Botley West Solar Farm

Preliminary Environmental Information Report

Volume 1

Chapter 10: Hydrology and Flood Risk

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Glossary

Term	Meaning
Applicant	SolarFive Ltd.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
EIA Scoping Report	A report setting out the proposed scope of the EIA process.
Climate change	A long term change in weather patterns, in the context of flood risk, climate change will produce more frequent severe rainfall.
Discharge Consents	Consent granted by the Environment Agency to discharge into watercourses, subject to conditions.
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 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.
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.
Cable corridor	The corridor within which the cables will be located.
Infrastructure Area	The area within which the transmission cables, substations, ac and 220kV cables and solar panels will be located.
Substation Area	An area currently identified as a potential location for the substation.
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.
River Basin Management Plan	River Basin Management Plans describe the current state of the water environment in the river basin district. It sets out what improvements are possible by 2015 and how the actions will make a difference to the local environment - the catchments, estuaries, the coast and groundwater.
Strategic Flood Risk Assessment	A Strategic Flood Risk Assessment provides information on areas at risk from all sources of flooding.
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.
Sustainable urban 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.
Treated Effluent	Water that has received primary, secondary or advanced treatment to reduce its pollution or health hazards and is subsequently released from a wastewater facility after treatment.
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.

Term		Meaning
Water Framework Directive (WFD)	Poor WFD Status	Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. Some impact on amenity. Moderate impact on wildlife and fisheries.
	Moderate WFD Status	Moderate change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries.
	Good WFD Status	Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.
Water Quality		The physical, chemical and biological characteristics of water.

Abbreviations

Abbreviations	Meaning
bgl	Below ground level
BGS	British Geological Survey
CC	Climate Change
CDC	Cherwell District Council
CoCP	Code of Construction Practice
DCO	Development Consent Order
DECC	Department of Energy and Climate Change (subsequently BEIS now DESNZ)
DESNZ	Department of Energy Security and Net Zero
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
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

Abbreviations	Meaning
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
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
UKCP19	United Kingdom Climate Projections 2019
WFD	Water Framework Directive
WODS	West Oxfordshire District Council
VoWH	Vale of the White Horse

Units

Unit	Description
%	Percentage
km^2	Square kilometres
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)
M AOD	Meters above ordnance datum
m^3	Meters cubed (volume)
mm/yr	Millimetres per year (rainfall)
MW	Megawatt (power)

10 Hydrology and Flood Risk

10.1 Introduction

10.1.1 Overview

10.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) has been prepared by RPS on behalf of Photovolt Development Partners GmbH. (PVDP) for the Applicant, SolarFive Ltd. (SolarFive). SolarFive is a licence holder under the Electricity Act 1989. SolarFive is also a company registered in England and Wales (company no. 12602740).

10.1.1.2 PVDP intends to submit an application on behalf of SolarFive for development consent to the Planning Inspectorate (PINS) under the Planning Act 2008. The proposal is to install and operate approximately 840MWe of solar generation in parts of West Oxfordshire, Cherwell and Vale of White Horse Districts (the Project). The application will be accompanied by an Environmental Statement (ES) prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (the EIA Regulations), and other required documents including a statement on pre-application consultation.

10.1.1.3 This PEIR summarises preliminary results of the assessment to date, before being further refined and reported within the Environmental Statement. The assessment was carried out in accordance with the approach set out in the Scoping Report. The purpose of the PEIR is to inform the statutory consultation process, enabling consultees to understand and comment on the likely significant effects of the Project.

10.1.1.4 This PEIR sets out the proposed content, methodologies and key issues to be included within the Environmental Impact Assessment (EIA) process and the resulting ES to be submitted with the application. The assessment presented is informed by the following technical chapters.

- Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR;
- Volume 3 Appendix 10.2 Hydraulic Modelling Report of the PEIR;
- Volume 3 Appendix 10.3 Hydrology Report of the PEIR;
- Volume 3 Appendix 10.4 Groundwater and Surface Water Abstraction Report of the PEIR.

10.1.1.5 This chapter also draws upon information contained within.

- Volume 1 Chapter 11 Ground conditions of the PEIR.
- Volume 1 Chapter 14 Climate change of the PEIR.
- Volume 1 Chapter 9 Ecology of the PEIR.

10.1.1.6 The PEIR will be consulted on as part of the statutory phase of public consultation that is proposed in the autumn. Following consultation, all comments on the PEIR will be reviewed, and where practicable, taken into

account, in preparation of the ES that will accompany the application to PINS for development consent.

10.2 Legislative and policy context

10.2.1 Legislation

10.2.1.1 This chapter of the PEIR has considered the legislative framework as defined below.

European Legislation

The European Floods Directive (2007/60/EC)

10.2.1.2 Aims to engage statutory bodies to draw up flood risk assessments and prepare flood maps and management plans.

The Drinking Water Directive (2020)

10.2.1.3 Concerns the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.

National Legislation

The Water Resources Act (amended England and Wales 2009)

10.2.1.4 The Water Resources Act Principally relates to the protection of controlled waters (i.e., rivers, lakes, canals and groundwater) from pollution. It sets out the responsibilities of the Environment Agency (EA) in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. It also regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwater.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

10.2.1.5 Establishes a legislative framework for the protection of surface waters and groundwater. The Regulations place a general duty of the Secretary of State and the EA to exercise their 'relevant functions' so as to secure compliance with the Water Framework Directive (2000/60/EC).

The Land Drainage Act 1991

10.2.1.6 Sets out the responsibilities of the National Rivers Authority (now the EA), Internal Drainage Boards, Local Authorities, Navigation Authorities and Riparian Owners in the mitigation of flooding.

The Environmental Protection Act 1990

10.2.1.7 Makes provision for the fundamental structure and authority for waste management and control of emissions into the environment.

The Environment Act 2021,

10.2.1.8 The Environment Act (2021) part of the new legal framework for environmental protection post Brexit. The Act brings in measures for improvement of the environment, including waste, resource efficiency, air quality, water, nature and biodiversity and conservation.

The Water Act 2003

10.2.1.9 Amends the Water Resources Act (1991) to improve the management of long-term water resources mainly through significant changes to how abstraction and impoundment of water is regulated. The Water Act aims for the sustainable use of water resources; strengthening the voice of consumers; a measured increase in competition; and the promotion of water conservation.

The Flood Risk Regulations 2009

10.2.1.10 Transposes Directive 2007/60/EC on the assessment and management of flood risk for England and Wales. The regulations impose duties on the EA and local authorities to prepare preliminary assessment reports about past floods in each river basin district, and the possible harmful consequences of future floods. The EA is also under a duty to prepare a preliminary assessment map of each river basin district. Following these assessments, the authorities must identify areas which are at significant risk of flooding.

The Flood and Water Management Act 2010

10.2.1.11 Implements the recommendations from Sir Michael Pitt's review of the floods in 2007 and aims to improve flood risk management. It designates Lead Local Flood Authorities, whose responsibilities include reviewing all proposed sustainable drainage systems for new applications.

The Water Act 2014

10.2.1.12 Amends the Water Industry Act (1991) and improves regulation of the water industry through licensing, as well as increasing competition within the water and sewerage industries for the benefit of customers. It also details that the long-term resilience of water supply and sewerage systems should be secured. In place of the existing multiple permitting/consent schemes, a single environmental permitting regime for the regulation of the water environment is set out, in addition to the mechanisms through which households can obtain flood insurance.

The Environmental Permitting (England and Wales) Regulations 2016

10.2.1.13 Regulate discharges to controlled waters.

The Reservoirs Act 1975

10.2.1.14 Makes provision against the escapes of water from large reservoirs or from lakes or lochs artificially created or enlarged.

10.2.2 Planning policy context

10.2.2.1 The Botley West Solar Farm (Botley West); known throughout this chapter as the Project; will be located in the county of Oxfordshire, across an area of approximately 1,400 ha, across three solar farms (Northern, Central and Southern). The Project extends from the Northern site, situated between the A4260 and the Dorn River Valley near Tackley and Wootton, through to the Central site, situated broadly between Bladon and Cassington, and connecting to a southern site situated near to Farmoor Reservoir and north of Cumnor, where the Project will connect to the National Grid transmission network. The name 'Botley West' is derived from the location of the grid connection point.

10.2.2.2 The Project lies within the administrative areas of Cherwell (CDC), West Oxfordshire (WODC) and Vale of White Horse (VWHDC) District Councils, and Oxfordshire County Council (OCC). The majority of the Project lies within West Oxfordshire.

National Policy Statements

10.2.2.3 There are currently six energy National Policy Statements (NPSs) produced in June 2011. A 2020 review of the NPS led to the publication of updated drafts in March 2023.

10.2.2.4 **Table 10.1** sets out a summary of the policies within these NPSs, relevant to hydrology and flood risk.

Table 10.1: Summary of designated and draft NPS document requirements relevant to hydrology and flood risk

Summary of NPS requirement	Summary of Draft NPS requirements	How and where considered in the PEIR
Climate change adaption		
The decision maker should be satisfied that there are not features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections (UKC1P8), taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime (paragraph 4.8.8, NPS EN-1).	The Secretary of State should be satisfied that there are not features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections, taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime (paragraph 4.9.9, NPS EN-1).	Climate change has been taken into account in the characterisation of the baseline and future baseline environment (see **section 10.5.8**). Climate change is also considered in the Flood Risk Assessment (FRA) (see Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR and the climate change chapter Volume 1, Chapter 14: Climate change).
As climate change is likely to increase risks to the resilience of	As climate change is likely to increase risks to the resilience of	An FRA has been prepared for the Project (see Volume 1, Appendix

Summary of NPS requirement	Summary of Draft NPS requirements	How and where considered in the PEIR
some electricity infrastructure from flooding, for example, in situations where it is located near the coast or is underground, applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and as appropriate, how it would be resilient to flooding, particularly for substations that are vital for the electricity transmission and distribution network (paragraph 2.6.1, NPS EN-5).	some of this infrastructure, from flooding for example, or in situations where it is located near the coast or an estuary or is underground, 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 (paragraph 2.6.1, NPS EN-5).	10.1: Flood Risk Assessment of the PEIR). The primary substation is to be located wholly within Flood Zone 1. Climate change is discussed in Volume 1, Chapter 14: Climate change of the PEIR.
Flood Risk		
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 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; • priority has been given to the use of sustainable drainage systems (SuDs) (as required in the next paragraph on National Standards); and in flood risk areas the project is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development. (paragraph 5.7.9, NPS EN-1).	In determining an application for development consent, the Secretary of State 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 • sustainable drainage systems (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 5.8.18) 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	An FRA has been prepared, (see Volume 1, Appendix 10.1: Flood Risk Assessment, of the PEIR) which considers the flood risk associated with the Project. The FRA has been undertaken in line with NPS EN-1, National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) ID7 which includes the undertaking of the Sequential and Exception Tests. An outline drainage strategy has also been prepared in line with sustainable drainage principles (SuDS), within Volume 1, Appendix 10.1: Flood Risk Assessment, of the PEIR.

Summary of NPS requirement	Summary of Draft NPS requirements	How and where considered in the PEIR
	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 5.8.11, NPS EN-1).	
For construction work which has drainage implications, approval for the project's drainage system will form part of the development consent issued by the decision maker. The decision maker will therefore need to be satisfied that the proposed drainage system complies with any National Standards published by Ministers under Paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010. In addition, the development consent order, or any associated planning obligations, will need to make provision for the adoption and maintenance of any SuDS, including any necessary access rights to property. The Decision Maker should be satisfied that the most appropriate body is being given the responsibility for maintaining any SuDS, taking into account the nature and security of the infrastructure on the proposed site. The responsible body could include, for example, the applicant, the landowner, the relevant local authority, or another body, such as an Internal Drainage Board. (paragraph 5.7.10, NPS EN-1).	For energy projects which have drainage implications, approval for the project's drainage system, including during the construction period, will form part of the development consent issued by the Secretary of State. The Secretary of State will therefore need to be satisfied that the proposed drainage system complies with any National Standards published by Ministers under paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010. In addition, the development consent order, or any associated planning obligations, will need to make provision for appropriate operation and maintenance of any SuDS throughout the project's lifetime. Where this is secured through the adoption of any SuDS features, any necessary access rights to property will need to be granted. Where relevant, the Secretary of State should be satisfied that the most appropriate body is being given the responsibility for maintaining any SuDS, taking into account the nature and security of the infrastructure on the proposed site. Responsible bodies could include, for example the landowner, the relevant lead local flood authority or water and sewerage company (through the Ofwat-approved Sewerage Sector Guidance), or another body, such as an Internal Drainage Board (paragraph 5.8.12, NPS EN-1).	Drainage strategies have been prepared and are provided in Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR. The proposed drainage strategies have been developed in accordance with the NPS, NPPF, PPG ID7 and the SuDS Manual, whereby sufficient attenuation storage is provided for 1 in 100 year plus climate change worst case storm event. Drainage provisions will be set out in an agreement with the relevant Lead Local Flood Authority.

Summary of NPS requirement	Summary of Draft NPS requirements	How and where considered in the PEIR
	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 or NRW, and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators (paragraph 5.8.18, NPS EN-1).	
n/a	Where a Flood Risk Assessment has been carried out this must be submitted alongside the applicant's ES. This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not, in general, be significant. (paragraph 3.10.75, NPS EN-3).	Drainage of solar PV arrays is discussed within the drainage strategy provided in Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR.
n/a	Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any runoff where recommended (paragraph 3.10.76, NPS EN-3)	Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR states access tracks are to be of permeable construction
n/a	Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses. (paragraph 3.10.77, NPS EN-3)	Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR states a minimum 8m easement between solar PV panels and watercourses is to be provided
The decision maker should not consent development in Flood Zone 2 in England unless it is satisfied that the sequential test requirements have been met. It should not consent development in Flood Zone 3 unless it is satisfied that the Sequential and Exception Test requirements have been met. The technology-specific NPSs set out some exceptions to the application of the sequential test. However, when seeking development consent on a site allocated in a development plan	The Secretary of State should not consent development in flood risk areas, accounting for all sources of flooding and the predicted impacts of climate change unless they are satisfied that the sequential test. requirements have been met. The Secretary of State should not consent development in Flood Zone 3 unless they are satisfied that the Sequential and Exception Test requirements have been met. The technology specific NPSs set out some exceptions to the application of the sequential	The export cable corridor is shown to be located within Flood Zone 1, 2 and 3 (Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR). The approach to flood risk and the assessment is described in the FRA and has been summarised in this chapter (see **section 10.8**). Localised low-lying areas of the Project are shown to be at risk from surface water flooding. Appropriate mitigation measures are outlined within the FRA

Summary of NPS requirement	Summary of Draft NPS requirements	How and where considered in the PEIR
through the application of the sequential test, informed by a strategic flood risk assessment, applicants need not apply the sequential test, but should apply the sequential approach to locating development within the site. (Paragraph 5.7.12, NPS EN-1).	test. However, when seeking development consent on a site allocated in a development plan through the application of the Sequential Test, informed by a strategic flood risk assessment, applicants need not apply the Sequential Test, provided the proposed development is consistent with the use for which the site was allocated and there is no new flood risk information that would have affected the outcome of the test. Consideration of alternative sites should take account of the policy on alternatives set out in section 4.2 above. All projects should apply the sequential approach to locating development within the site (Paragraph 5.8.15, NPS EN-1).	(Volume 1, Appendix 10.1: Flood risk assessment of the PEIR).
Preference should be given to locating projects in Flood Zone 1 in England. If there is no reasonably available site in Flood Zone 1, then projects can be located in Flood Zone 2. If there is no reasonably available site in Flood Zones 1 or 2, then nationally significant energy infrastructure projects can be located in Flood Zone 3 subject to the exception test. Consideration of alternative sites should take account of the policy on alternatives (paragraph 5.7.13, NPS EN-1)		The approach to flood risk and the assessment are described in the FRA (Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR) and has been summarised in this chapter. Alternative sites are discussed in Volume 1, Chapter 5: Need and Alternatives Considered of the PEIR.
Solar photovoltaic (PV) sites may also be proposed in low lying exposed sites. For these proposals, applicants should consider, in particular, how plant will be resilient to: • increased risk of flooding; and • impact of higher temperatures. (Paragraph 3.4.10, NPS EN-3)	Solar photovoltaic (PV) sites may also be proposed in low lying exposed sites. For these proposals, applicants should consider, in particular, how plant will be resilient to: • increased risk of flooding; and • impact of higher temperatures (Paragraph 3.4.10, NPS EN-3)	An FRA has been prepared, (see Volume 1, Appendix 10.1: Flood Risk Assessment, of the PEIR) which considers the flood risk associated with the Project. The FRA has been undertaken in line with NPS EN-1, NPS EN-3, NPS EN-5 and National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) ID7. An outline drainage strategy has also been prepared in line with sustainable drainage principles (SuDS), within Volume 1, Appendix 10.1: Flood Risk Assessment, of the PEIR.

