EAST YORKSHIRE SOLAR FARM

East Yorkshire Solar Farm

EN010143

Environmental Statement

Volume 2, Appendix 9-3: Flood Risk Assessment
Document Reference: EN010143/APP/6.2

Regulation 5(2)(e)
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

November 2023
Revision Number: 00

2009

BOOM-POWER.CO.UK

BOOM POWER

Prepared for:

East Yorkshire Solar Farm Limited

Prepared by:

AECOM Limited

Table of Contents

Figures

Plates

Tables

Executive Summary

ES1 This Flood Risk Assessment (FRA) has been prepared as part of an application for a Development Consent Order (DCO Application) for East Yorkshire Solar Farm (the Scheme). The Scheme comprises the construction, operation (including maintenance), and decommissioning of ground mounted solar photovoltaic (PV) panel arrays and supporting infrastructure including electrical equipment and cabling and environmental mitigation.

ES2 The Scheme is proposed to be located within the administrative areas of East Riding of Yorkshire Council and North Yorkshire Council, approximately 1.6km northwest of the market town of Howden. A Grid Connection Corridor is proposed with a point of connection at the National Grid Drax Substation. Due to its proposed generating capacity being above 50 Megawatts the Scheme is classified as a Nationally Significant Infrastructure Project (NSIP) and requires a Development Consent Order (DCO) under the Planning Act 2008.

ES3 The FRA reports on the assessment of the risk of flooding to and from the Scheme and the potential impact of the Scheme on flooding mechanisms which affect third party property and land. The FRA has been produced in accordance with regulation 5(2)(e) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, the National Policy Statement (NPS) for Energy EN-1, NPS for Renewable Energy EN-3, NPS for Electricity Networks Infrastructure EN-5 and the National Planning Policy Framework (NPPF). The FRA informs **Chapter 9: Flood Risk, Drainage and Water Environment, Environmental Statement (ES) Volume 1 [EN010143/APP/6.1]**.

ES4 The Scheme is to be located on land shown on **Figure 1-2, ES Volume 3 [EN/010143/APP/6.3].** The Scheme comprises the following elements: the Solar PV Site, Ecology Mitigation Area, Interconnecting Cable Corridor; Grid Connection Corridor and Site Accesses. The land required for these elements is collectively referred to as the Site.

ES5 Consultation with the Environment Agency, East Riding of Yorkshire Council, North Yorkshire Council and the relevant Internal Drainage Boards has been undertaken as part of the assessment set out in the FRA. The assessment covers both the construction and operational stages of the Scheme.

ES6 The assessment has been split into two separate parts due to the differing nature of elements of the Scheme: (1) Solar PV Site and Interconnecting Cable Corridor; and (2) Grid Connection Corridor. The assessment covers any associated Site Accesses for both of these aspects. According to Annex 3 of the NPPF, the Ecology Mitigation Area is classified as ‘water-compatible’ (nature conservation and biodiversity) and is considered compatible in any Flood Zone and has therefore not been assessed within the FRA.

Solar PV Site and Interconnecting Cable Corridor

ES7 The majority of the Solar PV Site and Interconnecting Cable Corridor are located within Flood Zone 1. The north-east corner of the Solar PV Site is

located within an area of Flood Zone 2 and 3 associated with the River Foulness. Within the central area of the Solar PV Site and Interconnecting Cable Corridor to the west is a small corridor of Flood Zone 3 and a wider Flood Zone 2 extent associated with the Fleet Dyke and its local drainage tributaries, draining east to west towards the River Derwent.

ES8 To further inform flood risk to the Solar PV Site and Interconnecting Cable Corridor, a hydraulic model of the River Derwent was received from East Riding of Yorkshire Council and simulated with the latest climate change allowances. The results from the hydraulic modelling represent the worst case undefended scenario and have been used to inform the design of any panels located within the Flood Zone 3 extent, allowing for an appropriate freeboard above the design flood event. While some panels are located within Flood Zone 3, all Field Stations and Grid Connection Substations will be located outside of Flood Zone 3.

ES9 The majority of the Solar PV Site, Interconnecting Cable Corridor and associated Site Accesses are considered to be at very low risk of surface water flooding. The risk from groundwater flooding is considered to be low to medium due to some parts of the Solar PV Site and Interconnecting Cable Corridor being located in areas considered to have up to 70% susceptibility to groundwater flooding. According to British Geological Survey (BGS) borehole records there is evidence that groundwater within superficial deposits may be less than 3 m below the ground surface during periods of elevated groundwater levels but is limited to some areas of the Solar PV Site, Interconnecting Cable Corridor, and Site Accesses.

ES10 The risk of flooding from sewers is considered to be very low due to the Solar PV Site, Interconnecting Cable Corridor, and Site Accesses being located within arable fields with no existing sewerage assets in these areas. The risk of flooding from artificial sources is also considered to be low.

Grid Connection Corridor

ES11 The majority of the Grid Connection Corridor and associated Site Accesses are located within Flood Zones 2 and 3 associated with the River Ouse and River Derwent. However, the Grid Connection Cables will be located below ground and therefore the risk of flooding to the Grid Connection Corridor from above ground sources is considered to be low.

ES12 The risk from surface water flooding is generally very low with isolated areas of low and medium flood risk. The risk from groundwater flooding is considered to be very low to low as the Grid Connection Corridor is located in areas considered to have <25% susceptibility to groundwater flooding. The risk of flooding from sewers is also considered to be very low due to the Grid Connection Corridor being located within arable fields with no existing sewerage assets in the Grid Connection Corridor. The risk of flooding from artificial sources is considered to be negligible.

Mitigation

ES13 The assessment of flood risk from the construction and decommissioning stages of the Scheme has concluded that with design mitigation, the risk to other receptors from all sources of flooding would be low. To prevent an increase in flood risk to vulnerable receptors, temporary construction embedded mitigation measures will be secured through the Construction

Environmental Management Plan (CEMP). A **Framework CEMP [EN010143/APP/7.7]** is included in the DCO Application.

ES14 The assessment of flood risk during the operational stage of the Scheme has concluded that with design mitigation, the risk to the Scheme from all sources of flooding would be low taking into account climate change. Embedded mitigation measures will be secured through the DCO as part of the Framework Operational Environmental Management Plan (OEMP) to prevent an increase in flood risk to vulnerable receptors.

Sequential and Exception Tests

ES15 A sequential approach, as presented in **Annex C**, has been applied in selecting the land for the Scheme. The Scheme has been located, as far as possible, in areas with the lowest risk of flooding from any source and is therefore considered to pass the Sequential Test.

ES16 As some of the Scheme's infrastructure is proposed to be located within Flood Zone 3, it is necessary to apply the Exception Test. It has been demonstrated that the Scheme would provide wider sustainability benefits to the community which outweigh flood risk, and the FRA has demonstrated that the development will be safe for its lifetime, without increasing flood risk elsewhere when considering the embedded mitigation. Therefore, the Scheme is considered to pass the Exception Test.

Summary

ES17 In summary, the Scheme is considered appropriate, meeting the requirements of the NPS EN-1 and the NPPF and will remain safe throughout its lifetime.

1. Introduction

1.1.1 This Flood Risk Assessment (FRA) has been prepared to support an application for a Development Consent Order (DCO Application) for East Yorkshire Solar Farm (the Scheme). The Scheme comprises the construction, operation (including maintenance), and decommissioning of ground mounted solar photovoltaic (PV) panel arrays and supporting infrastructure including electrical equipment and cabling and environmental mitigation.

1.1.2 The Scheme is located within the administrative areas of East Riding of Yorkshire Council and North Yorkshire Council, approximately 1.6km northwest of the market town of Howden. A Grid Connection Corridor is proposed with a point of connection at the National Grid Drax Substation. Due to its proposed generating capacity being above 50 Megawatts (MW) the Scheme is classified as a Nationally Significant Infrastructure Project (NSIP) and requires a Development Consent Order (DCO) under the Planning Act 2008.

1.1.3 This FRA forms an appendix to the Environmental Statement (ES) for the Scheme. It should be read in conjunction with **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]**.

1.1.4 This FRA is supported by the following Figures in **ES Volume 3, [EN010143/APP/6.3]:**

a. **Figure 9-1:** Surface Water Features and Their Attributes;

b. **Figure 9-2:** Drain Names and Internal Drainage Board areas;

c. **Figure 9-3:** Groundwater Features and their attributes;

d. **Figure 9-4:** Fluvial Flood Risk; and

e. **Figure 9-5:** Surface Water Flood Risk.

1.1.1 The Appendix is supported by the following Plates, which are embedded in the text:

a. **Plate 1:** Environment Agency Flood Map for Planning - Solar PV Area 2a;

b. **Plate 2:** Maximum modelled flood depth - 1% AEP + climate change undefended;

c. **Plate 3:** Maximum modelled flood depth - 3.3% AEP undefended;

d. **Plate 4:** Environment Agency Flood Map for Planning Parcel 1e;

e. **Plate 5:** Maximum modelled flood depth - 1% AEP H++ undefended;

f. **Plate 6:** Surface Water Flood Risk during 1% AEP plus climate change event;

g. **Plate 7:** Environment Agency extent of Reservoir Flooding Mapping; and

h. **Plate 8:** Environment Agency extent of Reservoir Flooding Mapping.

1.1.5 The Appendix is supported by the following Annexes:

a. **Annex A:** Hydraulic Modelling Method Report

b. **Annex B:** Hydraulic Modelling Technical Report; and

c. **Annex C:** Sequential Test Report.

1.1.2 Further information on the Scheme is included within **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**.

1.2 Purpose of the Report

1.2.1 The FRA has been produced as in accordance with regulation 5(2)(e) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.This report presents the flood risk posed to, and from, the development of the Solar PV Site, Interconnecting Cable Corridor; Grid Connection Corridor and Site Accesses from all sources of flooding. As the Ecology Mitigation Area is classified as 'Water-compatible' according to the National Planning Policy Framework (NPPF) (Ref. 9-7), it is compatible within any Flood Zone and therefore has not been considered further within this assessment.

1.2.2 The FRA has been prepared in accordance with the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref. 9-1), NPS for Renewable Energy Infrastructure (NPS EN-3) (Ref. 9-2), NPS for Electricity Networks (NPS EN-5) (Ref. 9-3), draft NPS EN-1 (Ref. 9-4), draft NPS EN-3 (Ref. 9-5), draft NPS EN-5 (Ref. 9-6), the NPPF (Ref. 9-7) and supporting Planning Practice Guidance (Ref. 9-8). Further information on planning policy and guidance specific to flood risk is detailed in **Appendix 9-1, ES Volume 2 [EN010143/APP/6.2]**.

1.3 FRA Objectives

1.3.1 The minimum requirements for FRAs, as outlined in NPS EN-1 (paragraph 5.7.5) (Ref. 9-1), are to:

a. "Be proportionate to the risk and appropriate to the scale, nature, and location of the project;

b. Consider the risk of flooding arising from the project in addition to the risk of flooding to the project;

c. Take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;

d. Be undertaken by competent people, as early as possible in the process of preparing the proposal;

e. 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;

f. Consider the vulnerability of those using the site, including arrangements for safe access;

g. 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;

h. 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;

i. 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;

j. 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;

k. Consider if there is a need to be safe and remain operational during a worst case flood event over the development's lifetime; and

l. Be supported by appropriate data and information, including historical information on previous events."

1.3.2 It should be noted that revised 2023 draft NPS EN-1 sets out an amended list of minimum requirements for FRAs. Although this emerging document is not adopted policy, the draft NPS EN-1 has also been considered within this FRA as it is an important and relevant matter for the Secretary of State for Energy Security and Net Zero (Secretary of State) to consider in their decision making on the Scheme. In general, the amended list in draft NPS EN-1 has similar wording to what is presented above; however, to the following text has been added to paragraph k:

"Detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the development's lifetime without increasing flood risk elsewhere".

1.3.3 The revised draft NPS EN-1 also includes 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".

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

a. Identify potential sources of flooding, including rivers, watercourses, surface water flooding, groundwater flooding, flooding from sewer systems and other forms of flooding (artificial), relevant to the Scheme;

b. Establish the risk of flooding in relation to the Scheme;

c. Determine the effects of the Scheme on flooding elsewhere either through displacement of floodwaters or increased runoff; and

d. Suggest appropriate flood mitigation measures for the Scheme, including a strategy for disposal of surface water runoff following the principles of Sustainable Drainage Systems (SuDS).

1.4 Consultation

1.4.1 Statutory consultation was undertaken at the Preliminary Environmental Information (PEI) Report stage. This consultation has continued with the Environment Agency and Lead Local Flood Authorities (LLFAs) during the

production of this FRA. The following statutory consultees have provided comment on matters relating to flood risk and drainage:

a. East Riding of Yorkshire Council (LLFA);

b. North Yorkshire Council (LLFA);

c. Yorkshire Water;

d. Canal and Rivers Trust;

e. The Selby Area Internal Drainage Board;

f. Yorkshire and Humber Drainage Boards;

g. Ouse and Humber Drainage Boards; and

h. The Environment Agency.

1.4.2 Further details of the consultation undertaken are presented in **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]**.

1.4.3 The comments received have been considered in revisions to the Scheme layout in conjunction with other topics. Additional information regarding the consultation process and content of each statutory consultee's comments, and how the Applicant has had regard to these comments, can be found in the **Consultation Report [EN010143/APP/5.1]** submitted as part of the DCO Application.

1.4.4 The Environment Agency and LLFAs provided hydraulic modelling data to inform this FRA. The methodology of the hydraulic modelling undertaken as part of this FRA was agreed with the Environment Agency. The hydraulic modelling report (Annex B of this FRA) and model data has been sent to the Environment Agency for review and approval in advance of submission of the DCO Application and their comments and approval are pending.

1.5 The Scheme

1.5.1 The Scheme is a proposed solar farm in East Yorkshire, which will generate renewable energy for exporting to the national grid, with the connection point at National Grid's Drax Substation.

1.5.2 The Scheme will comprise the construction, operation and maintenance, and decommissioning of a solar PV electricity generating facility with a total capacity exceeding 50 MW along with export connection to the National Grid. The Scheme, which has a development lifetime of 40 years, will be located within the 'Site' (as described in section 2 below) and will be the subject of the DCO Application. Further information on the Scheme is included within **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**.

2. Site Description

2.1 Location

2.1.1 The Site comprises all land within the Order limits covering an area of approximately 1,276 hectares (ha) located within the administrative areas of East Riding of Yorkshire Council and North Yorkshire Council[1].

2.1.2 The Order limits represent the maximum extent of land to be acquired or used for the construction, operation (including maintenance), and decommissioning of the Scheme. The Site comprises all land within the Order limits and is made up of the Solar PV Site, Ecology Mitigation Area, Interconnecting Cable Corridor, Grid Connection Corridor, and Site Accesses. The rationale for selecting the Site is described in **Chapter 3: Alternatives and Design Evolution, ES Volume 1 [EN010143/APP/6.1]**. The Order limits are shown on **Figure 1-2, ES Volume 3 [EN010143/APP/6.3]** and the elements of the Scheme are shown in **Figure 1-3, ES Volume 3 [EN010143/APP/6.3].**

2.1.3 The Ecology Mitigation Area will either remain under normal farming conditions or be converted to permanent grassland. It also includes a network of blind linear foot drains to temporarily hold water to improve the habitat for wintering birds. As the Ecology Mitigation Area is classified as 'water-compatible' (according to Annex 3 of the NPPF) it is considered compatible in any Flood Zone, therefore it is not considered further as part of the FRA. Although the Site Accesses are a specific element of the Scheme, for the purposes of the assessment they are considered as part of the Solar PV Site, Interconnecting Cable Corridor or Grid Connection Corridor with which they are associated.

2.1.4 The land use within the Solar PV Site and Interconnecting Cable Corridor is predominantly arable (some with semi-improved grassland margins), intersected by a network of drainage ditches, hedgerows and tree lines.

2.1.5 The landscape features immediately surrounding the Solar PV Site and Interconnecting Cable Corridor comprise the River Derwent to the west, several small rural villages and hamlets, and the market town of Howden. The boundary of the Solar PV Site is closer to residential areas than the Interconnecting Cable Corridor.

2.1.6 The land within the Grid Connection Corridor is predominantly agricultural, mostly set to arable. At the closest points the boundary of the Grid Connection Corridor is approximately 170 m south of Wressle, approximately 1.1 km north of Hemingbrough, 80 m south of Barmby on the Marsh (across the River Derwent) and approximately 290 m west of Long Drax.

