Botley West Solar Farm

Environmental Statement

Volume 3

Appendix 10.1: Flood Risk Assessment

20 October 2025

PINS Ref: EN010147
Document Ref: EN010147/APP/6.5
Revision 2
APFP Regulation 5(2)(a); Planning Act 2008; and Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations

Approval for issue

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Glossary

Term	Meaning
The Applicant	SolarFive Ltd
The Project	The Botley West Solar Farm
The Site	The area of land encompassing the Project development.
Aquifer	A body of permeable rock or superficial deposit which can contain or transmit groundwater.
Bedrock geology	Bedrock geology is a term used for the main mass of rocks forming the Earth that are present everywhere
Cable corridor	The corridor within which the cables will be located.
Climate change	A long term change in weather patterns, in the context of flood risk, climate change will produce more frequent severe rainfall.
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Discharge Consents	Consent granted by the Environment Agency to discharge into watercourses, subject to conditions.
Dry Day	There are 2 flooding scenarios shown on the reservoir flood maps. They are a ‘dry-day’ and a ‘wet-day’. The ‘dry-day’ scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels.
EIA Scoping Report	A report setting out the proposed scope of the EIA process.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Essential infrastructure	Is considered to be essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk; Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood; Wind turbines or; Solar farms.

Term	Meaning
Exception Test	The Exception Test ensures that development is permitted in flood risk areas only in exceptional circumstances and when strict qualifying conditions have been met. It is carried out if the Sequential Test demonstrates that a development cannot be located in areas of low flood risk.
Field drainage	Limiting the effect of flooding by maintaining surface water and land drainage systems.
Flood Risk Assessment (FRA)	A Flood Risk Assessment is an assessment of the risk of flooding from all flood mechanisms, including the identification of flood mitigation measures, in order to satisfy the requirements of the NPS, NPPF and PPG ID7.
Flood defences	A structure that is used to reduce the probability of floodwater affecting a particular area.
Flood Zone 1	Low Probability Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Flood Zone 2	Medium Probability Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Flood Zone 3	High Probability Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Flood Zone 3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.
Fluvial flooding	Fluvial flooding occurs when rivers burst their banks as a result of sustained or intense rainfall.
Geology	The scientific study of the origin, history and structure of the earth.
Greenfield runoff rate	Rates of surface water runoff from a site that is undeveloped (greenfield).
Ground conditions	The chemical and physical characteristics of the soil at a particular location and how it has been affected by historical land uses.
Groundwater	All water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.
Groundwater Flooding	Groundwater flooding occurs when the water table in permeable rocks rises to enter basements/cellars or comes up above the ground surface.
Hydrological catchment	An area that serves a watercourse with rainwater. Every part of land where the rainfall drains to a single watercourse is in the same catchment.

Term	Meaning
Lead Local Flood Authority	Lead Local Flood Authorities have responsibility for developing a Local Flood Risk Management Strategy for their area identifying local sources of flooding. The local strategy produced must be consistent with the national strategy. It will set out the local organisations with responsibility for flood risk in the area, partnership arrangements to ensure co-ordination between these organisations, an assessment of the flood risk, and plans and actions for managing the risk.
Local Authority	An administrative body in local government.
Main Rivers	The term used to describe a watercourse designated as a Main river under the Water Resources Act 1991 and shown on the Main river Map. These are usually larger rivers or streams and are managed by the Environment Agency.
Maximum design scenario	The scenario within the design envelope with the potential to result in the greatest impact on a particular topic receptor, and therefore the one that should be assessed for that topic receptor.
Ordinary watercourses	A river, stream, ditch, cut, sluice, dyke or non-public sewer that is not a designated Main river, and for which the local authority has flood risk management responsibilities and powers.
Sequential test	A sequential test is carried out to ensure development is sited on land that has the lowest risk of flooding within the Local Council area.
Strategic Flood Risk Assessment	Strategic Flood Risk Assessments are undertaken by the Local planning Authority and provides information on areas at risk from all sources of flooding, including future flood risk as a result of climate change.
Superficial Deposits	Superficial deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 2.6 million years from the present. They rest on older deposits or rocks referred to as bedrock.
Surface water flooding	Occurs when the volume of rainwater falling does not drain away through the existing drainage systems or soak into the ground but lies on or flows over the ground instead.
Surface water resources	Water on the surface of the land such as in a river, lake, wetland, or ocean.
Surface water runoff	Surface water runoff is flow of water that occurs when excess stormwater, meltwater, or other sources of water flows over a surface.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.

Term	Meaning
Sustainable Drainage Systems	A sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate, and by attenuating and conveying surface water runoff slowly at peak times.
Sewer flooding	Where wastewater and/or surface water escapes from or cannot enter a drain or sewer system and either remains on the surface or enters buildings
UK Climate Projections	Climate projections expressed in terms of absolute values. A projection of the response of the climate system to emission scenarios of greenhouse gases and aerosols, or radiative forcing scenarios based upon climate model simulations and past observations.
Water Quality	The physical, chemical and biological characteristics of water.
Wet Day	There are 2 flooding scenarios shown on the reservoir flood maps. The 'wet day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme natural flood.

Abbreviations

Abbreviation	Meaning
AEP	Annual Exceedance Probability
BEIS	Department of Business, Energy and Industrial Strategy
bgl	Below ground level
BGS	British Geological Survey
BWSF	Botley West Solar Farm
CC	Climate Change
CDC	Cherwell District Council
CoCP	Code of Construction Practice
DCO	Development Consent Order
DECC	Department of Energy and Climate Change (now BEIS)
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
FEH	Flood Estimation Handbook
FMP	Flood Modeller Pro
FRA	Flood Risk Assessment

Abbreviation	Meaning
GIS	Geographic Information Systems
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
ICP	Interim Code of Practice
IDB	Internal Drainage Board
IH24	Institute of Hydrology Report 124
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Projects
OCC	Oxfordshire County Council
PCS	Power Converter Stations
PDE	Project Design Envelope
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
PROW	Public right of way
PV	Photovoltaic
PVDP	PhotoVolt Development Partners GmbH
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System
UK	United Kingdom
UKCP18	United Kingdom Climate Projections 2018
WFD	Water Framework Directive
WODC	West Oxfordshire District Council
VoWH	Vale of the White Horse

Units

Unit	Description
%	Percentage
g	Gram (weight)
GW	Gigawatt (power)
ha	Hectare (area)
kg	Kilogram (weight)
km	Kilometre
km^2	Square kilometres
kV	Kilovolt (electrical potential)
kW	Kilowatt (power)
l/s	Litres per second (flow rate)
m	Meters (distance)
mAOD	Metres above Ordnance Datum
m^2	Meters squared (area)
m^3	Meters cubed (volume)
mm/yr	Millimetres per year (rainfall)
MW	Megawatt (power)

1 Flood Risk Assessment

1.1 Introduction

Overview

1.1.1 This Appendix of the Environmental Statement (ES) has been prepared by RPS on behalf of Photovolt Development Partners GmbH. (PVDP) for the Applicant. This Appendix supports Environmental Statement Volume 1 Chapter 10: Hydrology and Flood Risk of the ES.

1.1.2 PVDP is proposing to build and operate a new ground mounted solar farm in Oxfordshire. Botley West Solar Farm (the Project) covers approximately 1,400 ha, within the administrative areas of Cherwell, West Oxfordshire and The Vale of White Horse District Councils.

1.1.3 The Project is formed by three separate but related sites, referred hereafter as the Northern Site Area, Central Site Area, and South Site Area. The Sites are to be connected to the national grid via underground interconnecting cables. The interconnecting cable route will largely follow the public highway, but some parts will cross land controlled by the Applicant. Overall, proposals involve the delivery of approximately 840 Megawatt electric (MWe) of power to the National Grid via a new National Grid 400 Kilovolt (kV) substation. As the Project will generate over 50MW it is recognised as a Nationally Significant Infrastructure Project (NSIP), and therefore requires a Development Consent Order (DCO) under the Planning Act 2008.

1.1.4 A site-specific FRA has been prepared for the separate Project areas:

- Northern Site Area (Section 2);
- Central Site Area (Section 3); and,
- Southern Site Area including the National Grid Electricity transmission (NGET) Substation and Applicant Substation (Section 4).

1.1.5 A site-specific FRA has also been prepared for the Cable Corridor (Section 5).

1.1.6 The FRA supports the DCO in accordance with the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 (as amended).

1.1.7 This report should be read in conjunction with the Conceptual Drainage Strategy included in Volume 3, Appendix 10.2 Conceptual Drainage Strategy.

1.1.8 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the Project, and the proposed measures which could be incorporated into the Project to mitigate the identified risk. The report has been produced in accordance with the guidance detailed in National Policy Statements (NPS), National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG).

1.1.9 The key objectives of the FRA are:

- To assess the flood risk to the Project and to demonstrate the feasibility of appropriate design such that any residual flood risk to the Project and users would be acceptable.
- To assess the potential impact of the Project on flood risk elsewhere and to demonstrate the feasibility of appropriate design, such that the Project would not increase flood risk elsewhere.
- To satisfy the requirements of the legislative planning guidance set out in section 2 which require FRAs to be submitted in support of DCO applications.

Project

1.1.10 The key components of the Project include the following:

- Three separate but related solar farm sites where approximately 1,800,000 to 2,300,000 solar PV modules are to be located;
  - Northern Site Area (248ha developable area)
  - Central Site Area (546ha developable area)
  - Southern Site Area (50 ha developable area)
- NGET Substation – To connect the Project to the National Grid Transmission system via a proposed National Grid 400kV substation. This is located within the Southern Site Area
- Applicant Substation - The substation comprises a compound with 2 High Voltage (HV) transformers; containing the electrical components for transforming the power from 220 to 400 kV. This is located within the Southern Site Area;
- Up to 6 HV Transformers (Secondary Substations) – the secondary substation comprise a compound containing the electrical components for transforming power supplied by the generation assets to 220kV. These are located across the Site Areas;
- 156 Power Converter Stations (PCS) units - the PCS units contain transformers and inverters which allow energy to be exported to the National Grid. These are located across the Site Areas;
- 220kV grid connection cable corridor that will connect the Northern, Central and Southern Sites to the NGET substation. Including temporary Horizontal Directional Drilling (HDD) compounds; and,
- Office and maintenance facilities. These are located across the Site Areas.

1.1.11 In addition to the permanent components outlined above, temporary infrastructure would be required for the construction phase, including construction compounds and accesses.

1.1.12 Further information regarding the project description is presented within Volume 1 Chapter 6: Project Description of the ES.

1.2 Methodology

Sources of Information

1.2.1 The FRA has been prepared using a staged approach in accordance with the National Policy Statements (NPSs) EN-1, EN-3 and EN-5; issued in March 2023, together with the NPPF, and PPG-ID7. Further details on the legislative, policy and guidance framework are provided within **Section 1.3**.

1.2.2 Initially, screening studies have been undertaken utilising publicly available information within the hydrology and flood risk study area which may warrant further consideration. Identified potential flooding issues are then assessed further within a specific flood risk section. The outputs of this assessment are:

- A review of all available information and a qualitative analysis of the flood risk to the Project has been produced.
- Identification of any impact the Project has on flood risk elsewhere.

Information Sources

1.2.3 Information and reports used in the preparation of the report is set out in **Table 1.1** and **Table 1.2**, respectively below.

Table 1.1: Information sources consulted during the preparation of the FRA report

Source	Year	Author	Date accessed
https://environment.data.gov.uk/catchment-planning/	2023	Environment Agency (EA)	29/07/2024
https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall	2022	EA	29/07/2024
https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=363522b846b842a4a905829a8d8b3d0c	2021	EA	29/07/2024
reference GSIP-2023-13424-13080_1 to _16 and GSIP-2023-13424-13081	2023	Groundsure	29/07/2024
https://fehweb.ceh.ac.uk/GB/map	2023	Flood Estimation Handbook (FEH)	29/07/2024
https://flood-map-for-planning.service.gov.uk/	2023	EA	29/07/2024
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances	2022	UK Government	29/07/2024

Source	Year	Author	Date accessed
https://www.bgs.ac.uk/map-viewers/geoindex-onshore/	2023	BGS	29/07/2024
https://www.ada.org.uk/idb-map/	2023	Internal Drainage Board (IDB)	29/07/2024
https://check-long-term-flood-risk.service.gov.uk/map	2023	EA	29/07/2024
https://magic.defra.gov.uk/MagicMap.aspx	2026	DEFRA	29/07/2024
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf	2021	UK Government (Ministry of Housing Communities & Local Government)	29/07/2024
https://maps.the-hug.net/	2023	Ordnance Survey (OS)	29/07/2024
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf	2023	Department of Energy and Climate Change	29/07/2024
National Policy Statement for renewable energy infrastructure (EN-3) - GOV.UK (www.gov.uk)	2023	Department for Energy Security and Net Zero	29/07/2024
National Policy Statement for electricity networks infrastructure (EN-5) - GOV.UK (www.gov.uk)	2023	Department for Energy Security and Net Zero	29/07/2024
https://www.gov.uk/guidance/flood-risk-and-coastal-change	2022	UK Government (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government)	29/07/2024
http://www.landis.org.uk/soilscapes/	2024	The National Soils Research Institute	29/07/2024

Table 1.2: Reports Consulted during preparation of the FRA report

Title	Source	Year	Author	Date accessed
Cassington Neighbourhood Plan (2021 – 2041 Submission Plan)	https://www.westoxon.gov.uk/media/pdplutja/submission-draft-cassington-neighbourhood-plan.pdf	2022	Cassington Parish Council	29/07/2024

Title	Source	Year	Author	Date accessed
Cassington NFM report	n/a	2020	EA	29/07/2024
The Cherwell Local Plan 2011 - 2031	https://www.cherwell.gov.uk/downloads/download/45/adopted-cherwell-local-plan-2011-2031-part-1-incorporating-policy-bicester-13-re-adopted-on-19-december-2016	2016	Cherwell District Council. North Oxfordshire	29/07/2024
Cherwell Level 1 Strategic Flood Risk Assessment (Update)	https://www.cherwell.gov.uk/downloads/download/366/cherwell-level-1-strategic-flood-risk-assessment-update-may-2017	2017	Cherwell Distirct Council (CDC)	29/07/2024
Cumnor Parish Neighbourhood Development Plan 2021 to 2031	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.whitehorsedc.gov.uk/wp-content/uploads/sites/3/2021/09/Cumnor-Parish-Neighbourhood-Development-Plan-v7.0-07072021-min.pdf	2021	Cumnoor Parish Council	29/07/2024
Cassington NFM report.	n/a	2020	EA	29/07/2024
Enviro and Geo Insight digital reports	reference GSIP-2023-13424-13080_1 to _16 and GSIP-2023-13424-13081	2023	Groundsure	29/07/2024
Eynsham Neighbourhood Plan 2018 – 2031	https://www.westoxon.gov.uk/media/ngkckyhi/eynsham-neighbourhood-plan.pdf	2020	Eynsham Parish Council	29/07/2024
Oxfordshire County Council Local Standards and guidance for surface water drainage on major development in Oxfordshire	https://www.oxfordshirefloodtoolkit.com/wp-content/uploads/2022/01/LOCAL-STANDARDS-AND-GUIDANCE-FOR-SURFACE-WATER-DRAINAGE-ON-MAJOR-DEVELOPMENT-IN-OXFORDSHIRE-Jan-22-2.pdf	2021	Oxfordshire County Council (OCC)	29/07/2024
Oxfordshire County Council Local Flood Risk Management Strategy	https://www.oxfordshirefloodtoolkit.com/wp-content/uploads/2016/04/OxfordshireFloodRiskManagementStrategy.pdf	2016	Oxfordshire County Council (OCC)	29/07/2024
Oxfordshire County Council Local Flood Risk Management Strategy	https://ehq-production-europe.s3.eu-west-1.amazonaws.com/d30a3eae866fe7b933888438a8496c95ecc8bed8/original/1719306589/c4410563a8bdef623202b4ba8e4e1102_DRAFT_Oxfordshire_Local_Flood_Risk_Management_Strategy_v3.0.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-	2024	Oxfordshire County Council (OCC)	29/07/2024

Title	Source	Year	Author	Date accessed
	Credential=AKIA4KKNQAKICO37GBEP%2F20240905%2Feu-west-1%2Fs3%2Faws4_request&X-Amz-Date=20240905T080833Z&X-Amz-Expires=300&X-Amz-SignedHeaders=host&X-Amz-Signature=0d6782d454fca21e2693d6466bb7e2085488cefed9d803f4bbc0133f5605421a			
Vale of the White Horse District Council – Local Plan Part 1 2031	https://www.whitehorsedc.gov.uk/vale-of-white-horse-district-council/planning-and-development/local-plan-and-planning-policies/local-plan-2031/	2016	Vale of the White Horse (VoWH) District Council	29/07/2024
Vale of the White Horse District Council – Local Plan Part 2 2031	https://data.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=1173080763&CODE=481ECD6ACC86E6C4A6FE38F6391274B7	2019	VoWH District Council	29/07/2024
Vale of the White Horse District Council – SFRA	https://data.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=1954970524&CODE=E1F38F2C2D52A12711B6F45AB26D5181	2017	AECOM on behalf of Vale of the White Horse District Council	29/07/2024
West Oxfordshire District Council – Level 1 SFRA	https://www.westoxon.gov.uk/media/0adg2zs5/env9-west-oxfordshire-district-council-strategic-flood-risk-assessment-update-report-november-2016.pdf	2016	AECOM on behalf of West Oxfordshire District Council (WODS)	29/07/2024
West Oxfordshire District Council – Level 2 SFRA	https://www.westoxon.gov.uk/media/mngkh35q/ev24-level-2-strategic-flood-risk-assessment-land-north-and-west-of.pdf	2020	JBA Consulting on behalf of behalf of West Oxfordshire District Council	29/07/2024
West Oxfordshire Local Plan 2031	https://www.westoxon.gov.uk/media/feyjmpen/local-plan.pdf	2018	West Oxfordshire District Council	29/07/2024
Woodstock Neighbourhood Plan (draft)	https://woodstock-tc.gov.uk/wp-content/uploads/2021/06/Woodstock-Neighbourhood-Plan-Draft-Version-2020-2031.pdf	2020	Woodstock Town Council	29/07/2024

Study Area

1.2.4 The hydrology and flood risk study area to be used for the assessment has been ascertained using professional judgement and focuses on where potential impacts are most likely to occur on hydrological and flood risk receptors.

1.2.5 The extent of the hydrology and flood risk study area is informed by the nature and scale of the Project and the EA Catchment Data Explorer Mapping which provides information regarding hydrological catchments within the Project is located within **Figure 1.1.**

1.2.6 The EA Catchment Data Explorer Mapping shows Main Rivers and ordinary watercourses located within the project area drain to the Cherwell and Ray, Cotswolds and Gloucestershire and the Vale management catchments which alongside 17 other management catchments, form the Thames River Basin District. Management catchments are presented within **Figure 1.2.**

1.2.7 The study area takes into account the range of potential impacts arising from activities associated with the Project. The zone of influence is deemed appropriate by the impacts expected to arise from the Project. Based on the above, the hydrology and flood risk study area ('study area') is defined as:

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the Project, in addition to;
- A 250m buffer applied to the cable corridor, temporary construction compounds, and temporary and permanent access roads / haul roads
- A 1km buffer applied to the three solar PV array areas including ancillary infrastructure, NGET substation, Applicant substation, HV transformers and PCS units)
- A 1km buffer applies to the substations.