Summary of NPS requirement	Summary of Draft NPS requirements	How and where considered in the PEIR
Water quality resources		
The decision maker should satisfy itself that a proposal has regard to the River Basin Management Plans and meets the requirements of the WFD and its daughter directives, including those on priority substances and groundwater. The specific objectives for particular river basins are set out in River Basin Management Plans. The decision maker should also consider the interactions of the proposed project with other plans such as Water Resources Management Plans and Shoreline/Estuary Management Plans (paragraph 5.15.6, NPS EN-1).	The Secretary of State should be satisfied that a proposal has regard to the River Basin Management Plans and meets the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (including regulation 19). The specific objectives for particular river basins are set out in River Basin Management Plans. In terms of Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 compliance, the overall aim of development should be to prevent deterioration in status of water bodies to support the achievement of the objectives in the River Basin Management Plans and not to jeopardise the future achievement of good status for any affected water bodies. If the development is considered likely to cause deterioration of water body status or to prevent the achievement of good groundwater status or of good ecological status potential compliance with regulation 19 of the Water Environment (Water Framework Directive) (England and Wales) 2017 must be demonstrated (paragraph 5.16.8 NPS EN-1).	The assessment and the proposed mitigation measures have taken into account the requirements of the River Basin Management Plan and WFD to ensure all potential impacts on the water environment are mitigated to within acceptable levels (see Table 2.17).
The decision maker should consider whether appropriate requirements should be attached to any development consent and/or planning obligations entered into to mitigate adverse effects on the water environment (paragraph 5.15.7, NPS EN-1).	The Secretary of State should consider whether appropriate requirements should be attached to any development consent and/or planning obligations entered into to mitigate adverse effects on the water environment (paragraph 5.16.10, NPS EN-1).	This has been described and considered in relation to the Project.
The decision maker considers whether mitigation measures are needed over and above any which may form part of the project application. A construction management plan may help codify mitigation at that stage. The risk of impacts on the water environment can be reduced	The Secretary of State should consider whether mitigation measures are needed over and above any which may form part of the project application (see Sections 4.2 and 5.1). A construction management plan may help codify mitigation at that stage.	The approach to flood risk is presented in Volume 1, Appendix 10.1: Flood Risk Assessment of the PEIR and has been summarised in this chapter. Appropriate mitigation measures are set out in **Table 10.18** and an Outline Code of Construction

Summary of NPS requirement	Summary of Draft NPS requirements	How and where considered in the PEIR
through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked. The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling (paragraphs 5.15.8 to 5.15.10, NPS EN-1).	The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked. The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If an applicant needs new water infrastructure, significant supplies or impacts other water supplies, the applicant should consult with the local water company and the EA or NRW (paragraph 5.16.11 to 5.16.13, NPS EN-1).	Practice (CoCP) will be prepared and submitted alongside the ES.

The National Planning Policy Framework

10.2.2.5 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019, 2021 and 2023 (Department for Levelling Up, Housing and Communities, 2021). The NPPF sets out the Government's planning policies for England.

10.2.2.6 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. **Table 10.2** sets out a summary of the NPPF policies relevant to this chapter.

Table 10.2: Summary of NPPF requirements relevant to this chapter

Key provisions	How and where considered in the PEIR
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 (paragraphs 159 - 169 of the NPPF).	An FRA has been undertaken for the solar PV site, primary substation and export cable corridor due to the associated areas of development being over 1ha and partially located within Flood Zones 2 and 3. The approach to flood risk is presented in Volume 1, Appendix 10.1: Flood risk assessment of the PEIR.
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 (Paragraphs 153 – 158).	For the localised areas of the export cable corridor within Flood Zones 2 and 3, the Sequential and Exception Test are considered to be passed because the route of the corridor is required to link to the substation. The approach to flood risk is presented in Volume 1, Appendix 10.1: Flood risk assessment of the PEIR.

Key provisions	How and where considered in the PEIR
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 and flood risk.	The FRA has been undertaken in line with NPPF and PPG ID7 - Flood Risk and Coastal Change (see Volume 1, Appendix 10.1: Flood risk assessment of the PEIR).

Local planning policy

10.2.2.7 The relevant local planning policies applicable to hydrology and flood risk based on the extent of the study areas for this assessment are summarised in **Table 10.3**.

Table 10.3: Summary of local planning policy relevant to this chapter

Policy	Key provisions	How and where considered in the PEIR
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. […] 8.61 The use of SuDS will be required as part of all major development, unless demonstrated to be inappropriate. An important consideration in the provision and design of SuDS is that there are clear arrangements in place for ongoing maintenance. Advice should be sought from Oxfordshire County Council, the relevant lead local flood authority […]	FRA and sustainable drainage strategy to be undertaken in line with this policy

Policy	Key provisions	How and where considered in the PEIR
Vale of White Horse District Council Local Plan 2031		
Core Policy 42: Flood Risk	The risk and impact of flooding will be minimised through: i. directing new development to areas with the lowest probability of flooding ii. ensuring that all new development addresses the effective management of all sources of flood risk iii. ensuring that development does not increase the risk of flooding elsewhere, and iv. 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. All development will be required to provide a drainage strategy. Developments will be expected to incorporate sustainable drainage systems and ensure that runoff rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites. Sustainable drainage systems should seek to enhance water quality and biodiversity in line with the Water Framework Directive (WFD).	FRA and sustainable drainage strategy to be undertaken in line with this policy
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. 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.	Development proposals will incorporate this policy.
Cherwell Local Plan 2011 - 2031		

Policy	Key provisions	How and where considered in the PEIR
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)	FRA and sustainable drainage strategy to be undertaken in line with this policy
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. 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. Flood risk assessments should assess all sources of flood risk and demonstrate that: There will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100 year storm event with an allowance for climate change (the design storm event). Developments will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30 year storm event, up to and including the design storm event will be safely contained on site. Development should be safe and remain operational (where necessary) and proposals should demonstrate that surface water	FRA and sustainable drainage strategy to be undertaken in line with this policy

Policy	Key provisions	How and where considered in the PEIR
	will be managed effectively on site and that the development will not increase flood risk elsewhere, including sewer flooding.	
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. 2.1.3.27 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. In considering SuDS solutions, the need to protect ground water quality must be taken into account, especially where infiltration techniques are proposed. Where possible, SuDS should seek to reduce flood risk, reduce pollution and provide landscape and wildlife benefits. SuDS will require the approval of Oxfordshire County Council as LLFA and SuDS Approval Body, and proposals must include an agreement on the future management, maintenance and replacement of the SuDS features.	FRA and sustainable drainage strategy to be undertaken in line with this policy

10.3 Consultation and engagement

10.3.1.1 In June 2023, the Applicants submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction, operation and maintenance and decommissioning phases. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

10.3.1.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 24 July 2023. Key issues raised during the scoping process specific to hydrology and flood risk are listed in **Table 10.4**, together with details of how these issues have been addressed within the PEIR.

Table 10.4: Summary of scoping responses

Comment	How and where considered in the PEIR
Planning Inspectorate	
Study area The study area is applied on the basis that 1km is the extent of potential impacts to/from flooding and 250m represents the ZOI, but no further evidence to support these areas is provided. The Scoping Report does not consider potential hydrological connectivity to the Proposed Development site. The ES should justify the study area applied based on hydrological connectivity of the site to water receptors and the extent of potential flood risk.	The study area discussed within **section 10.4.3** and has been ascertained using professional judgement and focuses on where potential impacts are most likely to occur on hydrological and flood risk receptors during construction, operation and decommissioning phases of the project.

Comment	How and where considered in the PEIR
Elements in Flood Zones 2 and 3 The Scoping Report states that where practicable, built elements will be located outside of flood zones 2 and 3, implying that some elements may have to be situated in these areas. The ES should distinguish between flood zones 3a and 3b and specify what infrastructure will be located in which flood risk zones. The ES should explain what mitigation is in place to ensure that the Proposed Development is flood resilient and does not increase flood risk elsewhere.	Flood zones within the study area and associated mitigation measures are presented within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR.
Groundwater and standing water receptors Scoping Report paragraphs 7.4.6 to 7.4.14 provide a high-level description of the hydrological baseline environment but do not mention groundwater or standing water receptors or the potential for their presence. Neither receptor is included in potential impacts in Table 7.6. It is noted that Scoping Report paragraph 7.3.25 indicates ponds may be present on site. The Environment Agency note in their consultation response that aquifers are present in the study area and have potential to be impacted by the Proposed Development. The ES should describe any groundwater or standing water receptors identified in the study area and assess significant effects where they are likely to occur. Where groundwater receptors are assessed in other relevant chapters in the ES, this should be clearly cross referenced.	Hydrological features, including Main Rivers, ordinary watercourses and other hydrological features such as lakes, reservoirs and ponds are identified within **section 10.5.3** Hydrological setting. This section also includes Water Framework Directive surface water quality data of catchments which the Project is located within. A hydrogeological overview within **section 10.5.4** includes a review aquifer designations and source protection zones the Project is located within. Groundwater is to be discussed in detail within Volume 1 Chapter 11 Ground Conditions. The impact of deterioration of water quality within standing water and groundwater receptors is included within the impact of deterioration of water quality within Main Rivers and ordinary watercourses, discussed within **section 10.9.1**.
Deterioration of surface water quality Deterioration of surface water quality is anticipated due to direct impacts from construction work in close proximity to watercourses and due to temporary access road crossings. For clarity, impacts should also consider mobilisation of contaminants and sediment from ground disturbance/earthworks. The ES should also assess indirect effects i.e., potential pollution from any stored/spilled materials.	The impact of deterioration of water quality within Main Rivers and ordinary watercourses is discussed within **section 10.9.1** which includes pollutants that could mobilise as a result of ground disturbance / earthworks and also as a result of spillage of stored materials. This includes fine particulate materials (e.g. silts and clays), cement, oil and chemicals (from plant machinery and processes and spillage), and other wastes such as wood, plastics, sewage and rubble.
Deterioration of ground water quality Deterioration of ground water quality is not included in potential impacts in Table 7.6 although construction works may interact with groundwater receptors e.g., through piling and excavation. The Environment Agency identify in their consultation response that a historic landfill is located beneath the cable route corridor highlighting potential for contamination. The ES should assess effects to ground water quality where a pathway for impact exists and significant effects are likely.	Discussion regarding interactions between surface hydrology and hydrogeology is made within this chapter. Discussion of interaction between groundworks and groundwater is to be discussed in detail within Volume 1 Chapter 11 Ground Conditions of the PEIR.
Damage to field drainage at decommissioning Impacts identified at decommissioning do not include damage to field drainage although this is identified	The impact of damage to existing field drainage is presented within **section 10.9.4** The impact of damage to existing field drainage and assesses

Comment	How and where considered in the PEIR
as an impact at construction. The Scoping Report does not explain why this would not be an impact at decommissioning. The ES should justify why any potential impacts assessed differ between construction and decommissioning or else assess significant effects where they are likely to occur at decommissioning from damage to field drainage.	impacts at construction and decommissioning phases.
Best practice measures are proposed to be secured through management plans to reduce/avoid risks of pollution to waterbodies and responses to accidental spills and the Scoping Report states that construction and decommissioning activities are unlikely to affect bathing waters. It is proposed that where significant effects are identified in the Hydrology and Ground Conditions Chapter of the ES, an assessment of significant effects to human health from water quality/availability changes will be included. The Inspectorate agrees with this approach on the basis that the ES cross-references where appropriate.	Noted.
Best practice measures are proposed to be secured through management plans to reduce/avoid risks of pollution to waterbodies and responses to accidental spills. Operational effects on water quality and availability are not anticipated on a scale that would lead to likely significant effects. Where significant adverse effects are identified in the Hydrology and Ground Conditions Chapters this impact will be included in the Human Health Chapter, otherwise it is proposed to be scoped out. The Inspectorate agrees that where potential significant adverse effects are identified to water quality/availability in the Hydrology/Ground Conditions Chapters, impacts to Human Health should be assessed and where no significant adverse effects are identified to water quality/availability in the Hydrology/Ground	Noted.
Begbroke Parish Council	
Water runoff will increase, leading to increased flooding and overflowing ditches.	All sources of flood risk will be assessed within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. The conceptual surface water drainage strategy is included within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR.
Cassington Parish Council	
Literature Relevant local policy documents should include the Cassington Local Neighbourhood Plan and Green Infrastructure Plan. The Green Infrastructure Plan contains details of past flooding and current flood risk to the village of Cassington.	Relevant local policy documents will be taken into account within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR.. and Chapter 1 Volume 10: Hydrology and flood risk of the PEIR.
7.4.19 indicates that cumulative impacts from hydrology and flood risk will likely occur, whilst	Prior to the construction phase anecdotal and survey data for existing field drains would be established. In

Comment	How and where considered in the PEIR
7.4.20 suggests that these impacts will be contained within the footprint of each of the three sites. This, given the nature of the risks identified i.e. all linked to water movement, we challenge, particularly given our observation above that sections of the water movement mechanisms across the landscape are in poor repair and the history of surface water flooding. We expect these concerns to be reflected in a thorough assessment of flood risk to the villages including modelling, taking account of conditions on the ground of drainage infrastructure of the effects of the Central Section of the Botley West Scheme on local hydrology and if necessary trials undertaken with solar arrays of different design undertaken over an appropriate time period to understand impacts on soil hydrology and runoff.	the absence of data, where appropriate a field survey may be undertaken to establish the location of field drainage. For Thames Water infrastructure, asset plans will be used to inform the location of sewers and water supply pipelines, followed by on-site surveying to confirm the location of assets. During construction the applicant will seek to avoid existing field drainage and sewer/pipe networks where possible. In the event any said network is adversely affected, the application will endeavour to implement best measures to rectify any impacts. Increased flood risk as a result of the placement of solar PV modules is discussed within **section 10.9.1** The impact of increased flood risk from increased impermeable areas
We also note that a high-pressure water supply pipe runs underground across the fields to the north of Cassington and this also must be considered during construction and operation of the solar power station.	Thames Water assets have been indicatively located via Thames Water asset plans. Prior to detailed design stage, accurate location of assets will be obtained through detailed site surveys.
Study area This indicates, in keeping with previous sections, a likely zone of influence for hydrological impacts, specifically 250m for hydrology and 1km for flood risk. Again, we observe that there is no justification presented for the arrival of these figures, noting (again) that there has been no stakeholder consultation as part of the process.	The study area discussed within **section 10.4.3** and has been ascertained using professional judgement and focuses on where potential impacts are most likely to occur on hydrological and flood risk receptors during construction, operation and decommissioning phases of the Project.
Existing baseline conditions Scoping Report focuses largely on flood risk associated with water courses, however Cassington, Jericho Farm, Woretn and Yarnton surface water flooding is the significant issues which needs to be considered in the EIA. Elm's Road in Cassington appears to be particularly vulnerable to surface water flooding events which result from surface water draining off the high ground of the fields to the north of Cassington. This is consistent with flooding of properties on Elm's Road in 2007 (WODC, 2008). Foxwell Court, St Peter's Close, Horsemere Lane, Foxwell End and Reynold's Farm are also at risk of flooding from extreme surface water events (WODC, 2008). Outside the village Jericho Farm and Worten are also vulnerable to flooding and the road junction to Worten Farm was flooded over the winter of 2020/2021. 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 southwest corner of the playing fields. Since this time there have been no further property flooding events in Cassington	All sources of flood risk will be assessed within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR, including surface water. References will be made to existing flood risk concerns within the study area, as well as to flood alleviation schemes that have been undertaken.

Comment	How and where considered in the PEIR
although the threat remains as demonstrated by near flooding in the winter of 2022-2023.	
Flood risk Table 7.6 indicates a variety of potential hydrological and flood risk impacts which might arise as a consequence of the proposed development, with the vast majority to be subjected to a modelling approach to inform the assessment. A concern here is that many of the models will assume optimum condition infrastructure is in place (field drainage ditches, storm drains etc.), which they are not. We are therefore enquiring how these sub-standard infrastructures will be captured in the models (if at all)? Given existing flooding issues at Cassington, Worton and Jericho Farm resulting from surface water runoff alteration of hydrology on the hills to the north of Cassington which will be near completely covered by solar arrays is a significant concern for residents of the Parish. Any increase in surface water runoff would increase flood risks to properties particularly in Elm's Road, but also in Foxwell Court, St Peter's Close, Horsemere Lane, Foxwell End, Reynold's Farm, Jericho Farm and Worton. We are not reassured by the statement by PVDP in their Phase 1 Consultation Summary Report (PVDP, 2023) that "Well designed solar farms do not cause an increase in the risk of flooding."	All sources of flood risk will be assessed within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. The conceptual surface water drainage strategy is included within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. and discusses how flows generated from additional impermeable area will be dealt with as per national and local policy. Hydraulic modelling has been undertaken and results are presented within Volume 3 Appendix 10.2 Hydraulic modelling of the PEIR.
Climate Change In a situation where there is a continued risk to our villages from surface water flooding framed by an apparent increase in extreme rainfall events resulting from climate change (see UKCP18 statements on frequency and severity of surface water flooding in summer and autumn) this is a major concern to our residents.	Impacts of climate change is considered within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. 'Flood Risk Assessments: Climate Change Allowances', EA (May 2022) uses UKCP18 and UKCP19 climate change predictions. This data has been used to inform peak river flow and peak rainfall intensity allowances, as presented within is presented within **section 10.5.8** Future baseline conditions. Fluvial modelling has used both the 'upper and 'higher central' allowance category for the Cotswold management catchment. Climate change allowances are discussed in further detail within **section 1.3** within the flood modelling report Annex.
Surface water drainage Studies of how utility-scale solar power stations impact hydrology are relatively few at present. However, the studies that do exist show changes in soil moisture content associated with solar panel arrays and also increases in surface water runoff (e.g. Pisinaras et al., 2014; Yavari et al., 2022). Alterations in hydrology also have the potential to increase soil erosion in some circumstances (e.g. Yavari et al., 2022). One aspect of solar array design which influences runoff of rainwater is the tilt angle	The Pisinaras et al., 2014 study is of a river basin in Greece typical of Mediterranean hydrology and climate (dry hot summers and mild winters). The catchment is very hydrologically continuous with complex interactions with surface water, groundwater and the sea. Due to the study climate conditions, the hydrological conditions are unlikely to be very representative or relevant to UK conditions and is thus the effects of solar panels to soil moisture content and runoff are unlikely to apply to the Botley West Project.

