Botley West Solar Farm

Environmental Statement

Volume 1

Chapter 10: Hydrology and Flood Risk

November 2024

PINS Ref: EN010147
Document Ref: EN010147/APP/6.3
Revision P0
APFP Regulation 5(2)(a); Planning Act 2008; and Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations

Approval for issue

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Contents

Tables

Figures (See Volume 2: Figures)

Figure number	Figure title
Figure 10.12	Water Abstractions, Pollution Incidents and Discharge Consents

Appendices (See Volume 3: Appendices)

Appendix number	Appendix title
10.1	Flood Risk Assessment
10.2	Surface Water Drainage Strategy
10.3	Hydraulic Modelling Report
10.4	Hydrology Report
10.5	Surface Water Modelling Report
10.6	Surface water and groundwater abstractions, pollution incidents and discharge consents Report
10.7	Water Framework Directive Assessment

Glossary

Term	Meaning
The Applicant	SolarFive Ltd
The Project	The Botley West Solar Farm
The Site	The area encompassed within the Order Limit comprising the Northern Area, Central Area, Southern Area and Cable Corridor.
Cable corridor	The corridor within which the cables will be located.
Climate change	A long-term change in weather patterns, in the context of flood risk, climate change will produce more frequent severe rainfall.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Discharge Consents	Consent granted by the Environment Agency to discharge into watercourses, subject to conditions.
EIA Scoping Report	A report setting out the proposed scope and level of detail of the information to be provided in the Environmental Statement.
Field drainage	Limiting the effect of flooding by maintaining surface water and land drainage systems.
Flood Risk Assessment (FRA)	A Flood Risk Assessment is an assessment of the risk of flooding from all flood mechanisms, including the identification of flood mitigation measures, in order to satisfy the requirements of the NPS EN-1, 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 3a	High probability land having a 1 in 100 or greater annual probability of river flooding; or land having a 1 in 200 or greater annual probability of sea flooding.
Flood Zone 3b	This zone comprises the functional floodplain being 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.

Term	Meaning
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.
Infrastructure Area	The area within which the transmission cables, substations, ac and 220kV cables and solar panels will be located.
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 the Environment Agency carries out maintenance, improvement or construction work to manage flood risk on main rivers.
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 reasonable worst case that should be assessed for that topic receptor.
Order Limits	The area of land encompassing the Project including all land required temporarily or permanently,
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 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.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Substation Area	An area currently identified as a potential location for the substation.
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.

Term	Meaning
Sustainable urban Drainage Systems (SuDS)	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	Set of tools and data showing how the UK climate may change in the future. UKCP18 is the latest such tool and supersedes UKCP09.
Water Framework Directive (WFD)	A directive which commits member states to achieve good status of all waterbodies (both surface and groundwater), and also requires that no such waterbodies experience deterioration in status. Good status is a function of good ecological and good chemical status, defined by a number of elements.
Water Quality	The physical, chemical and biological characteristics of water.

Abbreviations

Abbreviation	Meaning
bgl	Below ground level
BGS	British Geological Survey
CC	Climate Change
CDC	Cherwell District Council
CoCP	Code of Construction Practice
CPRE	Campaign to Protect Rural England
DCO	Development Consent Order
DNRA	Did not require assessment
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

Abbreviation	Meaning
HDD	Horizontal Directional Drilling
ICP	Interim Code of Practice
IDB	Internal Drainage Board
IH24	Institute of Hydrology Report 124
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
MDS	Maximum Design Scenario
NGET	National Grid Electricity Transmission
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)
MWp	Megawatt-Peak

10 Hydrology and Flood Risk

10.1 Introduction

Overview

10.1.1 This chapter of the Environmental Statement (ES) has been prepared by RPS for Photovolt Development Partners GmbH (PVDP), on behalf of SolarFive Ltd (the Applicant).

10.1.2 PVDP intends to submit an application to the Planning Inspectorate (PINS) on behalf of the Applicant for development consent under the Planning Act 2008. The proposal is to install and operate approximately 840MWe of solar generation. across approximately 839 ha. The Project extends from an area of land in the north, situated between the A4260 and the Dorn River Valley near Tackley and Wootton (Northern Site Area), through a central section, situated broadly between Bladon and Cassington (Central Site Area), and connecting to a section further south near to Farmoor Reservoir and north of Cumnor (Southern Site Area), where the Project will connect to the National Grid transmission network.

10.1.3 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). Most of the Project lies within West Oxfordshire District Council.

10.1.4 This ES is submitted as part of the development consent application in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (the EIA Regulations) and other required documents.

10.1.5 This ES Chapter has been prepared in accordance with the approach set out in the Scoping Report and subsequent Preliminary Environmental Information Report (PEIR).

10.1.6 The assessment presented is informed by the following technical appendices.

- Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**;
- Volume 3 Appendix 10.2 Surface Water Drainage Strategy **[EN010147/APP/6.5]**;
- Volume 3 Appendix 10.3 Hydraulic Modelling Report **[EN010147/APP/6.5]**;
- Volume 3 Appendix 10.4 Hydrology Report **[EN010147/APP/6.5]**;
- Volume 3 Appendix 10.5 Surface Water Modelling Report **[EN010147/APP/6.5]**;
- Volume 3 Appendix 10.6 Surface water and groundwater abstractions, pollution incidents and discharge consents Report **[EN010147/APP/6.5]**; and,
- Volume 3 Appendix 10.7 Water Framework Directive Assessment **[EN010147/APP/6.5]**.

10.1.7 This chapter also draws upon information contained within.

- Volume 1 Chapter 9 Ecology and Nature Conservation **[EN010147/APP/6.3]**;
- Volume 1 Chapter 11 Ground Conditions **[EN010147/APP/6.3]**; and
- Volume 1 Chapter 14 Climate Change **[EN010147/APP/6.3]**.

Summary

10.1.8 This chapter concludes that there will be no likely significant effects arising from the Project during the construction, operation and maintenance or decommissioning phases.

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

10.2 Legislative and Policy Context

Legislation

10.2.1 This chapter has considered the legislative framework as defined below.

National Legislation

The Water Resources Act 1991

10.2.2 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

10.2.3 Transposes for England and Wales the Water Framework Directive (2000/60/EC) and 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 Groundwater (Water Framework Directive (England) Direction 2016

10.2.4 Sets out instructions to the EA on their obligations to protect groundwater.

The Land Drainage Act 1991

10.2.5 Sets out the responsibilities of Internal Drainage Boards and allows for Internal Drainage Boards, Lead Local Flood Authorities, and district councils to carry out flood risk management work.

The Environmental Protection Act 1990

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

The Environment Act 2021

10.2.7 Introduces measures for improvement of the environment, including waste, resource efficiency, air quality, water, nature and biodiversity and conservation.

The Water Act 2003

10.2.8 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 2003 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 and Water Management Act 2010

10.2.9 Aims to improve flood risk management through measures such as making Local Authorities responsible for preparing and putting in place strategies for managing flood risk in their areas and designating Lead Local Flood Authorities, whose responsibilities include reviewing all proposed sustainable drainage systems for new applications.

The Water Act 2014

10.2.10 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 sets out a resilience objective upon the Secretary of State to ensure the long-term resilience of water supply and sewerage systems. 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

10.2.11 Regulate discharges to controlled waters.

The Reservoirs Act 1975

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

Planning policy context

10.2.13 The Project covers approximately 1,300 ha within the county of Oxfordshire and is formed of three areas of solar installation.

10.2.14 The Project is within the Lead Local Flood Authority of Oxfordshire County Council.

National Policy Statements

10.2.15 There are currently six designated energy National Policy Statements (NPSs) those which are relevant to hydrology and flood risk are EN-1, EN-3, and EN- 5. The 2023 revised NPSs (EN-1 to EN-5) were designated on 17 January 2024.

10.2.16 **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 NPS document requirements relevant to Hydrology and Flood Risk

Summary of NPS requirement	How and where considered in the ES
Climate Change	
A robust approach to flood risk management is a vital element of climate change adaptation; the applicant and the Secretary of State should take account of the policy on climate change adaptation in Section 4.9. [paragraph 5.8.5 NPS EN-1]	Climate change has been taken into account in the characterisation of the baseline and future baseline environment of this ES (see **Section 10.6**). Climate change is also considered in ES Volume 1 Chapter 14 Climate Change **[EN010147/APP/6.3]**.
As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, … applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: • flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change; and earth movement or subsidence caused by flooding or drought (for underground cables). [paragraph 2.3.2, of NPS EN-5].	Climate change is considered in relation to peak river flow in ES Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**. The assessment applies relevant climate change scenarios to ensure the Project is safe throughout its lifetime. The FRA also considers other sources of flooding including groundwater to ensure the Project is safe throughout its project lifetime. Climate change is considered in relation to peak rainfall intensities in ES Volume 3 Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**. This takes into account increases in rainfall rates due to climate change to ensure the drainage design is able to accommodate increasing volumes of surface water runoff associated with the effects of climate change. Ground conditions in relation to earth movement or subsidence for particularly relating to the cable corridor is considered further in ES Volume 1 **[EN010147/APP/6.3]**.
Flood Risk	
A site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3 in England. In Flood Zone 1, an assessment should accompany all proposals for sites of 1 hectare or more. This assessment should identify and assess the risks of all forms of flooding to and from the project and	Due to the size of the Project which is over 1 ha, an FRA has been prepared. This is included in ES Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**. The FRA considers flood risk from fluvial and tidal sources in addition to flooding from surface water / ordinary watercourses, groundwater, sewers,

Summary of NPS requirement	How and where considered in the ES
demonstrate how these flood risks will be managed, taking climate change into account. [paragraph 5.8.13 – 5.8.14, of NPS EN-1].	reservoirs and other artificial sources. To assess fluvial flood risk within the Central Site Area, a hydraulic modelling exercise was undertaken included in ES Volume 3 Appendix 10.3 Hydraulic Modelling Report **[EN010147/APP/6.5]**. Information has also been obtained from the Environment Agency and Lead Local Flood Authority.
In determining an application for development consent, the decision maker should be satisfied that where relevant: • the application is supported by an appropriate FRA • the Sequential Test has been applied and satisfied as part of site selection • a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk • the proposal is in line with any relevant national and local flood risk management strategy SuDS (as required in the next paragraph on National Standards) have been used unless there is clear evidence that their use would be inappropriate • in flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in paragraph 5.8.42) • the project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development • land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance. [paragraph 5.8.36, of NPS EN-1].	Development has been sequentially steered towards Flood Zone 1, with solar PV modules and associated ancillary infrastructure located within Flood Zone 1 and has a low risk of flooding from all sources. Temporary construction compounds and permanent access tracks are located within Flood Zone 1, 2 and 3 and have been subjected to the sequential test and exception test. In regards to an assessment of residual flood risk, whilst flood defences are present within the study area and provide a degree of protection against flooding, the undefended scenario has been used to assess residual fluvial flood risk throughout the development lifetime, taking into account the effects of climate change. Historical flood events recorded by the Environment Agency and SFRA reports are also noted. Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods, and are to be secured through requirements of the DCO. Commitments are presented within **Table 10.26.** For temporary HDD Compounds to be situated with Flood Zone 3 there is a commitment for a flood management plan to reduce vulnerability of site users during the development lifetime to ensure development is safe for its lifetime. This is set out in the Outline CoCP **[EN010147/APP/7.6.1]**.
Development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques. [paragraph 5.8.10 – 5.8.12, of NPS EN-1].	There is to be no permanent development within Flood Zone 3. As a result, no floodplain compensation is required as part of the Project. Cumulative effects are assessed within **Section 10.10** of this chapter. With the implementation of the above, it is demonstrated flood risk will not be increased elsewhere, accounts for the predicted impacts of climate change and ensures no reduction in floodplain capacity.
Vulnerable aspects of the development should be located on parts of the site at lower risk and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife Overarching National Policy Statement for Energy (EN-1) habitat and flood storage uses. Opportunities should be taken to lower flood risk	

Summary of NPS requirement	How and where considered in the ES
by reducing the built footprint of previously developed sites and using SuDS. The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding. [paragraphs 5.8.29 of NPS EN-1].	
Flood resistant and resilient materials and design should be adopted to minimise damage and speed recovery in the event of a flood. [paragraph 5.8.35 if NPS EN-1]	
Energy projects should not normally be consented within Flood Zone 3b, or on land expected to fall within these zones within its predicted lifetime However, where essential energy infrastructure has to be located in such areas, for operational reasons, they should only be consented if the development will not result in a net loss of floodplain storage and will not impede water flows. Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if they are satisfied that the increase in present and future flood risk can be mitigated to an acceptable and safe level and taking account of the benefits of, including the need for, nationally significant energy infrastructure. [paragraph 5.8.41 – 5.8.42 of NPS EN-1]	
Vulnerable aspects of the development should be located on parts of the site at lower risk and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife Overarching National Policy Statement for Energy (EN-1) habitat and flood storage uses. Opportunities should be taken to lower flood risk by reducing the built footprint of previously developed sites and using SuDS. The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding. [paragraphs 5.8.29 of NPS EN-1].	
Sequential and Exception Test	
The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites with medium risk areas and then, only where there are no reasonably	The development vulnerability is classified as 'essential infrastructure'. This definition, alongside the definitions for the sequential test and exception test are provided within the ES Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**.

Summary of NPS requirement	How and where considered in the ES
available sites in low and medium risk areas, within high-risk areas. Project. [paragraph 5.8.21 of NPS EN-1].	Due to its vulnerability classification and location within Flood Zone 1, 2, 3 and 3b, the cable corridor has been subject to and has passed the sequential test and exception test.
The Exception Test is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site. It would only be appropriate to move onto the Exception Test when the Sequential Test has identified reasonably available, lower risk sites appropriate for the Project where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. Both elements of the Exception Test will have to be satisfied for development to be consented. To pass the Exception Test it should be demonstrated that: • the project would provide wider sustainability benefits to the community that outweigh flood risk; and • the project will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible will reduce flood risk overall.	

Drainage

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 (LLFA) or water and sewerage company (through the Ofwat approved Sewerage Sector Guidance), or another body, such as an Internal Drainage Board. [paragraph 5.8.37 – 5.8.39, of NPS EN-1].	A Conceptual Drainage Plan has been prepared for the Project included in ES Volume 3 Appendix 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]**. An Outline OMP and DMP has been prepared **[EN010147/APP/7.6.5]** and **EN010147/APP/7.6.4**) and is to be secured as a requirement of the DCO. The drainage scheme will provide a minor beneficial benefit in regards to surface water flood risk with the restriction of surface water flows from the site to the greenfield runoff rate. Surface water runoff is to be stored within gravel subbases and attenuation basins for the ancillary features of the Project for the development lifetime, incorporating climate change. The strategy prioritises natural drainage methods through the implementation of appropriate seeding to be placed across the solar panel areas to reduce runoff. Attenuation in the form of gravel bases and attenuation basins will be provided for the ancillary features. Exceedance events of the drainage schemes are to be considered further at detailed design stage.

Summary of NPS requirement	How and where considered in the ES
To satisfactorily manage flood risk, arrangements are required to manage surface water and the impact of the natural water cycle on people and property. Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts. The surface water drainage arrangements for any project should, accounting for the predicted impacts of climate change throughout the development's lifetime, be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, unless specific off-site arrangements are made and result in the same net effect. [paragraph 5.8.24 – 5.8.27, of NPS EN-1].	
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. Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems National Policy Statement for Renewable Energy Infrastructure (EN-3) 99 (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended. Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses. [paragraph 2.10.84- 2.10.86 of NPS EN-3].	
Watercourses on Site	
Development (including construction works) will need to account for any existing watercourses and flood and coastal erosion risk management structures or features, or any land likely to be needed for future structures or features so as to ensure: • Access, clearances and sufficient land are retained to enable their maintenance, repair, operation, and replacement, as necessary. • Their standard of protection is not reduced. • Their condition or structural integrity is not reduced. [paragraph 5.8.17 of NPS EN-1]	Appropriate mitigation measures in regard to flood risk, such as appropriate assessments for Ordinary Watercourses, Main Rivers and associated flood defences are outlined within ES Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. The distance of easements from on-site watercourses is dependent on the Local Planning Authorities and their associated guidance. It is proposed to provide a 8m easement for watercourses within West Oxfordshire District Council, a 9m easement for watercourses within Cherwell District Council and a 10m easement for watercourses within the Vale of White Horse District Council.
Culverting existing watercourses/drainage ditches should be avoided. Where culverting for access is unavoidable, applicants should demonstrate that no reasonable alternatives	For crossing of main rivers and ordinary watercourses 'HDD (or other trenchless techniques) entry and exit points will be located at least 8 m away from Environment Agency main

Summary of NPS requirement	How and where considered in the ES
exist and where necessary it will only be in place temporarily for the construction period. [paragraph 2.10.86 and 2.10.87 of NPS EN-3]	rivers at least 8m from ordinary watercourses (depending on the Council). This commitment is presented within the Outline CoCP **[EN010147/APP/7.6.1]** and is to be secured through requirements of the DCO. Commitments will ensure watercourse easements are not reduced and the condition of flood defences will not be adversely impacted by construction activities.
Consultation	
Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions before the official pre-application stage of the NSIP process with the EA, and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owner and operators. Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, and identify the information that will be required by the Secretary of State to reach a decision on the application when it is submitted. If the EA or another flood risk management authority has reasonable concerns about the proposal on flood risk grounds, the applicant should discuss these concerns with the EA and take all reasonable steps to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the authority's concerns. [paragraph 5.8.18 - 5.8.20 of NPS EN-1]	The applicant has engaged with the Environment Agency and LLFA with meetings and technical notes to discuss issues relating to hydrology and flood risk. They have both agreed with the approach in principle. Key consultation summaries are presented within **Section 10.3** of this chapter
Water Resources	
Where possible, applicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing, during operation. Applicants are encouraged to consider protective measures to control the risk of pollution to groundwater beyond those outlined in River Basin Management Plans and Groundwater Protection Zones – this could include, for example, the use of protective barriers. [paragraph 5.16.5 – 5.16.6 of NPS EN-1].	The Outline CoCP **[EN010147/APP/7.6.1]** sets out a requirement to include a Surface Water and Groundwater Management Plan within the detailed CoCP. The detailed CoCP will also include a Pollution Prevention Plan which will include information for managing surface water runoff during construction and protective measures to control the risk of pollution to groundwater during construction and operation. These will be secured through the requirements of the DCO.
The ES should in particular describe: • the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges • existing water resources affected by the proposed project and the impacts of the proposed project on	A WFD Assessment has been prepared in ES Volume 3 Appendix 10.7 Water Framework Directive Assessment **[EN010147/APP/6.5]**. This has been undertaken in accordance with the Planning Inspectorate Advice Note 18: The Water Framework Directive. The assessment considers the potential impact of the Project during the

Summary of NPS requirement	How and where considered in the ES
water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Abstraction Licensing Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance • existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics • any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions • how climate change could impact any of the above in the future • any cumulative effects [paragraph 5.16.7 of NPS EN-1].	construction, operations and maintenance, and decommissioning. The WFD Assessment and the have taken into account the requirements of the Thames RBMP and WFD to ensure all potential impacts on the water environment are mitigated to within acceptable levels including drinking water protected areas associated with public and private abstractions. The impact on hydromorphological supporting conditions to the biological elements of ecological status have been considered in the WFD Assessment. The document has undertaken an assessment of the water bodies and associated protected areas including designated shellfish waters and drinking water protected areas. Impacts to peak river flow as a result of climate change has been described and taken into account within ES Volume 1 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. This report also considers impacts in relation to peak rainfall intensities have been described and taken into account within ES Volume 1 Appendix 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]**. Measures to ensure discharges to the water environment are subject to pollution control are also detailed in the report. A cumulative effects assessment is provided within **Section 10.10** of this chapter.
The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If a development needs new water infrastructure, significant supplies or impacts other water supplies, the applicant should consult with the local water company and the EA. [paragraph 5.16.10, NPS EN-1].	
Activities that discharge to the water environment are subject to pollution control. [paragraph 5.16.11 of NPS EN-1].	
The Secretary of State should be satisfied that a proposal has regard to current River Basin Management Plans and meets the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (including regulation 19). The Secretary of State must refuse development consent where a project is likely to cause deterioration of a water body or its failure to achieve good status or good potential, unless the requirements set out in Regulation 19 are met. The Secretary of State should also consider the interactions of the proposed project with other plans such as Water Resources Management Plans and Shoreline Management Plans. [paragraphs 5.16.14 – 5.16.15 of the NPS EN-1]	
The Secretary of State must also consider duties under other legislation including duties under the Environment Act 2021 in relation to environmental	An assessment of effects to hydrology and flood risk has been undertaken as part of this chapter,

Summary of NPS requirement	How and where considered in the ES
targets and have regard to the policies set out in the Government's Environmental Improvement Plan 2023. [paragraph 5.16.13 of NPS EN-1].	and commitments (mitigation measures) are detailed within **Section 10.8.** Appropriate mitigation measures to reduce the impacts on the water environment are set out in the Outline CoCP **[EN010147/APP/7.6.1]** which has been prepared as part of the DCO application. The detailed CoCP will be supported via a series of management plans.

