Botley West Solar Farm

Environmental Statement

Volume 3

Appendix 10.7: Water Framework Directive Assessment

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Contents

Tables

Glossary

Term	Meaning
The Applicant	SolarFive Ltd
The Project	The Botley West Solar Farm (Botley West) Project
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
EIA Scoping Report	A report setting out the proposed scope of the EIA process.
Climate change	A long term change in weather patterns, in the context of flood risk, climate change will produce more frequent severe rainfall.
Discharge Consents	Consent granted by the Environment Agency to discharge into watercourses, subject to conditions.
Field drainage	Limiting the effect of flooding by maintaining surface water and land drainage systems.
Flood Risk Assessment (FRA)	A Flood Risk Assessment is an assessment of the risk of flooding from all flood mechanisms, including the identification of flood mitigation measures, in order to satisfy the requirements of the NPPF and PPG ID7.
Flood defences	A structure that is used to reduce the probability of floodwater affecting a particular area.
Flood Zone 1	Low Probability Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Flood Zone 2	Medium Probability Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Flood Zone 3	High Probability Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Flood Zone 3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.
Fluvial flooding	Fluvial flooding occurs when rivers burst their banks as a result of sustained or intense rainfall.
Geology	The scientific study of the origin, history and structure of the earth.
Greenfield runoff rate	Rates of surface water runoff from a site that is undeveloped (greenfield).
Ground conditions	The chemical and physical characteristics of the soil at a particular location and how it has been affected by historical land uses. .
Groundwater	All water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.

Term	Meaning
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.
Lead Local Flood Authority	Lead Local Flood Authorities have responsibility for developing a Local Flood Risk Management Strategy for their area identifying local sources of flooding. The local strategy produced must be consistent with the national strategy. It will set out the local organisations with responsibility for flood risk in the area, partnership arrangements to ensure co-ordination between these organisations, an assessment of the flood risk, and plans and actions for managing the risk.
Local Authority	An administrative body in local government.
Main Rivers	The term used to describe a watercourse designated as a Main river under the Water Resources Act 1991 and shown on the Main river Map. These are usually larger rivers or streams and are managed by the Environment Agency.
Maximum design scenario	The scenario within the design envelope with the potential to result in the greatest impact on a particular topic receptor, and therefore the one that should be assessed for that topic receptor.
Cable corridor	The corridor within which the cables will be located.
Infrastructure Area	The area within which the transmission cables, substations, ac and 220kV cables and solar panels will be located.
Substation Area	An area currently identified as a potential location for the substation.
Ordinary watercourses	A river, stream, ditch, cut, sluice, dyke or non-public sewer that is not a designated Main river, and for which the local authority has flood risk management responsibilities and powers.
River Basin Management Plan	River Basin Management Plans describe the current state of the water environment in the river basin district. It sets out what improvements are possible by 2015 and how the actions will make a difference to the local environment - the catchments, estuaries, the coast and groundwater.
Strategic Flood Risk Assessment	A Strategic Flood Risk Assessment provides information on areas at risk from all sources of flooding.
Surface water resources	Water on the surface of the land such as in a river, lake, wetland, or ocean.
Surface water runoff	Surface water runoff is flow of water that occurs when excess stormwater, meltwater, or other sources of water flows over a surface.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Sustainable urban Drainage Systems	A sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate, and by attenuating and conveying surface water runoff slowly at peak times.
Treated Effluent	Water that has received primary, secondary or advanced treatment to reduce its pollution or health hazards and is subsequently released from a wastewater facility after treatment.

Term		Meaning
UK Climate Projections		Climate projections expressed in terms of absolute values. A projection of the response of the climate system to emission scenarios of greenhouse gases and aerosols, or radiative forcing scenarios based upon climate model simulations and past observations.
Water Framework Directive (WFD)	Poor WFD Status	Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. Some impact on amenity. Moderate impact on wildlife and fisheries.
	Moderate WFD Status	Moderate change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries.
	Good WFD Status	Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.
Water Quality		The physical, chemical and biological characteristics of water.

Abbreviations

Abbreviation	Meaning
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
NGET	National Grid Electricity Transmission
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report
PINS	The Planning Inspectorate
PV	Photovoltaic
PVDP	Photovolt Development Partners GmbH
RBD	River Basin Districts
RBMP	River Basin Management Plans
SSSI	Site of Special Scientific Interest
SPA	Special Protection Area
WFD	Water Framework Directive

Units

Unit	Description
%	Percentage

km^2	Square kilometres
ha	Hectares
kWh	Kilowatt hour
MW	Megawatt
MWe	Megawatt electrical
MWh	Megawatt hour

1 Introduction

1.1 Background

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

1.1.2 PVDP is proposing to build and operate a new ground mounted solar farm in Oxfordshire. Botley West Solar Farm (the Project) covers approximately 1400 ha (excluding connecting cable routes), within the administrative areas of Cherwell, West Oxfordshire and The Vale of White Horse Districts.

1.1.3 This document forms an assessment of the Water Framework Directive (WFD) compliance for the Project. Specifically this document covers Stages 1 and 2 of WFD Assessment.

1.1.4 The aim of the WFD Assessment is to assess the impacts of the proposed works associated with the Project against the WFD parameters for the local waterbodies. The assessment includes a summary of the current local conditions, the potential for the Project to contribute towards WFD objectives and any likely alterations to the WFD classifications that could arise from the Project.

1.1.5 This WFD Assessment is required to demonstrate that the Project will not result in deterioration of the current quality status of the relevant WFD water body, and could provide improvements to the current status, in accordance with the objectives and measures set out in the Thames River Basin Management Plan (RBMP).

1.1.6 The technical report draws upon information contained within the following documents:

- ES Chapter 10: Hydrology and Flood Risk
- Appendix 10.1 Flood Risk Assessment;
- Appendix 10.2 Surface Water Drainage Strategy
- Appendix 10.3 Hydraulic Modelling Report;
- Appendix 10.4 Hydrology Report;
- Appendix 10.5 Surface Water Modelling Report; and,
- Appendix 10.6 Water Abstractions, Pollution Incidents and Discharge Consents.

Project

1.1.7 The Project is formed by three separate but related sites, referred hereafter as the Northern, Central and South solar photovoltaic (PV) array sites. Overall, proposals involve the delivery of approximately 11,350MWp of power to the National Grid via a new National Grid 400 Kilovolt (kV) substation (NGET substation). As the Project will generate over 50MW it is recognised as a

Nationally Significant Infrastructure Project (NSIP), and therefore requires a Development Consent Order (DCO) under the Planning Act 2008.

1.1.8 The key components of the Project include the following:

- Three separate but related solar farm sites where up to 2,300,000 solar PV modules are to be located;
  - Northern site (248ha developable area)
  - Central site (546ha developable area)
  - Southern site (50 ha developable area)
- Applicant substation - The substation comprise a compound containing the electrical components for transforming the power from 220 to 400 kV;
- 1 NGET Substation;
- Six Transformers (Secondary Substations) – the secondary substations comprise a compound containing the electrical components for transforming power supplied by the generation assets to 220kV;
- 156 Power Converter Stations (PCS) units - the PCS units contain transformers and inverters which allow energy to be exported to the National Grid;
- 220kV grid connection cable corridor that will connect the Northern, Central and Southern Sites to the primary substation, with maximum of 11 associated crossings, and c. 4 construction compounds;
- Office and maintenance facilities.

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

1.1.10 The solar farm sites and cable route corridor are collectively referred to as ‘the Project.’

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

Scope

1.1.12 Based upon the requirements of the EA, in regard to authorisation of activities which may impact the water environment, it has been deemed suitable to conduct a preliminary WFD assessment at this stage. This Preliminary Assessment has been undertaken using the following methodology:

- Identification of the water bodies within and in close proximity to the Project.
- Collection of baseline data to identify the current status as well as future baseline and ability of the water bodies within and in close proximity to the Project to meet the WFD objectives;
- Preliminary assessment of the potential impacts to the identified surface water bodies; this involves identifying the impacts that could improve the

WFD status and / or affect the ability of the water bodies to meet the objectives of the WFD.

Study Area

1.1.13 The 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.

1.1.14 The study area is presented within Figure 1.1 and takes into account the range of potential impacts arising from activities associated with the Project. The zone of influence is deemed appropriate by the impacts expected to arise from the Project. Based on the above, the hydrology and flood risk study area is defined as:

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

1.1.15 The development presents hydrological challenges, as it proposes to interact with several waterbodies and is located across several catchments. Due to the significant nature of the development, it is vital that the potential impacts of the development on local waterbodies is assessed.

1.1.16 For the purpose of this WFD assessment, water bodies that are within, intersect or are hydrologically connected to the Project area, have been identified and considered as relevant water bodies.

2 The Water Framework Directive

2.1 Legislative Background

2.1.1 The Water Framework Directive (WFD) (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000) is a European Union Directive which committed member states to achieve good qualitative and quantitative status of all water bodies by 2015. Under the Directive water bodies are defined as all ground and surface waters, including rivers, lakes, transitional waters, and coastal waters (up to one nautical mile from shore).

2.1.2 The regulations require the impacts of a project on biology, chemistry and hydromorphology are considered in relation to WFD status classes. This is reported under a specific WFD section in any Environmental Statement or in a separate WFD compliance report (Environment Agency, 2010).

2.1.3 The WFD requires the prevention of deterioration and the protection enhancement, and restoration of all bodies of water. This means that new development should not adversely impact upon on the ability of a water body to achieve its environmental objectives.

2.1.4 It was not possible to achieve good status of all water bodies by 2015 and therefore the outstanding water bodies have objectives set for 2021 or 2027.

2.1.5 The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations).

2.1.6 The 2017 WFD Regulations provide the implementation of the WFD through the designation of all surface waters (rivers, lakes, transitional (estuarine) and coastal waters) and groundwaters as water bodies and the establishment of targets to achieve 'good' status.

2.2 Determination of Good Status

Surface Water

2.2.1 Good status is determined from the ecological and chemical status of surface waters. These statuses are assessed according to the following criteria:

- Biological quality (fish, benthic invertebrates, aquatic flora);
- Hydromorphological quality (e.g., riverbank structure, river continuity and substrate of the riverbed), and;
- Physical-chemical quality (e.g., temperature, oxygenation, and nutrient conditions).

2.2.2 The chemical quality refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. The WFD operates on a 'one out, all out' basis, so if one such concentration is exceeded, then the water body will not be classed as having a good status. The pure chemical status of surface waters is therefore classified as either good or fail with the physical-chemical quality indicators being classified as either high, good, moderate, poor, or bad. Chemical status is assessed via the analysis of water samples against approximately 50 priority substances.

2.2.3 The ecological status of surface waters is classified as being high, good, moderate, poor, or bad, whilst water bodies that have been modified (e.g., canals or contain significant flood defences) are classed as 'Heavily Modified Water bodies' (HMWB) and have to reach at least good potential by their objective year. Ecological status is measured by considering presence of biological elements (fish, macro-invertebrates, macrophytes), and supporting elements (hydromorphology, ammonia, pH, phosphates, dissolved oxygen and 18 pollutants). The elements are measured against what is considered to be an 'undisturbed' condition.

Groundwater

2.2.4 The WFD stipulates that groundwater must achieve good quantitative status and good chemical status by their objective year. Groundwater bodies are classified as either good or poor. The quantity status considers elements such as impacts of saline intrusion, ability to serve groundwater and surface water abstractions, and ability to support groundwater dependent terrestrial ecosystems. The chemical status refers to the environmental quality standards

for river basin specific pollutants and the priority substances specified under the WFD.

River Basin Management Plans

2.2.5 The WFD introduced River Basin Districts (RBDs) to better manage watercourses without administrative and political boundaries. Each river basin is managed to achieve at least good status according to RBMPs, which provide a clear indication of how the objectives set for the river basin are to be reached within the required timescale.

2.3 WFD Objectives

2.3.1 WFD Assessments are undertaken to demonstrate that proposed works (either at strategy level or detailed design/implementation stage) can be undertaken without impacting the status of water bodies or preventing future works to enable the water bodies to achieve good status/potential.

2.3.2 There are no fixed methods for WFD assessment. The nature of the water environment and the breadth of the legislation mean that assessments are tailored to proposals on a case-by-case basis.

2.3.3 Determination of WFD compliance comprises a series of steps intended to establish the potential impacts of the Project, at an appropriate level of detail, and then to examine whether the identified impacts contravene the conditions of the WFD.

2.3.4 The following assessment objectives (derived from the Environmental Objectives of the Directive) are used to determine whether the Project, in and around the water environment, complies with the overarching objectives of the WFD:

- Objective 1: To prevent deterioration in the ecological status of the water body;
- Objective 2: To prevent the introduction of impediments to the attainment of good WFD status for the water body;
- Objective 3: To ensure that the attainment of the WFD objectives for the water body are not compromised; and
- Objective 4: To ensure the achievement of the WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised.

2.4 Assessment Stages

2.4.1 The WFD surface water and groundwater assessment draws upon a number of other disciplines in determining the potential impact to the environmental objectives of the water bodies that have the potential to be impacted. These will include hydrology and water quality, terrestrial and aquatic ecology, Habitat Regulations Assessment and hydrogeology.

2.4.2 To achieve the aims outlined above, a staged approach has been adopted in undertaking the WFD compliance assessment in accordance with the WFD

and the Planning Inspectorate Advice Note 18: Water Framework Directive (Planning Inspectorate, 2017).

2.4.3 The WFD compliance assessment is typically undertaken in three stages.

1. **Screening –** excludes any activities that do not need to go through the scoping or impact assessment stages.
2. **Scoping –** identifies the receptors that are potentially at risk from the activity and need impact assessment.
3. **Detailed Impact assessment –** considers the potential impacts of the activity, identifies ways to avoid or minimise impacts, and shows if the activity may cause deterioration or jeopardise the water body achieving good status.

2.4.4 A flow chart, taken from the Planning Inspectorate Advice Note 18 for assessing activities and projects for compliance with the WFD (Planning Inspectorate, 2017) has been included below in **Figure 2.1.**This provides an overview of the recommended process to address the WFD.

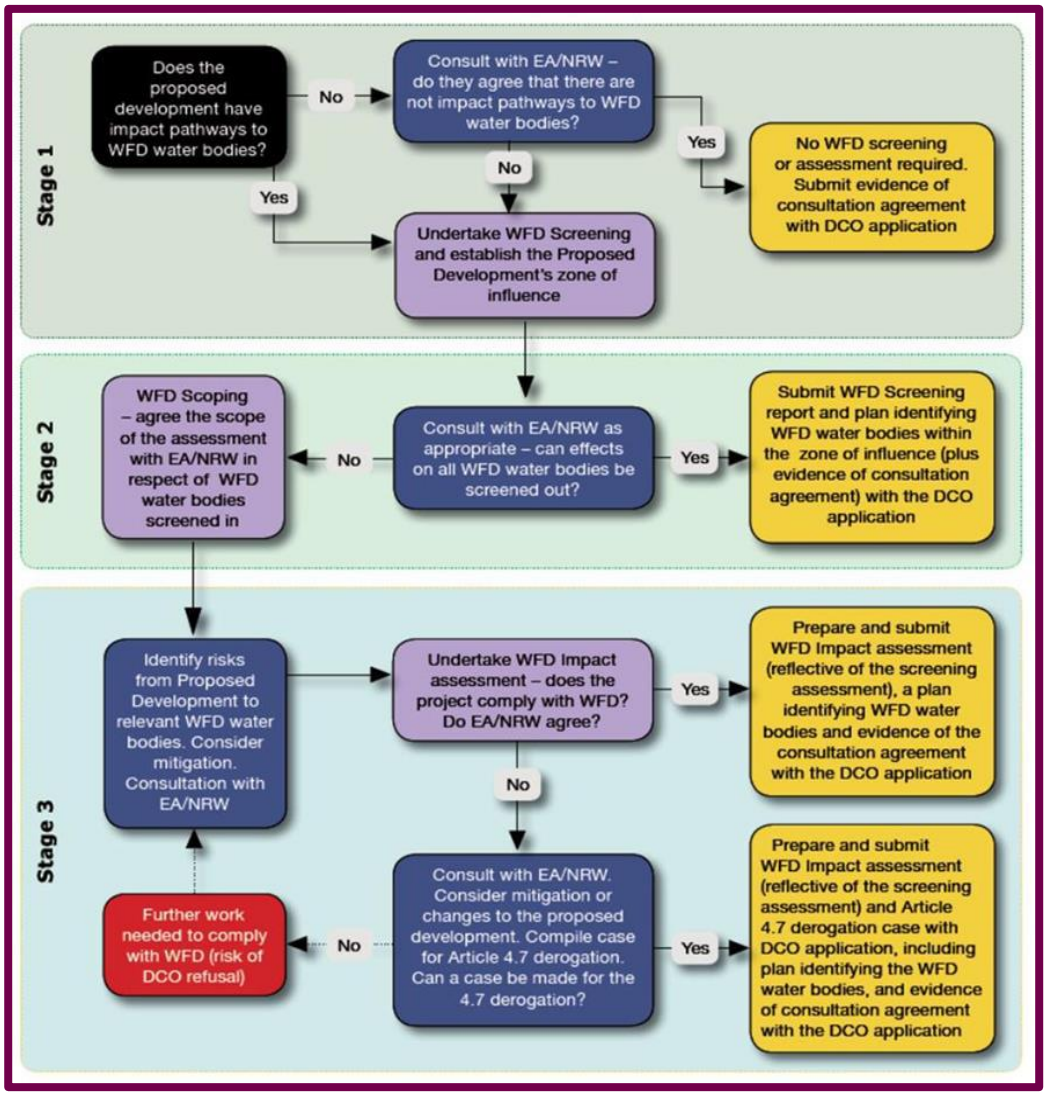

Figure 2.1: Flow chart illustrating the WFD compliance assessment process

Stage 1 - Screening assessment (preliminary assessment)

2.4.5 The screening assessment has been completed and is presented within this report. The screening assessment identifies the WFD water bodies within the zone of influence of the Proposed Development. Each component of the Proposed Development has been reviewed in terms of its potential to impact to the water environment (i.e., on surface and groundwater bodies).

