary	Approximately 1,400	0	0

1.7 Scheme Proposals

1.7.1 The Scheme is for the construction, operation (including maintenance) and decommissioning of ground mounted solar PV panels to generate solar electricity and store this within a BESS for export to the national electricity transmission network.

1.7.2 The Scheme will consist of the following infrastructure:

- Solar PV panels (also known as solar modules);
- Solar stations (invertor, transformer and switchgear);
- Battery Energy Storage System (BESS);
- Battery Direct Current (DC)/DC convertors;
- On-site cabling;

- On-site sub-stations;
- Solar farm control centre;
- Equipment storage;
- Fencing, security and lighting;
- Site access and access tracks;
- Surface water drainage; and
- Electricity connection to National Grid via Cable Route Corridor. The Tillbridge circuit will be connected to an existing free bay at Cottam sub-station.

1.7.3 **PEI Report Volume I Chapter 3: Scheme Description** provides further details of the components of the Scheme.

1.7.4 Annex A includes an Indicative Site Layout Plan.

1.8 Consultees

1.8.1 The following stakeholders will be consulted during the PEI Report consultation, and the FRA reviewed taking into account any comments made prior to the DCO submission:

- Lead Local Flood Authority – Lincolnshire County Council;
- The Environment Agency;
- Scunthorpe & Gainsborough Water Management Board;
- Upper Witham Internal Drainage Board; and
- Trent Valley Internal Drainage Board.

2. Legislation and Planning Policy

2.1.1 Legislation, planning policy, and guidance relating to flood risk and pertinent to the Scheme is set out in the following sections.

2.2 National Planning Policy

Overarching National Policy Statement (NPS) for Energy (EN-1), including overview of the Draft NPS (EN-1)

2.2.1 NPS EN-1[(1)] sets out the Government's policy for the development of nationally significant infrastructure projects which must be authorised by a DCO.

2.2.2 The additional draft NPS EN-1[(2)] requirements, discussed in 1.2.3 are included in the review of national policy.

2.2.3 The objectives of this Preliminary FRA are in line with paragraph 5.7.5 of NPS EN-1[(1)].

2.2.4 Paragraph 5.7.7 of NPS EN-1[(1)] recommends that applicants should arrange pre-application discussions with the Environment Agency (EA), and, where relevant, other bodies such as Internal Drainage Boards and sewerage undertakers to identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, identify the information that will be required, and address concerns, where proposed development is affected by flood risk or is likely to increase flood risk elsewhere.

2.2.5 NPS EN-1[(1)] states at paragraph 5.7.12 that the Infrastructure Planning Commission (IPC) (for the purposes of this Application, the appointed Examining Authority with the Secretary of State for Business Energy and Industrial Strategy being the decision-maker) should not recommend consent for development in:

- Flood Zone 2, unless it is satisfied that the Sequential Test requirements have been met; or
- Flood Zone 3, unless it is satisfied that the Sequential and Exception Test requirements have been met.

2.2.6 For the Sequential Test, NPS EN-1[(1)] states at paragraph 5.7.13 the following:

"*Preference should be given to locating projects in Flood Zone 1 in England or Zone A in Wales. If there is no reasonably available site in Flood Zone 1 or Zone A, then projects can be located in Flood Zone 2 or Zone B. If there is no reasonably available site in Flood Zones 1 or 2 or Zones A and B, then nationally significant energy infrastructure projects can be located in Flood Zone 3 or Zone C subject to the Exception Test.*"

"If, following application of the sequential test, it is not possible, consistent with wider sustainability objectives, for the project to be located in zones of lower probability of flooding than Flood Zone 3 or Zone C, the Exception Test can be applied. The test provides a method of managing flood risk while still allowing necessary development to occur."

"The Exception Test is only appropriate for use where the sequential test alone cannot deliver an acceptable site, taking into account the need for energy infrastructure to remain operational during floods. It may also be appropriate to use it where, as a result of the alternative site(s) at lower risk of flooding being subject to national designations such as landscape, heritage and nature conservation designations, for example Areas of Outstanding Natural Beauty (AONBs), Sites of Special Scientific Interest (SSSIs) and World Heritage Sites (WHS) it would not be appropriate to require the development to be located on the alternative site(s).

All three elements of the test will have to be passed for development to be consented. For the Exception Test to be passed:

- *It must be demonstrated that the project provides wider sustainability benefits to the community that outweigh flood risk;*
- *The project should be on developable, previously developed land or, if it is not on previously developed land, that there are no reasonable alternative sites on developable previously developed land subject to any exceptions set out in the technology-specific NPSs; and*
- *An FRA must demonstrate that the project will be safe, without increasing flood risk elsewhere subject to the exception below and, where possible, will reduce flood risk overall.*

Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the IPC may grant consent if it is satisfied that the increase in present and future flood risk can be mitigated to an acceptable level and taking account of the benefits of, including the need for, nationally significant energy infrastructure as set out in Part 3 above. In any such case the IPC should make clear how, in reaching its decision, it has weighed up the increased flood risk against the benefits of the project, taking account of the nature and degree of the risk, the future impacts on climate change, and advice provided by the EA and other relevant bodies."

2.2.7 It is noted that the IPC is an outdated reference; consent is now granted by the Secretary of State.

2.2.8 Paragraph 5.7.23 of NPS EN-1[(1)] also requires a sequential approach to be applied to the layout and design of projects with more vulnerable uses being located on parts of the site at lower probability and residual risk of flooding by using Sustainable Urban Drainage Systems (SuDS).

2.2.9 Paragraph 5.7.24 and 5.7.25 (respectively) require "*Essential energy infrastructure which has to be located in flood risk areas should be designed to remain operational when floods occur*" and that the "*receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding*".

2.2.10 Paragraph 5.7.19 explains the range of sustainable approaches to surface water drainage management and paragraph 5.7.21 requires "*surface water drainage arrangements for any project to be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed*

project, unless specific off-site arrangements are made and result in the same net effect".

2.2.11 Paragraph 5.7.22 also states that it "*may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration facilities or attenuation storage to be provided outside the project site, if necessary, through the use of a planning obligation*".

National Policy Statement for Renewable Energy Draft NPS EN-3

2.2.12 The current NPS EN-3[(3)] does not mention a need for an FRA or implications for drainage. However, paragraph 2.50.7 of draft NPS EN-3[(4)] notes that an FRA may be required and, if required, will need to consider the impacts of drainage, noting:

"This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not in general be significant. Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended. Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses. Culverting existing watercourses/drainage ditches should be avoided. Where culverting for access is unavoidable, it should be demonstrated that no reasonable alternatives exist and where necessary it will only be in place temporarily for the construction period."

2.2.13 This Preliminary FRA is compliant with paragraph 2.50.7 of draft NPS EN-3[(4)], as it considers drainage for the Scheme.

2.2.14 The Scheme proposes, as a design principal, to utilise existing water crossing locations to avoid the need for new culverts; this principle accords with the aspirations of paragraph 2.50.7. However, should a new crossing, requiring a culvert to be proposed, it is expected that the least impacting design be utilised, (e.g. arch rather than box or pipes) to mitigate impact to flood risk levels.

National Policy Statement for Electricity Networks Infrastructure (EN-5)

2.2.15 National Policy Statement for Electricity Networks Infrastructure (EN-5) (NPS EN-5) principally concerns high voltage transmission systems and distribution systems in addition to associated infrastructure.

2.2.16 Paragraph 2.4.1 of NPS EN-5[(6)] explains that as climate change is likely to increase risks to the resilience of electrical infrastructure it requires applicants to "*set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it would be resilient to flooding, particularly for substations that are vital for the electricity transmission and distribution network".* Applicants should, in particular, set out to what extent the Scheme is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to:

- Flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change;
- The effects of wind and storms on overhead lines;
- Higher average temperatures leading to increased transmission losses;
- Earth movement or subsidence caused by flooding or drought (for underground cables); and
- Coastal erosion – for the landfall of offshore transmission cables and their associated substations in the inshore and coastal locations respectively.

2.2.17 All substations and battery energy storage systems are located in Flood Zone 1; therefore, the Scheme is compliant with NPS EN-5[6] for flood risk to electrical infrastructure. PV panels located in Flood Zone 2 and 3 will be raised above predicted flood levels with an allowance for freeboard to ensure they remain operational in times of flood (flood risk to PV panels is discussed in Section 4).

National Planning Policy Framework (NPPF)

2.2.18 The NPPF[5] was first published in March 2012, superseding previous national planning policy statements and guidance. The NPPF[5] was subsequently revised in July 2021, and this Preliminary FRA complies with the revised version of the NPPF[5]. Flood Risk and Coastal Change Planning Practice Guidance (PPG) [7] was also published in 2014 to support the implementation of the NPPF. The PPG was last updated in August 2022; this Preliminary FRA complies with this and all other current national and local policy.