2.1.7 The Site Accesses are areas of land predominantly along or adjacent to the highway which are required to facilitate access to the Solar PV Site, Interconnecting Cable Corridor or Grid Connection Corridor such as new access routes or measures to provide better visibility splays. Where Site Accesses are identified outside of the public highway, these generally follow

[1] Prior to 1 April 2023 parts of the Grid Connection Corridor in North Yorkshire Council were located in the administrative areas of Selby District Council and North Yorkshire County Council.

the line of existing farm accesses. A full description of the Site is contained within **Chapter 2: The Scheme, ES Volume 1 [EN010143/APP/6.1]**.

3. Legislation, Planning Policy and Guidance

3.1 Introduction

3.1.1 Legislation, planning policy, and guidance relating to flood risk and pertinent to the Scheme is set out below.

3.2 National Policy Statements

3.2.1 The Scheme's proposed energy generating technology is not currently specifically referenced by an NPS. However, the EIA and supporting assessments take account of the following NPSs, which are considered to be matters that will be important and relevant to the Secretary of State's decision as to whether to grant a DCO for the Scheme:

a. Overarching National Policy Statement for Energy EN-1 (NPS EN-1) (Ref. 9-1);

b. National Policy Statement for Renewable Energy EN-3 (NPS EN-3) (Ref. 9-2); and

c. National Policy Statement for Electricity Networks Infrastructure EN-5 (NPS EN-5) (Ref. 9-3).

3.2.2 The NPSs for energy were designated in July 2011 and set out matters, principles and impacts that should form the basis of the Secretary of State's decision on DCO applications for Energy NSIPs.

3.2.3 The Government is currently reviewing and updating the Energy NPSs to ensure that the Planning Policy Framework enables the delivery of the infrastructure required for the country's transition to net zero carbon emissions. As part of the Energy NPS review process, the Government published a suite of Draft Energy NPSs for consultation on 30 March 2023. These include the following Draft NPSs:

a. Draft Overarching National Policy Statement for Energy (EN-1) (Draft NPS EN-1) (Ref. 9-4)

b. Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (Draft NPS EN-3) (Ref. 9-5); and

c. Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) (Ref. 9-6).

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

3.3.1 NPS EN-1 (Ref. 9-1) sets out the Government's policy for the development of NSIPs which must be authorised by a DCO.

3.3.2 The objectives of this FRA are in line with paragraph 5.7.5 of NPS EN-1, which are outlined in paragraph 1.3.1 above, and the additional draft NPS EN-1 requirements, discussed in paragraph 1.3.2.

3.3.3 Paragraph 5.7.7 of NPS EN-1 recommends that applicants should arrange pre-application discussions with the Environment Agency, and, where relevant, other bodies such as Internal Drainage Boards (IDBs) 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. Draft NPS EN-1 paragraph 5.8.18 also recommends this and includes contacting bodies such as LLFAs, highways authorities and reservoir owners and operators.

3.3.4 NPS EN-1 states at paragraph 5.7.12 that the Infrastructure Planning Commission (IPC) [now the appointed Examining Authority with the Secretary of State being the decision-maker] should not consent development in:

a. Flood Zone 2, unless it is satisfied that the Sequential Test requirements have been met; or

b. Flood Zone 3, unless it is satisfied that the Sequential and Exception Test requirements have been met.

3.3.5 Whilst these tests are still included in revised draft NPS EN-1, it does not include the same direction to refuse to consent development if these tests are not met.

3.3.6 For the Sequential and Exception Tests, NPS EN-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:

i. It must be demonstrated that the project provides wider sustainability benefits to the community that outweigh flood risk;

ii. 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

iii. 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 Environment Agency and other relevant bodies."

3.3.7 The Sequential and Exception Tests are also explained in draft NPS EN-1 with footnotes referencing the National Planning Practice Guidance Flood risk and coastal change online guidance. Paragraph 5.8.9 states "*If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied, as required by Table 2 of the Planning Practice Guidance. The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available."*

3.3.8 Paragraph 5.8.10 of draft NPS EN-1 explains the Exception Test *"is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site. It would only be appropriate to move onto the Exception Test when the Sequential Test has identified reasonably available, lower risk sites appropriate for the proposed development where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. Examples could include alternative site(s) that are 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) which would not usually be considered appropriate".*

3.3.9 Paragraph 5.8.11 adds that *"Both elements of the Exception Test will have to be satisfied for development to be consented. To pass the Exception Test it should be demonstrated that:*

a. *The project would provide wider sustainability benefits to the community that outweigh the flood risk; and*

b. *the project 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"*

3.3.10 Paragraph 5.7.23 of NPS EN-1 and paragraph 5.8.26 of draft NPS EN-1 also require 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 SuDS.

3.3.11 Paragraphs 5.7.24 and 5.7.25 (respectively) of NPS EN-1 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". Draft NPS EN-1 further adds that essential energy infrastructure "should only be consented if the development will not result in a net loss of floodplain storage and will not impede water flows."

3.3.12 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*".

3.3.13 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".

3.4 National Policy Statement for Renewable Energy Draft EN-3

3.4.1 Paragraph 3.4.10 of draft NPS EN-3 notes that:

"Solar photovoltaic (PV) sites may also be proposed in low lying exposed sites. For these proposals, applicants should consider, in particular, how plant will be resilient to:

a. increased risk of flooding; and

b. impact of higher temperature".

3.4.2 Paragraph 3.10.51 states *"applicants will consider several factors when considering the design and layout of sites, including, proximity to available grid capacity to accommodate the scale of generation, orientation, topography, previous land – use and ability to mitigate environmental impacts and flood risk".*

3.4.3 Paragraph 3.10.75 notes that *"Where a Flood Risk Assessment has been carried out this must be submitted alongside the applicant's ES. 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."* This FRA is compliant with paragraph 3.10.75 of draft NPS EN-3, as a Framework Surface Water Drainage Strategy **(Appendix 9-4, ES Volume 2 [EN010143/APP/6.2])** has been prepared which considers drainage for the Scheme.

3.4.4 Paragraph 3.10.145 states "*Water management is a critical component of site design for ground mount solar plants. Where previous management of the site has involved intensive agricultural practice, solar sites can deliver significant ecosystem services value in the form of drainage, flood attenuation, natural wetland habitat, and water quality management."*

3.5 National Policy Statement for Electricity Networks Infrastructure EN-5 (2021) and Draft National Policy Statement for Electricity Networks EN-5 (2023)

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

3.5.2 Paragraph 2.4.1 of NPS EN-5 and paragraph 2.3.2 of the draft NPS EN-5 explain 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:

a. Flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change;

b. The effects of wind and storms on overhead lines;

c. Higher average temperatures leading to increased transmission losses;

d. Earth movement or subsidence caused by flooding or drought (for underground cables); and

e. Coastal erosion – for the landfall of offshore transmission cables and their associated substations in the inshore and coastal locations respectively.

3.6 National Planning Policy Framework (NPPF)

3.6.1 The NPPF was first published in March 2012, superseding previous national planning policy statements and guidance. The NPPF has undergone a series of revisions since its original publication with the latest revision in September 2023 (Ref. 9-7), which this FRA complies with. Flood Risk and Coastal Change Planning Practice Guidance (PPG) was also published in 2014 to support the implementation of the NPPF. The Flood Risk and Coastal Change PPG was last updated in August 2022; this FRA complies with this and all other current national and local policy.

3.6.2 Section 14 of the NPPF, 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.*"

3.6.3 The assessment of flood risk is based on the definitions in **Table 1** as extracted from the PPG (Ref. 9-8).

Table 1. Flood Zones – Reproduced from Table 1 of the PPG 2022

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual exceedance probability (AEP) of river or sea flooding. (Shown as 'clear' on **ES Volume 3, [EN010143/APP/6.3] Figure 9-4** – all land outside Zones 2 and 3).
Zone 2 Medium Probability	Land having between a 1% and 0.1% AEP of river flooding; or land having between a 0.5% and 0.1% AEP of sea flooding. (Land shown in light blue on **ES Volume 3, [EN010143/APP/6.3] Figure 9-4**).
Zone 3a High Probability	Land having a 1% or greater AEP of river flooding; or Land having a 0.5% or greater of sea flooding. (Land shown in dark blue on **ES Volume 3, [EN010143/APP/6.3] Figure 9-4**).
Zone 3b The Functional Floodplain	Land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater AEP of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% AEP of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on **ES Volume 3, [EN010143/APP/6.3] Figure 9-4**).

3.6.4 Annex 3: Flood risk vulnerability classification of the NPPF, classifies the Flood Risk Vulnerability of various land uses. The Scheme falls within the definition of 'Essential Infrastructure'.

3.7 The Sequential Test and Exception Test

3.7.1 NPS EN-1, draft NPS EN-1, the NPPF and the PPG set out the details of the Sequential Test, which is a risk-based test that should be applied at all stages of development.

3.7.2 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 as set out below;

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)

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.

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 Flood Risk Assessment (SFRA) 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.

b 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 of the NPPF."

3.7.3 **Table 2** below reproduces the flood risk vulnerability and flood zone compatibility, as set out in Table 2 of the PPG. It does not show the application of the Sequential Test, which should be applied first to guide development to the lowest flood risk areas.

Table 2. Flood Risk Vulnerability and Flood Zone Compatibility – Reproduced from 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

3.7.4 The NPPF states in paragraph 164 that, for the Exception Test to be passed, 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".*

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

3.7.6 NPS EN-1 was published in July 2011, prior to the first release of the NPPF in 2012. With regard to the Exception Test, the NPPF, which was most recently updated in 2023, only requires two of the three requirements referred to in NPS EN-1 to be satisfied. The requirement under NPS EN-1 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. Whilst NPS EN-1 relates specifically to nationally significant energy infrastructure projects, planning policy relating to development and flood risk listed in the NPPF provides more up to date government policy.

3.7.7 The revised draft NPS EN-1, published for consultation in 2023, adopts the same approach to the Exception Test as that set out in the NPPF and requires only the following two criteria to be satisfied:

a. *"the project provides wider sustainability benefits to the community that outweigh flood risk; and*

b. *the project 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".*

3.7.8 Part a. includes footnote 214 which expects community benefits to include those set out in Part 3 of the draft NPS EN-1, which is focussed on need for new NSIPs.

3.7.9 Details on how the Sequential and Exception Tests have been met in relation to the Scheme are set out in section 9 of this report.

3.8 Local Planning Policy

3.8.1 The Scheme lies within the administrative areas of East Riding of Yorkshire Council and North Yorkshire Council. North Yorkshire Council was formed on 1 April 2023 by the merger of the administrative areas of North Yorkshire County Council and its six constituent District Councils. Therefore prior to the merger and the formation of the Unitary Authority the Scheme was located in the administrative areas of Selby District Council, North Yorkshire County Council and East Riding of Yorkshire Council. It is expected that over time a new Local Plan for North Yorkshire Council will be prepared, however, this is not in place (either adopted or at draft review stage) at the time of the DCO Application so the planning policy for Selby District Council and North Yorkshire County Council, as described below, along with that for the East Riding of Yorkshire, are the relevant local planning policies for the Scheme.

East Riding Local Plan Strategy 2019-2029

3.8.2 Within the East Riding Local Plan Strategy Document (Ref. 9-9), Policy ENV6 relates to Managing Environmental Hazards, with Part B to D relating specifically to flood risk.

3.8.3 Flood risk requirements include: application of the Sequential Test, appropriate measures to manage flood risk from new developments including limiting surface water runoff to greenfield runoff rates, incorporating SuDS into drainage design, and adherence to relevant East Riding of Yorkshire SFRA recommendations.

3.8.4 With the flood risk sections the policy includes the following statements which are relevant to the water environment:

a. Section D, point I (iv*) "do not culvert or otherwise build over watercourses unless supported by the Risk Management Authority";*

b. Section D, point I (vii) developments need to be *"adequately set back from all watercourses including culverted stretches";*

c. Section D, point 3 *"supporting the removal of existing culverting and returning these sections to open watercourse".*

3.8.5 Paragraph 8.92 states that surface water runoff from greenfield sites should be restricted to the existing rate checked against agricultural runoff rate. Restricted runoff should be applied using flow control devices coupled with on-site attenuation and other SuDS measures.

3.8.6 Paragraph 8.95 states that culverting will not generally be permitted as part of new development because of the adverse ecological, flood risk, safety and aesthetic impacts. It will only be permitted where there is no reasonably practicable alternative, or if the detrimental effects would be so minor that a more costly alternative is not justified.

3.8.7 Paragraph 8.96 states that if a development site contains existing culverted watercourse, applicants will be required to investigate whether it is feasible or practicable to open up the culvert and restore the watercourse to a more natural state. Where this is not possible, it will be necessary to incorporate mitigation measures that compensate for any loss of capacity and ensure that access is maintained to any watercourse or culvert to enable maintenance works to be carried out.

3.8.8 Policy A4 relates to the Goole and Humberhead Levels sub area. With regard to flood risk the following are of relevance:

a. "Proactively manage the risk of flooding posed from the Humber Estuary and the Rivers Aire, Derwent, Don (Dutch River), Ouse, and Trent, as well as the risk of surface water flooding, having regard where appropriate to the relevant Strategic Flood Risk Assessment and flood risk management plans and strategies;

b. *Manage improvements to the River Aire, River Ouse, Aire and Calder Navigation and Dutch River where it would create economic, environmental and recreational opportunities, and does not adversely affect conservation initiatives or the quality of the natural environment*".

East Riding Local Plan Update 2020–2039 (Draft)

3.8.9 Aside from minor changes in wording, Policies ENV6 Managing Environmental Hazards and A4 Goole and Humberhead Levels sub area as described above remain essentially unchanged in the Draft East Riding Local Plan Update 2020–2039 (Ref. 9-10).

Selby Core Strategy Local Plan

3.8.10 Within the Selby Core Strategy Local Plan (Ref. 9-11), Policy SP15 relates to Sustainable Development and Climate Change.

3.8.11 SP15 indicates that with regard to promoting sustainable development, the Council will direct development to sustainable locations; aim to achieve the most efficient use of land while not compromising the quality of local environment; ensure that development in areas of flood risk is avoided wherever possible through the application of the sequential test and exception test; and ensure that where development must be located within areas of flood risk that it can be made safe without increasing flood risk elsewhere. Finally, they support sustainable flood management measures such as water storage areas and schemes promoted through local surface water management plans to provide protection from flooding; and biodiversity and amenity improvements.

3.8.12 With regard to design and layout of development, schemes should contribute to reducing carbon emissions and be resilient to effects of climate change. Where appropriate they should:

a. Incorporate water-efficient design and sustainable drainage systems which promote groundwater recharge;

b. Protect, enhance and create habitats to both improve biodiversity resilience to climate change and utilise biodiversity to contribute to climate change mitigation and adaptation;

c. Incorporate decentralised, renewable and low-carbon forms of energy generation.

Selby District Council Local Plan Publication Version (draft) (2021)

3.8.13 Until the newly formed Unitary Authority publishes a Local Development Plan covering the new combined district council areas, the Selby District Local Plan remains as the relevant planning document for the Selby District area.

3.8.14 Policy SG11 of the Selby District Council Local Plan (Ref. 9-12) relates to flood risk. Part A states that development will only be supported where it is demonstrated that the site falls within the lowest flood risk areas (based on Environment Agency mapping and Selby District's SFRA maps), the site has passed through a Sequential Test (as per the NPPF), where there are no sequentially preferable sites the development will be assessed through application of the Exception Test (as per the NPPF), the proposal does not increase off-site flooding, and where essential infrastructure is located on functional floodplain (Flood Zone 3b) it is designed and constructed to the outlined requirements.

3.8.15 Part B outlines requirements to be applied (where feasible) for sites that have passed the Sequential and Exception Tests. The criteria include:

a. Where the development is located in areas of flood risk such as Flood Zone 2 (or higher) and does not constitute minor development or a change of use, the development layout within the site will be subject to the sequential approach, with the highest vulnerability development located in areas at lowest flood risk within the site;

b. Relevant flood resilience construction methods are to be identified through an up to date site-specific FRA and implemented to reduce the impact and likelihood of a flood event;

c. Where the development has existing trees, woodland and/or hedgerows these should be retained where the risk of flooding from surface water has been identified and it is possible, and if not retained the developer must agree a tree planting scheme to help reduce identified flood risk from surface water;

d. The features that manage surface water are commensurate with the design of the development in terms of size, form and materials and make a positive contribution to reducing flood risk;

e. SuDS are to be implemented for site drainage with relevant advice sought from LLFAs and IDBs;

f. Hard surfaces on developments should be permeable where practicable in line with highways guidance from the Local Highways Authority unless proven not to be possible by site investigation;

g. Watercourses are not culverted and any opportunity to remove culverts is taken. It is also encouraged that developments are suitably located away from watercourses (including culverts).