The National Planning Policy Framework

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

10.2.18 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 national planning policies relevant to this chapter.

Table 10.2: Summary of national planning policy requirements relevant to this chapter

Policy	Key Provisions	How and where considered in the ES
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 development covering an area of 1 hectare (ha) or greater in Flood Zone 1 (footnote 59 of the NPPF).	Due to the nature and scale of the Project, an FRA was prepared and is presented within Volume 1, Appendix 10.1: Flood risk assessment **[EN010147/APP/6.5]**.
	All plans should apply a sequential, risk-based approach to the location of development. This should take into account all sources of flood risk and the current and future impacts of climate change. Development should avoid, where possible, flood risk to people and property. (Paragraph 167).	Climate change has been taken into account in the characterisation of the baseline and future baseline environment of this ES, see **Section 10.6**. Climate change is also considered in the Flood Risk Assessment (FRA) in Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**. Development has been sequentially steered towards Flood Zone 1, with solar PV modules and associated ancillary infrastructure located within Flood Zone 1 and has a low risk of flooding from all sources. Temporary construction compounds and permanent access tracks are located within Flood Zone 1, 2 and 3 and have been subjected to the sequential test and exception test. The cable corridor has been subject to the exception test due to its partial location in Flood Zone 2 and 3. Where required, appropriate mitigation measures are outlined within Volume 1,

Policy	Key Provisions	How and where considered in the ES
		Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**.
National Planning Practice Guidance	PPG ID7 (March 2014) for Flood Risk and Coastal Change provides additional guidance (avoid, control, mitigate). in the implementation of the NPPF in relation to development and flood risk.	The FRA and Conceptual Drainage Strategy has been undertaken in line with NPPF and PPG ID7 - Flood Risk and Coastal Change. See Volume 1, Appendix 10.1: Flood Risk Assessment and Volume 1, Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**. The FRA considers avoidance through sequential steering of the development away from the areas of risk. Control is considered through the implementation of the surface water drainage strategy to control and attenuate the flow of water. Mitigation is implemented through the design of the solar farm such as raising of solar panels through inherent design of the features.

Local planning policy

10.2.19 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 ES
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;	Due to the nature and scale of the Project, an FRA was prepared and is presented within Volume 1, Appendix 10.1: Flood risk assessment **[EN010147/APP/6.5]**. Climate change has been taken into account in the characterisation of the baseline and future baseline environment of this ES (see 10.6). Climate change is also considered in the FRA in Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**. The Project design has been sequentially steered siting solar PV modules and associated ancillary infrastructure including temporary compounds to be located within Flood Zone 1. The cable corridor, HDD compounds and permanent access tracks are located within Flood Zone 1, 2 and 3 and have been subjected to the sequential test and exception test. Where required, appropriate mitigation measures are outlined within Volume 1, Appendix 10.1: Flood risk Assessment **[EN010147/APP/6.5]**. This includes an 8m easement for watercourses located within West Oxfordshire District Council.

Policy	Key Provisions	How and where considered in the ES
	• 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 […]	The conceptual drainage strategy is presented within Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]** and has been developed in accordance with 2023 NPS, NPPF, PPG ID7 the SuDS Manual and local council policy. The Conceptual drainage strategy considers existing and proposed runoff rates, the hierarchy of drainage and how SuDS can be incorporated within the proposed design.
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	Due to the nature and scale of the Project, an FRA was prepared and is presented within Volume 1, Appendix 10.1: Flood risk assessment **[EN010147/APP/6.5]**. Climate change has been taken into account in the characterisation of the baseline and future baseline environment of this ES (see **Section 10.6**). Climate change is also considered in the FRA in Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**. The Project design has been sequentially steered siting solar PV modules and associated ancillary infrastructure including temporary compounds to be located within Flood Zone 1. The cable corridor, HDD compounds and permanent access tracks are located within Flood Zone 1, 2 and 3 and have been subjected to the sequential test and exception test.

Policy	Key Provisions	How and where considered in the ES
	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 Project 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).	Where required, appropriate mitigation measures are outlined within Volume 3, Appendix 10.1: Flood risk assessment **[EN010147/APP/6.5]**.. The conceptual drainage strategy is presented within Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**. This has been developed in accordance with 2023 NPS, NPPF, PPG ID7 the SuDS Manual and local council policy. The conceptual drainage strategy considers existing and proposed runoff rates, the hierarchy of drainage and how SuDS can be incorporated within the proposed design. The strategy includes details of how water quality and other benefits will be supplied as part of the implementation of the SuDS.
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	Development proposals will incorporate this policy within the Southern Site Area which is located within the Vale of White Horse District Council. Appropriate mitigation measures are outlined within Volume 3, Appendix 10.1: Flood risk assessment **[EN010147/APP/6.5]**, including a 10m easement for watercourses within the Vale of White Horse District.

Policy	Key Provisions	How and where considered in the ES
	commencement of work to ensure that the watercourse will be satisfactorily protected from damage, disturbance or pollution.	
Cherwell Local Plan 2011 - 2031		
Policy ESD 1: Mitigating and Adapting to Climate Change	[…] The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following: • Taking into account the known physical and environmental constraints when identifying locations for development. • Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling. • Minimising the risk of flooding and making use of sustainable drainage methods, and • Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).	Climate change has been taken into account in the characterisation of the baseline and future baseline environment of this ES (see Section 10.6). Climate change is also considered in the Flood Risk Assessment (FRA) in Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**.
Policy ESD 6: Sustainable Flood Risk Management	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;	Due to the nature and scale of the Project, an FRA was prepared and is presented within Volume 3, Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**. Climate change has been taken into account in the characterisation of the baseline and future baseline environment of this ES (see **Section 10.6**). Climate change is also considered in the FRA in Volume 3 Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**. The Project design has been sequentially steered siting solar PV modules and associated ancillary infrastructure including temporary compounds to be located within Flood Zone 1. The cable corridor, HDD compounds and permanent access tracks are located within Flood Zone 1, 2 and 3 and have been subjected to the sequential test and exception test. Where required, appropriate mitigation measures are outlined within Volume 3, Appendix 10.1: Flood risk assessment **[EN010147/APP/6.5]**. This includes a 9m easement for watercourses within Cherwell District Council. The FRA also demonstrates that the Project will be sequentially steered away from areas of surface water risk. Where ancillary features are

Policy	Key Provisions	How and where considered in the ES
	• Development proposals of 1 ha or more located in flood zone 1; • Development sites located in an area known to have experienced flooding problems; and/or • 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 will be managed effectively on site and that the development will not increase flood risk elsewhere, including sewer flooding.	placed within areas of surface water flood risk mitigation has been built into the design to ensure that it is mitigated on site and does not increase risk off-site. The Conceptual Drainage Strategy is included in Volume 3, Appendix 10.2: Surface Water Drainage Strategy **[EN010147/APP/6.5]**. This demonstrates that attenuation is provided for areas of hardstanding within the Project and that these can accommodate the 100 year plus climate change storm event and the 30 year storm event.
Policy ESD 7: Sustainable Drainage Systems (SuDS)	All development will be required to use sustainable drainage systems (SuDS) for the management of surface water run-off. Where site specific Flood Risk Assessments are required in association with development proposals, they should be used to determine how SuDS can be used on particular sites and to design appropriate systems. 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.	The conceptual drainage strategy is presented within Volume 3 Appendix 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]**. This has been developed in accordance with 2023 NPS, NPPF, PPG ID7 the SuDS Manual and local council policy. The conceptual drainage strategy considers existing and proposed runoff rates, the hierarchy of drainage and how SuDS can be incorporated within the proposed design. This document also provides details regarding ownership of SuDS, maintenance and management of features.

10.3 Consultation and Engagement

Scoping

10.3.1 On 15 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 of the Project. 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 likely significant environmental effects in these areas.

10.3.2 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 ES.

Table 10.4: Summary of scoping responses

Comment	How and where considered in the ES
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 Zone of Impact, but no further evidence to support these areas is provided. The Scoping Report does not consider potential hydrological connectivity to the Project 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 is discussed within **Section 10.4** 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. Within the ES, the study area from solar farm land parcels has been increased from 250m to 1km based on feedback on alternative solar farm ES studies.
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 Project 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 **[EN010147/APP/6.5]**.
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	Hydrological features, including Main Rivers, ordinary watercourses and other hydrological features such as lakes, reservoirs and ponds are identified within **Section 10.6** This section also includes Water Framework Directive surface water quality data of catchments within which the Project is located. A hydrogeological overview within **Section 10.6** includes a review aquifer designations and source protection zones the Project is located

Comment	How and where considered in the ES
have potential to be impacted by the Project. 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.	within. Groundwater is discussed in detail within Volume 1 Chapter 11 Ground Conditions **[EN010147/APP/6.3]**. 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 10.6**.
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 10.6** 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 [of the Scoping Report] 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 of interaction between groundworks and groundwater is discussed in detail within Volume 1 Chapter 11 Ground Conditions **[EN010147/APP/6.3]**.
Damage to field drainage at decommissioning Impacts identified at decommissioning do not include damage to field drainage although this is identified 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.	The impact of damage to existing field drainage is presented within **Section 0**. The chapter assesses impacts at construction and decommissioning phases.
Begbroke Parish Council	
Water runoff will increase, leading to increased flooding and overflowing ditches.	All sources of flood risk have been assessed within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. Details of surface water runoff in regard to the Project is included within Volume 3 Appendix 10.2; Conceptual Drainage Strategy **[EN010147/APP/6.5]**.
Cassington Parish Council	
Literature	These reports are considered within the **Table 10.11** of this ES chapter which summarises key

Comment	How and where considered in the ES
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.	desktop reports that have been consulted. Whilst these documents are considered to be local policy the legislation section has been summarised primarily based on the NPS which takes precedence. The documents have been considered in further detail with regard to policy within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**.
7.4.19 indicates that cumulative impacts from hydrology and flood risk will likely occur, whilst 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.	Surface water modelling has been undertaken for the catchment area upstream and including Cassington. The results of which are detailed in Appendix 10.5: Surface Water Modelling Report **[EN010147/APP/6.5]**. Mitigation measures have been proposed to provide a betterment to surface water runoff and this is discussed in the Conceptual Drainage Strategy for the site within Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**. A site visit has been undertaken to establish the nature of the ordinary watercourses on site. This has been used to establish field drainage, and the nature and size of watercourses. This information has been used to inform the crossing schedule and baseline hydrological conditions at the site. Further details are provided in Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. Thames Water assets have been indicatively located via Thames Water asset plans. Prior to any construction activities, detailed Thames Water surveys will be undertaken to establish if any infrastructure is present prior to any intrusive work being undertaken. Potential impacts to private water supplies are considered further within Para 10.6.41. Increased flood risk as a result of the placement of solar PV modules is discussed within Appendix 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]**. The impact of increased flood risk from increased impermeable areas is also considered within this report.
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. This has been used to inform the construction and operational phases of the assessment and likely effects. Prior to construction, 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	The study area discussed within **Section 10.4** 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,

Comment	How and where considered in the ES
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.	operation and decommissioning phases of the Project. Within the ES, the study area from solar farm land parcels has been increased from 250m to 1km
Existing baseline conditions Scoping Report focuses largely on flood risk associated with water courses, however Cassington, Jericho Farm, Worten 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 although the threat remains as demonstrated by near flooding in the winter of 2022-2023.	All sources of flood risk have been assessed within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**, including surface water. Reference has been made to existing flood risk concerns within the study area, as well as to flood alleviation schemes that have been undertaken.
Flood risk Table 7.6 indicates a variety of potential hydrological and flood risk impacts which might arise as a consequence of the Project, 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 have been assessed within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. The Conceptual Drainage Strategy is included within Volume 3 Appendix 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]** and discusses how flows generated from additional impermeable area have been dealt with as per national and local policy. Hydraulic modelling for the River Evenlode and associated tributaries for the Central Site Area has been undertaken and results are presented within Volume 3 Appendix 10.3 Hydraulic modelling **[EN010147/APP/6.5]**. Surface water modelling has been undertaken for the catchment area upstream and including Cassington. The results of which are detailed in Appendix 10.5: Surface Water Modelling Report **[EN010147/APP/6.5]**. Mitigation measures have been proposed to provide a betterment to surface water runoff and this is discussed in the Conceptual Drainage Strategy for the site within Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**.

Comment	How and where considered in the ES
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 **[EN010147/APP/6.5]**. '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 10.6** 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 10.6** Future baseline conditions.
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 and orientation of the solar panels at a given site (Yavari et al., 2022).	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 has high hydrologic continuity 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 Project. 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. Surface water modelling has been undertaken for the catchment area upstream and including Cassington. The results of which are detailed in Appendix 10.5: Surface Water Modelling Report **[EN010147/APP/6.5]**. Mitigation measures have been proposed to provide a betterment to surface water runoff and this is discussed in the Conceptual Drainage Strategy for the site within Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**. Increased flood risk as a result of the placement of solar PV modules is discussed within **Section 0.** 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	The study area discussed within **Section 10.4** 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,

Comment	How and where considered in the ES
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.	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 is included as a key receptor within this chapter see **Section 10.6.**
Environment Agency	
Flood Zones Application sites lies within Flood Zones 1, 2 and 3 […] and the development is considered essential infrastructure under annex 3 of the NPPF. Site is partly defended by EA maintained flood defences and third party maintained defences. Error in Paragraph 2.1.5 of Scoping Report 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 **[EN010147/APP/6.5]**.
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 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.	Hydraulic modelling for the Central Site Area has been undertaken within Volume 3 Appendix 10.2 Hydraulic Modelling Report **[EN010147/APP/6.5]**. Hydraulic modelling has been submitted to the EA for review in November 2023. A response to the modelling was received in February 2024 and further clarification on the approach was provided in a meeting in July 2024. The EA agreed with the approach provided additional details were submitted for approval. We are awaiting response of this approval to date.

Comment	How and where considered in the ES
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.	These models have now been acquired and are detailed within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**.
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 **[EN010147/APP/6.5]**. Flood defences present within the Central Site Area 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 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.	A sequential approach to flood risk has been undertaken within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. Features of the Project to be located within Flood Zone 3 have been subjected to the Exception Test. Impacts of climate change is considered within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. '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 10.6.** 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 10.6**. The need for the Project and alternatives considered is discussed in Volume 1 Chapter 5: Alternatives Considered **[EN010147/APP/6.3]**.
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	Noted. All solar PV modules and permanent ancillary infrastructure is to be located outside the 1 in 100-year plus relevant climate change fluvial flood extent. Whilst the 275kV corridor route is to be located within this fluvial flood extent, no above ground development is proposed an as

Comment	How and where considered in the ES
preferred and should be considered in FRA, Cumulative impacts should also be considered, due to scale of Project, 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% 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.	such there will be no alterations to ground profiles from existing. Only temporary development such as HDD compounds/ construction compounds are to be located within the 1 in 100-year fluvial flood extent. However due to their temporary nature, floodplain compensation will not be required for these aspects of development.
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.	This has been included within the mitigation measures adopted as part of the Project (**Table 10.26**). Increased flood risk as a result of damage to existing flood defences has been scoped into the assessment and is presented within **Section 0.** 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. Whilst cables set under a river or significantly over a river through pylons may be acceptable, we would have concerns with new river	This has been included within the mitigation measures adopted as part of the Project (**Table 10.26**).

Comment	How and where considered in the ES
crossings or alterations to existing crossings (due to potential impact on flow and storage of flood water)	
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.
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. 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	Noted.
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** 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. Within the ES, the study area from solar farm land parcels has been increased from 250m to 1km. Blenheim Park SSSI and Wytham Woods SSSI are located within the study area and thus hydrology and flood risk related impacts to these receptors have been assessed.
Oxfordshire County Council	

Comment	How and where considered in the ES
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 **[EN010147/APP/6.5]**. The Conceptual Drainage Strategy is included within Volume 3 Appendix 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]**. This 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 Project 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.	Discussions with Thames Water and landowners will be undertaken at the detailed design stage to confirm the location of water supply pipelines and sewer infrastructure. Prior to any construction activities, Thames Water surveys will be undertaken to establish if any infrastructure is present prior to any intrusive work being undertaken.
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, Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**.
One of the routes for cabling does go through the Longmead Meadow site which may have flooding consequences on this highly significant environment and biodiverse site, which is adjacent to the River Thames, and this needs to be assessed.	The Long Mead Local Wildlife Site wildlife site has been included as a key receptor within this chapter in **Section 10.6**.
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 has been assessed alongside all other sources within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. 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 Drainage Strategy, presented within Volume 3, Appendix 10.22 Conceptual Drainage Strategy **[EN010147/APP/6.5]**. Increased flood risk as a result of the placement of solar PV modules is discussed within

Comment	How and where considered in the ES
	Conceptual Drainage Strategy **[EN010147/APP/6.5]**. 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, Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. Relevant guidance also is also taken into account within this report and the Hydrology and flood risk ES report. The Conceptual Drainage Strategy is included within Volume 3, Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. This has been undertaken in-line with national and local policy standards. Increased flood risk as a result of the placement of solar PV modules is discussed within **Section 0**.

Preliminary Environmental Information Report

10.3.1 The preliminary findings of the EIA process were published in the Preliminary Environmental Information Report (PEIR) as part of the statutory consultation period between 30 November 2023 and 8 February 2024. This included consultation with statutory bodies under section 42 of the Planning Act 2008.

10.3.3 A summary of the key items raised specific to hydrology and flood risk and how the ES has considered these issues is presented in the Consultation Report which is included in **[EN010147/APP/5.1]**.

Further Engagement

10.3.4 Throughout the EIA process, consultation and engagement (in addition to scoping and statutory consultation) with interested parties specific to hydrology and flood risk has been undertaken.