Stage 2 - Scoping assessment

2.4.6 This report begins to also focus on the WFD scoping assessment. This identifies links between the proposed activities and each WFD quality element that could be affected. It is also considers the proposed activities and how they could affect the morphological mitigation measures for waterbodies, where applicable.

2.4.7 The scoping phase involves considering each WFD quality element to identify those (if any) where a possible causal link exists. That is, where water body status or environmental objectives could potentially be affected at a water body level by the proposed activities.

2.4.8 Each activity type is examined based on the maximum design scenario. Where potential impacts from proposed activities exist, they will be scoped into the assessment and mitigation measures highlighted for further development as design progresses.

2.4.9 At this stage of the design process, some detailed elements are yet to be determined. Therefore, a full scoping assessment cannot be undertaken at this stage. Once details are confirmed, the scoping elements of this report will be updated to further inform the potential impacts and effects upon WFD objectives for the relevant waterbodies.

Stage 3 - Impact assessment

2.4.10 If required, a detailed impact assessment will examine the potential residual impact on water bodies (including cumulative impacts), suggesting further mitigation measures and enhancements where appropriate.

2.4.11 Within the context of the wider Project, the WFD assessment will provide the opportunity to inform detailed design by avoiding, minimising, mitigating and compensating risks to WFD surface water and groundwater receptors where the risk assessment determined that the proposed activities may have potential impacts.

3 Assessment Methodology

3.1 Information Sources

3.1.1 Information used in the preparation of the report is set out in **Table 3.1** below.

Table 3.1: Information sources consulted during the preparation of the WFDA

Title	Source	Author
BGS Geology Viewer	https://geologyviewer.bgs.ac.uk/?_ga=2.60345197.172764960.1660052920-1090504202.1660052920	British Geological Society (BGS)
Magic Map Application	https://magic.defra.gov.uk/MagicMap.aspx DEFRA	DEFRA
Catchment Data Explorer	https://environment.data.gov.uk/catchment-planning/	Environment Agency (EA)
Geoindex Onshore Mapping	https://www.bgs.ac.uk/map-viewers/geoindex-onshore/	BGS
Soilscapes viewer	http://www.landis.org.uk/soilscapes/	The National Soils Research Institute

3.1.2 **Table 3.2** below lists the reports consulted during the preparation of the WFDA.

Table 3.2: Reports consulted during preparation of the WFDA

Title	Source	Author
Thames River Basin District River Basin Management Plan: Updated 2022	https://www.gov.uk/government/publications/thames-river-basin-management-plan-updated-2022-habitats-regulation-assessment	EA

3.2 Consultation

3.2.1 Based upon the requirements of the EA in regard to authorisation of activities which may impact the water environment, it has been deemed suitable to conduct a WFD Preliminary Assessment at the Planning Stage. This report provides the Preliminary Assessment for the Planning Stage.

3.3 Potential Impacts

3.3.1 A review of the proposed potential works and the potential impacts to the identified surface water and groundwater bodies has been undertaken by identifying the impacts that could improve or reduce the WFD status or affect the ability of the water bodies to meet the objectives of the WFD.

3.3.2 The following factors have been considered when determining whether the potential effects of the Project are likely to lead to an improvement / reduction in status or impact on objectives being met:

- Whether the impact is temporary (such as short-term construction impacts) or permanent/long term;

- The characteristics and sensitivity of the specific water features affected by the Project (which may be different to the designated WFD water body);
- The scale and importance of the specific water features affected by the Project to the designated WFD water body; and
- The nature, scale, and extent of potential impact in the context of the existing pressures and proposed measures for the water body.

3.4 Limitations of Assessment

3.4.1 The assessment has been undertaken assuming the Maximum Design Scenario (MDS), however, in order to ensure the assessment captures the specific likely affects arising from the development, further details are required on the proposed construction techniques to be used. This is particularly relevant for the proposed crossing points. At this point a conservative assessment has been undertaken based on the MDS.

3.4.2 A further cycle of WFD data was released in 2022, however this has not been released for all waterbodies. Therefore, some of the data used in the assessment may not be reflective of the current situation. Once the updated data is released it will further help inform the baseline environment.

4 Project Overview

4.1.1 The components of the Botley West Solar Farm that have the potential to impact on the WFD objectives are outlined below. More detail on the nature of these activities is provided in Volume 1, Chapter 6: Project description of the Environmental Statement:

- Cable Corridor - The cables will be buried for the entirety of the Cable Corridor. The cables will be installed within the Solar Farm Development Area (this includes both the permanent installation area and temporary working area)
- Crossings – the Cable Corridor will cross infrastructure and obstacles such as roads, railways and watercourses. The method employed will depend on the sensitivity and the scale of the feature to be crossed. Where trenchless crossings are used it is likely that these components can be screened out of the WFD compliance assessment. The Crossing Schedule is provided in Volume 5, Annex 4.3 [APP-231].
- Access routes and temporary haul roads – These are particularly important if they cross watercourses. The method of construction to be used can determine the impact on a watercourse e.g. use of temporary culverts if inappropriately installed
- Temporary Construction compounds - Construction compounds will be required along the Cable Corridor and at Solar Farm. The compounds will provide laydown and storage for plant and materials, as well as office space, welfare facilities and parking for construction personnel. These will be located within the Project Area.

5 Stage 1 – Baseline Assessment - Screening

5.1 Waterbodies Present Within Study Area

Surface Water bodies

5.1.1 The surface water bodies within and in close proximity to the Project are listed in **Table 5.1** below.

Table 5.1: WFD Surface Water Bodies

Name (WFD ID)	Management Catchment	Operational Catchment	Waterbody type
Glyme (Dorn confluence to Evenlode) (ID: GB106039029940)	Cotswolds	Evenlode	River (22.715 km2 catchment area)
Dorn (Source to Glyme) (ID: GB106039037380)	Cotswolds	Evenlode	River (46.153 km2 catchment area)
Glyme (Enstone to Dorn) (ID: GB106039030010)	Cotswolds	Evenlode	River (34.527 km2 catchment area)
Cherwell (Bletchingdon to Ray) (ID: GB106039037432)	Cherwell and Ray	Cherwell	River (19.974 km2 catchment area)
Cherwell (Nell Bridge to Bletchingdon) (ID: GB106039037431)	Cherwell and Ray	Cherwell	River (53.659 km2 catchment area)
Evenlode (Glyme to Thames) (ID: GB106039029880)	Cotswolds	Evenlode	River (18.04 km2 catchment area)
Thames (Evenlode to Thame) (ID: GB106039030334)	Gloucestershire and the Vale	Oak	River (149.591 km2 catchment area)
Evenlode (Bledington to Glyme Confluence) (ID:106039029960)	Cotswolds	Evenlode	River (101.423km2 catchment)
Chil and Limb Brooks (source to B4044) (ID GB1060390310)	Cotswolds	Windrush	River (31.676 km2 catchment area)
Thames (Leach to Evenlode) (ID: GB106039030333)	Cotswolds	Windrush	River (79.294 km2 catchment area)
Filchhampstead Brook at Farmoor (ID GB106039030210)	Cotswolds	Windrush	River (10.281 km2 surface area)
Blenheim Lakes (ID: GB30640514)	Cotswolds	Evenlode	Lake (126.33km2 catchment area)
Farmoor Reservoir (ID: GB30641011)	Cotswolds	Windrush	Lake (0.77km2 catchment area)

Groundwater Bodies

5.1.2 The groundwater bodies within and in close proximity to the Project are listed in **Table 5.2** below.

Table 5.2: WFD Groundwater Bodies

Name (WFD ID)	Management Catchment	Operational Catchment	Water Body Type
Bicester-Otmoor Cornbrash (ID: GB40602G600800)	Thames GW	Bicester-Otmoor Cornbrash	Groundwater (approximately 80.935 km2 in area)
Shrivenham Corallian (ID: GB40602G600600)	Thames GW	Shrivenham Corallian	Groundwater (approximately 197.641 km2 in area)
Kemble Forest Marble (ID: GB40602G600500)	Thames GW	Kemble Forest Marble	Groundwater (approximately 206.726 km2 in area)
Burford Jurassic (ID: GB40601G600400)	Thames GW	Burford Jurassic	Groundwater (approximately 900.616 km2 in area)
Chipping Norton Jurassic (ID: GB40602G600300)	Thames GW	Chipping Norton Jurassic	Groundwater (approximately 314.724 km2 in area)
Tackley Jurassic (ID GB40601G603100	Thames GW	Tackley Jurassic	Groundwater (approximately 70.737 km2 in area)

5.2 WFD Screening

5.2.1 The purpose of the WFD screening stage is to identify a zone of influence of the Project and to determine whether that influence has the potential to adversely impact upon WFD water body receptors.

5.2.2 he screening stage identifies the specific activities that could affect the water bodies WFD status.

5.2.3 Water bodies and receptors that are screened out are not carried forward, and the justification is provided for these below.

Screening of WFD Waterbodies

5.2.4 Watercourses which may be affected by the development were screened based upon the criteria outlined in **Table 5.3** below, which was developed using professional experience and judgement. At this stage in the process, a conservative approach has been taken to scoping in watercourses. Once more detailed design information and survey information is available, it may be pertinent to scope out some watercourses.

5.2.5 Due to the nature of the waterbodies mentioned above, and the criteria in **Table 5.3**, all waterbodies are scoped into the assessment

Table 5.3: Screening criteria for WFD watercourses

Watercourse Category	Criteria	Screening Outcome	Receptor Value
No channel present	No evidence of presence of surface water feature (no defined channel present or evidence of historical channel but is now in filled)	Out	N/A
Channel with no baseflow* / Minor Tributary	Ordinary Watercourse Minor tributary (within WFD water body catchment). Artificially created drainage channel or small natural headwater or ephemeral channel. Channel with little or no baseflow. Absence of flowing water for majority of year / limited connection to water table (potential to dry out). Shallow, ponded water present at times. No regular fluvial geomorphological processes or features present Low potential to support freshwater fish, macroinvertebrate, and/or macrophyte species Riparian zone typically impacted by land use / regular vegetation management Low overall aquatic habitat and hydromorphological value	Out	Low
Channel with limited baseflow** / Moderate Tributary	Ordinary Watercourse or Main River that is a tributary of the WFD water body main river line Moderate tributary (within WFD water body catchment). Artificially created drainage channel or small natural channel. Channel with limited baseflow. Typically shallow low flows. Non-definable morphological flow types, except in localised and isolated reaches. Limited and discrete active fluvial geomorphological processes and features. Limited potential to support freshwater fish, macroinvertebrate, and/or macrophyte species. Riparian zone may be impacted by land use / regular vegetation management in some Cases. Moderate overall aquatic habitat and hydromorphological value.	In	Channel with limited baseflow** / Moderate Tributary
Channel with limited baseflow** / Moderate Tributary within a Sensitive	As above Located within an area Designated SSSI, SAC or SPA	In	Channel with limited baseflow** / Moderate Tributary within a Sensitive Area

Watercourse Category	Criteria	Screening Outcome	Receptor Value
Area			
"Modified' channel with permanent baseflow*** / Primary Watercourse	Main River or a significant Ordinary Watercourse. WFD water body main river line. Modified natural channel with permanent baseflow. Likely designated as Heavily Modified Water Body (HMWB) under WFD. Definable flow types (but diversity impacted by modifications) Active fluvial geomorphological processes and features (but functionality and diversity impacted by modifications) Potential to support some freshwater fish, macroinvertebrate, and/or macrophyte species (but habitat value impacted by modifications) Riparian zone typically impacted by land use / regular vegetation management Aquatic habitat and hydromorphological potential (but currently restricted by modifications)	In	High
"Functioning' channel with permanent baseflow*** / Primary Watercourse within a sensitive area	As above Located within an area Designated SSSI, SAC or SPA	In	Very High

* Sites typically assessed has having Q95 (the 5 percentile, low flow) flow ≤0.002m3/s

** Sites typically assessed has having Q95 flow >0.002m3/s to ≤0.01m3/s

*** Sites typically assessed has having Q95 flow >0.01m3/s

Screening of Potential Impacts

5.2.6 It is necessary to identify links between the proposed activity and every quality element that could be affected. It is also necessary at this stage to consider activities and how they affect the morphological mitigation measures for those waterbodies, where applicable.

5.2.7 For all activities, the scoping phase involves considering each WFD quality element to identify all those where a possible causal link exists. That is, where water body status or objectives could be affected at water body level by the proposed activities.

5.2.8 The scoping assessment has been applied for each activity type based on the MDS outlined in Section 1.1.8. The potential impact for each activity is provided below which has informed the selection of the activities which will be scoped into the assessment.

5.2.9 For the purpose of this assessment, it is considered that open cut trenching will result in largest compound footprint and largest area of disturbance (compared to HDD). This represents the MDS in terms of potential for runoff, spillage and direct disturbance to water bodies (where present). However, HDD or alternative trenchless techniques will be used to intersect waterbodies.

5.2.10 In terms of areas affected by the Project, the MDS is represented by the largest working areas and number of trenches, which arise from the construction of the Project.

5.2.11 The below key impacts have been identified:

- Habitat Disturbance and Impact on Hydromorphological condition of waterbodies
- Shading of Waterbodies
- Impact of Pollution from Accidental Spills/Contaminant Release
- Increase in Suspended Sediments

Table 5.4: Screening for Key Impacts

Potential Impact	Screened In/Out	Justification
Construction		
Temporary dewatering to enable construction	In~~Out~~	The ~~construction of the~~ Project will ~~adhere to best practice method statements, including measures to avoid and/or minimise disturbance of the water environment. Site investigation and monitoring will also be implemented before, during and after dewatering and excavation activities, in order to protect the integrity of nearby surface water features.~~require temporary dewatering to enable construction. This has the potential to impact fish refuge habitats, spawning habitats and loss of longitudinal connectivity for fish migration.
Footprint (e.g. the area of channel impacted by works in the vicinity of the channel)	Out	The construction of the Project will adhere to best practice method statements which include measures to avoid and/or minimised disturbance to the water environment.
Pollution risk and altered drainage patterns from general construction activities	In~~Out~~	~~The construction of the Project will adhere to best practice method statements which include measures to avoid and/or minimised disturbance to the water environment. Construction activities will be temporary in nature.~~Construction works associated with the Project has the potential to pollute and alter groundwater.
Creating or altering of pathways along which existing poor quality groundwater can migrate	In~~Out~~	Construction works associated with the Project has the potential to pollute and alter groundwater.~~The construction of the Project will adhere to best practice method statements which include measures to avoid and/or minimised disturbance to the water environment. Construction activities will be temporary in nature.~~
Operation		
Footprint (e.g. the area of channel impacted by works in the vicinity of the channel)	In~~n~~	The design of the Project has sought to reduce the length of impacted river channel as far as reasonably practicable. However, scheme components will result in a localised loss of existing river channel habitat.