3.8.16 Policy NE5 relates to protecting and enhancing rivers and waterbodies. Part A of the policy ensures that all development likely to impact the water environment will have regard to the Water Framework Directive (WFD) objectives set out in the Humber River Basin Management Plan. They must ensure no deterioration in water quality of surface or groundwater. They will ensure the ability of any WFD waterbody to achieve their status objective is not compromised and that improvement to the water environment is secured where possible.

3.8.17 Part B of the policy requires that developments in proximity to waterbodies will protect and enhance existing and potential functions and characteristics of the waterbodies through measures including:

a. “Consider opportunities to mitigate for climate change or flooding;

b. Take into account the latest priorities and strategies for waterbodies, assets and all users, including the Humber River Basin Management Plan and Blue and Green Infrastructure Strategies”.

3.9 Guidance

Strategic Flood Risk Assessments

3.9.1 The East Riding of Yorkshire Level 1 SFRA (Ref. 9-13) was published in 2019 and is part of the evidence base for the Local Plan. The SFRA collates

information on all known sources of flooding that may affect existing or future development within the East Riding area. Such sources include tidal, river, surface water (local drainage), sewers and groundwater. In collecting this information, the SFRA identifies and maps areas that have a 'low', 'medium' and 'high' probability of flooding within East Riding, in accordance with national policy. Within the flood affected areas, the SFRA recommends appropriate land uses that will not unduly place people or property at risk of flooding. Where flood risk has been identified as a potential constraint to future development, the SFRA recommends possible flood mitigation solutions that may be integrated into the design (by the developer) to minimise the risk to property and life should a flood occur.

3.9.2 The Level 1 Selby District SFRA (Ref. 9-14), published in 2015, provides a comprehensive and robust evidence base to support the Selby District Council Local Plan. It collates and analyses the latest available information and data for current and future (i.e. climate change) flood risk from all sources, and how these may be mitigated, with the aim of providing evidence to support the application of the Sequential Test for the allocation of new development sites, to support the Council's preparation of the Local Plan.

East Riding Flood Risk Sequential and Exception Test Supplementary Planning Document

3.9.3 East Riding of Yorkshire Council has prepared a Supplementary Planning Document (SPD) (Ref. 9-15) to set out the process that will be followed when considering flood risk. The SPD, adopted in November 2021, provides a step-by-step guide for applicants, planning officers and developers on how to apply local and national planning policy using, amongst other evidence, the council's SFRA.

3.9.4 For sites partially located within Flood Zone 2 or 3 the SPD states*: "When development is proposed on a site where only a small part of the site lies within Flood Zone 2 or 3 (and no other sources of flooding), the Sequential Test will not be required provided:*

a. The area of Flood Zone 2 and/or 3 will be used only for soft landscaping/open space; AND

b. Safe access and egress during flooding can be achieved without having to use the area of Flood Zone 2 and/or 3."

East Riding of Yorkshire Combined Planning Note and Standing Advice and SuDS Guidance

3.9.5 East Riding of Yorkshire Council published a Combined Planning Note and Standing Advice in 2016 on SuDS and Surface Water Drainage Requirements for New Development: Design and Maintenance (Ref. 9-16).

3.9.6 The guidance includes minimum design requirements, minimum information requirements that should be provided with a planning application, the requirements for an FRA, consideration of climate change, use of SuDS, and ongoing maintenance requirements of drainage systems and SuDS.

Preliminary Flood Risk Assessment

3.9.7 East Riding of Yorkshire Council provided a Preliminary Flood Risk Assessment (PFRA) in 2011 (Ref. 9-17) which identifies past significant flood events and maps potential future flood events located in the East Riding area to provide evidence for the Local Flood Management Strategy.

3.9.8 The PFRA mapped the county to show areas with risk of coastal and fluvial, surface water, and groundwater flooding alongside previous flood events.

3.10 Climate Change

3.10.1 As the Scheme has a development lifetime of 40 years, the impact of climate change needs to be considered. The Scheme has been assessed with a 75-year lifetime as a conservative approach in line with the NPPF (Ref. 9-7), which states that non-residential development should be assessed for a development lifetime of 75 years.

3.10.2 The Site is located within the Humber River Basin District and the River Ouse is tidally influenced along its reach within the Site. Sea level allowances have been calculated for the lifetime of the development in line with the Environment Agency Flood Risk Assessments Climate Change Allowances guidance (Ref. 9-18).

3.10.3 Climate change allowances relate to predicted percentage increase in peak river flows and peak rainfall that the Scheme design must consider.

3.10.4 Peak river flow allowances are based on WFD catchment areas. The Environment Agency Website ‘Climate change allowances for peak river flow in England’ has been consulted to confirm the revised climate change allowances for the catchment areas that cover the Site (Ref. 9-18).

3.10.5 The Scheme is covered by three management catchments, each with their own climate change allowances for river flows:

a. The Grid Connection Corridor to the south of the Site from Drax to the crossing of the Derwent is within the Wharfe and Lower Ouse Management Catchment which has a ‘Higher Central’ allowance of 31% (2080s) (for Essential Infrastructure);

b. The majority of the Solar PV Site and Interconnecting Cable Corridor is within the Derwent Humber Management Catchment which has a ‘Higher Central’ allowance of 33% (2080s) (for Essential Infrastructure); and

c. A small area to the east/south-east of the Solar PV Site and Interconnecting Cable Corridor is within the Hull and East Riding Management Catchment which has a ‘Higher Central’ allowance of 33% (2080s).

3.10.6 For peak rainfall intensity, the Scheme is covered by the same three management catchments as for river flows. Based on the development lifetime of the Scheme being between 2027 and 2067, the central allowance for the 2070s epoch should be applied. This allowance for all management catchments is:

a. 3.3% AEP – Hull and East Riding 35%, other catchments 40%; and

b. 1% AEP – 40%.

3.10.7 These peak rainfall allowances have been considered within the Framework Surface Water Drainage Strategy for the lifetime of the Scheme.

3.10.8 In line with the Environment Agency's climate change guidance (Ref. 9-18) for NSIPs, such as power stations and power lines, flood risk should also be assessed for a credible maximum climate change (extreme climate change) scenario. The Credible Maximum Scenario includes:

a. The H++ climate change allowances for sea level rise (+ 1.9 m);

b. The upper end allowance for peak river flow for the relevant management catchment;

   i. Hull and East Riding – 66%;

   ii. Derwent Humber – 54%;

   iii. Wharfe and Lower Ouse – 48%; and

c. An additional 2 mm for each year on top of sea level rise allowances from 2017 for storm surge.

3.10.9 The Credible Maximum Scenario sensitivity assessment has been undertaken as part of the FRA.

3.10.10 To adopt a conservative approach and account for any hydraulic modelling uncertainty, the Upper End allowance of +54% has been considered for fluvial flows within the design event. As the River Derwent is the main source of fluvial flood risk to the Solar PV Site, this has been adopted as the most appropriate approach.

4. Assessment of Flood Risk Methodology

4.1.1 As stated in section 1.4.4, the methodology for the hydraulic modelling was agreed with the Environment Agency.

4.1.2 As the Ecology Mitigation Area is classified as ‘water-compatible’ according to the NPPF it is considered compatible in any Flood Zone, it is not considered further as part of the assessment. Although the Site Accesses are a specific element of the Scheme, for the purposes of the assessment they are considered as part of the Solar PV Site, Interconnecting Cable Corridor or Grid Connection Corridor with which they are associated.

4.2 Flood Risk from all sources

4.2.1 This section sets out the sources and methodology to assess flood risk to the Solar PV Site and Interconnecting Cable Corridor, and to the Grid Connection Corridor. These sources are:

a. Fluvial – flooding occurs when the capacity of a river is exceeded either due to high flows from the catchment draining into the river or a combination of high flows and high tides which causes the river to overflow or overtop the banks;

b. Tidal – flooding occurs during extreme high tide and/or storm surge events which may cause wave overtopping or the unlikely event of a breaching scenario of existing tidal defences. High water levels within tidally influenced estuaries and rivers may also contribute to tidal flooding;

c. Pluvial (Surface water) – surface water runoff is defined as water flowing over the ground that has not yet entered a drainage channel or similar. An intense period of rainfall which exceeds the infiltration capacity of the ground usually results in surface water runoff and can also occur when the capacity of the sewer or drainage network is exceeded. Typically, runoff occurs on sloping land or where the ground surface is relatively impermeable. The ground can be impermeable, either naturally through the soil type or geology, or unnaturally due to development, which places large areas of impervious material over the ground surface (e.g. paving and roads);

d. Drainage Infrastructure – sewer and surface water flooding are often interconnected especially in combined sewer systems; insufficient drainage capacity in the sewer network can result in surface water flooding and, by the same rationale, large volumes of surface water can overload the public sewers, causing the sewer network to back up, surcharge and ultimately cause flooding above ground level;

e. Groundwater – flooding occurs when the natural level of water stored within the ground rises above local ground level. This can result in deep and long-lasting flooding of low lying or below ground areas such as underpasses and basements. It tends to occur after long periods of sustained high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at shallow depth. Groundwater flooding is most likely to occur in areas underlain by major aquifers, although it is also associated with more localised floodplain sands and gravels; and

f. Artificial waterbodies – flood sources include raised channels such as canals or storage features such as ponds and reservoirs:

i. Reservoir failure can be particularly dangerous as it causes the release of a large volume of water at a high velocity, which can result in deep and widespread flooding. However, reservoir inspection and design procedures are very rigorous such that the probability of failure is generally regarded as extremely low;

ii. Canals do not pose a direct flood risk given they are regulated water bodies with controlled water levels; however, flooding can still occur through a breach or overtopping. Control structures such as weirs or locks could experience a blockage or failure resulting in rising water levels and overtopping. Structural failure could lead to a breach which can potentially be hazardous as they may involve the rapid release of a large volume of water at high velocity.

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

a. **Very Low**: where very little risk is identified or any theoretical risk identified is classified as very low within Local Authority SFRAs and/or Environment Agency flood risk mapping extents, with very low probability of flooding occurring;

b. **Low**: where little risk is identified or any theoretical risk identified is classified as low within Local Authority SFRAs and/or Environment Agency flood risk mapping extents, with low probability of flooding occurring;

c. **Medium**: where risk is identified within Local Authority SFRA and/or Environment Agency flood risk mapping extents indicating a medium probability, but manageable flood risk with little to no mitigation required; and

d. **High**: where modelled levels within Local Authority SFRA and/or Environment Agency 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.

4.2.3 Through the sequential process, the Grid Connection Substations are located in Flood Zone 1, Field Stations are located outside of Flood Zone 3 and Solar PV panels have been located outside of Flood Zone 3 as far as practicable. Mitigation has been provided for infrastructure shown to be at flood risk, which includes Solar PV Areas 2a and 1e which are located within close proximity to the River Derwent and River Foulness respectively as seen on **ES Volume 3, [EN010143/APP/6.3] Figure 9-4**.

5. Flood Risk Assessment

5.1 Overview

5.1.1 The NPPF and draft NPS EN-1 require that all potential sources of flooding that could affect the Scheme are considered. This section of the FRA assesses the flood risk posed to the Site from: rivers and the sea, directly from rainfall on the ground surface, rising groundwater, overwhelmed sewers and drainage systems, from reservoirs, canals, lakes and other artificial flood sources.

5.1.2 Whilst developments are typically assessed as a whole site, this assessment is split into two separate elements due to the differing nature of these elements:

a. Solar PV Site and Interconnecting Cable Corridor (including any associated Site Accesses); and

b. Grid Connection Corridor (including any associated Site Accesses).

5.2 Flood Risk to the Solar PV Site and Interconnecting Cable Corridor

Fluvial

5.2.1 Flood risk to the Solar PV Site and Interconnecting Cable Corridor (including any associated Site Accesses) is predominantly from fluvial sources. The majority of the Solar PV Site and Interconnecting Cable Corridor are located within Flood Zone 1; however, Solar PV Areas 2a and 1e are partially located in areas of Flood Zone 2 and 3 as seen on **Figure 9-4, ES Volume 3, [EN010143/APP/6.3]**. Definitions of the Environment Agency Flood Zones are presented in **Table 1**.

Solar PV Area 2a

5.2.2 According to the Environment Agency Flood Map for Planning (Ref. 9-19), Solar PV Area 2a is located within Flood Zone 2 with a small area in the south located in Flood Zone 3, as seen in **Plate 1.**

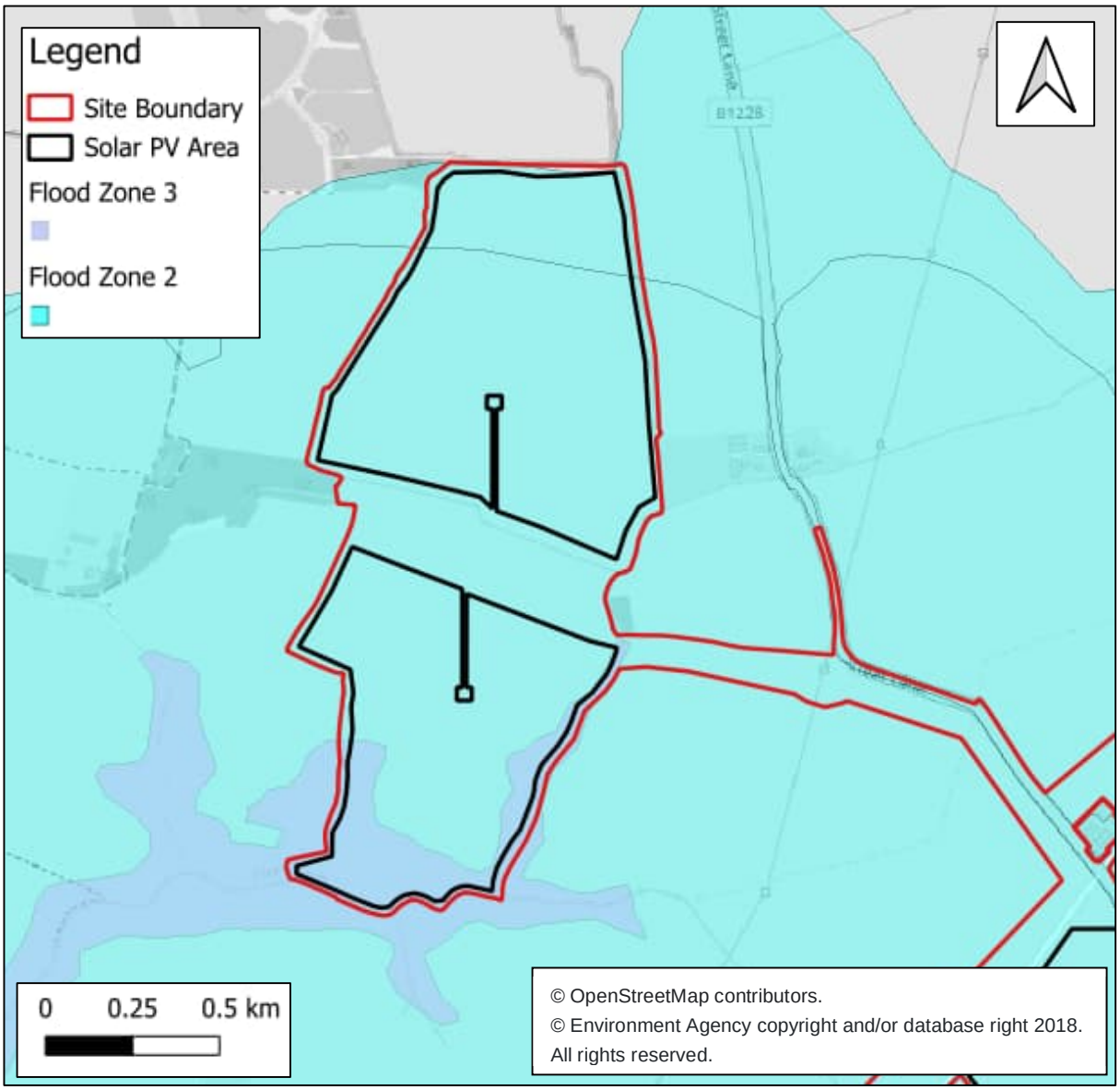


Plate 1. Environment Agency Flood Map for Planning - Solar PV Area 2a

5.2.3 To inform the FRA and provide the basis for the hydraulic modelling undertaken, the Environment Agency provided hydraulic models for the Main Rivers in the Study Area (Lower Derwent 2005 and Upper Humber 2016). The River Derwent model was not considered suitable for use due to the age of the model and a lack of compatibility with the most current version of hydraulic modelling software. The Upper Humber model was not considered suitable for use as the model extent did not cover the entirety of the Scheme.