1.2.8 Due to the nature and scale of the Project, the study area is appropriate for data collection taking into account the likely zone of influence by hydrological receptors. Beyond these buffer zones, the magnitude of effect will be unable to be accurately assessed as the dilution capacity becomes greater as the hydraulic catchment increases downstream of the Project. The buffers have also been chosen to identify any existing receptors, assets or infrastructure that have the potential to be affected by temporary flood risk as a result of the construction phase of the Project.

Hydraulic Modelling (Surface Water)

1.2.9 As part of the consultation, it was identified that an existing surface water risk is present within the site boundary north of Cassington Village and adjacent south of the site within Cassington Village. The identified surface water risk is shown in the online EA Risk of Flooding from Surface Water (RoFSW).

1.2.10 The RoFSW map is derived from a national model with varying resolution. As such it is not able to capture site-specific conditions. The updated modelling is in support of providing a more detailed understanding of the baseline conditions. The modelling is used to aid the design of Sustainable Drainage Systems (SuDS) features to provide appropriate mitigation and a betterment where feasible.

1.2.11 The surface water hydraulic model produced extents and flood depths within the Project and how flood depths and extents will evolve with climate change. The flood AEP events that were assessed as a part of the flood analysis include:

- 1 in 30-year;
- 1 in 100-year;

- 1 in 100-year + 30% Climate Change (CC) and
- 1 in 1000-year.

1.2.12 For more information, please see Volume 3 Appendices 10.5 Surface Water Modelling Report of the ES.

Ordinary Watercourses

1.2.13 Only those catchments over 3km^2 are included within the FMP Flood Zones. There are several ordinary watercourses within the Site that due to their catchment size have therefore, not been modelled.

1.2.14 For these smaller watercourses (less than 3km^2) surface water flood data is used to understand the risk. Surface water data does not include 100 year plus climate change allowances as this is not modelled.

1.2.15 Therefore, it is proposed to use the 1 in 1000-year surface water flood extent to assess the risk in the absence of any climate change data. To check that this is an appropriate approach in the absence of climate change data further investigation has been undertaken to ensure that the provided values exceed any anticipated climate change data.

1.2.16 The catchment boundaries have been extracted for the various ordinary watercourses. The catchments have been run through the Revitalised Flood Hydrograph 2 (ReFH2) hydrology software to extract a flow rating curve and ensure that the 1 in 1000-year results will provide higher values than the 1 in 100 year plus relevant climate change allowance by comparing the estimated flows within the rating curve. This is to ensure that the 1000 year is considered a conservative proxy for assessing climate change risk.

1.2.17 Information regarding the risk from ordinary watercourses is discussed in Section 2.4, 3.4, 4.4 and 5.4.

Format of assessment

1.2.18 There are three areas of solar installation (Northern, Central and Southern Site Areas) the Southern Site Area includes the NGET Substation. The three areas of solar installation will be connected via 220kV underground cables. These 220kV cables are required to connect all Project sites with the NGET Substation.

1.2.19 As such, separate flood risk assessments have been undertaken for the following

- Northern Site Area;
- Central Site Area;
- Southern Site Area (including the NGET Substation) and
- Cable Corridor.

1.2.20 Within each flood risk assessment, the following sources of flood risk have been identified and assessed, and mitigation measures have been proposed as appropriate:

- Fluvial and tidal flood risk,
- ordinary watercourse and surface water,
- groundwater flood risk,
- reservoir flood risk, and
- sewer flood risk.

1.2.21 The Sequential Test and Exception Test (further defined within **Section 1.3)** is presented within **Section 6.**

1.2.22 A proposed conceptual SuDS design has also been undertaken for the three Site Areas (including the Applicant substation and NGET substation). This has been provided in Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

1.3 Legislation, Policy and Guidance

National Policy Legislation and Guidance

National Policy Statements

1.3.1 Planning policy for Nationally Significant Infrastructure Projects, specifically in relation to hydrology and flood risk is contained in the 2023 NPS EN-1, EN-3 and EN-5 documents. It sets out the aims of planning policy on development and flood risk to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process. **Table 1.3** sets out a summary of the policies within these NPSs, relevant to Hydrology and Flood Risk along with how this has been addressed in the FRA.

Table 1.3: NPS requirements in relation to the FRA

Summary of NPS requirements	How and where considered in the FRA
Climate change adaption	
A robust approach to flood risk management is a vital element of climate change adaptation; the applicant and the Secretary of State should take account of the policy on climate change adaptation in Section 4.9. [paragraph 5.8.5 NPS EN-1]	An assessment of an increase of peak river flow and peak rainfall intensities driven by climate change has been made within the FRA to the end of the Project's development lifetime. The impacts to flooding as a result of climate change has been taken into account within this Flood Risk Assessment (FRA) **sections 2.4, 3.4, 4.4 and 5.4.** The FRA also considers other sources of flooding including groundwater to ensure the Project is safe throughout its project lifetime **sections 2.4, 3.4, 4.4 and 5.4.**

Summary of NPS requirements	How and where considered in the FRA
As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, … applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: • flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change; and earth movement or subsidence caused by flooding or drought (for underground cables). [paragraph 2.3.2, of NPS EN-5].	The impacts to flooding as a result of climate change has been taken into account within this Flood Risk Assessment (FRA) **sections 2.4, 3.4, 4.4** and **5.4.** The Conceptual Drainage Strategy provided in Appendix 10.2: Conceptual Drainage Strategy of the ES and assesses drainage requirements for new impermeable areas of the site, taking into account increases in peak rainfall intensity as a result of climate change.
Flood Risk	
A site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3 in England. In Flood Zone 1, an assessment should accompany all proposals for sites of 1 hectare or more. This assessment should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account. [paragraph 5.8.13 – 5.8.14, of NPS EN-1].	Due to the size of the Project which is over 1 ha, this FRA has been prepared for the Project The FRA considers flood risk from fluvial and tidal sources in addition to flooding from surface water / ordinary watercourses, groundwater, sewers, reservoirs and other artificial sources. To assess fluvial flood risk within the Central Site Area, a hydraulic modelling exercise was undertaken. Subsequent to the submission of the model the Applicant has sought to steer development to Flood Zone 1. Therefore the material weight on the model has significantly reduced, and therefore has now been removed from the informing the assessment. Information has also been obtained from the Environment Agency and Lead Local Flood Authority. See **sections 2.4, 3.4, 4.4** and **5.4.** Development has been sequentially steered towards Flood Zone 1, with solar PV modules and associated ancillary infrastructure located within Flood Zone 1 and has a low risk of flooding from all sources. Temporary construction compounds and permanent access tracks are located within Flood Zone 1, 2 and 3 and have been subjected to the sequential test and exception test. See **section 6.**
In determining an application for development consent, the decision maker should be satisfied that where relevant: • the application is supported by an appropriate FRA • the Sequential Test has been applied and satisfied as part of site selection • a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk • the proposal is in line with any relevant national and local flood risk management strategy SuDS (as required in the next paragraph on National Standards) have been used unless there is clear evidence that their use would be inappropriate • in flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in paragraph 5.8.42) • the project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance. [paragraph 5.8.36, of NPS EN-1].	
Development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate	

Summary of NPS requirements	How and where considered in the FRA
change throughout the lifetime of the development. There should be no net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques. [paragraph 5.8.10 – 5.8.12, of NPS EN-1].	In regards to an assessment of residual flood risk, whilst flood defences are present within the study area and provide a degree of protection against flooding, the undefended scenario has been used to assess residual fluvial flood risk throughout the development lifetime, taking into account the effects of climate change. Historical flood events recorded by the Environment Agency and SFRA reports are also noted. See **sections 2.4, 3.4, 4.4** and **5.4.** Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods, and are to be secured through requirements of the DCO. Commitments are presented within Volume 1 Chapter 10 Hydrology and Flood Risk. For temporary HDD Compounds to be situated with Flood Zone 3 there is a commitment for a flood management plan to reduce vulnerability of site users during the development lifetime to ensure development is safe for its lifetime. This is set out in the Outline CoCP **[EN010147/APP/7.6.1]**.
Vulnerable aspects of the development should be located on parts of the site at lower risk and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife Overarching National Policy Statement for Energy (EN-1) habitat and flood storage uses. Opportunities should be taken to lower flood risk by reducing the built footprint of previously developed sites and using SuDS. The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding. [paragraphs 5.8.29 of NPS EN-1].	
Flood resistant and resilient materials and design should be adopted to minimise damage and speed recovery in the event of a flood. [paragraph 5.8.35 if NPS EN-1]	
Energy projects should not normally be consented within Flood Zone 3b, or on land expected to fall within these zones within its predicted lifetime However, where essential energy infrastructure has to be located in such areas, for operational reasons, they should only be consented if the development will not result in a net loss of floodplain storage and will not impede water flows. Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if they are satisfied that the increase in present and future flood risk can be mitigated to an acceptable and safe level and taking account of the benefits of, including the need for, nationally significant energy infrastructure. [paragraph 5.8.41 – 5.8.42 of NPS EN-1]	
Vulnerable aspects of the development should be located on parts of the site at lower risk and residual risk of flooding. Applicants should	

Summary of NPS requirements	How and where considered in the FRA
seek opportunities to use open space for multiple purposes such as amenity, wildlife Overarching National Policy Statement for Energy (EN-1) habitat and flood storage uses. Opportunities should be taken to lower flood risk by reducing the built footprint of previously developed sites and using SuDS. The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding. [paragraphs 5.8.29 of NPS EN-1].	
Watercourses on Site	
Development (including construction works) will need to account for any existing watercourses and flood and coastal erosion risk management structures or features, or any land likely to be needed for future structures or features so as to ensure: • Access, clearances and sufficient land are retained to enable their maintenance, repair, operation, and replacement, as necessary. • Their standard of protection is not reduced. • Their condition or structural integrity is not reduced. [paragraph 5.8.17 of NPS EN-1].	Appropriate mitigation measures in regard to flood risk, such as appropriate assessments for Ordinary Watercourses, Main Rivers and associated flood defences are outlined within The distance of easements from on-site watercourses is dependent on the Local Planning Authorities and their associated guidance. It is proposed to provide a consistent 10m easement for watercourses within West Oxfordshire District Council, Cherwell District Council and for watercourses within the Vale of White Horse District Council. The above is set out in **Sections 2.5, 3.5, 4.5 and 5.5.** For temporary HDD Compounds to be situated with Flood Zone 3 there is a commitment for a flood management plan to reduce vulnerability of site users during the development lifetime to ensure development is safe for its lifetime. This is set out in the Outline CoCP **[EN010145/APP/7.6.1]**. For crossing of watercourses 'HDD (or other trenchless techniques) entry and exit points will be located at least 10 m away from Environment Agency main rivers at least 10m from ordinary watercourses (depending on the Council). This commitment is This is set out in the Outline CoCP **[EN010147/APP/7.6.1]**.
Culverting existing watercourses/drainage ditches should be avoided. Where culverting for access is unavoidable, applicants should demonstrate that no reasonable alternatives exist and where necessary it will only be in place temporarily for the construction period. [paragraph 2.10.86 and 2.10.87 of NPS EN-3]	
Consultation	
Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions before the official pre-application stage of the NSIP process with the EA, and, where	The applicant has engaged with the Environment Agency and LLFA with meetings and technical notes

Summary of NPS requirements	How and where considered in the FRA
relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owner and operators. Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, and identify the information that will be required by the Secretary of State to reach a decision on the application when it is submitted. If the EA or another flood risk management authority has reasonable concerns about the proposal on flood risk grounds, the applicant should discuss these concerns with the EA and take all reasonable steps to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the authority's concerns. [paragraph 5.8.18 - 5.8.20 of NPS EN-1]	in support of the FRA. They have both agreed with the approach in principle. Key consultation summaries are presented within the Consultation Report **[EN010147/APP/5.1].**

National Planning Policy Framework

1.3.2 The NPPF was released in March 2012 and was updated in December 2023. The document sets out the Government's planning policies for England.

1.3.3 Defra published their 'Non-statutory technical standards for sustainable drainage systems' in March 2015. These are supported by the revised NPPF.

1.3.4 The PPG (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2021) supports the NPPF and provides guidance across a range of topic areas.

1.3.5 **Table 10-2** of Volume 1 Chapter 10 Hydrology and Flood Risk sets out a summary of the NPPF policies relevant to this chapter. This details how the Project has met the requirements regarding hydrology and flood risk for the Project in relation to the NPPF in accordance with this FRA and Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

Table 1.4: Summary of NPPF requirements relevant to the FRA

Policy	Key Provisions
National Planning Practice Framework	A site-specific FRA is required for all proposals for new development in Flood Zones 2 and 3, and for any proposed development covering an area of 1 hectare (ha) or greater in Flood Zone 1 (paragraph 173 NPPF).
	New development should take into account climate change and that appropriate mitigation should be provided. It states that inappropriate development should be located away from high risk areas and a sequential risk-based approach should be applied through the local planning system to the location of development (paragraph 158).
	In accordance with the Project Vulnerability Categories, the Project is classified as 'Essential infrastructure'. *"Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power*

Policy	Key Provisions
	stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood" is classified as 'Essential infrastructure'. (Appendix 3 NPPF)
	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 proposed development in areas with a lower risk of flooding (paragraph 168 NPPF).
	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. To pass the exception test it should be demonstrated that: a. the development would provide wider sustainability benefits to the community that outweigh the flood risk; and b. the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. Both elements of the exception test should be satisfied for development to be allocated or permitted (paragraphs 169 and 170 NPPF).
	When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment59. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that: a. within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; b. the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment; c. it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; d. any residual risk can be safely managed; and e. safe access and escape routes are included where appropriate, as part of an agreed emergency plan (paragraph 173 NPPF).
National Planning Practice Guidance	PPG provides planning guidance on a range of topics including flood risk. PPG ID7 (March 2014) for Flood Risk and Coastal Change provides additional guidance in the implementation of the NPPF in relation to development, flood risk and drainage. Key aspects of the PPG are detailed below.
	The PPG details Environment Agency Flood Zones and flood risk classification and vulnerability for the Transmission Assets development classification. See **paragraphs 1.3.6** and **1.3.7 and Table 1.5** for more information.
	The FRA should detail how flood risk at the site likely to be affected by climate change. Further advice on how to take account of the impacts of climate change in flood risk assessments is available from the Environment Agency.
	In regard to the need for flood risk activity permits for development in proximity to watercourses, provisions have been made to disapply Flood Risk Activity Permits (FRAPS) as part of the project. Please see Outline Layout and Design Principles **[EN010147/APP/7.7]** for more details.

Flood Map for Planning

1.3.6 As referenced within **Table 1.4,** the Environment Agency Flood Map for Planning shows the locations of Flood Zones. Flood Zones refer to the probability of flooding from rivers and sea in a given year, assuming no defences are in place. Mapping does not account for climate change. Flood zone definitions are presented below within **Table 1.5.**

Table 1.5: Flood Map for Planning Flood Zones.

Flood zone	Flood zone definitions
Flood Zone 1	land assessed as having a less than 0.1% annual probability of river or sea flooding. (Land shown as 'clear' on the Flood Map for Planning (FMfP))
Flood Zone 2	land assessed as having between a 1% and 0.1% annual probability of river flooding, or between a 0.5% and 0.1% annual probability of sea flooding in any year. (Land shown in light blue on the FMfP)
Flood Zone 3a	land having a 1% or greater annual probability of river flooding, or a 0.5% or greater annual probability of flooding from the sea in any year. (Land shown in dark blue on the FMfP).
Flood Zone 3b	This zone comprises 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 annual probability 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% annual probability of flooding).

1.3.7 As discussed within **Table 1.4,** according to Table 3: Flood risk vulnerability and flood zone compatibility of the NPPF, the Transmission Assets and their associated construction activities and enabling works is classified as 'essential infrastructure' and as such is acceptable within Flood Zones 1 and 2. The exception test is required if development is proposed within Flood Zone 3.

Long Term Flood Risk Mapping

1.3.8 The Environment Agency's Long Term Flood Risk Mapping is available online and identifies areas at risk of surface water flooding, primarily from pluvial sources and small watercourses. The classification of the risk is based on the following.

- **High risk**: The area has a chance of flooding of greater than 1 in 30 (3.3%) each year.
- **Medium risk**: The area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) each year.
- **Low risk**: The area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) each year.
- **Very low risk**: The area has a chance of flooding of less than 1 in 1000 (0.1%) each year.

Climate Change Guidance

1.3.9 As described within **Table 1.4**, The NPPF states that new development should take into account climate change and that appropriate mitigation should be provided to minimise vulnerability and provide resilience to the impacts of climate change.

1.3.10 The NPPF and supporting planning practice guidance on flood risk and coastal change require an FRA to demonstrate how flood risk will be managed now and over the development's lifetime, taking climate change into account. In relation to how flood risk will evolve as a result of climate change, impacts to how peak river flows, rainfall intensity and sea level rise is defined and described in this section, and how these impacts could affect the Project for its development lifetime.

Peak River Flow Allowances

1.3.11 In May 2022 the EA released revised climate change allowances, which updates the 2020 and 2011 version of 'Adapting to Climate Change: Advice to Flood & Coastal Risk Management. The EA has used the UKCP18 projections to update the peak river flow allowances and have based them on management catchments instead of river basin districts.

1.3.12 The Project site boundary is located across the boundary of three catchments with differing climate change allowances:

- Cherwell and Ray Management Catchment;
- Gloucestershire and the Vale Management Catchment; and
- Cotswolds Management Catchment.

1.3.13 The guidance on how to apply peak river flow allowances has also been changed. The higher central allowance must be used where development classified as 'essential infrastructure' is located within Flood Zone 2 or 3a:

1.3.14 The document provides a central, higher and upper estimate for increases in river flow as a consequence of climate change. **Table 1.6** below presents the anticipated increase in peak river flows for each Management Catchment.

Table 1.6: Peak river flow allowances by Management Catchment

Management Catchment	Allowance category	Total potential change anticipated for '2020s' (2015-39)	Total potential change anticipated for '2050s' (2040-2069)	Total potential change anticipated for the '2080s' (2070 - 2115)
Cotswolds	Upper Estimate	31%	43%	82%
	Higher Central Estimate	17%	21%	43%
	Central Estimate	11%	13%	30%
	Upper Estimate	33%	43%	84%

Gloucestershire and the Vale	Higher Central Estimate	17%	19%	41%
	Central Estimate	11%	11%	26%
Cherwell and Ray	Upper Estimate	24%	27%	49%
	Higher Central Estimate	11%	10%	25%
	Central Estimate	6%	4%	15%

1.3.15 The Project is to be fully operational by Q1 of 2029. For the purposes of this assessment, the Project is expected to have a 42 year design lifetime.

1.3.16 As such the development will no longer be operational by the end of 2066 Therefore, the 2050's epoch should be assessed.

1.3.17 For 'essential infrastructure', the 2050's epoch higher central allowance will be used to assess uplifts to peak river flow within the Project to the end of the operational phase. This equates to 21% within the Cotswolds catchment, 19% within the Gloucestershire and the Vale catchment, and 10% within the Cherwell and Ray catchment.