Potential Impact	Screened In/Out	Justification
Shading due to the presence of a structure	Out	A 10m buffer will be maintained between the banks of ordinary watercourses, Main Rivers and temporary and permanent development associated with the Project. Due to the nature of the project, it is unlikely that any further shading may occur.
Changes to drainage patterns discharging to surface water body	Out	The design of the Project will adhere to best practice method statements, including measures to appropriately manage surface water and sediment runoff prior to discharge to the watercourse. The drainage strategy ~~y~~ has ensured the incorporation of suitable drainage systems (including balancing ponds) to intercept, attenuate and discharge runoff from the highway and other proposed infrastructure in a manner that will not significant adversely impact upon the existing flow regime or water quality of receiving watercourse.
Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	In	The Project has sought to reduce hydromorphological impacts as far as reasonably practicable by minimising any in-channel works. It is anticipated that the majority of watercourses will be crossed using HDD (or other trenchless methodologies), however some trenched methods may be utilised for smaller, regularly dry watercourses. Therefore, this may lead to some changes to hydromorphology

5.3 Baseline Conditions

Geology and Hydrology

Superficial Deposits

5.3.1 The Project area and associated buffer zones are indicated by British Geological Survey (BGS) online mapping (1:50,000 scale) to be underlain by a variety of superficial deposits, as shown in **Figure 1.4a, Figure 1.4b, Figure 1.4c** and **Figure 1.4d**. A summary of the superficial geology is listed below:

- Peat;
- Summertown-Radley sand and Gravel Member, comprising sand and gravel;
- Alluvium, comprising Clay, silt, sand and gravel;
- Hanborough Gravel Member, comprising sand and gravel;
- Wolvercote Sand and Gravel Member, comprising sand and gravel; and
- Northmoor sand and Gravel Member, comprising sand and gravel.
  - Portions of the Northern and Southern Project areas are not underlain by superficial deposits.

Bedrock Geology

5.3.2 BGS bedrock geology online mapping (1:50,000 scale) indicates that the Project area and associated buffer zones are underlain by a variety of bedrock strata, as shown in **Figure 1.5a, Figure 1.5b, Figure 1.5c and Figure 1.5d**. A summary of the bedrock geology is listed below:

- Cornbrash Formation, comprising limestone;
- Forest Marble Formation, comprising interbedded limestone and mudstone;
- Forest Marble Formation, comprising limestone;
- White Limestone Formation, comprising limestone;
- Hampen Formation, comprising limestone;
- Forest Marble Formation, comprising mudstone;
- Kellaways Clay Member, comprising mudstone;
- Kellaways Sand Member, comprising sandstone and siltstone;
- Peterborough Member, comprising mudstone;
- Oxford Clay Formation; and
- West Walton Formation, comprising mudstone.

Groundwater

BGS borehole log mapping shows several borehole logs located across the Project area. Details of groundwater levels encountered are presented below in

Table 5.5: Borehole Groundwater Levels

Borehole log reference	Depth groundwater encountered (m bgl)
SP41NE108	15.24 - 18.22
SP41SW29	n/a
SP41SW30	n/a
SP41SW28	2.20
SP41SE3	1.70
SP40NE84	1.80
SP40NE86	n/a
SP40NE85	n/a

Soils Classification

5.3.3 The Project area encompasses a variety of soil types, described by the National Soils Research Institute as:

- Freely draining lime-rich loamy soils;
- Slightly acid loamy and clayey soils with impeded drainage;
- Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils;
- Shallow lime-rich soils over chalk or limestone; and
- Slowly permeable seasonally wet acid loamy and clayey soils.

Groundwater Dependent Terrestrial Ecosystems (GWDTE)

5.3.4 The following GWDTE are located within the Project area;

- Wytham Woods SSSI (ID: 1001309) – Comprises a primary broadleaved, mixed and yew woodland, total area of 423 ha. Key pressures relate to woodland management and under grazing.
- Rushy Meadows SSSI (ID:1001685) – Comprises neutral grassland, total area 9 ha. Key pressures relate to under grazing and scrub encroachment.

Thames River Basin District

~~5.3.4~~5.3.5 The RBMP system provides a catchment-based approach to managing water bodies, in accordance with the WFD.

~~5.3.5~~5.3.6 The Project is located within the overarching Thames RBD, which covers 16,200 km2. The RBD comprises 20 management catchments, 85 surface water operational catchments and contains 548 water bodies.

~~5.3.6~~5.3.7 In 2019, 100% of the districts surface water bodies were classified as fail for chemical status and 6% of the districts surface water bodies were assessed as being in good or better condition for ecological status.

~~5.3.7~~5.3.8 In 2019, 62% of the districts ground water bodies were classified as poor for chemical status and 63% of the districts ground water bodies were assessed as having good quantitative status.

Register of Protected Areas

Source Protection Zones

~~5.3.8~~5.3.9 The Project area is not located within a Source Protection Zone.

Drinking Water Protected Areas

~~5.3.9~~5.3.10 Drinking Water Protected Areas (Surface Water) are defined by the Water Environment (Water Framework Directive) (England & Wales) Regulations 2017 as 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. The study area is located within one Drinking Water Protected Areas (Surface Water), as presented in **Table 5.6** and within **Figure 1.6**. No ground water safeguard zones are found within the 1km buffer area.

Table 5.6: 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

~~5.3.10~~5.3.11 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 site and 1km buffer area is presented below in **Table 5.7** and within **Figure 1.6.**

Table 5.7: 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)

~~5.3.11~~5.3.12 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 5.8** and within **Figure 1.6.**

Table 5.8: 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

5.4 WFD Status

WFD Classification

5.4.1 The WFD runs in 6-year cycles, and is currently within the third cycle, which runs from 2022- 2027. The Cycle 3 interim classification will be available in 2024, however a classification update was published in 2022. This data set is incomplete, therefore, to provide a holistic picture of waterbody classification, 2022 data will be presented alongside the 2019 Cycle 2 data.

5.4.2 It should also be noted, for the 2019 chemical status assessment, methods and evidence base were updated. Due to this change, all waterbodies now fail chemical status and cannot be compared to previous years.

Surface Water Bodies

5.4.3 Details of the waterbodies are included as **Annex A.** The below provides summary details of monitored surface water bodies.

Glyme (Dorn confluence to Evenlode)

5.4.4 Glyme (Dorn confluence to Evenlode) is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is 'Poor' with 'Poor' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Poor' ecological status. Chemical status has not been assessed.

Glyme (Enstone to Dorn)

5.4.5 Glyme (Enstone to Dorn) is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is 'Moderate' with 'Moderate' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data has not been provided.

Evenlode (Bledington to Glyme confluence)

5.4.6 Evenlode (Bledington to Glyme confluence) is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is 'Moderate' with 'Moderate' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Moderate' ecological status. Chemical status has not been assessed.

Dorn (Source to Glyme)

5.4.7 Dorn (Source to Glyme) is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is 'Poor' with 'Poor' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Poor' ecological status. Chemical status has not been assessed.

Cherwell (Bletchingdon to Ray)

5.4.8 Cherwell (Bletchingdon to Ray) is classified as a surface water body and is designated as heavily modified. The overall classification is 'Moderate' with 'Moderate' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Moderate' ecological status. Chemical status has not been assessed.

Cherwell (Nell Bridge to Bletchingdon)

5.4.9 Cherwell (Nell Bridge to Bletchingdon) is classified as a surface water body and is not designated as artificial or heavily modified. The overall classification is 'Moderate' with 'Moderate' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Moderate' ecological status. Chemical status has not been assessed.

Evenlode (Glyme to Thames)

5.4.10 Evenlode (Glyme to Thames) is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is 'Poor' with 'Poor' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Poor' ecological status. Chemical status has not been assessed.

Thames (Evenlode to Thame)

5.4.11 Thames (Evenlode to Thame) is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is 'Poor' with 'Poor' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Poor' ecological status. Chemical status has not been assessed.

Filchhampstead Brook at Farmoor Water

5.4.12 Filchhampstead Brook at Farmoor Water is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is

'Bad' with 'Bad' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Bad' ecological status. Chemical status has not been assessed**.**

Chil and Limb Brooks (source to B4044)

5.4.13 Chil and Limb Brooks (source to B4044) is classified as a surface water body and not designated as artificial or heavily modified. The overall classification is 'Poor' with 'Poor' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Poor' ecological status. Chemical status has not been assessed.

Thames (Leach to Evenlode)

5.4.14 Thames (Leach to Evenlode) is classified as a surface water body and is designated as heavily modified. The overall classification is 'Poor' with 'Poor' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Poor' ecological status. Chemical status has not been assessed.

Blenheim Lakes

5.4.15 Blenheim Lakes is classified as a lake water body and is designated as heavily modified. The overall classification is 'Moderate' with 'Moderate' ecological status and 'Fail' chemical status for Cycle 2 (2019). The Cycle 3 (2022) data indicates 'Moderate' ecological status. Chemical status has not been assessed.

Farmoor Reservoir

5.4.16 Farmoor Reservoir is classified as a lake water body and is designated as artificial. The overall classification is 'Good' with 'Good' ecological status and 'Fail' chemical status for Cycle 2 (2019). No data for Cycle 3 (2022) has been made available at the present time.

Groundwater Bodies

5.4.17 The below provides details of monitored groundwater bodies.

Chipping Norton Jurassic

5.4.18 Chipping Norton Jurassic is classified as a groundwater body. The overall classification for Cycle 2 (2019) is 'Poor', with 'Good' Quantitative elements and chemical quality assessed to be 'Poor'. No data for Cycle 3 (2022) has been published at the present time.

Burford Jurassic

5.4.19 Burford Jurassic is classified as a groundwater body. The overall classification for Cycle 2 (2019) is 'Poor', with 'Good' Quantitative elements and chemical quality assessed to be 'Poor'. No data for Cycle 3 (2022) has been published at the present time.

Tackley Jurassic

5.4.20 Tackley Jurassic is classified as a groundwater body. The overall classification for Cycle 2 (2019) is 'Good', with 'Good' Quantitative elements and chemical quality assessed to be 'Good'. No data for Cycle 3 (2022) has been published at the present time.

Kemble Forest Marble

5.4.21 Kemble Forest Marble is classified as a groundwater body. The overall classification for Cycle 2 (2019) is 'Poor', with 'Good' Quantitative elements and chemical quality assessed to be 'Poor'. No data for Cycle 3 (2022) has been published at the present time.

Bicester-Otmoor Cornbrash

5.4.22 Bicester-Otmoor Cornbrash is classified as a groundwater body. The overall classification for Cycle 2 (2019) is 'Poor', with 'Good' Quantitative elements and chemical quality assessed to be 'Poor'. No data for Cycle 3 (2022) has been published at the present time.

Shrivenham Corallian

5.4.23 Shrivenham Corallian is classified as a groundwater body. The overall classification for Cycle 2 (2019) is 'Good', with 'Good' Quantitative elements and chemical quality assessed to be 'Good'. No data for Cycle 3 (2022) has been published at the present time.

5.5 Development Specific WFD Classification

5.5.1 Most waterbodies within the Study Area of the Project pass through greenfield land and can be considered relatively natural. Therefore, it is acknowledged that although the classifications provided above may not be wholly representative, they can be considered suitable for the basis of this assessment.

5.5.2 A qualitative estimate summary has been undertaken of the WFD categories for the sub-reach adjacent to the Project. This is provided in **Table 5.9** overleaf.

Table 5.9: Summary WFD Status of Water Bodies within the Project Study Area

Waterbody	Overall Water Body	Ecological	Biological quality elements	Hydro-morphological supporting elements	Physico-chemical quality elements	Specific Pollutants	Chemical	Priority Hazardous Substances
Glyme (Dorn confluence to Evenlode)	Poor	2019 – Poor	2019 – Poor	2019 - Supports Good	2019 – Moderate		2019 – Fail	2019 – Good
		2022 - Poor	2022 - Poor	2022 - Supports Good	2022 - Good	No Data	2022 - DNRA	2022 - DNRA
Glyme (Enstone to Dorn)	Moderate	2019 – Moderate	2019 – Moderate	2019 - Supports Good	2019 – Good	No Data	2019 – Fail	2019 – Fail
		2022 - No Data	2022 - No Data	2022 - No Data	2022 - No Data		2022 - DNRA	2022 - DNRA
Evenlode (Bledington to Glyme confluence)	Moderate	2019 – Moderate	2019 – Moderate	2019 - Supports Good	2019 – Moderate	2019 – High	2019 – Fail	2019 – Fail
		2022 - Moderate	2022 - Moderate	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA
Dorn (Source to Glyme)	Poor	2019 – Poor	2019 – Poor	2019 - Supports Good	2019 – Moderate	No Data	2019 – Fail	2019 – Good
		2022 - Poor	2022 - Poor	2022 - Supports Good	2022 - Moderate		2022 - DNRA	2022 - DNRA
Cherwell (Bletchingdon to Ray)	Moderate	2019 – Moderate	2019 - Poor	2019 - Supports Good	2019 – No Data	2019 – High	2019 – Fail	2019 – Fail
		2022 - Moderate	2022- Moderate	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA
Cherwell (Nell Bridge to Bletchingdon)	Moderate	2019 – Moderate	2019 – Moderate	2019 - Supports Good	2019 – Moderate	2019 – High	2019 – Fail	2019 – Fail
		2022 - Moderate	2022 - Moderate	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA

Waterbody	Overall Water Body	Ecological	Biological quality elements	Hydro-morphological supporting elements	Physico-chemical quality elements	Specific Pollutants	Chemical	Priority Hazardous Substances
Evenlode (Glyme to Thames)	Poor	2019 – Poor	2019 – Poor	2019 - Supports Good	2019 – Moderate	2019 – High	2019 – Fail	2019 – Fail
		2022 - Poor	2022 - Poor	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA
Thames (Evenlode to Thame)	Poor	2019 – Moderate	2019 – Moderate	2019 - Supports Good	2019 – Moderate	2019 – High	2019 – Fail	2019 – Fail
		2022 - Poor	2022 - Poor	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA
Filchhampstead Brook at Farmoor Water	Bad	2019 – Bad	2019 – Bad	2019 - Supports Good	2019 – Moderate	2019 – High	2019 – Fail	2019 – Fail
		2022 - Bad	2022 -Bad	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA
Chil and Limb Brooks (source to B4044)	Poor	2019 – Poor	2019 – Poor	2019 - Supports Good	2019 – Moderate	2019 – High	2019 – Fail	2019 – Fail
		2022 - Poor	2022 - Poor	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA
Thames (Leach to Evenlode)	Poor	2019 – Poor	2019 – Poor	2019 - Supports Good	2019 – Moderate	2019 – High	2019 – Fail	2019 – Fail
		2022 - Poor	2022 - Poor	2022 - Supports Good	2022 - Moderate	2022 - High	2022 - DNRA	2022 - DNRA
Blenheim Lakes	Moderate	2019 – Moderate	No Data	2019 - Supports Good	No Data	No Data	2019 – Fail	2019 – Fail
		2022 - Moderate	No Data	2022 - Supports Good	No Data	No Data	2022 - DNRA	2022 - DNRA
Farmoor Reservoir	Good	2019 – Good	No Data	No Data	No Data	2019 – High	2019 – Fail	2019 – Fail

Waterbody	Overall Water Body	Ecological	Biological quality elements	Hydro-morphological supporting elements	Physico-chemical quality elements	Specific Pollutants	Chemical	Priority Hazardous Substances
		2022 - Good	No Data	No Data	No Data	2022 - High	2022 - DNRA	2022 - DNRA
Waterbody	**Overall Water Body**	**Quantitative**					**Chemical**	
Chipping Norton Jurassic	Poor	Good	-	-	-	-	Poor	No Data
Burford Jurassic	Poor	Good	-	-	-	-	Poor	No Data
Tackley Jurassic	Good	Good	-	-	-	-	Good	No Data
Kemble Forest Marble	Poor	Good	-	-	-	-	Poor	No Data
Bicester-Otmoor Cornbrash	Poor	Good	-	-	-	-	Poor	No Data
Shrivenham Corallian	Good	Good	-	-	-		Good	No Data
'Overall' Status	**Poor**	**Moderate**	**Poor**	**Supports Good**	**Moderate**	**High**	**Fail**	**Fail**

Key
DNRA - Does Not Require Assessment

5.6 Achievement of the WFD Objectives

5.6.1 The Thames RBMP states that the Significant Water Management Issues (SWMIs) in the district are: physical modifications, pollution from wastewater, pollution from towns and cities, pollution from metal mines, pollution from rural areas, changes to the natural flow and level of water, and negative effects of non-native invasive species.

5.6.2 The Thames River Basin District Management Plan sets out an overview of the planned improvements for the Thames River Basin District.

5.6.3 The Plan outlines the measures to achieve the priorities for the area. Some of the key measures are detailed below:

Physical Modifications

5.6.4 Methods to manage physical modifications are the following:

- Habitat restoration or creation;
- River restoration and fish pass improvements;
- Removal of barriers to fish passage;
- Riparian tree planting and fencing.

Managing Pollution from Wastewater, from Towns, Cities and Transport, from Metal Mines

5.6.5 Methods to manage pollution from wastewater, from towns, cities and transport, and from metal mines are the following:

- Pollution control initiatives.

Managing Pollution from Rural Areas

5.6.6 Methods to manage pollution from rural areas are the following:

- Reduce diffuse pollution at source;
- Mitigate/remediate diffuse pollution impacts on the receptor;
- Reduce diffuse pollution pathways.