Comment	How and where considered in the PEIR
and orientation of the solar panels at a given site (Yavari et al., 2022).	The Yavari et al., 2022 provides a review of previous studies from across the world, demonstrating hydrology and flood risk impacts from solar farms are very dependent on climate and ground conditions - most detrimental impacts appear to be associated with arid and semi-arid regions. Increased flood risk as a result of the placement of solar PV modules is discussed within **section 10.9.1** The impact of increased flood risk of this chapter.
Cumnor Parish Council	
Study area Council notes that the proposed DCO site in this Parish spans an elevation difference of c.40m. Given the complex hydrology of the Parish (see the Flood Risk Assessment in our made Neighbourhood Plan) Council considers the proposed 250m boundary for assessment to be inadequate, the known zone of influence being well in excess of 1km in this Parish, due to its rapid changes in elevation (greater than 86m across the Parish) and complex geology. Council believes para 7.4.6 should explicitly reference the river Thames itself, not as present 'River Thames tributary', since the site is proposed to both border and cross the river itself.	The study area discussed within **section 10.4.3** and has been ascertained using professional judgement and focuses on where potential impacts are most likely to occur on hydrological and flood risk receptors during construction, operation and decommissioning phases of the Project.
In para 7.4.12 the applicant ignores the fact that the proposed westerly crossing point of the Thames lies across the Longmead wildlife site, part of the Thames Valley Wildflower Meadow Restoration Project. Council requests that this site be included in scope.	The Long Mead Local Wildlife Site wildlife site will be included as a key receptor within this chapter.
Environment Agency	
Flood Zones Application sites lies within Flood Zones 1, 2 and 3 and the development is considered essential infrastructure. Site is partly defended by EA maintained flood defences and third party maintained defences. Error in Paragraph 2.1.5 of SR which states the Northern Site is entirely within FZ1; there is a small area of FZ3 as highlighted in Table 7.5. Part of the site is likely to lie within the 3.3% annual exceedance probability (AEP) flood outline, identified by Table 1 of the Flood Zone and Flood risk tables of the PPG as within FZ 3b (functional floodplain). Development should be avoided within the 3.3% AEP where possible.	Flood zones within the study area are presented within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR.
Hydraulic modelling Likely detailed hydraulic modelling will be required, and acknowledged in Paragraph 7.4.17 although more than one model is likely to be required. For any detailed modelling, a range of flood events including the 3.3% AEP, 1% AEP and 1% AEP plus an	Hydraulic modelling for the Central site has been undertaken within Volume 3 Appendix 10.2 Hydraulic Modelling Report of the PEIR. Hydraulic modelling has been submitted to the EA for review.

Comment	How and where considered in the PEIR
appropriate allowance for climate change should be modelled. If the site is within FZ2 and/or 3 from fluvial flood risk from the following rivers, detailed hydraulic modelling will be required as no modelling is currently available: River Evenlode (including a tributary that joins the Evenlode just upstream of Eynsham Mill), River Glyme, Eynsham Mead Ditch, Filchampstead Brook, Rowel Brook (detailed modelling should extend further upstream than the existing JFLOW data). EA to review and sign off any flood modelling to ensure it is fit for intended use. Once agreed, a detailed comparison should be made between the modelled flood levels and a detailed topographic survey to help establish any likely flood extents. Proposed scheme should then be designed in consideration of agreed flood extents and levels.	
Two existing detailed models providing information on River Thames flooding. Additional River Thames modelling may be required to determine 1% AEP plus an appropriate allowance for climate change event: Thames (Shifford to Eynsham) & Windrush (A40 to Thames Confluence) 2011, Thames (Eynsham to Sandford) 2018 2022 Red line in close proximity to Chil Brook - detailed model for this area; Chil Brook (Eynsham) 2013 model.	Noted.
The FRA should include some assessment of the likelihood and consequences of a breach or overtopping of the defences located on site, and mitigate accordingly. An assessment of the structural integrity of the defences should be provided, and considering of ongoing maintenance requirements for the operational lifetime of the development.	Information regarding the standard of protection and flood defences within the study area are discussed within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. Flood defences present within the Central site offer protection to the 1 in 2-year event and as such are deemed insignificant and as such a breach assessment is not deemed appropriate.
Sequential Approach Sequential approach should be taken for the choice of site and the layout within the site boundary, locating most vulnerable development in lowest areas of flood risk. The most vulnerable development may be any equipment that would be damaged by flood waters. Development is considered 'Essential Infrastructure,' although it is deemed compatible with all flood zones (subject to the application of the Sequential Test), it will need to pass the Exception Test in areas of FZ3 and should be designed and constructed to remain operational and safe in times of flood. Due to large areas of FZ1, may be possible to avoid any development in 1% AEP plus an appropriate allowance for climate change flood extent. If not possible, would expect to see detailed justification in the FRA as to why development is required in areas at high flood risk. Majority of the site is in FZ1 (particularly Northern and Southern sites), larger areas of the site appear	A sequential approach to flood risk has been undertaken within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. with Project to be located within Flood Zone 3 subjected to the Exception Test. Impacts of climate change is considered within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. 'Flood Risk Assessments: Climate Change Allowances', EA (May 2022) uses UKCP18 and UKCP19 climate change predictions. This data has been used to inform peak river flow and peak rainfall intensity allowances, as presented within **section 10.5.8** Future baseline conditions. Fluvial modelling has used both the 'upper and 'higher central' allowance category for the Cotswold management catchment. Climate change allowances are discussed in further detail within **section 1.3** within the hydraulic modelling report.

Comment	How and where considered in the PEIR
to be within FZ3. Welcome Paragraph 7.4.17 which should include flow paths from the 1% AEP fluvial event, plus an appropriate allowance for a climate change fluvial event, and 300mm freeboard. Concerned this may not be possible in some areas of the Central Site which contains significant areas of FZ3. Para 2.1.14 of SR states that for areas in FZ3 from the River Evenlode 'it is not proposed to develop solar arrays in these high-risk areas' - we strongly advise other built development is also excluded from areas at high flood risk especially if the equipment could be damaged by flood waters.	The need for the Project and alternatives considered is discussed in Volume 1 Chapter 5: Need for the Project and alternatives considered.
Floodplain compensation Any land raising or increases in built footprint within 1% AEP plus an appropriate allowance for climate change flood extent can lead to increases in flood risk elsewhere and floodplain compensation would be needed for any loss of floodplain storage within this flood extent. Level for level floodplain compensation is preferred and should be considered in FRA, Cumulative impacts should also be considered, due to scale of proposed development, the total volume of storage lost from footings in the floodplain could be large in total. To avoid losses in floodplain storage from the impedance of flood flows, access roads should be set at existing ground level. If there are safe access and egress issues relating to access routes in the floodplain, recommend these are discussed with LPAs. Cables that are set above ground may need to be located outside the 1% AEP plus an appropriate allowance for climate change flood extent. This is to prevent impedance flood flows, unless they are set above flood levels (such as by using pylons). Welcome at Paragraph 7.4.17 (PV arrays would be raised above the 1% AEP plus an appropriate allowance for climate change flood level) - at least 300mm freeboard above the design flood level should be provided to reduce the risk of flooding to property (taking into account wave action and inaccuracies of modelled data). Any other buildings/structures within 1% AEP plus an appropriate allowance for climate change flood level should also be raised at least 300mm above this design flood level, or designed to ensure they are not damaged by flood water. This and any other measures to ensure the solar farm would operate in times of flood should be considered in the FRA. Any changes in land level, such as for earthworks or in decommissioning and enhancement plans, within the 1% AEP plus an appropriate allowance for climate change flood extent, should be assessed within FRA. Any surplus material proposed to be reused in landscaping and restoration of the site (and not exported) should be located outside the 1%	Noted.

Comment	How and where considered in the PEIR
AEP plus an appropriate allowance for climate change flood extent, to prevent loss of floodplain storage. Walls and fences should be permeable to flood water.	
Works within 8m of a Main River and flood defences To ensure essential access to rivers, all development including fencing should be set back at least 8m from Main Rivers and ordinary watercourses where possible. Any temporary or permanent structures should be suitably set back from flood defences, to avoid compromising their structural integrity. Access to flood defences should be preserved for maintenance and inspected.	Include within the mitigation measures adopted as part of the Project (**Table 10.18**) Increased flood risk as a result of damage to existing flood defences has been scoped into the assessment and is presented within **section 10.9.3** The impact of increased flood risk arising from damage to existing flood defences
River crossings Works should be avoided if proposed in, under or over Main Rivers. If works are required to connect the site on either side of a main river, more information is required on how this may be achieved. Cables set under a river or significantly over a river through pylons may be acceptable, we would have concerns with new river crossings or alterations to existing crossings (due to potential impact on flow and storage of flood water)	Include within the measures (commitments) adopted as part of the Project (**Table 10.18**).
TVFS an emerging EA plan, in close proximity to BWSF area. Whilst TVFS is at an early stage, there is potential for it to overlap with the development boundaries of this project. Recommend applicant contact the TVFS project team asap: tvfs@environment-agency.gov.uk	Noted. Consultation with the TVFS project team has been initiated.
Consents The Environmental Permitting (England and Wales) Regulations 2016 require a permit or exemption to be obtained for any activities which will take place: • on or within 8 m of a main river (16 m if tidal) • on or within 8 m of a flood defence structure or culverted main river (16 m if tidal) • on or within 16 m of a sea defence • involving quarrying or excavation within 16 m of any main river, flood defence (including a remote defence) or culvert • in the floodplain of a main river if the activity could affect flood flow or storage and potential impacts are not controlled by a planning permission Please note, directional drilling within proximity to a watercourse, may be considered for an exemption, if it meets certain conditions.	Noted.

Comment	How and where considered in the PEIR
If the applicant is intending to disapply legislation, we advise them to consult with us at the earliest opportunity to discuss if this would be acceptable. If dewatering is required, it may require an environmental permit if it doesn't meet the exemption in The Water Abstraction and Impounding (Exemptions) Regulations 2017 Section 5: Small scale dewatering in the course of building or engineering works. Temporary dewatering from excavations to surface water: RPS 261 - GOV.UK	
Natural England	
The proposal could have potential impacts on Blenheim Park SSSI, Rushy Meadows SSSI, Wytham Ditches & Flushes SSSI and Wytham Woods SSSI. There are a number of potential impact pathways to consider at these sites during the construction and operational phases of the development which will require further assessment.	The study area discussed within **section 10.4.3** and has been ascertained using professional judgement and focuses on where potential impacts are most likely to occur on hydrological and flood risk receptors during construction, operation and decommissioning phases of the Project. Blenheim Park SSSI and Wytham Woods SSSI are located within the study area and thus hydrology and flood risk related impacts to these receptors will be assessed.
Oxfordshire County Council	
Requirement for full FRA. Acknowledgement that surface water drainage design will need to be consistent with LLFA local standards.	Existing flood risk within the study area is considered within Volume 3 Appendix 10.1 Flood Risk Assessment of the PEIR. The conceptual surface water drainage strategy is included within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR and has been undertaken in-line with national and local policy standards.
Improvement of water quality, biodiversity. Deliver benefits as part of the scheme for drainage receptor areas	Noted.
Thames Water	
Requires a build over agreement before commencement, because we believe proposed development is within 3m of a public sewer, of which the internal diameter is less than or equal to 150mm. TW do not permit driven piles within 15m of a public sewer.	Noted.
Vale of White Horse District Council	
The submitted scoping opinion request refers to the River Thames as a tributary of the Thames whereas it is actually designated as the River Thames at this point. The Flood Risk Assessment provided as one of the assessments informing the Cumnor Neighbourhood Plan identifies parts of the site as being at risk of surface water flooding which should be assessed in the EIA.	Existing flood risk within the study area is considered within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR.
One of the routes for cabling does go through the Longmead Meadow site which may have flooding consequences on this highly significant environment	The Long Mead Local Wildlife Site wildlife site will be included as a key receptor within this chapter.

Comment	How and where considered in the PEIR
and biodiverse site, which is adjacent to the River Thames, and this needs to be assessed.	
Yarnton Parish Council	
Scoping report focuses on rivers and watercourses with no mention of potential for flash flooding and field drainage for Yarnton. Flash flooding is significant local issue and Yarnton has been subject to several past flash flood events (2.1.5). Panels will have impact upon drainage patterns over the site and on local watercourse receptors, through construction, operation, maintenance and decommissioning. Important Yarnton residents are consulted about any surface water management plan and FRA and drainage (7.4.17). Lack of ploughing over long period may cause soil to become heavily compacted, leading to flashier runoff rates.	Surface water flooding can occur as a result of high intensity rainfall events and will be assessed alongside all other sources within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR. Existing flood risk issues will also be noted within the report. It is anticipated that following construction of the solar panels, the fields will be vegetated. The vegetation will promote soil cohesion and reduce the potential effects of run off and erosion. Additional information is provided in the conceptual surface water drainage strategy, presented within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR. Increased flood risk as a result of the placement of solar PV modules is discussed within **section 10.9** The impact of increased flood risk of this chapter.
West Oxfordshire District Council	
Although the majority of the site is in flood zone 1, it is proposed that cable routes will have to cross the River Thames, with crossing points to the east of Eynsham. There are extensive areas of flood zone 2 associated with the River Evenlode and its tributaries within the application boundary. Central Section – Where the Evenlode crosses the Central section there are also areas of Flood Zone 2. Relevant guidance to be included • Evenlode Catchment Management Plan (March 2021) • Thames river basin district river basin management plan: updated 2022 Row 10 should include potential increase in flood risk associated with run-off from solar panels.	Flood zones within the study area and associated mitigation measures are presented within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR. Relevant guidance will also be taken into account within this report and the Hydrology and flood risk PEIR report. The conceptual surface water drainage strategy is included within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR and has been undertaken in-line with national and local policy standards.

10.3.1.3 A summary of the key issues raised during consultation activities undertaken to date is presented in **Table 10.5**, together with how these issues have been considered in the production of this PEIR chapter.

Table 10.5: Summary of consultation relevant to this chapter

Date	Consultee and type of response	Issues raised	How and where considered in the PEIR
November 2022	Phone meeting	Attempted to establish is the EA's opinion on placing solar panels in areas potentially at risk of river flooding (Flood Zone 3).	Discussed proposals and agreed to provide additional information as design information comes forward.
July 2023	Formal request submitted	Detailed proposals to place solar panels within areas at risk of flooding from the 1 in 30-year and 1 in 100-year fluvial flood events.	A response has yet to be received.
September 2023	Teams meeting	Provided a main point of contact by the EA and discussed timescales regarding data provision to the EA.	Discussed proposals and agreed to provide additional information as design information comes forward.

10.4 Baseline methodology

10.4.1 Relevant guidance

10.4.1.1 Relevant guidance used to inform the baseline assessment is set out within the DMRB Sustainability and Environment Appraisal; LA113 Road Drainage and the Water Environment. Whilst this originally related to road projects, it is accepted that cable route projects can also follow the guidance due to their linear nature.

10.4.1.2 The hydrology and flood risk baseline environmental conditions are defined by the following attributes:

- Surface water
  - Water quality – informed by WFD status, number and details of abstractions, discharges, pollution incidents
  - Hydromorphology – informed by size and flows of waterbodies
- Groundwater
  - Water quality – informed by WFD status, number and details of abstractions, discharges, pollution incidents, aquifer designations and vulnerability.
  - Levels and flow – informed by size and flows of groundwater bodies
  - Dependant ecosystems – informed by details of downstream ecologically designated sites.
- Flood impacts (informed by Volume 1 Appendix 10.1: Flood risk assessment, Appendix 10.2 Hydraulic modelling report and Appendix 10.3)

10.4.2 Scope of the assessment

10.4.2.1 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 10.4** and **Table 10.5.**

10.4.2.2 Taking into account the scoping and consultation process, **Table 10.6** summarises the issues considered as part of this assessment.

Table 10.6: Issues considered within this assessment

Activity	Potential effects scoped into the assessment
Construction phase	
Increased impermeable areas associated with temporary construction activities, such as the erection of construction compounds, haul roads and construction accesses.	Increase in runoff and thus flood risk as a result of increases in impermeable areas.
Excavation and excessive ground loading as a result of machinery and construction activities	Damage to existing below ground infrastructure including field drainage infrastructure, water pipelines and sewage infrastructure.

Activity	Potential effects scoped into the assessment
Construction activities (including trenched and trenchless techniques) and associated machinery could lead to an increase in turbid runoff, high pH water runoff, bentonite breakouts during drilling and spillages/leaks of fuel, oil etc. Activities could also lead to damage to the banks along the watercourses and any associated flood defences.	Deterioration in the quality of Main Rivers and ordinary watercourses within the receiving catchment. Damage to existing flood defences and thus increasing flood risk. Trenching techniques / excavation of entry and exit pits may provide new conduits in which surface water flows can be conveyed, thus potentially increasing flood risk.
Operation and maintenance	
leaks and spills of stored material used during operation and maintenance.	Deterioration in the quality of Main Rivers and ordinary watercourses within the catchment.
Increased impermeable areas associated with permanent proposed development (primary substation, secondary substations / high voltage transformers, PCS units and solar PV modules)	Increase in runoff and thus flood risk as a result of increases in impermeable areas
Decommissioning	
Excavation and excessive ground loading as a result of machinery and construction activities	Deterioration in the quality of Main Rivers and ordinary watercourses within the receiving catchment.