Peak Rainfall Allowances

1.3.18 Peak Rainfall Allowances are used to consider how increased rainfall affects surface water flood risk and the design of drainage systems to manage the increased rainfall. Like updates to peak river flow allowances, peak rainfall allowances are now based on management catchments instead of river basin districts. It is noted all three management catchments have the same peak rainfall allowance uplifts.

1.3.19 Increased rainfall affects surface water flood risk and how drainage systems need to be designed. In May 2022 the EA released revised peak rainfall climate change allowances, to also reflect the Management Catchment geography. The anticipated increases for each catchment are the same and are presented within **Table 1.7** below.

Table 1.7: Cotswold, Gloucestershire and Cherwell & Ray Management Catchment peak rainfall allowances

1% Annual Exceedance Rainfall Event		
Epoch	**Central allowance**	**Upper allowance**
2050s	20%	40%
2070s	25%	40%

1.3.20 Run-off and attenuation calculation for any development design would have to take into account the above change in climate change policy, which is determined by the type and lifetime of the Project.

- Developments with a lifetime beyond 2100 must assess the upper end allowance for the 2070s epoch. The Project should be designed so that there is no increased flood risk elsewhere and the Project is safe from

surface water flooding for the upper end allowance in the 1% AEP event (1 in 100-year rainfall event).

- Developments with a lifetime between 2061 and 2100 should consider the central allowance for the 2070s epoch.
- Developments with a lifetime up to 2060 should consider the central allowance for the 2050s epoch.

1.3.21 The Project is to be fully operational by 2028. For the purposes of this assessment, the Project is expected to have a 37.5-year operating lifetime. Therefore, the development will no longer be operational by the end of 2066.

1.3.22 Based on the above information, and the type of development proposed, the 2070's central allowance is considered to be appropriate, and a 25% climate change allowance is to be used.

Local Planning Policy

1.3.23 The relevant local planning policies applicable to the FRA are summarised in **Table 1.8.**

Table 1.8: Summary of local planning policy relevant to this chapter

Policy	Key Provisions
West Oxfordshire Local Plan 2031	
Policy EH7: Flood Risk	Flood risk will be managed using the sequential, risk-based approach, set out in the National Planning Policy Framework, of avoiding flood risk to people and property where possible and managing any residual risk (taking account of the impacts of climate change). In assessing proposals for development: • the Sequential Test and, if necessary, the Exception Test will be applied; • all sources of flooding (including sewer flooding and surface water flooding) will need to be addressed and measures to manage or reduce their impacts, onsite and elsewhere, incorporated into the development proposal; • appropriate flood resilient and resistant measures should be used; • sustainable drainage systems to manage run-off and support improvements in water quality and pressures on sewer infrastructure will be integrated into the site design, maximising their habitat value and ensuring their long term maintenance; • a site-specific flood risk assessment will be required for all proposals of 1ha or more and for any proposal in Flood Zone 2 and 3 and Critical Drainage Areas; • only water compatible uses and essential infrastructure will be allowed in a functional flood plain (Flood Zone 3b); • land required for flood management will be safeguarded from development and, where applicable, managed as part of the green infrastructure network, including maximising its biodiversity value.
Vale of White Horse District Council Local Plan 2031	
Core Policy 42: Flood Risk	The risk and impact of flooding will be minimised through: 1. directing new development to areas with the lowest probability of flooding 2. ensuring that all new development addresses the effective management of all sources of flood risk 3. ensuring that development does not increase the risk of flooding elsewhere, and

Policy	Key Provisions
	4. ensuring wider environmental benefits of development in relation to flood risk. The suitability of development proposed in flood zones will be strictly assessed using the Sequential Test, and, where necessary, the Exceptions Test. A sequential approach should be used at site level. A site-specific flood risk assessment will be required for all developments of 1 ha and greater in Flood Zone 1 and, for all proposals for new development, including minor development and change of use in Flood Zone 2 and 3 and, in Critical Drainage Areas, and also where proposed development or a change of use to a more vulnerable class that may be subject to other forms of flooding. Appropriate mitigation and management measures will be required to be implemented. All development proposals must be assessed against the Vale of White Horse and South Oxfordshire Strategic Flood Risk Assessment and the Oxfordshire Local Flood Risk Management Strategy to address locally significant flooding. Appropriate mitigation and management measures must be implemented.
Development Policy 30: Watercourses	Development of land that contains or is adjacent to a watercourse will only be permitted where it would not have a detrimental impact on the function or setting of the watercourse or its biodiversity, or the detrimental impact can be appropriately mitigated. • Plans for development adjacent to or encompassing a watercourse should include a minimum 10 m buffer zone along both sides of the watercourse to create a corridor of land and water favourable to the enhancement of biodiversity. • Proposals which involve culverting a watercourse are unlikely to be considered acceptable. • Development which is located within 20 m of a watercourse will require a construction management plan to be agreed with the Council before commencement of work to ensure that the watercourse will be satisfactorily protected from damage, disturbance or pollution.
Cherwell Local Plan 2011 - 2031	
Policy ESD 1: Mitigating and Adapting to Climate Change	[…] The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following: • Taking into account the known physical and environmental constraints when identifying locations for development. • Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling. • Minimising the risk of flooding and making use of sustainable drainage methods, and Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).
Policy ESD 6: Sustainable Flood Risk Management	The Council will manage and reduce flood risk in the District through using a sequential approach to development; locating vulnerable developments in areas at lower risk of flooding. Development proposals will be assessed according to the sequential approach and where necessary the exceptions test as set out in the NPPF and NPPG. Development will only be permitted in areas of flood risk when there are no reasonably available sites in areas of lower flood risk and the benefits of the development outweigh the risks from flooding. In addition to safeguarding floodplains from development, opportunities will be sought to restore natural river flows and floodplains, increasing their amenity and biodiversity value. Building over or culverting of watercourses should be avoided and the removal of existing culverts will be encouraged.

Policy	Key Provisions
	Existing flood defences will be protected from damaging development and where development is considered appropriate in areas protected by such defences it must allow for the maintenance and management of the defences and be designed to be resilient to flooding. Site specific flood risk assessments will be required to accompany development proposals in the following situations: • All development proposals located in flood zones 2 or 3 • Development proposals of 1 ha or more located in flood zone 1 • Development sites located in an area known to have experienced flooding problems • Development sites located within 9m of any watercourses.
Policy ESD 7: Sustainable Drainage Systems (SuDS)	All development will be required to use sustainable drainage systems (SuDS) for the management of surface water run-off. Where site specific Flood Risk Assessments are required in association with development proposals, they should be used to determine how SuDS can be used on particular sites and to design appropriate systems.
Cunmor Parish Neighbourhood Development plan (2021-2031	
Policy RNE2: Flood Risk	A. Development proposals should be located and designed to take account of flood risk. Particular attention should be given to potential flood risk impacts in the following wards: • Farmoor • Cumnor HillAR • Dean Court area B. Inappropriate development in areas at risk of flooding will not be supported unless the exception tests in paragraph 159 of the NPPF are met. Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere. C. Development proposals should take account of impacts in terms of runoff generation and surface water drainage and should provide the required mitigation measures to ensure that there is no unacceptable increase in surface water discharge off site. D. Where is it appropriate to do so new developments should incorporate Sustainable Drainage Systems. As appropriate to their scale, nature and location sustainable drainage should be suitably designed to ensure that discharge rates do not exceed greenfield rates with systems designed to add to the area's biodiversity. Systems should be designed with full consideration for future maintenance.

Strategic Flood Risk Assessments

1.3.24 The Strategic Flood Risk Assessment (SFRA) is a high-level document produced by LPAs to assess flood risk at a borough-wide scale for the present day and future, by accounting for the impacts of climate change. The following SFRAs have been referenced throughout this FRA report:

- Cherwell District Council Level 1 SFRA update (2017);

- West Oxfordshire District Council Level 1 SFRA (2016) and Level 2 SFRA (2020); and
- Vale of the White Horse SFRA (2017).

Local Neighbourhood Plan

1.3.25 The Cassington Local neighbourhood plan contain policies to help shape and deliver new development in an area and also contains information relevant to the baseline flood risk to the village. This document has been used to inform surface water modelling upstream of the village.

Local Flood Risk Management Strategy

1.3.26 OCC produced a LFRMS in 2016 and an updated draft report in 2024. The LFRMS outlines aims and objectives of the Council as the LLFA involving improving education regarding flood risk and taking a holistic approach to preventing an increase in flood risk in collaboration with district councils and the Environment Agency.

Preliminary Flood Risk Assessment

1.3.27 Oxfordshire County Council produced a Preliminary Flood Risk Assessment in 2011. Whilst this has been reviewed, it has been largely superseded by the SFRAs undertaken by the three relevant district councils relevant to the project.

2 Northern Site Area Flood Risk Assessment

2.1 Site Setting

Location

2.1.1 The Northern Site Area is located at National Grid Reference SP 45978 18150 and is located north of the town of Woodstock, west of Tackley and east of Wootton. The Northern Site Area is irregular in shape and its location is presented in **Section 1.2.**

Topography

2.1.2 Using LIDAR data, the northern area of the Northern Site has an approximate elevation between 112 m above Ordnance Datum (mAOD) and 109 mAOD. The centre of the Northern Site Area varies between 103m AOD to 87m AOD, the southern section of the Northern Site Area at approximately 82m AOD. Therefore, this indicates the site has an elevation that gently slopes from the north to the south.

Existing Use

2.1.3 The Northern Site study area is currently occupied by a combination of agricultural fields, the majority of which are bounded by trees, hedgerows and bushes. Multiple farm holdings are scattered around the boundary edges.

2.1.4 There is an extensive public right of way (PROW) network running within and around the Northern Site Area, most prominently the Oxfordshire Way which crosses at an east-west bearing. The 416/11/20 bridleway also runs in a north-south bearing through the section for almost its entire length.

Proposed Use

2.1.5 The total developable area for the Northern Site Area is 248ha. The Project includes the following which is to be constructed in several phases:

- 45 PCS units;
- Two HV Transformers (Secondary Substations);
- One temporary construction compound;
- Electrical cabling; and
- Solar PV modules, mounted on metal framework and elevated between 1.8m and 2.5m above surrounding ground levels.

2.1.6 Further information regarding the project description is presented within Volume 1 Chapter 6: Project Description of the ES.

2.2 Hydrological Overview

2.2.1 The EA Catchment Data Explorer Mapping shows the Project is located within the Cherwell and Ray and Cotswolds management catchments which discharge to the River Thames.

Main Rivers

2.2.2 Ordnance Survey (OS) Mapping indicates that the nearest EA Main River is the River Glyme, located approximately 300m to the west of the Northern Site Area at its closest point. The River Glyme flows in a southerly direction and eventually flows into the River Evenlode south of the Northern Site Area. Additionally, a portion of the River Cherwell is present approximately 660 m to the north east of the Northern Site Area within the study area. Main Rivers are presented within **Figure 1.3a.**

Ordinary Watercourses

2.2.3 The River Dorn is approximately 80m to the west of the Northern Site Area at its closest point, and flows in a southerly direction, eventually out falling to the River Glyme to the west of the Northern Site Area. The River Dorn is classified as an ordinary Watercourse.

2.2.4 An unnamed ordinary watercourse is present to the north-east of the Northern Site Area. This appears to cut off in the OS watercourse mapping at the north

east of the site boundary. This appears to be an agricultural field drain/ditch (National Grid reference: 446021, 220428 to 445025, 217951) which is not permanently present with water and conveys flows south westwards. It is anticipated flows ultimately discharge to the River Glyme. Ordinary watercourses are presented within **Figure 1.3a.**

Other Hydrological Features

2.2.5 The Oxford Canal is located in the north eastern portion of the study area, approximately 960 m east of the Northern Site Area at it's closest point. The Oxford Canal appears to be hydrologically connected to the River Cherwell at this location. Other hydrological features are presented within **Figure 1.3a.**

Internal Drainage Boards

2.2.6 The Northern Site Area and associated study area buffer are not located within an Internal Drainage Board (IDB).

2.3 Hydrogeological Overview

Geological Setting

2.3.1 British Geological Survey (BGS) online mapping (1:50,000 scale) confirmed the Northern Site Area is not underlain by superficial deposits, however Head, Alluvium, River Terrace Deposits and Wolvercote Sand and Gravel Member deposits are located within the associated study area, as presented within **Figure 1.4a.** The site is underlain by a variety of bedrock strata, listed below and presented within **Figure 1.5a.**

- Cornbrash Formation formed of Limestone
- Forest Marble Formation formed of Limestone, mudstone, interbedded.
- Forest Marble Formation formed of Limestone
- Forest Marble Formation formed of Mudstone
- White Limestone Formation formed of Limestone
- Hampen Formation formed of Limestone
- Forest Marble Formation formed of Mudstone
- Kellaways Clay Member formed of Mudstone
- Kellaways Formation and Oxford Clay Formation formed of mudstone, siltstone and sandstone
- Horsehay Sand Formation formed of Sandstone
- Sharp's Hill Formation formed of argillaceous rocks with subordinate sandstone and limestone

2.3.2 Bedrock is discussed in further detail within Volume 1 Chapter 11 Geology, hydrogeology and ground conditions of the ES.

Groundwater

2.3.3 BGS borehole log mapping shows a borehole log within the centre of the Northern Site Area, reference: SP41NE108. Water was encountered 15.24m and 18.22m below ground level (bill), rising to a standing level of 11.60m bgl.

2.3.4 The West Oxfordshire District Council Level 1 SFRA denoted the majority of the Northern Site Area within the council boundary is not susceptible to groundwater flooding. Along the south-western border there is a small area at which there is 25% to 50% chance of groundwater flooding.

2.3.5 The Cherwell District Council Level 1 SFRA denoted the portion of the Northern Site Area located within the council boundary is located within an area with less than <25% chance of groundwater flooding.

Aquifer Designation

2.3.6 Bedrock underlying the east of the Northern Site Area is classified as a Secondary A Aquifer while bedrock within the west is classified as a Principal Aquifer. Secondary A Aquifer comprises of formations of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers. Principal Aquifers comprise of formations that provide a high level of water storage and may support water supply and / or river base flow on a strategic scale.

2.3.7 Further information on geology and ground conditions can be found in Volume 1, Chapter 11: Ground Conditions of the ES.

Source Protection Zone

2.3.8 EA online groundwater Source Protection Zone (SPZ) mapping indicates that the Northern Site Area is not located within a groundwater SPZ.

Soils Classification

2.3.9 The soils are described as ‘shallow lime-rich soils over chalk or limestone’, in the east of the Northern Site Area and ‘freely draining lime-rich loamy soils’ in the west of the Northern Site Area by the National Soils Research Institute.

2.3.10 An Agricultural Land Classification and Soil Resources survey conducted by Reading Agricultural Consultants in November 2023 indicates that the soils within the Northern Site Area are predominantly located shallow over limestone. Topsoils mainly comprise calcareous clay with some silty clay and loam in the south. The profiles are noted to drain freely into the bedrock.

2.4 Flood Risk

Fluvial and Tidal Flooding

Flood Map for Planning

2.4.1 The EA Flood Map for Planning (available online) is presented within **Figure 1.6**a and indicates that the majority of the Northern Site Area is located within

Flood Zone 1. Limited areas within the south-western extent of the Northern Site Area are located within Flood Zone 2 and 3.

2.4.2 Due to the distance inland, the Northern Site Area is not assessed to be at risk from tidal flooding.

2.4.3 No publicly available fluvial modelling is available for the area of Flood Zones 2 and 3 within the Northern Site Area. As such, areas of Flood Zone 3a and 3b are unable to be ascertained. It would appear the Flood Zone Mapping is picking up an overland flow pathway, associated with a partially dry ditch. This is further collaborated to the surface water flood extents. No modelled flood data was available from the EA as part of our data request. It is not deemed feasible to provide a hydraulic model for this agricultural field drain. This is due to the small size of the catchment.

2.4.4 The Long-Term Flood Risk from Surface Water mapping dataset has therefore, been used to provide further information on potential flood depths and flows from this watercourse. This information is discussed in the relevant surface water and ordinary watercourses section below.

Analysis

2.4.5 Solar PV modules and ancillary infrastructure (including PCS units, temporary compounds and HV Transformers (Secondary Substations) have been sequentially steered to Flood Zone 1. Temporary compounds will also be sequentially steered to Flood Zone 1.

Strategic Flood Risk Assessment

2.4.6 The Northern Site Area is split between two LPAs and is therefore covered by two different SFRAs. West Oxfordshire District Council broadly covers the western portion of the Northern study area and Cherwell District Council the eastern portion.

West Oxfordshire District Council Level SFRA

2.4.7 The West Oxfordshire District Council Level 1 SFRA confirmed that in the western study area, the flood zones within the Northern Site Area are as shown within the EA Flood Map for Planning.

Cherwell District Council SFRA

2.4.8 The Cherwell District Council Level 1 SFRA confirmed that the portion of the Northern Site Area located in this borough is wholly located in Flood Zone 1.

Flood Defences

2.4.9 EA Spatial Flood Defence mapping shows no flood defences are present within the Northern Site Area. Outside of the Northern Site Area within the study area, flood defences are present along the channel of the River Glyme and River Cherwell. Details of flood defences are provided below within **Table 2.1**.

Table 2.1: Northern Site Area flood defences

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
46613	Natural High Ground	Private individual, Company or Charity	Unknown	2
45748	Natural High Ground	Unknown	Unknown	2
46842	Natural High Ground	Private individual, Company or Charity	Unknown	2
48532	Natural High Ground	Private individual, Company or Charity	Unknown	2
46850	Natural High Ground	Private individual, Company or Charity	Unknown	2
47946	Natural High Ground	Unknown	Unknown	2
47596	Natural High Ground	Unknown	Unknown	2

Flood Warning / Alert Areas

2.4.10 The EA defines a Flood Warning Area as "geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater."

2.4.11 The Northern Site Area is partially located within the following Flood Warning / Flood Alert areas:

- River Evenlode from Moreton in Marsh to Cassington and also the River Glyme at Wootton and Woodstock (reference 061WAF12Evenlode) Flood Alert
- River Cherwell from Lower Heyford down to and including Oxford (reference 061WAF14LChrwell) Flood Alert (study area only)
- River Glyme at Woodstock (reference 061FWF12Glyme); (study area only)
- River Cherwell from Lower Heyford down to Cherwell Bridge (reference 061FWF14LHeyford) (study area only)

2.4.12 The location of the Flood Alert and Flood Warning within the study area is presented within **Figure 1.7a**.

Summary

2.4.13 The Northern Site Area is predominantly located within Flood Zone 1 with a marginal area of Flood Zone 2 and 3. No hydraulic modelling is available for the area of Flood Zone 2 and 3 within the Northern site study area.

2.4.14 No development is proposed within areas of Flood Zone 2 and 3. Therefore, the risk of fluvial flooding is considered to be low. The risk from the dry field ditch/culvert is considered further in the surface water and ordinary watercourses section. Due to the distance inland, the Northern Site Area is not assessed to be at risk from tidal flooding.

Groundwater Flood Risk

2.4.15 Groundwater flood risk mapping included within the Groundsure Enviro and Geo Insight report (2023) shows the Northern Site Area has a 'negligible' risk of groundwater flooding. The majority of the study area is shown to have a 'low' risk of flooding.

2.4.16 Due to the type of development proposed, the overall risk of flooding from groundwater has been assessed to be low.