10.3.5 The engagement has been used to inform a Statement of Common Ground (SoCG) Flood/Drainage report which is included in **[EN010147/APP/7.5.3]**.

10.3.6 A summary of the key items raised specific to hydrology and flood risk part of this further engagement is presented in **Table 10.5**. This table summarises how these issues have been considered in the production of this ES chapter.

Table 10.5: Summary of further consultation undertaken

Date	Consultee and type of response	Issues Raised	How and where considered in the ES
Additional Consultation			
November 2022	Environment Agency - Phone meeting	Attempted to establish 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. Following further review no solar panels are to be placed within Flood Zone 2 or 3, therefore, no further engagement on this subject
July 2023	Environment Agency - 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.	Following development of the plans the site has been sequentially steered towards areas of low risk (Flood Zone 1). As such response from this is no longer relevant.
September 2023	Environment Agency - 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.
July 2024	Oxfordshire County Council Lead Local Flood Authority (LLFA) -Teams meeting	RPS presented the proposed sustainable drainage strategy for the site which was agreed in principle by the LLFA. The LLFA raised no concerns to the presented information.	The proposed approach will be incorporated into the Statement of Common Ground between the Applicant and the LLFA **[EN010147/APP/7.5.3]**. The Conceptual Drainage Strategy is presented in Volume 3, Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**.
June 2024	Environment Agency – Formal Technical Note	A letter was issued to the EA following their PEIR consultation comments. A response is awaited at the time of issue. A formal meeting has been set up to discuss these comments.	The information received has been updated within the ES chapter and accompanying relevant Appendices. The details of which are listed in the relevant response section above.

Date	Consultee and type of response	Issues Raised	How and where considered in the ES
			The proposed agreed approach will be incorporated into the Statement of Common Ground **[EN010147/APP/7.5.3]**.
July 2024	Environment Agency - Teams meeting	RPS have requested a meeting with the EA to discuss the Technical Note submitted in response to PEIR comments. We are awaiting this meeting at the time of issue.	The proposed approach will be incorporated into the Statement of Common Ground **[EN010147/APP/7.5.3]**.

10.4 Assessment Methodology

Relevant Guidance

10.4.1 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 this guidance is also applicable to solar projects due to their linear nature.

10.4.2 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 3 Appendix 10.1: Flood risk assessment, Appendix 10.3 Hydraulic Modelling Report and Appendix 10.5 Surface Water Modelling Report **[EN010147/APP/6.5]**).

Scope of the Assessment

10.4.3 The scope of this ES follows that of the Scoping Opinion and has been developed in consideration of the statutory and non-statutory consultee responses detailed in **Table 10.4** and **Table 10.5.** The scope of the assessment focuses on three key stages being the construction, operation (including maintenance) and decommissioning phases of the development, including:

- the 275kV corridor route;
- temporary construction compounds;
- access tracks;
- the National Grid Electricity Transmission (NGET) substation;
- Applicant Main Project Substation;
- Applicant Secondary Project Substations;
- Solar PV array areas;
- Medium Voltage (MV) and High Voltage (HV) transformers;

- Power Converter Stations; and
- Site accesses and maintenance tracks.

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

Table 10.6: Activities considered within this assessment

Activity	Potential likely significant effects scoped into the assessment
Construction Phase	
Activities required to facilitate the construction of the Project e.g. temporary construction compounds, removal of surface vegetation, compaction of soils, excavations, dewatering may alter drainage patterns and surface water runoff rates onsite, increasing the risk of flooding posed to the surrounding area.	Increased flood risk arising from additional surface water runoff.
Activities required to facilitate the construction of the Project, e.g. removal of surface vegetation, excavations (including trenched and trenchless techniques), dewatering, stockpiling may generate contaminated runoff. Accidental spills/contaminant release could also occur as a result of activities. These activities could impact the chemical and biological status of ordinary watercourses and Main Rivers and ground receptors.	Increased deterioration of water quality within surface and ground waterbody receptors.
If the Project is located within or near existing formal and informal flood defences, activities required to facilitate construction of the Project may impact the integrity (or efficacy) of flood defence infrastructure and therefore increase the risk of flooding within the site and surrounding area.	Increased flood risk arising from damage to existing flood defences.
If the Project is located on or near existing field drainage, activities required to facilitate the construction of the Project may damage field drainage.	Increased damage to existing field drainage.
If the Project is located on or near existing water supply and wastewater drainage infrastructure, activities required to facilitate the construction of the Project may damage water supply and wastewater drainage infrastructure.	Increased damage to existing water supply and wastewater drainage infrastructure.
Operation and Maintenance	
New impermeable areas arising from the Project (NGET substation, Applicant Main Project Substation, MV and HV transformers/ Applicant Secondary Project Substations, PCS units and solar PV modules) may alter drainage patterns and surface water runoff rates onsite, increasing the risk of flooding posed to the surrounding area.	Increased flood risk arising from additional surface water runoff.
Activities associated with the operation of the Project, including management of drainage and runoff from new impermeable areas may generate contaminated runoff. Accidental spills/contaminant release could also occur as a result of activities. These activities could impact the chemical and biological status of ordinary watercourses and Main Rivers and ground receptors.	Increased deterioration of water quality within surface and ground waterbody receptors.
If the Project is located on or near existing field drainage, activities required for operation and maintenance of the elements may impact field drainage	Increased damage to existing field drainage.

Activity	Potential likely significant effects scoped into the assessment
If the Project is located on or near existing water supply and wastewater drainage infrastructure, activities required to facilitate operation and maintenance of the Project may damage water supply and wastewater drainage infrastructure.	Increased damage to existing water supply and wastewater drainage infrastructure.
If the Project is located within or near existing formal and informal flood defences, activities required to facilitate operation and maintenance of the Project may impact the integrity (or efficacy) of flood defence infrastructure and therefore increase the risk of flooding within the site and surrounding area.	Increased flood risk arising from damage to existing flood defences.
Decommissioning	
Activities required to facilitate the decommissioning of the Project e.g. temporary construction compounds, removal of surface vegetation, compaction of soils, excavations, dewatering may alter drainage patterns and surface water runoff rates onsite, increasing the risk of flooding posed to the surrounding area.	Increased flood risk arising from additional surface water runoff.
Activities required to facilitate the decommissioning of the Project, e.g. removal of surface vegetation, excavations, dewatering, stockpiling may generate contaminated runoff. Accidental spills/contaminant release could also occur as a result of activities. These activities could impact the chemical and biological status of ordinary watercourses and Main Rivers and ground receptors.	Increased deterioration of water quality within surface and ground waterbody receptors.
If the Project is located within or near existing formal and informal flood defences, activities required to facilitate decommissioning of the Project may impact the integrity (or efficacy) of flood defence infrastructure and therefore increase the risk of flooding within the site and surrounding area.	Increased flood risk arising from damage to existing flood defences.
If the Project are located on or near existing field drainage, activities required to facilitate the decommissioning of the Project may damage field drainage.	Increased damage to existing field drainage.
If the Project are located on or near existing water supply and wastewater drainage infrastructure, activities required to facilitate the decommissioning of the Project may damage water supply and wastewater drainage infrastructure.	Increased damage to existing water supply and wastewater drainage infrastructure.

10.4.5 No effects have been scoped out of this assessment.

Study area

10.4.6 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. The study area focuses on the Site and watercourses within, and in the vicinity of the Site, in the context of the interlinked wider hydrological system.

10.4.7 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.

10.4.8 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 has been applied to the 275kV corridor route, temporary construction compounds, and temporary and permanent access roads / haul roads; and,
- A 1km buffer applied to the three areas of solar installation (Northern Site Area, Central Site Area and Southern Site Area), NGET substation, Applicant Main Project substation, HV and MV transformers including Applicant Secondary Project Substations and PCS units.

10.4.9 The watercourses on site and within the study area including drainage ditches, ordinary watercourses and main rivers all drain into the River Thames. The River Thames is considered the final receiving water feature that could conceivable be significantly affected due to its size and associated dilution. The River Thames is captured within the study area, and as such the hydraulic connectivity of the identified study area and associated watercourses is deemed acceptable.

10.4.10 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.

10.4.11 A figure of the study area is presented within Figure 10.1 **[EN010147/APP/6.4].**

Cable Corridor Options

10.4.12 At the current stage of the Project there are multiple cable options proposed:

10.4.13 Land between Northern Site between the Oxfordshire Way, and B4027, south east of Wootton

10.4.14 Area between the Northern and Central Sites on land to the east of Woodstock and in the vicinity of the Bladon roundabout on the A44

10.4.15 Central Site on land east of Burleigh Wood and around Bladon Heath

10.4.16 Land between the Central and Southern Sites east and south of Eynsham around the Swinford Bridge

10.4.17 These are presented in figures in **[EN010147/APP/6.4]**. A consideration of the cable corridor options has been undertaken as part of the assessment and the worst-case option presented within the assessment of this Chapter.

Site-specific surveys

10.4.18 Hydrological walkover surveys have focused upon identified areas of risk during the baseline study. The site-specific walkovers undertaken in support of the project are detailed below.

Central Site Area

10.4.19 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 Appendix 10.3 Hydraulic Modelling Report **[EN010147/APP/6.5]**.

Ordinary watercourses within the Project

10.4.20 A site visit was undertaken by the applicant to establish the nature of the ordinary watercourses on the site. This is in order to identify the size and nature of the drainage ditches and watercourses at the site. Further details are provided within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**.

Site-specific reports

Flood risk assessment

10.4.21 The Project cover an area of over one hectare and therefore, in accordance with the guidance in NPS EN-1, NPPF, and PPG ID7, a site-specific FRA has been undertaken. This is included in Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**.

10.4.22 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;
- a site-specific assessment of flood risk for the Project; and
- application of the sequential and exception tests.

10.4.23 Whilst all of the permanent development associated with the Project has been sequentially steered into EA Flood Zone 1, including the Solar PV array areas and associated ancillary infrastructure, the 275kV cables will pass through areas designated as Flood Zones 2 and 3. However, as the cables will be installed below ground, there is no potential for significant operational runoff.

10.4.24 Therefore, the FRA focuses upon areas of Flood Zone 2 and 3 (i.e., crossing locations of Main Rivers and ordinary watercourses), where construction and temporary development is proposed. Flood risk from surface water, groundwater, sewers, water mains and other artificial sources is also assessed within the FRA.

Conceptual Drainage Strategy

10.4.25 A technical report detailing the impact of the development runoff on and off site. Additional information can be found within Volume 3 Appendix 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]**.

Hydraulic modelling report

10.4.26 Following consultation with the EA it was established that no detailed modelling of flood risk was available to the study area and that the EA Flood Map for Planning (FMfP) extents are based on coarse catchment wide 2-dimensional (2D) JFLOW outputs. In order to obtain a more refined understanding of the flood risk posed RPS undertook a detailed hydraulic model exercise of the Central Site Area.

10.4.27 In order to undertake the hydraulic modelling, a standard integrated 1-dimensional (1D) - 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. Additional information can be found within Volume 3 Appendix 10.3 Hydraulic Modelling Report **[EN010147/APP/6.5]**.

Hydrology report

10.4.28 A technical report detailing hydraulic perimeters used to calculate peak flows and inflow hydrographs to be used for a hydraulic model of the River Evenlode and its tributary. Additional information can be found within Volume 3 Appendix 10.3: Hydrology Report **[EN010147/APP/6.5]**.

Surface Water modelling report

10.4.29 Consultation comments highlighted the existing surface water risk upstream of Cassington. The risk can be seen on the EA Long Term Risk of Flooding Map, this is created using coarse JFlow Model Outputs. To obtain a more refined understanding of the flood risk posed RPS undertook a detailed surface water modelling exercise of the area of concern.

10.4.30 A surface water model was developed for Cassington village and the agricultural fields to the north using TUFLOW modelling software. This simulated a range of storm events to understand the pre-existing risk and identify suitable mitigation. Additional information can be found within Volume 3 Appendix 10.5: Surface Water Modelling Report **[EN010147/APP/6.5]**.

Surface water and groundwater abstractions, pollution incidents and discharge consents

10.4.31 A technical report detailing surface water abstraction licences, discharge consents and pollution incidents has been produced to provide further information regarding how surface watercourses are utilised within the study area, and how the baseline water quality has been affected by pollution and consented discharges of flows to watercourses. Additional information can be found within Volume 3 Appendix 10.6: Surface water and groundwater abstractions, pollution incidents and discharge consents **[EN010147/APP/6.5]**.

Water Framework Directive Assessment

10.4.32 A Water Framework Directive (WFD) assessment has been undertaken to provide information of the current overall WFD status for waterbodies potentially affected by the Project, and detailed mitigation measures in which a deterioration in WFD waterbody quality can be prevented. Additional information can be found within Volume 3, Appendix 10.7: Water Framework Directive **[EN010147/APP/6.5]**.

10.5 Assessment Criteria and Assignment of Significance

Overview

10.5.1 The hydrology and flood risk impact assessment has followed the methodology set out in Volume 1, Chapter 4: Approach to Environmental Assessment **[EN010147/APP/6.3]**. 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).

Impact Assessment Criteria

10.5.2 The likely 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 DMRB methodology.

10.5.3 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 **[EN010147/APP/6.3]**.

Receptor Value and Sensitivity

10.5.4 The criteria for defining sensitivity in this chapter are outlined in **Table 10.7** below.

Table 10.7: Sensitivity criteria

Sensitivity/Value	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/Value	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 1km radius of the site.

Magnitude of impact

10.5.5 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.

10.5.6 The criteria for defining magnitude in this chapter are outlined in **Table 10.8** below.

Table 10.8: 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.

Likely Significance of effect

10.5.7 The likely 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 10.9**. Where a range of significance levels is presented, the final assessment for each effect is based upon expert judgement.

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

10.5.9 For the purpose of this assessment, any effects with a likely significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 10.9: Assessment matrix

Sensitivity of Receptor	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Negligible	Minor	Minor or Moderate	Moderate or Major	Major
Very High	Negligible	Minor	Moderate or Major	Major	Substantial

10.5.10 The definitions for likely significance of effect levels are described as follows:

- Substantial: Only adverse effects are normally assigned this level of significance. These effects are generally, but not exclusively, associated with sites or features of international 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 national importance may also enter this category.
- 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.

Assumptions and limitations of the assessment

10.5.11 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 statutory consultation stages. The information has been supplemented with publicly available desktop reports as presented within Section 10.6 Groundsure searches and public consultation such that it is considered sufficient to characterise the baseline environment is presented within Section 10.3.

10.5.12 It is also noted that the EA flood zone mapping used for the Northern Site Area and Southern Site Area land parcels 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 available flood maps do not show flooding from other sources such as groundwater, direct runoff from fields or overflowing sewers. However, in the absence of this further information has been used to support the description of these other sources of flooding and is presented in the FRA (see Volume 3 Appendix 10.1 Flood Risk Assessment), such that sufficient baseline information is available.

10.5.13 The assessment is limited by a lack of flow data which is not available for the ordinary watercourses within the hydrology and flood risk study area. However, this is not a major concern as ordinary watercourse catchments within the study area predominantly respond to rainfall events, and flooding from this source is assessed using EA surface water mapping which provide depth and flow data within ordinary watercourses and uses a range of modelled rainfall scenarios.

10.5.14 The assessment is limited by a lack of water quality data. In the absence of this, water quality data has been informed by WFD status of waterbodies and a separate WFD report has been prepared, see Volume 3, Appendix 10.7 Water Framework Directive Assessment.

10.5.15 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 Appendix 10.3 Hydraulic Modelling Report.

10.5.16 Where available, catchment data regarding water quality has been used to inform the assessment. Groundsure searches and public consultation have also been obtained. 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.

10.6 Baseline Environment Conditions

Methodology for Baseline Studies

10.6.1 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 within **Table 10.10** and **Table 10.11** below.

Table 10.10: Summary of publicly available information

Title	Source	Year	Author	Date Accessed
Catchment Data Explorer	https://environment.data.gov.uk/catchment-planning/	2023	EA	May 2024
Climate change allowances for peak rainfall in England	https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall	2022	EA	May 2024
Climate change allowances for peak river flow in England	[redacted]	2021	EA	May 2024
Designated Sites View	[redacted]	2024	Natural England	June 2024
Flood Map for Planning	https://flood-map-for-planning.service.gov.uk/	2023	EA	May 2024
Geoindex Onshore Mapping	[redacted]	2023	BGS	May 2024
Internal Drainage Boards Map	[redacted]	2023	IDB	May 2024
Long Term Flood Risk Map	https://check-long-term-flood-risk.service.gov.uk/map)	2023	EA	May 2024
Magic Map Application	https://magic.defra.gov.uk/MagicMap.aspx	2026	DEFRA	May 2024
OS mapping 1:25 000	[redacted]	2023	OS	May 2024
Soilscapes viewer	[redacted]	2024	The National Soils Research Institute	May 2024

Table 10.11: Summary of key desktop reports

Title	Source	Year	Author	Date accessed
Cassington Neighbourhood Plan (2021 – 2041 Submission Plan)	https://www.westoxon.gov.uk/media/pdplutja/submission-draft-cassington-neighbourhood-plan.pdf	2022	Cassington Parish Council	21/05/2024
Cassington NFM report	N/A	2020	EA	February 2024
Cherwell Level 1 Strategic Flood Risk Assessment	Strategic_Flood_Risk_Assessment.pdf	2022	Cherwell Distirct Council (CDC)	July 2023

Title	Source	Year	Author	Date accessed
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	May 2023
Enviro and Geo Insight digital reports	reference GSIP-2023-13424-13080_1 to _16 and GSIP-2023-13424-13081	2023	Groundsure	June 2024
Eynsham Neighbourhood Plan 2018 – 2031	https://www.westoxon.gov.uk/media/ngkckyhi/eynsham-neighbourhood-plan.pdf	2020	Eynsham Parish Council	May 2024
Long Mead Local Wildlife Site	[redacted]	2023	Long Mead Local Wildlife Site	May 2024
OCC Local Standards and guidance for surface water drainage on major development in Oxfordshire	[redacted]	2021	Oxfordshire County Council (OCC)	July 2024
The Cherwell Local Plan 2011 - 2031	https://www.cherwell.gov.uk/downloads/download/45/adopted-cherwell-local-plan-2011-2031-part-1-incorporating-policy-bicester-13-re-adopted-on-19-december-2016	2016	Cherwell District Council. North Oxfordshire	June 2024
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	June 2024
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	June 2024

Title	Source	Year	Author	Date accessed
Vale of the White Horse District Council – SFRA	https://data.whitehorsedc.gov.uk/java/support/dynamic_serve.jsp?ID=1954970521&CODE=E1F38F2C2D52A127918B0EB7C3997083	2017	AECOM on behalf of Vale of the White Horse District Council	June 2024
West Oxfordshire District Council – Level 1 SFRA	https://www.westoxon.gov.uk/media/0adg2zs5/env9-west-oxfordshire-district-council-strategic-flood-risk-assessment-update-report-november-2016.pdf	2016	AECOM on behalf of West Oxfordshire District Council	June 2024
West Oxfordshire District Council – Level 2 SFRA	https://www.westoxon.gov.uk/media/mngkh35q/ev24-level-2-strategic-flood-risk-assessment-land-north-and-west-of.pdf	2020	JBA Consulting on behalf of behalf of West Oxfordshire District Council	June 2024
West Oxfordshire Local Plan 2031	https://www.westoxon.gov.uk/media/feyjmpen/local-plan.pdf	2018	West Oxfordshire District Council	June 2024

Topography

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

10.6.3 The study area comprises of three sites, the Northern Site Area, the Central site and the Southern Site Area including the buffer zones. Within the Northern site Area, elevations gently fall from the north to the south between 112 m above Ordnance Datum (m AOD) and 109 m AOD. 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 93 m AOD within the south and 69 m AOD within the north.