10.4.3 Study area

10.4.3.1 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.

10.4.3.2 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.

10.4.3.3 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.

10.4.3.4 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 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 temporary construction compounds, the three solar farm sites and export cable corridor route and 1km buffer applied to the new primary substation.

10.4.3.5 Due to the variety of 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.

10.4.3.6 A figure of the study area is presented within **Figure 10.1**.

10.4.4 Methodology for baseline studies

Desk studies

10.4.4.1 Information on hydrology and flood risk within the study area was collected through a detailed desktop review of existing studies and datasets. These are summarised at **Table 10.7** below.

Table 10.7 Summary of key desktop reports

Title	Source	Year	Author	Date accessed
BGS Geology Viewer	ttps://geologyviewer.bgs.ac.uk/?_ga=2.60345197.172764960.1660052920-1090504202.1660052920	2023	BGS	July 2023
Catchment Data Explorer	https://environment.data.gov.uk/catchment-planning/ (Accessed 10/05/2023)	2023	EA	July 2023
Climate change allowances for peak rainfall in England	https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall (Accessed: 10/05/2023)	2022	EA	July 2023
Climate change allowances for peak river flow in England	https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=363522b846b842a4a905829a8d8b3d0c (Accessed: 10/05/2023)	2021	EA	July 2023
Enviro and Geo Insight digital reports	reference GSIP-2023-13424-13080_1 to _16 and GSIP-2023-13424-13081	2023	Groundsure	July 2023
Flood Map for Planning	https://flood-map-for-planning.service.gov.uk/ (Accessed: 10/05/2023)	2023	EA	July 2023
Flood Risk Assessments: Climate Change Allowances	https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances (Accessed: 10/05/2023)	2022	UK Government	July 2023

Title	Source	Year	Author	Date accessed
Geoindex Onshore Mapping	https://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSBoreholes&_ga=2.208842641.248375038.1661445015-2146726876.1661445015	2023	BGS	July 2023
Internal Drainage Boards Map	https://www.ada.org.uk/idb-map/	2023	IDB	July 2023
Long Term Flood Risk Map	https://check-long-term-flood-risk.service.gov.uk/map (Accessed: 10/05/2023)	2023	EA	July 2023
National Planning Policy Framework	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf (Accessed: 10/05/2023)	2021	UK Government (Ministry of Housing Communities & Local Government)	July 2023
OS mapping 1:25 000	https://maps.the-hug.net/	2023	OS	July 2023
Overarching National Policy Statement (NPS) for Energy EN-1	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf	2011	Department of Energy and Climate Change	July 2023
Overarching National Policy Statement (NPS) for Energy EN-3	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47856/1940-nps-renewable-energy-en3.pdf	2011	Department of Energy and Climate Change	July 2023
Overarching National Policy Statement (NPS) for Energy EN-5	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf	2011	Department of Energy and Climate Change	July 2023
DRAFT: Overarching National Policy Statement for energy (EN-1)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf (Accessed: 24/07/2023)	2023	Department for Energy Secruity and Net Zero	July 2023
DRAFT: National Policy Statement for renewable energy infrastructure (EN-3)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147382/NPS_EN-3.pdf (Accessed: 24/07/2023)	2023	Department for Energy Secruity and Net Zero	July 2023

Title	Source	Year	Author	Date accessed
DRAFT: National Policy Statement for electricity networks infrastructure (EN-5)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147384/NPS_EN-5.pdf (Accessed: 24/07/2023)	2023	Department for Energy Secruity and Net Zero	July 2023
Planning Practice Guidance: Flood Risk and Coastal Change	https://www.gov.uk/guidance/flood-risk-and-coastal-change (Accessed: 10/05/2023)	2022	UK Government (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government)	July 2023
Soilscapes viewer	http://www.landis.org.uk/soilscapes/	2023	The National Soils Research Institute	July 2023
Defra Data Services Platform	https://environment.data.gov.uk/	2023	EA	July 2023
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 (Accessed: 24/07/2023)	2017	Cherwell Distirct Council (CDC)	July 2023
Cassington NFM report.	n/a	2020	EA	August 2023
Eynsham Neighbourhood Plan 2018 – 2031	https://www.westoxon.gov.uk/media/ngkckyhi/eynsham-neighbourhood-plan.pdf	2020	Eynsham Parish Council	August 2023
Long Mead Local Wildlife Site	http://www.longmeadwildlifesite.org.uk/	2023	Long Mead Local Wildlife Site	August 2023
Cassington Neighbourhood Plan (2021 – 2041 Submission Plan)	https://www.westoxon.gov.uk/media/pdplutja/submission-draft-cassington-neighbourhood-plan.pdf	2022	Cassington Parish Council	August 2023
Cumnor Parish Neighbourhood Development Plan 2021 to 2031	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	August 2023

Title	Source	Year	Author	Date accessed
OCC 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 (Accessed: 24/07/2023)	2021	Oxfordshire County Council (OCC)	July 2023
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 Oxfordhsire	July 2023
Vale of the White Horse District Council – Local Plan 2031 part 1	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	July 2023
Vale of the White Horse District Council – Local Plan 2031 part 2	https://data.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=1173080763&CODE=481ECD6ACC86E6C4A6FE38F6391274B7	2019	Vale of the White Horse (VoWH) District Council	August 2023
Vale of the White Horse District Council – SFRA	dynamic_serve.jsp (whitehorsedc.gov.uk)	2017	AECOM on behalf of Vale of the White Horse District Council	July 2023
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 (Accessed: 24/07/2023)	2016	Aecom on behalf of West Oxfordshire District Council (WODS)	July 2023
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 (Accessed: 24/07/2023)	2020	JBA Consulting on behalf of behalf of West Oxfordshire District Council	July 2023
West Oxfordshire Local Plan 2031	https://www.westoxon.gov.uk/media/feyjmpen/local-plan.pdf (Accessed: 24/07/2023)	2018	West Oxfordshire District Council	July 2023

Site-specific surveys

10.4.4.2 A site-specific walkover survey was undertaken in June 2023 as part of the hydraulic modelling exercise to finalise model calibration. Additional information can be found within Volume 3 Annexes 10.2 Hydraulic Modelling Report of the PEIR.

Identification of designated sites

10.4.4.3 A review of desktop reports, publicly available information and information requests (as identified in **Table 10.7**) identified two ecologically designated sites within the study area; Blenheim Park SSSI and Wytham Woods SSSI. Scoping opinion response also highlighted Long Mead Local Wildlife Site to be included. Relevant qualifying interests are presented within **Table 10.8** below.

Table 10.8: Designated sites and relevant qualifying interests

Designated site	Distance to the Project (nearest point)	Relevant qualifying interest
Long Mead Local Wildlife Site (LWS)	Within Southern site and cable route study area.	The site includes 10ha rare wildflower hay meadow (of which only 1,000ha remain in the UK) with freshwater habitat, woodland and a traditional orchard and forms part of the Thames Valley Wildflower Meadow Restoration Project.
Blenheim Park SSSI	Within 250m of the Central site study area boundary.	Blenheim Park contains one of the finest areas of ancient oak-dominated pasture woodland in the country. The lakes are some of the largest areas of open water in Oxfordshire and are of regional importance for breeding and wintering birds.
Wytham Woods SSSI	Within Southern site and cable route study area.	This site consists of a complex of ancient woodland, wood pasture, common land and old limestone grassland on a variety of soils. The ancient woodland copses have probably present in Saxon times. The site has an exceptionally rich flora and fauna. Over 500 species of vascular plants have been recorded.

10.4.4.4 Further information regarding sites designated for their ecological interest is provided within Volume 1, Chapter 9: Ecology and nature conservation of the PEIR.

Water Framework Directive

10.4.4.5 The current overall WFD status for watercourses potentially affected by the Project have been identified via the publicly available Environment Agency's Catchment Data Search. The open access database provides the most up to date (2023) current status classifications for a number of Main Rivers within the Thames River Basin District. The WFD classification is not site-specific but

classifies a defined river reach based on site samples. These watercourses have been included as they are most likely to be the most affected by the Project. The impacts of the Project on water quality are outlined within the baseline environment and assessed within the impacts section and a WFD screening assessment is intended to be submitted at the ES stage of the Project.

10.4.4.6 For surface waters, the WFD objectives are based on the ecological and chemical status of the waterbody (i.e., the predicted future status if technically feasible measures are implemented). These measures are required to prevent deterioration in the current status of the waterbody and produce more benefits than they cost to implement once implemented. The date to achieve the objective status is determined by the type of measures which are needed in order to improve the status of the waterbody (i.e., the cost of the measures (are they affordable) and the time taken for the status to improve once the measures have been implemented).

Site-specific reports

10.4.4.7 The Project will cover an area of over a hectare and therefore, in accordance with the guidance in NPPF, PPG ID7 and NPS EN-1, a site-specific FRA has been undertaken. This is included in Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR .

10.4.4.8 The key components of the FRA are:

- a review of publicly available EA data, local flood management plans and future flood management schemes;
- a review of Strategic FRAs;
- an assessment of the flood risk in relation to the existing conditions and future baseline conditions; and
- a site-specific assessment of flood risk for the Project.

10.4.4.9 The AC cables and 220kV cables will pass through areas designated as Flood Zones 2 and 3. The overall length of these cable corridors means that the affected area will exceed 1 ha. However, as the cables will be installed below ground, there is no potential for significant operational runoff. Therefore, the FRA focuses upon areas of Flood Zone 2 and 3 (i.e., crossing locations of Main Rivers and ordinary watercourses), where construction is proposed as well as the cable route and substation areas that include permanent proposed structures.

10.5 Baseline environment

10.5.1.1 The Project will be located in the county of Oxfordshire, across an area of approximately 1,400 ha. The Project location extends from an area of land in the north, situated between the A4260 and the Dorn River Valley near Tackley and Wootton, through a central section, situated broadly between Bladon and Cassington, and connecting to a section further south near to Farmoor Reservoir and north of Cumnor, where the Project will connect to the National Grid transmission network.

10.5.2 Topography

10.5.2.1 EA 1m lidar data has been used in conjunction with available topographical survey data. The LiDAR data has an error margin of +/- 150mm.

10.5.2.2 The study area comprises of three sites, the Northern site, the Central site and the Southern site. Within the Northern site, elevations gently fall from the north to the south between 112 m above Ordnance Datum (mAOD) and 109 mAOD. Elevations within the central site vary between 101m and 65m AOD., with greatest elevations generally located within the east. The Southern site elevations vary between 93mAOD within the south and 69mAOD within the north.

10.5.3 Hydrological Setting

10.5.3.1 Hydrological features within the study area include Main Rivers, ordinary watercourses and additional hydrological features such as lakes and reservoirs are presented within **Figure 10.2a, Figure 10.2b, Figure 10.2c** and **Figure 10.3**.

Main Rivers

10.5.3.2 The study area includes the following Main Rivers/designated watercourse features:

- River Glyme;
- River Evenlode;
- Rowel Brook;
- River Thames;
- Wharf Stream; and
- Filchamstead Brook;

Ordinary watercourses

10.5.3.3 The study area includes the following ordinary watercourse features:

- River Dorn;
- Tributaries of the River Glyme;
- Tributaries of the River Evenlode;
- Tributaries of the Filchamstead Brook; and
- Tributaries of the River Thames

Additional Hydrological Features

10.5.3.4 The study area includes the following additional hydrological features:

- Duke's Lake;
- Cresswell Lake;

- Peninsula Lake;
- Oxey Mead Lake; and
- Farmoor Reservoir

Surface Water Body Status

10.5.3.5 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 alongside 17 other management catchments form the Thames River Basin District. As such, all surface watercourses within the study area discharge to the River Thames.

10.5.3.6 **Table 10.9** lists the watercourses with catchments within the study area, associated WFD classification grade and overall objectives. WFD catchments within the study area are presented within **Figure 10.4**.

Table 10.9: WFD surface water quality data

Name (WFD ID)	Waterbody type	Classification (Cycle 3 2019)	Hydro-morphological Designation	Overall objective
Glyme (Dorn confluence to Evenlode) (ID: GB106039029940)	River (22.715 km^2 catchment area)	Ecological: Poor Chemical: Fail	not designated artificial or heavily modified	Good by 2027
Dorn (Source to Glyme) (ID: GB106039037380)	River (46.153 km^2 catchment area)	Ecological: Poor Chemical: Fail	not designated artificial or heavily modified	Good by 2027
Cherwell (Bletchingdon to Ray) (ID: GB106039037432)	River (19.974 km^2 catchment area)	Ecological: Moderate Chemical: Fail	heavily modified	Good by 2027
Cherwell (Nell Bridge to Bletchingdon) (ID: GB106039037431)	River (53.659 km^2 catchment area)	Ecological: Moderate Chemical: Fail	not designated artificial or heavily modified	Good by 2027
Evenlode (Glyme to Thames) (ID: GB106039029880)	River (18.04 km^2 catchment area)	Ecological: Poor Chemical: Fail	not designated artificial or heavily modified	Good by 2027
Thames (Evenlode to Thame) (ID: GB106039030334)	River (149.591 km^2 catchment area)	Ecological: Moderate Chemical: Fail	not designated artificial or heavily modified	Good by 2027
Filchhampstead Brook at Farmoor (ID GB106039030210)	River (10.281 km^2 surface area)	Ecological: Bad Chemical: Fail	not designated artificial or heavily modified	Good by 2027

Flood alert and flood warnings

10.5.3.7 Information relating to flood warning and flood alert areas located within the study area are presented below within **Table 10.10** and **Table 10.11** and additionally presented within **Figure 10.5**.

Table 10.10 Flood Warnings

Flood Warning Area Code	Description	Flood source
061FWF12Glyme	River Glyme at Woodstock, from Glympton including Wootton down to and including The Lince near Bladon	River Glyme
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 10.11 Flood Alerts

Flood Alert Area Code	Description	Flood source
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
061WAF14LChrwell	River Cherwell and its tributaries from Lower Heyford down to Oxford including Rousham, Enslow, Thrupp and Hampton Poyle	River Cherwell, Woodeaton Brook, Bayswater Brook, Marston Brook, Peasmoor Brook
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

10.5.4 Geological and hydrogeological setting

10.5.4.1 A full description of the geological and hydrogeological setting is presented within Volume 1 Chapter 11: Ground Conditions of the PEIR.

Bedrock geology

10.5.4.2 BGS bedrock geology online mapping (1:50,000 scale) presents a range of bedrock strata located within the study area and listed below. Bedrock geology is presented within **Figure 10.6a, Figure 10.6b, Figure 10.6c** and **Figure 10.7**.

- 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
- Peterborough Member formed of Mudstone

Superficial deposits

10.5.4.3 BGS superficial deposits online mapping (1:50,000 scale) presents a range of superficial deposits are located within the study area which are listed below and presented within F**igure 10.8a, 10.8b. 10.8c** and **Figure 10.9.** It is noted no superficial deposits are present within the Northern Site, Southern Site but are present within the associated buffer zones.

- 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.

Aquifer designation

10.5.4.4 The Multi-Agency Geographic Information for the Countryside (MAGIC) online mapping (1:50,000 scale) presents a range of Aquifer Designations located within the study area which are listed below.

- **Secondary A Aquifer** - comprise 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.
- **Unproductive** – in an area where bedrock or strata at the surface are not classified as an Aquifer.

10.5.4.5 White Limestone Formation and Forest Marble Formation are associated with bedrock Principal Aquifers while Cornbrash Formation, Kellaways Sand Member are associated with bedrock Secondary A Aquifers. The majority of superficial deposits within the study area are classified as superficial Secondary A Aquifers. Further information on geology and ground conditions can be found in Volume 1, Chapter 11: Ground conditions of the PEIR.

Source Protection Zones

10.5.4.6 EA online groundwater SPZ mapping indicates that the site is not located within a groundwater SPZ.

Groundwater body status

10.5.4.7 **Table 10.12** lists the groundwater catchments within the study area, associated WFD classification grade and overall objectives.

Table 10.12 WFD groundwater quality data

Name (WFD ID)	Water Body Type	Classification (2019)	Overall objective
Bicester-Otmoor Cornbrash (ID: GB40602G600800)	Groundwater (approximately 80.935 km^2 in area)	Overall: Poor	Good by 2027
Tackley Jurassic Water Body (ID: GB40601G603100)	Groundwater (approximately 70.737 km^2 in area)	Overall: Good	Good
Burford Jurassic (ID: GB40601G600400)	Groundwater (approximately 900.616 km^2 in area)	Overall: Poor	Good by 2027
Chipping Norton Jurassic (ID: GB40602G600300)	Groundwater (approximately 314.724 km^2 in area)	Overall: Poor	Good by 2027
Tackley Jurassic (ID GB40601G603100	Groundwater (approximately 70.737 km^2 in area)	Overall: Good	Good by 2027

10.5.4.8 Further information on groundwater can be found in Volume 1, Chapter 11: Ground conditions of the PEIR.

10.5.5 Designated sites

10.5.5.1 The study area includes Long Mead Local Wildlife Site, Blenheim Park SSSI and Wytham Woods SSSI which are both located within catchments which drain to Main Rivers within the study area. Both sites are biologically designated, as discussed within **Table 10.8.**

10.5.6 Flood risk

EA Flood Zones

10.5.6.1 The EA Flood Zones refer to the probability of flooding from rivers and sea in a given year, assuming no defences are in place and accounting for climate change. Flood zone definitions are set out within **Table 10.13**.