Ordinary Watercourse and Surface Water Flood Risk

2.4.17 The EA's Long Term Flood Risk Mapping includes Risk of Flooding from Surface Water mapping which was updated in January 2025 and is available online and presented within **Figure 1.8a**. The classification of the risk is based on the following:

- **High chance:** The area has a chance of flooding of greater than 1 in 30 (3.3%) each year.
- **Medium chance:** The area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) each year.
- **Low chance:** The area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) each year.
- **Very low chance:** The area has a chance of flooding of less than 1 in 1000 (0.1%) each year.

2.4.18 The majority of the Northern Site Area is shown to have a 'very low' chance of surface water flooding. A flow pathway is present running north east to south west, and is associated with a field ditch. The ditch has a 'low' to 'high' chance of flooding. Depths are anticiapted to be up to 300mm in all scenarios.

2.4.19 The EA's Long Term Flood Risk Mapping also includes climate change allowances for the year 2040 and 2060 to assess future flood risk. The overall extent is largely similar, but with a greater chance of flooding expected between 2040 and 2060. The depths remain up to 300mm in all scenarios.

Ordinary Watercourses

2.4.20 One ordinary watercourse is present in the Northern site Area (National Grid reference: 446021, 220428 to 445025, 217951). This risk is associated with a field ditch which is not permanently present with water. At the downstream extent, EA FMP mapping is available but with no depths and levels provided. At the upstream no flood zones are associated with the watercourse as the catchment here is less than 3km2 in size. Therefore, surface water data is used to assess the risk here. Catchment descriptors have been extracted for this watercourse with the main catchment features presented below:

- Area (km^2): 5.0625
- SAAR 61-90 (mm): 655
- PROP WET: 0.32

- BFIHOST19: 0.857

2.4.21 At this location, the watercourse is situated within the Cherwell and Ray Management Catchment as such the 21% allowance should be assessed.

2.4.22 Extracted ReFH2 values for the peak flow indicate that the 1 in 1000 year produces higher results than 100-year plus 21% allowance, see Table 2.2. It is, therefore, considered acceptable to use the 1000-year surface water flood extents at this location as a conservative proxy in the absence of detailed climate change data..

Table 2.2: ReFH2 Peak flows for the Northern Ordinary Watercourses

Location	Description	100 year	100 year + 21%	1000 year
446021, 220428 to 445025, 217951	Field Ditch flowing in a south westerly direction	7.18	8.98	9.16

2.4.23 The flow pathway consists primarily of 'low' risk with limited areas at 'high' and 'medium' chance.

2.4.24 During the low chance (up to 1000-year) event the flow pathway consists primarily of depths below 300mm, with small, isolated areas at depths of up to 300mm..

Analysis

2.4.25 The site is situated within the boundaries of West Oxfordshire and Cherwell. In line with West Oxfordshire Local Policy requirements and Cherwell Local Policy requirements, it is expected that either an 8m easement or 9m easement respectively will be required. The easement is from either side of the ordinary watercourse banks where no development will be located. For ease a 10m easement will be proposed for all watercourses for the Northern Site Area.

2.4.26 The solar panels will also be placed outside of the 1000-year surface water flood extent associated with the field ditch in the Northern Site Area (National Grid Reference: 446021, 220428 to 445025, 217951).

2.4.27 Any other solar panels within surface water risk areas by nature of the design will be raised above the ground on steel frames allowing water to flow beneath. Any Solar PV modules are waterproof and will be raised 800mm above ground levels at the lower edge. Solar PV modules are limited to areas at risk of surface water flooding where depths do not exceed 300mm. As such there is a 500mm easement between the maximum water level and bottom of the solar array.

2.4.28 Based on the above, the Northern Site Area is considered to have a low risk of flooding from this source.

Reservoir Flood Risk

2.4.29 The EA's Reservoir Flood Extents mapping (available online) and presented within **Figure 1.9a** shows that the Northern Site Area is not located within an

area potentially at risk from reservoir flooding. The risk of flooding from this source is therefore considered to be low.

2.4.30 Within the wider Northern study area, land adjacent to the River Cherwell in the east is identified to be affected by reservoir flooding during the dry scenario. During a wet scenario, land adjacent to the River Cherwell and the River Glyme in the west of the study area is also identified to be affected. This does not encroach the Northern Site Area. Both the River Glyme and River Cherwell in the study area are considered to be affected by reservoir flooding when there is also flooding from fluvial sources.

Sewer Flood Risk

2.4.31 Flooding from sewerage failure occurs when a rainfall event exceeds the maximum capacity of the surrounding network. The most common causes of flooding from sewers are inadequate flow capacity, blockages, pumping station failures, burst water mains, water inflow from rivers or the sea, tide locking, siltation, fats/greases, and sewer collapse. Should any of these events occur there is a risk of flooding within the vicinity of the sewer by surcharge where the flood is in excess of the sewer capacity (usually 1 in 30-year event or greater).

2.4.32 The Northern Site Area predominantly comprises agricultural land and therefore, unlikely to be crossed by sewage infrastructure. Prior to Detailed Design, pre-construction surveys are expected to be undertaken of the Northern Site Area. Pre-commencement surveys will be undertaken prior to construction on site, this will be set out in the Outline CoCP **[EN010147/APP/7.6.1]**. The implementation of the above will limit the potential impact on the surrounding sewer networks from any residual risk from this source. Flood risk from this source is therefore assessed to be low.

Historic Flooding

2.4.33 The EA Historical Flooding mapping shows there are no historical flood records within the Northern Site Area. Within the wider study area, the River Cherwell in the east is shown to have been affected by a historical flood event. The EA Historical Flood Map is presented within **Figure 1.10a.**

2.5 Flood Risk Management

Site Vulnerability

2.5.1 The NPS and NPPF requires the Local Authority to apply the Sequential and Exception Test in consideration of new development. The sequential and exception test has been applied to the entire Project within **Section 6**.

Proposed Mitigation

2.5.2 Solar PV modules and ancillary infrastructure (including PCS units, temporary compounds and HV Transformers (Secondary Substations) are proposed to be limited to Flood Zone 1 and the maximum 1000-year surface water flood extent.

2.5.3 No development is proposed within 10m of the banks of ordinary watercourses within the Northern Site Area in line with Local Policy guidance.

2.5.4 Solar PV modules are restricted to low-risk isolated areas of surface water risk where depths do not exceed 300mm. Solar PV modules are waterproof and will be raised by the nature of the design at least 800mm above ground levels at the lower edge.

Safe Access and Egress

2.5.5 The provision of safe access and escape for flood risk during construction and decommissioning will be considered within the detailed Code of Construction Practice (COCP) and Decommissioning Environmental Management Plans DEMP(s). An Outline CoCP **[EN010145/APP/7.6.1]** and Outline DEMP **[EN010145/APP/7.6.4]** includes the commitment to prepare Flood Management Plan for each stage.

2.5.6 The provision of safe access and escape for flood risk during operations will be considered within the detailed Operational Management Plan (OMP) **[EN010145/APP/7.6.2]**. An Outline OMP includes the commitment to prepare a Flood Management Plan.

2.5.7 During high river levels and flood warnings areas of the Project would be evacuated.

Construction and Decommissioning

2.5.8 During construction, a drainage strategy will be implemented that will control surface water runoff, including measures to prevent flooding of the working area or offsite and to ensure any runoff is treated appropriately.

2.5.9 Finally, it is anticipated that storage of fuels and chemicals will be within areas at low risk of flooding (Flood Zone 1). Refuelling of plant and equipment will only be permitted in designated refuelling areas located within areas at low risk of flooding. All refuelling will be undertaken using pumps to reduce spillage.

2.5.10 The requirement for the above will be considered within the detailed Code of Construction Practice (COCP) and DEMP(s). An Outline CoCP **[EN010145/APP/7.6.1]** and Outline DEMP **[EN010145/APP/7.6.4]** includes the commitment to managing surface water runoff, and treatment for each stage.

Drainage Strategy

2.5.11 A conceptual proposed SuDS design has also been undertaken for the Northern Site Area Solar PV Arrays has been provided in Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

2.6 Summary and conclusions

Summary

2.6.1 A site-specific FRA in accordance with Section 5.7 of the NPS-EN1, the NPPF and associated PPG ID-7 has been undertaken for the Northern Site Area

located to the north of the town of Woodstock, west of Tackley and east of Wootton.

Flood Risk

2.6.2 The Northern Site Area is located within Flood Zones 1, 2 and 3. Permanent development and temporary development hnot as been restricted to areas of Flood Zone 1, Development is also restricted to outside of the 1000-year surface water flood extent where the risk is associated with ordinary watercourses.

2.6.3 All development is proposed to be restricted to a 10m easement from the banks of ordinary watercourses and from the banks of main rivers within the Northern Site Area.

2.6.4 The risk from groundwater risk is considered to be low. The risk from reservoir, sewer and other flood risk sources is low.

2.6.5 Management plans are to be implemented to manage the risk during construction, operation and decommissioning phases of the Project

2.6.6 As presented in greater detail within section 6, it has been demonstrated that the Project meets the Sequential and Exception Tests imposed under the NPPF.

2.6.7 Based on the above the overall risk is low within the Northern Site Area.

Residual Risk

2.6.8 This assessment has quantified the risks of fluvial and surface water flooding at the Project and provided relevant mitigation to ensure there is no adverse impact to flood risk because of the Project.

2.6.9 In any case there remains a residual risk from fluvial and surface water in the event that events are greater than design standards assessed, unsuccessful implementation of the management plans (include FMP's) and failure to receive flood warnings/alerts.

2.6.10 The inherent raised nature of the PV's and waterproof design would ensure that they wouldn't be damaged during the above residual risk occurrences. In addition, the ancillary features are to be set with significant distance from watercourses and are therefore, are unlikely to be impacted during very extreme events.

2.6.11 It is concluded that the residual flood risks are suitably low, and that further mitigation or management is not required.

Surface Water Drainage

2.6.12 A conceptual proposed SuDS design has also been undertaken for the Northern Site Area Solar PV Arrays has been provided in Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

Conclusion

2.6.13 The FRA and supporting documentation demonstrate the Northern Site Area meets the requirements of the NPS and the NPPF.

3 Central Site Area Flood Risk Assessment

3.1 Site Setting

Location

3.1.1 The Central Site Area is located at National Grid Reference SP 45189 13154 and is located to the west of Kidlington. The Central Site Area is irregular in shape and its location is presented in **Figure 1.1**. The Central Site Area assessment takes into account a 1 km buffer zone when assessing flood risk, discussed in greater detail within Section **1.2**.

Topography

3.1.2 Using topographical survey supplemented by LiDAR data, the northern area of the Central Site Area has elevations of around 76m AOD and 85m AOD, the eastern area of the Central Site Area appears to increase in elevation ranging from 95m AOD and 101m AOD. The western area of the Central Site Area ranges between 67m AOD to 65m AOD. The southern section of the Central Site Area approximately 63m AOD and 62mAOD. The general elevation falls to the south west.

Existing Use

3.1.3 The Central Site Area currently comprises agricultural fields divided by hedgerows and trees. The River Evenlode is conveyed through the Central Site Area and the Cotswold railway line bisects the runs from north-west to south-east.

3.1.4 Majority of the Central Site Area is located in the West Oxfordshire District Council extent, with a smaller section within the east located within the Cherwell District Council extent.

Proposed Use

3.1.5 The total developable area for the Central Site Area is 546ha Project includes the following which is to be constructed in several phases:

- 104 PCS units;
- Three HV transformers (Secondary Substations);
- Two temporary construction compounds; and
- Solar PV modules, mounted on metal framework and elevated between 1.8m and 2.5m above surrounding ground levels.

3.1.6 Further information regarding the project description is presented within Volume 1 Chapter 6: Project Description of the ES.

3.2 Hydrological Overview

3.2.1 The EA Catchment Data Explorer Mapping shows the Project is located within the Cherwell and Ray and Cotswolds management catchments which discharge to the River Thames.

Main Rivers

3.2.2 OS Mapping indicates that the River Evenlode, classified as a Main River, conveys flows southwards within the western extent of the Central Site before converging with the River Thames, also a Main River, at approximately 1km to the south of the Central Site Area.

3.2.3 The River Glyme a Main River, is located to the north-east of the Central Site Area and flows in a southerly direction, converging with the River Evenlode approximately 250m to the north of the Central Site Area.

3.2.4 Rowel Brook, a Main River, is located within the far eastern extent of the Central Site Area and conveys flows to the south east. The watercourse eventually discharges to the Oxford Canal which flows south in the east of the Central study area.

3.2.5 Other identified Main Rivers within the Central study area include a stretch of the Eynsham Mead Ditch, a stretch of the Cassington Cut, and Cassington Stream a tributary of the River Thames the flows south through Cassington.

3.2.6 Main Rivers within the study area are presented within **Figure 1.3b.**

Ordinary Watercourses

3.2.7 Several unnamed ordinary watercourses are present within the Central Site Area, radiating from a central point within the site and flow towards aforementioned watercourses. Ordinary watercourses within the study area are presented within **Figure 1.3b.**

Other Hydrological Features

3.2.8 Several pond features are present within the Central Site study area, including ponds associated with Eynsham Mill. Other hydrological features are presented within **Figure 1.3b.**

Previous Hydrological Study

3.2.9 The Atkins Flood Cassington Design Book was commissioned by the Blenheim Estates in 2020 to develop a hydrological understanding of the flood mechanisms impacting Cassington specifically. The report also proposed potential ways in which flooding may be reduced. Cassington village is located to the south-east of the Central Site Area and within the report it was identified by the EA that none of the study area for the report was located in the EA Flood Zones. Furthermore, the report assessed the study area to have low risk for both the river and surface water flooding, however the report found that the village does have a pre-existing history of flooding. Flooding was assessed to be a result of run off from the agricultural fields in addition to spring flows within

the study area. Flows are directed by topography which slopes to the south, towards Cassington.

Internal Drainage Boards

3.2.10 The Central Site Area and associated buffer zone are not located within an IDB.

3.3 Hydrogeological Overview

Geological Setting

3.3.1 BGS superficial deposits online mapping (1:50,000 scale) is presented within **Figure 1.4b** and indicates that the Central Site Area is underlain by the following superficial deposits:

- Summertown-Radley sand and Gravel Member formed of sand and gravel;
- Alluvium, formed from Clay, silt, sand and gravel;
- Hanborough Gravel Member, formed of sand and gravel;
- Wolvercote Sand and Gravel Member formed of sand and gravel; and
- Northmoor sand and Gravel Member formed of sand and gravel.

3.3.2 BGS bedrock geology online mapping (1:50,000 scale) and presented within **Figure 1.5b** shows the Central Site Area to be underlain by the following bedrock geology:

- Oxford Clay Formation;
- West Walton Formation formed of mudstone;
- Cornbrash Formation formed of limestone;
- Kellaways Clay Member formed of mudstone;
- Kellaways Sand Member formed of sandstone and siltstone;
- Forest Marble Formation formed of Mudstone; and
- Forest Marble Formation of Limestone.
- Peterborough Member - Mudstone

Groundwater

3.3.3 BGS mapping shows the presence of several borehole logs within the Central Site Area including SP41SW29 within the western extent of the Central Site, SP41SW30 within the far west of the Central Site Area, SP41SW28 upon the central-northern boundary and SP41SE3 located some 600m to the east of the Central Site Area. Information regarding groundwater levels are presented below within **Table 3.1.**

Table 3.1: Borehole log records

Borehole log reference	Depth groundwater encountered (mbgl)
SP41SW29	n/a
SP41SW30	n/a
SP41SW28	2.20m
SP41SE3	1.70m

3.3.4 The West Oxfordshire District Council Level 1 SFRA denotes that the risk from groundwater flooding within the Central Site Area is dominated by high susceptibility (75%+) where the land is a natural low-lying valley bottom.

3.3.5 The Cherwell District Council Level 1 SFRA denotes the Central Site Area within the council boundary is located within an area with less than <25% chance of groundwater flooding.

Aquifer Designation

3.3.6 Bedrock strata within the north-east of the Central Site Area corresponding to Kellaways Sand, Cornbrash and Forest Marble (mudstone) formations are classified as a Secondary A aquifer. Bedrock corresponding to Forest Marble (sandstone) is classified as a Principal Aquifer. The remainder of the Central Site Area is classified as unproductive. Superficial deposits within the Central Site Area are classified as a Secondary A aquifer.

3.3.7 Further information on geology and ground conditions can be found in Volume 1, Chapter 11: Ground conditions of the ES.

Source Protection Zone

3.3.8 EA online groundwater SPZ mapping indicates that the Central Site Area is not located within a groundwater SPZ.

Soils Classification

3.3.9 National Soils Research Institute indicates the Central Site Area comprises a variety of soil types described as the following:

- Freely draining lime-rich loamy soils within the south-west of the Central Site Area;
- Slightly acid loamy and clayey soils with impeded drainage along the course of the River Evenlode;
- Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils within the centre of the Central Site Area;
- Shallow lime-rich soils over chalk or limestone within the north-west of the Central Site Area; and
- Slowly permeable seasonally wet acid loamy and clayey soils within the central-north of the Central Site Area.

3.3.10 An Agricultural Land Classification and Soil Resources survey conducted by Reading Agricultural Consultants in November 2023 indicates that there is a variety of soils within the Central Site Area with some areas wet, and other reflecting drought. There was a variety of good and poor draining soils which were also identified to reflect Flood Zones.

3.4 Flood Risk

Fluvial and Tidal Flooding

Flood Map for Planning

3.4.1 The EA Flood Map for Planning (available online) and presented within **Figure 1.6b** indicates the Central Site Area is located within Flood Zones 1, 2 and 3. A band of Flood Zone 2 and 3 bisects the western extent of the Central Site Area and extends across the site's southern boundary, associated with fluvial flooding from the River Evenlode. An area of Flood Zone 2 and 3 is present within the south-west of the site and is associated with fluvial flooding from a tributary of the River Evenlode. Finally, there is an area of Flood Zone 2 and 3 present within the far eastern extent of the Central Site Area, associated with fluvial flooding from Rowel Brook and the Oxford Canal. The remainder of the site is located within Flood Zone 1.

3.4.2 Due to the distance inland, the Central Site Area is not assessed to be at risk from tidal flooding.

3.4.3 The study area of the Central Site Area encompasses areas of Flood Zone 2 and 3 associated with fluvial flooding from the River Evenlode and tributaries, River Glyme, Rowel Brook and tributaries of the River Thames.

3.4.4 At this location, the EA Flood Map for Planning was identified to have a course resolution. In early design iterations it was to be explored if solar panels could be placed in areas of flood risk, and as such hydraulic modelling was undertaken for the River Evenlode and contributing tributaries to provide a more refined flood extent.

3.4.5 At Cassington, a baseline surface water hydraulic model for the catchment was developed by RPS which includes associated tributaries within the catchment including drains and Cassington stream (grid reference: 445250, 211100).

3.4.6 The Thames (Eynsham to Sandford) model was obtained for the Project.

3.4.7 For ordinary watercourses, RPS have used surface water extents to understand the anticipated risk from these watercourses where the catchments are less than 3km^2. This is encompassed within the 'Surface Water and Ordinary Watercourses Flood Risk' section below.