5.2.4 As an alternative to the Environment Agency's Lower Derwent 2005 model, a hydraulic model of the River Derwent (2016) provided by East Riding of Yorkshire Council was instead used to inform the assessment, as agreed with the Environment Agency. The River Derwent (2016) hydraulic model was updated to the latest model software version as follows:

a. Extension of the 2D model boundary to include the Scheme and surrounding areas;

b. Update of the ground model using best available Light Detection and Ranging data (LiDAR);

c. Update of the 1D river junctions in line with latest industry standards;

d. Addition of known culverts underneath the Hull to Selby railway line separating Solar PV Areas 3b and 3c to enable flows to pass through the railway embankment; and

e. Refinement of the 2D mesh, where appropriate.

5.2.5 The scope of the hydraulic modelling was agreed with the Environment Agency (see section 1.3). The hydraulic model was simulated for the 3.3% AEP, 1% AEP, 1% AEP + climate change, and 1% AEP Credible Maximum Scenarios. The hydraulic model does not include representation of flood defences present along the River Derwent and therefore model simulations are undefended scenarios representing the worst case. Further details on the hydraulic modelling are available in **Annexes A** and **B** of this report.

5.2.6 **Plate 2** shows the maximum modelled flood depths across Solar PV Area 2a during the undefended 1% AEP plus climate change event, which shows a larger extent and depth of flooding when compared to the 1% AEP event. This indicates that flood depths are generally below 0.60 m across the parcel, with higher depths of up to 1.40 m in the south of the Solar PV Area close to Fleet Dyke (tributary of the River Derwent).

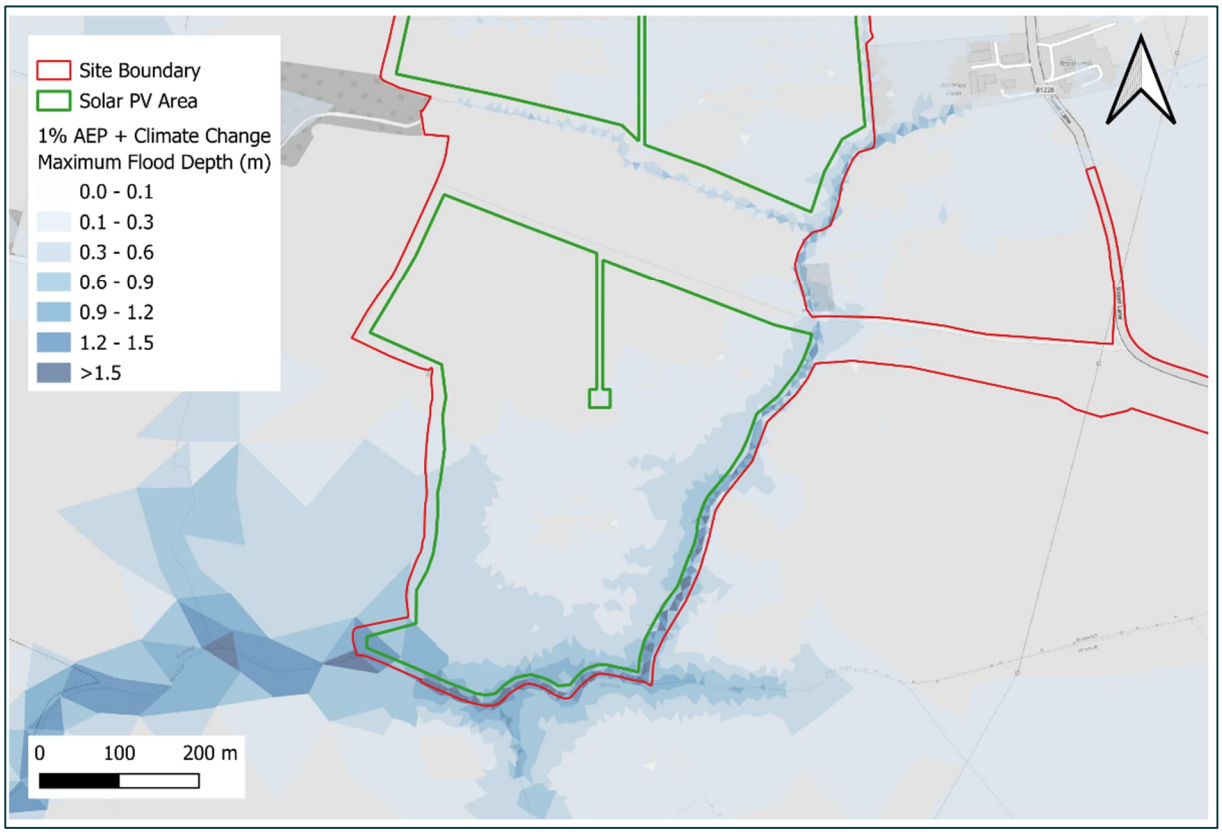


Plate 2. Maximum modelled flood depth Solar PV Area 2a - 1% AEP + climate change undefended

5.2.7 To determine the Flood Zone 3b extent, the hydraulic model has been simulated for the 3.3% AEP event. **Plate 3** shows the maximum modelled flood depths across the Solar PV Area during the undefended 3.3% AEP event. This indicates that solar PV panels will be located within Flood Zone 3b. Generally, flood depths are below 0.60 m across the parcel, with higher

depths of up to 1.10 m in the south of the Solar PV Area in close proximity to the Fleet Dyke. During the 3.3% AEP event, maximum flow velocities are generally less than 0.20 m/s across the parcel, reaching a maximum flow velocity of approximately 0.30 m/s along the eastern boundary of the parcel. Mitigation measures for the Solar PV Panels located within Flood Zones 2 and 3 have been incorporated into the design of the Solar PV Area (see section 7).

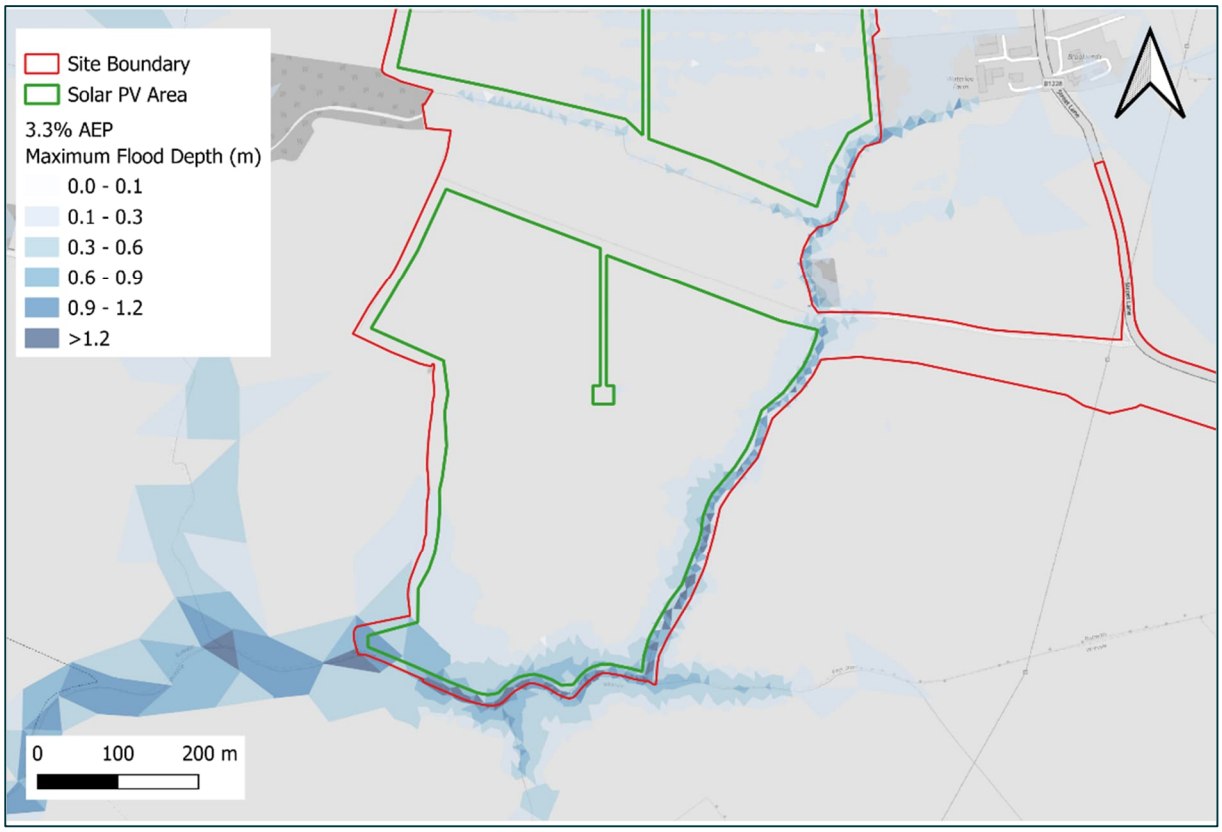


Plate 3. Maximum modelled flood depth Solar PV Area 2a - 3.3% AEP undefended

Solar PV Area 1e

5.2.8 According to the Environment Agency Flood Map for Planning (Ref. 9-19), Solar PV Area 1e is partially located within Flood Zone 2 and 3, as seen in **Plate 4** below.

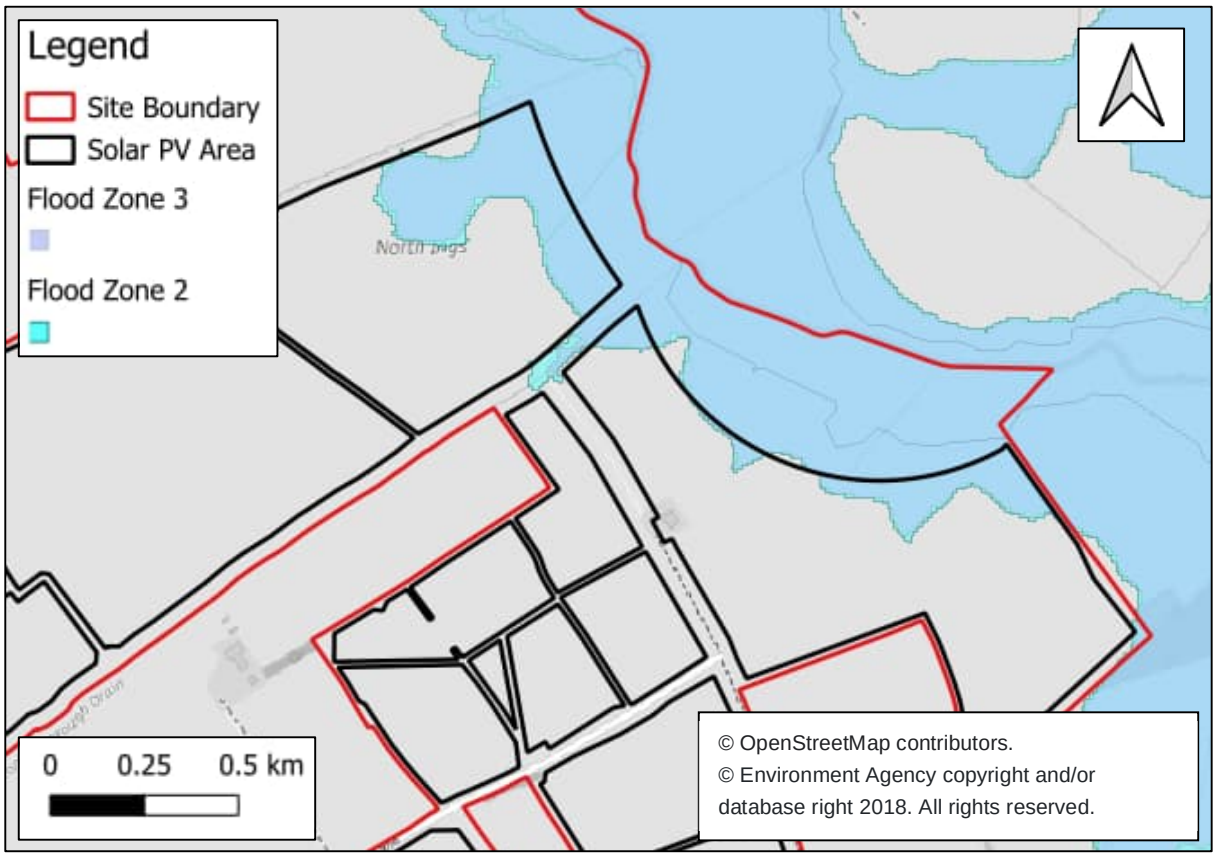


Plate 4. Environment Agency Flood Map for Solar PV Area 1e

5.2.9 A request was submitted to the Environment Agency for the hydraulic model of the River Foulness, however the available model (Market Weighton 2020) did not extend to cover the stretch of the river within the Site. It was therefore assumed that no model covering the Site was available. In the absence of existing hydraulic modelling, a flood level has been estimated based on LiDAR data and the Environment Agency Flood Zone extents shown in **Plate 4**. Given the absence of modelled data, the Flood Zone 2 extent has been used as a proxy for climate change.

5.2.10 LiDAR data shows that the approximate ground level at the edge of the Flood Zone 2 extent in Solar PV Area 1e is 4.20 m AOD which is therefore considered to be the approximate flood level associated with this Flood Zone at this location. LiDAR data shows that the lowest ground level in the Solar PV Site in Flood Zone 2 and 3 is approximately 3.00 m AOD which coincides with topographic low points associated with small drainage channels that outfall to the River Foulness. Mitigation measures for the solar PV panels located within Flood Zone 2 and 3 have been incorporated into the design of the Solar PV Site (see section 7).

5.2.11 As hydraulic modelling results were not available, it has not been possible to determine the Flood Zone 3b extent. The East Riding of Yorkshire SFRA (Ref. 9-13) produced in 2019 provides mapping of Flood Zone 3b using the 5% AEP event. This does not show Solar PV Area 1e to be located within Flood Zone 3b.

Historic Flooding

5.2.12 Historic flood mapping and recorded flood outlines (Ref. 9-20) for the Site and the surrounding area show that there have been a number of flood events where fluvial flooding occurred in the Solar PV Site and Interconnecting Cable Corridor. These events within the Solar PV Site and Interconnecting Cable Corridor were recorded in 1991, 2000, 2007 and 2020. The recorded flood outlines can be seen on **Figure 9-3-1** of this report.

Summary

5.2.13 Based on this information, the risk to the majority of the Solar PV Site and Interconnecting Cable Corridor from fluvial sources is considered to be low, as the majority of these elements are located within Flood Zone 1. However, the risk is considered to be high to Solar PV Areas 2a and 1e, during construction, operation, and decommissioning, due to parts of these Solar PV Areas being located within Flood Zones 2 and 3.

Tidal

5.2.14 The predominant risk to the Solar PV Site and Interconnecting Cable Corridor is from fluvial sources which generally pose a low risk to the majority of the Solar PV Site and Interconnecting Cable Corridor as described in Paragraph 5.2.13. However, the River Derwent and River Foulness are tidally influenced.

Solar PV Area 2a

5.2.15 As part of the hydraulic modelling, the Credible Maximum Scenario (H++) has been simulated which accounts for sea level rise. **Plate 5** shows the maximum modelled flood depths across Solar PV Area 2a during the undefended H++ event. This indicates that flood depths across the Solar PV Area are generally below 0.60 m but reach up to approximately 1.60 m in the south of the Solar PV Area in close proximity to the Fleet Dyke. Based on this information, it is considered that there is a high risk of flooding from tidal sources to Solar PV Area 2a during construction, operation, and decommissioning.