2.2.19 Section 14 of the NPPF[5], entitled Meeting the Challenge of Climate Change, Flooding and Coastal Change (paragraphs. 152-173), sets out the requirements to assess flood risk and climate change for developments. Paragraph 169 expects, "*major developments to incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate.".*

2.2.20 The assessment of flood risk is based on the definitions in Table 2-1 as extracted from the PPG.

Table 2-1: Flood Zones – Table 1 of the PPG 2014

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)

Flood Zone	Definition
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 FRAs areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

2.2.21 Annex 3: Flood risk vulnerability classification of the NPPF[5], classifies the Flood Risk Vulnerability of various land uses in Table 2-2 below. The More Vulnerable classification encompasses usages such as hospitals and buildings used for dwellings. Less Vulnerable applies to buildings used for general industry, storage and distribution.

Table 2-2: Development Type and Vulnerability Classification – Reproduced from Annex 3 of the NPPF

Development Type	Definition
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. • Solar farms.
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.

Development Type	Definition
	• 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 and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in “more vulnerable”, 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). • Car Parks
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 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. • 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

Development Type	Definition
	category, subject to a specific warning and evacuation plan.

2.2.22 The Scheme fall within the definition of 'Essential Infrastructure'. The overall aim of the sequential approach is to steer new development to areas of lowest flood risk, i.e., Flood Zone 1 and low surface water flood risk (Sequential Test). Where there are no reasonable sites available outside areas at risk of flooding, Flood Zones 2 and 3 may be considered, subject to passing the Exception Test, as required and set out in Table 3-3 below.

2.2.23 Surface water flood risk has been reviewed alongside the Environment Agency (Gov.uk) published Updated Flood Map for Surface Water (EA uFMfSW)[8].

2.2.24 The EA uFMfSW[8] shows where areas could be potentially susceptible to surface water flooding in an extreme rainfall event.

2.2.25 The latest mapping assesses flooding resulting from severe rainfall events based on the following three scenarios:

- High Risk:1 in 30 year (0.33%) annual probability event
- Medium Risk: 1 in 100 year (1%) annual probability event
- Low Risk: 1 in 1000 year (0.1%) annual probability event

2.2.26 Land at lower than 1 in 1000 (0.1%) annual probability of flooding is considered to be a "Very Low" risk.

The Sequential Test and Exception Test

2.2.27 NPS EN-1[1] and The NPPF[5] set out the details of the Sequential Test, which is a risk-based test that should be applied at all stages of development.

2.2.28 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:

- Applying the sequential test and then, if necessary, the exception test as set out below;
- Safeguarding land from development that is required, or likely to be required, for current or future flood management;
- 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)
- 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.

2.2.29 The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the development in areas with a lower risk of flooding. The Strategic FRA will provide the basis for applying this test. The sequential test approach should be used in areas known to be at risk now or in the future from any forms of flooding.

2.2.30 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). Table 2-3 below reproduces the flood risk vulnerability and flood zone compatibility, as set out in Table 2 of the PPG.

Table 2-3: Flood Risk Vulnerability and Flood Zone Compatibility – Table 2 of the PPG 2022

Flood Zone	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 (functional floodplain)	Exception Test Required	×	×	×	✓

✓ Exception test is not required

× Development should not be permitted

Flood Zones that the Scheme sits within

2.2.31 The NPPF[5] states in paragraph 164 that, for the Exception Test to be passed, it should be demonstrated that:

- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- 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.

2.2.32 Both elements of the Exception Test should be satisfied for development to be allocated or permitted.

2.2.33 NPS EN-1[1] was published in July 2011, prior to the first release of the NPPF[5] in 2012. With regard to the Exception Test, the NPPF[5], which was subsequently updated in 2021, only requires two of the three requirements referred to in NPS EN-1[1] to be satisfied. The requirement for schemes to be located on developable or previously developed land, should no alternative site on previously developed land be available, is not referred to in the NPPF[5]. Whilst NPS EN-1[1] relates specifically to nationally significant energy infrastructure projects, planning policy relating to development and flood risk listed in NPPF[5] provides more up to date government policy.

2.2.34 The draft NPS EN-1[2], published in September 2021, has been reviewed for this Preliminary FRA, and does not change the approach to the assessment. It should be noted that the text of this draft is closely aligned to the NPPF[1] (see paragraph 3.4.3 above) and requires the following two criteria to be satisfied:

- the project provides wider sustainability benefits to the community that outweigh flood risk; and
- the project reduces flood risk overall, where possible.

2.3 Local Planning Policy

2.3.1 The Scheme Boundary is primarily located within the administrative areas of Lincolnshire County Council and WLDC. A portion of the Cable Route Corridor, west of the River Trent where Cottam sub-station is located, is within Nottinghamshire County Council and Bassetlaw District Council administrative areas.

2.3.2 Lincolnshire County Council will consider the FRA (through consultation with the Environment Agency as necessary) as the Scheme Boundary is predominantly located in Flood Zone 1.

2.3.3 The following key planning documents and salient policies have been considered to inform this Preliminary FRA:

- Lincolnshire County Council;
  - Preliminary FRA (2011) [9]
  - Second Cycle Preliminary FRA for Lincolnshire (2017) [10]
  - Central Lincolnshire Local Plan (2023) [11]
  - Joint Flood Risk and Water Management Strategy 2019-2050 [12]
- WLDC
  - Strategic FRA (2009) [13]
- Bassetlaw District Council
  - Bassetlaw Local Plan 2020-2037[14]
  - Strategic FRA (2019) [15]

2.4 Internal Drainage Boards and Water Management Boards

2.4.1 Internal Drainage Boards (IDB) and Water Management Boards (WMB) are local public authorities that manage water levels within areas of special drainage need (Internal Drainage Districts) in England and Wales. Works relating to watercourses within these designated areas of the Scheme Boundary must seek consent from the relevant IDB/WMB.

2.4.2 The Scheme Boundary is located across two IDBs and one WMB.

2.4.3 Cottam Power Station is wholly within Upper Witham IDB, whilst the remainder of the Scheme Boundary has areas located within Trent Valley IDB and Scunthorpe and Gainsborough WMB.

2.4.4 The following documents have been considered to inform this Preliminary FRA:

- Scunthorpe and Gainsborough Water Management Board;
  - Policy Statement on Flood Protection and Water Level Management[16]
  - Application for works in Drainage District, Guidance notes[17]
  - Land Drainage Byelaws[18]
- Trent Valley Internal Drainage Board;
  - Planning and Byelaw Policy[19]
  - Advice Note, AN06: Surface Water[20]
- Upper Witham Internal Drainage Board;
  - Policy Statement on Water Level and Flood Risk Management[21]
  - Asset List[22]
  - Upper Witham Internal Drainage Board Byelaws[23]

3. Supporting Information

3.1 Contributing Areas

3.1.1 Within hydrology, it is generally understood that permeable surfaces absorb rainfall whilst impermeable surfaces repel rainfall leading to surface water runoff. For a site, the total impermeable area is often referred to as the site's Contributing Area. The Contributing Area is used as part of the calculation to determine the volume of surface water runoff generated within the site. Developing greenfield sites (typically entirely permeable land) often increases the site's Contributing Area as natural permeable surfaces are sealed by impermeable surfaces.

3.1.2 For the Scheme, some existing permeable surfaces will be replaced by proposed impermeable surfaces across the Principal Site.

3.1.3 The solar PV panels are assumed to not contribute to the total post-Scheme impermeable area as the racks holding the solar PV panels are usually supported by galvanised steel poles driven into the ground, therefore mitigating the need for concrete footings. The ground beneath the solar PV panels remains permeable.

3.1.4 It is expected that interception of rainfall by the solar PV panels will impose negligible impact on the with-Scheme surface water runoff rates as the ground below and surrounding the solar PV panels is proposed to consist of native grassland and wildflower mix, which will provide permeable surface area.

3.1.5 A comparison of the proposed and existing Principal Site has been undertaken to demonstrate how the with-Scheme Contributing Area will be affected compared to the pre-Scheme scenario.

3.1.6 Table 3-1 below presents this overall comparison (Refer **PEI Report Volume II Appendix 10-3** for detailed breakdowns of impermeable areas within the Scheme areas):

Table 3-1: Contributing Areas of the Developed Principal Site

	Total Area (ha)	Pre-Scheme Contributing Area (ha)	Post-Scheme Contributing Area (ha)	Pre-Scheme PIMP*	Post-Scheme PIMP
Extent Principal Site	Approximately 1,400	0	23.94	0%	1.7%**

*- Percentage Impermeable Area (PIMP) – percentage of an area that is impermeable

**- Assumed operational buildings/compound areas are 100% PIMP. Photovoltaic (PV) panel areas assumed to have effective 0% PIMP

3.2 Existing Drainage

3.2.1 The area within the Principal Site is largely greenfield. A full topographical survey is currently under development. It is unknown if formal piped drainage systems are present across the site. It is assumed that for low intensity rainfall events, rainfall is collected within the catchments and naturally drains to Ordinary Watercourses (surface water ditches) located along the field boundaries

identified by LiDAR data. For rainfall events where rainfall exceeds the maximum discharge rates of the Ordinary Watercourses, it is assumed that any excess runoff would flow overland and pond in the low lying areas surrounding the Ordinary Watercourses before naturally draining after the event has occurred.