Hydrological Setting

10.6.4 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 10.2d**.

Main Rivers

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

- River Glyme;
- River Evenlode;

- Rowel Brook;
- River Thames;
- Wharf Stream;
- Filchamstead Brook;
- Cassington Cut;
- River Cherwell;
- River Dorn;
- Unnamed Main River running through Cassington (OS grid reference 445250, 211100); and
- Unnamed drain (OS grid reference 444650, 205300).

Ordinary watercourses

10.6.6 The study area includes the following ordinary watercourse features:

- River Dorn;
- Eynsham Mead Ditch;
- Tributaries of the River Glyme;
- Tributaries of the River Evenlode;
- Tributaries of the Filchamstead Brook;
- Tributaries of the River Cherwell;
- Tributaries of the River Thames: and
- An unnamed Ordinary Watercourse running in a south easterly direction from grid reference 444940, 213500 to 446320, 210060.

Additional Hydrological Features

10.6.7 The study area includes the following additional hydrological features:

- Cresswell Lake;
- Marlborough Pool;
- Peninsula Lake;
- The Lake (Blenheim Park);
- Farmoor Reservoir; and
- Oxford Canal.

Surface Water Body Status

10.6.8 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. All surface watercourses within the study area discharge to the River Thames.

10.6.9 **Table 10.12** lists the surface waterbody within the study area, associated WFD classification grade and overall objectives. WFD surface water bodies and catchments within the study area are presented within **Figure 10.3.**

Table 10.12: WFD surface water quality data

Name (WFD ID)	Waterbody type	Classification (Cycle 3 2019)	Classification (Cycle 3 2022)	Hydro-morphological Designation	Overall objective
Glyme (Dorn confluence to Evenlode) (ID: GB106039029940)	River (22.715 km^2 catchment area)	Ecological: Poor Chemical: Fail	Ecological: Poor Chemical: Does not require assessment (DNRA)	Not designated artificial or heavily modified	Ecological: Moderate by 2027 Chemical: Good by 2063
Dorn (Source to Glyme) (ID: GB106039037380)	River (46.153 km^2 catchment area)	Ecological: Poor Chemical: Fail	Ecological: Poor Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Good by 2039 Chemical: Good by 2063
Glyme (Enstone to Dorn) (ID: GB106039030010)	River (34.527 km^2 catchment area)	Ecological: Moderate Chemical: Fail	Ecological: Not assessed Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Good by 2039 Chemical: Good by 2063
Cherwell (Bletchingdon to Ray) (ID: GB106039037432)	River (19.974 km^2 catchment area)	Ecological: Moderate Chemical: Fail	Ecological: Moderate Chemical: DNRA	Heavily modified	Ecological: Moderate by 2015 Chemical: Good by 2063
Cherwell (Nell Bridge to Bletchingdon) (ID: GB106039037431)	River (53.659 km^2 catchment area)	Ecological: Moderate Chemical: Fail	Ecological: Moderate Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Good by 2027 Chemical: Good by 2063
Evenlode (Glyme to Thames) (ID: GB106039029880)	River (18.04 km^2 catchment area)	Ecological: Poor Chemical: Fail	Ecological: Poor Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Moderate by 2015 Chemical: Good by 2063
Thames (Evenlode to Thame) (ID: GB106039030334)	River (149.591 km^2 catchment area)	Ecological: Moderate Chemical: Fail	Ecological: Poor Chemical: Fail	Not designated artificial or heavily modified	Ecological: Moderate by 2015 Chemical: Good by 2063
Evenlode (Bledington to Glyme Confluence)	River (101.423km^2 catchment)	Ecological: Moderate Chemical: Does not require assessment	Ecological: Moderate Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Moderate by 2015 Chemical: Good by 2063

Name (WFD ID)	Waterbody type	Classification (Cycle 3 2019)	Classification (Cycle 3 2022)	Hydro-morphological Designation	Overall objective
(ID:106039029960)					
Sandford Brook (Source to Ock) (ID:GB106039023410)	River (14.747km^2 catchment area)	Ecological: Poor Chemical: Fail	Ecological: Not assessed Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Good by 2027 Chemical: Good by 2063
Frilford and Marcham Brook (ID: GB106039023420)	River (20.238km^2 catchment area)	Ecological: Moderate Chemical: Does not require assessment	Ecological: Moderate Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Moderate by 2015 Chemical: Good by 2063
Chil and Limb Brooks (source to B4044) (ID GB1060390310)	River (31.676 km^2 catchment area)	Ecological: Poor Chemical: Does not require assessment	Ecological: Poor Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Moderate by 2015 Chemical: Good by 2063
Thames (Leach to Evenlode) (ID: GB106039030333)	River (79.294 km^2 catchment area)	Ecological: Poor Chemical: Does not require assessment	Ecological: Poor Chemical: DNRA	Heavily modified	Ecological: Moderate by 2015 Chemical: Good by 2063
Filchhampstead Brook at Farmoor (ID GB106039030210)	River (10.281 km^2 surface area)	Ecological: Bad Chemical: Fail	Ecological: Bad Chemical: DNRA	Not designated artificial or heavily modified	Ecological: Bad by 2015 Chemical: Good by 2063
Oxford Canal, Anyho to Thrupp (ID: GB70510198)	Canal (21.067km length)	Ecological: Good Chemical: Fail	Ecological: Not assessed Chemical: Does not require assessment	Artificial	Ecological: Good by 2021 Chemical: Good by 2063
Oxford Canal, Thrupp to Thames (ID: GB70610542)	Canal (13.217km length)	Ecological: Moderate Chemical: Does not require assessment	Ecological: Not assessed Chemical: Does not require assessment	Artificial	Ecological: Good by 2027 Chemical: Good by 2063
Blenheim Lakes (ID: GB30640514)	Lake (126.33km^2 catchment area)	Ecological: Moderate Chemical: Fail	Ecological: Not assessed Chemical: Not assessed	Heavily modified	Ecological: Good by 2027 Chemical: Good by 2063
Farmoor Reservoir (ID: GB30641011)	Lake (0.77km^2 catchment area)	Ecological: Good Chemical: Fail	Ecological: Not assessed Chemical: Does not require assessment	Artificial	Ecological: Good by 2021 Chemical: Good by 2063

Flood alert and flood warnings

10.6.10 Information relating to flood warning and flood alert areas located within the study area are presented below within **Table 10.13:** and

10.6.11 **Table** 10.14: and additionally presented within **Figure 10.4**. The flood warning/alert extents largely match the extent of Flood Zone 2.

Table 10.13: 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
061FWF14Heyford	River Cherwell from Lower Heyford down to Cherwell Bridge including Rousham, Enslow, Thrupp and Hampton Poyle	River Cherwell and Woodeaton Brook
061FWF12Cassngtn	River Evenlode at Eynsham Mill down to and including Cassington Mill near Cassington	River Evenlode

Table 10.14: 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

Drinking Water Protected Areas

10.6.12 Drinking Water Protected Areas (Surface Water) are defined by the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017 as catchments where water is abstracted for human consumption (either over 10m^3 per day as an average or serving more than 50 persons) or is intended for such future use. The study area is located within one Drinking Water Protected Areas (Surface Water), as presented in **Table 10.17** and within **Figure 10.5**.

Table 10.15: Drinking Water Protected Areas (Surface Water)

Protected Area ID	Drinking Water Protected Area	Pressures	WFD Management Catchment
GB106039030333	Thames (Leach to Evenlode)	Pesticides	Thame and South Chilterns

Drinking Water Safeguard Zones

10.6.13 Drinking Water Safeguard Zones are defined as catchments which are at risk of failing the Drinking Water Protected Areas objectives. Information regarding Drinking Water Safeguard Zones (surface water) present within the study area is presented below in **Table 10.16** and within **Figure 10.5**.

10.6.14 There are no Drinking Water Safeguard Zones (groundwater) within the study area.

Table 10.16: Drinking Water Safeguard Zones (Surface Water)

Safeguard Zone ID	Drinking Water Safeguard Zone	Pressures	WFD River Basin District
SWSGZ4012	Upper Thames	Pesticides	Thames
SWSGZ4016	Lower Thames	Pesticides	Thames

Nitrate Vulnerable Zones (2021-2024)

10.6.15 Nitrate Vulnerable Zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. The following NVZs are present within the study area and 1km buffer area are presented within **Table 10.17** and within **Figure 10.5**.

Table 10.17: Nitrate Vulnerable Zones

NVZ ID	Name	Type
472	Cherwell (Ray to Thames) and Woodeaton Brook NVZ	Surface Water
473	Evenlode (Glyme to Thames) NVZ	Surface Water
474	Glyme (Dorn confluence to Evenlode) NVZ	Surface Water
475	Evenlode (Bledington to Glyme confluence) NVZ	Surface Water
478	Filchhampstead Brook at Farmoor NVZ	Surface Water
480	Chil and Limb Brooks (source to B4044) NVZ	Surface Water
482	Thames (Leach to Evenlode) NVZ	Surface Water
681	Ock and tributaries (Land Brook confluence to Thames) NVZ	Surface Water

Geological and hydrogeological setting

10.6.16 A full description of the geological and hydrogeological setting is presented within Volume 1 Chapter 11: Ground Conditions **[EN010147/APP/6.3]**.

Bedrock geology

10.6.17 BGS bedrock geology online mapping (1:50,000 scale) presents a range of bedrock strata located within the study area, as shown within **Figure 10.6a**, **Figure 10.6b**, **Figure 10.6c** and **Figure 10.6d [EN010147/APP/6.4]**.

10.6.18 The Northern Site Area comprises primarily of White Limestone Formation – Limestone. The Central and Southern Site Areas comprise predominantly of Oxford Clay Formation. Both bedrocks are considered to be permeable in nature.

10.6.19 A full list of bedrock geologies within the study area are as follows:

- 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
- Chipping Norton Limestone Formation
- Sharp's Hill Formation formed of argillaceous rocks with subordinate Sandstone and Limestone;
- Standford Formation formed of Limestone;
- Kingston Formation formed of Sandstone;
- Hazelbury Bryan Formation formed of Sandstone, Siltstone and Mudstone;
- Hampen Formation formed of Limestone;
- Peterborough Member formed of Mudstone;
- Ampthill Clay Formation and Kimmeridge Clay Formation (undifferentiated).

Superficial deposits

10.6.20 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 **Figure 10.7a**, **10.7b**, **10.7c and Figure 10.7d**.

10.6.21 The Northern Site Area comprises is predominantly not underlain by superficial deposits. The Central and Southern Site Areas have areas underlain by superficial deposits, listed below. Primarily these comprise of alluvium (formed from clay, silt, sand and gravel).

10.6.22 A full list of superficial deposits within the study area are as follows:

- Summertown-Radley sand and Gravel Member formed of sand and gravel;
- Head formed from clay, silt, sand and gravel;
- River Terrace Deposits 1 formed from sand and gravel;
- Alluvium, formed from clay, silt, sand and gravel;
- Hanborough Gravel Member, formed of sand and gravel;
- Wolvercote Sand and Gravel Member; and
- Northmoor sand and Gravel Member.

Aquifer designation

10.6.23 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.

10.6.24 White Limestone Formation and Forest Marble Formation are associated with bedrock Principal Aquifers while Cornbrash Formation, Kellaways Sand Member, Stanford Formation, Kingston Formation, Hazelbury Bryan Formation And Sharp's Formation are associated with bedrock Secondary A Aquifers. The majority of superficial deposits within the study area are classified as Secondary A Aquifers, with lower permeability superficial deposits classified as Secondary (undifferentiated) Aquifers. Further information on geology and ground conditions can be found in Volume 1, Chapter 11: Ground conditions **[EN010147/APP/6.3]**.

Source Protection Zones

10.6.25 EA online groundwater SPZ mapping indicates that the study area and associated 1km buffer area is not located within a groundwater SPZ.

Groundwater body status

10.6.26 Groundwater bodies within the study area are located within the Thames GW management catchment. Summary WFD information is presented within **Table 10.18:** and **Figure 10.8**.

Table 10.18: 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
Shrivenham Corallian (ID: GB40602G600600)	Groundwater (approximately 197.641 km^2 in area)	Overall: Good	Good by 2015
Kemble Forest Marble (ID: GB40602G600500)	Groundwater (approximately 206.726 km^2 in area)	Overall: Poor	Good by 2027
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

10.6.27 Further information on groundwater can be found in Volume 1, Chapter 11: Ground conditions **[EN010147/APP/6.3]**.

Ecologically designated sites

10.6.28 There are six sites with a statutory designation and one non-statutory designated site located within the study area. Information for all designated sites is presented in **Table 10.19** and within **Figure 10.9**.

10.6.29 Further information regarding sites designated for their ecological interest is provided within Volume 1, Chapter 9: Ecology and Nature Conservation **[EN010147/APP/6.3]**.

Table 10.19: Designated sites and relevant qualifying interests

Designated site	Designation type	Citation
Blenheim Park	SSSI (Biological)	Blenheim Park contains one of the finest areas of ancient oak-dominated pasture woodland in the country and is descended from a twelfth century deer park and Anglo-Saxon chase. The lakes, which were excavated and landscaped in the early eighteenth century, are some of the largest areas of open water in Oxfordshire and are of regional importance for breeding and wintering birds.
Sheep's Banks	SSSI (Biological)	Sheep's Bank is an isolated fragment of species-rich grassland situated in an area now largely converted to arable and reseeded pasture. The site represents the eastern-most example of traditionally managed Cotswold grassland, falling

Designated site	Designation type	Citation
		midway between the Jurassic limestone grasslands of Gloucestershire to the west and Northamptonshire to the east.
Shipton-on-Cherwell & Whitehill Quarries	SSSI (Geological)	The Shipton-on-Cherwell Quarry currently exposes a section from near the base of the White Limestone (including the type section of the Shipton Member) up to the Lower Cornbrash; it is one of the most important sections in Oxfordshire for displaying the typical local Mid to Upper Bathonian lithostratigraphic succession.
Witham Ditches & Flushes	SSSI (Biological)	The ditches of Wytham support a species-rich eutrophic aquatic and fen flora, examples of which are rare in the county following widespread drainage, pollution and fertiliser enrichment. They contain flowering plants which are now uncommon in central southern England, at least one species of which has its sole Oxfordshire locality here. A wet neutral grassland included within the site is a small survivor of the agricultural improvements which have led to the biological impoverishment of virtually all other meadow land in the county south of the Thames.
Wytham Woods	SSSI (Biological)	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 are undoubtedly of greater age and were probably present in Saxon times. The site has an exceptionally rich flora and fauna. Over 500 species of vascular plants have been recorded. Many aspects of the bird, mammal and invertebrate fauna have been studied by Oxford University and have provided Wytham Wood with a volume of data probably unparalleled in this country.
Rushy Meadows	SSSI (Biological)	This site consists of a series of unimproved alluvial grasslands alongside the Oxford Canal, in which low-intensity, traditional management has produced rich meadow and fen communities containing several uncommon species. Meadow habitats of this type are now both rare and under threat in Britain. Rushy Meadows represents one of the few surviving sites in a district where such grasslands have declined in area following agricultural improvement and urban development.
Long Mead	Local Wildlife Site (non-statutory)	Combines 10ha rare wildflower hay meadow with freshwater habitat, woodland and a traditional orchard.

Flood risk

EA Flood Zones

10.6.30 The EA Flood Zones refer to the probability of flooding from rivers and sea in a given year, assuming no defences are in place. Mapping does not account for climate change. Flood zone definitions are set out within **Table 10.20:**.

Table 10.20: 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	Flood zone definitions
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 3a	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.
Flood Zone 3b	referred to the functional floodplain, land assessed as having a 1 in 30 or greater annual probability of river flooding (>3.3%)

10.6.31 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 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. Flood Zones within the study area are presented within **Figure 10.10a, Figure 10.10b, Figure 10.10c** and **Figure 10.10d**.

Flood defences

10.6.32 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 1.9**, **Table 1.14**, **Table 1.16** and **Table 1.21** within Volume 3 Appendix 10.1 Flood Risk Assessment and their locations within the study area presented within **Figure 1.6a, Figure 1.6b, Figure 1.6c** and **Figure 1.6d**.

Hydraulic modelling

10.6.33 Following early consultation with the EA it was established that no detailed modelling of flood risk was available to the study area and that the FMfP extents are based on coarse catchment wide JFLOW outputs. In order to obtain a more refined understanding of the flood risk posed RPS undertook a detailed hydraulic model exercise of the Central Site Area. In the early stages of the project this was to explore if solar panels could be proposed within the FMfP Flood Zone 3. Following masterplan iterations and consultation all solar panels have been excluded from Flood Zone 2 and 3. However, the modelling provides further clarity on the flood extent and climate change risk and has therefore, been presented within the report.

10.6.34 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.

10.6.35 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 +43% CC allowance flood events. The model hydrology is based on the latest EA Flood Estimation Guidelines from July 2022.

10.6.36 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 +43% CC events where flood depth remains at 0.6-1.2m at most of the regions. The 1 in 100-year + 43% fluvial flood event is presented within **Figure 10.11a, Figure 10.11b, Figure 10.11c** and **Figure 10.11d**. Further information regarding flood depth, velocity and hazard and associated mapping is presented within Volume 3 Appendix 10.3 Hydraulic Modelling Report **[EN010147/APP/6.5]**.

Other sources of Flooding

10.6.37 Other sources of flooding have been assessed in Volume 3, Appendix 10.1 Flood Risk Assessment. A summary of risk and mitigation is included in Table 10.21 below.

Table 10.21: Summary of Other sources of Flood Risk

Source of flooding	Summary of risk
Sewers	Pre-commencement surveys will be undertaken prior to construction on site. Due to the agricultural nature of the site the flood risk from this source is therefore assessed to be low.
Surface Water	The surface water risk is largely considered to be 'very low.' There are areas of low to high risk associated with ordinary watercourses and overland flow pathways. PV panels will be raised where surface water depths reach 600mm. A drainage strategy is proposed for impermeable areas and a construction drainage scheme will be implemented.
Groundwater	Due to the type of development proposed, the overall risk of flooding from groundwater has been assessed to be low.
Other Sources (e.g. reservoirs, water mains)	Due to the regular inspection and maintenance regime in place on large reservoirs, the likelihood of catastrophic failure and therefore risk of flooding to the site from this source is unlikely to occur. Taking into account the above, the overall risk of flooding from a reservoir failure has been assessed to be low. Pre-commencement surveys will be undertaken prior to construction on site to identify any water mains.

Sewer Infrastructure, water supplies, consents and pollution incidents

Sewer infrastructure

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

Groundwater abstractions

10.6.39 The abstraction licences accessed from the EA under an Open Government Licence identified one active groundwater abstraction within the study area, as presented within **Figure 10.12**. For further details please refer to Volume 3 Appendix 10.6 Surface water and groundwater abstractions, pollution incidents

and discharge consents **[EN010147/APP/6.5]** and Consents and Licenses Required Under Other Legislation **[EN010147/APP/5.3]**.

Surface water abstractions

10.6.40 Abstraction licence data obtained from the EA under an Open Government Licence identified seven active surface water abstractions within the study area, as presented within **Figure 10.12**. For further details please refer to Volume 3 Appendix 10.6 Surface water and groundwater abstractions, pollution incidents and discharge consents **[EN010147/APP/6.5]**.