5.2.16 Mitigation measures described in section 7 ensure that the Scheme can adapt to large-scale climate change over its lifetime.

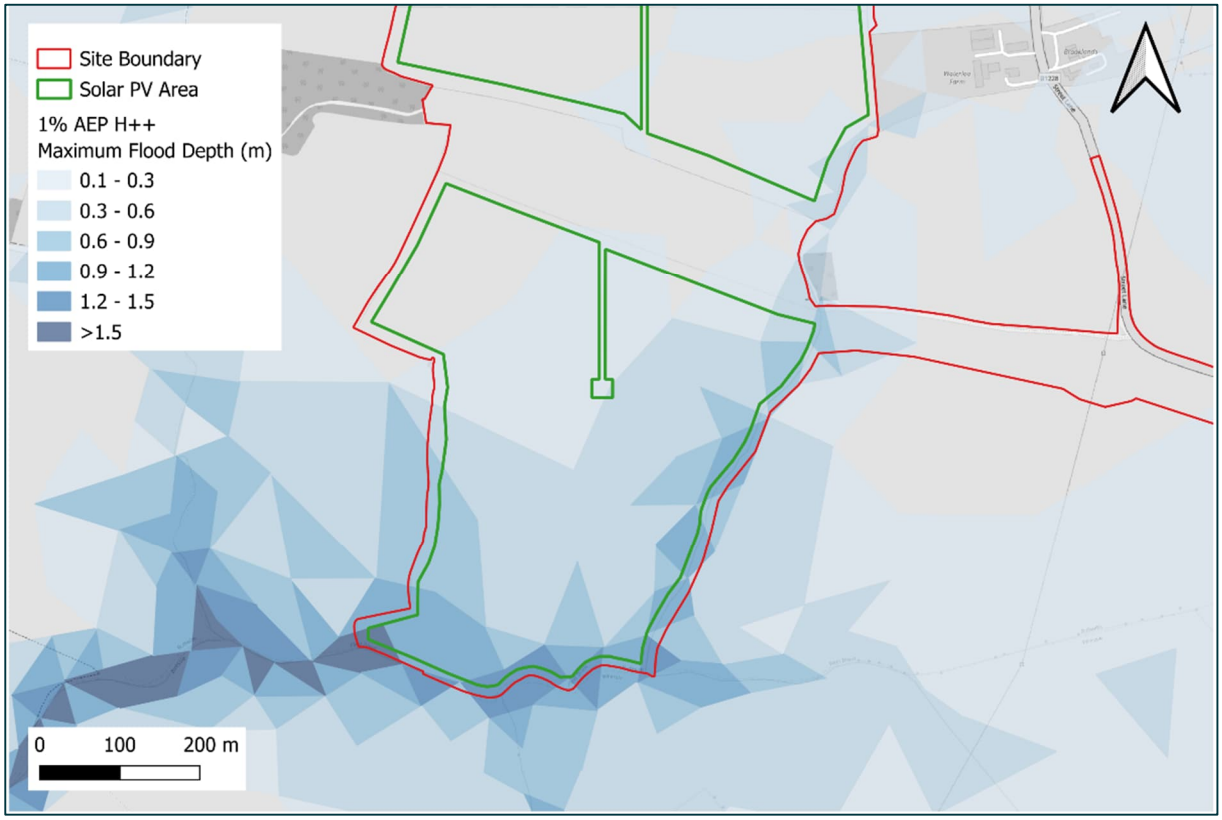


Plate 5. Maximum modelled flood depth Solar PV Area 2a - 1% AEP H++ undefended

Solar PV Area 1e

5.2.17 The River Foulness discharges to the Market Weighton Canal which discharges to the River Humber estuary and is tidally influenced. The River Foulness discharges to the Market Weighton Canal approximately 7.5 km to the south-east of Solar PV Area 1e. The Market Weighton Canal discharges to the River Humber estuary via Weighton Lock. Weighton Lock is managed and controlled by the Environment Agency, whilst the Ouse and Humber Drainage Board manage the Market Weighton Canal. Due to controls of the Market Weighton Canal and the distance from the Solar PV Area to the confluence of the River Foulness and Market Weighton Canal, it is considered that there is minimal tidal influence on the River Foulness and therefore a low risk to Solar PV Area 1e from tidal flooding during construction, operation, and decommissioning.

Tidal/Fluvial - Residual Risk

5.2.18 Due to the presence of flood defences along the northern and southern sections of the River Derwent, there is a residual risk of flooding to the Solar PV Site if there was overtopping or a breach of the flood defences. The Environment Agency Reduction in Risk of Flooding from Rivers and the Sea (Ref. 9-21) mapping shows that the part of Solar PV Areas 2a and 1e within Flood Zone 3 are shown as being in an area where there is a reduction in the risk of flooding, due to defences as seen on **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**.

5.2.19 The hydraulic modelling undertaken for the Scheme does not include representation of the River Derwent flood defences. As a consequence, specific breach modelling of the defences is not required as the hydraulic modelling undertaken to inform the assessment represents the undefended and worst case scenario of flood risk to the Scheme. Mitigation has been provided based on this scenario, as described in section 7.

Surface Water

5.2.20 As defined by the Environment Agency, the following levels of surface water flood risk can be classified as follows:

a. High Risk – the area has an annual chance of flooding of greater than 3.33% AEP (1 in 30 year).

b. Medium Risk – the area has an annual chance of flooding of between 1% AEP (1 in 100 year) and 3.33% AEP (1 in 30 year).

c. Low Risk – the area has an annual chance of flooding of between 1 in 1000 year (0.1% AEP) and 1 in 100 year (1% AEP).

d. Very Low Risk – the area has an annual chance of flooding of less than in 1000 year (0.1% AEP).

5.2.21 From a review of the Environment Agency's Risk of Flooding from Surface Water Map (Ref. 9-22), the majority of the Solar PV Site and Interconnecting Grid Corridor is considered to be at 'Very Low' risk of surface water flooding (illustrated on **Figure 9-5, ES Volume 3 [EN010143/APP/6.3]**). This means that each year this area has a chance of flooding of less than 0.1% AEP.

5.2.22 An allowance for rainfall (+40%) has been included as part of the hydraulic modelling for the Scheme to account for climate change. **Plate 6** shows the 1% AEP plus climate change event results. This shows that the majority of the Site does not experience surface water flooding and where flooding does occur, the majority of flood depths on the Site are less than 0.20 m. There are areas where depths are higher, reaching up to approximately 0.70 m, including in the north-west of the Solar PV Site and Interconnecting Cable Corridor where there are local depressions coinciding with the drainage ditches across the Solar PV Site and Interconnecting Cable Corridor. The higher depths present on the north-eastern boundary of the Site are due to fluvial risk from the River Foulness, described in Paragraph 5.2.8.

5.2.23 Based on this information, the risk from surface water flooding to the majority of the Solar PV Site and Interconnecting Cable Corridor is considered to be very low, with small areas considered to be at low to high risk during construction, operation, and decommissioning.

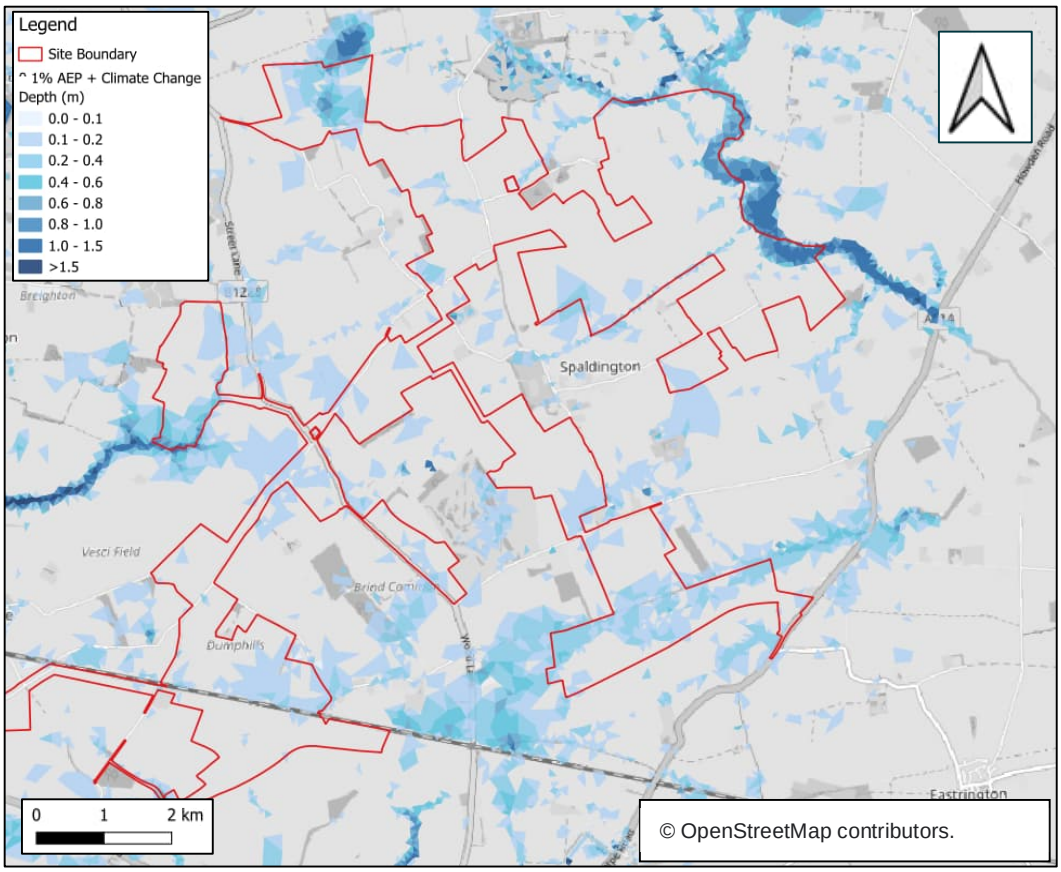


Plate 6. Surface Water Flood Risk during 1% AEP plus climate change event

Groundwater

5.2.24 The British Geological Survey (BGS) Groundwater Flood Map can be seen in **Figure 9-3-2** of this report and shows that the majority of the Solar PV Site and Interconnecting Cable Corridor is not within an area where there is potential for groundwater flooding to occur, with few isolated areas where there is potential for groundwater flooding to occur at the surface.

5.2.25 A review of the East Riding of Yorkshire SFRA (Ref. 9-13) indicates that susceptibility to groundwater flooding is predominantly less than 25%. There are areas to the south, near North Howden, and to the north and east, towards Spaldington and along the River Foulness, located in areas shown to be slightly more susceptible to groundwater flooding (25 to 50% and 50 to 70% susceptibility). It is considered that groundwater flood risk is unlikely to increase as a result of the Scheme, as the majority of the infrastructure (e.g. solar PV panels (mounted on frames), Field Station Units/Field Substations (on foundations/plinths) etc.) will be above the ground surface. Infiltration into the soil and underlying geology will remain the same as existing conditions.

5.2.26 As described in **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]** there is limited groundwater level data across the Site however according to BGS borehole records, there is evidence that groundwater within superficial deposits may be less than 3 m below the ground surface during times of elevated groundwater levels.

5.2.27 Based on this information, the risk from groundwater flooding to the Solar PV Site and Interconnecting Cable Corridor is considered to be low during construction, operation, and decommissioning.

Sewers

5.2.28 It is considered unlikely that flooding from sewers will impact the Solar PV Site and Interconnecting Cable Corridor as they are located within arable fields. A search undertaken to identify Yorkshire Water sewerage assets did not identify any public sewers within the Solar PV Site and Interconnecting Cable Corridor, therefore the risk from sewer flooding is considered to be very low during construction, operation and decommissioning.

Artificial Sources

5.2.29 Artificial flood sources include raised channels such as canals or storage features such as ponds and reservoirs.

Reservoirs

5.2.30 The Environment Agency Flood Risk from Reservoirs (Ref. 9-23) indicates that parts of the Solar PV Site and Interconnecting Cable Corridor are located within the extent associated with the risk of flooding from a reservoir breach. Areas of the Solar PV Site and Interconnecting Cable Corridor are covered by the combined risk of when there is also flooding from rivers including Solar PV Areas 1e, 2a, 2c, 2d, 2f, 2g, 3a. 3b and 3c (see **Plate 7** below).

5.2.31 Statutory reservoirs (large, raised reservoirs with volumes above ground of 25,000 m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. Whilst the consequence of failure can be significant, the likelihood of failure is typically low. Therefore, the risk of flooding from this source is considered low during construction, operation, and decommissioning.

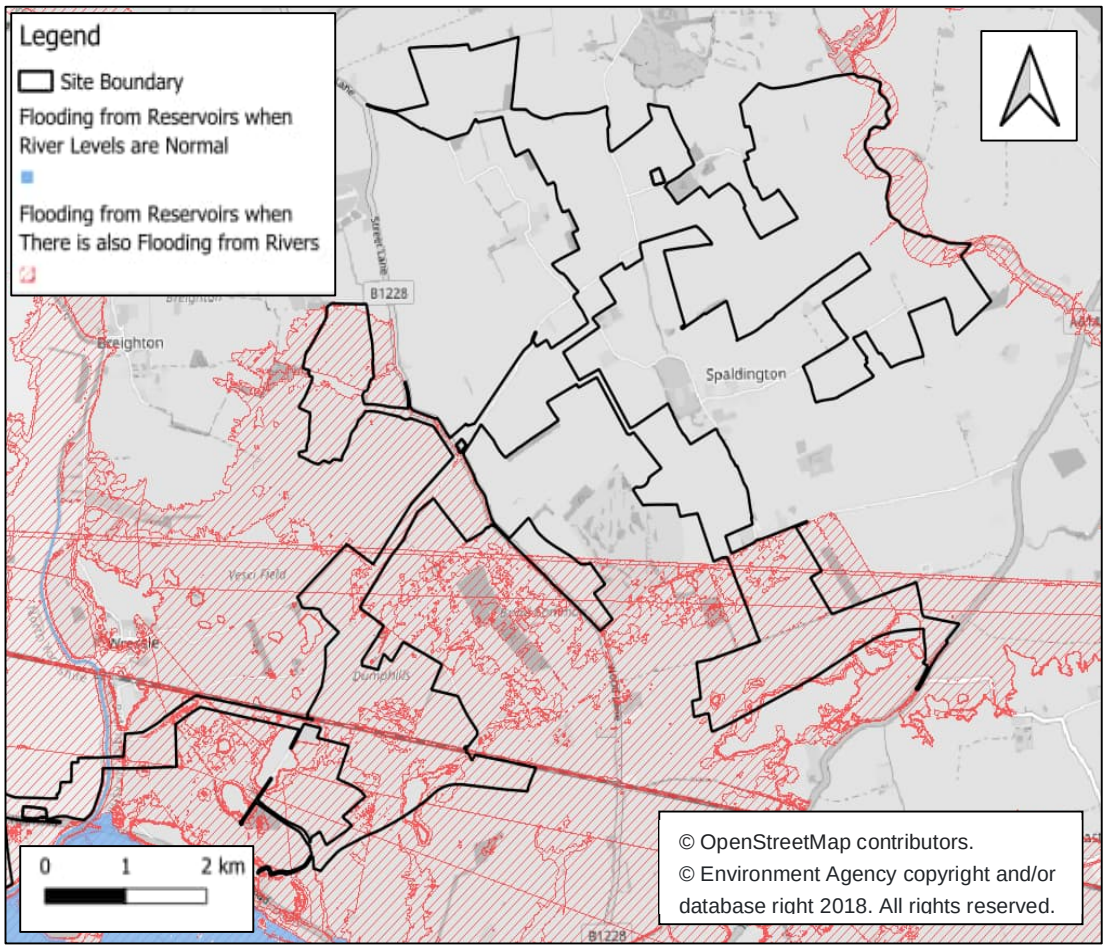


Plate 7. Environment Agency extent of Reservoir Flooding Mapping across the Solar PV Site and Interconnecting Cable Corridor

Canal Systems

5.2.32 The River Foulness drains to the Market Weighton Canal approximately 7.5 km to the south-east of Solar PV Area 1e. Due to the distance from the Solar PV Site and Interconnecting Cable Corridor, it is not considered that the canal poses a flood risk.

5.2.33 Based on the information above, the Solar PV Site and Interconnecting Cable Corridor are considered to be at low risk of flooding from artificial sources during construction, operation and decommissioning.