3.3 Existing Flood Risk from All Sources

3.3.1 Table 3-2 summarises the pre-Scheme flood risk across the Scheme Boundary. Note the Scheme Boundary has been marked indicatively in Table 3-2 maps, to represent the perspective of the Principal Site and Cable Route Corridor and surroundings in the context of the SFRA [13] mapping. Refer to **PEI Report Volume III Figure 2-1** for the precise extent of the Scheme Boundary):

Table 3-2: Pre-Scheme Flood Risk Mapping

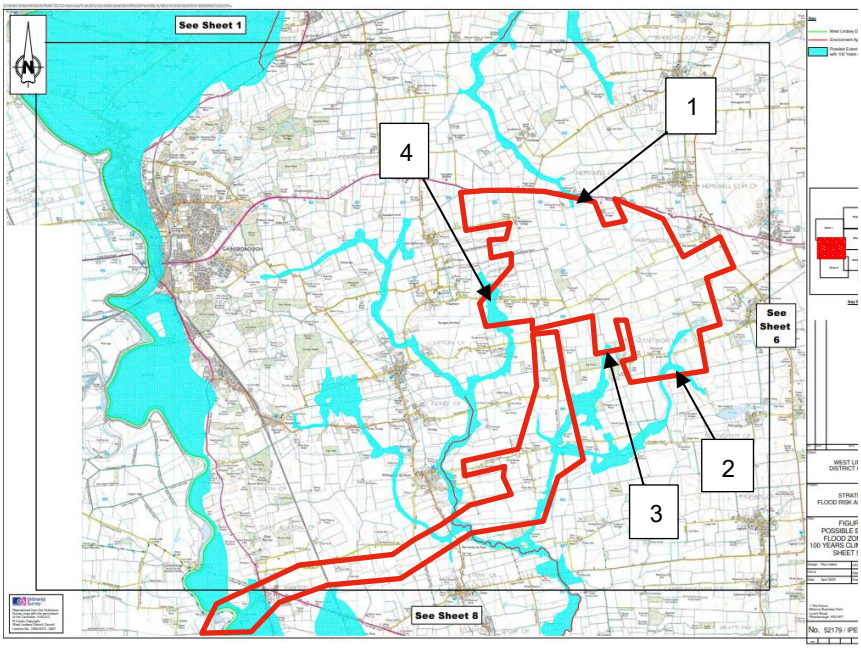
Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (majority of Principal Site and Cable Route Corridor) - High (two very small areas in Principal Site and area surrounding Cottam sub-station associated with River Trent within Cable Route Corridor)	

Figure 3-1 – WLDC SFRA – Fluvial Flood Risk Map

WLDC's Strategic Flood Risk Mapping indicates majority of the Principal Site is located within Flood Zone 1, with 4 small areas of Flood Zone 2 and 3 extents located near the Principal Site Boundary (Labelled 1 – 4 on Figure 3-1). There are two areas where Flood Zone 2 and 3 extend into the Principal Site where PV panel infrastructure is proposed (area 1 and 2 on Figure 3-1) both have an approximate area of 4 ha each.

The majority of the Cable Route Corridor is located within Flood Zone 1 with small areas of Flood Zone 2 and 3 associated with watercourses. The area of the Cable Route Corridor located west of the River Trent, surrounding Cottam sub-station sits within of Flood Zone 3.

Flood Risk Source	Flood Risk Level	Comments
Tidal	Low (Principal Site and majority of Cable Route Corridor) – Medium (small area of Cable Route Corridor where crossing the River Trent)	

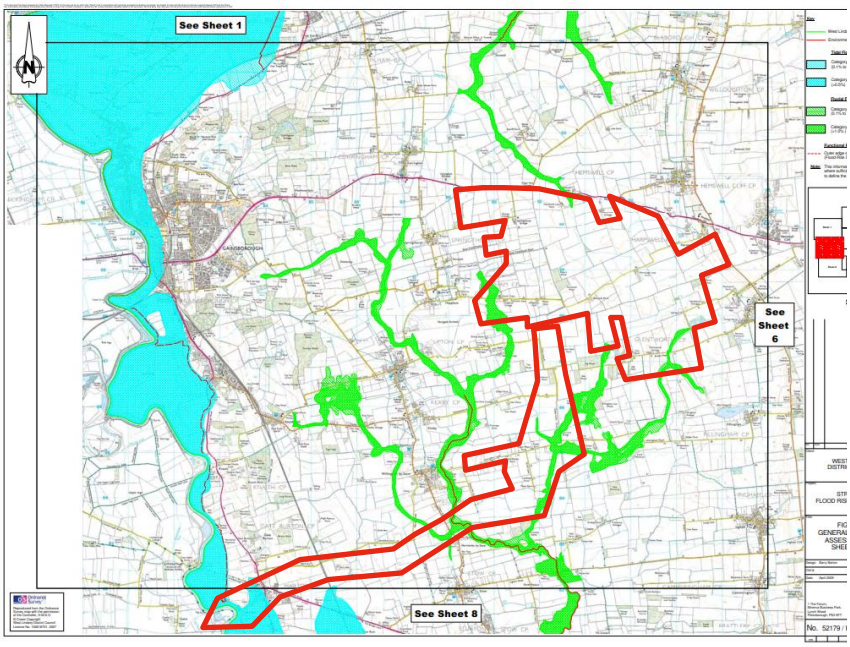


Figure 3-2 – WLDC SFRA – Tidal Flood Risk Map (blue hatch)

The WLDC SFRA[13] mapping indicates tidal flood risk only exists along the tidal estuary of the River Trent where flood defences are in place. The Principal Site is not in close proximity to this risk area.

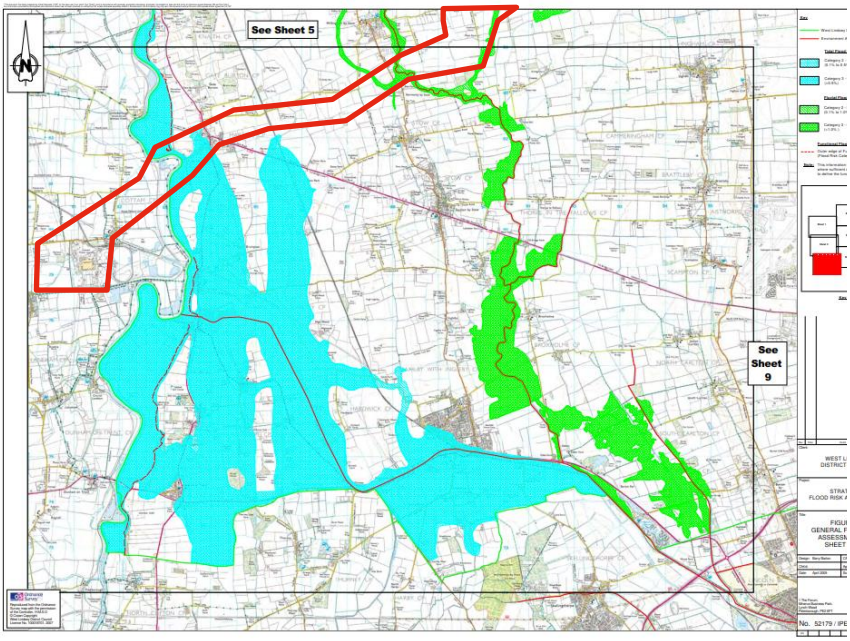
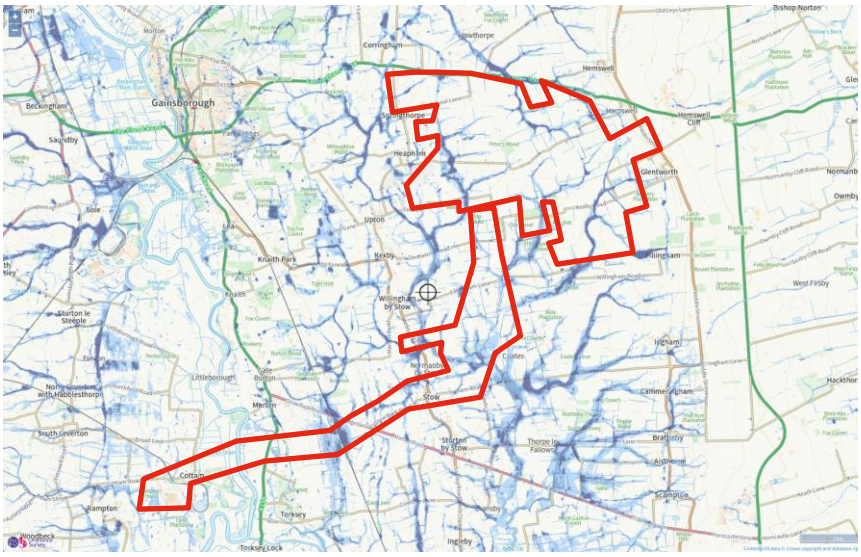
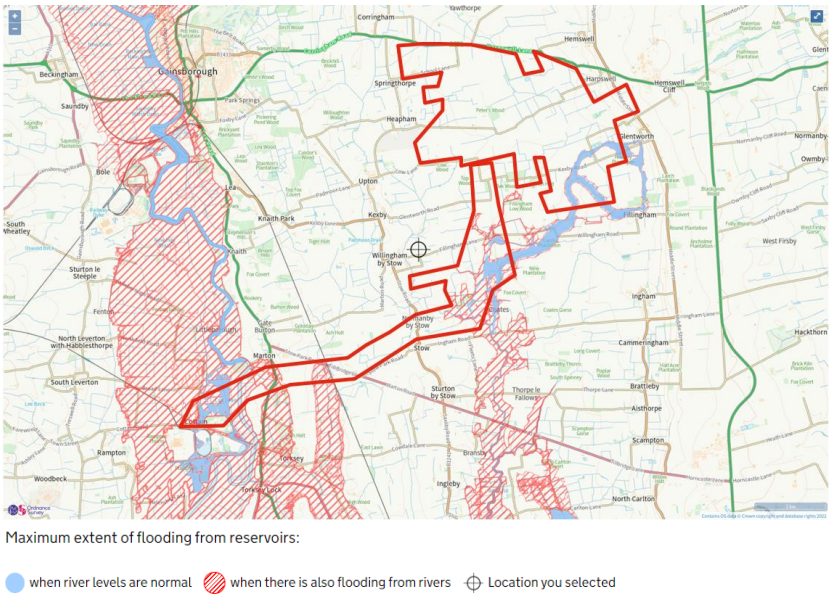