Table 10.13 flood map for planning Flood Zones.

Flood zone	Flood zone definitions
Flood Zone 1	land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
Flood Zone 2	land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% to 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% to 0.1%) in any year.

Flood Zone 3	land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

10.5.6.2 The study area is located within Flood Zones 1, 2 and 3, associated with fluvial flooding from Main Rivers. Flood Zones and fluvial flooding is described in greater detail within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR. Flood Zones within the study area are presented within **Figure 10.10a, Figure 10.10b, Figure 10.10c** and **Figure 10.11**.

Flood defences

10.5.6.3 Flood defences in the form of naturally high ground are present along banks of Main Rivers within the study area. The majority of defences offer up to a 1 in 2-year or 1 in 5-year standard of protection. Flood defences are listed within Table 7-2 within Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR and their locations within the study area presented within **Figure 10.10a, Figure 10.10b, Figure 10.10c, Figure 10.11a** and **Figure 10.11b**.

Hydraulic modelling

10.5.6.4 The Project has no prior hydraulic modelling available to support the FRA. As such, RPS Consulting Services Ltd (RPS) was commissioned by SolarFive Ltd to undertake a hydraulic modelling exercise to assess the fluvial flood risk of the Project.

10.5.6.5 In order to undertake the hydraulic modelling, a standard integrated 1-dimensional (1D) - 2-dimensional (2D) Flood Modeller Pro (FMP) -TUFLOW model was utilised to simulate flood risk from the River Evenlode and its tributaries. Implementing these techniques ensure that complex flow regimes and the inter-connectivity of the open channel and wider floodplain are considered in the model.

10.5.6.6 Design peak flow estimates have been derived for the 1 in 20 year, 1 in 30 year, 1 in 100 year, 1 in 100 year +21% CC, and 1 in 100 year +43% CC allowance flood events. The model hydrology is based on the latest EA Flood Estimation Guidelines from July 2022.

10.5.6.7 The baseline model results have indicated that during the 1 in 20 year flood event, out of bank flow occurs resulting in some regions of the site flooding. During the 1 in 100 flood event, flood depths are predominantly between 0.1 – 0.8m with smaller areas up to 1.2m in depth. Slightly larger extents of the site are flooded in the 100 year +21% CC and 100 year +43% CC events where flood depth remains at 0.6-1.2m at most of the regions. Further information regarding flood depth, velocity and hazard and associated mapping is presented within Volume 3 Annexes 10.2 Hydraulic Modelling Report of the PEIR.

10.5.6.8 For more information, please see Volume 3 Annexes 10.2 Hydraulic Modelling Report of the PEIR.

10.5.7 Sewer infrastructure, water supplies, consents and pollution incidents

Sewer infrastructure

10.5.7.1 Public sewer infrastructure assets within the study area are served by Thames Water.

Groundwater abstractions

10.5.7.2 The abstraction licences taken from Groundsure data records identified one active groundwater abstractions within the study area (for further details refer to Volume 3 Annexes 10.4 Groundwater and Surface Water Abstraction Report of the PEIR).

Surface water abstractions

10.5.7.3 The abstraction licences taken from Groundsure data records identified three active surface water abstractions within the study area (for further details refer to Volume 3 Annexes 10.4 Groundwater and Surface Water Abstraction Report of the PEIR).

Private water supply

10.5.7.4 There is one private groundwater supply record within the study area, to the east of Cassington.

Discharge consents

10.5.7.5 Discharges of liquid effluent or waste water into surface waters are regulated by the EA using discharge consents and environmental permits. A review of Groundsure data identified approximately 23 active consented discharges to surface waters within the study area. The majority of the discharges related to final/treated effluent from domestic properties. Although the volume and parameters of the discharges are regulated (via the discharge consents and permits), the quality of the receiving surface water may potentially be affected.

10.5.7.6 The details of the discharge consents and permits are provided within Volume 3 Annexes 10.4 Groundwater and Surface Water Abstraction Report of the PEIR

Pollution incidents

10.5.7.7 Pollution incident mapping has been used to identify if the quality of watercourses within the study area may have been affected by pollution. A review of Groundsure data identified 12 pollution incidents in the study area, however 11 of the incidents were reported as Category 4 (significant) to water and one of the incidences were reported as Category 3 (minor). For more details see Volume 3 Annexes 10.4 Groundwater and Surface Water Abstraction Report of the PEIR.

10.5.8 Future baseline conditions

10.5.8.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires that "*an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*" is included within the Environmental Statement.

10.5.8.2 In the event that the Project does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

10.5.8.3 The main impact on the hydrology and flood risk future baseline is associated with the potential effects of climate change, which may impact on future peak river flow rates, rainfall intensity and sea levels. A summary of climate change allowances as outlined by the EA (May 2022) is presented below. Further details of climate change allowances can be found at Flood Risk Assessment: Climate change allowances (Environment Agency, 2022).

10.5.8.4 The NPS takes into account the NPPF and PPG ID-7 which sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. The NPPF and supporting PPG ID-7 on flood risk and coastal change explain when and how FRAs should be used. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

Peak river flow

10.5.8.5 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 have used the UKCP19 climate projections to update the peak river flow allowances and have based them on management catchments, sub-catchments of river basin districts.

10.5.8.6 The guidance on how to apply peak river flow allowances has also been changed. The range of allowances is based on percentiles which describes the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flow fall below it, and half fall above it. The guidance on how to apply peak river flow allowances has also been changed. The following allowances must be used.

- The central allowance (based on the 50th percentile) for all assessments except for essential infrastructure, where you use the higher central allowance (based on the 70th percentile).
- The upper end allowance (based on the 95th percentile) for 'credible maximum scenario' assessments.
- The central allowance to calculate flood storage compensation, except for where essential infrastructure is affected, where you use the higher central allowance.

10.5.8.7 The document provides a central, higher and upper estimate for increases in river flow as a consequence of climate change. This site is located across the boundary of three catchments with differing climate change allowance. These are the Cotswolds, Gloucestershire and the Vale and Cherwell and Ray Management Catchments.

10.5.8.8 **Table 10.14** below presents the anticipated increase in peak river flows for each Management Catchment.

Table 10.14. 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%
Gloucestershire and the Vale	Upper Estimate	33%	43%	84%
	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%

Peak rainfall intensity

10.5.8.9 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 are provided in **Table 10.15** below.

Table 10.15. Peak rainfall intensity allowance by Management Catchments for the 1% annual exceedance event

Management Catchment	Allowance category	Total potential change anticipated for '2050s' (2040-2069)	Total potential change anticipated for the '2070s' (2061-2125)
All Management Catchments	Upper Estimate	40%	40%
	Central Estimate	20%	25%

10.5.8.10 Runoff 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 lifetime of the development.

- Developments with a lifetime beyond 2100 must assess the upper end allowance for the 2070s epoch. The development should be designed to that there is no increased flood risk elsewhere and the development is safe from surface water flooding for the upper end allowance in the 1% annual exceedance probability 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.

10.5.8.11 The Project is expected to be fully operational by 2028. Temporary consent for the Project is expected to be up to 42 years. As such, the 2070's central estimate (for developments with a lifetime between 2040 – 2069) of 25% is considered to be acceptable.

10.5.9 Key receptors

10.5.9.1 Key receptors have been identified based on information listed within **Table 10.7. Table 10.16** identifies the receptors taken forward into the assessment.

Table 10.16: Key receptors taken forward to assessment

Receptor	Description	Sensitivity/value
Waterbodies (including Main Rivers and ordinary watercourses)	Taking a precautionary approach in assuming surrounding waterbodies have achieved/maintained 'Good' status at the time when construction begins, the surface watercourses within the study area have been assessed with a WFD status of 'Good'. Waterbodies (including Main Rivers and ordinary watercourses) are listed within 10.5.3 and presented within Figure 10.2a, Figure 10.2b, Figure 10.2c, Figure 10.3a and Figure 10.3b.	High vulnerability, moderate recoverability and moderate value. The sensitivity of the receptor is therefore, considered to be high.
Flood defences	Numerous flood defences bound watercourses within the study area, offering protection against flooding. Flood defences are listed within Table 7-2 within the Flood Risk Assessment (Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR) and their locations within the study area presented within Figure 10.10a, Figure 10.10b, Figure 10.10c, Figure 10.11a and Figure 10.11b.	Flood defences have a high value, moderate vulnerability, a moderate recoverability. The sensitivity of the receptor is considered to be high.
Adjacent land	The Project Site comprises of three sites, the northern site, the Central site and the southern site. The three sites are linked by a cable corridor which connects to a primary substation within the Southern site.	As such, land within the study area is of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

Receptor	Description	Sensitivity/value
	Within the study area, adjacent land to the Project comprises a mixture of rural and agricultural land and urban settlements including Woodstock, Bladon, Begbroke, Long Hanborough, Church Hanborough Eynsham, Cassington, Farmoor and Botley. Oxford airport is located upon the central-eastern boundary of the study area and the Cotswolds railway line bisects the central extent of the study area from east to west. Farmoor Reservoir is located upon the far south-western boundary of the study area. The study area also includes several A and B public highways, including the A48, A44 and A420.	
Field drainage	It is expected field drainage pipes are to be installed within agricultural fields within the study area to enable rapid drainage of excess soil moisture. Installed field drainage can improve soil structure, crop performance, access to land and reduce risk of livestock health.	Field drains are considered to be of moderate vulnerability, moderate to high recoverability and low value. The sensitivity of the receptor is therefore considered to be medium.
Drainage pipelines	Water supply and sewage infrastructure that is operated by Thames Water.	Drainage pipelines are considered to have a moderate value and contribute to the local and regional economy. It has high vulnerability due to high costs. The sensitivity of the receptor is therefore considered to be high.
Blenheim Park SSSI	The designated site is located within the Central site study area and designated for nationally important biological reasons.	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Wytham Woods SSSI	The designated site is located within the Southern site and cable route corridor study areas and designated for nationally important biological reasons	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Long Mead Local Wildlife Site	part of the Thames Valley Wildflower Meadow Restoration Project	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Construction workers	Site users during the construction and decommissioning phases of the development.	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Site operatives	Site users during the operational and decommissioning phases of the development.	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.6 Key parameters for assessment

10.6.1 Maximum design scenario

10.6.1.1 The maximum design scenarios identified in **Table 10.17** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the Project Design Envelope provided in Volume 1, Chapter 6: Project description of the PEIR. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g., different infrastructure layout), to that assessed here be taken forward in the final design scheme.

Table 10.17: Maximum design scenario considered for the assessment of potential impacts

[a] C=construction, O=operational and maintenance, D=decommissioning

Potential impact	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
The impact of increased flood risk from increased impermeable areas	Yes	Yes	No	**Construction phase** • Indicative Number of Solar PV Modules – 1,874,712 • Indicative Solar PV Module Dimensions – W 1.303m, L 2.384, D 33mm • Minimum height equipment above ground level (AGL) – 0.6m • Maximum height of solar PV modules AGL – 1.8m to 2.5m • Minimum distance North/South separation distance (m) between tables – 2m • Indicative Foundation Type - Driven-piles or screw piles • Indicative Total number of piles – Max. Number of piles: 1,968,722 • Depth of piles below ground level (m) – 1.0m to 2.0m • Indicative Number Power Converter Stations PCS - 156 • Indicative number of HV Transformer (Secondary Substations) and dimensions – 6no., L 15m x W8m x H5m. • Indicative Transformer Foundation Dimensions (below ground level) L20m x W19m x H1m. • NGET Substation Dimensions – 165 * 135m **Operation and maintenance phase** • Operation of infrastructure constructed within the construction phase. **Decommissioning phase** • Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction).	**Construction, Operation and maintenance phase** The MDS is represented by the largest permanent areas of impermeable surface/hard standing, which represent the worst case in terms of changes in runoff rates and flood risk to the surrounding area. **Decommissioning phase** Decommissioning is understood to operate within the parameters identified for construction and is therefore it will not give rise to greater adverse effects as those predicted for construction
The impact of the deterioration of water quality within Main Rivers and ordinary watercourses	Yes	Yes	Yes		
The impact of increased flood risk arising from damage to existing flood defences	Yes	No	Yes		
The impact of damage to existing field drainage and water pipelines.	Yes	No	Yes		
The impact of increased flood risk arising from damage to existing flood defences.	Yes	No	Yes		

10.7 Mitigation measures intended to be adopted as part of the Project

10.7.1.1 For the purposes of the EIA process, the term 'Measures adopted as part of the Project' is used to include the following types of mitigation measures (adapted from IEMA, 2016).

- Primary (inherent) mitigation - measures included as part of the Project design. IEMA describes these as '*modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken'*. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the Project and the parameters secured in the DCO and/or marine licences. For example, a reduction in footprint or height.
- Secondary (foreseeable) mitigation. IEMA describes these as '*actions that will require further activity in order to achieve the anticipated outcome'*. These include measures required to reduce the significance of environmental effects (such as lighting limits) and may be secured through environmental management plan.
- Tertiary (inexorable) mitigation. IEMA describes these as '*actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects*'. It may be helpful to secure such measures through a Code of Construction Practice or similar.

10.7.1.2 For the purposes of this PEIR, mitigation measures set out are those considered to be appropriate for the Project at this time. They may evolve and/or be refined in response to the statutory consultation process and/or other considerations.

10.7.1.3 Where relevant, measures have been identified that may result in enhancement of environmental conditions. The mitigation measures relevant to this chapter are summarised in **Table 10.18**.

10.7.1.4 Primary and tertiary measures that are intended to form part of the final design (and/or are established legislative requirements/good practice) have been taken into account as part of the initial assessment presented in **section 10.8.6.1** below (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures that the Applicants are intending to commit to, are taken into account in the assessment of effects.

10.7.1.5 Where an assessment identifies likely significant adverse effects, further mitigation measures may be applied. These are measures that could further prevent, reduce and, where possible, offset these effects. They are defined by IEMA as actions that will require further activity in order to achieve the anticipated outcome and may be imposed as part of the planning consent, or

through inclusion in the Environmental Statement (referred to as secondary mitigation measures in IEMA, 2016). For further or secondary measures both pre-mitigation and residual effects are presented.

Table 10.18: Mitigation measures adopted as part of the Project.

Mitigation number	Measure adopted	How the measure will be secured
Primary Mitigation		
10.1	Where possible A, B and Classified unnumbered roads (known as C roads), Environment Agency Main Rivers, ordinary watercourses, flood defences and all railway crossings will be crossed by HDD (or other trenchless methodology) as set out in the Crossing Schedule.	Crossing schedule to be provided as part of application and DCO.
10.2	HDD (or other trenchless methodology) entry and exit points will be located at least 10 m away from ordinary watercourses and 10 m from EA Main Rivers or the landward toe of flood defences. Where a surface watercourse is to be crossed by HDD (or other trenchless methodology), the AC cables and 220kV cables will be installed at least 2 m beneath the hard bed of any watercourses and the optimal clearance depth beneath watercourses will be agreed with the relevant authorities prior to construction. Where EA flood defences are present, a minimum 2 m vertical clearance will be maintained between the hard bed of the watercourse and the landward toe of those flood defences.	Crossing schedule to be provided as part of application and DCO.
10.3	Where required, trenched techniques may be used for minor ditches or smaller watercourses that are frequently dry. In these cases, measures will be implemented to protect water quality and flow and these will be detailed within the Code of Construction Practice (CoCP).	Outline Code of Construction Practice (CoCP), to be submitted alongside the Environmental Statement. The nature of contingency measures shall be outlined in and delivered through the CoCP.
10.4	A 10m buffer will be maintained between the banks of ordinary watercourses, Main Rivers and temporary and permanent development associated with the Project.	These measures would be secured through a requirement of the DCO.
10.5	Temporary haul road(s) will be installed using permeable gravel aggregate with a geotextile or other type of protective matting, or plastic or metal plates or grating.	Outline Code of Construction Practice (CoCP), to be submitted alongside the Environmental Statement.
Secondary Mitigation		
10.6	Where the export cable corridor crosses sites of particular sensitivity (e.g., ordinary watercourses, EA Main Rivers, SSSIs groundwater inner Source Protection Zones) a hydrogeological risk assessment will be undertaken to inform a site-specific crossing method statement which will also be agreed with the relevant authorities prior to construction.	Method statements to be agreed with relevant authorities prior to construction. Requirement for method statements to be set out in the CoCP.