Private water supply

10.6.41 There is one private groundwater supply record within the study area, to the east of Woodstock. For further details please refer to Volume 3 Appendix 10.6 Surface water and groundwater abstractions, pollution incidents and discharge consents **[EN010147/APP/6.5]**.

Discharge consents

10.6.42 Discharges of liquid effluent or waste water into surface waters are regulated by the EA using discharge consents and environmental permits. A review of data obtained from the EA under an Open Government Licence identified approximately 22 active consented discharges to surface waters within the study area, as presented within **Figure 10.12**. The majority of the discharges related to final/treated effluent from private dwellings and commercial / industrial units. 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.

10.6.43 The details of the discharge consents and permits are provided within Volume 3 Appendix 10.6 Surface water and groundwater abstractions, pollution incidents and discharge consents **[EN010147/APP/6.5]**.

Pollution incidents

10.6.44 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 data obtained from the EA under an Open Government Licence identified five pollution incidents in the study area, classified as Category 1 (Major) or Category 2 (Significant), as presented within Figure 10.12. For more details see Volume 3 Appendix 10.6 Surface water and groundwater abstractions, pollution incidents and discharge consents.

Future baseline conditions

10.6.45 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 data obtained from the EA under an Open Government Licence identified five pollution incidents in the study area, classified as Category 1 (Major) or Category 2 (Significant), as presented within Figure 10.12. For more

details see Volume 3 Appendix 10.6 Surface water and groundwater abstractions, pollution incidents and discharge consents.

10.6.46 Schedule 4, paragraph 3 of 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.

10.6.47 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.

10.6.48 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 is presented below. Further details of climate change allowances can be found at Flood Risk Assessment: Climate change allowances (Environment Agency, 2022).

10.6.49 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

10.6.50 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.

10.6.51 The peak river flow allowances are 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.

10.6.52 The document provides a central, higher and upper estimate for increases in river flow as a consequence of climate change. The study area 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.

10.6.53 **Table 10.22:** below presents the anticipated increase in peak river flows for each Management Catchment.

Table 10.22: 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%

10.6.54 The Project is anticipated to be operational by the end of 2028. For the purposes of this assessment, the Project is assumed to have a 42 year design lifetime which includes construction, operation and decommissioning.

10.6.55 For 'Essential Infrastructure', the 2050's epoch higher central allowance will be used to assess uplifts to peak river flow within the study area to the end of the operation and maintenance phase. This equates to 21% within the Cotswolds catchment, 19% within the Gloucestershire and the Vale catchment, and 10% within the Cherwell and Ray catchment.

Peak rainfall intensity

10.6.56 Peak Rainfall Allowances are used to consider how increased rainfall affects surface water flood risk and the design of drainage systems to manage the increased rainfall.

10.6.57 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 10.23:** below.

Table 10.23: 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%

10.6.58 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.

10.6.59 The Project is anticipated to have a design life of 42 years which includes construction, operation and decommissioning.

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

Key receptors

10.6.61 Key receptors taken forward into the assessment are identified based on information listed within **Table 10.24**.

Table 10.24: 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 **Section 10.6** and presented within **Figure 10.2a, Figure 10.2b, Figure 10.2c** and **Figure 10.2d**.	High vulnerability, moderate recoverability and high 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.	Moderate vulnerability, a moderate recoverability and high

Receptor	Description	Sensitivity/value
	Flood defences are listed within Table 7-2 within the Flood Risk Assessment (Volume 3 Appendix 10.1 Flood Risk Assessment) and their locations within the study area presented within **Figure 10.10a, Figure 10.10b, Figure 10.10c** and **Figure 10.10d**.	value. The sensitivity of the receptor is considered to be high.
Adjacent land	The Project Site study area is presented within **Figure 10.1 a**nd comprises of three sites, the Northern Site Area, the Central Site Area and the Southern Site Area. The three sites are linked by a cable corridor which connects to the Applicant Main Project Substation within the Southern Site Area. 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.	High vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered to be high.
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.	Moderate vulnerability, moderate to high recoverability and low value. The sensitivity of the receptor is therefore considered to be medium.
Water supply and wastewater drainage infrastructure pipelines	Public water supply and wastewater drainage infrastructure that is operated by Thames Water. Private water supplies and drainage infrastructure are owned by respective landowners.	Moderate value, high vulnerability due to high costs. The sensitivity of the receptor is therefore considered to be high.
Principal Aquifers	White Limestone Formation and Forest Marble Formation are associated with bedrock Principal Aquifers	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Biologically designated SSSIs	Blenheim Park, Wytham Woods, Sheep's Banks, Witham Ditches & Flushes, presented within **Figure 10.9**.	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Non-statutory designated sites	Long Mead Local Wildlife site, presented within **Figure 10.9**.	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Nitrogen Vulnerable Zone	Land is classified to be at risk from agricultural nitrate pollution, as presented within **Figure 10.5**.	High value, high vulnerability and a low recoverability. The

Receptor	Description	Sensitivity/value
		sensitivity of the receptor is considered to be high.
Drinking Water Safeguard Zone	Catchments which are at risk of failing the Drinking Water Protected Areas objectives, as presented within **Figure 10.5**.	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.
Drinking Water Protected Area	Catchments where over water is abstracted for human consumption (either over $10m^3$ per day or serving more than 50 persons), or is intended for such future use, as presented within **Figure 10.5**.	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 operation and maintenance phase of the development.	High value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.6.62 Whilst receptors associated with groundwater have been listed as a 'key receptor' within this chapter due to linkages between groundwater and surface water (with the potential for surface waters to infiltrate to groundwater, and for groundwater to contribute to base river flows) further assessment is made within Volume 1, Chapter 11: Ground conditions **[EN010147/APP/6.3]**.

10.6.63 Shipton-on-Cherwell & Whitehill Quarries SSSI (geological) is not considered to be a key receptor within this report due to negligible impacts from hydrology and flood risk. This is as there is no obvious pathway to this SSSI.

10.7 Key Parameters for Assessment

Maximum design scenario

10.7.1 The maximum design scenarios identified in **Table 10.25** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group (i.e. they identify the “worst case” scenario for adverse hydrology and flooding effects). These scenarios have been selected from the Project Design Envelope provided in Volume 1, Chapter 6: Project Description of the ES **[EN010147/APP/6.3]**. Any other development scenario is considered to have less significant effects, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here being taken forward in the final design scheme.

Table 10.25: Maximum design scenario (MDS) considered for the assessment of potential impacts

Potential impact	Phase[a]			Justification
	C	O	D	
The impact of increased flood risk arising from additional surface water runoff	Yes	Yes	Yes	**Construction phase** **Solar PV modules** • Indicative number of solar PV modules is up to 2,200,000. • Indicative individual solar PV module dimensions – width 1.4m, length 2.40, depth 0.04m with an area up to 3.50m^2. • Minimum height of solar PV modules is 0.80m above ground level at lower the edge. • Maximum height of solar PV modules is 2.30m above ground level at the higher edge. • Maximum table width (including ridge break) is 22.00m. • Minimum distance north/south separation distance between tables is 1.50m • Minimum east/west separation distance between tables is 0.25m. • Minimum distance between fence boundary and table areas is 7.00m. • Indicative Total number of piles is up to 1,600,000. Indicative foundation type is driven piles or screw piles. The use of pre-cast concrete shoes may be used in areas of sensitive archaeology. • The maximum depth of piles below ground is 3.00m **Ancillary infrastructure** • The indicative number of power converter stations is 156 with maximum dimensions of 14.00m in length and 2.90m in width. • The indicative number of HV and MV transformer stations (Applicant Secondary Project Substations) is 6 with maximum dimensions of 18.00m in length and 10m in width. • The indicative number of Applicant Main Project Substations is 1 with maximum dimensions of 156.00m in length and 62m in width. **Construction, Operation and maintenance phase** The MDS for permanent development 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. In regards to the cable route, trenchless techniques will be used This represents the MDS. These techniques are considered to be the MDS due to the risk of bentonite breakout. **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 deterioration of water quality within surface and ground waterbody receptors	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	Yes	No	Yes	
The impact of damage to existing water supply and wastewater drainage infrastructure	Yes	No	Yes	

Potential impact	Phase[a] C	O	D	Justification
				• The indicative number of NGET substations is 1 with a maximum site area requirement of 3.8ha. **275kV corridor route** • The 275kV corridor route is approximately 22 km long and runs from the Northern site to the Botley West substation. • Maximum number of transition joint bays to be constructed along the cable route is one every 600 m. • Excavations to install 275kV cables via trenched techniques will typically be 1.42m deep and 0.60m wide. • Maximum number of crossings to be undertaken via trenchless techniques (HDD or similar) is 11. HDD construction compounds are required at each entry and exit pit; dimensions for the entrance compound are 75.00m in length and 30.00 m in width. Dimensions for the exit compound are 25.00 m in length and 30.00 m in width. • HDD construction compounds are to be served by temporary access roads approximately 5m wide. • The indicative number of temporary construction compounds is 4 with a maximum dimension of 200m in length and 200m in width. • Access tracks will not be permanently surfaced. During construction there may be a temporary need to lay terra-firma matting or similar in areas of high vehicle usage, on saturated ground and/or to avoid damage to soil structure. **Operation and maintenance phase** • The operation and maintenance phase involves the operation of infrastructure (solar PV modules and ancillary 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

Potential impact	Phase[a] C	O	D	Justification
				areas and to require no greater amount or duration of activity than assessed for construction).

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

10.8 Mitigation and Enhancement Measures Adopted as Part of the Project

10.8.1 The design process for the Project has been heavily influenced by the findings of early environmental appraisals and the EIA process. The Project has had several measures incorporated into the design to avoid or minimise environmental impacts.

10.8.2 The key aspects where the design has evolved are described in ES Volume 1, Chapter 5: Alternatives Considered **[EN010147/APP/6.3]**. These include measures required for legal compliance, as well as measures that implement the requirements of good practice guidance documents. The assessment has been undertaken on the basis that these measures are incorporated in the design and construction practices (i.e. they are 'embedded mitigation').

10.8.3 Embedded mitigation measures for the construction phase are set out in the ES Volume 1, Chapter 6: Project Description **[EN010147/APP/6.3]**, Appendix 6.1: Project Mitigation Measures and Commitments Schedule **[EN010147/APP/6.5]** and the various management **[EN010147/APP/7.6]** plans outlined in this chapter.

10.8.4 Implementation of embedded mitigation relied upon in the assessment will be secured in the DCO, including by ensuring the works described in Schedule 1 of the DCO are restricted to their corresponding works areas shown on the Works Plans **[EN010147/APP/2.3]**, a DCO requirement requiring compliance of detailed design of the Project to accord with the Outline Design Principles **[EN010147/APP/7.7]**, or through specific DCO requirements requiring compliance with a management strategy, plan, or other requirement document.

10.8.5 Consideration has been given to any ‘additional mitigation’ over and above the embedded mitigation that may be required and has the potential to mitigate any significant adverse effects identified following the assessment of the Project inclusive of its embedded mitigation. Where significant effects remain following the implementation of embedded mitigation and achievable further measures could lower the identified effect, the topic chapter identifies additional mitigation and explains how the additional mitigation is secured, for example via a specific DCO requirement, via a management plan, or document secured by a DCO requirement like the Project Mitigation Measures and Commitments Schedule **[EN010147/APP/6.5]**.

10.8.6 To the extent any likely significant effects are anticipated following the assessment of the Project after the implementation of embedded and additional mitigation, each topic chapter will report these as residual effects. Residual effects for all topics are summarised in Chapter 21: Summary of Significant Environmental Effects of the ES **[EN010147/APP/6.3]**.

10.8.7 Where relevant, measures have also been identified that may result in enhancement of environmental conditions. Enhancement measures are not required to mitigate significant effects of the Project and are not factored into the determination of residual effects. They are further measures which would have additional beneficial outcomes should they be implemented.

10.8.8 Both embedded and additional mitigation measures relevant to this chapter are summarised in **Table 10.26.**

Table 10.26: Mitigation measures intended to be adopted as part of the Project

Mitigation number	Measure adopted	How the measure will be secured
Embedded Mitigation		
10.1	The Project has been designed, as far as possible, to avoid and minimise adverse impacts and effects on the water environment through the process of design development, and by embedded design measures into the design. As an example, solar PV modules are waterproof and will be raised by the nature of the design at least 800mm above ground levels at the lower edge. Hydraulic modelling was undertaken for the central site area to steer Solar PV arrays towards the lowest area of flood risk (outside the 100 year plus climate change extent).	Committed within the Project design set out in Outline Landscape and Ecology Management Plan **[EN010147/APP/7.6.3].**
10.2	An 8m, 9m or 10m buffer will be maintained from the banks ordinary watercourses (West Oxfordshire District Council, Cherwell District Council and Vale of White Horse District Council respectively) for permanent development associated with the Project. An 8 m buffer will be maintained from the banks of Main River or landward toe of a flood defence structure for permanent development associated with the Project.	This is secured as a requirement within the DCO. The crossing schedule is set out in the Crossing Schedules and Plans document **[EN010147/APP/7.3.9]**.
10.3	The following features will be crossed by HDD (or other trenchless techniques), as set out in the Crossing Schedule submitted as part of the application for the development consent. • All Environment Agency main rivers within the Project Area; and, • Ordinary Watercourses where water is present within the channel at all times.	This is secured as a requirement within the DCO. The crossing schedule is set out in the Crossing Schedules and Plans document [**EN010147/APP/7.3.9]**.
10.4	HDD (or other trenchless techniques) entry and exit points will be located at least: • 8 m, 9m or 10m from the bank of an Ordinary Watercourse (West Oxfordshire District Council, Cherwell District Council and Vale of White Horse District Council respectively); and, • 8 m from the bank of a Main River or landward toe of a flood defence structure. Where a surface watercourse is to be crossed by HDD (or other trenchless methodology), the 275kV 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 1.5 m vertical clearance will be maintained between the	Commitment to be set out in the Outline CoCP **[EN010147/APP/7.6.1]** to be provided as part of application for development consent. Outline CoCP and agreed with relevant stakeholders. CoCP to be secured as DCO requirement.

Mitigation number	Measure adopted	How the measure will be secured
	hard bed of the watercourse and the landward toe of those flood defences.	
10.5	At the HDD compounds, 275kV corridor route and access tracks to be constructed 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 during low river levels and briefing site personnel regarding weather conditions. If a Flood Warning/Flood Alert within the study area is issued works within the Flood Warning/Flood Alert areas would be stopped whilst the Flood Warning/Flood Alert is active. A Flood Management Plan will be undertaken prior to construction and will be set out in the CoCP.	Commitment to be set out in the Outline CoCP **[EN010147/APP/7.6.1]** to be provided as part of application for development consent. CoCP to be developed in line with Outline CoCP and agreed with relevant stakeholders. CoCP to be secured as DCO requirement.
10.6	Where the 275kV corridor route crosses sites of particular sensitivity (River Thames) 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 is set out in the Outline CoCP which is provided as part of the application for development consent **[EN010147/APP/7.6.1]**.
10.7	A Pollution Prevention Plan (PPP) will be prepared and submitted at detailed design stage upon consent of the DCO. The 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 Outline CoCP **[EN010147/APP/7.6.1]**. The detailed CoCP will include a full PPP.
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 CoCP **[EN010147/APP/7.6.1]** to be secured as a DCO requirement.
10.9	An Outline CoCP has been prepared and submitted with the application for the Project consent. Detailed CoCP's will be developed in accordance with the Outline CoCP. In relation to Hydrology and Flood Risk, the Outline CoCP will include measures to maintain and address: • flood protection and control measures; • water environment and drainage; • pollution prevention; • geology and ground conditions; and	Outline CoCP **[EN010147/APP/7.6.1]** to be secured as DCO requirement. Detailed CoCP's to be developed in line with Outline CoCP and agreed with relevant stakeholders.

Mitigation number	Measure adopted	How the measure will be secured
	• soil management.	
10.10	An Outline Operational Management Plan (OMP) has been prepared and submitted with the application for development consent. Solar farm developments are not 'occupied' and only occasional maintenance visits are required for landscape maintenance and equipment servicing and repairs. No maintenance operatives will be on-site during periods of elevated flood risk and access to the Site will be restricted. The Detailed OMP will include a Flood Management Plan including a flood warning and evacuation plan to manage any remaining residual risks to site users.	OMP to be provided as part of application for development consent **[EN010147/APP/7.6.2]**. Detailed OMP's to be developed in line with Outline OMP and agreed with relevant stakeholders. Detailed OMP's to be secured as DCO requirement.
10.11	An Outline Decommissioning Management Statement has been prepared and submitted with the application for development consent. The Outline Decommissioning Plan includes provisions for the removal of all above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. A Decommissioning Environmental Management Plan will be produced and approved for the Project following the appointment of a contractor, prior to the commencement of the decommissioning phase of the Project.	Outline Decommissioning Plan (DMP) to be provided as part of application for development consent **[EN010147/APP/7.6.4]**. Detailed DMS to be developed in line with Outline DMS and agreed with relevant stakeholders. Detailed DMS to be secured as DCO requirement.
10.12	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. This will ensure the grassland will grow between array gaps.	These measures would be secured through a requirement of the DCO.
10.13	Internal maintenance roads, required for occasional access during the operational period may have targeted areas of Type 1 aggregate. Filter strips will be placed adjacent to these areas to manage the increase in runoff.	These measures would be secured through a requirement of the DCO.
Additional Mitigation		
10.14	Surface water modelling was undertaken for the area upstream of Cassington to understand the pre-existing flood risk and inform enhancement mitigation measures. Shallow ponds, bunds and ditch widening is proposed at an area upstream of Cassington in accordance with baseline surface water modelling. The sizing and	This is an enhancement measure to be secured as part of the DCO requirement.

Mitigation number	Measure adopted	How the measure will be secured
	discharge location is subject to detailed design and proposed options modelling.	

10.9 Assessment of effects

10.9.1 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 10.25**, along with the maximum design scenario against which each impact has been assessed.

10.9.2 A description of the likely significant effect on receptors caused by each identified impact is given below.

10.9.3 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.

Cable Corridor Options

10.9.4 An assessment of the cable corridor options, presented in **Table 10.27** to **Table 10.30**. The worst-case design parameters have been taken forward in the assessment and effects below.

Table 10.27: Cable Options Northern Site between the Oxfordshire Way, and B4027, south east of Wootton

4.2	Northern Site between the Oxfordshire Way, and B4027, south east of Wootton	
	Option A	**Option B**
Receptor 1 Waterbodies (including main rivers and ordinary watercourses)	1 Neither option is within proximity to a waterbody	1 Neither option is within proximity to a waterbody
Receptor 2 Flood Defences	1 No flood defences are present near either option	1 No flood defences are present near either option
Receptor 3 Adjacent Land	2 Option A runs beneath the road alongside the agricultural field. This option is approximately 20m closer to farming settlements, hotel, car dealership and North Oxfordshire Crematorium/ Memorial Park.	1 Option B runs beneath agricultural land and is slightly further away from farming settlements, hotel and car dealership.