Changes to Natural Flow and Levels

5.6.7 Methods to manage natural flow and levels are the following:

- Control pattern/timing of abstractions;
- Water demand management;
- Improvement to condition of channel/bed and/or banks/shoreline;
- Use alternative source/relocate abstraction or discharge.

Manage Non-Invasive Native Species

5.6.8 Methods to manage non-invasive native species are the following:

- Mitigation, control and eradication;
- Building awareness and understanding;
- Early detection, monitoring and rapid response;
- Prevent introduction.

Peatland Restoration

5.6.9 Methods to restore peatland are the following:

- Implementation of tried and tested methodologies in line with the England Peat Action Plan.

5.6.10 Measures from the above list which are relevant to the pressures impacting the waterbodies will be considered within the mitigation/improvements suggested within the Project.

6 Stage 2 – Preliminary Assessment - Scoping

6.1 Introduction

6.1.1 A summary of the mitigation measures adopted as part of the Project is provided in Table 10.18 of Chapter 10: Hydrology and Flood Risk, and an updated version of the Chapter is submitted at this Deadline 3.

6.1.2 This assessment considers locations at which the Project may impact the existing waterbodies, how this can be managed using the mitigation measures being adopted as part of the Project, and any further mitigation which may be suitable.

6.2 Scheme Baseline Components

6.2.1 It is anticipated that the elements of development highlighted in Section 1.1.8, are likely to include the following works which may impact the hydrological environment;

- Crossings, new, extensions to existing or removal of existing;
- Channel modifications;
- Drainage Outfalls.

6.3 Maximum Design Scenario

6.3.1 The maximum design scenarios identified in **Table 6.1** have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the information provided in Chapter 3: Project Description of the ES. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here be taken forward in the final design. Therefore, this comprises a conservative assessment of a worst case scenario.

Table 6.1: Maximum design scenario 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 2,300,000. • Indicative individual solar PV module dimensions – width 1.4m, length 2.40, depth 0.04m with an area up to 3.50m2. • 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 2,500,000. 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 transformer stations (Secondary Substations) is 6 with maximum dimensions of 18.00m in length and 10m in width. • The indicative number of Applicant Substations is 1 with maximum dimensions of 140.00m in length and 62m in width.
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	

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, open cut trenching will result in the largest area of disturbance compared to trenchless techniques This represents the MDS in terms of potential for runoff, spillage and direct disturbance to waterbodies, field drainage and water and sewer pipelines (where present). However, alternative trenchless techniques will be used to install the cable route beneath watercourses and associated flood defences. In these locations,

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. **HVAC cable route** • The HVAC cable route is approximately 22km 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 600m • Excavations to install HVAC 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 30.00m in width. Dimensions for the exit compound are 25.00m in length and 30.00m 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 areas and to require no greater amount or duration of activity than assessed for construction).
				trenchless 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

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

Mitigation Measures Adopted as Part of the Proposed Development

6.3.2 For the purposes of the EIA process, the term *'measures adopted as part of the Proposed Development'* is used to include the following types of mitigation measures (adapted from IEMA, 2016). These measures are set out in Volume 1, Appendix 3.1: Mitigation Schedule of the ES [APP-129] and mitigation measures relevant to the WFD assessment are provided within **Table 6.2.** Mitigation measures are broken down into the following categories:

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

Table 6.2: Mitigation measures intended to be adopted as part of the Project

Mitigation number	Measure adopted	How the measure will be secured
Primary Mitigation		
10.1	Where possible A, B and Classified unnumbered roads (known as C roads), Environment Agency Main Rivers, ordinary watercourses, flood defences and all railway crossings will be crossed by HDD (or other trenchless methodology) as set out in the Crossing Schedule.	Crossing schedule to be provided as part of application and DCO.
10.2	HDD (or other trenchless methodology) entry and exit points will be located at least 10 m away from ordinary watercourses and 10 m from EA Main Rivers or the landward toe of flood defences. Where a surface watercourse is to be crossed by HDD (or other trenchless methodology), the HVAC 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 hard bed of the watercourse and the landward toe of those flood defences.	Crossing schedule to be provided as part of application and DCO.
10.3	Where required, trenched techniques may be used for minor ditches or smaller watercourses that are frequently dry. In these cases, measures will be implemented to protect water quality and flow and these will be detailed within the Code of Construction Practice (CoCP).	Outline Code of Construction Practice (CoCP) has been prepared to accompany this ES. The nature of contingency measures is outlined in and delivered through the CoCP.
10.4	A 8m buffer will be maintained between the banks of Main Rivers and temporary and permanent development associated with the Project. In regards to Ordinary Watercourses, the distance of easements between the banks of watercourses and temporary and permanent development is dependent on the Local Planning Authority and their associated guidance. It is proposed to provide a 8m easement for ordinary watercourses within West Oxfordshire District Council, a 9m easement for ordinary watercourses within Cherwell District Council and a 10m easement for ordinary watercourses within the Vale of White Horse District Council.	These measures would be secured through a requirement of the DCO.

Mitigation number	Measure adopted	How the measure will be secured
10.5	Temporary haul road(s) will be installed using Type 3 aggregate with a geotextile or other type of protective matting, or plastic or metal plates or grating where required.	Outline Code of Construction Practice (CoCP) has been prepared to accompany this ES, and updated at this Deadline 3.
Secondary Mitigation		
10.6	Where the export cable corridor crosses sites of particular sensitivity (e.g., ordinary watercourses, EA Main Rivers, SSSIs groundwater inner Source Protection Zones) a hydrogeological risk assessment will be undertaken to inform a site-specific crossing method statement which will also be agreed with the relevant authorities prior to construction.	Method statements to be agreed with relevant authorities prior to construction. Requirement for method statements is set out in the CoCP.
10.7	Shallow ponds, bunds and ditch widening is proposed at an area upstream of Cassington in accordance with baseline surface water modelling. The sizing and discharge location is subject to detailed design and proposed options modelling.	This is an enhancement measure to be secured as part of the DCO.
Tertiary Mitigation		
10.8	An Outline Pollution Prevention Plan (PPP) will be prepared and submitted with the application for development consent. An PPP will be developed in accordance with the Outline PPP and will include details of emergency spill procedures. Good practice guidance detailed in the Environment Agency's Pollution Prevention Guidance notes (including Pollution Prevention Guidance notes 01, 05, 08 and 21) will be followed where appropriate, or the latest relevant available guidance.	Requirement for PPP to be set out in CoCP.
10.9	During construction of piled foundations, the following guidance will be used: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention (Environment Agency, 2001), or latest relevant available guidance.	Outline Code of Construction Practice (CoCP) has been prepared to accompany this ES.
10.10	An Outline Code of Construction Practice (CoCP) will be prepared and submitted with the application for development consent. A CoCP will be developed in accordance with the outline CoCP. The CoCP will include measures to reduce temporary disturbance to residential properties, recreational users and existing land users.	Outline Code of Construction Practice (CoCP) has been prepared to accompany this ES CoCP is to be developed in line with Outline CoCP and agreed with relevant stakeholders.
10.11	A Decommissioning Plan will be developed prior to decommissioning in a timely manner. The Decommissioning Plan will include provisions for the removal of all above ground	A Decommissioning Plan has been prepared to accompany this ES.

Mitigation number	Measure adopted	How the measure will be secured
	infrastructure and the decommissioning of below ground infrastructure and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Decommissioning Plan will be in line with the latest relevant available guidance.	
10.12	At the compounds located within Flood Zones 2 and 3, construction measures will be adopted to maintain the existing level of flood protection during construction. These measures will be discussed with the EA. This would also include scheduling work windows against tide times and briefing site personnel regarding weather conditions, tide times and heights. If a Flood Warning/Flood Alert within the study area is issued works within the Flood Warning/Flood Alert areas would be stopped whilst the Flood Warning/Flood Alert is active.	Outline Code of Construction Practice (CoCP) has been prepared to accompany this ES. CoCP to be developed in line with Outline CoCP and agreed with relevant stakeholders. The nature of contingency measures shall be outlined in and delivered through the CoCP.
10.13	Appropriate seeded vegetation will be provided below and between rows of the solar PV modules to act as a filter strip to dissipate energy of surface water and promote low erosivity sheet flow during operation of the solar farm. The vegetation will be managed organically and will either be mowed or used for light grazing. The grassland will not only grow between array gaps.	These measures would be secured through a requirement of the DCO.
10.14	The transformers at the substations will be placed on concrete and have a bund. A control point/ shut off valve will be provided at the bund so that polluted flows from this source can be retained within the platform areas.	These measures would be secured through a requirement of the DCO.

6.3.3 The scope of the detailed assessment is based upon the activities identified as potentially posing a risk to WFD quality elements in the screening assessment.

6.3.4 **Table** 6.3 below summarises potential impacts of the scheme components previously highlighted.

6.3.5 The elements of biological, physicochemical, hydromorphological and quantitative status have been scoped in for assessment across the different potential impacts identified in the MDS.

Table 6.3: Likely Impacts of Proposed Works and Scoping Outcome

Element of Proposed Works	WFD Element Impact Biological Fish Invertebrates Macrophytes Macrophytes and phytobenthos combined	Hydro-morphological supporting elements Hydrological regime Morphology	Physicochemical supporting elements	Chemical Priority hazardous substances Priority substances	Quantitative
Crossings (New and Alterations) and Associated Works	**SCOPED IN** The proposed crossing of watercourses may cause a localised loss of biological components within the vicinity of the crossings. The extent of the loss will be dependent upon the dimensions of the crossings, technique used and biological baseline. It is anticipated that the effects will mainly impact macrophytes, phytobenthos, macroinvertebrates and fish. Construction impacts will be managed via best practice method statements, however localised loss of existing river habitats which may extend beyond construction could have an adverse effect and require further mitigation, dependent upon the crossing technique used.	**SCOPED IN** The proposed crossing of watercourses may cause a localised loss of riparian habitats within the vicinity of the crossings. The anticipated effect upon flow dynamics, connection to groundwater, connection to floodplain and general channel structure, will be dependent upon the dimensions of the crossing, technique used and hydromorphological baseline within the locality.	**SCOPED IN** The proposed crossing of watercourses may cause a localised change in the hydromorphological regime. The potential for alterations to river processes and effects on sediment transfer, flows and dissolved oxygen are dependent upon the dimensions of the crossing, technique used and hydromorphological baseline within the locality.	**SCOPED OUT** No anticipated effects	**SCOPED IN** The construction phase of the development may require piling or dewatering, to allow the required works. These elements of works have the potential to alter groundwater flow paths, and impact nearby watercourses.
Drainage Outfalls	**SCOPED IN** The footprint of drainage outfalls will extend into the channel of waterbodies to provide scour protection. At detailed design stage, scour protection will be selected to ensure the channel alterations and impacts on biological	**SCOPED IN** The footprint of drainage outfalls will extend into the channel of waterbodies to provide scour protection. At detailed design stage, scour protection will be selected to	**SCOPED OUT** No anticipated effects	**SCOPED OUT** No anticipated effects	**SCOPED OUT** No anticipated effects

Element of Proposed Works	WFD Element Impact Biological Fish Invertebrates Macrophytes Macrophytes and phytobenthos combined	Hydro-morphological supporting elements Hydrological regime Morphology	Physicochemical supporting elements	Chemical Priority hazardous substances Priority substances	Quantitative
	receptors are minimised. If this is achieved, impacts upon fauna will be limited.	ensure the channel alterations and flow dynamics are minimised. If this is achieved, impacts upon river dimensions and dynamics will be limited.			

7 Stage 3 – Detailed Impact Assessment

7.1 Elements for Detailed Assessment

7.1.1 It has been determined that the proposed elements of works which have the greatest potential for impact, from a WFD perspective are Watercourse crossings, using trenched techniques.

7.1.2 At present, within the proposed cable corridor there are a total of 43 crossing points. Of these 43, trenched methodologies have been identified for 30 locations. The remaining are proposed to be crossed using HDD (or other trenchless methodologies).

7.1.3 An initial assessment of the 30 crossing locations which propose to utilise trenched methodologies was undertaken. Based upon aerial imagery, watercourses which appeared to be permanently 'wet' channels were deemed as unsuitable for trenched methodologies. Watercourses such as field drains were determined as suitable candidates for the use of trenched methodologies, as they are unlikely to be permanently 'wet, and therefore, construction can take place during 'dry' periods to minimise disruption to the hydrological regime.

7.1.4 This initial assessment highlighted 15 locations which further information would be required to determine the suitability of trenched techniques and the potential impacts from a WFD perspective.

7.1.5 PVDP visited the locations in August 2024, and the information provided is summarised in **Table 7.1** below and **Annex B**.

Table 7.1: Proposed Open Cut Locations Further Information

Crossing ID	Location	WFD Catchment	Watercourse Designation	Watercourse Type	Water Present	Image References	Comment on Potential WFD Considerations
CR 119	51°50'47.6"N 1°19'28.9"W	Cherwell (Bletchingdon to Ray) Tackley Jurassic	Ordinary Water Course	Drain	Yes - 150mm water	1,2	Flow was observed within watercourse. On site images indicate that dense, relatively mature vegetation is present within vicinity of channel – Requirement to dewater and remove established riparian vegetation
CR 205	51°49'52.7"N 1°19'57.5"W	Thames (Evenlode to Thame) Bicester-Otmoor Cornbrash	Ordinary Water Course	Inland Water	No	3,4	No flow observed, images show dense, mature vegetation - Requirement to remove established riparian vegetation, however unlikely to have impact upon hydrological functioning
CR 208	51°49'36.4"N 1°19'35.8"W	Thames (Evenlode to Thame) Bicester-Otmoor Cornbrash	Ordinary Water Course	Inland Water	No	5,6	No flow observed, vegetation present- Requirement to remove vegetation, however unlikely to have impact upon hydrological functioning
CR208	51°49'36.4"N 1°19'35.8"W	Thames (Evenlode to Thame) Bicester-Otmoor Cornbrash	Ordinary Water Course	Drain	No	-	No images provided, however if flow is not present unlikely to have significant impact upon hydrological processes
CR 710	51°47'49.5"N 1°22'16.1"W	Evenlode (Glyme to Thames) Kemble Forest Marble	Ordinary Water Course	Inland Water	Stream	11,12	Significant flow observed, with dense mature riparian vegetation. Utilising a trenched methodology likely to require significant dewatering and restoration of disturbed riparian habitat

Crossing ID	Location	WFD Catchment	Watercourse Designation	Watercourse Type	Water Present	Image References	Comment on Potential WFD Considerations
CR 712	51°47'38.2"N 1°22'18.8"W	Evenlode (Glyme to Thames) Kemble Forest Marble	Ordinary Water Course	Inland Water	No	13,14	No flow observed, vegetation present- Requirement to remove vegetation, however unlikely to have impact upon hydrological functioning
CR 3038	51°47'57.5"N 1°20'23.0"W	Thames (Evenlode to Thame)	Ordinary Water Course	Inland Water	No	15,16	No flow observed, vegetation present- Requirement to remove vegetation, however unlikely to have impact upon hydrological functioning
CR 3050	51°47'55.4"N 1°21'07.0"W	Thames (Evenlode to Thame)	Ordinary Water Course	Inland Water	No	7,8	No flow observed, images show dense, mature vegetation - Requirement to remove established riparian vegetation, however unlikely to have impact upon hydrological functioning
CR3041	51°47'55.4"N 1°21'07.0"W	Thames (Evenlode to Thame)	Ordinary Water Course	Drain	No	-	No images provided, however if flow is not present unlikely to have significant impact upon hydrological processes
CR 808	51°46'39.8"N 1°21'54.0"W	Thames (Leach to Evenlode)	Ordinary Water Course	Inland Water	No	19,20	No flow observed, limited vegetation present- unlikely to have impact upon hydrological functioning
CR 810	51°46'30.4"N 1°21'03.1"W	Thames (Leach to Evenlode)	Ordinary Water Course	Inland Water	No access	-	No images provided, however if flow is not present unlikely to have significant impact upon hydrological processes
CR 815	51°45'37.0"N 1°20'51.6"W	Filchhampstead Brook at Farmoor	River	River	No	21,22	Existing culvert, design parameters may provide opportunity for trenched technique. Limited natural

Crossing ID	Location	WFD Catchment	Watercourse Designation	Watercourse Type	Water Present	Image References	Comment on Potential WFD Considerations
							environment, unlikely further deterioration of WFD, however limited opportunity for improvement
CR 4016	51°44'49.6"N 1°19'50.8"W	Filchhampstead Brook at Farmoor	Ordinary Water Course	Inland Water	Stream	23,24	Flow was observed within watercourse. On site images indicate that dense, relatively mature vegetation is present within vicinity of channel – Requirement to dewater and remove established riparian vegetation
CR 4018	51°44'48.8"N 1°19'39.0"W	Filchhampstead Brook at Farmoor	Ordinary Water Course	Inland Water	Stream	25,26	Flow was observed within watercourse. On site images indicate that dense, relatively mature vegetation is present within vicinity of channel – Requirement to dewater and remove established riparian vegetation
CR 8101	51°47'03.8"N 1°21'49.0"W	Thames (Evenlode to Thame)	River	River	No	17,18	Existing culvert, design parameters may provide opportunity for trenched technique. Some existing vegetation present, unlikely further deterioration of WFD, however limited opportunity for improvement

7.1.6 The information provided indicates that CR 119, CR 710, CR 4016 and CR 4018 may have the potential to cause deterioration to the water bodies, due to the nature of the watercourses and surrounding riparian habitat.