Figure 3-3 – WLDC SFRA – Tidal Flood Risk Map (Blue Hatch)

The Cable Route Corridor passes through an area of High risk, associated with the River Trent as it is subject to tidal influence within this area.

Flood Risk Source	Flood Risk Level	Comments
Pluvial (surface water)	Very Low (majority of Scheme Boundary) – High (areas associated with watercourses)	 Extent of flooding from surface water **Figure 3-4 – Gov.uk – Flood Map for Surface Water (accessed January 2023)** Gov.uk Online Flood Maps[24] indicate the majority of the Scheme Boundary lies in areas of Very Low risk from surface water flooding. There are small areas ranging from low to high risk associated with watercourses. The area of the Cable Route Corridor crossing the River Trent is shown to be generally low risk.
Groundwater	Low	Majority of boreholes are restricted for access across the Principal Site. LCC PFRA[12]notes groundwater flooding in the region of Louth, far east of the Scheme Boundary (~20km); this area is not impacted by the Scheme. No other groundwater flooding identified within the Principal Site. The Principal Site lies atop mudstones and clays, with little ability to store water. Given the Principals Site's high elevation and at the top of any river catchment, groundwater risk is considered Low.
Sewers	Low	The WLDC SFRA[13]indicates the risk of sewer surcharging resulting in flooding events is limited to urbanised areas of the District. The Principal Site's rural location means that the risk of flooding from sewers exceeding their hydraulic capacity is low. The Cable Route Corridor passes through various roads including the A156. Risk of flooding from sewers located within these roads during the construction phase is to be managed within the CEMP.

Flood Risk Source	Flood Risk Level	Comments
Artificial sources	Low	 **Figure 3-5 – Gov.uk – Reservoir Flood Risk Mapping (accessed January 2023)** Online Flood Maps[24] show the maximum extent of flooding from reservoirs extends into a small area within the Principal Site boundary towards the southeast near Kexby Road. This is associated with the unnamed ordinary watercourse which acts as a tributary to the canalised downstream end of the River Till (Fossdyke Canal). The WLDC SFRA indicates the Canal is infrequently full and can be considered a minor flood risk source. The mapping also shows areas of the Cable Route Corridor lying over the flood extents “when river levels are normal” and “when there is also river flooding”., i.e. the flood extents of reservoir flooding are greater (higher risk) during flood events where the rivers are at capacity and utilising floodplain storage.

3.4 Watercourses

3.4.1 Watercourses are designated as Main Rivers or Ordinary Watercourses. Main Rivers are identified on the Statutory Main River Map and are maintained by the Environment Agency, whereas ordinary watercourses are maintained by the Lead Local Flood Authority.

3.4.2 The following watercourses lie within the Scheme Boundary:

b. Main River:

- There are no main rivers present within the Principal Site.
- The River Till runs passes through the Cable Route Corridor flowing in a southerly direction from Kexby to Stow.
- The River Trent passes through the Cable Route Corridor southwest of Marton flowing towards Torksey.

c. Ordinary Watercourse:

- Various unnamed watercourses are present within the Scheme Boundary, consisting of tributaries to main rivers and surface water ditches along field boundaries.
- Yawthorpe Beck is one of the ordinary watercourses present within the Principal Site, a surface water field ditch located on the northern boundary of the Principal site crossing under Harpswell Lane northwards towards Yawthorpe.

3.5 Geology and Hydrology

3.5.1 A desk top assessment has been completed to determine bedrock and superficial geology within the Scheme Boundary. These maps indicate the Scheme Boundary sits across various bedrock formations, including Marlstone Rock Formation, Scunthorpe Mudstone Formation, Charmouth Mudstone Formation, Penarth Group, and Mercia Mudstone Group. The mapping indicates the Scheme Boundary lies within various superficial deposit types, including Till, Mid Pleistocene (Diamicton), Alluvium (clay, silt, sand and gravel), and Glaciofluvial Deposits, Mid Pleistocene (sand and gravel).

3.5.2 The EA's Online Interactive Maps for Groundwater show the Principal Site has a Medium groundwater vulnerability. The Maps also show the Cable Route Corridor generally follows the medium risk areas before reaching the River Trent and continuing to Cottam, where the vulnerability increased to Medium-High.

4. Assessment of Flood Risk (Principal Site)

4.1 Flood risk from all sources

4.1.1 This section assesses the flood risk from the following sources against the Indicative Site Layout Plan as shown within Annex A for the with-Scheme scenario:

- Fluvial (Rivers and the Sea);
- Surface Water;
- Sewers;
- Groundwater; and
- Artificial waterbodies.

4.1.2 The methodology used to assess the flood risk is detailed below:

- **Low**: where little risk is identified or any theoretical risk identified is classified as low within Local Authority SFRAs and/or EA flood risk mapping extents, with low probability of flooding occurring.
- **Medium**: where risk is identified within Local Authority SFRA and/or EA flood risk mapping extents indicating a medium probability, but manageable flood risk with little to no mitigation required; and
- **High**: where modelled levels within Local Authority SFRA and/or EA flood risk mapping extents show risk to the Scheme as a high probability of flood risk and where mitigation needs to be considered and residual risks controlled.

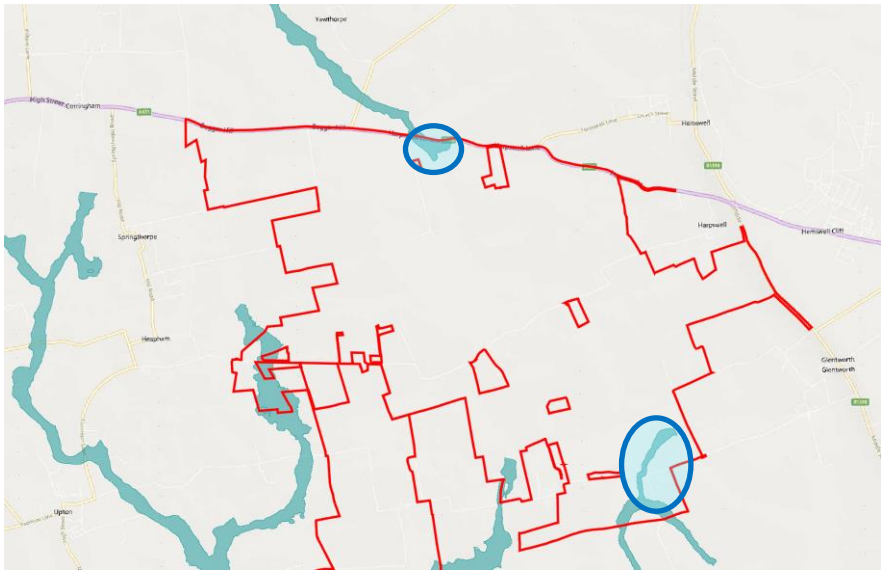
4.1.3 Through the sequential test process and design iterations, all proposed buildings/compound areas and the majority of the solar PV panels will be located outside of Flood Zones 2 and 3 i.e., in Flood Zone 1.