Mitigation number	Measure adopted	How the measure will be secured
Tertiary Mitigation		
10.7	An Outline Pollution Prevention Plan (PPP) will be prepared and submitted with the application for development consent. An PPP will be developed in accordance with the Outline PPP and will include details of emergency spill procedures. Good practice guidance detailed in the Environment Agency's Pollution Prevention Guidance notes (including Pollution Prevention Guidance notes 01, 05, 08 and 21) will be followed where appropriate, or the latest relevant available guidance.	Requirement for PPP to be set out in CoCP.
10.8	During construction of piled foundations, the following guidance will be used: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (Environment Agency, 2001), or latest relevant available guidance.	Outline Code of Construction Practice (CoCP), to be submitted alongside the Environmental Statement.
10.9	An Outline Infrastructure Drainage Strategy will be prepared and submitted with the application for development consent. An Infrastructure Construction Drainage Scheme will be developed for the temporary construction works in accordance with the Outline Infrastructure Drainage Strategy. The Infrastructure Construction Drainage Scheme will ensure that existing land drainage is maintained during construction and will identify specific drainage measures for each area of land based on information identified and recorded by a land drainage consultant prior to construction. It will include measures to control surface water runoff, including measures to prevent flooding of the working area or offsite and to ensure any runoff is treated appropriately. The Infrastructure Construction Drainage Scheme will be developed in consultation with landowners, the LLFA and EA.	Outline Infrastructure Drainage Strategy to be provided as part of application for development consent. Infrastructure Construction Drainage Scheme to be developed in line with Outline Infrastructure Drainage Strategy and agreed with relevant stakeholders.
10.10	An Outline Code of Construction Practice (CoCP) will be prepared and submitted with the application for development consent. A CoCP will be developed in accordance with the outline CoCP. The CoCP will include measures to reduce temporary disturbance to residential properties, recreational users and existing land users.	Outline Code of Construction Practice (CoCP), to be submitted alongside the Environmental Statement. CoCP to be developed in line with Outline CoCP and agreed with relevant stakeholders.
10.11	A Decommissioning Plan will be developed prior to decommissioning in a timely manner. The Decommissioning Plan will include provisions for the removal of all above ground infrastructure and the decommissioning of below ground infrastructure and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Decommissioning Plan will be in line with the latest relevant available guidance.	To be a requirement of the DCO.

Mitigation number	Measure adopted	How the measure will be secured
10.12	At the compounds located within Flood Zones 2 and 3, construction measures will be adopted to maintain the existing level of flood protection during construction. These measures will be discussed with the EA. This would also include scheduling work windows against tide times and briefing site personnel regarding weather conditions, tide times and heights. If a Flood Warning/Flood Alert within the study area is issued (see **Table 10.10** and **Table 10.11**) works within the Flood Warning/Flood Alert areas would be stopped whilst the Flood Warning/Flood Alert is active.	Outline Code of Construction Practice (CoCP), to be submitted alongside the Environmental Statement. CoCP to be developed in line with Outline CoCP and agreed with relevant stakeholders. The nature of contingency measures shall be outlined in and delivered through the CoCP.
10.13	Appropriate seeded vegetation will be provided below and between rows of the solar PV modules to act as a filter strip to dissipate energy of surface water and promote low erosivity sheet flow during operation of the solar farm. The vegetation will be managed organically and will either be mowed or used for light grazing. The grassland will not only grow between array gaps.	These measures would be secured through a requirement of the DCO.
10.14	Swales comprising of appropriately seeded vegetation will be provided along the downstream perimeter of solar PV module parcels to capture and attenuate any exceedance flows from solar PV modules following high intensity rainfall events. The sizing and discharge location of swales are subject to detailed drainage design and soakaway testing.	These measures would be secured through a requirement of the DCO.

10.8 Impact assessment methodology

10.8.1 Overview

10.8.1.1 The hydrology and flood risk impact assessment has followed the methodology set out in Volume 1, Chapter 4: Approach to Environmental Assessment of the PEIR. Specific to the hydrology and flood risk impact assessment, the following guidance documents have also been considered:

- National Highways *et al* (2020) Design Manual for Roads and Bridges (DMRB) LA113 Road drainage and the water environment;
- National Highways *et al* (2020) Design Manual for Roads and Bridges (DMRB) LA104 Environmental assessment and monitoring;
- Non-statutory technical standards for sustainable drainage systems (Defra, 2015); and
- Report C753: The SuDS manual (CIRIA, 2015).

10.8.2 Impact assessment criteria

10.8.2.1 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al.,* 2020).

10.8.2.2 The approach to determining the significance of effects is a two-stage process that involves defining the magnitude of the impact and the sensitivity of the receptor. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume 1, Chapter 4: Approach to Environmental Assessment methodology of the PEIR.

10.8.3 Receptor sensitivity/value

10.8.3.1 The criteria for defining sensitivity in this chapter are outlined in **Table 10.19** below.

Table 10.19: Sensitivity criteria

Sensitivity	Definition
Very High	Receptor with little to no capacity to accommodate change, is high value or critical importance to the local, regional or national economy. Receptor is highly vulnerable to impacts that may arise from the development and recoverability is long term or not possible. **Surface Water**: WFD current overall status of high. The surface water body supports sensitive aquatic ecological receptors and is extensively used for public water supply and large-scale agricultural use. **Groundwater**: Groundwater body supports public and/or large-scale industrial water supply and is a very high productivity aquifer. **Flood Risk**: Land within Flood Zone 3 or more than one hundred residential properties protected from flooding by flood defence infrastructure or by natural floodplain storage.
High	Receptor with a low a capacity to accommodate change, is of moderate value with reasonable contribution to the local, regional or national economy. Receptor is generally vulnerable to impacts that may arise from the development and recoverability is flow and/or costly. **Surface Water**: WFD current overall status of good. Surface water body may support sensitive aquatic ecological receptors and is used is used for public water supply / medium scale industrial or agricultural use. **Groundwater**: Groundwater body supports public water and/or large-scale industrial water supply and is a high productivity aquifer. **Flood Risk**: Land within Flood Zone 3 and/or 2 or between one and one hundred residential properties or industrial premises protected from flooding by flood defence infrastructure or by natural floodplain storage.
Medium	Receptors with a moderate capacity to accommodate change, is of minor value with small levels of contribution to the local, regional and national economy. Receptor is somewhat vulnerable to impacts that may arise from the development and has moderate to high levels of recoverability. **Surface Water**: WFD current overall status of moderate. The surface water features may be locally important for spawning of salmonid species. Surface water body is used for private water supply or small scale industrial/agricultural use. **Groundwater**: Groundwater body supports private water supply or medium scale agricultural/industrial abstractions. **Flood Risk**: Flood plain within Flood Zone 2 and/or 1 or limited constraints and a low probability of flooding of residential and industrial properties.
Low	Receptor with a high capacity to accommodate change, is of low value with little contribution to the local, regional or national economy. Receptor is not generally vulnerable to impacts that may arise from the development and/or has high recoverability. **Surface Water**: WFD current overall status of poor. Surface water bodies are not significant in terms of sensitive ecological receptors or fish spawning. Small scale (single residential or commercial use) abstraction licences are present in close proximity. **Groundwater**: Low or very low productivity aquifer with no abstraction licences. **Flood Risk**: Flood plain within Flood Zone 2 and/or located outside floodplain within Flood Zone 1 or limited constraints and a very low probability of flooding of residential and industrial properties.

Sensitivity	Definition
Negligible	Receptor with a very high capacity to accommodate change, is of negligible value with no contribution to local, regional or national economy. Receptor is not vulnerable to impacts that may arise from the development and/or has high recoverability. **Surface Water**: WFD current overall status of bad. No sensitive ecological receptors or fish spawning are present within the surface water bodies. No abstraction licences present within the area. **Groundwater**: Very low productivity aquifer with no abstraction licences. **Flood Risk**: Land is within a little to no flood risk zone and no major flood risk areas are present within a 250 m radius of the site.

10.8.4 Magnitude of impact

10.8.4.1 In determining impact magnitude, the impact duration and the nature of the impact has been taken into account. The following definitions from the DMRB (LA104 and LA113) have been used in the assessment.

- Temporal scale.
  - Short Term: A period of months, up to one year.
  - Medium Term: A period of more than one year, up to five years.
  - Long Term: A period of greater than five years.
- Geographical scale - whether the effect would be experienced at the local, regional or national level.
- Adverse or Beneficial – whether the nature of the effect increases or decreases potential contamination risks to sensitive receptors.
- Temporary – effects that persist for a limited period only (due for example, to particular activities taking place for a short period of time).
- Permanent – effects that result from an irreversible change to the baseline environment (e.g., land-take) or which persist for the foreseeable future.
- Reversible/irreversible effect: effects can be reversed by mitigation measures or by natural environmental recovery within reasonable timescales (e.g. 5 to 10 years following cessation of construction).
- Direct – effects that arise from the impact of activities that form an integral part of the Project (e.g. direct employment and income generation).
- Indirect – effects that arise from the impact of activities that do not explicitly form part of the Project.

10.8.4.2 The criteria for defining magnitude in this chapter are outlined in **Table 10.20** below.

Table 10.20: Impact magnitude criteria

Magnitude of impact		Definition
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement or resource quality; extensive restoration or enhancement; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable change in attributes, quality or vulnerability, minor loss or, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to, or positive addition of one or more characteristics, features or elements.
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

10.8.5 Significance of effect

10.8.5.1 The significance of the effect upon hydrology and flood risk has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in **Table 10.21**. Where a range of significance levels is presented, the final assessment for each effect is based upon professional judgement.

10.8.5.2 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

10.8.5.3 For the purpose of this assessment, any effects with a significance level of moderate or major is considered to be significant. Any effect that is minor or below is not considered to be significant in terms of the EIA Regulations.

Table 10.21: Assessment matrix

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major
Very High	Minor	Moderate or Major	Major	Major

10.8.5.4 Where the magnitude of impact is 'no change', no effect would arise.

10.8.5.5 The definitions for significance of effect levels are described as follows.

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.
- Moderate: These beneficial or adverse effects have the potential to be important and may influence the key decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
- No change: No loss or alteration of characteristics, features or elements; no observable impact in either direction.

10.8.6 Assumptions and limitations of the assessment

10.8.6.1 The assessment within this chapter is based on publicly available data obtained from the EA, VoWHDC, CDC and WODC, parish councils, and commercial data supplied by companies, as well as additional information supplied from stakeholders during the scoping and consultation stages. The information has been supplemented with publicly available desktop reports as presented within (**Table 10.7**), Groundsure searches and public consultation such that it is considered sufficient to characterise the baseline environment.

It is also noted that the EA flood zone mapping does not take into account the impact of local flood defences or climate change upon flooding, and does not provide information on flood depth, speed or volume of flow. The maps do not show flooding from other sources such as groundwater, direct runoff from fields or overflowing sewers. However, a description of these sources of flooding is provided in the FRA (see Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR), such that sufficient baseline information is available.

10.8.6.2 The assessment is limited by a lack of detailed information regarding:

- flow data for watercourses; and
- water quality data for specific locations.

10.8.6.3 Notwithstanding the above, overall a moderate to high level of certainty has been applied to the baseline and assessment presented in this chapter. Where available, catchment data regarding water quality has been used to inform the assessment. Based on professional judgement, information available is considered sufficient to establish the baseline within the study area, therefore, there are no data limitations that would affect the conclusions of this assessment.

10.8.6.4 To support the hydraulic modelling exercise, a hydrological site walkover of the Main Rivers and ordinary watercourses to be crossed by the cable corridor was undertaken. A description of the site visit is provided within Volume 3 Annexes 10.2 Hydraulic Modelling Report of the PEIR

10.9 Assessment of effects

10.9.1.1 The impacts of the construction, operation and maintenance, and decommissioning phases of the Project have been assessed. The potential impacts arising from the construction, operation and maintenance and decommissioning phases of the Project are listed in **Table 10.17** along with the maximum design scenario against which each impact has been assessed.

10.9.1.2 The impacts ‘Deterioration of water quality in ‘Main Rivers’’ and ‘Deterioration of water quality of ordinary surface watercourses.’ Have been combined into a singular impact ‘The impact of deterioration of water quality within Main Rivers and ordinary watercourses‘ to avoid repetition within this chapter.

10.9.1.3 A description of the potential likely significant effects on receptors caused by each identified impact is given below.

10.9.1 The impact of increased flood risk from increased impermeable areas

10.9.1.1 During construction, operation and maintenance of the Project, there is a potential for increased surface water flood risk as a result higher rates of surface water runoff from increased impermeable areas. During construction phase this includes construction compounds, haul road and construction accesses. During the operational phase of the Project, greatest flood risk will arise from impermeable areas associated with the primary substation, secondary substation / high volage transformers, PCS units and the solar PV modules.

Construction phase

Sensitivity of receptor

10.9.1.2 The study area includes Long Mead LWS, Blenheim Park SSSI and Wytham Woods SSSI which are both located within catchments which drain to Main Rivers within the study area. Both sites are biologically designated, as discussed within **Table 10.8**. Both sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.9.1.3 Within the study area, adjacent land to the Project comprises a mixture of rural and agricultural land and urban settlements including Woodstock, Bladon, Begbroke, Long Hanborough, Church Hanborough Eynsham, Cassington, Farmoor and Botley.

10.9.1.4 Oxford airport is located upon the central-eastern boundary of the study area and the Cotswolds railway line bisects the central extent of the study area from east to west. Farmoor Reservoir is located upon the far south-western boundary of the study area. The study area also includes several A and B public highways, including the A48, A44 and A420. Adjacent land is of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

10.9.1.5 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.1.6 Impacts on flood risk would arise from any temporary change in runoff over the areas affected during construction, such as construction compounds, haul road and construction accesses. It is also expected the export cable corridor itself could act as a drainage channel for surface water flows.

10.9.1.7 Construction measures (as set out in **Table 10.18**) will be implemented to ensure the risk of flooding is not increased. Measures include the use of permeable gravel aggregate with a geotextile or other type of protective matting, or plastic or metal plates or grating for construction compounds, haul road and construction accesses and drainage features to maintain land drainage flow.

10.9.1.8 In most cases, including crossing of Main Rivers, HDD will be used to pass beneath watercourses. However, trenched techniques may be used, where appropriate, for minor ditches or smaller watercourses that are frequently dry. Where this is the case, measures will be put in place to protect water quality and flow (where relevant). (full details provided within the Volume 1, Chapter 6: Project description of the PEIR). An outline method statement for the proposed crossing methodologies will be included in the Outline CoCP that will be submitted alongside the ES. This method statement will be developed further (in consultation with the EA/LLFA) during the detailed design stage.

10.9.1.9 The impacts on flood risk from the temporary change in runoff are only likely to affect the surrounding local receptors and, assuming that designed in and

construction measures (**Table 10.18**) are implemented, there is unlikely to be any observable degradation in flood risk. The magnitude of impact is predicted to be indirect, of local spatial extent, short term duration and continuous. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.9.1.10 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity for the study area is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operational phase

Sensitivity of receptor

10.9.1.11 Designated sites and are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.9.1.12 Adjacent land within the study area is of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

10.9.1.13 Site users during this phase of the Project will be site operatives who are assessed to be highly vulnerable, low recoverability, high value and have an overall high sensitivity.

Magnitude of impact

10.9.1.14 The Project has been subject to an FRA and a conceptual drainage strategy Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR) in order to meet the requirements of the NPS, national and local planning policy and best practice.

10.9.1.15 It is expected solar panels will intercept precipitation falling upon areas of the site over-sailed by solar PV modules. This increase in impermeable area has the potential to increase surface water runoff from the baseline scenario.

10.9.1.16 The potential for increased runoff rates to occur is to be appropriately mitigated by features of the solar arrays themselves. The solar PV modules are to have a 12 to 18 degree pitch on the horizontal plane which will reduce the flow velocity of run-off landing on the solar PV modules. Furthermore, typical solar PV modules are constructed with gaps between each individual panel which allows surface water to drip to the vegetated ground beneath. This reduces the risk of water sheeting and runoff only occurring from the leeward edge of the modules.

10.9.1.17 Filter strip SuDS comprising of appropriately seeded vegetation below and between rows of solar PV modules are proposed to dissipate kinetic energy of surface water and promote low erosivity sheet flow during operation of the Project. Vegetation will be year-round organically managed vegetated ground cover and is expected to will promote a betterment of interception and infiltration of precipitation compared to existing intensive arable or livestock grazing use. Research undertaken by Cook and McCuen (2013) found that

provided full vegetation cover beneath the solar PV modules is maintained, the change in run-off characteristics from solar PV module areas is likely to be insignificant and that ground cover has a much more important control over runoff.

10.9.1.18 Swales comprising of appropriately seeded vegetation are proposed to be provided along the downstream perimeter of solar PV module parcels to capture and attenuate any exceedance flows from solar PV modules following high intensity rainfall events. The sizing and discharge location of swales are subject to detailed drainage design and soakaway testing.

10.9.1.19 A conceptual drainage strategy has been prepared for impermeable areas associated with the primary substation, operation and maintenance buildings, secondary substations / high voltage transformers and PCS units. With the incorporation of a drainage strategy, to be agreed with the LLFA, it has been determined flows from impermeable area from the operation and maintenance facility and primary substation will be restricted to the 1 in 1-year greenfield runoff rate for up to the 1 in 100-year plus climate change event and thus slightly reduce the risk of flooding to areas downstream.

10.9.1.20 While discharge location and rate for the secondary substations / high voltage transformers and PCS units are yet to be determined, it has been demonstrated that attenuation for the 1 in 100-year plus climate change event has been demonstrated to be able to be provided within gravel bases in which infrastructure will be situated. When compared to the baseline, this slight reduction in flood risk to areas downstream introduces a slight beneficial effect.

10.9.1.21 The magnitude of impact is predicted to be of local spatial extent and long term duration. The impact magnitude is therefore predicted to be negligible beneficial.

Significance of effect

10.9.1.22 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor beneficial** significance, which is not significant in EIA terms.

10.9.2 The impact of deterioration of water quality within Main Rivers and ordinary watercourses

10.9.2.1 During construction, there is a potential risk of accidental discharges of untreated runoff containing contaminants. It is anticipated that any untreated runoff will eventually outfall to watercourses (Main Rivers and ordinary watercourses) located downstream. Untreated runoff also has the potential to infiltrate in-situ into groundwater confined within superficial deposits and solid geology underlying the study area.