4.2	Northern Site between the Oxfordshire Way, and B4027, south east of Wootton	
Receptor 4 Field Drainage	1 It is anticipated no field drainage is present at either option	1 It is anticipated no field drainage is present at either option
Receptor 5 Water supply and wastewater drainage infrastructure pipelines	1 It is anticipated no drainage infrastructure is present at either option	1 It is anticipated no drainage infrastructure is present at either option
Receptor 6 Principal Aquifers	1 Both options do not cross a principle aquifers. They pass through a Secondary A aquifer.	1 Both options do not cross a principle aquifers. They pass through a Secondary A aquifer.
Receptor 7 Biologically designated SSSIs	2 Neither option is within a SSSI. Option A is approximately 20m closer to the SSSI 1500m southeast.	1 Neither option is within a SSSI.
Receptor 8 Non-statutory designated sites	1 Neither option is within a non-statutory designated site	1 Neither option is within a non-statutory designated site
Receptor 9 Nitrogen Vulnerable Zone	1 both options are within a nitrogen vulnerable zone	1 both options are within a nitrogen vulnerable zone
Receptor 10 Drinking Water Safeguard Zone	1 both options are within a drinking water safeguard zone	1 both options are within a drinking water safeguard zone
Receptor 11 Drinking Water Protected Area	1 Neither option is within a drinking water protected area	1 Neither option is within a drinking water protected area
Receptor 12 Construction workers	1 Neither option poses increased risk to construction workers	1 Neither option poses increased risk to construction workers
Receptor 13 Site operatives	1 Neither option poses increased risk to site operatives	1 Neither option poses increased risk to site operatives

Table 10.28: Cable Options Area between the Northern and Central Sites on land to the east of Woodstock and in the vicinity of the Bladon roundabout on the A44

4.3	Area between the Northern and Central Sites on land to the east of Woodstock and in the vicinity of the Bladon roundabout on the A44			
	Option A	Option B	Option C	Option D

4.3	Area between the Northern and Central Sites on land to the east of Woodstock and in the vicinity of the Bladon roundabout on the A44			
Receptor 1 Waterbodies (including main rivers and ordinary watercourses)	2 Option A crosses one ordinary watercourse and the northern boundary where the option route turns west runs adjacent to an ordinary watercourse.	2 Option B crosses one ordinary watercourse and the northern boundary where the option route turns west runs adjacent to an ordinary watercourse.	1 Option C does not cross any waterbodies.	1 Option D does not cross any waterbodies.
Receptor 2 Flood Defences	1 No flood defences present.	1 No flood defences present.	1 No flood defences present.	1 No flood defences present.
Receptor 3 Adjacent Land	2 Option A passes beneath the A44 and follows the A4095, passing residential dwellings and farms. A waterbody is present in adjacent land. Farmland and farm infrastructure present.	2 Option B passes beneath the A44 roundabout via HDD and follows the A4095, passing residential dwellings and farms. A waterbody is present in adjacent land. Farmland and farm infrastructure present.	1 Option C passes beneath the A44 and follows the A4095 before turning west down Shipton Road. There is only one farming settlement on this road. It passes through agricultural fields approximately 30m away from residential settlements.	1 Option D passes beneath the roundabout on the A44 via HDD and follows the A4095 before turning west down Shipton Road. There is only one farming settlement on this road. It passes through agricultural fields approximately 30m away from residential settlements.
Receptor 4 Field Drainage	1 It is anticipated no field drainage is present at all options	1 It is anticipated no field drainage is present at all options	1 It is anticipated no field drainage is present at all options	1 It is anticipated no field drainage is present at all options
Receptor 5 Water supply and wastewater drainage infrastructure pipelines	1 It is anticipated no drainage infrastructure is present at all options	1 It is anticipated no drainage infrastructure is present at all options	1 It is anticipated no drainage infrastructure is present at all options	1 It is anticipated no drainage infrastructure is present at all options
Receptor 6 Principal Aquifers	2 Option A passes through a small area	2 Option B passes through a small area	1 Option C does not pass through a principle aquifer, the	1 Option D does not pass through a

	considered a principle aquifer.	considered a principle aquifer.	route is considered a Secondary A aquifer.	principle aquifer, the route is considered a Secondary A aquifer.
Receptor 7 Biologically designated SSSIs	1 Option A is located approximately 700m from a SSSI (Shipton-on-Cherwell & Whitehill Farm Quarries). The waterbodies crossed do not appear to interact with the SSSI.	1 Option B is located approximately 700m from a SSSI (Shipton-on-Cherwell & Whitehill Farm Quarries). The waterbodies crossed do not appear to interact with the SSSI.	1 Option C is located 1.3km from Shipton-on-Cherwell & Whitehill Farm Quarries SSSI.	1 Option D is located 1.3km from Shipton-on-Cherwell & Whitehill Farm Quarries SSSI.
Receptor 8 Non-statutory designated sites	1 All options are outside of proximity to any non-statutory designated sites.	1 All options are outside of proximity to any non-statutory designated sites.	1 All options are outside of proximity to any non-statutory designated sites.	1 All options are outside of proximity to any non-statutory designated sites.
Receptor 9 Nitrogen Vulnerable Zone	1 All options are within a nitrogen vulnerable zone	1 All options are within a nitrogen vulnerable zone	1 All options are within a nitrogen vulnerable zone	1 All options are within a nitrogen vulnerable zone
Receptor 10 Drinking Water Safeguard Zone	1 All options are within a drinking water safeguard zone.	1 All options are within a drinking water safeguard zone.	1 All options are within a drinking water safeguard zone.	1 All options are within a drinking water safeguard zone.
Receptor 11 Drinking Water Protected Area	1 All options are not within a drinking water protection area.	1 All options are not within a drinking water protection area.	1 All options are not within a drinking water protection area.	1 All options are not within a drinking water protection area.
Receptor 12 Construction workers	2 Construction workers will need to work where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk.	2 Construction workers will need to work where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk.	1 Option C and D do not cross waterbodies, only agricultural fields, posing less risk to construction workers.	1 Option C and D do not cross waterbodies, only agricultural fields, posing less risk to construction workers.
Receptor 13 Site operatives	2 Site users will need to work and potentially	2 Site users will need to work and potentially	1 Less risk is posed to site operatives in	1 Less risk is posed to site

4.3	Area between the Northern and Central Sites on land to the east of Woodstock and in the vicinity of the Bladon roundabout on the A44		
	carry out maintenance where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk.	carry out maintenance where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk.	options C and D due to the cable being located in agricultural fields.	operatives in options C and D due to the cable being located in agricultural fields.

Table 10.29: Cable Options Area Central Site on land east of Burleigh Wood and around Bladon Heath

4.4	Central Site on land east of Burleigh Wood and around Bladon Heath		
	Option A	**Option B**	**Option C**
Receptor 1 Waterbodies (including main rivers and ordinary watercourses)	1 Option A runs in close proximity to a waterbody near Burleigh Lodge however does not cross.	2 Option B intersects a waterbody near Burleigh Farm.	2 Option C intersects a waterbody near Burleigh Farm.
Receptor 2 Flood Defences	1 No flood defences present.	1 No flood defences present.	1 No flood defences present.
Receptor 3 Adjacent Land	2 Option A passes near residential dwellings in the northwest alongside Burleigh Lodge in the west.	1 Options B and C pass through agricultural fields only, no residential constraints.	1 Options B and C pass through agricultural fields only, no residential constraints.
Receptor 4 Field Drainage	1 It is anticipated no field drainage is present at all options	1 It is anticipated no field drainage is present at all options	1 It is anticipated no field drainage is present at all options
Receptor 5 Water supply and wastewater drainage infrastructure pipelines	1 It is anticipated no drainage infrastructure is present at all options	1 It is anticipated no drainage infrastructure is present at all options	1 It is anticipated no drainage infrastructure is present at all options
Receptor 6 Principal Aquifers	1 All options do not cross a principal aquifer. They pass through a Secondary A aquifer.	1 All options do not cross a principal aquifer. They pass through a Secondary A aquifer.	1 All options do not cross a principal aquifer. They pass through a Secondary A aquifer.
Receptor 7 Biologically designated SSSIs	1 All options are not within a SSSI.	1 All options are not within a SSSI.	1 All options are not within a SSSI.
Receptor 8	1	1	1

4.4	Central Site on land east of Burleigh Wood and around Bladon Heath		
Non-statutory designated sites	All options are not within a non-statutory designated site.	All options are not within a non-statutory designated site.	All options are not within a non-statutory designated site.
Receptor 9	1	1	1
Nitrogen Vulnerable Zone	All options are within a Nitrogen Vulnerable Zone	All options are within a Nitrogen Vulnerable Zone	All options are within a Nitrogen Vulnerable Zone
Receptor 10	1	1	1
Drinking Water Safeguard Zone	All options are within a Drinking Water Safeguard Zone	All options are within a Drinking Water Safeguard Zone	All options are within a Drinking Water Safeguard Zone
Receptor 11	1	1	1
Drinking Water Protected Area	All options are not within a Drinking Water Protected area	All options are not within a Drinking Water Protected area	All options are not within a Drinking Water Protected area
Receptor 12	1	2	2
Construction workers	Construction workers would need to work in proximity to the waterbody near Burleigh Lodge.	Construction workers will need to work where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk	Construction workers will need to work where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk.
Receptor 13	1	2	2
Site operatives	Site users would need to work and maintain the cable in proximity to the waterbody near Burleigh Lodge however not crossing the waterbody.	Site users will need to work and potentially carry out maintenance where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk.	Site users will need to work and potentially carry out maintenance where the cable crosses the waterbody and where the cable runs adjacent to the waterbody causing increased risk.

Table 10.30: Cable Options Area, Land between the Central and Southern Sites east and south of Eynsham around the Swinford Bridge

	Land between the Central and Southern Sites east and south of Eynsham around the Swinford Bridge							
	Option A	**Option B**	**Option C**	**Option D**	**Option E**	**Option F**	**Option G**	**Option H**
Receptor 1 Waterbodies (including main rivers and ordinary watercourses)	1 Crosses River Thames (main river), Eynsham Mead Ditch (main river), a small drain running along Wharf Road and a culverted drain beneath the B449.				2 Crosses main river (River Thames), Eynsham Mead Ditch (main river) twice and an ordinary watercourse runs along the eastern boundary.			
Receptor 2 Flood Defences	1 Cross through flood defences at two locations				2 Cross defended rivers at three locations.			
Receptor 3 Adjacent Land	2 Option A runs past the water works in the south and small residential settlement nearby. Passes through mostly agricultural land before reaching the factory. It runs beneath the B449 nearby residential settlements.	2 Option B is located slightly east of Option A in the south. Passes through mostly agricultural land before reaching the factory. It runs beneath the B449 nearby residential settlements.	2 Option C runs past the water works in the south and small residential settlement nearby. Passes through mostly agricultural land before reaching the factory. It runs beneath the B449 nearby residential settlements.	2 Option D is located slightly east of Option A in the south. Passes through mostly agricultural land before reaching the factory. It runs beneath the B449 nearby residential settlements.	1 Option E passes by near to the waterworks in the south, crosses the Thames and runs through agricultural land. Before meeting Cassington road in the north where it turns west to join the B449. There are no residential	1 Option F is located slightly east of Option A in the south, it crosses the Thames and runs through agricultural land. Before meeting Cassington road in the north where it turns west to join the B449. There are no residential	1 Option G passes by near to the waterworks in the south, crosses the Thames and runs through agricultural land. Before meeting Cassington road in the north where it turns west to join the B449. There are no residential settlements in this option.	1 Option H is located slightly east of Option A in the south, it crosses the Thames and runs through agricultural land. Before meeting Cassington road in the north where it turns west to join the B449. There are no residential

					settlements in this option.	settlements in this option.		settlements in this option.
Receptor 4 Field Drainage	1 It is anticipated no field drainage is present at all options							
Receptor 5 Water supply and wastewater drainage infrastructure pipelines	1 It is anticipated no drainage infrastructure is present at all options							
Receptor 6 Principal Aquifers	1 All options have an unproductive aquifer in the south and then cross through a Secondary A aquifer. There are no principle aquifers.							
Receptor 7 Biologically designated SSSIs	1 All options share a boundary with Wytham Woods (SSSI) in the east where the cable crosses the River Thames.							
Receptor 8 Non-statutory designated sites	1 All options are not within a non-statutory designated site.							
Receptor 9 Nitrogen Vulnerable Zone	1 All options are within a nitrate vulnerable zone.							
Receptor 10 Drinking Water Safeguard Zone	1 All options are within a drinking water safeguard zone.							
Receptor 11 Drinking Water Protected Area	2 Option A passes through a drinking water	2 Option B passes through a drinking water	2 Option C passes through a drinking water	2 Option D passes through a drinking water	1 Option E passes through a drinking water	1 Option F passes through a drinking water	1 Option G passes through a drinking water	1 Option H passes through a drinking water

	protected area twice.	protected area twice.	protected area twice.	protected area twice.	protected area once.	protected area once.	protected area once.	protected area once.
Receptor 12	1				2			
Construction workers	Construction workers will need to work near and within main watercourses at two locations.				Construction workers will need to work near and within main watercourses at three locations, increasing risk slightly.			
Receptor 13	1				2			
Site operatives	Site operatives will need to carry out maintenance near and within main watercourses at two locations.				Site operatives will need to carry out maintenance near and within main watercourses at three locations.			

The impact of increased flood risk arising from additional surface water runoff

10.9.5 During construction, operation and maintenance of the Project, without mitigation 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 NGET substation, Applicant Main Project Substation, Applicant Secondary Project Substations / high and medium volage transformers, PCS units and the solar PV modules.

Construction phase

Sensitivity of receptor

10.9.6 The relevant receptors are biologically designated SSI's, adjacent land, and construction workers.

10.9.7 The study area includes five biologically designated SSSIs (listed within **Table 10.19**) and Long Mead Local Wildlife Site which are located within WFD waterbody catchments within the study area. The sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of these receptors is considered to be **high**.

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

10.9.9 Areas of Flood Zone 2 and 3 are present across the Project and within proximity to Main Rivers and Ordinary Watercourses. 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

10.9.10 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 275kV corridor route itself could act as a drainage channel for surface water flows.

10.9.11 During construction, haul roads will be positioned to minimise impacts upon sensitive receptors. Where possible haul road routes will use existing unsurfaced tracks and field access points and where it is necessary to cross

existing rights of way, these will be carefully managed to reduce, or avoid, adverse effects.

10.9.12 During construction, haul roads will be positioned to minimise impacts upon sensitive receptors. Where possible haul road routes will use existing unsurfaced tracks and field access points and where it is necessary to cross existing rights of way, these will be carefully managed to reduce, or avoid, adverse effects.

10.9.13 Whilst is assumed that during construction the haul roads will be unsurfaced *using existing tracks and* field access points, there may be a need to lay temporary Terrafirma matting or similar particularly in areas of high vehicle usage on saturated ground and/or to avoid or minimise damage to soil structure. Where the use of Terrafirma matting is considered to be inappropriate, then there may be targeted areas where use of Type 1 and/or Type 3 material will be laid. It is assumed that such areas will be limited in extent and where required incorporate additional drainage measures, such as filter strips.

10.9.14 Any soils arising from these works, will be placed in areas of low flood risk. The construction methodology of any such surfaced areas will be controlled by the CoCP.

10.9.15 The CoCP will also include measures regarding surface water drainage during construction, an Outline CoCP has been prepared for the Project. **[EN010147/APP/7.6.1]**. This will ensure surface water runoff is intercepted and attenuated on-site, and that surface water discharges are controlled in quality and volume and cause no increase in flood risk. Permeable gravel aggregate and terrafirma will be used within the temporary compounds where possible to reduce the generation of surface water runoff arising from a change in surface permeability.

10.9.16 All watercourses, trenchless techniques (e.g. HDD) will be used to pass beneath watercourses (see Volume 3, Appendix 6.2: HDD Methodology and Indicative Crossing Locations **[EN010147/APP/6.5]**). The Outline CoCP includes crossing methodologies **[EN010147/APP/7.6.1]**.

10.9.17 Site users will sign up to Flood Warnings and Flood Alerts. The full CoCP, OEMP and DMP will include a Flood Management Plan. The draft CoCP sets out this requirement **[EN010147/APP/7.6.1]**

10.9.18 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 10.26**) 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.**

Likely significance of effect

10.9.19 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.

Operation and Maintenance phase

Sensitivity of receptor

10.9.20 The relevant receptors are biologically designated SSI's, adjacent land, and site users.

10.9.21 Biologically designated sites and Long Mead Local Wildlife Site are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be **high.**

10.9.22 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.**

10.9.23 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

10.9.24 Avoidance of flood risk has been central in the design of the Project.

10.9.25 The Project has been subject to an FRA and a conceptual drainage strategy in Volume 3 Appendix 10.1: Flood Risk Assessment and Volume 3 Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**. This meets the requirements of the NPS, national and local planning policy and best practice.

10.9.26 The solar panels have been sequentially steered towards the lowest areas of flood risk (Flood Zone 1) for the Northern and Southern Site Areas. Hydraulic modelling has been undertaken for the Central Site Area to inform the location of panels. Panels have been sequentially steered to areas outside of the 100 year plus climate change fluvial extent .

10.9.27 Any Solar PV modules are waterproof and will be raised 800mm above ground levels at the lower edge. Solar PV modules are limited to areas at risk of surface water flooding where a minimum easement of 200mm between the maximum water level and bottom of the solar array can be provided.

10.9.28 Upon completion of the construction phase, fields that currently are used to produce arable crops will become vegetated year-round. As a result, there will not be periods of exposed bare soil. During operational times there will be minimal access to the solar panels reducing compaction of the soil.

10.9.29 The proposed Conceptual Drainage Strategy follows the SuDS best practice and ensures source control where possible. The following is proposed:

- 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.

- Within the Project a 1.5 m to 3 m gap is to be placed between solar arrays. This provides adequate spacing to allow water to fall on the vegetated ground.
- All access tracks will comprise of permeable material (where possible) and as such will maintain infiltration capacity similar to the bare soil cover under the current scenario.
- Where targeted areas of Type 1 aggregate are used for high vehicle usage areas filter strips will be placed alongside the roads to attenuate the additional surface water runoff.
- Where ancillary features are required gravel subbases are used to provide attenuation in accordance with the impermeable area for the 100 year plus climate change event.
- Attenuation ponds or similar will be constructed for the NGET and Applicant Main Project Substation to provide attenuation in accordance with the impermeable area for the 100 year plus climate change event.

10.9.30 Site users will sign up to Flood Warnings and Flood Alerts. The full CoCP, OMP and DMP will include a Flood Management Plan. The draft OMP sets out this requirement **[EN010147/APP/7.6.2].**

10.9.31 With the implementation of the above surface water runoff will be appropriately mitigated with no increase in runoff and source point attenuation incorporated where feasible. The impact magnitude is therefore predicted to be **no change**

Likely Significance of effect

10.9.32 Assuming that designed in and construction measures are implemented, there is unlikely to be any observable degradation in flood risk to receptors.

10.9.33 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 **negligible adverse significance**, which is not significant in EIA terms

Decommissioning phase

Sensitivity of receptor

10.9.34 The relevant receptors are biologically designated SSI's, adjacent land, and construction workers.

10.9.35 Biologically designated statutory sites are of national importance and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be high.

10.9.36 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.

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

Magnitude of impact

10.9.38 During decommissioning, it is assumed that works will be more limited and less intrusive and extensive than during construction.

10.9.39 The design life of the Project (construction, operation and maintenance and decommissioning) is 42 years. Decommissioning will 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).