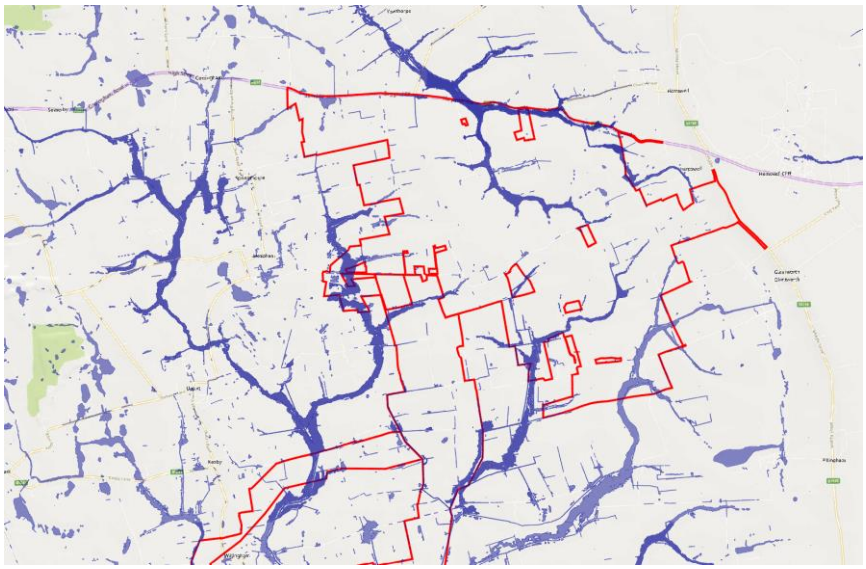
4.1.4 The River Trent, River Till and other ordinary watercourses will not be impacted by a change in flood risk level within the Cable Route Corridor as no above ground installations are proposed for the operational phase of the Scheme.

4.1.5 Infrastructure shown to be at flood risk is to be mitigated as discussed below in section 5.3.

4.1.6 Table 4-1 below summaries the flood risk as a result of the Scheme.

Table 4-1 With-Scheme Flood Risk Summary (Operational Phase)

Flood Risk Source	Flood Risk Level	Comments
Fluvial	Low (Principal Site) – with two small areas (circled in Blue) in Principal Site where solar PV panels are proposed.	 **Figure 4-1 : Flood Zone 2 Mapping** **Source: Defra online Flood Zone 2 Dataset (2023)** The majority of the Principal Site is at low risk of fluvial flooding. Two areas noted in Figure 4-1 above indicate where solar PV panels are proposed and where they interact with Flood Zone 2 and 3. Solar PV Panel infrastructure within Flood Zones 2/3 interaction zones will not alter the existing flood extents topography and are proposed to be installed to enable sufficient freeboard of at least 300mm during the design storm event, including allowances for climate change. Solar PV panels are to be minimum 600mm above ground level. No solar stations, batteries or inverters will be located in Flood Zones 2 and 3. No fluvial compensation will be required as support legs are less than 100mm diameter with minimal impact on floodplain due to the small areas involved (each leg occupied approx. 0.032m^3 for an assumed 300mm depth of water). Risk remains Medium with no increase in flood risk to the Scheme or elsewhere.
Tidal	Low (Principal Site)	No change to flood risk level as a result of the Scheme. Principal Site not impacted by Tidal risk.

Flood Risk Source	Flood Risk Level	Comments
Pluvial (surface water)	Medium	 **Figure 4-2: Surface Water Flood Mapping** **Source: Defra online RoFSW Dataset (2023)** Surface water flood risk is generally low across the Principal Site, with some areas of Medium risk associated with natural topography valleys draining north and south from the Scheme. Solar PV panels will not increase surface water flood risk, and any increased surface water runoff from impermeable areas is proposed to be managed to mimic the pre-Scheme conditions for up to and including the 1 in 100 + 40% Climate Change (CC) event. Flood Risk will not increase elsewhere as a result and, therefore, remains Medium.
Groundwater	Low	The Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3**) does not propose to utilise infiltration techniques to discharge increased surface water runoff. No change to flood risk level.
Sewers	Low	The Scheme does not impact any existing sewage infrastructure, and no new infrastructure is proposed. No change to flood risk level.
Artificial sources	Low (Principal Site)	The Scheme does not impact artificial sources of flood risk and is not located within the vicinity of an existing artificial flood risk source. No change to flood risk level.

4.2 Climate Change

4.2.1 As of July 2021, the climate change allowances used in FRAs have changed, and now propose peak river flow allowances based on Water Framework Directive catchment areas, instead of nationwide allowances in previous iterations of guidance. The Defra mapping website 'Climate change allowances for peak river flow in England'[27] has been reviewed to confirm the revised climate change allowances for the catchment areas that cover the Scheme Boundary. These values have been used in this assessment. Refer to Figure 4-3 below.

4.2.2 Climate change allowances relate to predicted percentage increase in peak river flows as a result of the effects of climate change, which development projects like the Scheme must take into account in their design.

4.2.3 The current allowance for design purposes for the Scheme Boundary is the Higher Central allowance of 39% and 32% (for Essential Infrastructure), for the Lower Trent and Erewash Management Catchment and Witham Management Catchment, respectively.

4.2.4 As the Scheme is located across the two Management Catchments, the highest value of 39% allowance has been used to provide a robust assessment for design across the whole Scheme based on a worst-case scenario.

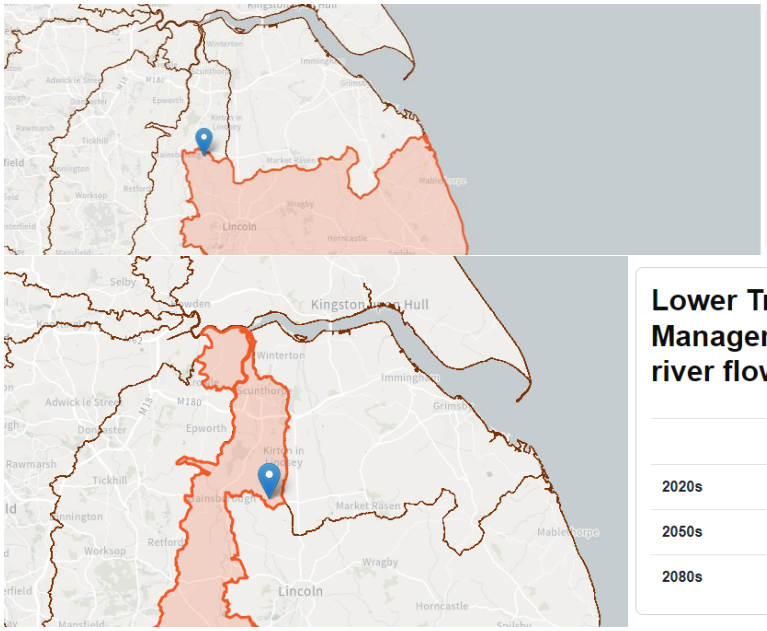
4.2.5 An additional assessment for Essential Infrastructure projects is the application of the H++ Scenario climate change allowance for sea level rise; a sensitivity assessment to ensure infrastructure can operate in extreme events involving a tidal influence. Previously, the H++ Scenario would be applied to Infrastructure projects of this scale. The H++ scenario provides an estimate of sea level rise and river flood flow change beyond the likely range (i..e an extreme event beyond expected climate change allowances) but within physical plausibility. It is useful for contingency planning to understand what might be required if climate change were to happen much more rapidly than expected.

4.2.6 Section 4.3 discussed the H++ scenario for the Scheme.

4.2.7 Figure 4-3 below indicates the latest climate change allowances for peak river flow for fluvial assessment (accessed January 2023) [28].

4.2.8 For nationally significant infrastructure projects, the credible maximum scenario (CMS) should be assessed to ensure infrastructure remains operational in times of extreme flooding. This is based on the Upper End allowance for climate change, which in this case (worst case) is 62%.

4.2.9 Section 4.4 below discusses flood risk within the context of climate change and the allowances. Annex B includes a fluvial flood level technical note which discusses the areas of PV panels located in Flood Zone 2 and 3 and reviews and applies these climate change allowances in the assessment.



Witham Management Catchment peak river flow allowances

	Central	Higher	Upper
2020s	9%	14%	27%
2050s	8%	15%	32%
2080s	21%	32%	57%

Lower Trent and Erewash Management Catchment peak river flow allowances

	Central	Higher	Upper
2020s	13%	18%	29%
2050s	17%	23%	38%
2080s	29%	39%	62%

Figure 4-3: Peak River Flow Climate Change Allowances per Catchment

4.3 With-Scheme Tidal Flood Risk

4.3.1 Sea level rise and the H++ scenario have been considered in this Preliminary FRA. An assessment of sea level rise has been undertaken to demonstrate the Principal Site is not at risk of sea level rise, from climate change or when incorporating the H++ scenario.

4.3.2 The River Trent tidal mapping in the WLDC SFRA[13] indicates tidal flood risk limited to the western extent of the Cable Route Corridor, with no impact on the Principal Site. Furthermore, tidal defences are in place along the River Trent; however, the calculations have been undertaken assuming these are not in place.

4.3.3 There are a range of allowances for each river basin district and epoch for sea level rise. They are set out in Table 2 of the Environment Agency online Climate Change Assessment guidance[29] and are based on percentiles. A percentile describes the proportion of possible scenarios that fall below an allowance level. Table 4-2 below indicates the sea level rise estimate, for the epochs for the Humber River basin catchment.