Hydraulic Modelling

Thames (Eynsham to Sandford) Flood Model

3.4.8 The EA provided the Thames (Eynsham to Sandford) hydraulic flood model. There is a portion of land in the south east of the Central study area which is identified to be located in the 1 in 100 year, 1 in 100-year plus 35% climate

change, 1 in 100-year plus 70% climate change and 1 in 100-year events. The affected land appears to extend along the River Thames and ends at the Cassington Cut, largely remaining south east of Cassington. These events do not encroach the Project's development boundary.

Strategic Flood Risk Assessment Data

3.4.9 The Central Site Area is split between two LPAs and is therefore covered by two different SFRAs. The West Oxfordshire District Council Level 1 SFRA broadly covers the western portion of the study area and the Cherwell District Council Level 1 SFRA the eastern portion.

West Oxfordshire District Council SFRA

3.4.10 The West Oxfordshire District Council Level 1 SFRA indicates that there are areas of the Central Site Area located in contains Flood Zones 2 and 3; associated with the River Evenlode, Dorn and Queen Pool. These flood zones are relatively confined to their watercourses, with the exception of an area of Flood Zone 3 where the Evenlode and Thames confluence at Cassington. This is land at risk of flooding from the 1 in 100-year or greater flood event.

Cherwell District Council SFRA

3.4.11 The Cherwell District Council Level 1 SFRA denotes the section of the Central Site Area located in this council boundary is wholly located in Flood Zone 1 and is not located within an area which has incidents of historic flooding.

Analysis

3.4.12 Solar PV modules and ancillary infrastructure (including PCS units, temporary compounds and Transformers (Secondary Substations) are proposed to be limited to Flood Zone 1.

Flood Defences

3.4.13 EA Spatial Flood Defence mapping shows several flood defences present within the Central Site Area and associated buffer zone, associated with the River Glyme, River Evenlode and Rowel Brook. Details of flood defences are provided below within **Table 3.2.**

Table 3.2: Central Site Area flood defences

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
126550	Natural High Ground	Unknown	Unknown	2
127592	Natural High Ground	Unknown	Unknown	2
157578	Natural High Ground	EA	3	2

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
15803	Natural High Ground	Private individual, Company or Charity	Unknown	5
15804	Natural High Ground	Private individual, Company or Charity	Unknown	5
158713	Natural High Ground	EA	3	2
158714	Natural High Ground	EA	3	2
158715	Natural High Ground	EA	2	2
170668	Natural High Ground	Unknown	Unknown	2
18029	Natural High Ground	Unknown	Unknown	2
18136	Natural High Ground	Unknown	Unknown	2
18137	Natural High Ground	Unknown	Unknown	2
18138	Natural High Ground	Unknown	Unknown	2
18215	Natural High Ground	Unknown	Unknown	2
18216	Natural High Ground	Unknown	Unknown	2
18549	Natural High Ground	Unknown	Unknown	2
46517	Natural High Ground	Unknown	Unknown	2
46579	Natural High Ground	Unknown	Unknown	2
46621	Natural High Ground	Unknown	Unknown	5
46753	Natural High Ground	Private individual, Company or Charity	Unknown	25
46797	Natural High Ground	Unknown	Unknown	2
46820	Natural High Ground	Unknown	Unknown	2
46878	Natural High Ground	Unknown	Unknown	5
47491	Natural High Ground	Unknown	Unknown	2
47492	Natural High Ground	Unknown	Unknown	2
47788	Natural High Ground	Unknown	Unknown	2
48179	Natural High Ground	Unknown	Unknown	2
48180	Natural High Ground	Unknown	Unknown	2
48183	Natural High Ground	Unknown	Unknown	2
48211	Natural High Ground	Unknown	Unknown	2
48212	Natural High Ground	Unknown	Unknown	2
48243	Natural High Ground	Private individual, Company or Charity	Unknown	2

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
48262	Natural High Ground	Unknown	Unknown	2
48296	Natural High Ground	Private individual, Company or Charity	Unknown	2
48375	Natural High Ground	Unknown	Unknown	2
48439	Natural High Ground	Unknown	Unknown	2
48440	Natural High Ground	Unknown	Unknown	2
48477	Natural High Ground	Private individual, Company or Charity	Unknown	5
48478	Natural High Ground	Private individual, Company or Charity	Unknown	2
48513	Natural High Ground	Unknown	Unknown	2
48524	Natural High Ground	Unknown	Unknown	2
48554	Natural High Ground	Private individual, Company or Charity	Unknown	2
88538	Natural High Ground	Local Authority	Unknown	2
89931	Natural High Ground	Local Authority	Unknown	2

Flood Warning / Alert

3.4.14 The Central Site Area is located in the following Flood Warning and Flood Alert areas:

- River Evenlode from Moreton in Marsh to Cassington and also the River Glyme at Wootton and Woodstock (reference 061WAF12Evenlode) Flood Alert
- River Thames and tributaries from Buscot Wick down to Kings Lock (reference 061WAF23BscotKngs) Flood Alert
- River Thames and tributaries from Buscot Wick down to Kings Lock (reference 061WAF23BscotKngs)
- River Glyme at Woodstock (reference 061FWF12Glyme)
- River Evenlode at Eynsham Mill down to and including Cassington Mill near Cassington (reference 061FWF12Cassngtn)
- River Thames between Newbridge and Kings Lock above Oxford (061FWF23Nwbrdg).

3.4.15 Flood warnings and alerts within the Central Site Area are presented within **Figure 1.7b**.

Summary

3.4.16 The Central Site Area is located within Flood Zone 1, 2 and 3 (including Flood Zone 3a and 3b). Development is currently proposed to be limited to Flood Zone 1.

3.4.17 Based on the type of development proposed, fluvial flood risk is assessed is considered to be low. The Central Site Area is not assessed to be at risk from tidal flooding.

Groundwater Flood Risk

3.4.18 Groundwater flood risk mapping included within the Groundsure Enviro and Geo Insight report (2023) shows the Central Site Area has a 'negligible' risk of groundwater flooding. The majority of the 1km buffer zone is shown to have a 'negligible to moderate' risk of flooding.

3.4.19 Due to the type of development proposed, the overall risk of flooding from groundwater has been assessed to be low.

Surface Water and Ordinary Watercourses Flood Risk

3.4.20 The EA's Long Term Flood Risk Mapping includes Risk of Flooding from Surface Water mapping which was updated in January 2025 and ispresented within **Figure 1.8b. This** identifies the majority of the Central Site Area is shown to have a 'very low' chance of surface water flooding. The extent is lower than the previous mapping for the submitted November 2024 report.

3.4.21 There are several overland flow pathways radiating from the centre of the site posing a 'low – high' chance of flooding from this source.

3.4.22 Small, isolated areas of surface water ponding are at present at the site. Depths remain below 300mm during a low, medium or high chance scenario.

3.4.23 There is one location to the north of Cotswold railway line which shows depths of up to 900mm. LiDAR data used within the surface water modelling dataset is unable to identify the underpass at this location where the drainage ditches pass beneath. Water will pass beneath the arches and will not accumulate at this location as shown in the modelling. The upstream and downstream drainage ditches, show limited channel capacity with water remaining within bank and not spilling to adjacent locations. Therefore, it is anticipated that depths outside of the drainage ditch banks will not exceed 300mm at this location. The site visit conducted as part of the hydraulic modelling confirmed the large arch bridges at this location, allowing water to pass beneath.

3.4.24 The EA's Long Term Flood Risk Mapping also includes climate change allowances for the year 2040 and 2060 to assess future flood risk. The overall extent is largely similar, but with a greater chance of flooding expected between 2040 and 2060. Depths remain below 300mm for the majority of the at risk areas, excluding the railway line.

Ordinary Watercourses

3.4.25 Eynsham Mead Ditch (grid reference: 443575, 210300) flows south and is culverted beneath Cassington Road. The EA has identified it as a main river but there are no associated Flood Zone mapping due to their small catchment size (less than 3km^2). Therefore, surface water data is used to assess the risk here. Catchment descriptors have been extracted for this watercourse with the main catchment features presented below:

- Area: 0.8925
- SAAR 61-90 (mm): 620
- PROP WET: 0.32
- BFIHOST19: 0.739

3.4.26 An ordinary watercourse (grid reference: 444940, 213500) flows south through the east of the site. Given the small catchment size (less than 3km^2) there are no associated flood zones. Therefore, surface water data is used to assess the risk here. Catchment descriptors have been extracted for this watercourse with the main catchment features presented below:

- Area: 3.3025
- SAAR 61-90 (mm): 625
- PROP WET: 0.32
- BFIHOST19: 0.386

3.4.27 At these location the watercourses are situated within the Gloucestershire and the Vale Management Catchment as such the % allowance should be assessed.

3.4.28 Extracted ReFH2 values for the peak flow indicate that the 1 in 1000 year produces higher results than 100-year plus 19% allowance, see Table 3.3. It is therefore, considered acceptable to use the 1000-year surface water flood extents at this location in the absence of climate change data at this location.

Table 3.3: ReFH2 Peak flows for the Central Ordinary Watercourses

Location	Description	Peak rainfall (mm)		
		100 year	100 year + 25%	1000 year
443575, 210300	Eynsham Mead Ditch	7.18	8.54	11.10
444940, 213500	Ordinary watercourse	8.79	10.46	13.64

3.4.29 The risk at the watercourses is ‘low’ to ‘high’.

3.4.30 Eynsham Mead Ditch (443575, 210300) flows in a southerly direction before discharging into the River Thames. Depths during the low chance scenario (up to 1000-year event) are 300mm to 900mm within the channel and up to 300mm in areas adjacent to the watercourse.

3.4.31 The ordinary watercourse present in the east of the Central Site Area (444940, 213500) has two tributaries that converge at the railway line before flowing in

a southerly direction beneath the railway line. Flood depths during the 1000-year event are less than 300mm and between 300mm to 900mm in areas to the south of the Central Site Area in proximity to a railway line where flood depths exceed 900m.

3.4.32 A review of the LiDAR indicates that the railway line is present as a raised elevation. Due to the amount of ponding within this area, it is expected the surface water modelling used within the RoFSW mapping does not account for any structure to enable surface water flows to pass underneath the elevated railway line. The site visit identified that railway is elevated with a bridge beneath, allowing water flow beneath the bridge. As such the modelled depths at this location are unlikely to exceed 300mm.

3.4.33 At this location the watercourse is situated within the Cherwell and Ray Management Catchment as such the 21% allowance should be assessed. Extracted ReFH2 values for the peak flow indicate that the 1 in 1000 year produces higher results than 100-year plus 21% allowance, see Table 2.2. It is therefore, considered acceptable to use the low chance (up to 1000-year) surface water flood extents at this location in the absence of climate change data at this location.

3.4.34 The hydraulic model report is included in Volume 3, Appendix 10.5: Surface Water Modelling Report.

Council Data

Cassington Local Neighbourhood Plan (2021 – 2041 Submission Plan)

3.4.35 The relevant information from the Cassington Local Neighbourhood Plan has been extracted to inform the baseline flood risk and includes the following:

- Cassington is at low risk of flooding from the River Thames to the south and the River Evenlode to the west. The village is at risk from the 1 in 30-year surface water flooding event.
- Following the 2007 flood events action was taken to mitigate future surface-water flooding including the clearing of previously blocked drains and the building of a drainage pond behind the south-west corner of the playing fields. Since this time there have been no further property flooding events in Cassington village although the threat remains.
- Outside the village, Jericho Farm and Worton are vulnerable to flooding and the road junction to Worton Farm was flooded over the winter of 2020/2021.

Surface Water Modelling

3.4.36 Based on the baseline flood risk within Cassington Village described within the Cassington Neighbourhood Plan above, a surface water hydraulic model was developed for Cassington village and the agricultural fields to the north to understand flood risk to the village. This incorporates Cassington stream (located at National Grid Reference 445250, 211100). The following events

were modelled: 1 in 30 year, 1 in 100 year, 1 in 100 year + 30 % Climate Change and 1 in 1,000 year surface water flood events.

3.4.37 The model results indicate that the primary mechanism of flooding is via an overland flow path through the fields, collecting within a stream which subsequently flows through Cassington. Baseline mapping demonstrates that flood depths are up to 0.50 m for all modelled events.

3.4.38 Velocities are identified to generally remain below 0.30 m/s, with up to 1.00 m/s modelled in the upstream fields and up to 2.00 m/s downstream through Cassington.

3.4.39 Flood hazard mapping shows that while majority of the catchment has a 'very low hazard' there are areas within Cassington Village, including impacted properties adjacent to the stream, categorised as 'hazard to some' and 'hazard to most'.

Analysis

3.4.40 The site is situated within the boundaries of West Oxfordshire and Cherwell. In line with West Oxfordshire Local Policy requirements and Cherwell Local Policy requirements, it is expected either an 8m easement or 9m easement respectively will be required. The easement is from either side of the ordinary watercourse buffers where no development will be located. For consistency a 10m easement will be proposed across the site including for the Central Site Area. Development is limited to outside the 1000 year surface extent for the risk associated with the following watercourses; Eynsham Mead Ditch (443575, 210300) and the Ordinary Watercourse (444940, 213500).

3.4.41 Surface water modelling has been undertaken for the land and ordinary watercourse of Cassington Stream, depths remain below 0.5m in all modelled events. It is proposed to construct shallow ponds, bunds, and ditches to provide a betterment to the existing baseline flood risk. Solar panels can be placed within the shallow pond as depths will not exceed 0.5m here allowing for a 300mm easement between the lowest leading edge at 0.8m above ground level.

3.4.42 Any other solar panels within surface water risk areas (not associated with ordinary watercourses) by nature of the design will be raised above the ground on steel frames allowing water to flow beneath. Any Solar PV modules are waterproof and will be raised 800mm above ground levels at the lower edge, allowing for a 500mm freeboard. Solar PV modules are limited to areas at risk of surface water flooding where a minimum easement of 300mm between the maximum water level and bottom of the solar array can be provided.

3.4.43 Based on the above mitigation, the Central Site Area is considered to have a low risk of flooding from this source.

Reservoir Flood Risk

3.4.44 The EA's Reservoir Flood Extents mapping (available online) and presented within **Figure 1.9b** shows that the Central Site Area is located within an area potentially at risk from reservoir flooding associated with Bladon Lake, during the dry scenario and the wet scenario. Flooding is associated with the River

Thames, River Evenlode and River Glyme and is conveyed along the channel of the River Evenlode. There is also a portion in the east of the Central Site study area, affected during the wet scenario associated with the Oxford Canal, when fluvial flooding coincides with reservoir flooding.

3.4.45 Due to the regular inspection and maintenance regime in place on large reservoirs, the likelihood of catastrophic failure and therefore risk of flooding to the site from this source is unlikely to occur. Flood risk from this source is therefore considered to be low.

Sewer Flood Risk

3.4.46 Flooding from sewerage failure occurs when a rainfall event exceeds the maximum capacity of the surrounding network. The most common causes of flooding from sewers are inadequate flow capacity, blockages, pumping station failures, burst water mains, water inflow from rivers or the sea, tide locking, siltation, fats/greases, and sewer collapse. Should any of these events occur there is a risk of flooding within the vicinity of the sewer by surcharge where the flood is in excess of the sewer capacity (usually 1 in 30-year event or greater).

3.4.47 The Central Site Area predominantly comprises agricultural land and therefore, unlikely to be crossed by sewage infrastructure. Prior to Detailed Design, pre-construction surveys are expected to be undertaken of the Central Site Area to confirm the presence of any infrastructure within the Central Site Area.

Council Data

Cassington Local Neighbourhood Plan (2021 – 2041 Submission Plan)

3.4.48 The relevant information from the Cassington Local Neighbourhood Plan has been extracted and are included as follows:

- An aging high-pressure water main which runs from Farmoor Reservoir to Banbury which lies north of Cassington. This water main has failed multiple times in different areas and has caused considerable flooding and is considered to pose flood risk.
- There are also concerns with respect to the ability of the local drainage and sewerage systems to sustain further development around Cassington and around the local area.

3.4.49 Pre-commencement surveys will be undertaken prior to construction on site, this will be set out in the Outline CoCP **[EN010145/APP/7.6.1]**.The implementation of the above will limit the potential impact on the surrounding sewer networks from any residual risk from this source. Flood risk from this source is therefore assessed to be low.

Historic Flooding

3.4.50 The EA Historical Flooding mapping presented within **Figure 1.10b** shows there are no historical flood records within the majority of the Central Site Area. The historical flooding within the southern extent of the site is associated with

flooding from the River Evenlode. Within the wider study area, historical flooding is identified to have occurred in the south east in the vicinity of the Cassington Cut, River Thames and associated tributaries.

3.5 Flood Risk Management

Site Vulnerability

3.5.1 The NPS and NPPF requires the Local Authority to apply the Sequential and Exception Test in consideration of new development. The sequential and exception test has been applied to the entire site boundary within Section 6.

Proposed Mitigation

3.5.2 Solar PV modules and ancillary infrastructure (including PCS units, temporary compounds and Transformers (Secondary Substations) are proposed to be limited to Flood Zone 1. In the absence of climate change extents, the 1000-year surface water extent has been used to assess the risk from ordinary watercourses. Solar PV modules and ancillary infrastructure are to be restricted from the 1000-year flood extent associated with ordinary watercourses at the Central Site Area; Eynsham Mead Ditch (National Grid reference: 443575, 210300) and Ordinary Watercourse (National Grid reference: 444940, 213500).

3.5.3 In line with West Oxfordshire District Council and Cherwell District Council, no development is proposed within 10m of the banks of ordinary watercourses and Main Rivers within the Central Site Area.

3.5.4 The majority of solar panels will be installed outside of the surface water flood extents. However, there are isolated locations where solar panels will be placed within areas identified as at risk of flooding. This assessment excludes flood risk associated with ordinary watercourses.

3.5.5 Solar panels will not be installed in areas where flood depths do not exceed 300mm,. In these locations, the lowest leading edge will be raised to at least 800 mm above ground level, providing a 500mm freeboard.

3.5.6 This will ensure the solar panels can remain functional and provide an appropriate freeboard. Solar PV modules, by nature of their design, are waterproof.

Safe Access and Egress

3.5.7 The provision of safe access and escape for flood risk during construction and decommissioning will be considered within the detailed Code of Construction Practice (COCP) and DEMP(s). An Outline CoCP **[EN010145/APP/7.6.1]**) and Outline DEMP **[EN010145/APP/7.6.4]** includes the commitment to prepare Flood Management Plan for each stage.

3.5.8 The provision of safe access and escape for flood risk during operations will be considered within the detailed OMP (s). An Outline OMP **[EN010145/APP/7.6.2]** includes the commitment to prepare a Flood Management Plan.

3.5.9 During high river levels and flood warnings areas of the Project would be evacuated.

Construction and Decommissioning

3.5.10 During construction, a drainage strategy will be implemented that will control surface water runoff, including measures to prevent flooding of the working area or offsite and to ensure any runoff is treated appropriately.

3.5.11 Finally, it is anticipated that storage of fuels and chemicals will be within areas at low risk of flooding (Flood Zone 1). Refuelling of plant and equipment will only be permitted in designated refuelling areas located within areas at low risk of flooding. All refuelling will be undertaken using pumps to reduce spillage.

3.5.12 The requirement for the above will be considered within the detailed Code of Construction Practice (COCP) and DEMP(s). An Outline CoCP **[EN010145/APP/7.6.1]**) and Outline DEMP **[EN010145/APP/7.6.4]** includes the commitment to managing surface water runoff, and treatment for each stage.