7.1.7 As highlighted in Stage 1 and Stage 2 above, the following elements have bene brought forward to the detailed impact assessment:

- **Impacts** – Disturbance of floodplain/riparian habitats and processes, disturbance of in-channel biological habitats/processes, disturbance of wider hydromorphological processes, alterations to groundwater processes.
- **WFD Elements** –Biological, Physicochemical, Hydromorphological, Quantitative.

7.2 RBMP Measures, Further Mitigation and Potential Enhancements

Potential Mitigation

7.2.1 Several measures were identified within the Thames RBMP as part of the programme of measures to achieve Good Status/Potential by 2027. As the WFD waterbodies within the vicinity of the development have not achieved Good, the focused measures should be considered for implementation within the scheme where reasonable.

WFD Mitigation / Enhancement

7.2.2 As the Project will intersect several watercourses, this poses the unique opportunity of providing improvements to the watercourses and surrounding water environment. It is likely the opportunity to provide potential improvements will coalesce with the measures outlined within the Thames RBMP. Priority management issues for the relevant management catchments are:

Cotswolds Management Catchment

- Manage physical modifications
- Manage pollution from rural areas
- Manage pollution from waste water

Cherwell and Ray Management Catchment

- Manage changes to Natural Flow and Level of Water
- Manage invasive non-native species
- Manage physical modifications
- Manage pollution from rural areas
- Manage pollution from waste water
- Manage pollution from towns, cities and transport

Gloucestershire and the Vale Management Catchment

- Manage changes to Natural Flow and Level of Water
- Manage invasive non-native species
- Manage physical modifications
- Manage pollution from rural areas
- Manage pollution from waste water
- Manage pollution from towns, cities and transport

Thames GW Management Catchment

- Manage changes to Natural Flow and Level of Water
- Manage physical modifications
- Manage pollution from rural areas
- Manage pollution from waste water
- Manage pollution from towns, cities and transport

7.2.3 By introducing a drainage system as part of the construction works and within permanent development areas which manages runoff, this may provide an opportunity to mitigate pollution, based upon the existing situation, and lead to improvements of water quality. The drainage systems will also be designed in line with relevant guidance to ensure changes to hydrological regime are minimised. This will work to support the priority issues for the management catchments within the vicinity of the Project.

7.2.4 The Project specific impacts that have been scoped in, relate to the disturbance of floodplain/riparian habitats and processes, disturbance of in-channel biological habitats/processes, disturbance of wider hydromorphological processes, and alterations to groundwater processes. It is anticipated that designs will be informed by a Fluvial Geomorphologist and Ecologist at detailed design stage to ensure that potential impacts are minimised. This may provide the opportunity to further 'naturalise' the existing riparian habitats, ensure good functionality of hydrological processes and ensure that the presence of invasive species is reduced. This will further aid in the resolution of the priority issues.

7.2.5 The locations of proposed watercourse crossings, fall within WFD catchments which have been impacted by several factors which have been an issue in the past and may become an issue in the future including:

- Phosphate
- Perfluorooctane sulphonate (PFOS)
- Polybrominated diphenyl ethers (PBDE)
- Macrophytes and Phytobenthos Combined
- Mercury and Its Compounds

7.2.6 Several of the above factors fall into the four groups of global pollutants (uPBTs), which were assessed for the first time within the 2019 cycle. These factors are causing all water bodies to fail chemical status. There are measures that can be utilised to mitigate these pollutants, however due to the sources of these pollutants and the scale at which they can be controlled, it is not deemed suitable to consider these within the Project.

7.2.7 **Table 7.2** presents the assessment of the effects on WFD status against wider RMBP pressures, WFD Reasons for Not Achieving Good status and whether the Project is in line with WFD compliance objectives.

Table 7.2: Summary of RNAG, RBMP Measures, Effects of Project on WFD Waterbodies and Deterioration in Status

Waterbody (ID) and Current Status	Reasons for Not Achieving Good (RNAG)	RBMP Mitigation Measures relevant to RNAG and wider Catchment Issues	Scheme Components and Potential to Affect	Risk of Temporary Deterioration	Conclusions
Cherwell (Bletchingdon to Ray) Moderate Ecological Status	• Polybrominated diphenyl ethers (PBDE) • Mercury and Its Compounds • Physical modification • Perfluorooctane sulphonate (PFOS)	Pollution • Mitigate/remediate point source impacts on receptor • Reduce point source pollution at source • Reduce point source and diffuse pollution pathways (includes controlling entry to the water environment) • Reduce diffuse pollution at source Physical Modification • habitat restoration or creation • river restoration and fish pass improvements • removal of barriers to fish passage • riparian tree planting and fencing	Construction of the Project has the potential to pollute nearby waterbodies. However the introduction of construction drainage systems and Construction Environmental Management Plans will sufficiently protect waterbodies from pollution risks and other sources of pollution are outside the scope of mitigation that can be attached to the scheme. Introducing construction elements of the Project, particularly the use of Open Cut techniques, will involve the removal or damage of existing riparian, floodplain and channel habitats, along with disruption to biological and hydromorphological processes.	Risk of deterioration. Proposed pollution mitigation deemed sufficient and may provide enhancements to existing water quality. Potential impacts on habitats and biological processes may lead to deterioration and prevention of reaching 'Good' status. Habitat and hydrological process restoration can be implemented.	The Project will not cause failure to meet surface water 'Good Ecological Status' or 'Good Ecological Potential', result in a deterioration of surface water Ecological Status or Potential. There are no changes which will permanently prevent or compromise the Environmental Objectives being met.
Evenlode (Glyme to Thames)	• Nutrient management – Fish	Pollution	Construction of the Project has the potential to pollute nearby waterbodies.	Risk of deterioration. Proposed pollution mitigation deemed	The Project will not cause failure to meet surface water 'Good Ecological Status' or 'Good

Waterbody (ID) and Current Status	Reasons for Not Achieving Good (RNAG)	RBMP Mitigation Measures relevant to RNAG and wider Catchment Issues	Scheme Components and Potential to Affect	Risk of Temporary Deterioration	Conclusions
Poor Ecological Status	• Sewage Discharges - Dissolved Oxygen • Physical modification - Fish • Perfluorooctane sulphonate (PFOS) • Phosphate – Sewage/Nutrient Management • Polybrominated diphenyl ethers (PBDE) – No sector responsible	• Mitigate/remediate point source impacts on receptor • Reduce point source pollution at source • Reduce point source and diffuse pollution pathways (includes controlling entry to the water environment) • Reduce diffuse pollution at source Physical Modification • habitat restoration or creation • river restoration and fish pass improvements • removal of barriers to fish passage • riparian tree planting and fencing •	However the introduction of construction drainage systems and Construction Environmental Management Plans will sufficiently protect waterbodies from pollution risks and other sources of pollution are outside the scope of mitigation that can be attached to the scheme. Introducing construction elements of the Project, particularly the use of Open Cut techniques, will involve the removal or damage of existing riparian, floodplain and channel habitats, along with disruption to biological and hydromorphological processes.	sufficient and may provide enhancements to existing water quality. Potential impacts on habitats and biological processes may lead to deterioration and prevention of reaching 'Good' status. Habitat and hydrological process restoration can be implemented.	Ecological Potential', result in a deterioration of surface water Ecological Status or Potential. There are no changes which will permanently prevent or compromise the Environmental Objectives being met.
Filchhampstead Brook at Farmoor Bad Ecological Status	• Perfluorooctane sulphonate (PFOS)	Pollution • Mitigate/remediate point source impacts on receptor	Construction of the Project has the potential to pollute nearby waterbodies. However the introduction of construction drainage	Risk of deterioration. Proposed pollution mitigation deemed sufficient and may provide	The Project will not cause failure to meet surface water 'Good Ecological Status' or 'Good Ecological Potential', result in a

Waterbody (ID) and Current Status	Reasons for Not Achieving Good (RNAG)	RBMP Mitigation Measures relevant to RNAG and wider Catchment Issues	Scheme Components and Potential to Affect	Risk of Temporary Deterioration	Conclusions
	• Physcial Modification – Invertebrates • Polybrominated diphenyl ethers (PBDE) • Physical Modification – Fish • Phosphate • Macrophytes and Phytobenthos Combined	• Reduce point source pollution at source • Reduce point source and diffuse pollution pathways (includes controlling entry to the water environment) • Reduce diffuse pollution at source Physical Modification • habitat restoration or creation • river restoration and fish pass improvements • removal of barriers to fish passage • riparian tree planting and fencing •	systems and Construction Environmental Management Plans will sufficiently protect waterbodies from pollution risks and other sources of pollution are outside the scope of mitigation that can be attached to the scheme. Introducing construction elements of the Project, particularly the use of Open Cut techniques, will involve the removal or damage of existing riparian, floodplain and channel habitats, along with disruption to biological and hydromorphological processes.	enhancements to existing water quality. Potential impacts on habitats and biological processes may lead to deterioration and prevention of reaching 'Good' status. Habitat and hydrological process restoration can be implemented.	deterioration of surface water Ecological Status or Potential. There are no changes which will permanently prevent or compromise the Environmental Objectives being met.

Potential Impacts ~~and Improvements~~

7.2.8 As highlighted above, one of the scheme components which is likely to have the greatest impact is the proposed cable crossings.

7.2.9 When considering construction, the breaking of ground lead to the increased potential for mobilisation of contaminants through leaching from increased exposure to rainfall, changes in shallow drainage patterns or via perched or shallow groundwater, particularly where there are identified potential contamination sources within the Project boundaries. The majority of the Project comprises agricultural land and is not therefore considered to represent a potentially significant source of contaminants of concern. However, there are on-site potentially infilled areas of ground and former landfill which could represent sources of contaminants of concern. The presence of one of the key potential contamination sources (Hensington Cutting landfill site) in an area of a Principal Aquifer requires consideration on potential impacts on groundwater receptors.

7.2.10 The risks presented by contamination are considered to be very low other than the cable crossing location of the Hensington Cutting landfill site. Mitigation measures to avoid disturbance of the contents and potential mobilisation of gas/leachate/asbestos fibres generated from the landfill site that could represent a risk to soil or groundwater, could be achieved through design. Options include the use of Horizontal Directional Drilling (HDD) beneath the base of the feature to avoid disturbance of the contents or controlled direct excavation through the waste mass, including removal and disposal of in-situ waste materials and replacement with clean inert material and encapsulation of the excavation within a low permeability seal/wall.

~~7.2.8~~7.2.11 It is proposed that crossings will be undertaken using Open Cut or HDD (or other trenchless methodologies).

HDD (or other trenchless methodologies)

~~7.2.9~~7.2.12 Entry and exit points of HDD crossings will be located at least 10m away from ordinary watercourses and 10m from EA Main Rivers or Flood Defences. Cables crossing via HDD methods will be installed at least 2m beneath the hard bed of watercourses. It is proposed that trenched techniques may be used for minor ditches and smaller watercourses which are frequently dry. A 10m buffer will be maintained between watercourses and temporary and permanent development associated with the Project to ensure no direct impact or loss of habitat.

Open Cut (Trenched Methodologies)

~~7.2.10~~7.2.13 It is anticipated that Open Cut techniques will have the greatest impact upon the hydrological environment, due to the disturbance of the riparian environment. However, it should be noted that disturbances to hydrological connectivity are possible with any construction methodology, and this requires due consideration. As highlighted above, the locations where open cut is proposed, and where flows within the watercourse have been observed, have

been considered further in regards to the current WFD status, known pressures and likely effects of the proposed works.

~~7.2.11~~7.2.14 Due to the nature of these locations, it is determined that there will be impacts to the watercourses, which may potentially feed into the wider environment and WFD catchments. Due to the nature of the impacts arising from Trenched Methodologies, works will be required to reinstate the current environment. The required works to ensure that the pre-commencement conditions are retained will be determined by ecologists and other specialists, however it is likely that there may be scope to provide improvements to the pre-commencement conditions, which will contribute to ensuring that the watercourse will not be prevented from achieving 'Good' status in the future.

Potential Improvements

~~7.2.12~~7.2.15 The potential improvements that could be considered as part of the Project may include:

- Mitigating physical modifications to watercourse channels by promoting habitat restorations via riparian planting and river restoration;
- Enhance watercourse connectivity by installing wildlife corridors and fish passes;
- Implement further processes to avoid pollution or siltation of the watercourses;
- Install mechanisms to assist with the removal of pollutants and enable the planted vegetation to filter the water; and
- Enhance the geo-morphology of the watercourse channel within the vicinity of the development to promote natural flows and levels.

8 Summary and Conclusions

8.1.1 This report has undertaken a WFD assessment of the impacts of the Botley West Solar Farm Project, upon WFD water bodies within the study area.

8.1.2 Implementing best construction and design practices will minimise the deterioration of the water environment and continue progress towards meeting the objectives of the WFD. The greatest impacts from the development are likely to arise from alterations to habitats, biological processes and hydromorphological/hydrogeological processes.

8.1.3 It is determined that the introduction of construction drainage systems and Construction Environmental Management Plans will sufficiently protect waterbodies from pollution risks. Disruptions to habitats, biological processes and hydromorphological/hydrogeological processes, have limited mitigation options, however, restoration of the baseline environment post construction is the best option to ensuring 'Good' status is maintained/achieved.

8.1.4 The Project has the potential to provide local improvement techniques to be incorporated into the detailed design. Inclusion of such techniques has the potential to provide a beneficial effect resulting in some localised improvement and also feeds into the wider RBMP objectives.

8.1.5 The Project will not cause failure to meet surface water 'Good Ecological Status' or 'Good Ecological Potential', result in a deterioration of surface water Ecological Status or Potential.

8.1.6 There are no changes which will permanently prevent or compromise the Environmental Objectives being met.

8.1.7 It is confirmed that the works proposed as part of the Botley West Solar Farm Project meet the WFD objectives, and that the scheme is therefore compliant with the WFD regulations.