10.9.40 An Outline Decommissioning plan has been prepared **[EN010147/APP/7.6.4]**. This will be refined prior to the decommissioning phase. The decommissioning plan includes details relevant to flood risk. The impact magnitude is therefore considered to be **negligible adverse.**

Likely significance of effect

10.9.41 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.

The impact of deterioration of water quality within surface and ground waterbody receptors

10.9.42 During construction, there is a potential risk of accidental discharges of untreated runoff containing contaminants associated with enabling works, normal construction activities and storage of construction materials. It is anticipated that any untreated runoff will eventually outfall to surface waterbodies, including Main Rivers and ordinary watercourses located within the study area. All waterbodies form part of the Thames catchment which is situated within the study area. As such the below section considers the hydraulic connectivity of the site to downstream receiving waterbody.

10.9.43 Untreated runoff also has the potential to infiltrate in-situ into groundwater bodies confined within solid geology underlying the study area.

10.9.44 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.

10.9.45 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 the receptor

10.9.46 The relevant receptors are waterbodies, Drinking Water Safeguard Zones, biologically designated SSSIs and construction workers.

10.9.47 There are 13 surface waterbody catchments within the study area which form three management catchments; Gloucester and the Vale, Cotswolds and Cherwell and Ray. There are seven groundwater body catchments within the study area which form the Thames GW management catchment. These management catchments, along with 16 others form the Thames River Basin District. All waterbodies within the study area therefore discharge to the River Thames.

10.9.48 Taking a precautionary approach in assuming surrounding waterbodies will 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 surface and ground waterbodies 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.**

10.9.49 There are two surface water Drinking Water Safeguard Zones deemed to be at risk from pesticides within the study area (including the buffer) with details provided within **Table 10.15**). Furthermore, seven surface water and one groundwater abstractions were noted within the study area. The entire study area covered by eight NVZs as listed within **Table 10.17** and as such is deemed to be at risk from agricultural nitrate pollution. Five significant and major pollution incidents have also been recorded to have occurred within the study area since 2002.

10.9.50 The study area includes five biologically designated SSSIs (listed within **Table 10.19**) which are located within WFD waterbody catchments within the study area. The sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of these receptors is considered to be high.

10.9.51 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

10.9.52 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 surface water and groundwater bodies, potentially impact on water quality and cause a reduction in waterbody WFD classification.

10.9.53 In most cases, HDD or a similar trenchless technique will be used to pass beneath watercourses and associated flood defences (as set out within **Table 10.25**). 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 local surface water and groundwater bodies. There is the potential for this to impact on water quality and therefore cause a reduction in the WFD classification.

10.9.54 Trenched techniques may be used where the 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 alter the quantity of flows entering downstream watercourses.

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

10.9.56 Measures outlined in Table 10.26 and the Outline CoCP **[EN010147/APP/7.6.1]** will 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**.

Likely Significance of effect

10.9.57 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

10.9.58 The relevant receptors are waterbodies, Drinking Water Safeguard Zones, biologically designated SSSIs and site users.

10.9.59 The surface water 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**.

10.9.60 Designated sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of these receptors is considered to be **high**.

10.9.61 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

10.9.62 A conceptual drainage strategy has been prepared and is included in Volume 3, Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]**. This

has been produced in order to meet the requirements of the NPS, national and local planning policy and best practice.

10.9.63 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 surface waterbodies and infiltrate to superficial deposits and solid geology underlying the Project. There is potential for contaminated water to runoff the site in the unlikely event of a fire at the transformers located at the substations.

10.9.64 The conceptual drainage strategy includes the provision of SuDS to mitigate pollutants which are embedded mitigation.

- Filter strips are expected to provide sufficient treatment to the run-off from impermeable areas associated with solar PV arrays via slowing the flow rate of runoff and promoting deposition of any residual pollutants upon vegetation. The root zone of vegetation and soil matrix is expected to promote filtration and breakdown of pollutants.
- The gravel bases serving the secondary substations / high and medium voltage transformers and PCS units will filter and enable deposition of pollutants from associated impermeable areas within gravel.

10.9.65 Attenuation basins within the NGET substation and applicant substations will enable sedimentation and filtration of pollutants through the root zone of vegetation and soil matrix.

- The transformers within the substation will be placed on concrete with appropriate bunding to hold fire water in the unlikely event of this occurring.
- The pollution hazard has been assessed in accordance with Table 26.2 and Table 26.3 of the SuDS Manual which gives the pollution hazard indices for various land uses and details the mitigation indices.

10.9.66 Regular inspection and maintenance will be required following construction to allow effective operation of the proposed surface water drainage network and SuDS features. A SuDS maintenance plan for the proposed SuDS features is included within the conceptual drainage strategy in Volume 3, Appendix 10.1: Flood Risk Assessment **[EN010147/APP/6.5]**.

10.9.67 Solar PV modules may contain hazardous materials including heaving metals. However during normal operational conditions, it is expected solar PV modules are to be fully sealed. There is a residual risk of contamination from solar PV modules if they are damaged during the operation phase. Operational procedures to prevent any increase in pollutants to the surrounding environment are detailed within an Outline OMP **[EN010147/APP/7.6.2]**. This plan includes inspection and maintenance plans, 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.

10.9.68 With the provision of operational measures and on-site drainage networks, the magnitude of impact is assessed to be **negligible adverse**.

Likely Significance of effect

10.9.69 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

10.9.70 The relevant receptors are waterbodies, Drinking Water Safeguard Zones, biologically designated SSSIs and construction workers.

10.9.71 The surface and ground waterbodies 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**.

10.9.72 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**.

10.9.73 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

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

10.9.75 The impacts of decommissioning of the Project components will be reduced through the incorporation of management measures (outlined in **Table 10.26** 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**.

Likely significance of effect

10.9.76 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.

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

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

Construction phase

Sensitivity of receptor

10.9.78 The relevant receptors are flood defences, adjacent land, and construction workers.

10.9.79 Formal flood defences are present along banks of Main Rivers within the study area. Further details on the location and standard of protection offered by EA maintained flood defences are presented within Table 1.9, Table 1.14 and Table 1.16 within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. Formal flood defences have a high value, medium vulnerability, a medium recoverability and therefore are considered to have **high** sensitivity.

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

10.9.81 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

10.9.82 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 10.26**. 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 which flood defences in the study area are predominantly comprised of. This could impact the integrity of flood defences within the study area and lead to an increased risk of flooding to areas which benefit from flood defences. As such, a minimum vertical clearance will be maintained between HDD activities and the hard bed of the watercourse and the landward toe of those flood defences, to be confirmed post consent (as set out in **Table 10.26**).

10.9.83 Areas within proximity to Main Rivers and flood defences are predominantly located within Flood Zone 2 and 3. Within these areas, the site manager will

sign up to the Flood Warning Service to enable site personnel to be evacuated from the site in a timely manner prior to a flood event occurring (as set out in **Table 10.26**).

10.9.84 Measures outlined in **Table 10.26** and the CoCP **[EN010147/APP/7.6.1]** 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.**

Likely Significance of effect

10.9.85 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.

Operation and Maintenance phase

Sensitivity of receptor

10.9.86 The relevant receptors are flood defences, adjacent land, and site users.

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

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

10.9.89 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

10.9.90 During operation and maintenance phase there is not anticipated to be any alteration to cable route. In the unlikely event of maintenance of the cable route the detailed OMP will include detailed maintenance plan setting out how the cables will be inspected. Where possible any maintenance works will avoid a 16m buffer zone from flood defences. An Outline OMP secures this requirement as part of the DCO application **[EN010147/APP/7.6.2]**.

10.9.91 Mitigation measures are expected to ensure no degradation to crossed flood defences during operation and maintenance. The impact magnitude is therefore considered to be **no change**.

Likely significance of effect

10.9.92 Overall, the magnitude of the impact is deemed to be no change, the sensitivity of the receptor is considered to be high. As such, the significance of effect is **negligible adverse significance**.

Decommissioning phase

Sensitivity of receptor

10.9.93 The relevant receptors are flood defences, adjacent land, and construction workers.

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

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

10.9.96 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

10.9.97 As cables will remain in place during decommissioning, no further work will be undertaken and existing flood defences will not be affected. Maintenance within proximity to flood defences is unlikely to be required. However, in the unlikely event this is required it will be undertaken in line with DMP's to ensure there is no impact to the flood defences. A DMP will be developed prior to decommissioning in a timely manner and will include details relevant to flood risk. An Outline DMP secures this requirement as part of the DCO application **[EN010147/APP/7.6.2]**. The impact magnitude is therefore considered to be **no change.**

Likely significance of effect

10.9.98 Overall, the magnitude of the impact is deemed to be no change, the sensitivity of the receptor is considered to be high. As such, the significance of effect is **negligible adverse significance**.

The impact of damage to existing field drainage

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

10.9.100 During operation of the Project, there is a potential risk of damage to existing field drainage arising from maintenance during the operation phase.

Construction phase

Sensitivity of receptor

10.9.101 The relevant receptors are field drainage, adjacent land, and construction workers.

10.9.102 Field drainage is predominantly located within agricultural land to assist with land drainage. Field drainage is considered to have medium vulnerability and high recoverability. The sensitivity of the receptor is therefore considered to be **medium**.

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

10.9.104 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

10.9.105 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 10.26**.

10.9.106 With the incorporation of appropriate construction mitigation techniques, the impact magnitude is therefore considered to be **no change**.

Likely significance of effect

10.9.107 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 **negligible adverse significance**, which is not significant in EIA terms.

Operation phase

Sensitivity of receptor

10.9.108 The relevant receptors are field drainage, adjacent land, and site users.

10.9.109 Field drainage is considered to have medium vulnerability and high recoverability. The sensitivity of the receptor is therefore considered to be **medium**.

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

10.9.111 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

10.9.112 Avoidance of flood risk has been central in the design of the Project.

10.9.113 The Project has been subject to an FRA and a conceptual drainage strategy in Volume 3 Appendix 10.1: Flood Risk Assessment and Volume 3 Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]** in order to meet the requirements of the NPS, national and local planning policy and best practice.

10.9.114 As such there is not anticipated to be any alteration to surface water flows during operation of the Project. These measures are included in **Table 10.26**.

10.9.115 With the incorporation of appropriate mitigation techniques, there will be no impact on existing field drainage. The impact magnitude is therefore considered to be **no change.**

Likely significance of effect

10.9.116 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, **negligible adverse significance**, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.9.117 The relevant receptors are field drainage, adjacent land, and construction workers.

10.9.118 Field drainage is considered to have medium vulnerability and high recoverability. The sensitivity of the receptor is therefore considered to be **medium**.

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

10.9.120 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

10.9.121 During decommissioning, the majority of the cable corridor will remain in place. Joint bays 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.

10.9.122 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.

10.9.123 A DMP will be developed prior to decommissioning in a timely manner and will include details relevant to flood risk. An Outline DMP secures this requirement as part of the DCO application **[EN010147/APP/7.6.4]**.

10.9.124 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**.

Likely significance of effect

10.9.125 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.

The impact of damage to existing water supply and wastewater drainage infrastructure

10.9.126 During construction and decommissioning of the Project, there is a potential risk of damage to existing water supply and wastewater drainage infrastructure due to construction activity.

Construction phase

Sensitivity of receptor

10.9.127 The relevant receptors are 1ater supply and wastewater drainage infrastructure pipelines, adjacent land, and construction workers.

10.9.128 Pipeline infrastructure comprises both private and public water supply and wastewater drainage infrastructure. Public water supply and wastewater drainage infrastructure is operated by Thames Water. Water supply and wastewater drainage infrastructure is 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 of repair and replacement. The sensitivity of the receptor is therefore considered to be **high.**

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

10.9.130 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

10.9.131 Construction phase activities could damage water supply and wastewater drainage infrastructure, causing temporarily disruptions in water supply and flooding from the back-up of infrastructure. Flooding can damage adjacent land receptors and could enter surface water bodies and ground water bodies and negatively impact their WFD status.

10.9.132 The site selection of the Project has taken into account the location of major services utilities see Volume 1, Chapter 5: Alternatives Considered **[EN010147/APP/6.3]** however the presence of local drainage cannot be discounted as it is not always mapped by regulators.

10.9.133 Thames Water assets have been indicatively located via Thames Water asset plans. Prior to any construction activities, detailed Thames Water surveys will be undertaken to establish if any infrastructure is present prior to any intrusive work being undertaken.

10.9.134 Potential impacts to private water supplies are considered further within Prior to any construction activities, utility surveys will be undertaken to establish the location of water supply and wastewater drainage infrastructure prior to intrusive work being undertaken. During construction, micro-routing or appropriate techniques will be employed where required to avoid impact to local services.

10.9.135 CoCP is to be provided as part of application for development consent. CoCP to be developed in line with Outline CoCP **[EN010147/APP/7.6.1]** and agreed with relevant stakeholders. The CoCP will detail requirement of pre-commencement surveys and best practice construction techniques to prevent damage to water supply and wastewater drainage infrastructure.

10.9.136 Any residual impacts of construction which affect water supply and wastewater drainage infrastructure are likely to cause temporary disruption of water supply and/or wastewater drainage 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**.

Likely significance of effect

10.9.137 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.

Operation and Maintenance phase

10.9.138 The relevant receptors are water supply and wastewater drainage infrastructure pipelines, adjacent land, and site users.

10.9.139 Water supply and wastewater drainage 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**.

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

10.9.141 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

10.9.142 Avoidance of flood risk has been central in the design of the Project.

10.9.143 The Project has been subject to an FRA and a conceptual drainage strategy in Volume 3 Appendix 10.1: Flood Risk Assessment and Volume 3 Appendix 10.2: Conceptual Drainage Strategy **[EN010147/APP/6.5]** in order to meet the requirements of the NPS, national and local planning policy and best practice.

10.9.144 Potential impacts to private water supplies are considered further within Prior to any construction activities, utility surveys will be undertaken to establish the location of water supply and wastewater drainage infrastructure prior to intrusive work being undertaken. During operation there will be no alteration near to these water supplies.

10.9.145 With the incorporation of appropriate mitigation techniques, there will be no impact on existing water supply and wastewater drainage infrastructure. The impact magnitude is therefore considered to be **no change.**

Likely significance of effect

10.9.146 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, **negligible adverse significance**, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.9.147 The relevant receptors are water supply and wastewater drainage infrastructure pipelines, adjacent land, and construction workers.

10.9.148 Water supply and wastewater drainage 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**.

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

10.9.150 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

10.9.151 During decommissioning, the majority of the cable corridor will remain in place. Joint bays 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.

10.9.152 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.

10.9.153 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.

Likely significance of effect

10.9.154 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.

Future monitoring

Construction Phase

10.9.155 There are no likely significant adverse effects as a result of the Project in the construction phase, therefore no additional mitigation measures are required.

10.9.156 Water quality monitoring will however be undertaken to establish a baseline position prior to the commencement of construction. Due to the level of risk posed by the operation works, monitoring is likely to comprise visual and olfactory observations plus in-situ testing using handheld water quality meters only.

10.9.157 Details of the sampling regime, including the monitoring suite and sampling frequencies, will be provided in the detailed CoCP and agreed with relevant stakeholders. The requirement for monitoring is set out in the Outline CoCP **[EN010147/APP/7.6.1]**.

Operational Phase

10.9.158 Regular inspection and maintenance of the drainage systems will be undertaken throughout the operational phase of the Project. All maintenance and Site works will be carried out in accordance with good practice guidance, with requirements outlined in the Outline OMP **[EN010147/APP/7.6.2]**.

10.9.159 The Outline DMP **[EN010147/APP/7.6.4]** sets out requirements for monitoring which details that requirements for monitoring of existing water supplies with be explored at detailed DMP stage prior to decommissioning. Where required monitoring of pertinent infrastructure will be included.

Decommissioning Phase

10.9.160 There are no likely significant adverse effects as a result of the Project in the decommissioning phase, therefore no additional mitigation measures are required.

10.9.161 Water quality monitoring will however be undertaken to establish a baseline position prior to the commencement of construction. Due to the level of risk posed by the operation works, monitoring is likely to comprise visual and olfactory observations plus in-situ testing using handheld water quality meters only.

10.9.162 Details of the sampling regime, including the monitoring suite and sampling frequencies, will be provided in the detailed DMP (s) and agreed with relevant stakeholders. The requirement for monitoring is set out in the Outline DMP **[EN010147/APP/7.6.4]**.

10.10 Cumulative Effects

10.10.1 The hydrology and flood risk cumulative effects assessment (CEA) EA methodology has followed the methodology set out in Volume 1, Chapter 4: Approach to Environmental Assessment **[EN010147/APP/6.3]**. 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.

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

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

10.10.4 The specific projects, plans and activities scoped into the CEA, are outlined in **Table 10.31**. Further detail is provided in Volume 1 Chapter 20 Cumulative Effects and Inter-relationships **[EN010147/APP/6.3]**.

Table 10.31: 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						
20/01734/OUT Salt Cross Garden Village Strategic Location for Growth	Outline Planning Application	Pending	2,200 dwellings and 40ha of employment land	Unknown	Unknown	Unknown
16/01364/OUT Land east of Woodstock	Permitted	Adjacent	300 residential dwellings, up to 1100sqm of A1/A2/B1/D1 floorspace;	Unknown	Unknown	Unknown
21/00189/FUL Land north of Hill Rise, Woodstock	Permitted	1.0	180 dwellings (Appeal allowed Oct 23)	Unknown	Unknown	Unknown
21/00217/OUT Land north of Banbury Road, Woodstock	Pending	0.3	235 dwellings with community space and car barns	Unknown	Unknown	Unknown
17/03155/RES Land south east of Pinsley Farm	Operational	Adjacent	120 dwellings	Unknown	Unknown	Unknown
20/01817/FUL Land Between Woodstock Sewage Works And B4027 - Solar Farm	Permitted	Adjacent	5MW generating capacity on 9.1ha of land	Unknown	Unknown	Unknown
21/03522/OUT West of Rutten Lane Yarnton	Pending	Adjacent	The erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing	Unknown	Unknown	Unknown

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
			pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points. (APPEAL LODGED)			
22/01715/OUT Land south of Perdiswell Farm, Shipton Road	Outline	Adjacent	Erection of up to 500 dwellings with associated access, open space and infrastructure	Unknown	Unknown	Unknown
23/00517/FUL New Science Park West of junction with The Boulevard, Oxford Airport, Langford Lane	Full	Adjacent	Redevelopment of the site to include the demolition of existing buildings and development of new accommodation across 5 buildings for employment uses (Class E(g)(ii) and (iii)) plus ancillary amenity building, outdoor amenity space, car parking, cycle parking, landscaping and associated works	Unknown	Unknown	Unknown
23/02098/OUT Multi-phased residential-led mixed used development.	No Details	Adjacent	Up to 215,000 square metres gross external area of residential floorspace (or c.1,800 homes which depending on the housing mix could result in a higher or lower number of housing units) within Use Class C3/C4 and large houses of multiple occupation (Sui Generis); Supporting social infrastructure including secondary school/primary school(s) (Use Class F1); health, indoor sport and recreation, emergency and nursery facilities (Class	Unknown	Unknown	Unknown

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
			E(d)-(f)). Supporting retail, leisure and community uses, including retail (Class E(a)), cafes and restaurants (Class E(b)), commercial and professional services (Class E(c)), a hotel (Use Class C1), local community uses (Class F2), and other local centre uses within a Sui Generis use including public houses, bars and drinking establishments (including with expanded food provision), hot food takeaways, venues for live music performance, theatre, and cinema. Up to 155,000 net additional square metres (gross external area) of flexible employment uses including research and development, office and workspace and associated uses (Use E(g)), industrial (Use Class B2) and storage (Use Class B8) in connection with the expansion of Begbroke Science Park; Highway works, including new vehicular, cyclist and pedestrian roads and paths			
Tier 2						
P18/V2796/SCR 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	Unknown	Unknown	Unknown
Tier 3						
NGET Substation	No details	Adjacent	400kv NGET Substation proposed adjacent southwest	Unknown	Unknown	Unknown

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
Promotion of site (722302) Land at Pinsley Wood	Promotion	Adjacent	Request for a Scoping Opinion for a proposed 49.99MW solar scheme	Unknown	Unknown	Unknown
Cherwell Local Plan (PR8) Land east of A44	Allocation	Adjacent	Request for an EIA Screening Opinion prior to the submission of an application for the installation of a solar photovoltaic array	Unknown	Unknown	Unknown
Cherwell Local Plan (PR9) Land west of Yarnton	Allocation	Adjacent	Updated request for Screening Opinion	Unknown	Unknown	Unknown

Maximum design scenario – cumulative effects assessment

10.10.5 The maximum design scenarios identified in **Table 10.32:** 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 6: Project Description **[EN010147/APP/6.3]**, 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 10.32: 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 arising from additional surface water runoff	Yes	Yes	No	Maximum design scenario as described for the Project (**Table 10.32**: Maximum design scenario for the assessment of cumulative **effects**) assessed cumulatively with the following other projects/plans within Tier 1, Tier 2 and Tier 3: Tier 1, Tier 2 and Tier 3 • 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 deterioration of water quality within surface and ground waterbody receptors	Yes	Yes	Yes	Maximum design scenario as described for the Project (**Table 10.32**: Maximum design scenario for the assessment of cumulative **effects**) assessed cumulatively with the following other projects/plans within Tier 1, Tier 2 and Tier 3: Tier 1, Tier 2 and Tier 3 • 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 supply and wastewater drainage infrastructure	Yes	No	Yes		

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

10.11 Cumulative effects assessment

10.11.1 The CEA takes into account the study area. The buffer is considered appropriate for data collection taking into account the likely zone of influence of other Projects to hydrological receptors and hydrological connectivity.