Table 4-2: Extract from Table 2 of Environment Agency Sea Level Rise Tables (Online)

Area of England	Allowance	2000 to 2035 (mm/yr)	2000 to 2035 (mm) – Cumulative Total	2036 to 2065 (mm/yr)	2036 to 2065 (mm) – Cumulative Total	2066 to 2095 (mm/yr)
Humber	Higher central	5.5	193	8.4	252	11.1
Humber	Upper end	6.7	235	11	330	15.3

4.3.4 The sea level rise allowances account for slow land movement. This is due to 'glacial isostatic adjustment' from the release of pressure at the end of the last ice age. The northern part of the UK is slowly rising and the southern part is slowly sinking. This is why net sea level rise is predicted to be less for the north-west and north-east than the rest of the country.

4.3.5 The design life of the Scheme is anticipated to be approximately 40-60 years and decommissioning is expected to commence thereafter, albeit the operational life may extend beyond this date.

4.3.6 Sea level rise poses a potential risk to the Cable Route Corridor, but it is not considered to impact the Principal Site. It has been estimated, using the Environment Agency's online sea level rise data for the Humber River basin management area, sea level could rise by up to approximately 596mm by the year 2068 (with a 40 year design life plus one year for a cautionary approach); assessed by accumulating the mm/yr increase in sea level depth in each epoch up to the year 2068. Refer to Calculations in Annex C for more detail.

4.3.7 A rise of 596mm would provide a tidal flood level of 5.79m AOD. Applying the H++ analysis as a sensitivity test, i.e. applying a maximum 1.9m rise, the tidal level could theoretically reach 7.09m by 2100.

4.3.8 The lowest site level across the Principal Site is 13.13m AOD (from LiDAR review). This level is over 6m above the H++ level. Therefore, sea level rise is not considered to pose a risk to the solar PV panels and battery/compound areas of the Scheme. There is no permanent above ground infrastructure proposed along the Cable Route Corridor. As such, no mitigation is required to protect finished levels of infrastructure due to sea level rise.

4.3.9 Combined fluvial and tidal modelling is not considered necessary for this Scheme as it is not reasonable to assume sea level will rise a further 6m to the lowest level of the Principal Site, even with fluvial interaction, due to the landscape topography around the River Trent catchment and lower lying expanses of land around the Trent floodplain.

4.3.10 In summary, the flood risk to structures (Principal Site) and the risk to people associated with sea level rise is considered low, with no mitigation required.

4.4 With-Scheme Fluvial Flood Risk

4.4.1 In general the Principal Site is located within Flood Zone 1, with four areas of Flood Zone 2 and 3 extents located near the Principal Site Boundary.

4.4.2 Two of these four areas within the Principal Site Boundary have been identified as interaction zones. The interaction zones are areas where land designated as Flood Zone 2 and/or 3 falls within the Principal Site and includes proposed solar PV panel infrastructure.

4.4.3 The remaining two areas within the Scheme Boundary are proposed as ecological or archaeological mitigation areas, with no proposed above ground built infrastructure or ground raising proposed (i.e. no battery, compound or solar PV areas).

4.4.4 Figure 4-4 identifies the two interaction zones (Harpswell Lane and Kexby Road) in the north and southeast of the Principal Site where they interact with Flood Zone 3.

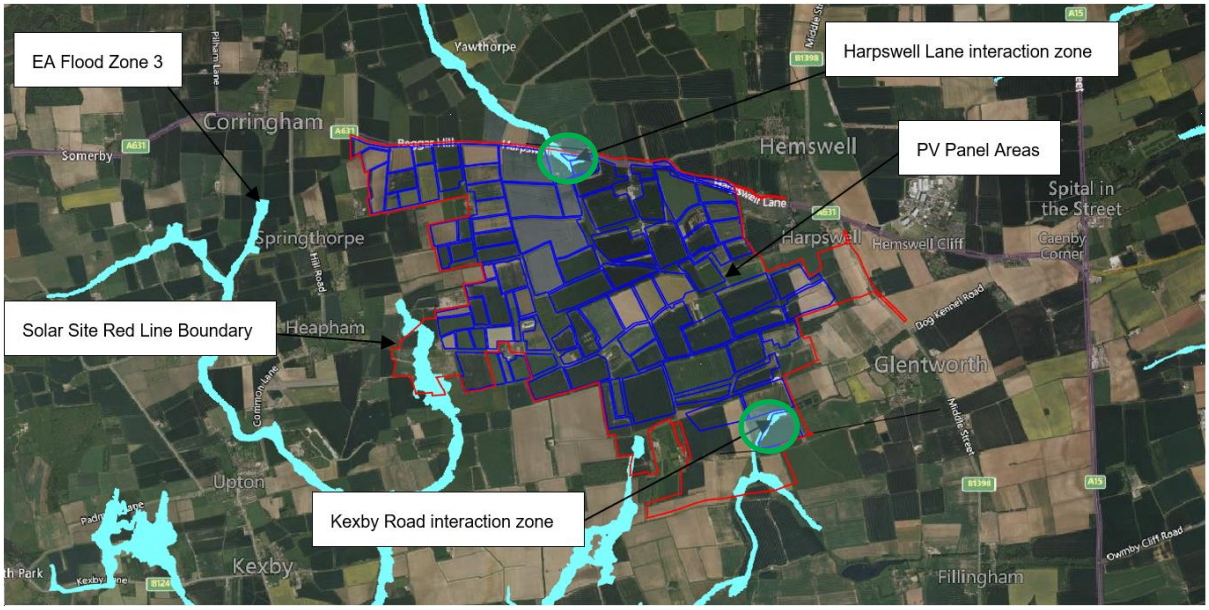


Figure 4-4: Principal Site Overview

4.4.5 The Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3**) proposes that surface water flows from the Scheme will be discharged to watercourses present on the Principal Site at existing greenfield rates via sustainable drainage techniques. The controlled discharge rates proposed will ensure the pre-Scheme run off conditions are mimicked to mitigate the risk of increasing peak river flow rates within the watercourses. Therefore, the overall fluvial flood risk level for the Principal Site and surrounding areas in the with-Scheme scenario is considered to be unchanged from the pre-Scheme Scenario.

Summary of Fluvial Flood Level Technical Note

4.4.6 A Fluvial Flood Level Technical Note included in Annex B of this Preliminary FRA sets out the findings of an analysis predicting the anticipated flood levels within the two interaction zones and demonstrates that there will be no increased risk

from fluvial flooding to the solar PV panel infrastructure within these interaction zones, including allowances for climate change and an assessment for the CMS.

4.4.7 The interaction zones identify areas of solar PV panels where fluvial flooding may occur between the ground level and the bottom of the solar PV panel. A typical solar has 600mm difference between the ground level and bottom of solar PV panel level.

4.4.8 The Fluvial Flood Level Technical Note seeks to determine the minimum required bottom of solar PV Panel level within the interaction zones to ensure suitable freeboard above the predicted flood levels for the 1 in 100 year + Climate Change events is provided.

4.4.9 The predicted flood level assessment was undertaken by estimating peak river flow rates for the 2080's Epoch for both the higher and upper climate changes allowances.

4.4.10 A 3D model developed from LiDAR map data of the Principal Site was developed, providing topographical data of the watercourses and their surrounding floodplain.

4.4.11 An analysis of the watercourses channel and floodplain discharge capacities enabled a prediction of flood level across the flood plains during the 1 in 100 year + climate change events, as per values noted in Figure 4-3 above.

4.4.12 A comparison of the predicted flood levels and base height of solar PV panel levels within the interaction zones indicates that the level of the base of the solar PV panels within the Harpswell Lane interaction zone will need to be raised by 120mm (minimum level of 19.54m AoD) to enable suitable freeboard (standing advice from the Environment Agency recommends a minimum of 300mm) for the 1 in 100 year + Higher Climate Change allowance.

4.4.13 The comparison indicates that the solar PV panels within the Kexby Road interaction zone will not require raising, as the standard 600mm level difference from the ground level to bottom of solar PV Panel level provides suitable freeboard for the 1 in 100 year + Higher Climate Change allowance (i.e. the design allowance or the Scheme).

4.4.14 A sensitivity check using the Upper Climate Change Allowance (i.e. a sensitivity check for the design) demonstrates the raised solar PV panel level within the Harpswell Lane interaction zone and the standard solar PV panel level within the Kexby Road interaction zones will maintain 240mm of freeboard. This is deemed suitable as the sensitivity check ensures that even for extreme storm events, the solar PV panel infrastructure will be above the predicted flood level.

4.4.15 Table 4-3 shows the lowest ground level and estimated lowest bottom of solar PV Panel levels at each of the interaction zones assessed from the 3D surface.

Table 4-3 – Proposed Solar PV Panel Levels

Ditch	Lowest Ground Level (m AoD)	Predicted Flood Level (m AoD) (1 in 100 year + CC Higher Allowance)	Proposed Bottom of solar PV Panels Level in FZ 3 (m AoD)	Freeboard to bottom of solar PV Panel level (1 in 100 year + CC Higher Allowance)
Harpswell Lane	18.75	19.17	**19.47**	**300**
Kexby Road	19.75	19.95	**20.35**	**400**

4.4.16 The Fluvial Flood Level Technical Note demonstrates that there will be sufficient freeboard between the predicted worst case flood depth level and the solar PV Panel infrastructure for up to the 1 in 100 year event, including allowances for climate change. The assessment is based on the contributing catchment area and the peak runoff rates that it can feasibly generate, related to channel capacity and predicted flooding as a result of exceeded channel capacity. It is considered no additional detailed fluvial modelling is required as a result of this assessment.