9 References

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Annexes

Appendix A

Annex A – WFD Waterbody Data Tables

Table 1. EA Water Body Classification for Glyme (Dorn confluence to Evenlode)

Classification Item	2019	2022
Ecological	**Poor**	**Poor**
Biological quality elements	**Poor**	**Poor**
Fish	Poor	Poor
Invertebrates	Good	Good
Macrophytes and Phytobenthos Combined	Moderate	Moderate
Macrophytes Sub Element	Moderate	Moderate
Physico-chemical quality elements	**Moderate**	**Good**
Ammonia (Phys-Chem)	High	High
Biochemical Oxygen Demand (BOD)		High
Dissolved oxygen	High	High
Phosphate	Moderate	Good
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Morphology	Supports good	Supports good
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	
Fluoranthene	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 2. EA Water Body Classification for Glyme (Enstone to Dorn)

Classification Item	2019	2022
Ecological	**Moderate**	
Biological quality elements	**Moderate**	
Fish	Moderate	
Invertebrates	High	
Macrophytes and Phytobenthos Combined	Moderate	
Macrophytes Sub Element	Moderate	
Physico-chemical quality elements	**Good**	
Ammonia (Phys-Chem)	High	
Dissolved oxygen	Good	
Phosphate	High	
Temperature	High	
pH	High	
Hydromorphological Supporting Elements	**Supports good**	
Hydrological Regime	Supports good	
Morphology	Supports good	
Specific pollutants	**High**	
Copper	High	
Iron	High	
Manganese	High	
Zinc	High	
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Benzo(b)fluoranthene	Good	
Benzo(g-h-i)perylene	Good	
Benzo(k)fluoranthene	Good	
Cadmium and Its Compounds	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	

Classification Item	2019	2022
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 3. EA Water Body Classification for Evenlode (Bledington to Glyme confluence)

Classification Item	2019	2022
Ecological	**Moderate**	**Moderate**
Biological quality elements	**Moderate**	**Moderate**
Fish	Moderate	Moderate
Invertebrates	Good	Good
Macrophytes and Phytobenthos Combined	Moderate	Moderate
Macrophytes Sub Element	Moderate	Moderate
Physico-chemical quality elements	**Moderate**	**Moderate**
Ammonia (Phys-Chem)	High	High
Dissolved oxygen	Good	High
Phosphate	Poor	Poor
Temperature	Good	High
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Morphology	Supports good	Supports good
Specific pollutants	**High**	**High**
Chlorothalonil	High	High
Copper	High	High
Diazinon	High	High
Dimethoate	High	High
Iron	High	High
Manganese	High	High
Pendimethalin	High	High
Permethrin	High	High
Zinc	High	High
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Anthracene	Good	
Benzo(a)pyrene	Good	
Benzo(b)fluoranthene	Good	

Classification Item	2019	2022
Benzo(g-h-i)perylene	Good	
Benzo(k)fluoranthene	Good	
Cadmium and Its Compounds	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Hexachlorocyclohexane	Good	
Mercury and Its Compounds	Good	
Pentachlorobenzene	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Quinoxyfen	Good	
Tributyltin Compounds	Good	
Priority substances	**Good**	**Does not require assessment**
Aclonifen	Good	
Alachlor	Good	
Bifenox	Good	
Cybutryne	Good	
Cypermethrin (Priority)	Good	
Dichlorvos (Priority)	Good	
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Terbutryn	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 4. EA Water Body Classification for Dorn (Source to Glyme)

Classification Item	2019	2022
Ecological	**Poor**	**Poor**
Biological quality elements	**Poor**	**Poor**
Fish	Poor	Poor
Invertebrates	Moderate	High
Macrophytes and Phytobenthos Combined	Poor	Poor
Macrophytes Sub Element	Poor	Poor
Physico-chemical quality elements	**Moderate**	**Moderate**
Ammonia (Phys-Chem)	High	High

Classification Item	2019	2022
Dissolved oxygen	High	High
Phosphate	Moderate	Moderate
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Morphology	Supports good	Supports good
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	
Fluoranthene	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 5. EA Water Body Classification for Cherwell (Bletchingdon to Ray)

Classification Item	2019	2022
Ecological	**Moderate**	**Moderate**
Biological quality elements	**Poor**	**Moderate**
Fish	Poor	Moderate
Invertebrates	Moderate	Moderate
Macrophytes and Phytobenthos Combined		
Macrophytes Sub Element	Moderate	Moderate
Physico-chemical quality elements		**Moderate**
Ammonia (Phys-Chem)		High
Dissolved oxygen		High

Classification Item	2019	2022
Phosphate		Moderate
Temperature		High
pH		High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Supporting elements (Surface Water)	**Moderate**	**Moderate**
Mitigation Measures Assessment	Moderate or less	Moderate or less
Specific pollutants	**High**	**High**
Copper	High	High
Iron	High	High
Manganese	High	High
Zinc	High	High
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Cadmium and Its Compounds	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Fail	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 6. EA Water Body Classification for Cherwell (Nell Bridge to Bletchingdon)

Classification Item	2019	2022
Ecological	**Moderate**	**Moderate**
Biological quality elements	**Moderate**	**Moderate**

Classification Item	2019	2022
Fish	Good	Moderate
Invertebrates	Moderate	Moderate
Macrophytes and Phytobenthos Combined	Moderate	Moderate
Macrophytes Sub Element	Moderate	Moderate
Physico-chemical quality elements	**Moderate**	**Moderate**
Ammonia (Phys-Chem)	High	High
Dissolved oxygen	Good	High
Phosphate	Poor	Poor
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Specific pollutants	**High**	**High**
Copper	High	High
Iron	High	High
Manganese	High	High
Zinc	High	High
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Cadmium and Its Compounds	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Fail	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 7. EA Water Body Classification for Evenlode (Glyme to Thames)

Classification Item	2019	2022
Ecological	**Poor**	**Poor**
Biological quality elements	**Poor**	**Poor**
Fish	Poor	Poor
Invertebrates	High	High
Physico-chemical quality elements	**Moderate**	**Moderate**
Acid Neutralising Capacity	High	High
Ammonia (Phys-Chem)	High	High
Dissolved oxygen	Good	Good
Phosphate	Poor	Poor
Temperature	Good	Good
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Morphology	Supports good	Supports good
Specific pollutants	**High**	**High**
Copper	High	High
Iron	High	High
Manganese	High	High
Permethrin	High	High
Triclosan	High	High
Zinc	High	High
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Cadmium and Its Compounds	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	

Classification Item	2019	2022
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 8. EA Water Body Classification for Thames (Evenlode to Thame)

Classification Item	2019	2022
Ecological	**Moderate**	**Poor**
Biological quality elements	**Moderate**	**Poor**
Fish	Good	Poor
Invertebrates	Moderate	High
Physico-chemical quality elements	**Moderate**	**Moderate**
Ammonia (Phys-Chem)	High	High
Dissolved oxygen	High	High
Phosphate	Moderate	Moderate
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Morphology	Supports good	Supports good
Specific pollutants	**High**	**High**
Arsenic	High	High
Chlorothalonil	High	High
Chromium (VI)	High	High
Copper	High	High
Diazinon	High	High
Dimethoate	High	High
Iron	High	High
Manganese	High	High
Pendimethalin	High	High
Permethrin	High	High
Triclosan	High	High
Zinc	High	High
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**

Classification Item	2019	2022
Benzo(a)pyrene	Good	
Benzo(b)fluoranthene	Good	
Benzo(g-h-i)perylene	Good	
Benzo(k)fluoranthene	Good	
Cadmium and Its Compounds	Good	
Di(2-ethylhexyl)phthalate (Priority hazardous)	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Hexachlorocyclohexane	Good	
Mercury and Its Compounds	Fail	
Nonylphenol	Good	
Pentachlorobenzene	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Quinoxyfen	Good	
Tributyltin Compounds	Good	
Priority substances	**Good**	**Does not require assessment**
Aclonifen	Good	
Alachlor	Good	
Bifenox	Good	
Cybutryne	Good	
Cypermethrin (Priority)	Good	
Dichlorvos (Priority)	Good	
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Terbutryn	Good	
Trichloromethane	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 9. EA Water Body Classification for Filchhampstead Brook at Farmoor Water

Classification Item	2019	2022
Ecological	**Bad**	**Bad**
Biological quality elements	**Bad**	**Bad**
Fish	Poor	Poor
Invertebrates	Bad	Bad
Macrophytes and Phytobenthos Combined	Moderate	Moderate
Macrophytes Sub Element	Moderate	Moderate
Physico-chemical quality elements	**Moderate**	**Moderate**
Acid Neutralising Capacity	High	High
Ammonia (Phys-Chem)	High	High
Dissolved oxygen	Moderate	Moderate
Phosphate	Moderate	Moderate
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Morphology	Supports good	Supports good
Specific pollutants	**High**	**High**
Copper	High	High
Iron	High	High
Manganese	High	High
Zinc	High	High
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Cadmium and Its Compounds	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	

Classification Item	2019	2022
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 10. EA Water Body Classification for Chil and Limb Brooks (source to B4044)

Classification Item	2019	2022
Ecological	**Poor**	**Poor**
Biological quality elements	**Poor**	**Poor**
Invertebrates	Poor	Poor
Macrophytes and Phytobenthos Combined	Moderate	Moderate
Macrophytes Sub Element	Moderate	Moderate
Physico-chemical quality elements	**Moderate**	**Moderate**
Ammonia (Phys-Chem)	Poor	Poor
Dissolved oxygen	Bad	Bad
Phosphate	Bad	Bad
Temperature	High	High
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Morphology	Supports good	Supports good
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Benzo(b)fluoranthene	Good	
Benzo(g-h-i)perylene	Good	
Benzo(k)fluoranthene	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	

Classification Item	2019	2022
Priority substances	**Good**	**Does not require assessment**
Cypermethrin (Priority)	Good	
Fluoranthene	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 11. EA Water Body Classification for Thames (Leach to Evenlode)

Classification Item	2019	2022
Ecological	**Poor**	**Poor**
Biological quality elements	**Poor**	**Poor**
Fish	Poor	Poor
Invertebrates	High	High
Macrophytes and Phytobenthos Combined		Good
Macrophytes Sub Element		Good
Physico-chemical quality elements	**Moderate**	**Moderate**
Acid Neutralising Capacity	High	High
Ammonia (Phys-Chem)	High	High
Dissolved oxygen	High	Moderate
Phosphate	Moderate	Bad
Temperature	Moderate	Good
pH	High	High
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Does not support good	Does not support good
Supporting elements (Surface Water)	**Moderate**	**Moderate**
Mitigation Measures Assessment	Moderate or less	Moderate or less
Specific pollutants	**High**	**High**
Arsenic	High	High
Copper	High	High
Iron	High	High
Manganese	High	High
Permethrin	High	High
Toluene	High	High
Triclosan	High	High
Zinc	High	High
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	

Classification Item	2019	2022
Cadmium and Its Compounds	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Hexachlorocyclohexane	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	Fail	
Polybrominated diphenyl ethers (PBDE)	Fail	
Tributyltin Compounds	Good	
Trifluralin (Priority hazardous)	Good	
Priority substances	**Good**	**Does not require assessment**
1,2-dichloroethane	Good	
Atrazine	Good	
Benzene	Good	
Cypermethrin (Priority)	Good	
Fluoranthene	Good	
Lead and Its Compounds	Good	
Nickel and Its Compounds	Good	
Pentachlorophenol	Good	
Simazine	Good	
Trichlorobenzenes	Good	
Trichloromethane	Good	
Other Pollutants	**Good**	**Does not require assessment**
Aldrin, Dieldrin, Endrin & Isodrin	Good	
Carbon Tetrachloride	Good	
DDT Total	Good	
Tetrachloroethylene	Good	
Trichloroethylene	Good	
para - para DDT	Good	

Table 12. EA Water Body Classification for Farmoor Reservoir

Classification Item	2019	2022
Ecological	**Moderate**	**Moderate**
Hydromorphological Supporting Elements	**Supports good**	**Supports good**
Hydrological Regime	Supports good	Supports good
Supporting elements (Surface Water)	**Moderate**	**Moderate**
Expert Judgement	Moderate	Moderate
Mitigation Measures Assessment	Moderate or less	Moderate or less
Chemical	**Fail**	**Does not require assessment**
Priority hazardous substances	**Fail**	**Does not require assessment**
Benzo(a)pyrene	Good	
Dioxins and dioxin-like compounds	Good	
Heptachlor and cis-Heptachlor epoxide	Good	
Hexabromocyclododecane (HBCDD)	Good	
Hexachlorobenzene	Good	
Hexachlorobutadiene	Good	
Mercury and Its Compounds	Good	
Perfluorooctane sulphonate (PFOS)	**Fail**	
Polybrominated diphenyl ethers (PBDE)	**Fail**	
Priority substances	**Good**	**Does not require assessment**
Fluoranthene	Good	
Other Pollutants	**Does not require assessment**	**Does not require assessment**

Table 13. EA Water Body Classification for Chipping Norton Jurassic

Classification Item	2019
Overall Water Body	**Poor**
Quantitative	**Good**
Quantitative Status element	**Good**
Quantitative Dependent Surface Water Body Status	Good
Quantitative GWDTEs test	Good
Quantitative Saline Intrusion	Good
Quantitative Water Balance	Good
Chemical (GW)	**Poor**
Chemical Status element	**Poor**
Chemical Dependent Surface Water Body Status	Good
Chemical Drinking Water Protected Area	Poor

Classification Item	2019
Chemical GWDTEs test	Good
Chemical Saline Intrusion	Good
General Chemical Test	Poor
Supporting elements (Groundwater)	
Prevent and Limit Objective	Active
Trend Assessment	Upward trend

Table 14. EA Water Body Classification for Burford Jurassic

Classification Item	2019
Overall Water Body	**Poor**
Quantitative	**Good**
Quantitative Status element	**Good**
Quantitative Dependent Surface Water Body Status	Good
Quantitative GWDTEs test	Good
Quantitative Saline Intrusion	Good
Quantitative Water Balance	Good
Chemical (GW)	**Poor**
Chemical Status element	**Poor**
Chemical Dependent Surface Water Body Status	Good
Chemical Drinking Water Protected Area	Poor
Chemical GWDTEs test	Good
Chemical Saline Intrusion	Good
General Chemical Test	Poor
Supporting elements (Groundwater)	
Prevent and Limit Objective	Active
Trend Assessment	Upward trend

Table 15. EA Water Body Classification for Tackley Jurassic

Classification Item	2019
Overall Water Body	**Good**
Quantitative	**Good**
Quantitative Status element	**Good**
Quantitative Dependent Surface Water Body Status	Good
Quantitative GWDTEs test	Good
Quantitative Saline Intrusion	Good
Quantitative Water Balance	Good
Chemical (GW)	**Good**

Classification Item	2019
Chemical Status element	**Good**
Chemical Dependent Surface Water Body Status	Good
Chemical Drinking Water Protected Area	Good
Chemical GWDTEs test	Good
Chemical Saline Intrusion	Good
General Chemical Test	Good
Supporting elements (Groundwater)	
Prevent and Limit Objective	Active
Trend Assessment	Upward trend

Table 16. EA Water Body Classification for Kemble Forest Marble

Classification Item	2019
Overall Water Body	**Poor**
Quantitative	**Good**
Quantitative Status element	**Good**
Quantitative Dependent Surface Water Body Status	Good
Quantitative GWDTEs test	Good
Quantitative Saline Intrusion	Good
Quantitative Water Balance	Good
Chemical (GW)	**Poor**
Chemical Status element	**Poor**
Chemical Dependent Surface Water Body Status	Good
Chemical Drinking Water Protected Area	Poor
Chemical GWDTEs test	Good
Chemical Saline Intrusion	Good
General Chemical Test	Good
Supporting elements (Groundwater)	
Prevent and Limit Objective	Active
Trend Assessment	Upward trend

Table 17. EA Water Body Classification for Bicester-Otmoor Cornbrash

Classification Item	2019
Overall Water Body	**Poor**
Quantitative	**Good**
Quantitative Status element	**Good**
Quantitative Dependent Surface Water Body Status	Good
Quantitative GWDTEs test	Good

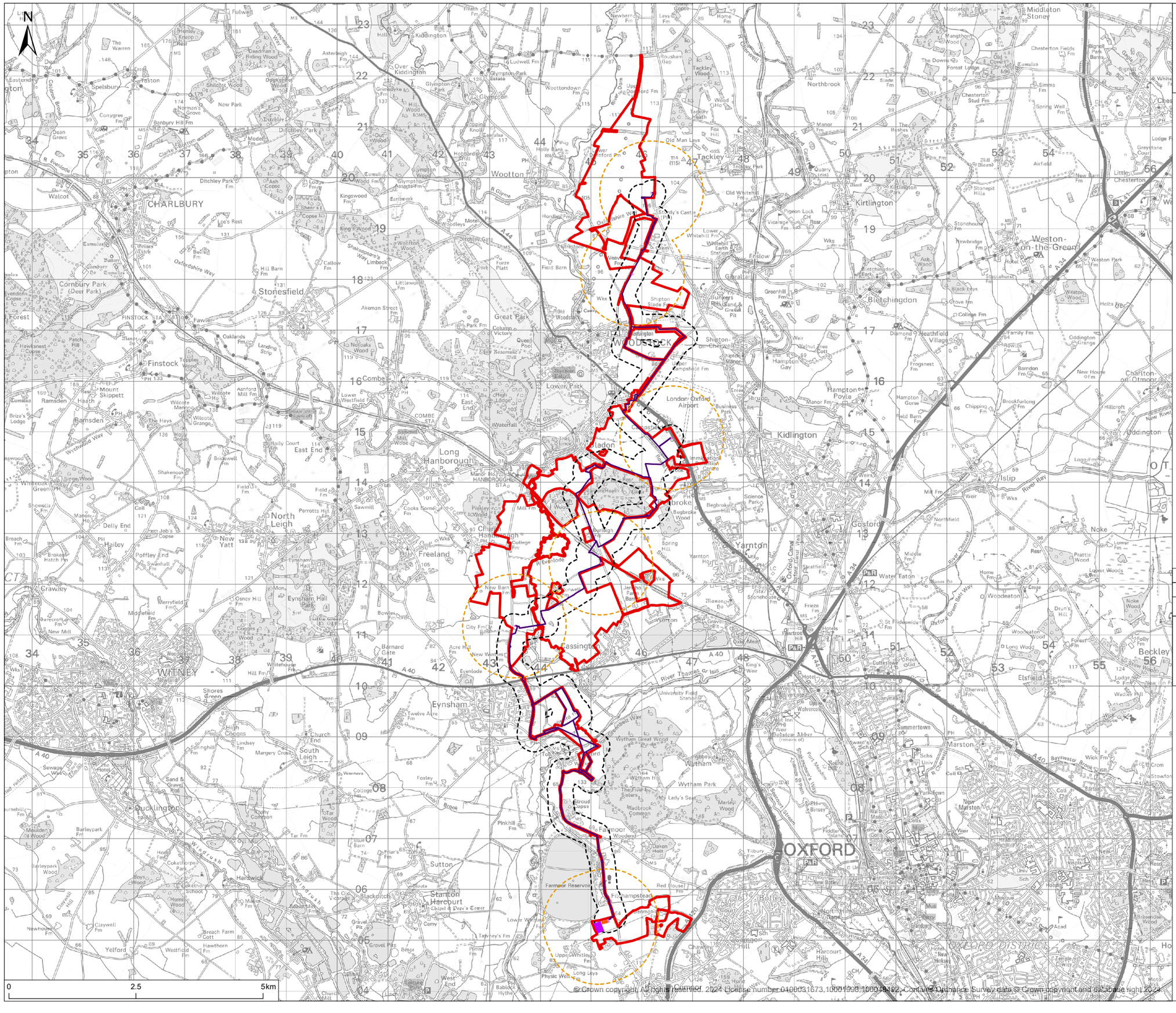
Classification Item	2019
Quantitative Saline Intrusion	Good
Quantitative Water Balance	Good
Chemical (GW)	**Poor**
Chemical Status element	**Poor**
Chemical Dependent Surface Water Body Status	**Good**
Chemical Drinking Water Protected Area	Poor
Chemical GWDTEs test	Good
Chemical Saline Intrusion	Good
General Chemical Test	Good
Supporting elements (Groundwater)	
Prevent and Limit Objective	Active
Trend Assessment	Upward trend