Drainage Strategy

3.5.13 A conceptual proposed SuDS design has also been undertaken for the Central Site Area (including the NGET Substation). This has been provided in Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

3.6 Summary and conclusions

Summary

3.6.1 A site-specific FRA, in accordance with the NPS EN-1 and NPPF and associated PPG ID-7 has been undertaken for the Central Site Area, located to the west of Kidlington.

Flood risk

3.6.2 The Central Site Area is located within Flood Zones 1, 2 and 3 (further classified as 3a and 3b). Permanent development and temporary development has been restricted to areas outside the 100 year plus 46% fluvial extent and the 1000-year surface water flood extent associated with ordinary watercourses.

3.6.3 No development is proposed within 10m of the banks of ordinary watercourses and Main Rivers within the Central Site Area.

3.6.4 All proposed development is raised above the ground level at this location and the groundwater risk is considered to be low. There is no other significant risk from any other sources of flooding at this location.

3.6.5 Management plans are to be implemented to manage the risk during construction, operation and decommissioning phases.

3.6.6 As presented in greater detail within section 6, it has been demonstrated that the Project meets the Sequential and Exception Tests imposed under the NPPF.

Residual Risk

3.6.7 This assessment has quantified the risks of fluvial and surface water flooding at the Project and provided relevant mitigation to ensure there is no adverse impact to flood risk because of the Project.

3.6.8 In any case there remains a residual risk from fluvial and surface water in the event that events are greater than design standards assessed, unsuccessful implementation of the management plans (include the FMP) and failure to receive flood warnings/alerts.

3.6.9 The inherent raised nature of the PV's and waterproof design would ensure that they wouldn't be damaged during the above residual risk occurrences. In addition, the ancillary features are to be set with significant distance from watercourses and are therefore, are unlikely to be impacted during very extreme events.

3.6.10 It is concluded that the residual flood risks are suitably low, and that further mitigation or management is not required.

Surface water drainage

3.6.11 A conceptual proposed SuDS design has also been undertaken for the three Solar PV Array Land Parcels (including the NGET Substation). This has been provided in Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

Conclusion

3.6.12 The FRA and supporting documentation demonstrate the Central Site Area meets the requirements of the NPS EN-1 and NPPF.

4 Southern Site Area Flood Risk Assessment

4.1 Site Setting

Location

4.1.1 The Southern Site study area is located at National Grid Reference SP 45981 05513 and is located to the west of Botley. The Southern Site Area is irregular in shape and the site location is presented in **Figure 1.1.** The site assessment takes into account a 1km buffer zone when assessing flood risk, discussed in greater detail within **Section 1.2**.

Topography

4.1.2 Using LiDAR data, the northern area of the Southern Site Area has elevations of 63m AOD and 69m AOD. The southern area of the Southern Site Area has elevations of 87m AOD and 93mAOD. This indicates that the Southern Site

Area has higher elevations in the south, therefore the Southern Site Area gently slopes towards the north.

Existing Use

4.1.3 The Southern Site Area currently comprises agricultural fields divided by hedgerows and trees.

Proposed Use

4.1.4 The total developable area for the Southern Site Area is 50ha Proposed development includes the following which is to be constructed in several phases:

- Seven PCS units;
- One HV Transformer (Secondary Substation);
- One temporary construction compound;
- Solar PV modules, mounted on metal framework and elevated between 1.8m and 2.5m above surrounding ground levels; and
- One Applicant substation located within the north-western extent of the site. The total area to be set aside amounts to approximately 3.8ha. Within that area it is assumed that the substation itself will occupy a footprint of approximately 165m by 135m.

4.1.5 Further information regarding the project description is presented within Volume 1 Chapter 6: Project Description of the ES.

4.2 Hydrological Overview

4.2.1 The EA Catchment Data Explorer Mapping shows the Project is located within the Cotswolds and Gloucestershire and the Vale management catchments which discharge to the River Thames.

Main Rivers

4.2.2 OS Mapping indicates that the nearest EA Main River to the site is an unnamed drain which flows to the north west in the northern portion of the Southern Site Area. The watercourse converges with another unnamed drain before discharging to the Filchamstead Brook, which runs along the northern extent of the Southern Site Area.

4.2.3 A tributary of the River Thames, classified as a Main River, is located some 200m to the west of the Southern Site Area and conveys flows to the west. The Filchamstead Brook is a tributary of the River Thames and discharges to the river some 2.1km to the north of the Southern Site Area. Main Rivers within the Southern Site Area are presented within **Figure 1.3c**.

Ordinary Watercourses

4.2.4 Tributaries of the Filchamstead Brook are located upon the northern boundary of the Southern Site Area and are classified as ordinary watercourses until their convergence at a point 250m to the north of the Northern Site Area, where the watercourse is re-classified as a Main River.

4.2.5 An unnamed ordinary watercourse is located approximately 250m to the west of the Southern Site Area and discharges into the River Thames.

4.2.6 Ordinary Watercourses within the Southern Site Area are presented within **Figure 1.3c**.

Other Hydrological Features

4.2.7 Farmoor Reservoir is located within the study area of the Southern Site Area, 75m to the north-west of the Southern Site Area at its closest point. Other Hydrological Features within the Southern Site are presented within **Figure 1.3c**.

Internal Drainage Boards

4.2.8 The Southern Site Area and associated buffer zone are not located within an IDB.

4.3 Hydrogeological Overview

Geological Setting

4.3.1 BGS superficial deposits online mapping (1:50,000 scale) is presented within **Figure 1.4c** indicates that the Southern Site Area is not situated on any superficial deposits, however Alluvium (clay, silt, sand and gravel) and Northmoor sand and gravel member are present within the western extent of the study area and small amounts of Peat within the eastern extent of the study area.

4.3.2 BGS bedrock geology online mapping (1:50,000 scale) and presented within **Figure 1.5c** shows the entirety of the Southern Site Area is situated on Oxford Clay Formation and West Walton Formation (mudstone).

4.3.3 The Southern Site Study Area includes the following bedrock geology:

- Hazelbury Bryan Formation (Sandstone, siltstone and mudstone);
- Kingston Formation (Sandstone);
- Stanford Formation (Limestone) and
- Ampthill Clay Formation and Kimmeridge Clay Formation (Mudstone).

Groundwater

4.3.4 BGS mapping shows a borehole reference SP40NE84 located some 600m to the east of the Southern Site Area recorded a groundwater at 1.80mbgl. However, additional borehole (SP40NE86, SP40NE85) within proximity

undertaken during the ground investigation did not encounter groundwater during ground investigations.

Aquifer Designation

4.3.5 The Southern Site Area is not located in an area where bedrock or strata at the surface are classified as an Aquifer.

Source Protection Zone

4.3.6 EA online groundwater SPZ mapping indicates that the Southern Site Area is not located within a groundwater SPZ.

Soils Classification

4.3.7 The soils within the Southern Site Area are described as 'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils' by the National Soils Research Institute.

4.3.8 An Agricultural Land Classification and Soil Resources survey conducted by Reading Agricultural Consultants in November 2023 indicates that there is farm land present within the Southern Site Area that has some permanent pasture, functioning ditches and underdrains and non-calcareous clay or silty clay topsoil.

4.4 Flood Risk

Fluvial and Tidal Flooding

Flood Map for Planning

4.4.1 The EA Flood Map for Planning (available online) and presented within **Figure 1.6c** indicates that the majority of the Southern Site Area is located within Flood Zone 1. Limited areas within the north-eastern extent of the site are located in Flood Zone 2 and 3, associated with fluvial flooding from an unnamed drain and Filchampstead Brook.

4.4.2 Due to the distance inland, the Project is not assessed to be at risk from tidal flooding.

4.4.3 No publicly available fluvial hydraulic modelling is available for the area of Flood Zones 2 and 3 within the Southern Site Area. As such, areas of Flood Zone 3a and 3b are unable to be ascertained. The Long-Term Flood Risk from Surface Water mapping dataset has been used to provide further information on potential flood depths and flows from these watercourses. This information is discussed in the relevant surface water section below.

4.4.4 In the absence of any hydraulic modelling and climate change data relating to fluvial flood risk for the Southern Site Area, this assessment uses the 0.1% Annual Exceedance Probability (AEP) extents as a conservative proxy for assessing climate change risk.

4.4.5 A number of ordinary watercourses are present which are not modelled within the EA Flood Map for Planning as they are less than 3km^2. It is not deemed feasible to provide a hydraulic model due to the size and nature of the project.

4.4.6 The Long-Term Flood Risk from Surface Water mapping dataset has therefore, been used to provide further information on potential flood depths and flows from these watercourses. This has been encompassed within the 'Surface Water and Ordinary Watercourses Flood Risk' below.

Analysis

4.4.7 Solar PV modules and ancillary infrastructure (including PCS units, temporary compounds and Transformers (Secondary Substations) are currently proposed to be limited to Flood Zone 1.

Strategic Flood Risk Assessment

Vale of White Horse District Council SFRA

4.4.8 The relevant information from the VofWH SFRA have been extracted and are included as follows:

- The Southern Site Area itself is not located within any designated historic flood outlines, however there are some outlines present within the north-west of the Southern Site Area buffer zone, associated with Farmoor Reservoir.
- The SFRA confirms that the northern boundary of the Southern Site Area is encroached by Flood Zone 3. The Southern Site Area buffer zone is also partially located within Flood Zone 2 and 3.
- The Southern Site Area and associated buffer zone is located within the flood warning area for the River Thames between Newbridge and Kings Lock above Oxford reference: 061FWF23Nwbrdg.
- Majority of the Southern Site Area and buffer zone has a 'very low' of surface water flooding, however there are some overland flow routes at 'low risk' and some isolated pooling with 'high' risk.
- The Southern Site Area and associated buffer zone has a probability of flooding from Groundwater of less than <25% and there are no reported groundwater flooding incidents within the Southern Site Area and associated buffer zone.
- The Southern Site Area and associated buffer zone is located within an area that has 9 external sewer flooding incidents and 12 internal flooding incidents
- The northern extent of the Southern Site Area and associated buffer zone is included within the extent of reservoir flooding, this is associated with Farmoor Reservoir located to the west of the site.

Flood Defences

4.4.9 The EA Spatial Flood Defence mapping shows no flood defences are present within the Southern Site Area. Flood defences are present within the buffer zone and details are shown within **Table 4.1.**

Table 4.1: Southern Site Area flood defences

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
7350	Natural High Ground	Private individual, Company or Charity	Unknown	2
7436	Natural High Ground	Private individual, Company or Charity	Unknown	2
7470	Embankment	Private individual, Company or Charity	Unknown	5
7640	Natural High Ground	Unknown	Unknown	2
7674	Natural High Ground	Private individual, Company or Charity	Unknown	2
7695	Natural High Ground	Unknown	Unknown	2
8308	Natural High Ground	Private individual, Company or Charity	Unknown	2
8309	Natural High Ground	Private individual, Company or Charity	Unknown	2

Flood Warning / Alert Areas

4.4.10 The Southern Site Area is located within the following Flood Warning / Flood Alert areas:

- River Thames between Newbridge and Kings Lock above Oxford (reference 061FWF23Nwbrdg) Flood Warning;
- River Thames and tributaries from Buscot Wick down to Kings Lock (reference 061WAF23BsctKngs) Flood Alert.

4.4.11 Flood Warnings and Flood Alerts within the Southern Site Area are presented within **Figure 1.7c.**

Summary

4.4.12 The Southern Site Area is predominantly located within Flood Zone 1 with marginal areas of Flood Zone 2 and 3. No hydraulic modelling is available for the area of Flood Zone 2 and 3 within the Southern site study area.

4.4.13 No development is expected within areas of Flood Zone 3. Therefore, the risk of fluvial flooding is considered to be low. The Southern Site Area is not assessed to be at risk from tidal flooding.

Groundwater Flood Risk

4.4.14 Groundwater flood risk mapping included within the Groundsure Enviro and Geo Insight report (2023) shows the Southern Site Area has a ‘negligible’ risk

of groundwater flooding. The majority of the 1km buffer zone of the Southern Site Area is shown to have a 'negligible to low' risk of flooding.

4.4.15 Due to the type of development proposed, the overall risk of flooding from groundwater has been assessed to be low.

Ordinary Watercourse and Surface Water Flood Risk

4.4.16 The EA's Long Term Flood Risk Mapping includes Risk of Flooding from Surface Water which was updated in January 2025 and is available online and presented within **Figure 1.8c.**The majority of the Southern Site Area is classified to have a 'very low' chance of surface water flooding, with limited areas at risk of flooding of 'low' and 'medium' chance. Depths are largely limited to 300mm with small areas of 600mm depths associated with topographical depressions. A surface water flow pathway runs through the site to the north of Denmans Farm, with depths of up to 600mm in all scenarios.

4.4.17 The EA's Long Term Flood Risk Mapping also includes climate change allowances for the year 2040 and 2060 to assess future flood risk. The overall extent is largely similar, but with a greater chance of flooding expected between 2040 and 2060. Depths remain below 600mm in all scenarios.

4.4.18 A Main River flows through Filchampstead (445400, 205550) which has no associated Flood Zones in its upper reaches given the small catchment size (less than 3km^2). The watercourse has associated tributaries with the Southern Site Area. Therefore, surface water data is used to assess the risk here. Catchment descriptors have been extracted for this watercourse with the main catchment features presented below:

- Area: 7.1025
- SAAR 61-90 (mm): 644
- PROP WET: 0.32
- BFIHOST19: 0.479

4.4.19 At this location the watercourses are situated within the Cotswolds Management Catchment as such the 21% allowance should be assessed.

4.4.20 Extracted ReFH2 values for the peak flow indicate that the 1 in 1000 year produces higher results than 100-year plus 21% allowance, see Table 3.3. It is therefore, considered acceptable to use the 1000-year surface water flood extents at this location in the absence of climate change data at this location.

Table 4.2: ReFH2 Peak flows for the Southern Ordinary Watercourses

Location	Description	Peak rainfall (mm)		
		100 year	100 year + 21%	1000 year
445400, 205550	Filchampstead	9.87	11.96	15.46

4.4.21 The risk at the watercourses is 'low' to 'high'.

4.4.22 Filchampstead (445400, 205550) flows in a westerly direction. Depths during the low chance (up to 1000-year event) are up to 300mm in areas adjacent to the watercourse. A small area of ponding occirs to the south of the watercourse, associated with a topographical depression, depths here reach up to 600mm during a low chance (1000-year event).

Analysis

4.4.23 In line with Vale of White Horse District Council development policy 30, it is expected the watercourses will require an easement of at least 10m in which no development will be located. The easement is from the banks of the ordinary watercourses.

4.4.24 The solar panels will also be placed outside of the 1000 year surface flood extent associated with Filchampstead river and associated tributaries in the Southern Site Area.

4.4.25 Any other solar panels within surface water risk areas by nature of the design will be raised above the ground on steel frames, allowing water to flow beneath. Any Solar PV modules are waterproof and will be raised 900mm above ground levels at the lower edge where depths may reach up to 600mm, this provides a 300mm freeboard. Where depths reach 300mm and for all other panels the lowest leading will be set to 800mm, this provides a 500mm freeboard.

4.4.26 Therefore, sthe olar PV modules are limited to areas at risk of surface water flooding where a minimum easement of 300mm between the maximum water level and bottom of the solar array can be provided and excluded from risk areas associated with an ordinary watercourse / main river.

4.4.27 Based on the above, the Southern Site Area is considered to have a low risk of flooding from this source.

Reservoir Flood Risk

4.4.28 The EA's Reservoir Flood Extents mapping (available online) and presented within **Figure 1.9c** shows that the northern portion of the Southern site Area is located within an area potentially at risk from reservoir flooding during the dry scenario and the wet scenario. The northern portion of the Southern study area is also identified to be affected by reservoir flooding when there is also fluvial flooding. Flood risk is primarily from Farmoor Reservoir located 75m to the north-west of the Southern Site Area.

Sewer Flood Risk

4.4.29 Flooding from sewerage failure occurs when a rainfall event exceeds the maximum capacity of the surrounding network. The most common causes of flooding from sewers are inadequate flow capacity, blockages, pumping station failures, burst water mains, water inflow from rivers or the sea, tide locking, siltation, fats/greases, and sewer collapse. Should any of these events occur there is a risk of flooding within the vicinity of the sewer by surcharge where the flood is in excess of the sewer capacity (usually 1 in 30-year event or greater).

4.4.30 The Southern Site Area predominantly comprises agricultural land and therefore, unlikely to be crossed by sewage infrastructure. Prior to Detailed Design, pre-construction surveys are expected to be undertaken of the Southern Site Area to establish the presence of any sewage infrastructure. This will limit the potential impact on the surrounding sewer networks from any residual risk from this source. Flood risk from this source is therefore assessed to be very low.

Historic Flooding

4.4.31 The EA Historical Flooding mapping shows there are no historical flood records within the Southern Site Area. Within the wider study area, the Farmoor Reservoir in the north west is shown to have been affected by a historical flood event. The EA Historical Flood Map is presented within **Figure 1.10c.**

4.5 Flood Risk Management

Site Vulnerability

4.5.1 The NPS and NPPF requires the Local Authority to apply the Sequential and Exception Test in consideration of new development. The sequential and exception test has been applied to the entire site boundary within Section 6.

Proposed Mitigation

4.5.2 Solar PV modules and ancillary infrastructure (including PCS units, temporary compounds, Transformers (Secondary Substations), Applicant Substation and NGET Substation is proposed to be limited to Flood Zone 1. Solar PV modules and ancillary infrastructure is to be restricted to outside the 1000-year surface water flood extent associated with Filchampstead Brook and associated tributaries.

4.5.3 No development is proposed within 10m of the banks of ordinary watercourses in line with VoWH District Council local policy. No development is proposed within 10m of banks of Main Rivers within the Southern Site Area.

4.5.4 The majority of solar panels will be installed outside of the surface water flood extents. However, there are isolated locations where solar panels will be placed within areas identified as at risk of flooding. This assessment excludes flood risk associated with ordinary watercourses.

4.5.5 Solar panels will not be installed in areas where flood depths exceed 900 mm. In locations where flood depths may reach up to 600 mm, the lowest leading edge of the panels will be set at a minimum height of 900 mm above ground level. For all other panels, including those in areas with flood depths up to 300 mm, the lowest leading edge will be raised to at least 800 mm above ground level.

4.5.6 This will ensure the solar panels can remain functional and provide an appropriate freeboard. Solar PV modules, by nature of their design, are waterproof.

Safe Access and Egress

4.5.7 The provision of safe access and escape for flood risk during construction and decommissioning will be considered within the detailed Code of Construction Practice (COCP) and DEMP(s). An Outline CoCP **[EN010145/APP/7.6.1]**) and Outline DEMP **[EN010145/APP/7.6.4]** includes the commitment to prepare Flood Management Plan (FMP) for each stage.

4.5.8 The provision of safe access and escape for flood risk during operations will be considered within the detailed (OMP) (s). An Outline OMP **[EN010145/APP/7.6.2]** includes the commitment to prepare a Flood Management Plan.

4.5.9 During high river levels and flood warnings areas of the Project would be evacuated.

Surface water flooding

4.5.10 It is anticipated the design of the Applicant Substation and NGET Substation will ensure that ground levels will fall away from the permanent structures and direct surface water towards onsite drainage systems to provide a level of protection against water ingress.