Credible Maximum Scenario (CMS)

4.4.17 Nationally significant infrastructure projects (NSIPs) are major infrastructure projects which include solar farms with an output greater than 50MW, such as the Scheme.

4.4.18 The online Environment Agency guidance ("Flood risk assessments: climate change allowances") indicates that for "Assessing credible maximum scenarios for nationally significant infrastructure projects, new settlements or urban extensions":

"*If you develop NSIPs you may need to assess the flood risk from a credible maximum climate change scenario*" (CMS).

4.4.19 The test should be treated as a 'sensitivity test', to help you assess how sensitive a proposal is to changes in the climate for different future scenarios. This will ensure a proposed development can be adapted to large-scale climate change over its lifetime.

4.4.20 The CMS allowance to be referred to in this assessment is the Upper End for the 2080s Epoch, From Figure 4-3 this value is 62%.

4.4.21 The Fluvial Risk Technical Note has provided an assessment of catchment runoff for each of the two interaction zones with solar PV panels. The Runoff assessment allows for 150% additional flows, in excess of the 62% increase in peak flows required for the assessment.

4.4.22 The solar PV panels are proposed to be raised by up to 120mm to retain the minimum 300mm freeboard to the bas of the solar PV panels.

4.4.23 With a 100% increase in peak flows from the runoff catchment, flood depths are not predicted to require further mitigation, as the 600mm solar PV panel height above ground can accommodate the additional flood depths without mitigation to

retain at least 300mm freeboard, ensuring the solar PV panels will operate in extreme events.

4.4.24 It is considered that there will be no increase to the fluvial flood risk within and/or surrounding the Scheme Boundary as a result of the Scheme, including review for the credible maximum scenario.

4.5 With-Scheme Surface Water Flood Risk

4.5.1 As discussed within Table 3-2, the surface water flood risk is generally low across the Principal site for the Pre-Scheme scenario. However, as the Principal Site covers a considerable area, localised areas with variations from medium to high surface water flood risk are present. These medium to high risk areas are associated with topographical low spots and/or with the areas immediately surrounding the two watercourses identified in the Fluvial Flood Level Technical Note (Annex B).

4.5.2 The Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3**) discusses in detail the increases in total impermeable area across the Principal Site for the with-Scheme scenario. The increases in impermeable area are envisaged to result in localised increases to surface water run off rates directly associated with BESS, substations and compounds. The increase in surface water runoff from these areas is proposed to be managed via sustainable drainage techniques to temporarily attenuate the increased surface water flows before discharging to surrounding watercourses at restricted rates to mimic the pre-Scheme conditions for up to and including the 1 in 100 year + 40% climate change event.

4.5.3 As discussed within the Preliminary Drainage Strategy, it is considered that total impermeable areas where solar PV panels are proposed for the with-Scheme scenario will remain consistent to the pre-Scheme state. Therefore, the proposed PV panel areas are considered to not impact the post-Scheme surface water flood risk level associated specially in relation to the two watercourses identified in the Fluvial Flood Level Technical Note (Annex B). Further detail of the with-Scheme impermeable areas is discussed within the Preliminary Drainage Strategy.

4.5.4 Therefore, it is envisaged that there will be no increase to surface water flood risk on or surrounding the Principal Site for the with-Scheme scenario.

4.6 With-Scheme Other Sources of Flood Risk

4.6.1 There are no Artificial Sources of flood risk within the Principal Site; therefore, flood risk remains low from Artificial Sources.

4.6.2 Groundwater flood risk is anticipated to remain unchanged, as there are no proposals for discharging surface water runoff via infiltration methods.

4.6.3 The with-Scheme scenario does not propose to interact or alter any existing sewer infrastructure and therefore will result in no change to flood risk from such sources. Construction risk of exposing or damaging sewers during the construction phase of the Scheme will be included and managed within the CEMP.

4.6.4 It is envisaged that flood risk levels from other sources (groundwater, sewers, or artificial bodies) within and surrounding the Scheme boundary will remain unchanged.

4.7 Flood Risk Summary

4.7.1 As previously discussed, the Scheme is not envisaged to impact fluvial, tidal, groundwater, sewers, or artificial risk levels of flooding within or surrounding the Scheme Boundary.

4.7.2 The increase in surface water runoff rates as a result of the with-Scheme scenario will be managed via sustainable drainage techniques proposed to mimic the pre-Scheme conditions detailed within the Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3**), resulting in no impact to flooding from surface water sources within or surrounding the Scheme Boundary.

4.7.3 The pre- and post-Scheme flood risk conclusions are presented in Table 4-4 below.

Table 4-4: Flood Risk Summary (Principal Site)

Flood Risk Source	Pre-Scheme Flood Risk Level	Post-Scheme Flood Risk Level	Comments
Fluvial	Low (Principal Site)	Low (Principal Site)	Discharge from impermeable areas detailed in the Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3**) are to be restricted to Greenfield rates, mitigating increases to peak river flow rates. Solar PV Panel infrastructure within Flood Zones 2/3 “interaction zones” are not envisaged to alter the existing flood extents’ topography and are proposed to be installed to enable sufficient freeboard during the worst case flooding scenarios.
Tidal	Low (majority of Scheme Boundary) – High (areas associated with watercourses)	Low (majority of Scheme Boundary) – High (areas associated with watercourses)	No change to flood risk level.
Pluvial (surface water)	Low	Low	Increased surface water runoff is proposed to be managed to mimic the pre-Scheme conditions for up to and including the 1 in 100 + 40% CC event. No change in flood risk level.
Groundwater	Low	Low	The Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3**) does not propose to utilise

Flood Risk Source	Pre-Scheme Flood Risk Level	Post-Scheme Flood Risk Level	Comments
			infiltration techniques to discharge increased surface water runoff. No change to flood risk level.
Sewers	Low	Low	No change to flood risk level.
Artificial sources	Low (Principal Site and majority of Cable Route Corridor) – Medium (small area of Cable Route Corridor where crossing the River Trent)	Low (Principal Site and majority of Cable Route Corridor) – Medium (small area of Cable Route Corridor where crossing the River Trent)	No change to flood risk level.

4.8 The Sequential and Exception Tests

4.8.1 The Sequential and Exception Tests have been undertaken to satisfy both NPS EN-1[(1)] and NPPF[(5)] requirements.

4.8.2 Paragraph 5.7.13 of NPS EN-1[(1)] states a preference should be given to locating projects in Flood Zone 1. If there is no reasonably available site in Flood Zone 1, then projects can be located in Flood Zone 2. If there is no reasonably available site in Flood Zones 1 or 2, then NSIPs can be located in Flood Zone 3, subject to the Exception Test.

4.8.3 Similarly, within the NPPF[(5)], the overall aim of the Sequential Test is to steer new development to the lowest flood zone, i.e. Flood Zone 1. Where there are no reasonably available sites within Flood Zone 1, Flood Zones 2 and 3 may be considered, subject to passing the Exception Test, depending on the type of development proposed. The development type for the Scheme is 'Essential Infrastructure', which is defined in Table 3 of the NPPF[(5)] (as set out in section 3.2 of this Preliminary FRA). Table 4 in Section 3.2 provides that Essential Infrastructure can be located in Flood Zones 3a and 3b if the Exception Test is passed. In accordance with national planning policy (NPPF and NPS), the Secretary of State will need to be satisfied that the Scheme passes the Sequential Test and the Exception Test, as small areas of the Scheme are within Flood Zone 3a.

4.8.4 Both NPS EN-1[(1)] and the NPPF[(5)] therefore require the application of both the Sequential Test and the Exception Test.

4.8.5 When considering alternative sites section 4.4 on NPS EN-1 provides that this should be undertaken in a proportionate manner. The sequential test should be applied to both the layout and design of a project and paragraph 5.7.23 states

that "*Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife habitat and flood storage uses.*"

Principal Site

4.8.6 The Principal Site includes areas of high risk of flooding although is predominantly within Flood Zone 1.

4.8.7 The location of the Principal Site was dictated in part by the availability of a grid connection point at National Grid Cottam Substation. **PEI Report Volume I Chapter 4: Alternatives and Design Evolution** provides an explanation of site selection process along with how the Scheme had considered alternatives taking into account wider environmental and planning considerations.

4.8.8 As set out in **PEI Report Volume I Chapter 4: Alternatives and Design Evolution** the location of the Principal Site was informed by the considerations outlined in Draft NPS EN-3 in relation to the siting of solar PV development.