10.9.2.2 There are a number of potential pollutants which could arise during construction, and hence which may affect the water quality of receiving watercourses. These are outlined below:

- fine particulate materials (e.g. silts and clays);
- cement;

- oil and chemicals (from plant machinery and processes); and
- other wastes such as wood, plastics, sewage and rubble.

10.9.2.3 These pollutants may be present as a result of normal construction activities, such as excavation, dewatering, incorrect storage of oils and chemicals and/or accidental spillage.

Construction phase

Sensitivity of receptor

10.9.2.4 Main Rivers and ordinary watercourses present within the study area discharge to the River Thames.

10.9.2.5 Taking a precautionary approach in assuming surrounding waterbodies have achieved/maintained 'good' status at the time when construction begins, the surface watercourses and groundwater bodies within the study area will have been assessed with a WFD status of 'good'. The watercourses and groundwater bodies are therefore considered to be highly vulnerable in relation to WFD classification status, but of moderate recoverability and moderate value in relation to the local economy. The sensitivity of the receptor is therefore, considered to be high.

10.9.2.6 Designated sites are biologically designated, national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.9.2.7 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.2.8 Activities associated with machinery during construction could lead to an increase in turbid run-off and spillages/leaks of fuel, oil etc. that could affect nearby watercourses and groundwater bodies and potential for this to impact on water quality and therefore cause a reduction in the WFD classification.

10.9.2.9 In most cases, HDD or a similar trenchless technique will be used to pass beneath watercourses (as set out within **Table 10.18**). The impacts on these watercourses from construction activities involving the use of HDD techniques and associated machinery could lead to an increase in turbid runoff, high pH water runoff, bentonite breakouts during drilling and spillages/leaks of fuel, oil etc. affecting nearby watercourses and groundwater bodies. There is the potential for this to impact on water quality and therefore cause a reduction in the WFD classification.

10.9.2.10 Trenched techniques may be used where the export cable route or the haul road cross smaller watercourses (that are frequently dry) and drainage channels. Trenching could lead to damage to the banks along the watercourses, an increase in turbid runoff, spillages/leaks of fuel, oil etc. and an alteration in surface water flow pathways that could affect nearby watercourses.

10.9.2.11 During excavation, the export cable corridor could also act as a drainage channel, leading to runoff from construction areas affecting nearby watercourses and groundwater bodies.

10.9.2.12 Measures outlined in **section 10.7** and the outline CoCP, to be submitted alongside the ES, are expected to intercept runoff and ensure that discharges are controlled in quality and volume causing no degradation in WFD classification. The magnitude of impact is predicted to be indirect, of local spatial extent, short term duration and intermittent. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.9.2.13 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operational phase

Sensitivity of receptor

10.9.2.14 The watercourses and groundwater bodies are considered to be highly vulnerable in relation to WFD classification status, but of moderate recoverability and moderate value in relation to the local economy. The sensitivity of the receptor is therefore, considered to be high.

10.9.2.15 Designated sites are nationally important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.9.2.16 Site users during this phase of the Project will be site operatives who are assessed to be highly vulnerable, low recoverability, high value and have an overall high sensitivity.

Magnitude of impact

10.9.2.17 The Project has been subject to a conceptual drainage strategy (Volume 1, Annex 2.3: Flood Risk Assessment of the PEIR) in order to meet the requirements of the NPS, national and local planning policy and best practice.

10.9.2.18 Pollutants may be present as a result of normal operations, traffic and emergency or accidental spillage. These activities could lead to an increase in turbid run-off and spillages/leaks of fuel, oil that could runoff to watercourses and infiltrate to superficial deposits and solid geology underlying the Project.

10.9.2.19 The conceptual drainage strategy includes the provision of SuDS to mitigate pollutants. Filter strips and swales are expected to provide sufficient treatment to the run-off from impermeable areas associated with solar PV arrays. The gravel bases serving the secondary substations / high voltage transformers and PCS units will filter pollutants from associated impermeable areas.

10.9.2.20 Furthermore, it is expected operational procedures to prevent any increase in pollutants to the surrounding environment. An operational management plan and will include storage procedures of potentially polluting substances,

emergency spill response procedures, clean up and remediation of contaminated water runoff. It is expected the site will not be permanently occupied and occasionally visited by site operatives to undertake inspection and maintenance activities. Site operatives will be fully debriefed of operational procedures on-site, including pollution prevention and response procedures. With the provision of operational measures and on-site drainage networks, the magnitude of impact is assessed to be negligible adverse.

Significance of effect

10.9.2.21 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.9.2.22 The watercourses and groundwater bodies are considered to be highly vulnerable in relation to WFD classification status, but of moderate recoverability and moderate value in relation to the local economy. The sensitivity of the receptor is therefore, considered to be high.

10.9.2.23 Designated sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.9.2.24 Site users during this phase of the Project will be construction workers and site operatives who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.2.25 During decommissioning, the majority of export cable will remain in place, with the solar panels, substation and associated infrastructure to be removed.

10.9.2.26 The impacts of decommissioning of the Project components will be reduced through the incorporation of management measures (outlined in **Table 10.18** including emergency spill response procedures including clean up and remediation of contaminated soils, appropriate water proofing of exposed cable ducts and the continued maintenance of onsite drainage. The magnitude of impact is predicted to be indirect, of local spatial extent, short term duration and intermittent. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.9.2.27 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

10.9.3 The impact of increased flood risk arising from damage to existing flood defences

10.9.3.1 During construction and decommissioning of the Project, there is a potential risk of increased flood risk as a result of damage to the existing flood defences by construction activities.

Construction phase

Sensitivity of receptor

10.9.3.2 Flood defences are present along banks of Main Rivers within the study area. and have a high value, medium vulnerability, a medium recoverability and therefore are considered to have high sensitivity.

10.9.3.3 Adjacent land within the study area is of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

10.9.3.4 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.3.5 The majority of Main Rivers and associated flood defences within the study area are expected to be crossed using HDD techniques (or similar trenchless techniques) as set out in Table 10.18. The impacts on these flood defences from construction activities involving the use of HDD techniques and associated machinery could lead to impacts on the structural stability of earthen embankments. There is the potential for this to impact on the integrity of flood defences within the area and lead to an increased risk of flooding to areas which benefit from flood defences.

10.9.3.6 Areas within proximity to Main Rivers and flood defences are likely to be located within Flood Zone 2 and 3. Works within areas of Flood Zone 2 and 3 would be stopped whilst relevant Flood Warning/Flood Alert are active (as set out in **Table 10.18)**.

10.9.3.7 Measures outlined in **Table 10.18** and the CoCP are expected to ensure no degradation to crossed flood defences. The magnitude of impact is predicted to be of local spatial extent and short term duration. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.9.3.8 Formal flood defences present along banks of Main Rivers are expected to be crossed using HDD techniques (or similar trenchless techniques) to reduce the impact of increased flood risk arising from damage to flood defences. Mitigation measures are expected to ensure no degradation to crossed flood defences during construction. Overall, the magnitude of the impact is deemed to be low, the sensitivity of the receptors is considered to be high. The effect

will therefore be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.9.3.9 Flood defences are present along banks of Main Rivers within the study area. and have a high value, medium vulnerability, a medium recoverability and therefore are considered to have high sensitivity.

10.9.3.10 Adjacent land within the study area is of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

10.9.3.11 Site users during this phase of the Project will be construction workers and site operatives who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.3.12 As the export cables will remain in place during decommissioning, no work will be undertaken and existing flood defences will not be affected. Furthermore, a Decommissioning Plan will be developed prior to decommissioning in a timely manner and will include details relevant to flood risk. The impact magnitude is therefore considered to be no change.

Significance of effect

10.9.3.13 Overall, the magnitude of the impact is deemed to be no change, the sensitivity of the receptor is considered to be high. As such, **no effect** would arise which is not significant in EIA terms.

10.9.4 The impact of damage to existing field drainage

10.9.4.1 During construction and decommissioning of the Project, there is a potential risk of damage to existing field drainage arising from construction activities.

Construction phase

Sensitivity of receptor

10.9.4.2 Field drains constructed for field irrigation within the Project are of moderate vulnerability, moderate to high recoverability and low value. The sensitivity of the receptor is therefore considered to be medium.

10.9.4.3 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.4.4 The impact on field drainage and irrigation from open cut techniques and the installation of link boxes and joint bays during the construction phase could temporarily affect surface water flow pathways. This could have an impact on water quality and potential flow rates.

10.9.4.5 The removal of field drains within the Project area may cause a backup on surrounding field drains, in turn increasing the flood risk to receptors. Measures 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 measures are included in **Table 10.18**.

10.9.4.6 With the incorporation of appropriate construction mitigation techniques, the impact is predicted to be of local spatial extent with a minor shift away from existing hydrological environment of local receptors. The magnitude of impact is predicted to be direct, of local spatial extent, short term duration and intermittent. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.9.4.7 Overall, the magnitude of impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.9.4.8 Field drains constructed for field irrigation within the Project are of moderate vulnerability, moderate to high recoverability and low value. The sensitivity of the receptor is therefore considered to be medium.

10.9.4.9 Site users during this phase of the Project will be construction workers and site operatives who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.4.10 During decommissioning, the majority of the cable corridor will remain in place. Joint bays and link boxes will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use.

10.9.4.11 All solar PV array infrastructure including solar PV modules, mounting structures, cabling, inverters and transformers will be removed from the site and the land returned to full agricultural use. In line with NPS standards, a decommissioning and enhancement plan will be developed in consultation the local planning authority, local community and key stakeholders and form an integral part of the DCO application.

10.9.4.12 The magnitude of the impact is predicted to be of local spatial extent and short term duration. The impact magnitude is therefore predicted to be negligible adverse.

Significance of effect

10.9.4.13 Overall, the magnitude of impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will therefore, be of **minor adverse** significance, which is not significant in EIA terms.

10.9.5 The impact of damage to existing water pipelines

10.9.5.1 During construction and decommissioning of the Project, there is a potential risk of damage to existing water pipelines due to construction activity.

Construction phase

Sensitivity of receptor

10.9.5.2 Drainage pipeline infrastructure comprises water supply and wastewater drainage pipelines operated by Thames Water, which are considered to have a moderate value and contribute to the local and regional economy. They have high vulnerability and low recoverability due to high costs. The sensitivity of the receptor is therefore considered to be high.

10.9.5.3 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.5.4 The impact on water pipeline and sewage infrastructure from open cut and HDD techniques during the construction phase could temporarily disrupt local drainage infrastructure, impacting on watercourse water quality, potentially reduce flow rates to local water supply networks.

10.9.5.5 The site selection of the Project has taken into account the location of major services utilities (see Volume 1, Chapter 5: Need for the Project and Alternatives Considered of the PEIR), however the presence of local drainage cannot be discounted as it is not always mapped by regulators.

10.9.5.6 Discussions with Thames Water and other service companies will be undertaken at the detailed design stage to confirm the location of local services. Micro-routing or appropriate construction techniques will be employed where required to avoid impact to local services.

10.9.5.7 Any impacts of construction which affect drainage supply infrastructure are likely to cause temporary disruption of water supply to residents/businesses in the local surrounding area. The magnitude of impact is predicted to be indirect, of local spatial extent, short term duration and intermittent. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.9.5.8 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the setting is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.9.5.9 Drainage pipeline infrastructure has high vulnerability to the decommissioning impacts of the Project and low recoverability due to high costs. The sensitivity of the receptor is therefore considered to be high.

10.9.5.10 Site users during this phase of the Project will be construction workers and site operatives who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.9.5.11 During decommissioning, the majority of the cable corridor will remain in place. Joint bays and link boxes will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use.

10.9.5.12 All solar PV array infrastructure including solar PV modules, mounting structures, cabling, inverters and transformers will be removed from the site and the land returned to full agricultural use. In line with NPS standards, a decommissioning and enhancement plan will be developed in consultation the local planning authority, local community and key stakeholders and form an integral part of the DCO application.

10.9.5.13 The magnitude of the impact is predicted to be of local spatial extent and short term duration. The impact magnitude is therefore predicted to be negligible adverse.

Significance of effect

10.9.5.14 Overall, the magnitude of impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will therefore, be of **minor adverse** significance, which is not significant in EIA terms.

10.9.6 Future monitoring

10.9.6.1 No monitoring to test the predictions made within the impact assessment is considered necessary.

10.10 Cumulative effect assessment methodology

10.10.1.1 The hydrology and flood risk CEA methodology has followed the methodology set out in Volume 1, Chapter 4: Approach to the Environmental Assessment of the PEIR. As part of the assessment, all projects and plans considered

alongside the Project have been allocated into 'tiers' reflecting their current stage within the planning and development process.

- Tier 1
  - Under construction
  - Permitted application
  - Submitted application
  - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact
- Tier 2
  - Scoping report has been submitted
- Tier 3
  - Scoping report has not been submitted
  - Identified in the relevant Development Plan
  - Identified in other plans and programmes.

10.10.1.2 For clarity, cumulative effects with the generation assets are considered first:

- Botley West Solar Farm

10.10.1.3 This assessment is followed by all other relevant projects, identified by tier.

10.10.1.4 This tiered approach is adopted to provide a clear assessment of the Project alongside other projects, plans and activities.

10.10.1.5 Tier 1, Tier 2 and Tier 3 projects have been reviewed. However, of these developments, only four Tier 1 and four Tier 2 projects were scoped into the CEA for consideration for hydrology and flood risk, given their size, position and type of development. These four projects are outlined in **Table 10.22**.

Table 10.22: List of other projects, plans and activities considered within the CEA

Project/Plan	Status	Distance from the Project (nearest point, km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Project
Tier 1-						
Eynsham Park and Ride and Science Transit	Permitted	Adjacent	A40 Dualling Witney to Eynsham Park & Ride as part of OCC Transport Plan	n/a	n/a	n/a
Ducklington Solar Farm	Permitted	Adjacent	36MWp. Enough for 7,843 homes (16% of district)	n/a	n/a	n/a
Tar Farm Solar Farm	Permitted	Adjacent	49.9 MW	n/a	n/a	n/a
Erection and use of anaerobic digestion facility	Approved	1	Anaerobic Digestion Facility	n/a	n/a	n/a
Tier 2-						
Land to the west of Red House Farm, Botley, OX2 9ND	Scoping opinion provided	Adjacent	Request for a Scoping Opinion for a proposed 49.99MW solar scheme	n/a	n/a	n/a
Land to the west of Red House Farm, Botley, OX2 9ND	Screening decision - positive	Adjacent	Request for an EIA Screening Opinion prior to the submission of an application for the installation of a solar photovoltaic array	n/a	n/a	n/a

Project/Plan	Status	Distance from the Project (nearest point, km)	Description of project/plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Project
Land to the west of Red House Farm, Botley, OX2 9ND	Screening decision - positive	Adjacent	Updated request for Screening Opinion	n/a	n/a	n/a
Farmoor Reservoir, Farmoor	Screening decision - negative	Adjacent	Proposal to install a floating solar generator on part of Farmoor Reservoir. Request for a Screening Opinion for 7.3MW solar generator on part of reservoir	n/a	n/a	n/a

10.10.2 Maximum design scenario – cumulative effects assessment

10.10.2.1 The maximum design scenarios identified in **Table 10.23** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the Project Design Envelope provided in Volume 1, Chapter 5: Project Description, of the PEIR as well as the information available on other projects and plans, in order to inform a 'maximum design scenario'. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g., different foundation type or substation layout), to that assessed here, be taken forward in the final design scheme.

Table 10.23 Maximum design scenario for the assessment of cumulative effects

Potential cumulative effect	Phase[a]			Maximum Design Scenario	Justification
	C	O	D		
The impact of increased flood risk	Yes	Yes	No	Maximum design scenario as described for the Project (**Table 10.17**) assessed cumulatively with the following other projects/plans within Tier 1 and Tier 2: Tier 1 and Tier 2 • Assumed that construction works to occur concurrently with the Project · • The magnitude of operational and maintenance phase impacts on the Project will be smaller than construction phase impacts.	Outcome of the CEA will be greatest when the greatest number of other schemes are considered. For the CEA it is assumed that: • Baseline conditions will be shared for all projects. · • Outcome of the CEA will be greatest when projects are constructed concurrently. · • The magnitude of effects expected for the construction phase of the Tier 1 developments should not be significant in EIA terms given each respective planning permission will require the detailing and implementation of suitable drainage strategies and the consideration of flood risk, with suitable mitigation where required.
The impact of the deterioration of water quality within Main Rivers and ordinary watercourses	Yes	Yes	Yes	Maximum design scenario as described for the Project **(Table 10.17**) assessed cumulatively with the following other projects/plans within Tier 1 and Tier 2: Tier 1 and Tier 2 • Assumed that construction works to occur concurrently with the Project · • The magnitude of operational and maintenance phase and decommissioning phase impacts on the Project will be smaller than construction phase impacts.	
The impact of damage to existing field drainage	Yes	No	Yes		
The impact of damage to existing water pipelines	Yes	No	Yes		

[a] C=construction, O=operational and maintenance, D=decommissioning

10.11 Cumulative effects assessment

10.11.1.1 The CEA takes into account a 250m buffer for infrastructure of the solar site and the cable route corridor. A 1km buffer has been taken into account for the substation. The buffers are considered appropriate for data collection taking into account the likely zone of influence of other Projects to hydrological receptors.