Construction and Decommissioning

4.5.11 During construction, a drainage strategy will be implemented that will control surface water runoff, including measures to prevent flooding of the working area or offsite and to ensure any runoff is treated appropriately.

4.5.12 Finally, it is anticipated that storage of fuels and chemicals will be within areas at low risk of flooding (Flood Zone 1). Refuelling of plant and equipment will only be permitted in designated refuelling areas located within areas at low risk of flooding. All refuelling will be undertaken using pumps to reduce spillage.

4.5.13 The requirement for the above will be considered within the detailed Code of Construction Practice (COCP) and DEMP(s). An Outline CoCP **[EN010145/APP/7.6.1]**) and Outline DEMP **[EN010145/APP/7.6.4]** includes the commitment to managing surface water runoff, and treatment for each stage.

Drainage Strategy

4.5.14 A conceptual proposed SuDS design has also been undertaken for the three Solar PV Array Land Parcels (including the NGET substation). This has been provided in Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

4.6 Summary and conclusions

Summary

4.6.1 A site-specific FRA, in accordance with the NPS EN-1 and NPPF has been undertaken for the Southern Site Area, located to the west of Botley.

Flood risk

4.6.2 The Southern Site Area is located within Flood Zones 1, 2 and 3 and is assessed to have a low risk of fluvial flooding and all other sources of flooding. Permanent development and temporary development has been restricted to areas of and is assessed to have a low risk of fluvial flooding and all other sources of flooding. Proposed development is currently limited to Flood Zone 1 and the 1000-year surface water flood extent associated with ordinary watercourses.

4.6.3 All development is proposed to be restricted outside of a 10m buffer from the banks of ordinary watercourses in line with VoWH District Council local policy. All development is proposed to be restricted outside of a 10m buffer from the banks of Main Rivers in line with EA policy.

4.6.4 All proposed development is raised above the ground level at this location and the groundwater risk is considered to be low. There is no other significant risk from any other sources of flooding at this location.

4.6.5 Management plans are to be implemented to manage the risk during construction, operation and decommissioning phases.

4.6.6 As presented in greater detail within section 6, it has been demonstrated that the Project meets the Sequential and Exception Tests imposed under the NPPF.

4.6.7 Based on the above the risk is low.

Residual Risk

4.6.8 This assessment has quantified the risks of fluvial and surface water flooding at the Project and provided relevant mitigation to ensure there is no adverse impact to flood risk because of the Project.

4.6.9 In any case there remains a residual risk from fluvial and surface water in the event that events are greater than design standards assessed, unsuccessful implementation of the management plans (include the FMP) and failure to receive flood warnings/alerts.

4.6.10 The inherent raised nature of the PV's and waterproof design would ensure that they wouldn't be damaged during the above residual risk occurrences. In addition, the ancillary features are to be set with significant distance from watercourses and are therefore, are unlikely to be impacted during very extreme events.

4.6.11 It is concluded that the residual flood risks are suitably low, and that further mitigation or management is not required.

Surface water drainage

4.6.12 A conceptual proposed SuDS design has also been undertaken for the three Solar PV Array Land Parcels (including the NGET substation). This has been provided in Volume 3 Appendix 10.2 Conceptual Drainage Strategy.

Conclusion

4.6.13 The FRA and supporting documentation demonstrate the Southern Site Area meets the requirements of the NPS EN-1 and NPPF.

5 Cable Corridor Flood Risk Assessment

5.1 Site Setting

Location

5.1.1 The Botley West Cable Corridor is presented within Figure 1.1 and is located to the north west of Oxford, extending from the west of Tackley before running to the south and terminating to the west of Botley and east of Farmoor Reservoir. The Cable Corridor passes through LPA areas of Cherwell, West Oxfordshire and The Vale of White Horse Districts.

5.1.2 The site assessment takes into account a 250m buffer zone when assessing flood risk, discussed in greater detail within **Section 1.2.**

Existing Use

5.1.3 The Cable Corridor predominantly comprises agricultural land, running predominantly along field margins when crossing agricultural land. There are several built-up areas and settlements within and adjacent to the site, including Woodstock, Bladdon, Begbroke, Kidlington, Cassington, Yarnton, Eynsham, Swinford, Farmoor and Botley.

5.1.4 The A40 and A44 routes broadly east to west and is located within the central extent of the Cable Corridor. Other infrastructure within the study area includes several major roads and the Cotswolds line which bisects the central extent of the site. The Cable Corridor routes along the B4044 for much of the southern extent of the site.

5.1.5 The Cable Corridor bisects Wytham Woods Site of Specific Scientific Interest (SSSI) and crosses several watercourses along its length, including the following;

- River Evenlode;
- River Thames;
- Wharf Stream; and
- Filchampstead Brook.

Proposed Use

5.1.6 The three main Project Areas (Northern, Central and Southern Site Areas) will be connected via 220 kV underground cables which ultimately connect to the NGET Substation (Botley West) via the Cable Corridor.

5.1.7 There are four temporary compounds located east of Tumbledown Hill in the Southern Site Area, west of the River Evenlode and west of Woodstock Road in the Central Site Area, and west of Banbury Road in the Northern Site Area.

5.1.8 There are numerous HDD Compounds across the cable corridor between then Central and Southern Site Area s, the Central Site Area and Northern Site Area.

5.2 Hydrological Overview

5.2.1 The EA Catchment Data Explorer Mapping shows the Project is located within the Cherwell and Ray, Cotswolds and Gloucestershire and the Vale management catchments which discharge to the River Thames.

Main Rivers

5.2.2 The Cable Corridor includes the following Main Rivers:

- River Evenlode;
- River Thames;
- Eynsham Mead Ditch; and
- Filchampstead Brook.

5.2.3 Main Rivers are presented within Figure 1.3a, Figure 1.3b, Figure 1.3c and Figure 1.3d.

Ordinary Watercourses

5.2.4 The Cable Corridor includes the following ordinary watercourse features:

- Tributaries of the River Evenlode;
- Tributaries of the River Cherwell;
- Tributary of the River Thames.

5.2.5 Ordinary watercourses are presented within **Figure 1.1a**, **Figure 1.1b**, **Figure 1.1c** and **Figure 1.1d**.

Internal Drainage Boards

5.2.6 The Cable Corridor is not located within an Internal Drainage Board.

5.3 Hydrogeological Overview

Superficial deposits

5.3.1 BGS superficial deposits online mapping (1:50,000 scale) is presented within **Figure 1.4a, Figure 1.4b, Figure 1.4c** and **Figure 1.4d** and indicates that the Cable Corridor is underlain by superficial deposits of:

- Summertown-Radley sand and Gravel Member formed of sand and gravel;
- Alluvium, formed from Clay, silt, sand and gravel;
- Hanborough Gravel Member, formed of sand and gravel;

- Wolvercote Sand and Gravel Member formed of sand and gravel; and
- Northmoor sand and Gravel Member formed of sand and gravel.
- Northern Drift Formation – Sand and Gravel

5.3.2 Superficial deposits are discussed in further detail within Volume 1 Chapter 11 Geology, hydrogeology and ground conditions of the ES.

Bedrock geology

5.3.3 BGS bedrock geology online mapping (1:50,000 scale) and presented within **Figure 1.5**Error! Reference source not found.**a, Figure 1.5b, Figure 1.5c** and **F igure 1.5d** shows the Cable Corridor to be underlain by the following bedrock geology:

- Oxford Clay Formation;
- West Walton Formation (mudstone);
- Cornbrash Formation formed of limestone;
- Kellaways Clay Member formed of mudstone;
- Kellaways Sand Member formed of sandstone and siltstone;
- Forest Marble Formation formed of Mudstone; and
- Forest Marble Formation of Limestone.
- White Limestone Formation formed of Limestone
- Hampen Formation formed of Limestone

5.3.4 Bedrock is discussed in further detail within Volume 1 Chapter 11 Geology, hydrogeology and ground conditions of the ES.

Aquifer Designation

5.3.5 Limestone bedrock deposits underlying the north extent of the Cable Corridor corresponds to Secondary A Aquifers. Kellaways Sand, Cornbrash and Forest Marble (mudstone) formations are classified as a Secondary A aquifer. Bedrock corresponding to Forest Marble (sandstone) is classified as a Principal Aquifer. The remainder of the Cable Corridor is classified as unproductive. Superficial deposits within the Cable Corridor are classified as a Secondary A aquifer.

5.3.6 Further information on geology and ground conditions can be found in Volume 1, Chapter 11: Ground conditions of the ES.

Source Protection Zone

5.3.7 EA online groundwater SPZ mapping indicates that the Cable Corridor is not located within a groundwater SPZ.

5.4 Flood Risk

Fluvial and Tidal Flooding

5.4.1 Fluvial flooding can occur if river flows are unable to be conveyed within the river banks, resulting in overflowing and water being conveyed onto adjacent land.

5.4.2 Due to the distance inland, the Cable Corridor is not considered to be at risk of flooding from tidal sources.

Flood Map for Planning

5.4.3 The Flood Map for Planning is presented within **Figure 1.6a, Figure 1.6b, Figure 1.6c** and **Figure 1.6d**. The northern extent of the Cable Corridor is predominantly located within Flood Zone 1, with a small extent of Flood Zone 2 and 3 also present.

5.4.4 There are extensive areas within the central extent of the Cable Corridor study area that are located within Flood Zones 2 and 3. The remainder of the central extent and the majority of the southern extent of the Cable Corridor is located within Flood Zone 1. Flooding is fluvial in nature and is associated with main rivers and ordinary watercourses identified in paragraphs **5.2.2** and **5.2.4.**

5.4.5 Temporary elements such as HDD Compound, HDD Corridor section and Access construction routes will cross areas of Flood Zone 2 and 3 to accommodate the construction of the cable route.

5.4.6 The Four Temporary Construction Compounds are to be located within Flood Zone 1.

5.4.7 Extents of the study area located within Flood Zone 2 and 3 are presented within **Table 5.1** below:

Table 5.1: Flood zones within the Cable Corridor study area

Flood Zone	Area m2 (ha)
Flood Zone 2	1,636,355 (163.64)
Flood Zone 3	1,105,346 (110.53)

5.4.8 In locations where there is no modelled data available from the EA and in the absence of climate change data, this assessment uses the 0.1% Annual Exceedance Probability (AEP) extents as a conservative proxy for assessing climate change risk.

Flood Data

Thames (Eynsham to Sandford) Flood Model

5.4.9 The EA Thames (Eynsham to Sandford) hydraulic flood model does not encroach the Cable Corridor study area.

Chil Brook (Eynsham)

5.4.10 The EA provided the Chil Brook (Eynsham) 2013 model. The model covers a portion of Cable Corridor land between the Central and Southern solar parcels and is associated with the Chil Brook, Wharf Stream and River Thames within the cable corridor study area.

5.4.11 The HDD Compounds in this area are to be located outside of the 1 in 75-year flood extent. The study area and cable corridor are within the flood extents for the 1 in 1 in 20-year, 100-year, 1 in 100-year plus 20% climate change and 1 in 1,000-year events. Therefore, the cable corridor crosses areas of Flood Zone 3b.

5.4.12 Fluvial flood risk from ordinary watercourses with catchments smaller than 3km^2 has been encompassed within the 'Surface Water and Ordinary Watercourses Flood Risk' below.

Strategic Flood Risk Assessment

5.4.13 The Cable Corridor is located within three Council Districts forming of West Oxfordshire District Council, Cherwell District Council and Vale of White Horse District Council. Any relevant information has been extracted and included below.

West Oxfordshire District Council Strategic Flood Risk Assessment

5.4.14 Relevant information from the West Oxfordshire District Council SFRA have been extracted and are included as follows:

- There are significant areas designated as Functional Floodplain in the south site associated with confluence of the River Windrush and the River Thames. There is a smaller localised area of Functional Floodplain along Chil Brook.
- The EA Asset Information and Management System (AIMS) dataset identifies that there are no significant flood defences along the River Evenlode, Windrush and Thames for the Woodstock Sub-area.
- Small flood assets in Cassington along the River Evenlode, such as a control gate. Chil Brook also has several assets e.g. outfalls.
- Furthermore, in the north of the sub-area there are some flood assets along Slape Bottom, the River Dorn and River Glyme
- Where the River Evenlode and Thames confluence, there is an area of Flood Zone 3. This land is at risk of flooding from the 1% AEP (1 in 100 year) or greater flood event.
- There are several historic flood records in 2007, however these are mainly at the confluence of the Windrush and the Thames and beyond the Cable Corridor.
- There is a high risk of ponding in the natural topographic low points, therefore ponding occurs in lower lying areas adjacent to the watercourses.

Cherwell District Council Strategic Flood Risk Assessment

5.4.15 Relevant information from the Cherwell District Council SFRA have been extracted and are included as follows:

- Areas of Flood Zone 2 and Flood Zone 3b (High Probability Functional Floodplain).

The Vale of the White Horse Strategic Flood Risk Assessment

5.4.16 Relevant information from the VofWH SFRA have been extracted and are included as follows:

- Part of the cable route is located in the historic flood outline (located near Farmoor Reservoir and Eynsham)
- The SFRA confirmed that the cable route is located within Flood Zone 2 and Flood Zone 3.
- SFRA confirmed that part of the cable route is located in the River Thames Flood Warning Area

Flood Defences

5.4.17 The EA Spatial Flood Defences (including standardised attributes) mapping shows the presence of the following flood defences within the Cable Corridor. Defences and associated attributes are listed below within **Table 5.2**.

Table 5.2: Flood Defences

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
125902	Natural High Ground	Private individual, Company or Charity	Unknown	2
130850	Natural High Ground	Private individual, Company or Charity	Unknown	5
15632	Natural High Ground	EA	2	5
15633	Natural High Ground	Private individual, Company or Charity	Unknown	5
15732	Natural High Ground	EA	5	5
15803	Natural High Ground	Private individual, Company or Charity	Unknown	5
15804	Natural High Ground	Private individual, Company or Charity	Unknown	5
15805	Natural High Ground	Private individual, Company or Charity	Unknown	2
16133	Natural High Ground	Unknown	Unknown	2
16134	Natural High Ground	EA	2	5

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
16135	Natural High Ground	Unknown	Unknown	2
16240	Natural High Ground	Private individual, Company or Charity	Unknown	5
18295	Natural High Ground	Private individual, Company or Charity	Unknown	2
18471	Natural High Ground	Private individual, Company or Charity	Unknown	2
18484	Natural High Ground	Unknown	Unknown	2
44316	Natural High Ground	Unknown	Unknown	2
44344	Natural High Ground	Unknown	Unknown	2
44425	Natural High Ground	Unknown	Unknown	2
44428	Natural High Ground	EA	3	5
44430	Natural High Ground	EA	3	5
44607	Natural High Ground	Unknown	Unknown	2
44608	Natural High Ground	EA	5	5
45670	Natural High Ground	Private individual, Company or Charity	Unknown	2
46339	Natural High Ground	EA	2	5
46368	Natural High Ground	Unknown	Unknown	2
46369	Natural High Ground	Unknown	Unknown	2
46460	Natural High Ground	Private individual, Company or Charity	Unknown	2
46709	Natural High Ground	Private individual, Company or Charity	Unknown	2
46712	Natural High Ground	Private individual, Company or Charity	Unknown	2
46753	Natural High Ground	Private individual, Company or Charity	Unknown	25
47034	Natural High Ground	Private individual, Company or Charity	Unknown	2
47491	Natural High Ground	Unknown	Unknown	2
48158	Natural High Ground	Unknown	Unknown	2
48159	Natural High Ground	Unknown	Unknown	2
48160	Natural High Ground	Unknown	Unknown	2
48161	Natural High Ground	Unknown	Unknown	2

Asset ID	Description	Asset maintainer	Current Condition	Design Standard of Protection (years)
48179	Natural High Ground	Unknown	Unknown	2
48180	Natural High Ground	Unknown	Unknown	2
48183	Natural High Ground	Unknown	Unknown	2
48262	Natural High Ground	Unknown	Unknown	2
48291	Natural High Ground	Unknown	Unknown	2
48295	Natural High Ground	EA	4	2
48296	Natural High Ground	Private individual, Company or Charity	Unknown	2
48439	Natural High Ground	Unknown	Unknown	2
48472	Natural High Ground	Unknown	Unknown	2
48491	Natural High Ground	Unknown	Unknown	2
48513	Natural High Ground	Unknown	Unknown	2
48524	Natural High Ground	Unknown	Unknown	2
48531	Natural High Ground	EA	4	2
48554	Natural High Ground	Private individual, Company or Charity	Unknown	2
8309	Natural High Ground	Private individual, Company or Charity	Unknown	2

Flood Warnings and Flood Alert Areas

5.4.18 Flood warning and flood alert areas located within the Cable Corridor are presented below within **Table 5.3** and **Table 5.4**, additionally presented within **Figure 1.7a**, **Figure 1.7b**, **Figure 1.7c** and **Figure 1.7d.**

Table 5.3: Flood Warnings

Flood Warning Area Code	Description	Flood source
061FWF23Nwbrdg	River Thames between Newbridge and Kings Lock above Oxford including Northmoor, Stanton Harcourt, Bablock Hythe and caravan park, Eynsham, Swinford and Yarnton	River Thames
061FWF12Cassngtn	River Evenlode at Eynsham Mill down to and including Cassington Mill near Cassington	River Evenlode

Table 5.4: Flood Alerts

Flood Alert Area Code	Description	Flood source
061WAF23BsctKngs	River Thames and tributaries from Buscot Wick down to Kings Lock, above Oxford, including Buscot, Kelmscott, Radcot, Chimney, Northmoor, Stanton Harcourt, Bablock Hythe and caravan park, Eynsham, Swinford and Yarnton	River Thames
061WAF12Evenlode	River Evenlode from Moreton in Marsh to Cassington including, Kingham, Bledington, Milton under Wychwood, Shipton under Wychwood, Ascott under Wychwood, Charlbury, Fawler and Long Hanborough and also the River Glyme at Wootton and Woodstock	River Evenlode, River Glyme

Summary

5.4.19 The Cable Corridor is located within Flood Zones 1, 2 and 3a and 3b and is not assessed to be at risk from tidal flooding. Due to the nature of development, the Cable Corridor is assessed to have a low risk of fluvial flooding.

5.4.20 The installation of below ground cables will be temporary in nature with no permanent above ground structures proposed. The majority of the construction works are within agricultural land. However, there will be no changes to existing land use. The cable corridors will not increase flood risk to the surrounding area and has negligible risk of flooding to and from the development.

5.4.21 All HDD compounds will be excluded from Flood Zone 3b. All other temporary development will be placed outside of the 1 in 100-year extent.

Groundwater Flood Risk

5.4.22 Groundwater flood risk mapping included within the Groundsure Enviro and Geo Insight report (2022) shows the Cable Corridor study area has a ‘negligible risk of groundwater flooding.

Strategic Flood Risk Assessment Data

West Oxfordshire District Council Strategic Flood Risk Assessment

5.4.23 Relevant information from the West Oxfordshire District Council SFRA have been extracted and are included as follows:

- The north sub-area has a >25% susceptibility of groundwater flood risk. The south has a high susceptibility of 75%+.