Table 18. EA Water Body Classification for Shrivenham Corallian

Classification Item	2019
Overall Water Body	**Good**
Quantitative	**Good**
Quantitative Status element	**Good**
Quantitative Dependent Surface Water Body Status	Good
Quantitative GWDTEs test	Good
Quantitative Saline Intrusion	Good
Quantitative Water Balance	Good
Chemical (GW)	**Good**
Chemical Status element	**Good**
Chemical Dependent Surface Water Body Status	Good
Chemical Drinking Water Protected Area	Good
Chemical GWDTEs test	Good
Chemical Saline Intrusion	Good
General Chemical Test	Good
Supporting elements (Groundwater)	
Prevent and Limit Objective	Active
Trend Assessment	Upward trend

Appendix B

Figures



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Legend

- Order Limits
- 275kV Cable Route
- Secondary Substation
- Main Substation
- NG Substatation
- 250m cable route buffer
- 1km substation buffer

Rev	Description	By	CB	Date

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Title Study Area

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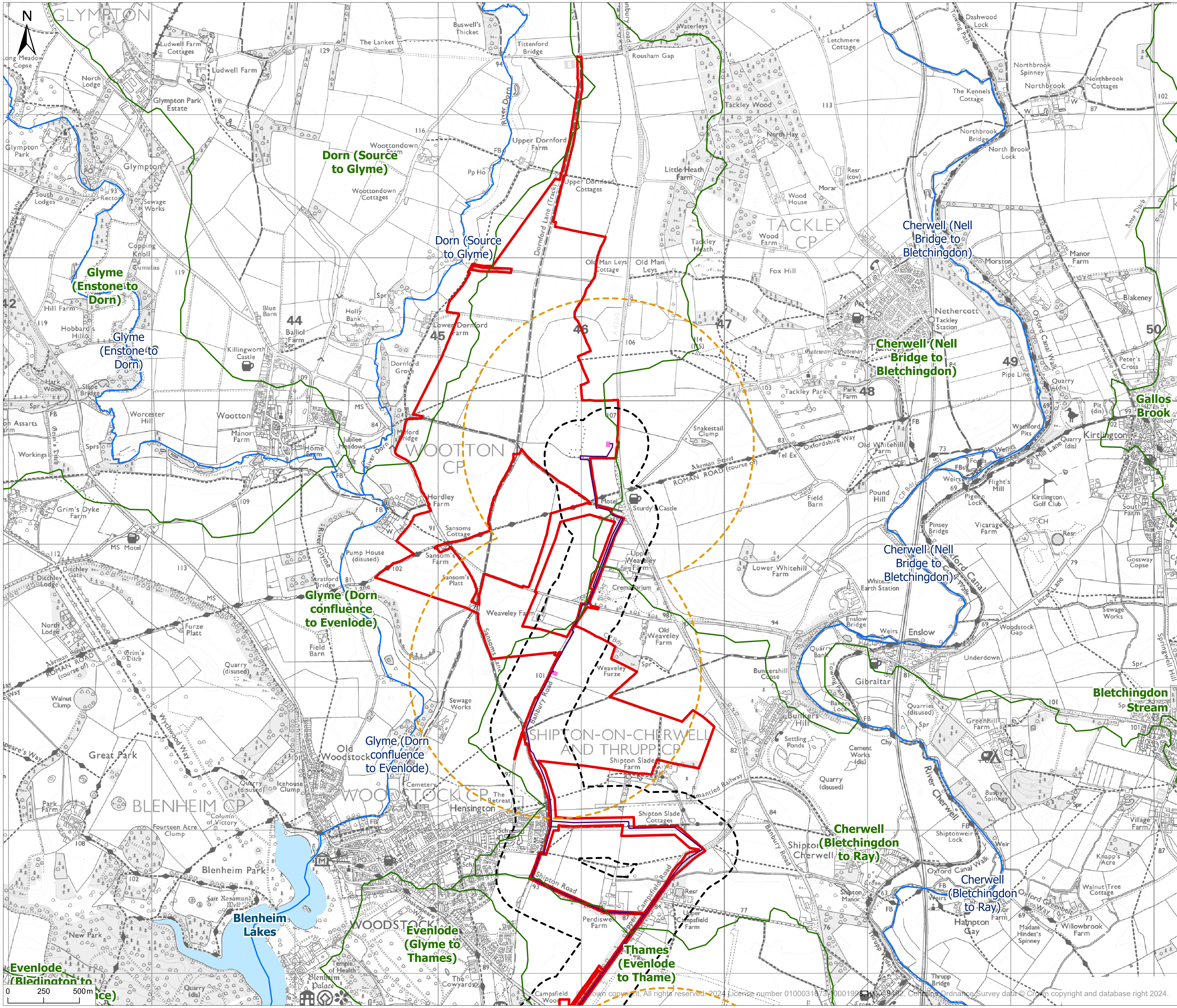

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- 1km substation buffer
- WFD River Water Bodies Cycle 3
- WFD River Water Body Catchments Cycle 3
- WFD Lake Water Bodies Cycle 3

Rev	Description	By	CB	Date

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Client PVDP

Project Botley West Solar Farm

Title Surface Water Bodies - North

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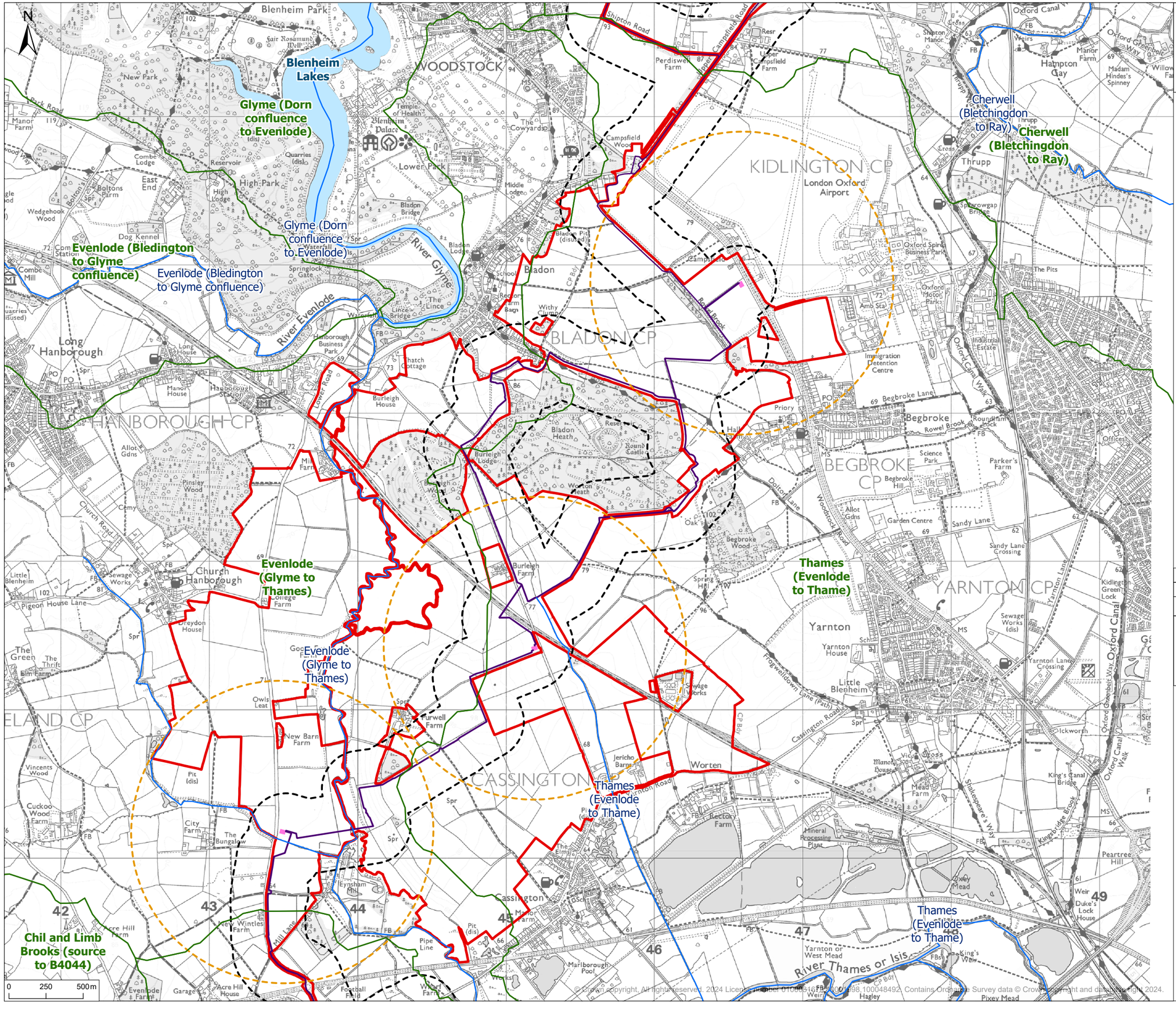

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Rev	Description	By	CB	Date

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Project	Botley West Solar Farm
Title	Surface Water Bodies - Central

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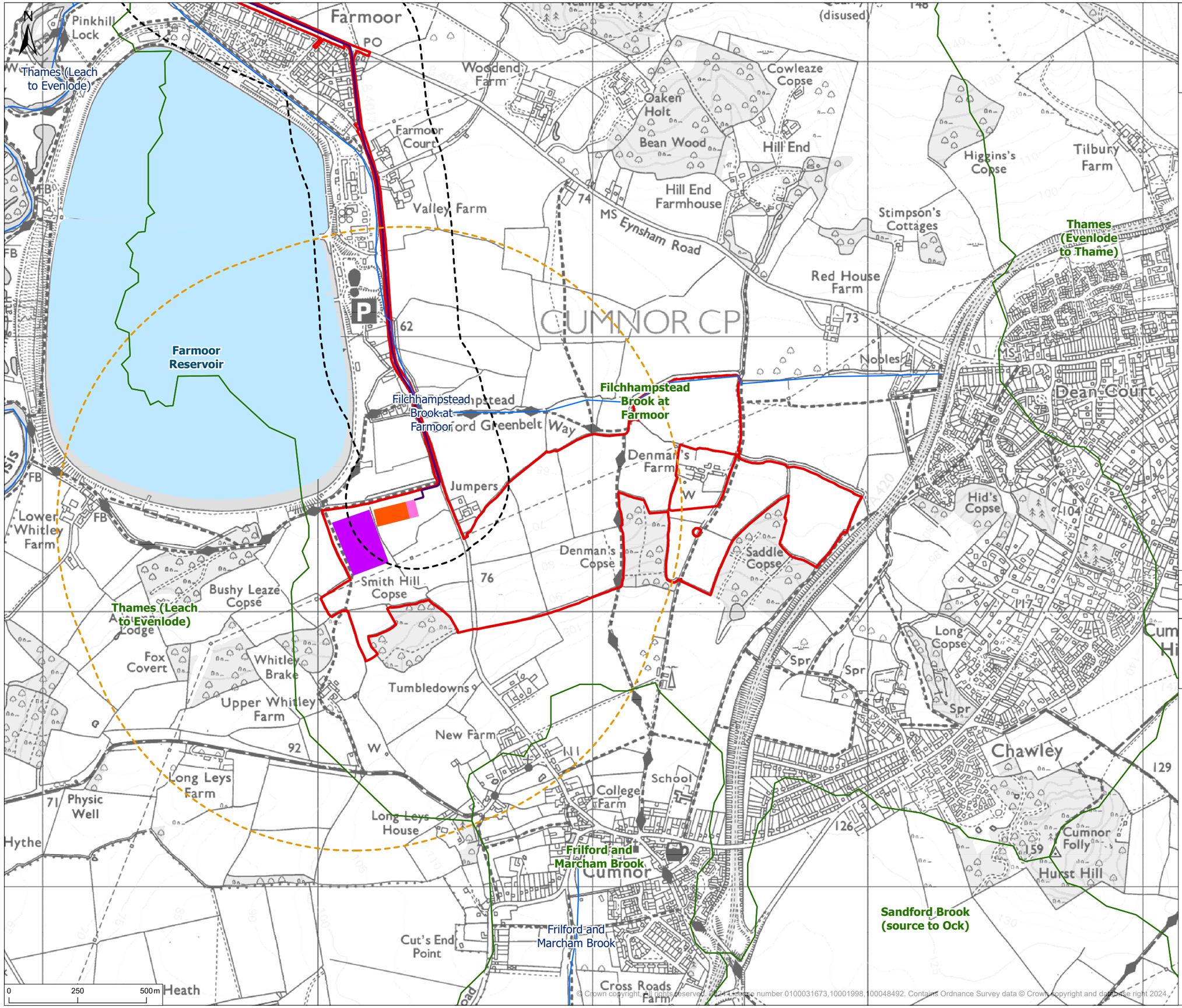

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Title	Surface Water Bodies - South

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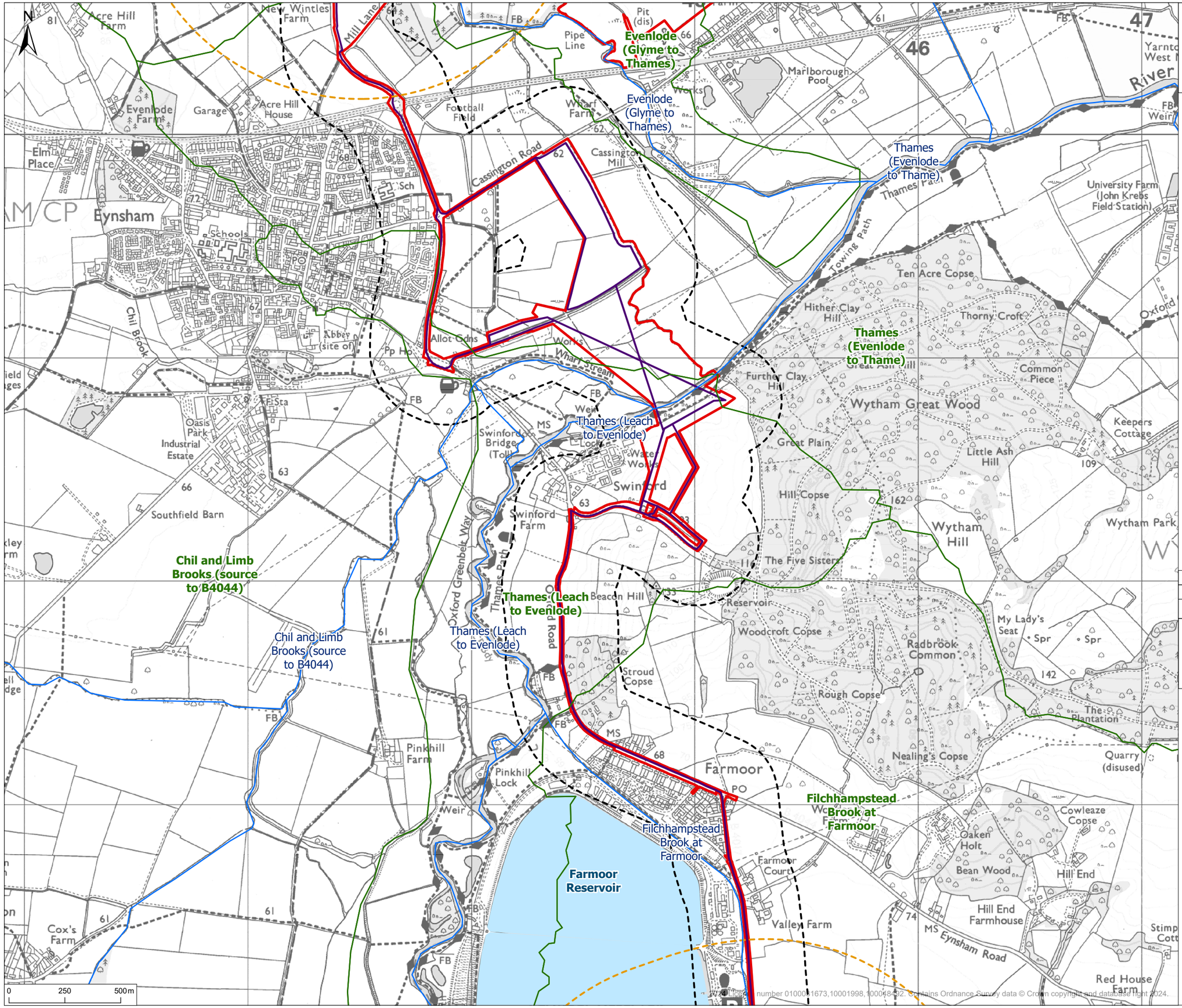