10.11.1.2 A description of the significance of cumulative effects upon flood risk and hydrology receptors arising from each identified impact is given below.

10.11.2 The impact of increased flood risk from increased impermeable areas

Construction Phase

Sensitivity of receptor

10.11.2.1 The study area includes Long Mead LWS, Blenheim Park SSSI and Wytham Woods SSSI which are both located within catchments which drain to Main Rivers within the study area. Both sites are biologically designated, as discussed within **Table 10.8**. Both sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.11.2.2 Within the study area, adjacent land to the Project comprises a mixture of rural and agricultural land and urban settlements including Woodstock, Bladon, Begbroke, Long Hanborough, Church Hanborough Eynsham, Cassington, Farmoor and Botley.

10.11.2.3 Oxford airport is located upon the central-eastern boundary of the study area and the Cotswolds railway line bisects the central extent of the study area from east to west. Farmoor Reservoir is located upon the far south-western boundary of the study area. The study area also includes several A and B public highways, including the A48, A44 and A420. Adjacent land is of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

10.11.2.4 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.11.2.5 Tier 1 and 2 Developments with greatest potential for cumulative effects include new highway infrastructure and renewable energy development. This is due to developments comprising large spatial extents of temporary hardstanding which could increase flood risk from additional surface water runoff during the construction phase compared to smaller projects within the CEA.

10.11.2.6 It is assumed, where relevant, in accordance with NPS, the NPPF and PPG, that new developments would be required to implement a series of

construction mitigation measures to manage surface water drainage during construction. The cumulative impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. The magnitude is therefore, considered to be negligible adverse.

Significance of effect

10.11.2.7 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity for the study area is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operational Phase

Sensitivity of receptor

10.11.2.8 Designated sites are nationally important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.11.2.9 Adjacent land is of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.

10.11.2.10 Site users during this phase of the Project will be site operatives who are assessed to be highly vulnerable, low recoverability, high value and have an overall high sensitivity.

Magnitude of impact

10.11.2.11 Tier 1 and 2 Developments with greatest potential for cumulative effects include new highway infrastructure and renewable energy development. This is due to developments comprising large spatial extents of temporary hardstanding which could increase flood risk from additional surface water runoff during the construction phase compared to smaller projects within the CEA.

10.11.2.12 It is assumed, where relevant, in accordance with NPS, the NPPF and PPG, that new developments would be required to attenuate surface water runoff, where practicable, to the greenfield runoff rate prior to discharge into the local drainage network or surrounding surface water environment.

10.11.2.13 The cumulative impact is predicted to be of local spatial extent, long term duration, continuous and high reversibility. The magnitude is therefore, considered to be negligible beneficial.

Significance of effect

10.11.2.14 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor beneficial** significance, which is not significant in EIA terms.

10.11.3 The impact of deterioration of water quality within Main Rivers and ordinary watercourses

Construction phase

Sensitivity of receptor

10.11.3.1 Main Rivers and ordinary watercourses present within the study area discharge to the River Thames.

10.11.3.2 Taking a precautionary approach in assuming surrounding waterbodies have achieved/maintained 'good' status at the time when construction begins, the surface watercourses and groundwater bodies within the study area will have been assessed with a WFD status of 'good'. The watercourses and groundwater bodies are therefore considered to be highly vulnerable in relation to WFD classification status, but of moderate recoverability and moderate value in relation to the local economy. The sensitivity of the receptor is therefore, considered to be high.

10.11.3.3 Designated sites are biologically designated, national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.11.3.4 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.11.3.5 Developments with greatest potential for cumulative effects include new highway infrastructure and renewable energy development. Due to the large spatial scales of the projects listed above, it is anticipated the potential for runoff contamination and thus cumulative impacts is greatest from these projects during construction compared to other smaller projects within the study area.

10.11.3.6 It is understood, where relevant, in accordance with NPS, the NPPF and PPG, that new developments would be required to implement a series of construction mitigation measures to provide appropriate management techniques to treat potentially contaminated runoff prior to discharge into the local drainage network or surrounding surface water environment, thus reducing the potential for cumulative impacts to occur.

10.11.3.7 Any cumulative impact predicted to be of local spatial extent, short term duration, intermittent occurrence and high reversibility. It is predicted that the impact will affect the receptor indirectly. The magnitude is therefore, considered to be negligible adverse.

Significance of effect

10.11.3.8 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operational phase

Sensitivity of receptor

10.11.3.9 The watercourses and groundwater bodies are considered to be highly vulnerable in relation to WFD classification status, but of moderate recoverability and moderate value in relation to the local economy. The sensitivity of the receptor is therefore, considered to be high.

10.11.3.10 Designated sites are nationally important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.11.3.11 Site users during this phase of the Project will be site operatives who are assessed to be highly vulnerable, low recoverability, high value and have an overall high sensitivity.

Magnitude of impact

10.11.3.12 Tier 1 and 2 Developments with greatest potential for cumulative effects include new highway infrastructure and renewable energy development. Due to the large spatial scales of the projects listed above, it is anticipated the potential for runoff contamination and thus cumulative impacts is greatest from these projects during construction compared to other smaller projects within the study area.

10.11.3.13 It is assumed, where relevant, in accordance with NPS, the NPPF and PPG, that new developments would be required to provide appropriate management techniques to treat potentially contaminated runoff prior to discharge into the local drainage network or surrounding surface water environment.

10.11.3.14 The cumulative impact is predicted to be of local spatial extent, long term duration, continuous and high reversibility. The effect is therefore, considered to be negligible adverse.

Significance of effect

10.11.3.15 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse significance**, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.11.3.16 The watercourses and groundwater bodies are considered to be highly vulnerable in relation to WFD classification status, but of moderate recoverability and moderate value in relation to the local economy. The sensitivity of the receptor is therefore, considered to be high.

10.11.3.17 Designated sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.11.3.18 Site users during this phase of the Project will be construction workers and site operatives who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.11.3.19 During decommissioning, the majority of export cable will remain in place, with the solar panels, substation and associated infrastructure to be removed.

10.11.3.20 The impacts of decommissioning of the Project components will be reduced through the incorporation of management measures (outlined in **Table 10.18**) including emergency spill response procedures including clean up and remediation of contaminated soils, appropriate water proofing of exposed cable ducts and the continued maintenance of onsite drainage. The magnitude of impact is predicted to be indirect, of local spatial extent, short term duration and intermittent. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.11.3.21 Overall, the magnitude of the impact is deemed to be negligible, the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

10.11.4 The impact of damage to existing field drainage

Construction phase

Sensitivity of receptor

10.11.4.1 Field drains constructed for field irrigation within the Project are of moderate vulnerability, moderate to high recoverability and low value. The sensitivity of the receptor is therefore considered to be medium.

10.11.4.2 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.11.4.1 The impact on field drainage and irrigation from open cut techniques and the installation of link boxes and joint bays during the construction phase could temporarily affect surface water flow pathways. This could have an impact on water quality and potential flow rates.

10.11.4.2 The removal of field drains within the Project area may cause a backup on surrounding field drains, in turn increasing the flood risk to receptors. Measures 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 measures are included in **Table 10.18**.

10.11.4.3 Cumulative impacts on field drainage and irrigation would only occur where development limits coincide. Furthermore, there is a limited spatial overland between the Project, proposed highways infrastructure and renewable energy projects. In line with national standards, projects as a minimum, require a surface water management strategy and drainage scheme to limit any increase in surface water runoff from the site, and to mimic (as close as practicable) the current hydrological regime. It is assumed that all other Project be constructed using industry best practice and therefore should limit any effect on field drainage.

10.11.4.4 With the incorporation of appropriate construction mitigation techniques, the cumulative impact is predicted to be of local spatial extent with a minor shift away from existing hydrological environment of local receptors. The magnitude of impact is predicted to be of local spatial extent and short term duration. The impact magnitude is therefore considered to be negligible adverse.

Significance of effect

10.11.4.5 Overall, the magnitude of impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The cumulative effect will therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.11.4.6 Field drains constructed for field irrigation within the Project are of moderate vulnerability, moderate to high recoverability and low value. The sensitivity of the receptor is therefore considered to be medium.

10.11.4.7 Site users during this phase of the Project will be construction workers and site operatives who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.11.4.8 Developments with greatest potential for cumulative effects include new highway infrastructure development and renewable energy projects.

10.11.4.9 When the operational phase ends, the Project will be decommissioned. The majority of the cable corridor will remain in place but solar PV array infrastructure will be removed from the site and the land returned to full agricultural use. In line with NPS standards, preparation of a decommissioning plan setting out control measures will be required for the Project and all other NSIP projects.

10.11.4.10 The magnitude of the impact is predicted to be of local spatial extent and short term duration. The impact magnitude is therefore predicted to be negligible.

Significance of effect

10.11.4.11 Overall, the magnitude of impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will therefore, be of **minor adverse** significance, which is not significant in EIA terms.

10.11.5 The impact of damage to existing water pipelines

Construction phase

Sensitivity of receptor

10.11.5.1 Drainage pipeline infrastructure comprises water supply and wastewater drainage pipelines operated by Thames Water, which are considered to have a moderate value and contribute to the local and regional economy. They have high vulnerability and low recoverability due to high costs. The sensitivity of the receptor is therefore considered to be high.

10.11.5.2 Site users during this phase of the Project will be construction workers who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.11.5.3 Cumulative impacts on drainage pipeline infrastructure would only occur where water and sewer pipelines were located in proximity to the Project. Furthermore, there is a limited spatial overland between the Project, proposed highways infrastructure and renewable energy development. In line with national standards, projects as a minimum, require a standoff from in situ utility assets to limit the risk of damage to the utility. It is assumed that all other proposed development be constructed using industry best practice and therefore should limit any effect on water and sewer pipelines.

10.11.5.4 With the incorporation of appropriate pre-construction consultation, surveying and design and construction mitigation techniques, the cumulative impact is predicted to be of local spatial extent with a minor shift away from existing hydrological environment of local receptors. The magnitude of impact is predicted to be of local spatial extent and short term duration. The impact magnitude is therefore considered to be negligible.

Significance of effect

10.11.5.5 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the setting is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.11.5.6 Drainage pipeline infrastructure has high vulnerability to the decommissioning impacts of the Project and low recoverability due to high costs. The sensitivity of the receptor is therefore considered to be high.

10.11.5.7 Site users during this phase of the Project will be construction workers and site operatives who are assessed to be highly vulnerable, low recoverability, high value and an overall high sensitivity.

Magnitude of impact

10.11.5.8 Developments with greatest potential for cumulative effects include new highway infrastructure development and renewable energy projects.

10.11.5.9 When the operational phase ends, the Project will be decommissioned. The majority of the cable corridor will remain in place but solar PV array infrastructure will be removed from the site and the land returned to full agricultural use. In line with NPS standards, preparation of a decommissioning plan setting out control measures will be required for the Project and all other NSIP projects.

10.11.5.10 The magnitude of the impact is predicted to be of local spatial extent and short term duration. The impact magnitude is therefore predicted to be negligible.

Significance of effect

10.11.5.11 Overall, the magnitude of impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will therefore, be of **minor adverse** significance, which is not significant in EIA terms.

10.11.6 Future monitoring

10.11.6.1 No monitoring to test the predictions made within the impact assessment is considered necessary and no residual effects are anticipated.

10.12 Transboundary effects

10.12.1.1 As per the scoping report, it was concluded that the proposed development is unlikely to have a significant effect either alone or cumulatively on the environment in a European Economic Area State (EEA states) and therefore a transboundary assessment is not proposed in the ES.

10.13 Inter-related effects

10.13.1.1 Inter-relationships are the impacts and associated effects of different aspects of the Project on the same receptor. These are as follows.

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Project (construction, operation and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases (e.g., construction noise effects from piling, operational substation noise, and decommissioning disturbance).
- Receptor led effects: Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on hydrology and flood risk, such as increased flood

risk may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.

10.13.1.2 Inter-related effects methodology is provided in Chapter 19: Cumulative Effects and Inter-relationships of the PEIR and will be assessed further at the ES stage.

10.14 Summary of impacts and monitoring

10.14.1.1 Information on hydrology and flood risk within the study area was collected through desk review, a site-specific FRA and conceptual drainage strategy (see Volume 3 Annexes 10.1 Flood Risk Assessment of the PEIR) and a hydraulic modelling exercise (see Volume 3 Annexes 10.2 Hydraulic Modelling Report of the PEIR).

10.14.1.2 **Table 10.24** presents a summary of the potential impacts and residual effects in respect to hydrology and flood risk. The impacts assessed include:

- The impact of increased flood risk
- The impact of deterioration of water quality within Main Rivers and ordinary watercourses
- The impact of damage to existing field drainage
- The impact of damage to existing water pipelines

10.14.1.3 It is concluded that there will be no significant effects arising from the Project during the construction, operation and maintenance or decommissioning phases.

10.14.1.4 **Table 10.25** presents a summary of the potential cumulative impacts and residual effects. The cumulative impacts assessed include:

- The impact of increased flood risk
- The impact of deterioration of water quality within Main Rivers and ordinary watercourses
- The impact of damage to existing field drainage
- The impact of damage to existing water pipelines

10.14.1.5 It is concluded that there will be no significant cumulative effects from the Project alongside other projects/plans.

10.14.1.6 No potential transboundary impacts have been identified in regard to effects of the Project.

Table 10.24: Summary of potential environmental effects and monitoring.

[a] C=construction, O=operational and maintenance, D=decommissioning

Description of effect	Phase[a]			Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D						
The impact of increased flood risk from increased impermeable areas	✓	✓		C: negligible adverse O: negligible beneficial	C: high O: high	C: minor adverse O: minor beneficial	n/a	C: minor adverse O: minor beneficial	n/a
The impact of deterioration of water quality within main rivers and ordinary watercourses	✓	✓	✓	C: minor adverse O: minor adverse D: minor adverse	C: high O: high D: high	C: minor adverse O: minor adverse D: minor adverse	n/a	C: minor adverse O: minor adverse D: minor adverse	n/a
The impact of increased flood risk arising from damage to existing flood defences	✓		✓	C: negligible adverse D: no change	C: high D: high	C: minor adverse D: no effect	n/a	C: minor adverse D: no change	n/a
The impact of damage to existing field drainage	✓		✓	C: negligible adverse D: negligible adverse	C:medium and high D: medium and high	C: minor adverse D: minor adverse	n/a	C: minor adverse D: no effect	n/a
The impact of damage to existing water pipelines	✓		✓	C: negligible adverse D: negligible adverse	C: medium and high D: medium and high	C: minor adverse D: minor adverse	n/a	C: minor adverse D: minor adverse	n/a

Table 10.25: Summary of potential cumulative environmental effects and monitoring.

[a] C=construction, O=operational and maintenance, D=decommissioning

Description of effect	Phase[a]			Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D						
Tier 1									
The impact of increased flood risk from increased impermeable areas	✓	✓		C: negligible adverse O: negligible beneficial	C: high O: high	C: minor adverse O: minor beneficial	n/a	C: minor adverse O: minor beneficial	n/a
The impact of deterioration of water quality within main rivers and ordinary watercourses	✓	✓	✓	C: minor adverse O: minor adverse D: minor adverse	C: high O: high D: high	C: minor adverse O: minor adverse D: minor adverse	n/a	C: minor adverse O: minor adverse D: minor adverse	n/a
The impact of damage to existing field drainage	✓		✓	C: negligible adverse D: negligible adverse	C:medium and high D: medium and high	C: minor adverse D: minor adverse	n/a	C: minor adverse D: no effect	n/a
The impact of damage to existing water pipelines	✓		✓	C: negligible adverse D: negligible adverse	C: medium and high D: medium and high	C: minor adverse D: minor adverse	n/a	C: minor adverse D: minor adverse	n/a
Tier 2									
The impact of increased flood risk from	✓		✓	C: negligible adverse	C: high D: high	C: minor adverse	n/a	C: minor adverse	n/a

Description of effect	Phase[a]			Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D						
increased impermeable areas				D: negligible beneficial		D: minor beneficial		D: minor beneficial	
The impact of deterioration of water quality within main rivers and ordinary watercourses	✓	✓		C: minor adverse O: minor adverse D: minor adverse	C: high O: high D: high	C: minor adverse O: minor adverse D: minor adverse	n/a	C: minor adverse O: minor adverse D: minor adverse	n/a
The impact of damage to existing field drainage	✓		✓	C: negligible adverse D: negligible adverse	C:medium and high D: medium and high	C: minor adverse D: minor adverse	n/a	C: minor adverse D: no effect	n/a
The impact of damage to existing water pipelines	✓		✓	C: negligible adverse D: negligible adverse	C: medium and high D: medium and high	C: minor adverse D: minor adverse	n/a	C: minor adverse D: minor adverse	n/a

10.15 Next steps

10.15.1.1 Following a refinement of the Project's study area, a hydrological survey will be undertaken at key watercourse crossings points where appropriate. The survey will comprise a walkover survey to provide baseline information on the watercourses including width of the channels, the degree of channel modification and obstacles in the channels.

10.15.1.2 Investigations will be undertaken across the three solar PV sites as part of engineering design to confirm the rate of infiltration. The results will be used to inform the drainage design.

10.15.1.3 A survey of private water supply abstractions will be undertaken to further characterise the use of groundwater and surface water resources.

10.15.1.4 Further consultation will be undertaken with LLFAs and the EA regarding the placement of solar PV modules within Flood Zone 3 in addition to the management of surface water during construction and operation.

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