Flood Risk Assessment Summary to the Solar PV Site and Interconnecting Cable Corridor

5.2.34 A summary of flood risk from all sources to the Solar PV Site and Interconnecting Cable Corridor is provided in **Table 3.**

Table 3. Summary of flood risk to the Solar PV Site and Interconnecting Cable Corridor

Flood Mechanism	Source	Flood Risk to the Development	Mitigation required
Fluvial	Fluvial Main River/Ordinary Watercourse	Low (majority), high (north/north-east associated with River Foulness (Solar PV Area 1e), central site area to the west associated with Fleet Dyke and its local drainage tributaries (Solar PV Area 2a))	Yes
Tidal	The sea	Low (majority), high (Solar PV Area 2a associated with Fleet Dyke)	No (Mitigation for fluvial will also mitigate any tidal risk)
Surface Water Flooding	Runoff from surrounding land and hard surfaces	Very low (majority), low – high (localised shallow patches)	Yes
Groundwater	Rising groundwater levels in the underlying geology	Low	Yes
Sewers	Surrounding public/private drainage systems	Low	No
Artificial Sources	Reservoirs and Canals	Low	No

5.3 Flood Risk to the Grid Connection Corridor

Overview

5.3.1 This section assesses the flood risk posed to the Grid Connection Corridor.

Fluvial/Tidal

5.3.2 The risk of flooding to the Grid Connection Corridor is predominantly from the River Ouse which is tidally influenced at the point where it is crossed by Grid Connection Corridor. The majority of the Grid Connection Corridor is located within Flood Zone 2 and Flood Zone 3 associated with the River

Ouse and River Derwent. Flood zones are illustrated on **Figure 9-4, ES Volume 3 [EN010143/APP/6.3].**

5.3.3 The Grid Connection Corridor intersects flood defence embankments on both sides of the River Ouse and the River Derwent that provide a degree of protection to the landward side. However, there are a number of smaller channels and watercourses within the Grid Connection Corridor that also pose a fluvial flood risk.

5.3.4 The climate change mapping in the Selby SFRA (Ref. 9-14) uses the flood outline associated with a 0.5% AEP tidal event with relevant climate change allowances. This shows predicted future flooding due to climate change is more extensive around Drax when compared to present day flood risk. The SFRA mapping along the Grid Connection Corridor (1% AEP plus 24% climate change Higher Central Sea Level Rise) appears to result in the same extent as the current Flood Zone 3 and does not exceed Flood Zone 2.

5.3.5 As the Grid Connection Cables will be buried, and the only above ground infrastructure will be link box covers (2 m by 2 m ‘manhole -type’ covers over buried link boxes set at or very close to ground level, estimated one link box every *c.* 900 m of cable) it is considered that fluvial/tidal sources pose a very low risk during construction, operation, and decommissioning.

Surface Water

5.3.6 The risk of surface water flooding is generally very low (annual chance of flooding of less than 0.1% AEP) with isolated areas of low (chance of flooding of between 0.1% and 1% AEP) and, medium (chance of flooding of between 1% and 3.3% AEP) generally associated with topographical low points, drains and agricultural ditches (Ref. 9-22). Flood risk from surface water is illustrated on **Figure 9-5, ES Volume 3 [EN010143/APP/6.3].**

5.3.7 As the Grid Connection Cable will be buried and link box covers (see paragraph 5.3.5) are very small and set at or very close to ground level, it is considered that above surface water flooding poses a very low risk to the Grid Connection Corridor during construction, operation, and decommissioning.

Groundwater

5.3.8 The BGS Groundwater Flood Map can be seen in **Figure 9-3-2** of this report and shows that the majority of the Grid Connection Corridor is located in an area where there is no or limited potential for groundwater flooding to occur. There are very small, isolated areas where there is potential for groundwater flooding to occur at the surface near the grid connection location at Drax.

5.3.9 As described in **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]** there is limited groundwater level data across the Site however there is evidence that groundwater within superficial deposits may be less than 3 m below the ground surface during times of elevated groundwater levels.

5.3.10 A review of the Selby District Council SFRA (Ref. 9-14) indicates for the area of the Grid Connection Corridor located within the former Selby District there is predominantly no susceptibility to groundwater flooding with the exception of areas to the south of the River Ouse, near Drax, which are located in areas shown to be less than 25% susceptible to groundwater flooding.

5.3.11 East Riding of Yorkshire SFRA (Ref. 9-13) mapping indicates susceptibility to groundwater flooding is predominantly less than 25%, it is therefore considered the risk from this source is very low to low during construction, operation and decommissioning. Localised impacts on groundwater flows within the vicinity of the buried cable may occur but are unlikely to increase flood risk to vulnerable receptors as the Grid Connection Corridor is predominantly within green open space consisting of arable fields.

Sewers

5.3.12 It is considered unlikely that flooding from sewers will impact the Grid Connection Corridor as the majority of the route is through arable fields. A search undertaken to identify Yorkshire Water sewerage assets within the Site did not identify any public sewers. The Selby Level 1 SFRA (Ref. 9-14) indicates that within the postcode areas crossed by the Grid Connection Corridor, only 0–3 incidences of sewer flooding had occurred within the 10 years prior to publication of the SFRA and therefore the risk of flooding from this source is considered to be very low during construction, operation, and decommissioning.

Artificial Sources

Reservoirs

5.3.13 The Grid Connection Corridor is located within the extent associated with the risk of flooding from a reservoir breach. **Plate 8** describes that for the majority of the Grid Connection Corridor flooding due to a reservoir breach would only occur if it coincided with flooding from rivers. Risk of flooding due to a reservoir breach when river levels are normal is only identified within small areas near Drax Power Station.

5.3.14 Statutory reservoirs (large, raised reservoirs with volumes above ground of 25,000 m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. Whilst the consequence of failure can be significant, the likelihood of failure is typically low. The risk of flooding from this source is considered negligible as the Grid Connection Cable will be buried during construction, operation, and decommissioning.

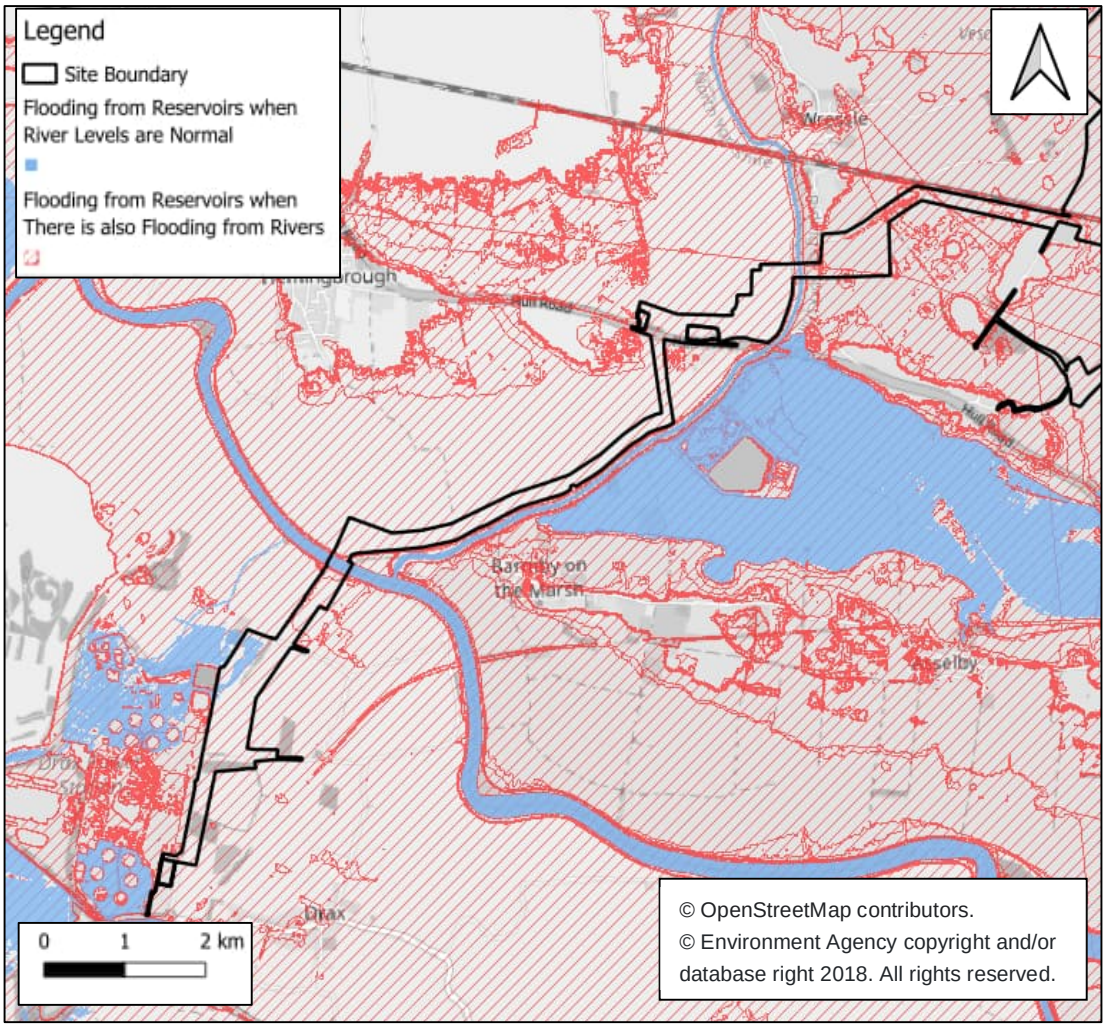


Plate 8. Environment Agency extent of Reservoir Flooding Mapping across the Grid Connection Corridor

Canal Systems

5.3.15 There are no canals in close proximity to the Grid Connection Corridor.

5.3.16 The Grid Connection Corridor is therefore considered to be at negligible risk of flooding from artificial sources during construction, operation and decommissioning.

Flood Risk Assessment Summary to the Grid Connection Corridor

5.3.17 A summary of flood risk from all sources to the Grid Connection Corridor is provided in **Table 4**.

Table 4. Summary of flood risk to the Grid Connection Corridor

Flood Mechanism	Source	Flood Risk to the Development	Mitigation required
Fluvial/Tidal	Tidal Main River/Fluvial	High (defences are present)	No – The proposed grid connection is via buried cables, therefore no risk

Flood Mechanism	Source	Flood Risk to the Development	Mitigation required
	Ordinary Watercourse		from above ground sources.
Surface Water Flooding	Runoff from surrounding land and hard surfaces	Very low (majority), low–high (localised shallow patches)	No – The proposed grid connection is via buried cables, therefore no risk from above ground sources.
Groundwater	Rising groundwater levels in the underlying geology	Very Low–Low	Yes
Sewers	Surrounding public/private drainage systems	Very Low	No – The proposed grid connection is via buried cables, therefore no risk from above ground sources.
Artificial Sources	Reservoirs and Canals	Negligible	No – The proposed grid connection is via buried cables, therefore no risk from above ground sources.

6. Flood Risk – From Development

6.1 Overview

6.1.1 The NPPF highlights how built development can lead to an increased risk of flooding by increasing surface water runoff. Development often increases the area of impermeable surfaces thereby promoting rapid runoff to surface water sewers or watercourses rather than percolation into the ground. The effect can be to increase both total and peak water flows, contributing to flooding.

6.1.2 However, the draft NPS EN-3 (Renewable Energy Infrastructure) highlights in paragraph 3.10.75 that:

"As solar PV panels will drain to the existing ground, the impact will not, in general, be significant."

6.1.3 Section 9.6 of **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]** provides information on the embedded mitigation measures to manage surface water flood risk from the development.

6.2 Solar PV Site and Interconnecting Cable Corridor

Surface Water Management

6.2.1 A **Framework Surface Water Drainage Strategy, Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** has been prepared to support the DCO Application. A detailed strategy will be provided post-consent following the detailed design of the Grid Connection Substations and informed by infiltration testing, as secured through the DCO.

6.2.2 As noted in paragraph 6.1.2, solar PV panels will drain to the existing ground and the impact will not, in general, be significant. Early consultation with the Ouse and Humber Drainage Board discussed the key elements of the Scheme and how they should be considered with respect to land drainage. Discussions with the IDB identified that the solar PV panels, and Field Stations do not need to be considered within the Framework Drainage Strategy as the solar PV panels and Field Stations will be raised above ground and therefore allow runoff underneath. As the two Grid Connection Substations located within Solar PV Area 1c will consist of hardstanding materials, attenuation storage methods have been proposed to manage surface water runoff. It is proposed that attenuation storage areas will be located adjacent the full length of each Grid Connection Substation to ensure no increase in flood risk to third party land.

Floodplain Displacement

6.2.3 The construction of the solar PV mounting structures will cause a reduction in floodplain storage across the Solar PV Site, potentially increasing flood risk to third party land. However, it is noted that as the legs of the solar PV mounting structures comprise slim metal posts directly driven into the ground, the area of land they collectively occupy is very small.

6.2.4 The results of the hydraulic modelling indicate that solar PV panels in Solar PV Area 2a are located within Flood Zone 3b. Hydraulic modelling was not

available to determine Flood Zone 3b in Solar PV Area 1e, however the East Riding of Yorkshire SFRA (Ref. 9-13) does not show Solar PV Area 1e to be located within the 5% AEP flood extent.

6.2.5 The approximate maximum flood depth during the 1% AEP plus climate change event in Solar PV Area 2a is 1.40 m. The cumulative cross-sectional area of the legs of the solar PV mounting structures within the modelled flood extent during the 1% AEP + climate change event is approximately 128 m^2, resulting in a loss of floodplain storage of approximately 150 m^3.

6.2.6 Hydraulic modelling results are not available for Solar PV Area 1e, however, it is considered that the floodplain storage loss within Solar PV Area 1e is smaller than Solar PV Area 2a due to the smaller Flood Zone 3 extent. It is considered that there is a negligible loss of floodplain storage of approximately 100 m^3 in this Solar PV Area.

6.2.7 Collectively the solar PV mounting structures result in a loss of floodplain storage of less than 250 m^3 across the 1,276 ha Site. The provision of compensatory storage to account for the loss of floodplain volume is outlined in section 7.

6.3 Grid Connection Corridor

6.3.1 The Grid Connection Cables will be buried, therefore the likelihood of increased flood risk from their operation is considered to be low. For flood risk sources above ground (fluvial, tidal, surface water and artificial), there will not be a quantifiable increase in risk from these sources.

6.3.2 The depth and construction of the flood defence embankments along the River Ouse and River Derwent will be identified through liaison with the Environment Agency and directional drilling will be used at a sufficient depth to avoid compromising their structural integrity. Therefore, the likelihood of increased flood risk from the installation of cable crossings is considered to be low.

6.3.3 The Grid Connection Cables will not increase flood risk from sewers. A search undertaken to identify Yorkshire Water sewerage assets within the Site did not identify any public sewers within the Grid Connection Corridor.

6.3.4 The buried Grid Connection Cables may impede groundwater flow locally. The Grid Connection Corridor is within green open space (arable fields and roadside verges) and where it is in roads the impermeable surfacing will prevent ground water emergence. Therefore, any local increases in groundwater flow are unlikely to affect vulnerable receptors.

7. Mitigation Measures

7.1 Introduction

7.1.1 It has been demonstrated that the primary flood risk to the Solar PV Site and Interconnecting Cable Corridor will be from fluvial/tidal and surface water sources during the three project phases. The mitigation measures required to alleviate the risk of fluvial and surface water flooding to the Site are detailed in this section.

7.2 Fluvial

7.2.1 The north-east corner of the Solar PV Site is located in an area of Flood Zone 2 and 3 associated with the River Foulness. Within the central area of the Solar PV Site to the west is a small corridor of Flood Zone 3 and a wider Flood Zone 2 extent associated with the Fleet Dyke and its local drainage tributaries, draining east to west towards the River Derwent, as seen on **Figure 9-4, ES Volume 3, [EN010143/APP/6.3]**. At the construction, operation and decommissioning phases, the following mitigation measures will be incorporated which will reduce the assessed fluvial flood risk in section 5.2 (**Table 3**) to low.