4.8.9 A sequential approach has been applied to the layout and design of the Principal Site whereby the two substations, BESS and the majority of the solar PV arrays located in areas with the lowest risk of flooding from any source. As shown on **PEI Report Volume III Figure 3-1** there are two small areas where solar PV arrays are located on flood zone 2. Where required, embedded mitigation within he design has been included. In particular, east-west tracking panels are to be used enabling them to be tilted and as such be resilient to instances of flooding in these areas. The Sequential Test is therefore considered passed for the Principal Site due to flood risk from any source to be low following the embedded mitigation.

Grid Connection Corridor

4.8.10 The Grid Connection corridor covers areas of high risk of fluvial flooding (Flood Zone 3). Whilst other grid connection corridor options were considered, these would also cover areas of Flood Zone 3 in order to connect to National Grid Cottam Substation. In addition, consideration has been given to the potential of a shared corridor with neighbouring solar developments within the area (Gate Burton, West Burton and Cottam Solar projects) in order to minimise the cumulative impact in regards to disruption as well as environmental impacts along with reducing the number of affected landowners. There are therefore no alternative routes at lower risk of flooding from any source.

4.8.11 In this instance, it is therefore necessary to apply the exception test for the Grid Connection Corridor and demonstrate that:

- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- 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.

4.8.12 Through the generation of low carbon electricity the Scheme will contribute to the urgent need to decarbonise electricity generation in the UK as established in the Net Zero Strategy: Build Back Greener (October 2021), and the British Energy

Security Strategy (April 2022). It will contribute to the UKs obligations for net zero under the Climate Change Act 2008 (as amended). It is also in line with the current and emerging planning policy on renewable energy (Draft NPS EN-3) which recognises the need for sustained growth in solar capacity to meet net zero emissions by 2050. Therefore, the Scheme will have both a national, and global significance, through its decarbonisation of the nation's electricity generation, and is clearly commensurate with national energy policy which will be detailed further within the Statement of Need and the Planning Statement which will be submitted with the DCO application.

4.8.13 In addition, the Scheme will include habitat creation and enhancement as set out in **PEI Report Volume I Chapter 9: Ecology and Nature Conservation**. This will contribute to the Scheme providing biodiversity net gain in line with the Environmental Act 2021. There are areas of high-risk flooding within the Principal Site which are excluded for solar panels and are proposed to be used for ecological enhancement. Therefore, taking the above into account, it is judged here that the Scheme will provide wider sustainability benefits that outweigh its impacts on flood risk.

4.8.14 As detailed within Section 7 of this Preliminary FRA, embedded mitigation measures and a Preliminary Drainage Strategy, secured by a requirement of the draft DCO will be implemented, in order to ensure that the Scheme is safe for its lifetime and that there will be no increases in flooding elsewhere. Thus, the Scheme satisfies the second requirement of the Exception Test and will remain safe throughout its lifetime without increasing flood risk to third party land.

4.8.15 Therefore, as demonstrated above the Scheme is considered to pass the Sequential and Exception Test.

5. Assessment of Flood Risk (Cable Route Corridor)

5.1 Flood risk from all sources

5.1.1 Long term flood risk resulting from the Cable Route Corridor is considered to be as existing, as the infrastructure will be buried throughout the Corridor with no permanent above ground built development.

5.1.2 Table 5-1 below sets out the flood risk from all sources for the Cable Route Corridor only.

Table 5-1: Flood Risk Assessment

Flood Risk Source	Pre-Scheme Flood Risk Level	Post-Scheme Flood Risk Level	Comments
Fluvial	High (Cable Route Corridor cross the River Till and Trent to where it connects to the substation at Cottam.	High (Cable Route Corridor cross the River Till and Trent to where it connects to the substation at Cottam.	**Source: (Figure 9.1 and 9.2 of WLDC SFRA[13]) and online mapping (Gov.uk).** No change to flood risk level and no increase in flood risk. No permanent above ground infrastructure being located in the Cable Route Corridor. No long term flood risk and no mitigation required (i.e. no floodplain compensation or raising of ground levels/floor levels. No alternative Cable Route Corridor available that would avoid Flood Zones 2/3 completely.
Tidal	Medium to High along majority of cable route in tidal Trent reaches.	Medium to High along majority of cable route in tidal Trent reaches.	**Source: (Figure 9.1 and 9.2 of WLDC SFRA[13]).** No change to flood risk level and no increase in flood risk.
Pluvial (surface water)	Medium to High along cable route through interaction with fluvial Flood Zones	Medium to High along cable route through interaction with fluvial Flood Zones	**Source: (Online SW Mapping, Gov,uk[8]).** No change to flood risk level and no increase in flood risk. No mitigation required for below ground cables. Any interaction with existing below ground drainage (land drains) will be managed and reinstated during construction and set out in the CEMP.
Groundwater	Low to Medium	Low to Medium	**Source: British Geological Society (BGS) Online[32] and Lincolnshire County Council (LCC) PFRA[9].** No historical groundwater flooding events are mentioned specifically within West Lindsey. However, where the Cable Route Corridor crosses the Rivers Trent and Till, groundwater may be elevated. There is no risk mapping for groundwater in this area, but as soils are largely impermeable the

Flood Risk Source	Pre-Scheme Flood Risk Level	Post-Scheme Flood Risk Level	Comments
			risk is considered medium, as the bedrock geology would not support large amounts of water storage, such as an aquifer. There may be a risk of groundwater flooding during and laying of cables. Further investigation will be carried out to inform the construction methods for the Cable Route Corridor and where they cross watercourses and ensure no increase in risk to the Scheme or elsewhere.
Sewers	Low	Low	**Source (WLDC SFRA[13] and LCC PFRA[9]):** No change to flood risk level. There are no confirmed sewers in the vicinity of the Cable Route Corridors. As there is no proposed connection to public sewers along the Cable Route Corridor, there will be no increase in sewer flood risk as a result of the Scheme. Construction risk of exposing or damaging sewers will be included and managed within the CEMP.
Artificial sources	Medium to High (residual) – Flood risk from artificial sources are confined to small areas of the cable route corridor with a medium risk. However, the risk is increased when river levels are in high or flood conditions	Medium to High (residual) – Flood risk from artificial sources are confined to small areas of the cable route corridor with a medium risk. However, the risk is increased when river levels are in high or flood conditions	No change to flood risk level and no mitigation required.

6. Drainage Strategy

6.1 Drainage Strategy Principles

6.1.1 The Preliminary Drainage Strategy included in **PEI Report Volume II Appendix 10-3** proposes a system for new impermeable areas during the with-Scheme scenario designed to accommodate the 1 in 100-year storm, plus a 40% allowance for an increase in peak rainfall intensity due to climate change.

6.1.2 The Strategy assumes the solar PV panels and access roads will not lead to an increase in impermeable area within the Scheme and that 100% of the runoff from the BESS areas, substations areas, and intermediate warehouses areas will contribute to runoff managed by the new system.

6.1.3 The Preliminary Drainage Strategy proposes to attenuate runoff via sustainable drainage techniques (excluding infiltration to ground due to assumed geological conditions) and restrict at greenfield rates to watercourses within the Scheme Boundary as per the existing conditions.

6.1.4 Foul drainage is not considered within the drainage strategy as no connection to the public sewer is proposed, drainage will be dealt with via a septic tank arrangement or similar sealed system for the compound areas, emptied and maintained to recommended manufacturer advice.

6.1.5 Further details including contributing areas, runoff rates, water quality assessment and maintenance requirements are included within the report.

7. Residual Risks and Mitigation

7.1 Residual risks to the Scheme

7.1.1 A residual fluvial risk remains in relation to the areas of PV within Flood Zone 3. The solar PV panels in the flood risk areas are proposed to be raised by up to 120 mm to provide additional protection against this risk. The legs that sit within the floodplain will not cause a barrier to flood flows as they are expected to be less than 100mm in diameter and do not materially remove floodplain volume, with the relatively few number of panels that will be located in Flood Zone 3. Therefore, floodplain compensation is not considered to be required.

7.1.2 Residual flood risk to the Scheme is considered to be low.

7.2 Safe Access

7.2.1 Through the Sequential Test process and design iterations, there are no buildings located within the floodplain. The only structures within the floodplain are solar PV panels. All compounds for site staff, on-site substations and battery storage units have been located out of flood zones and it is envisaged access to solar PV panels within Flood Zone 3a would not be undertaken during flooding conditions.

7.2.2 Substations and battery storage units will not be manned unless for maintenance / carrying out works. During a flood event, the affected infrastructure will not be accessed or manned until flood waters recede.

8. Conclusions

8.1.1 This Preliminary FRA has been prepared to support the PEI Report.

8.1.2 No additional flood risk mitigation or floodplain compensation is considered to be required for the Scheme to be compliant with flood risk policy and guidance.

8.1.3 The FRA demonstrates flood risk, from all sources, will not increase as a result of the Scheme, within the Scheme Boundary or elsewhere. A separate Preliminary Drainage Strategy (**PEI Report Volume II Appendix 10-3)** demonstrates surface water drainage will be managed effectively to ensure there is no increase in surface water runoff from the Scheme above the existing regime.

9. Annexes

Annex A – Indicative Site Layout Plan

Annex B – Fluvial Flood Level Technical Note

Annex C – Sea Level Rise Calculation

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