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

The impact of increased flood risk arising from additional surface water runoff

Construction Phase

Sensitivity of receptor

10.11.3 The study area includes five biologically designated SSSIs (listed within **Table 10.19**) and Long Mead Local Wildlife Site which are located within WFD waterbody catchments within the study area. The sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of these receptors is considered to be **high**.

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

10.11.5 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

10.11.6 Tier 1, 2 and 3 Developments with greatest potential for cumulative effects include new highway infrastructure, large scale housing and commercial developments 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.

10.11.7 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**.

Likely significance of effect

10.11.8 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.

Operation and Maintenance Phase

Sensitivity of receptor

10.11.9 Biologically designated sites and Long Mead Local Wildlife Site are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be **high**.

10.11.10 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**.

10.11.11 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

10.11.12 Tier 1, 2 and 3 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.

10.11.13 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. This provides a betterment as surface water will be attenuated at the source where required up to the climate change event in accordance with guidance.

10.11.14 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 adverse**.

Likely significance of effect

10.11.15 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 beneficial significance**, which is not significant in EIA terms.

Decommissioning Phase

Sensitivity of receptor

10.11.16 Biologically designated sites and Long Mead Local Wildlife Site are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of the receptor is considered to be **high**.

10.11.17 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**.

10.11.18 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

10.11.19 Tier 1, 2 and 3 Developments with greatest potential for cumulative effects include new highway infrastructure, large scale housing and commercial developments 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.

10.11.20 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**.

Likely significance of effect

10.11.21 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.

The impact of deterioration of water quality within surface and ground waterbody receptors

Construction phase

Sensitivity of receptor

10.11.22 There are 13 surface waterbody catchments within the study area which form three management catchments; Gloucester and the Vale, Cotswolds and Cherwell and Ray. There are seven groundwater body catchments within the study area which form the Thames GW management catchment. These management catchments, along with 16 others form the Thames River Basin District. All waterbodies within the study area therefore discharge to the River Thames.

10.11.23 Taking a precautionary approach in assuming surrounding waterbodies will 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 surface and ground waterbodies 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**.

10.11.24 There are two surface water Drinking Water Safeguard Zones deemed to be at risk from pesticides (with details provided within **Table 10.15**). Furthermore, seven surface water and one groundwater abstractions were noted within the study area. The entire study area covered by eight NVZs as listed within **Table 10.17** and is such is deemed to be at risk from agricultural nitrate pollution. Five significant and major pollution incidents have also been recorded to have occurred within the study area since 2002.

10.11.25 The study area includes five biologically designated SSSIs (listed within **Table 10.19**) which are located within WFD waterbody catchments within the study area. The sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of these receptors is considered to be **high**.

10.11.26 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

10.11.27 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.

10.11.28 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.

10.11.29 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.**

Likely significance of effect

10.11.30 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.

Operation and Maintenance phase

Sensitivity of receptor

10.11.31 The surface water 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**.

10.11.32 Designated sites are national important and thus high value, high vulnerability and a low recoverability. The sensitivity of these receptors is considered to be **high**.

10.11.33 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

10.11.34 Tier 1, 2 and 3 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.

10.11.35 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.

10.11.36 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**.

Likely significance of effect

10.11.37 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

10.11.38 The surface and ground waterbodies 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**.

10.11.39 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**.

10.11.40 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

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

10.11.42 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**.

Likely significance of effect

10.11.43 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.

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

Construction phase

Sensitivity of receptor

10.11.44 Formal flood defences are present along banks of Main Rivers within the study area. Further details on the location and standard of protection offered by EA maintained flood defences are presented within Table 1.9, Table 1.14 and Table 1.16 within Volume 3 Appendix 10.1 Flood Risk Assessment **[EN010147/APP/6.5]**. Formal flood defences have a high value, medium vulnerability, a medium recoverability and therefore are considered to have **high** sensitivity.

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

10.11.46 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

10.11.47 Cumulative impacts on flood defences would only occur where flood defences were located in proximity to the Project. Furthermore, there is a limited spatial overland between the Project line with national standards, projects as a minimum, require a standoff from flood defences to limit the risk of damage. It is assumed that all other Projects be constructed using industry best practice and therefore should limit any effect on flood defences.

10.11.48 With the incorporation of appropriate pre-construction consultation, permits 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 adverse.**

Likely Significance of effect

10.11.49 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.

Operation and Maintenance phase

Sensitivity of receptor

10.11.50 Flood defences present along banks of Main Rivers have a high value, medium vulnerability, a medium recoverability and therefore are considered to have **high** sensitivity.

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

10.11.52 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

10.11.53 During operation and maintenance phase there is not anticipated to be any alteration to flood defences from projects.

10.11.54 In the unlikely event of maintenance in proximity to flood defences these are assumed to be undertaken in line with relevant permits and consultation with the EA.

10.11.55 With the incorporation of relevant permits and operation measures there is expected to be no degradation to crossed flood defences during operation and maintenance. The impact magnitude is therefore considered to be **no change**.

Likely significance of effect

10.11.56 Overall, the magnitude of the impact is deemed to be no change, the sensitivity of the receptor is considered to be high. As such, the significance of effect is **negligible adverse significance**.

Decommissioning phase

Sensitivity of receptor

10.11.57 Flood defences present along banks of Main Rivers have a high value, medium vulnerability, a medium recoverability and therefore are considered to have **high** sensitivity.

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

10.11.59 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

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

10.11.61 When the operational phase ends, the Project will be decommissioned. In line with NPS standards, a decommissioning plan setting out control measures has been prepared for the Project and will be set out for large scale developments in the wider area.

10.11.62 Any works in proximity to flood defences are assumed to be undertaken in line with relevant permits and consultation with the EA.

10.11.63 With the incorporation of relevant permits and operation measures there is expected to be no degradation to crossed flood defences during decommissioning. The impact magnitude is therefore considered to be **negligible adverse.**

Likely significance of effect

10.11.64 Overall, the magnitude of the impact is deemed to be no change, the sensitivity of the receptor is considered to be high. As such, the significance of effect is **minor adverse significance**.

The impact of damage to existing field drainage

Construction phase

Sensitivity of receptor

10.11.65 Field drainage is predominantly located within agricultural land to assist with land drainage. Field drainage is considered to have medium vulnerability and

high recoverability. The sensitivity of the receptor is therefore considered to be **medium**.

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

10.11.67 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

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

10.11.69 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 10.26**.

10.11.70 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 projects be constructed using industry best practice and therefore should limit any effect on field drainage.

10.11.71 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**.

Likely significance of effect

10.11.72 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.

Operation and Maintenance phase

Sensitivity of receptor

10.11.73 Field drainage is considered to have medium vulnerability and high recoverability. The sensitivity of the receptor is therefore considered to be **medium**.

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

10.11.75 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

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

10.11.77 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, a decommissioning plan setting out control measures has been prepared for the Project and will be set out for large scale developments in the wider area.

10.11.78 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**.

Likely significance of effect

10.11.79 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

10.11.80 Field drainage is considered to have medium vulnerability and high recoverability. The sensitivity of the receptor is therefore considered to be **medium**.

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

10.11.82 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

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

10.11.84 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.

10.11.85 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.

Likely significance of effect

10.11.86 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.

The impact of damage to existing water supply and waste water drainage infrastructure

Construction phase

Sensitivity of receptor

10.11.87 Pipeline infrastructure comprises both private and public water supply and wastewater drainage infrastructure. Public water supply and wastewater drainage infrastructure is operated by Thames Water. Water supply and wastewater drainage infrastructure is 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 of repair and replacement. The sensitivity of the receptor is therefore considered to be high.

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

10.11.89 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

10.11.90 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 Project be constructed using industry best practice and therefore should limit any effect on water and sewer pipelines.

10.11.91 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.

Likely significance of effect

10.11.92 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.

Operation and Maintenance phase

Sensitivity of receptor

10.11.93 Water supply and wastewater drainage 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**.

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

10.11.95 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

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

10.11.97 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, a decommissioning plan setting out control measures has been prepared for the Project and will be set out for large scale developments in the wider area.

10.11.98 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 **no change.**

Likely significance of effect

10.11.99 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 **negligible adverse significance**, which is not significant in EIA terms.

Decommissioning phase

Sensitivity of receptor

10.11.100 Water supply and wastewater drainage 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**.

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

10.11.102 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

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

10.11.104 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, a decommissioning plan setting out control measures has been prepared for the Project and will be set out for large scale developments in the wider area.

10.11.105 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**.

Likely significance of effect

10.11.106 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.

Future Monitoring

10.11.107 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 As per the scoping report, it was concluded that the Project 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 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.

10.13.2 It is anticipated there may be an inter-related effect between possible groundwater contamination and surface water hydrology, especially in relation to watercourse crossings via HDD or other trenchless techniques. Additional information is presented within Volume 1, Chapter 11: Ground Conditions **[EN010147/APP/6.3]**. Secondary mitigation is proposed to ensure that contamination of groundwater does not occur. That will in turn ensure that there are limited impacts on surface water quality.

10.13.3 **Table 10.33** lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, operational and maintenance and decommissioning phases of the Project, and also the inter-related effects (receptor-led effects that are predicted to arise for wider environmental receptors.

Table 10.33: Summary of likely significant inter-related effects

Description of impact	Phase			Likely significant inter-related effects	Significance
	C	O	D		
Contamination of groundwater (including aquifers) from polluted surface water	✓	✓	✓	There is potential for receptor led effects between groundwater (including aquifers) and surface water. Contaminated surface water associated with construction, operation and maintenance and decommissioning activities has the potential to enter and contaminate groundwater receptors (including aquifers). Due to embedded measures included as part of the project design it is unlikely that receptors would experience increase significance of inter-related effects that which has already been reported in the individual chapters for the identified receptors. Therefore, there is no change result from the inter-related assessment.	The effects are not likely to be greater when considered over the lifetime of the Project, therefore, no inter-related effects are considered likely. No change resulting from inter-related assessment.
Contamination of surface waters from polluted groundwater	✓	✓	✓	There is a potential for receptor led effects between surface water and groundwater. Contaminated groundwater associated with construction and decommissioning activities has the potential to enter and contaminate surface water receptors. Due to embedded measures included as part of the project design required to meet legislative requirements, it is unlikely that receptors would experience increase	The effects are not likely to be greater when considered over the lifetime of the Project, therefore, no inter-related effects are

Description of impact	Phase C	Phase O	Phase D	Likely significant inter-related effects	Significance
				significance of inter-related effects that which has already been reported in the individual chapters for the identified receptors. Therefore there is no change result from the inter-related assessment.	considered likely. No change resulting from inter-related assessment.
Contamination of habitats and detrimental effects to ecology from polluted surface waters	✓	✓	✓	There is a potential for receptor led effects between surface water and habitat and species. Contaminated runoff associated with construction and decommissioning activities has the potential to enter and contaminate surface water receptors which can serve as a habitat for species. Due to embedded measures included as part of the project design required to meet legislative requirements, it is unlikely that receptors would experience increase significance of inter-related effects that which has already been reported in the individual chapters for the identified receptors. Therefore there is no change result from the inter-related assessment.	The effects are not likely to be greater when considered over the lifetime of the Project, therefore, no inter-related effects are considered likely. No change resulting from inter-related assessment.

Receptor-led effects

There is potential for receptor led effects between possible groundwater contamination and surface water hydrology, especially in relation to the watercourse crossings via Horizontal Directional Drilling (HDD) or other trenchless techniques. Mitigation is proposed to ensure that contamination of groundwater does not occur. This is addressed in Volume 1, Chapter 11: Ground Conditions **[EN010147/APP/6.3]**. There are also potential effects associated with ecology and potential pollution of watercourses during construction and this is addressed in Volume 1, Chapter 9: Ecology and Nature Conservation **[EN010147/APP/6.3]**.

There is also the potential receptor led effects associated with possible contamination or spillages and pollution of watercourses and therefore, water quality, including those potentially used as potable source, during construction. This is addressed in Volume 1, Chapter 16: Human Health.

There is the potential for receptor led effects between dust emissions and surface water hydrology during construction. Tertiary mitigation is proposed to ensure suitable management of dust, such that the impacts to the quality of surface water receptors do not occur. This is addressed in Volume 1, Chapter 19: Air Quality **[EN010147/APP/6.3]**.

Overall, it is unlikely that receptors would experience increased significance of inter-related effects than that which has already been reported in the individual chapters for the identified receptors. Therefore, there is no change resulting from the inter-related assessment.

10.14 Summary of impacts, mitigation measures and monitoring

10.14.1 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 Appendix 10.1 Flood Risk Assessment and Volume 3 10.2 Conceptual Drainage Strategy **[EN010147/APP/6.5]**. As well as hydraulic modelling exercise for the Central Site Area see Volume 3 Appendix 10.2 Hydraulic Modelling Report **[EN010147/APP/6.5]** and a Surface Water

Modelling Report for Cassington in Volume 3 Appendix 10.5 Surface Water Modelling Report **[EN010147/APP/6.5]**

10.14.2 **Table 10.34** 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 arising from additional surface water runoff
- The impact of deterioration of water quality within surface and groundwater body receptors
- The impact of increased flood risk arising from damage to existing flood defences
- The impact of damage to existing field drainage
- The impact of damage to existing water supply and wastewater drainage infrastructure

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

10.14.4 **Table 10.35** presents a summary of the potential cumulative impacts and residual effects. The cumulative impacts assessed include:

- The impact of increased flood risk arising from additional surface water runoff
- The impact of deterioration of water quality within surface and groundwater body receptors
- The impact of increased flood risk arising from damage to existing flood defences
- The impact of damage to existing field drainage
- The impact of damage to existing water supply and wastewater drainage infrastructure

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

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

Table 10.34: Summary of potential environmental effects, mitigation and monitoring.

Description of effect	Phase[a] C	O	D	Magnitude of impact	Sensitivity of the receptor	Likely significance of effect	Further mitigation	Residual effect	Proposed monitoring
The impact of increased flood risk arising from additional surface water runoff	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of deterioration of water quality within surface and ground waterbody receptors	✓	✓	✓	C: negligible adverse O: negligible adverse D: negligible 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 O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of damage to existing field drainage	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C:medium and high O: medium and high D: medium and high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of damage to existing water supply and	✓	✓	✓	C: negligible adverse O: no change	C: medium and high	C: minor adverse O: negligible adverse	n/a	C: minor adverse O: negligible adverse	n/a

Description of effect	Phase[a] C	O	D	Magnitude of impact	Sensitivity of the receptor	Likely significance of effect	Further mitigation	Residual effect	Proposed monitoring
wastewater drainage infrastructure				D: negligible adverse	O: medium and high D: medium and high	D: minor adverse		D: minor adverse	

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

Table 10.35: Summary of potential cumulative environmental effects, mitigation and monitoring.

Description of effect	Phase[a] C	O	D	Magnitude of impact	Sensitivity of the receptor	Likely significance of effect	Further mitigation	Residual effect	Proposed monitoring
Tier 1									
The impact of increased flood risk arising from additional surface water runoff	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of deterioration of water quality within surface and ground waterbody receptors	✓	✓	✓	C: negligible adverse O: negligible adverse D: negligible 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	✓	✓	✓	C: negligible adverse	C: high	C: minor adverse	n/a	C: minor adverse	n/a

Description of effect	Phase[a] C	O	D	Magnitude of impact	Sensitivity of the receptor	Likely significance of effect	Further mitigation	Residual effect	Proposed monitoring
flood risk arising from damage to existing flood defences				O: no change D: negligible adverse	O: high D: high	O: negligible adverse D: minor adverse		O: negligible adverse D: minor adverse	
The impact of damage to existing field drainage	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of damage to existing water supply and wastewater drainage infrastructure	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: medium and high O: medium and high D: medium and high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
Tier 2									
The impact of increased flood risk arising from additional surface water runoff	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of deterioration of water quality within	✓	✓	✓	C: negligible adverse O: negligible adverse D: negligible adverse	C: high O: high D: high	C: minor adverse O: minor adverse	n/a	C: minor adverse O: minor adverse	n/a

Description of effect	Phase[a] C	O	D	Magnitude of impact	Sensitivity of the receptor	Likely significance of effect	Further mitigation	Residual effect	Proposed monitoring
surface and ground waterbody receptors						D: minor adverse		D: minor adverse	
The impact of increased flood risk arising from damage to existing flood defences	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of damage to existing field drainage	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of damage to existing water supply and wastewater drainage infrastructure	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: medium and high O: medium and high D: medium and high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
Tier 3									
The impact of increased flood risk arising from additional	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse	n/a	C: minor adverse O: negligible adverse	n/a

Description of effect	Phase[a] C	O	D	Magnitude of impact	Sensitivity of the receptor	Likely significance of effect	Further mitigation	Residual effect	Proposed monitoring
surface water runoff						D: minor adverse		D: minor adverse	
The impact of deterioration of water quality within surface and ground waterbody receptors	✓	✓	✓	C: negligible adverse O: negligible adverse D: negligible 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 O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a
The impact of damage to existing field drainage	✓	✓	✓	C: negligible adverse O: no change D: negligible adverse	C: high O: high D: high	C: minor adverse O: negligible adverse D: minor adverse	n/a	C: minor adverse O: negligible adverse D: minor adverse	n/a

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

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