Construction/Decommissioning

7.2.2 Measures to prevent an increase in flood risk during the construction/decommissioning works will be contained within the detailed Construction Environmental Management Plan (CEMP) and detailed Decommissioning Environmental Management Plan (DEMP). Framework versions of these plans are provided with the DCO as documents **[EN010143/APP/7.7]** and **[EN010143/APP/7.9].** Delivery of the detailed CEMP and DEMP will be secured through the DCO. Examples of measures that will be implemented include:

a. Topsoil and other construction materials will be stored outside of the 0.5% AEP extent for areas at tidal flood risk and outside of the 1% AEP extent for areas at fluvial flood risk. If areas located within Flood Zone 3 are to be utilised for the storage of construction materials, this would be done in accordance with the applicable flood risk activity regulations, if required;

b. Connectivity will be maintained between the floodplain and the adjacent watercourses, with no changes in ground levels within the floodplain as far as practicable;

c. During the construction/decommissioning phase, the Contractor will monitor the weather forecasts daily, and review the weekly and monthly weather forecasts each week, and plan works accordingly. For example, works in the channel of any watercourses would be avoided or halted were there to be a significant risk of high flows or flooding; and

d. The laydown area site office and supervisor will be notified of any potential flood occurring by use of the Floodline Warning Service or equivalent service.

7.2.3 The Contractor will be required to produce an Emergency Response Plan as part of the detailed CEMP and DEMP which will provide detail of the response to an impending flood and include:

a. A 24-hour availability and ability to mobilise staff in the event of a flood warning;

b. The removal of all plant, machinery and material capable of being mobilised in a flood for the duration of any holiday close down period where there is a forecast risk that the Site may be flooded;

c. Details of the evacuation and site closedown procedures;

d. Arrangements for removing any potentially hazardous material;

e. Arrangements for removing any potentially hazardous material and implement more stringent protection measures;

f. If water is encountered during below ground construction, suitable de-watering methods would be used. Any groundwater dewatering required in excess of the exemption thresholds would be undertaken in line with the requirements of the Environment Agency (under the Water Resources Act 1991 as amended) and the Environmental Permitting Regulations (2016); and

g. Safe egress and exits will be maintained at all times when working in excavations. When working in excavations a banksman is to be present at all times.

7.2.4 The Scheme proposes, as a design principle, to utilise existing water crossing locations (where practicable) to avoid the need for new crossings. However, should a new crossing be required, an open span bridge crossing will be used, with the specific type of crossing selected being determined based on site specific factors and in consultation with the relevant authority (generally the IDB/LLFA for the Solar PV Site). There will be no new culverts as part of the Scheme, but existing culverts may be upgraded or slightly extended. It is assumed, as a worst case, that culverts could be extended by up to 2 m.

Operation

7.2.5 Mitigation measures provided during operation of the Scheme ensure that the Scheme will be safe throughout its lifetime and are based upon worst case undefended hydraulic modelling results. These are also outlined in the **Framework Operational Environmental Management Plan (OEMP) [EN010143/APP/7.8]** which, through the DCO, will secure the provision of a detailed OEMP prior to commencement of the operational phase.

Solar PV Area 2a

7.2.6 Within Solar PV Area 2a the majority of the solar PV panels and vulnerable electrical components have been sequentially located outside of Flood Zone 3. Where panels are located within Flood Zone 3, the tilt range of the tracker panels will be restricted to ensure that a 300 mm freeboard above the modelled design flood event (1% AEP plus climate change) is maintained at all times regardless of whether there is a flood event occurring or not. Tilt range can be set on a solar PV table by solar PV table basis and therefore will vary across the Flood Zone 3 area. Additionally, panels can be remotely

moved into their horizontal (night-time storage position) of 2.3 m above ground level as further described in Paragraph 7.2.12.

7.2.7 To compensate for the approximate 150 m^3 of floodplain volume lost as a result of the Scheme in this Solar PV Area, flood compensation is proposed along the edge of Flood Zone 3 in this area to provide this storage. The floodplain compensation indicative area can be seen on **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**. The precise location and design of the compensation area will be determined at the detailed design stage post consent. Following decommissioning of the Scheme, the compensation area will be reinstated to a flat field as existing.

Solar PV Area 1e

7.2.8 Within Solar PV Area 1e the majority of the solar PV panels and vulnerable electrical components have been sequentially located outside of Flood Zone 3.

7.2.9 The estimated maximum flood depth defined using the Environment Agency Flood Zone 2 extent and LiDAR data, in Solar PV Area 1e is 1.20 m where there are natural depressions in the ground. The estimated maximum flood level is approximately 4.20 m AOD based on this analysis.

7.2.10 The tilt range of the tracker panels will be restricted to ensure that a 300 mm freeboard above the estimated flood event is maintained at all times. Where depressions are located, the panels will either traverse the depression and maintain the same minimum panel level as the highest ground level either side or will stop at the depression if it is too wide.

7.2.11 To compensate for the approximate 100 m^3 of floodplain volume lost as a result of the Scheme in Solar PV Area 1e, flood compensation is proposed along the edge of Flood Zone 3 in this area to provide this storage. The floodplain compensation indicative area can be seen on **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**. The precise location and design of the compensation area will be determined at the detailed design stage post consent. Following decommissioning of the Scheme, the compensation area will be reinstated to a flat field as existing.

7.2.12 To increase resiliency of the panels in both parcels, including during the 1% AEP H++ event, when a flood warning is issued by the Environment Agency, the panels will be set to their horizontal position where the height above ground level will be 2.30 m. The solar farm will be monitored 24 hours a day and site inspections will occur daily so operatives will set the panels to the horizontal position if increasing water levels are observed or if a flood warning is received. This is done remotely from the Operations and Maintenance Hub at Johnson's Farm or by maintenance personnel remotely online from any location. Therefore, the Solar PV Site will remain safe throughout its lifetime.

7.2.13 Field Stations located within Flood Zone 2 and in areas of surface water flood risk will be raised a minimum of 300 mm above the modelled design flood event in that location. The Grid Connection Substations in Solar PV Area 1c are located within Flood Zone 1.

7.2.14 Infrastructure will be off set from watercourses by 10 m (except where crossings are required).

7.3 Groundwater

Construction/Decommissioning

7.3.1 There may be potential for shallow groundwater across the Solar PV Site and Grid Connection Corridor, and therefore potential for groundwater ingress during construction. This will be managed following standard construction techniques potentially including pumping, damming, use of trench boxes or shoring up excavation pits with sheet piling. It is noted that there is less potential for groundwater ingress during decommissioning as it is expected that if cables do not remain *in situ,* they will be removed by opening up the ground at regular intervals and pulling the cable through to the extraction point, avoiding the need to re-excavate the entire length of the cable.

7.3.2 Significant groundwater ingress is not anticipated due to the largely clayey, low permeability, superficial geology into which the pits would be excavated.

Operation

7.3.3 Due to the largely clayey low permeability superficial geology, no continuous foundations present in the design, the regularly spaced discrete solar PV panel foundations, and shallow cabling trenches, mitigation during operation is not required.

7.4 Surface Water

Construction/Decommissioning

7.4.1 The **Framework CEMP [EN010143/APP/7.7]** and **Framework DEMP [EN010143/APP/7.9]** incorporate examples of measures to prevent an increase in surface water flood risk during the construction/decommissioning works including a temporary drainage system.

7.4.2 As stated previously these Framework management plans will be the basis of the detailed CEMP/DEMP to be prepared prior to the commencement of the relevant phase, as secured through the DCO.

Operation

7.4.3 A Framework Surface Water Drainage Strategy has been prepared (see **Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]** which sets out the framework drainage strategy for the Scheme as described in Section 7.2. This provides details on the management of surface water for Solar PV Area 1c and the Grid Connection Substations. A detailed strategy will be provided post-consent following the detailed design of the Grid Connection Substations and informed by infiltration testing, as secured through the DCO.

7.4.4 No surface water drainage is proposed for the Grid Connection Corridor as the cables will be buried, and the corridor will be restored to greenfield conditions post construction.

8. Sequential and Exception Test

8.1 Introduction

8.1.1 As set out in section 3, the NPS EN-1, draft NPS EN-1 and the NPPF require the application of both the Sequential Test and the Exception Tests, where relevant. The aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding from any source.

8.1.2 The Solar PV Site, Interconnecting Cable Corridor, Grid Connection Corridor, and Site Accesses are classed as 'Essential Infrastructure' as defined in Annex 3 of the NPPF (see Table 2). The majority of development is situated within areas with the lowest risk of flooding from any source, however there are certain parts of the Scheme that are proposed to be located in Flood Zone 2, 3a and 3b, with whole Solar PV Areas within Flood Zone 2.

8.1.3 The Sequential Test needs to be satisfied for site selection to accord with NPS EN-1 and draft NPS EN-1. Table 2 in Section 3.2 indicates that Essential Infrastructure can be located in Flood Zone 3 if the Exception Test is passed. In accordance with national planning policy the Secretary of State will need to be satisfied that where relevant the Scheme passes the Sequential and Exception Tests. The Sequential Test evidence for the Scheme is presented in **Annex C** with a summary provided below.

8.2 Sequential Test: Solar PV Site

8.2.1 A sequential approach has been applied in selecting the land for the Scheme and to the layout and design of the solar infrastructure within the Solar PV Site. The Scheme is located, as far as possible, in areas with the lowest risk of flooding from any source.

8.2.2 The location of the Solar PV Site has been selected on the basis of number of different factors which are discussed in more detail in **Chapter 3: Alternatives and Design Evolution, ES Volume 1 [EN010143/APP/6.1]**. The Sequential Test Report provided at **Annex C** explains the site selection criteria, the process of identifying an area of search and the areas of land at lower risk of flooding that have been considered. The Sequential Test Report concludes that reasonably available alternative sites in Flood Zone 1 within the area of search have not been identified for the Solar PV Site.

8.2.3 A sequential approach has been applied to the layout and design of the solar infrastructure within the Solar PV Site whereby the two Grid Connection Substations, most Field Stations, and the majority of the solar PV panels are located in areas with the lowest risk of flooding from any source. There are limited areas where solar PV panels and field stations are located within Flood Zone 2 and only solar PV panels are located in the areas of Flood Zone 3 which form part of the Solar PV Site. Where required, embedded mitigation within the design has been included as discussed in section 7.

8.2.4 The Sequential Test is therefore considered to be met for the Solar PV Site.

8.3 Sequential Test: Grid Connection Corridor and Interconnecting Cable Corridor and Site Accesses

8.3.1 The Interconnecting Cable Corridors will accommodate the cabling required to transfer electricity between the inverters/transformers/switchgears at the Field Stations and the Grid Connection Substations in Solar PV Area 1c and between some Solar PV Areas. The selection of these corridors has therefore been primarily on the basis of the technical requirement for the cable routing to be a direct route between the Solar PV Areas and the Grid Connection Substations to avoid losses in transmission. Interconnecting Cable Corridors for Solar PV Areas 2a, 2c and 2d are within Flood Zone 2 as shown on **Figure 9-4, ES Volume 3 [EN010143/APP/6.3]**. Alternative corridors which would avoid Flood Zones 2 and 3 would not provide a direct route between the Solar PV Areas themselves and between the Solar PV Areas and the Grid Connection Substations. For Solar PV Area 2a an alternative route avoiding Flood Zone 2 would require a route to the north and then east travelling to the south of Willitoft. This would require several road and PRoW crossings and would not have the potential benefit of co-locating Interconnecting Cables and Grid Connection Cables in the same trench along the Grid Connection Corridor which the proposed Interconnecting Cable Corridor links into. For the Interconnecting Cable Corridor between Solar PV Area 2c and Solar PV Area 2d an alternative route avoiding Flood Zone 2 would require crossing a PRoW and either Spaldington Golf Course or the anaerobic digestion plant and wind turbine development to the east. These alternatives were not therefore considered by the Applicant further. There are therefore no reasonably available alternatives.

8.3.2 Some areas of the land required to facilitate construction and operational access known as the Site Accesses element of the Scheme are within Flood Zone 2. It is not however possible to locate these in areas at a lower risk of flooding due to the need for their location in relation to the public highway.

8.3.3 The Grid Connection Corridor is predominantly located within areas of high risk of fluvial/tidal flooding (Flood Zone 3) and medium risk of fluvial /tidal flooding (Flood Zone 2). As explained in **Chapter 3: Alternatives and Design Evolution, ES Volume 1 [EN010143/APP/6.1]**, the identification of the Grid Connection Corridor considered the operational and engineering requirements including the need to connect to the National Grid Drax Substation; planning and environmental constraints which included the flood risk context; and other land use and land ownership constraints. This confirmed that a corridor outside Flood Zones 2 and 3 would not be possible and no reasonable alternatives are available in Flood Zone 1. Areas of the Grid Connection Corridor within Flood Zone 3 were also unable to be avoided by using Flood Zone 2 land.

8.3.4 Given the above, the Sequential Test has, where relevant, been met for the Scheme.

8.4 Exception Test

8.4.1 As some of the Scheme's infrastructure within the Solar PV Site and the Grid Connection Corridor are proposed to be located within Flood Zone 3 it is necessary to apply the Exception Test to these parts of the Scheme in

accordance with national planning policy set out in section 3 of this FRA. The Exception Test in the NPPF and draft NPS EN-1 requires it to 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.

8.4.2 Paragraph 5.8.11 of Draft NPS EN-1 part a includes footnote 214, which expects community benefits to include those set out in Part 3 of the draft NPS EN-1, which is focused on the need for new NSIP.

8.4.3 NPS EN-1 which was published in 2011 also includes the requirement that "*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",* however this was published prior to the NPPF and is not reflected in draft NPS EN-1.

8.4.4 In response to meeting the first limb of the Exception Test, the need for the Scheme is explained in the **Statement of Need [EN010143/APP/7.1]**. Through the generation of low carbon electricity, the Scheme will contribute to the urgent need to decarbonise electricity generation in the UK as required by national energy policy and will contribute to the UK's obligations for net zero under the Climate Change Act 2008 (2050 Target Amendment) Order 2019. It will also meet the need identified in current and emerging planning policy on renewable energy. Therefore, the Scheme will have both a national, and global significance, through its decarbonisation of the UK's electricity generation.

8.4.5 In addition, the Scheme will include habitat creation and enhancement as set out in **Chapter 2 The Scheme, ES Volume 1 [EN010143/APP/6.1], Chapter 8: Ecology, ES Volume 1 [EN010143/APP/6.1], the Biodiversity Net Gain Assessment Report [EN010143/APP/7.11]** and the **Framework Landscape and Ecological Management Plan (LEMP) [EN010143/APP/7.14].** This will contribute to the Scheme providing biodiversity net gain. There are areas of high-risk of flooding within the Site which are excluded from development and are instead proposed to be used for ecological enhancement. Therefore, taking the above into account, it is considered that the Scheme will provide wider sustainability benefits to the community that outweigh its impacts on flood risk in accordance with NPS EN-1, draft NPS EN-1 and the NPPF.

8.4.6 In response to meeting the second limb of the Exception Test, the information presented in section 7 of this FRA and **Chapter 9: Flood Risk, Drainage and Water Environment, ES Volume 1 [EN010143/APP/6.1]**, demonstrate that mitigation measures have been, and will be, developed into the design of the solar PV infrastructure and cabling and construction methods for the cabling. This will ensure that the Scheme will be at a low risk of flooding from all sources; will be safe for its lifetime; and that there will be no increase in flooding elsewhere.

8.4.7 Therefore, the Scheme satisfies the second element of the Exception Test of the NPPF, draft NPS EN-1 and NPS EN-1 (although it is the third requirement in NPS EN-1, due to the additional criteria included).

8.4.8 The additional requirement of the Exception Test, as set out in NPS EN-1 only, requires *"development to 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".* The Sequential Test Report at **Annex C** explains how previously developed brownfield land has been considered for the Solar PV Site. The Scheme is not located on previously developed land as there is no previously developed land in the area of search which meets the Scheme's requirements . There are therefore no reasonable alternative sites available on previously developed land.

8.4.9 In summary, the above demonstrates that the Scheme is considered to pass the Sequential and Exception Tests.

9. Conclusions

9.1 Overview

9.1.1 This FRA has assessed flood risk from all sources of flooding to and from the Scheme. The majority of the Solar PV Site and Interconnecting Cable Corridor lies in Flood Zone 1, with areas of Flood Zone 2 and 3 associated with the Fleet Dyke and associated tributaries to the west and central area and Flood Zone 3 in the north/north-east area along the northern border, associated with the River Foulness. The majority of the Grid Connection Corridor is in Flood Zone 3, associated with the tidal River Ouse and its floodplain. Other sources of flood risk (fluvial, surface water, sewer, groundwater and artificial) also impact both elements of the Scheme to differing degrees.