Cherwell District Council Strategic Flood Risk Assessment

5.4.24 Relevant information from the Cherwell District Council SFRA have been extracted and are included as follows:

- Situated on Secondary A and Unproductive Aquifer designations (bedrock)

- Situated on a Secondary A aquifer formed of superficial deposits and unclassified
- Majority of the areas is <25 percent susceptible to Groundwater Flooding, however there are some areas in the south with >=75 percent susceptibility to groundwater flooding.
- Groundwater Vulnerability deemed as a Minor Aquifer – high vulnerability, small areas of Minor Aquifer – Low vulnerability and some areas do not have a vulnerability designation.

The Vale of the White Horse Strategic Flood Risk Assessment

5.4.25 Relevant information from the VofWH SFRA have been extracted and are included as follows:

- Located on a Kellaways Clay Member and Oxford Clay Formation and West Walton Formation
- The cable route is located in areas with <25%, >=25% <50% and >=50% <75% susceptibility to experience flooding from groundwater.

5.4.26 Due to the type of development proposed, the overall risk of flooding from groundwater has been assessed to be low.

Ordinary Watercourse and Surface Water Flood Risk

5.4.27 The EA's Risk of Flooding from Surface Water mapping, available online and presented within **Figure 1.9a, Figure 1.9b, Figure 1.9c** and **Figure 1.9d** identifies areas at risk of surface water flooding. The EA's RoFSW mapping shows localised areas along the Cable Corridor as having 'low' to 'high' risk of flooding from surface water and ordinary watercourses. Flooding is predominantly associated with overland flow pathways flowing towards watercourses and out-of-bank flows from ordinary watercourses and main rivers.

5.4.28 The EA's Long Term Flood Risk Mapping also includes climate change allowances for the year 2040 and 2060 to assess future flood risk. The overall extent is largely similar, but with a greater chance of flooding expected between 2040 and 2060.

5.4.29 The Cable Corridor will not be impacted by or cause any adverse effect on surface water flooding following installation.

Strategic Flood Risk Assessment Data

5.4.30 The Cable Corridor is located within three Council Districts forming of West Oxfordshire District Council, Cherwell District Council and Vale of White Horse District Council. Any relevant information has been extracted and included below.

West Oxfordshire District Council Strategic Flood Risk Assessment

5.4.31 Relevant information from the West Oxfordshire District Council SFRA have been extracted and are included as follows:

- There are relatively few reported surface water flood incidents (exceptions at Hanborough)

Cherwell District Council Strategic Flood Risk Assessment

5.4.32 Relevant information from the Cherwell District Council SFRA have been extracted and are included as follows:

- High Risk of surface water flooding, overland flow routes are present.

The Vale of the White Horse Strategic Flood Risk Assessment

5.4.33 Relevant information from the VofWH SFRA have been extracted and are included as follows:

- The cable route will be located in sections that experience surface water flooding from a 3.3% AEP, 1% AEP event.

Summary

5.4.34 As cables, once in situ will not pose a flood risk and all construction compounds are temporary with construction period surface water drainage measures implemented, the overall risk of flooding from surface water has been assessed to be low.

Reservoir failure

5.4.35 The Reservoir Flood Risk Mapping is presented within **Figure 1.9a, Figure 1.9b, Figure 1.9c** and **Figure 1.9d** and shows the central and south extent of the Cable Corridor to be at risk of flooding from reservoir failure during both dry and wet (when there is also flooding from river) scenarios. Flooding is associated with Farmoor Reservoir, and Bladon Lake.

5.4.36 Due to the regular inspection and maintenance regime in place on large reservoirs, the likelihood of catastrophic failure and therefore risk of flooding to the site from this source is unlikely to occur.

5.4.37 Taking into account the above, the overall risk of flooding from a reservoir failure has been assessed to be low.

Strategic Flood Risk Assessment Data

The Vale of the White Horse Strategic Flood Risk Assessment

5.4.38 Relevant information from the VofWH SFRA have been extracted and are included as follows:

- The route is located in area which is expected to be affected by reservoir flooding.

Artificial Sources Flood Risk

5.4.39 Field drainage is expected to be present within agricultural land within the Cable Corridor and could pose localised sources of flooding if impacted during construction. This will be temporary in nature.

5.4.40 The Cable Corridor will not be impacted by or cause any adverse effect on field drainage following installation. Measures will be incorporated to manage surface water flows include the restoration of field drainage following the installation of the Project and techniques to avoid disruption of surface water runoff along the corridor. These are set out in the Outline OMP **[EN010145/APP/7.6.2]**. As such, the risk of flooding from this source is assessed to be low.

5.4.41 Mitigation measures as identified in Volume 1, Chapter 10: Hydrology and flood risk of the ES, limit the potential impact on the surrounding field drainage networks. Flood risk from this source is therefore assessed to be low.

Sewer Flood Risk

5.4.42 Flooding from sewerage failure occurs when a rainfall event exceeds the maximum capacity of the surrounding network. The most common causes of flooding from sewers are inadequate flow capacity, blockages, pumping station failures, burst water mains, water inflow from rivers or the sea, tide locking, siltation, fats/greases, and sewer collapse. Should any of these events occur there is a risk of flooding within the vicinity of the sewer by surcharge where the flood is in excess of the sewer capacity (usually 1 in 30-year event or greater).

5.4.43 Pre-commencement surveys will be undertaken prior to construction on site, this will be set out in the Outline CoCP **[EN010145/APP/7.6.1]**. The implementation of the above will limit the potential impact on the surrounding sewer networks from any residual risk from this source. Flood risk from this source is therefore assessed to be low.

Strategic Flood Risk Assessment Data

5.4.44 The Cable Corridor is located within three Council Districts forming of West Oxfordshire District Council, Cherwell District Council and Vale of White Horse District Council. Any relevant information has been extracted and included below.

West Oxfordshire District Council Strategic Flood Risk Assessment

5.4.45 Relevant information from the West Oxfordshire District Council SFRA have been extracted and are included as follows:

- Majority of the area has experienced one to five sewer flood incidents. Areas to the south have recorded 15-20 sewer flood incidents, beyond the Cable Corridor.

Cherwell District Council Strategic Flood Risk Assessment

5.4.46 Relevant information from the Cherwell District Council SFRA have been extracted and are included as follows:

- Located in an area with 0 – 5 DG5 Sewer Flooding Incidents.

The Vale of the White Horse Strategic Flood Risk Assessment

5.4.47 Relevant information from the VofWH SFRA have been extracted and are included as follows:

- The route is located in an area which has experienced 9 external and 12 internal sewer flooding events.

Historic Flooding

5.4.48 The EA Historic Flood Map is presented within **Figure 1.10a, Figure 1.10b, Figure 1.10c** and **Figure 1.10d** and records historical flooding has occurred within the central extent of the Cable Corridor in proximity to the River Evenlode and River Thames.

5.5 Flood Risk Management

Site Vulnerability

5.5.1 The NPS and NPPF requires the Local Authority to apply the Sequential and Exception Test in consideration of new development. The sequential and exception test has been applied to the entire site boundary within Section 6.

Proposed Mitigation

Flood Warning / Flood Alerts

5.5.2 Approximately 44% of the Cable Corridor is located within Flood Zone 2 and 3 with the majority of land within these Flood Zones served by several Flood Warnings / Flood Alerts Areas (**Figure 1.7a, Figure 1.7b, Figure 1.7c** and **Figure 1.7d).**

5.5.3 During the construction phase the site manager will sign up to the Flood Warning Service and will be alerted by a phone call or text when a Flood Warning becomes active. The flood warning(s) will be applied to the entire Cable Corridor located within Flood Zones 2 and 3 to enable site personnel to be evacuated from the site in a timely manner prior to a flood event occurring.

Watercourse crossings

5.5.4 Trenchless techniques are anticipated to be used to cross watercourses along the Project's Cable Corridor. Where required, consent will be sought from LLFAs and/or the EA for any works within at least 8 m of non-tidal water bodies and 8m (9m within CDC and 10m within VOWHDC) from the edge of drainage and flood risk management features.

5.5.5 Mitigation measures to minimise any potential adverse effects on surrounding watercourses, increase in flood risk, degradation of agricultural land / designated sites during construction are set out in Volume 1, Chapter 10: Hydrology and Flood Risk of the ES and the outline CoCP **[EN010145/APP/7.6.1]**, to be submitted alongside the ES.

Construction methods

5.5.6 During construction, a drainage strategy will be implemented that will control surface water runoff, including measures to prevent flooding of the working area or offsite and to ensure any runoff is treated appropriately.

5.5.7 To manage impacts to field drainage, the contractor will develop a field drainage strategy in consultation with the landowners affected. It may be necessary to install additional field drainage on either side of the Cable Corridor to ensure the existing drainage of the land is maintained during and after construction.

5.5.8 Dewatering of trenches may be required. In the event that trenches need dewatering, water from such activities will be discharged in agreement with LLFAs and/or the EA to a local drainage ditch or watercourse and/or spread over ground.

5.5.9 Finally, it is anticipated that storage of fuels and chemicals will be within areas at low risk of flooding (Flood Zone 1). Refuelling of plant and equipment will only be permitted in designated refuelling areas located within areas at low risk of flooding (Flood Zone 1). No refuelling is to be undertaken within areas of Flood Zone 2 and 3 and all refuelling will be undertaken using pumps to reduce spillage.

5.6 Summary and conclusions

Summary

5.6.1 A site-specific FRA, in accordance with the NPS EN-1 and NPPF has been undertaken for Cable Corridor which routes from the west of Tackley to the west of Botley, Oxfordshire.

Flood Risk

5.6.2 The Cable Corridor traverses across areas of Flood Zone 1, 2 and 3a and 3b.

5.6.3 Due to the nature of the development, the risk of fluvial flooding is considered to be low. The Cable Corridor is not assessed to be at risk of tidal flooding.

5.6.4 Proposed mitigation measures will reduce any adverse impacts caused by the installation of the Cable Corridor, meaning there will be a negligible impact to the existing hydrology and flood risk to the area and designated sites.

5.6.5 Following the installation of the Cable Corridor, it is anticipated that it will have no adverse effects/impacts on all sources of flooding and the hydrological characteristics of the area.

5.6.6 All HDD compounds will be excluded from Flood Zone 3b. All other temporary development will be placed outside of the 1 in 100-year extent / Flood Zone 3.

Conclusion

5.6.7 The FRA and supporting documentation demonstrate the Cable Corridor meets the requirements of the NPS EN-1 and NPPF.

6 Sequential and Exception Tests

6.1 Overview

6.1.1 This section applies the Sequential and Exception tests for the entire site boundary.

6.1.2 The NPS and NPPF requires the Local Authority to apply the Sequential and Exception Test in consideration of new development.

Sequential Test

6.1.3 The NPPF requires the local authority to demonstrate a sequential, risk based approach is applied to steer new development to the lowest areas of flood risk. Where it is not possible to locate development in low-risk areas of the site it is required to compare reasonably available sites in the wider area. The aim of the test is to steer new development to areas at the lowest probability of flooding.

6.1.4 According to Appendix 3: Flood risk vulnerability classification of the NPPF, the proposed permanent development is classified as 'Essential infrastructure' and as such is acceptable within Flood Zones 1 and 2. The exception test is required if development is proposed within Flood Zone 3.

Exception Test

6.1.5 According to Table 2 of the PPG to the NPPF, 'essential infrastructure' developments are considered appropriate within Flood Zone 1 and 2 without the requirement to apply the exception test. Therefore, application of the exception test is required for Project within Flood Zone 3.

6.1.6 The PPG advises that essential infrastructure development can be considered appropriate in Flood Zone 3a and 3b, following satisfactory application of the Exception Test. The Exception Test aims to ensure that more vulnerable property types are not allocated to areas at high risk of flooding. For the Exception Test to be passed:

a. It must be demonstrated that the Project provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared;

b. A site-specific flood risk assessment must demonstrate that 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.

6.2 Northern, Central and Southern Land Parcels

Sequential Test

6.2.1 The location of the solar PV array sites is set out in Volume 1, Need, National Planning Policy and Alternatives Considered of the ES. The report provides an explanation of site selection process along with how the Scheme has considered alternatives taking into account wider environmental and planning considerations. The location of the Site was informed by the considerations outlined in the NPS in relation to the siting of solar PV development.

6.2.2 The solar PV modules are to be located within Flood Zone 1, considered to have a low risk of fluvial flooding. Hydraulic modelling has been undertaken for the Central Site Area in support of the project which provides a refined 1 in 100 years plus climate change flood extent and 1 in 1,000 year flood extent. Solar PV modules are excluded from the 100 year plus climate change extent.

6.2.3 The solar PV array sites is predominately classified as having a very low risk of surface water flooding although there are small areas at low to high risk across the parcels. The site is considered to be at a low risk of groundwater flooding. The risk from other sources is also considered low.

6.2.4 As discussed, the scheme was selected due to it being the most favourable location considering all factors in the selection process.

6.2.5 A sequential approach has been applied to the layout and design of the solar PV array sites whereby the ancillary infrastructure, Primary, Secondary and NGET substations, and solar PV arrays are located in areas with the lowest risk of flooding from any source. The development is placed within Flood Zone 1, and outside the revised 100 year plus climate change extent for the central area. A small minority of solar panels are in areas at risk of surface water flooding, however by nature of the design the panels are elevated above the modelled flood depths. Therefore, they have inherent mitigation built in to place them at low risk. The site is not at significant risk from groundwater and other sources.

6.2.6 In addition, the Scheme will include habitat creation and enhancement as set out in Volume 3, Chapter 9, Ecology and Nature Conservation of the ES. This will contribute to the Scheme providing biodiversity net gain. There are areas of high-risk flooding within the study area which are excluded for solar panels and are proposed to be used for ecological enhancement. Safeguarding these flood risk areas for ecological enhancement will secure these areas from future development, mitigating potential future increases to flood risk.

6.2.7 To summarise, the design of the site has factored in a sequential, risk based approach and places all solar PV arrays and permanent development features in areas of low risk of flooding (Flood Zone 1). Therefore, the solar PV array sites are considered to pass the sequential test and the application of the exception test is not required.

6.3 Cable Route Corridor

Sequential Test

6.3.1 Development is classified as 'essential infrastructure' which is considered to be acceptable within Flood Zones 1 and 2 without the requirement to apply the exception test. Application of the exception test is required for Projects within Flood Zone 3.

6.3.2 The majority of the temporary compounds all to be located outside Flood Zone 1, with a low risk from all other assessed forms of flooding. The sequential test is therefore assessed to have passed for temporary elements of the development.

6.3.3 The cable corridor and temporary HDD compounds for construction will be placed partially within Flood Zone 3, with a low to high risk of surface water.

6.3.4 In regards to the permanent development (Cable Corridor), HV Transformers (Secondary Substations) located within the solar PV installation areas needs to connect to a National Grid substation with available capacity, and there are a limited number of locations for which a substation can be located. A route appraisal has been undertaken as part of the design process and has taken into account a number of environmental material considerations; including flood risk. The proposed route has been chosen based on these considerations and was determined to be most appropriate and sequentially preferrable.

6.3.5 The permanent cable corridor is classified as 'essential infrastructure' and is located within Flood Zone 1, 2 and 3 and has a low risk from all other assessed forms of flooding. As such, development that falls into this classification is subject to the exception test.

Exception Test

6.3.6 With reference to Part a) of the exception test, the Project is classified as a NSIP and will contribute towards meeting the UK Government's targets for generating energy from a renewable energy source; it will generate employment during its construction and operation. It will also provide wider sustainability benefits to the local community and beyond.

6.3.7 Therefore Part a) of the exception test is considered to be satisfied. Further details regarding employment is contained within Volume 3, Chapter 15: Socio-economics of the ES.

6.3.8 With reference to Part b) above, the Project is to connect the Northern, Central and Southern solar farm sites to the Applicant Substation and therefore is unable to be routed without crossing areas within Flood Zone 3.

6.3.9 The installation of below ground cables will be temporary in nature with no permanent above ground structures proposed. The majority of the construction works are within agricultural land however, there will be no changes to existing land use. Once installed, the Cable Corridor does not increase flood risk to the surrounding area and has negligible risk of flooding to and from the Project.

6.3.10 Any alterations in the existing surface water drainage regime associated with the installation of the below ground cables are expected to be only during the construction stage and thus temporary in nature. Any increase in run-off from the Project's Cable Corridor during construction will be managed through control principals set out in the Outline CoCP **[EN010145/APP/7.6.1]** that will be submitted to the LLFA for approval with consultation with the ES prior to the commencement of works.

6.3.11 This FRA demonstrates that the Project will be safe, without increasing flood risk elsewhere, and will reduce flood risk overall given the reduction in surface water runoff following redevelopment.

6.4 Conclusions

6.4.1 Overall, each of the solar PV array areas and associated Cable Corridor and temporary development of the Project is in accordance with the purpose and requirements of the Sequential Test, taking account of the flood risk vulnerability classification.

6.4.2 Regarding the Exception Test, the FRA demonstrates that the Project will be safe for its lifetime, taking into account the vulnerability, without increasing flood risk elsewhere and, where possible, will reduce flood risk overall. Therefore the scheme is considered to be in compliance with the Exception Test.

7 Conclusions

7.1 Background

7.1.1 RPS has been appointed by the Applicant to provide a FRA in support of a DCO Application.

7.1.2 With reference to the Flood Map for Planning, the Site is considered to lie within Flood Zones 1, 2, 3a and 3b as defined in Table 1 of PPG.

7.1.3 Hydraulic modelling has been undertaken for the Central Site Area to provide revised flood extents.

7.1.4 The surface water risk is largely considered to be 'very low.' There are areas of low to high risk associated with ordinary watercourses and overland flow pathways.

7.1.5 Operational elements of the Project proposed in Flood Zone 3a and 3b are as follows;

- PV panels – limited to areas of Flood Zone 1 and areas of surface water flooding where depths are below 600mm;
- Ancillary features – limited to areas of Flood Zone 1 and low risk of surface water flooding;
- NGET Substation and Applicant Substation – limited to areas of Flood Zone 1 and low risk of surface water flooding;

- Cable Corridor will extend through areas of Flood Zone 3a and 3b. Once in place these will not be impacted by flooding and will not have any effect on flood risk;
- Internal access tracks – to be constructed of permeable material to avoid impact on runoff and conveyance.

7.2 Flood Risk Management

7.2.1 The Project has been supported by fluvial hydraulic modelling of the Central Site Area. As well as overland flow modelling for an area of identified surface water risk north of Cassington.

7.2.2 All permanent development is restricted to Flood zone 1.

7.2.3 In the isolated locations where depths of flooding may reach up to 600mm in accordance with surface water maps the solar panels will be raised at the lower leading edge to 900mm. This will place them at least 300mm above any identified surface water flood depths.

7.2.4 For the rest of the Project where depths do not exceed 300mm, solar panels are to be raised at the lower leading edge to 800mm, placing them at least 500mm above any identified surface water flood depths.

7.2.5 A CoCP will be in place for all Project stages. Flood Warning and Evacuation Plans will be produced for temporary development in Flood Zone 3 at detailed design stage.

7.3 Vulnerability Classification

7.3.1 The Project is classed as ‘essential infrastructure’ development type which is defined as ‘*Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood’.*

7.3.2 The Cable Corridor ‘essential infrastructure’ crosses areas of Flood Zone 3a and 3b and is therefore subject to the Exception Test.

7.4 Sequential and Exception Test

7.4.1 The sequential and exception tests have been applied to the Project and are passed. This FRA demonstrates that the Project can be made safe throughout its lifetime.

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