9.1.2 The Scheme is classed as ‘Essential Infrastructure’ under the NPPF and therefore should avoid Flood Zone 3a and 3b where feasible and take into account the availability of suitable sites at lower risk of flooding. Where this is unavoidable, the development is required to pass the Exception Test and should be designed and constructed to remain operational and safe in times of flooding.

9.2 Flood Risk – To Development

9.2.1 The following potential sources of flooding which could affect the Solar PV Site and Interconnecting Cable Corridor have been considered and assessed as follows:

a. With the majority of the Scheme, including the two Grid Connection Substations, located in Flood Zone 1, the current risk from fluvial sources is considered to be ‘low’. However, the Scheme does have areas of higher risk (Flood Zone 2 and 3) which increases the risk in these locations to ‘high’. The Scheme has been designed accordingly in order to remain operational during times of flood. Based on the design and embedded mitigation, the risk within these areas is considered low;

b. The risk of surface water flooding to the majority of the Solar PV Site and Interconnecting Cable Corridor is considered to be ‘very low’. There are a few areas where the risk is higher, but these generally cover a small spatial extent. A Framework Surface Water Drainage Strategy incorporating SuDS has been prepared for the Scheme to manage these flow paths to ensure that the Scheme remains safe throughout its lifetime;

c. The risk of groundwater is considered to be ‘low’ based on available information;

d. The risk of flooding from sewers is considered to be ‘low’; and

e. The risk of flooding from artificial sources is considered to be ‘low’.

9.2.2 The following potential sources of flooding which could affect the Grid Connection Corridor have been considered and assessed as follows:

a. The majority of the Grid Connection Corridor is in Flood Zone 3, associated with the River Ouse and its floodplain. The cable will be

buried, inherently flood protected, and protected by existing flood defences; it will therefore remain operational during times of flood. Based on these factors, the risk within these areas should be considered low;

b. The risk of surface water flooding to the majority of the Grid Connection Corridor is considered to be 'very low'. There are a few isolated areas where the risk is higher but these generally cover a small spatial extent;

c. The risk of groundwater is considered to be 'very low – low' based on available information although will be localised and unlikely to be discernible from fluvial and/or surface water flooding;

d. The risk of sewer flooding is considered to be 'very low'; and

e. The risk of flooding from artificial sources is considered to be 'negligible', due to the low likelihood of reservoir failure, and that the cable will be buried during operation so the risk from this source is mitigated.

9.2.3 Additional hydraulic modelling has been undertaken to determine the impacts of climate change on the fluvial and tidal flood extents the outputs of which have been used to inform the FRA. The hydraulic model does not include representation of the flood defences present along the River Derwent and therefore this FRA assesses the worst case undefended scenario. Mitigation measures put forward for the lifetime of the development are therefore based on this worst case scenario.

9.3 Flood Risk – From Development

9.3.1 With the exception of fluvial and surface water sources, an increase in flood risk from other sources from development is considered unlikely or very localised (groundwater for the buried cable).

Fluvial

9.3.2 The following potential sources of flooding which could come from the Solar PV Site and Interconnecting Cable Corridor have been considered and assessed as follows:

a. Within the Solar PV Site, structures and panels have been sequentially located to avoid areas of high fluvial flood risk and raised to a sufficient height to avoid flood water, being preferentially located in Flood Zone 1, then Flood Zone 2, and then Flood Zone 3. The Interconnecting Cable is buried. The majority of the Solar PV Site and Interconnecting Cable Corridor are in Flood Zone 1. Where the solar PV panels are located within Flood Zone 3, there has been shown to be a negligible loss of floodplain storage volume. To account for the small loss of floodplain storage, flood compensation areas are proposed to account for this volume. This meets the criteria set in Section 3.1.

b. The Scheme proposes, as a design principle, to utilise existing water crossing locations (where practicable) to avoid the need for new crossings. However, should a new crossing be required, an open span bridge crossing will be used, with the specific type of crossing selected being determined based on site specific factors and in consultation with the relevant authority (generally the IDB/LLFA for the Solar PV Site).

There would be no new culverts as part of the Scheme, but existing culverts may be upgraded or slightly extended.

c. The Interconnecting Cable will be underground so there will be no loss of floodplain storage, impedance of water flows or increase to flood risk elsewhere.

The potential sources of flooding which could come from the Grid Connection Corridor have been considered. As the cable will be underground there will be no loss of floodplain storage, impedance of water flows or increase to flood risk elsewhere.

Surface Water

9.3.3 A Framework Surface Water Drainage Strategy has been prepared (see **Appendix 9-4, ES Volume 2 [EN010143/APP/6.2]**) which sets out the framework drainage strategy for the Scheme as described in Section 7.2. This provides details on the management of surface water for Solar PV Area 1c and the Grid Connection Substations. A detailed strategy will be provided post-consent following the detailed design of the Grid Connection Substations and informed by infiltration testing, as secured through the DCO.

9.4 Sequential and Exception Test

9.4.1 Section 8 of this FRA has provided the rationale and justification for the Scheme meeting the Sequential and Exception Tests for the Scheme.

9.4.2 For the Solar PV Site, alternative land areas identified to be at low risk from all sources (fluvial, groundwater and surface water) of flooding within an area of search were assessed to confirm whether there are reasonably available and suitable areas for solar PV infrastructure at lower risk of flooding. This identified that none of the alternative areas to the Solar PV Site which are at low risk from all sources of flooding were considered reasonably available and therefore this confirms the Applicant has identified land within the Solar PV Site in accordance with the Sequential Test policy requirements.

9.4.3 A sequential approach has been applied to the layout and design of the solar infrastructure within the Solar PV Site whereby the two Grid Connection Substations, and the majority of the solar PV panels are located in areas with the lowest risk of flooding from any source. There are a number of areas where solar PV panels are located within Flood Zone 2 and 3. Where solar PV panels are located within Flood Zone 3, mitigation will be in place to ensure the development remains safe throughout its lifetime.

9.4.4 For the parts of the Interconnecting Cable Corridor and Site Accesses that fall within Flood Zone 2 and Flood Zone 3 it is considered that there are no reasonably available areas at lower risk of flooding for these elements of the Scheme.

9.4.5 The Grid Connection Corridor is predominantly located within Flood Zone 3 (for fluvial and tidal sources). Taking into consideration operational and engineering requirements including the need to connect to the National Grid Drax Substation; planning and environmental constraints which included the flood risk context; and other land use and land ownership constraints, a corridor outside Flood Zones 2 and 3 would not be possible and therefore no reasonable alternatives are available in Flood Zone 1. Areas of the Grid

Connection Corridor within Flood Zone 3 were also unable to be avoided by using Flood Zone 2 land.

9.4.6 In summary, it has been demonstrated that the Sequential Test has, where relevant, been met for the Scheme.

9.4.7 As there is not an alternative Grid Connection Corridor at lower risk of flooding and solar PV infrastructure is also proposed in Flood Zone 3, the Exception Test has been applied. The Scheme will provide wider sustainability benefits which outweigh flood risk and appropriate mitigation has been considered to ensure that the Scheme remains operational and is safe during times of flooding. It has therefore been demonstrated that the Exception Test has been met.

Revision: 0 Drawn: TG Checked: AK Approved: SB Date: 2023-10-24

Filename: I:\5004 - Information Systems\60683115_Boom Power\02_Maps\Environmental Statement\App9-3_Flood_Risk_Assessment\App9-3_Flood_Risk_Assessment\App9-3_Flood_Risk_Assessment.aprx

AECOM

PROJECT

East Yorkshire Solar Farm

CLIENT

East Yorkshire Solar Farm Limited

CONSULTANT

AECOM Limited
Midpoint,
Alencon Link
Basingstoke, RG21 7PP
www.aecom.com

LEGEND

- Order limits
- Land not Included in the Order limits

Recorded Flood Outline (Year)

- 1977
- 1978
- 1982
- 1991
- 1995
- 1999
- 2000
- 2007
- 2013
- 2015
- 2020
- 2021

NOTES

ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

60683115

FIGURE TITLE

Recorded Flood Outline

FIGURE NUMBER

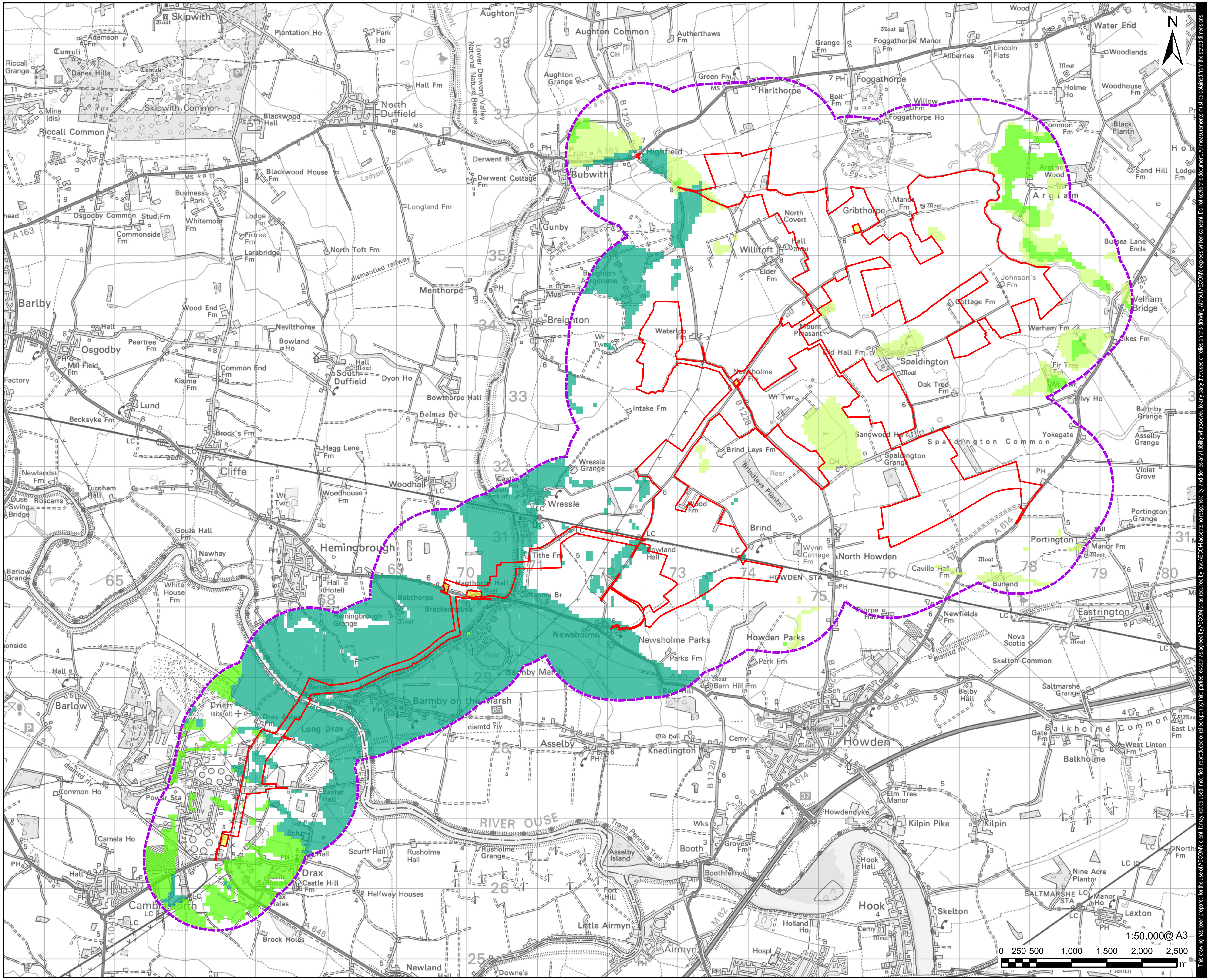
Figure 9-3-1

1:50,000@ A3

0 250 500 1,000 1,500 2,000 2,500 m

Revision: 0 Drawn: TG Checked: AK Approved: SB Date: 2023-10-24

Filename: I:\5004 - Information Systems\60683115_Boom Power\02_Maps\Environmental Statement\App9-3_Flood_Risk_Assessment\App9-3_Flood_Risk_Assessment.aprx



AECOM

PROJECT

East Yorkshire Solar Farm

CLIENT

East Yorkshire Solar Farm Limited

CONSULTANT

AECOM Limited
Midpoint,
Alencon Link
Basingstoke, RG21 7PP
www.aecom.com

LEGEND

- Order limits
- Land not Included in the Order limits
- Order limits - 1km Buffer - Extent of Groundwater Flooding Data
- Limited Potential for Groundwater Flooding to Occur
- Potential for groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

NOTES

ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

60683115

FIGURE TITLE

BGS Groundwater Flood Risk

FIGURE NUMBER

Figure 9-3-2

10. References

Ref. 9-1 National Policy Statement for Energy NPS EN1 (2011).

Ref. 9-2 National Policy Statement for Energy NPS EN3 (2011).

Ref. 9-3 National Policy Statement for Energy NPS EN5 (2011).

Ref. 9-4 Department for Energy Security & Net Zero (2023) overarching National Policy Statement for Energy EN1 (2023).

Ref. 9-5 Department for Energy Security & Net Zero (2023). National Policy Statement for Renewable Energy Infrastructure (EN-3).

Ref. 9-6 Department for Energy Security & Net Zero (2023). Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)

Ref. 9-7 Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework (NPPF).

Ref. 9-8 Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2021) National Planning Practice Guidance (NPPG).

Ref. 9-9 East Riding of Yorkshire Council (2016) Local Plan Strategy 2019 – 2029.

Ref. 9-10 East Riding of Yorkshire Council (2021) Draft Local Plan Strategy 2020 – 2039.

Ref. 9-11 Selby District Council (2013) Core Strategy Local Plan.

Ref. 9-12 Selby District Council (2021) Local Plan Publication Version.

Ref. 9-13 East Riding of Yorkshire Council (2019) Level 1 Strategic Flood Risk Assessment.

Ref. 9-14 Selby District Council (2015) Strategic Flood Risk Assessment.

Ref. 9-15 East Riding of Yorkshire (2021) Flood Risk Sequential and Exception Test Supplementary Planning Document (SPD).

Ref. 9-16 East Riding of Yorkshire Combined Planning Note and Standing Advice.

Ref. 9-17 East Riding of Yorkshire Council (2011) Preliminary Flood Risk Assessment.

Ref. 9-18 Environment Agency (2022) Flood Risk Assessments: Climate Change Allowances. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. [Accessed September 2023]

Ref. 9-19 Environment Agency (2023) Flood Map for Planning. Available at: https://flood-map-for-planning.service.gov.uk/. [Accessed September 2023]

Ref. 9-20 Environment Agency (2023) Recorded Flood Outlines. Available at: https://www.data.gov.uk/dataset/16e32c53-35a6-4d54-a111-ca09031eaaaf/recorded-flood-outlines. [Accessed September 2023]

Ref. 9-21 Environment Agency (2023) Reduction in Risk of Flooding from Rivers and the Sea due to Defences. Available at: https://www.data.gov.uk/dataset/dcdcf96b-3293-4987-8ca8-

9b8827f5ccf8/reduction-in-risk-of-flooding-from-rivers-and-sea-due-to-defences [Accessed October 2023]

Ref. 9-22 Environment Agency Risk of Surface Water Flooding Map. Available at: https://check-long-term-flood-risk.service.gov.uk. [Accessed September 2023]

Ref. 9-23 Environment Agency Flood Risk from Reservoirs Map. Available at: https://www.gov.uk/check-long-term-flood-risk. [Accessed September 2023]

11. Abbreviations

Abbreviation	Definition
AEP	Annual Exceedance Probability
AONB	Areas of Outstanding Natural Beauty
BGS	British Geological Survey
DCLG	Department of Communities and Local Government
DCO	Development Consent Order
ES	Environmental Statement
FRA	Flood Risk Assessment
IDB	Internal Drainage Board
IPC	Infrastructure Planning Commission
LLFA	Lead Local Flood Authority
MW	Megawatt
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Projects
PEI	Preliminary Environmental Information
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
PV	Photovoltaic
SFRA	Strategic Flood Risk Assessment
SPD	Supplementary Planning Document
SSSI	Sites of Special Scientific Interest
SuDS	Sustainable Drainage Systems
WFD	Water Framework Directive
WHS	World Heritage Sites