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- WFD Lake Water Bodies Cycle 3

Rev	Description	By	CB	Date

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Client: PVDP

Project: Botley West Solar Farm

Title: Surface Water Bodies - Cable Route

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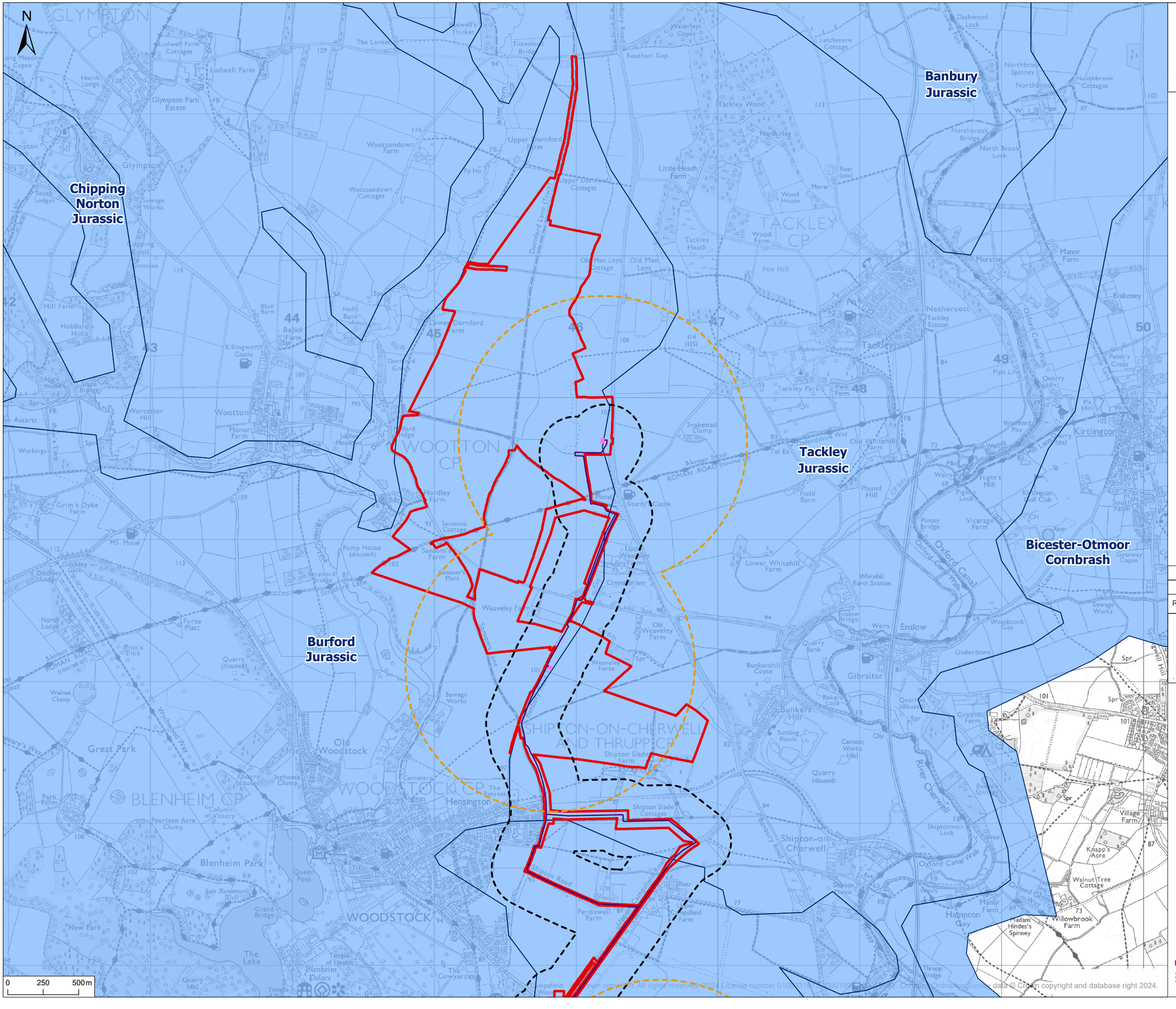

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Legend

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- 1km substation buffer
- WFD Groundwater Bodies Cycle 3

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PHOTOVOLT DEVELOPMENT PARTNERS

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Client	PVDP
Project	Botley West Solar Farm
Title	Ground Water Bodies - North

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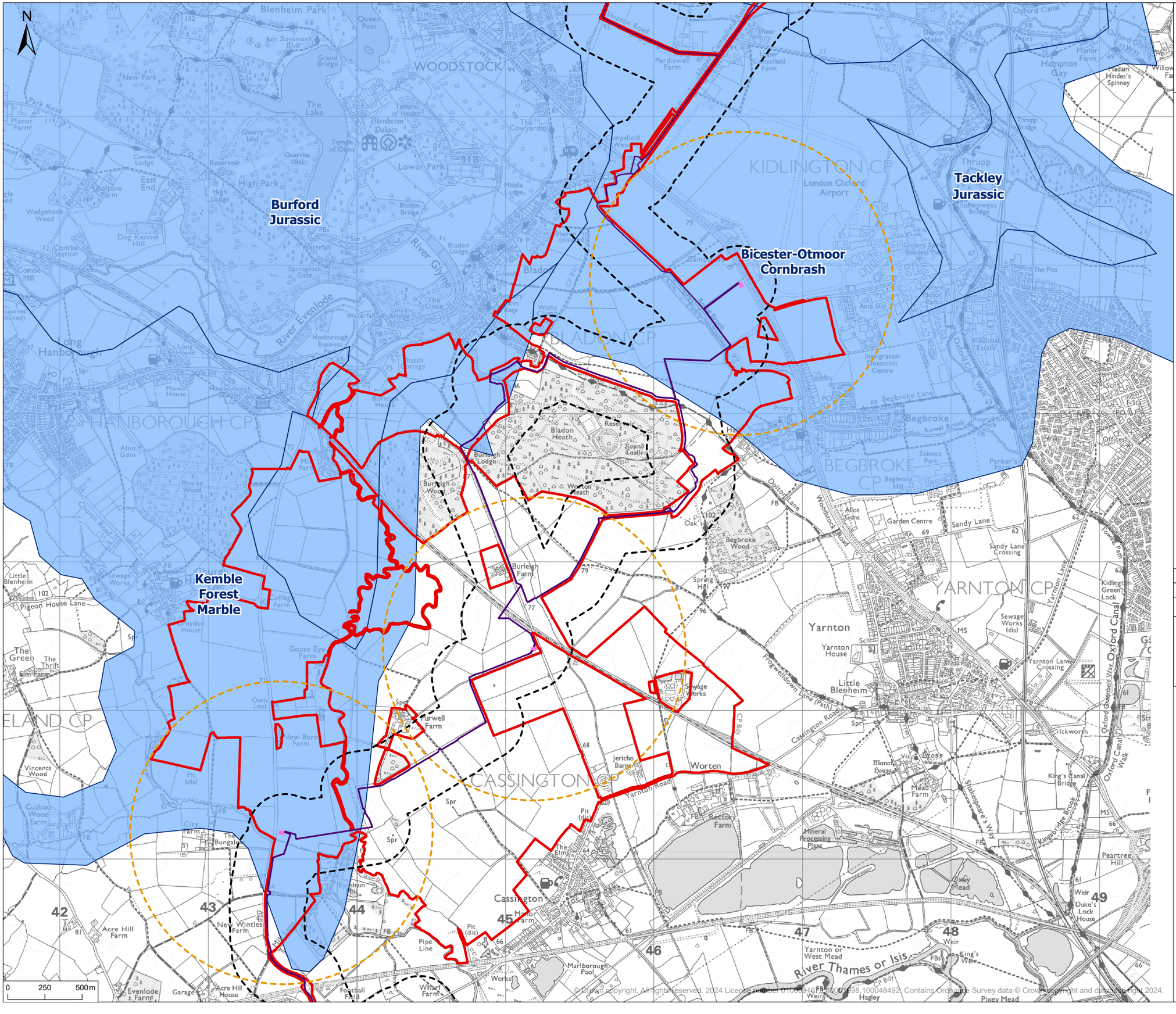

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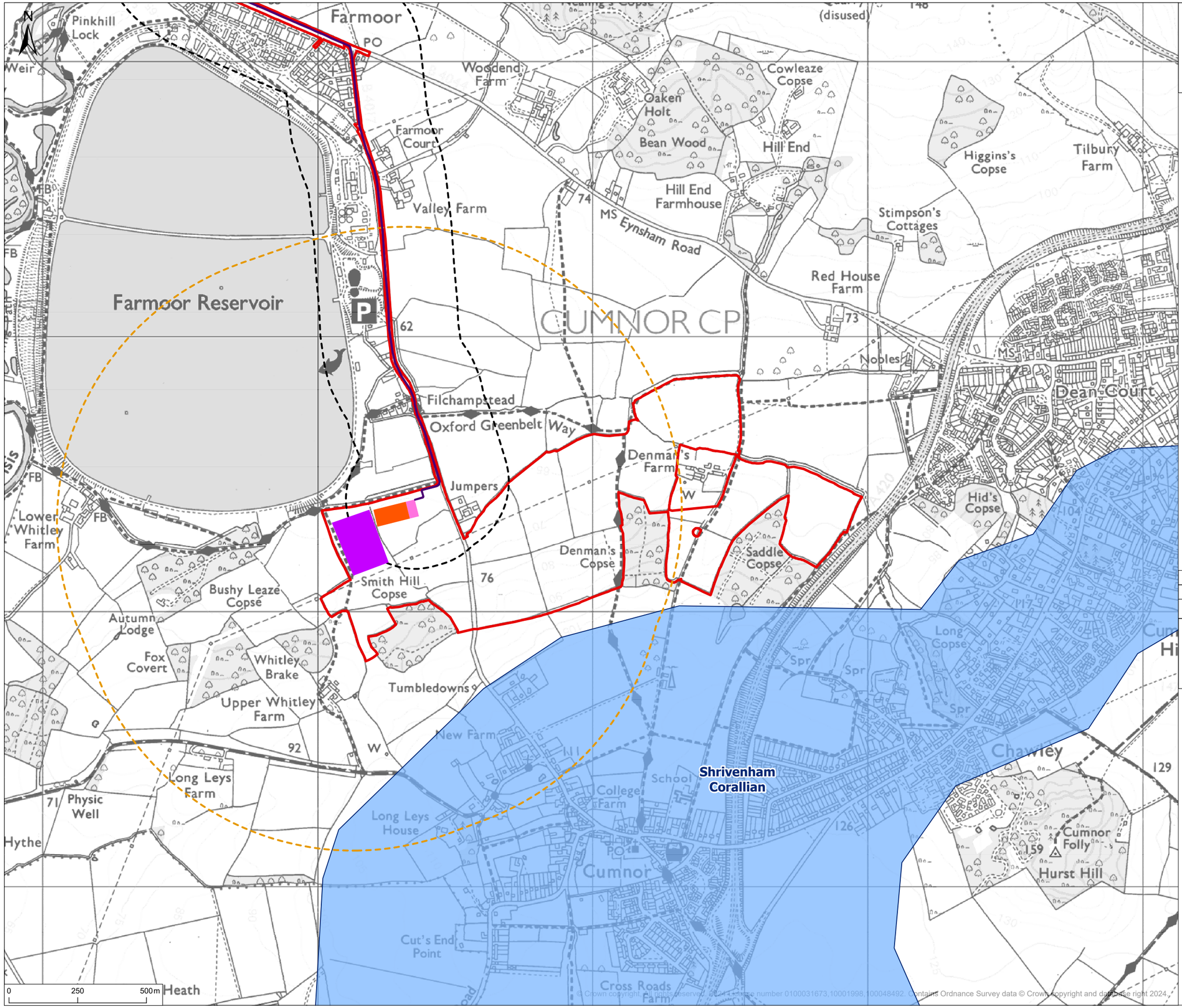

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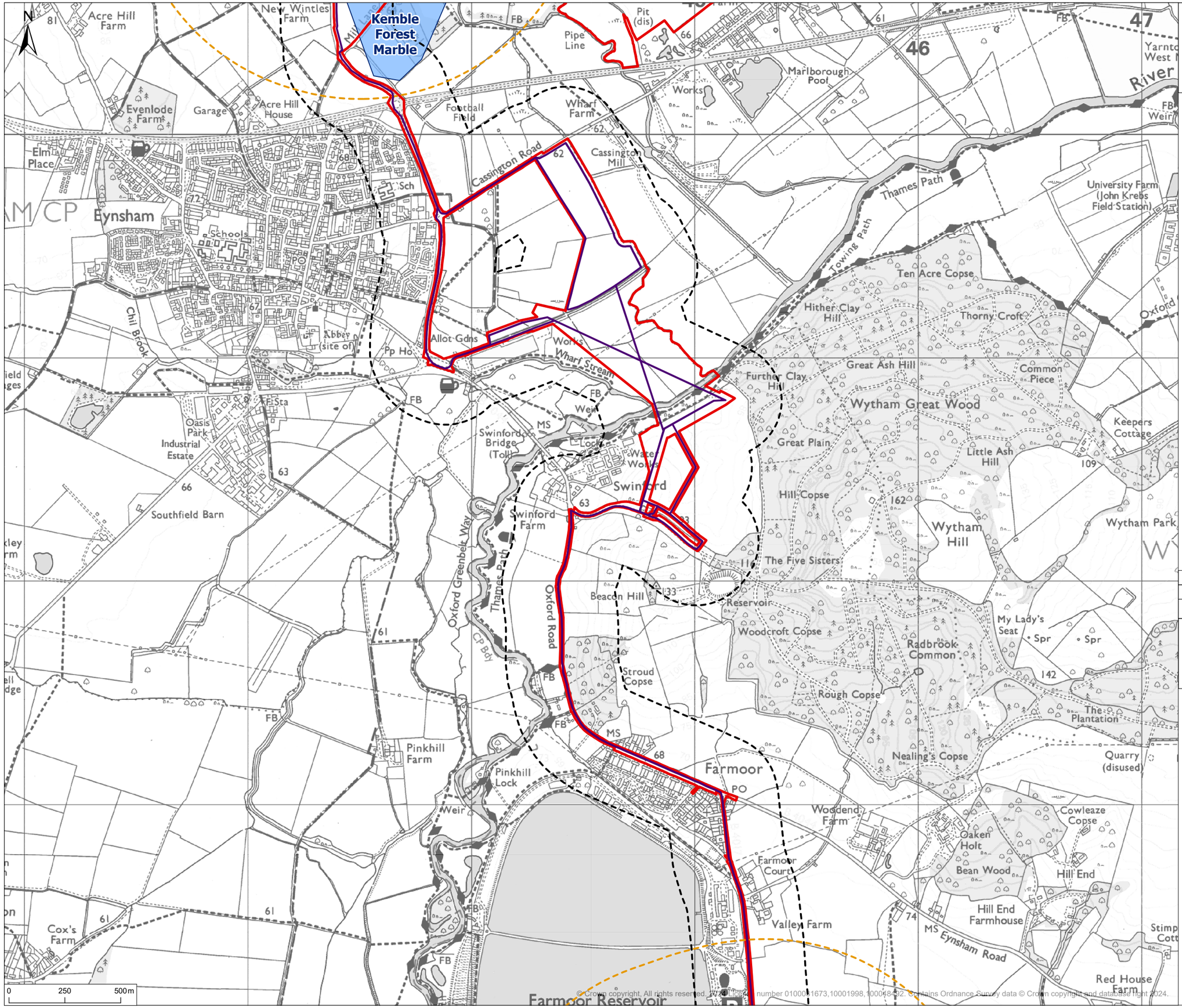

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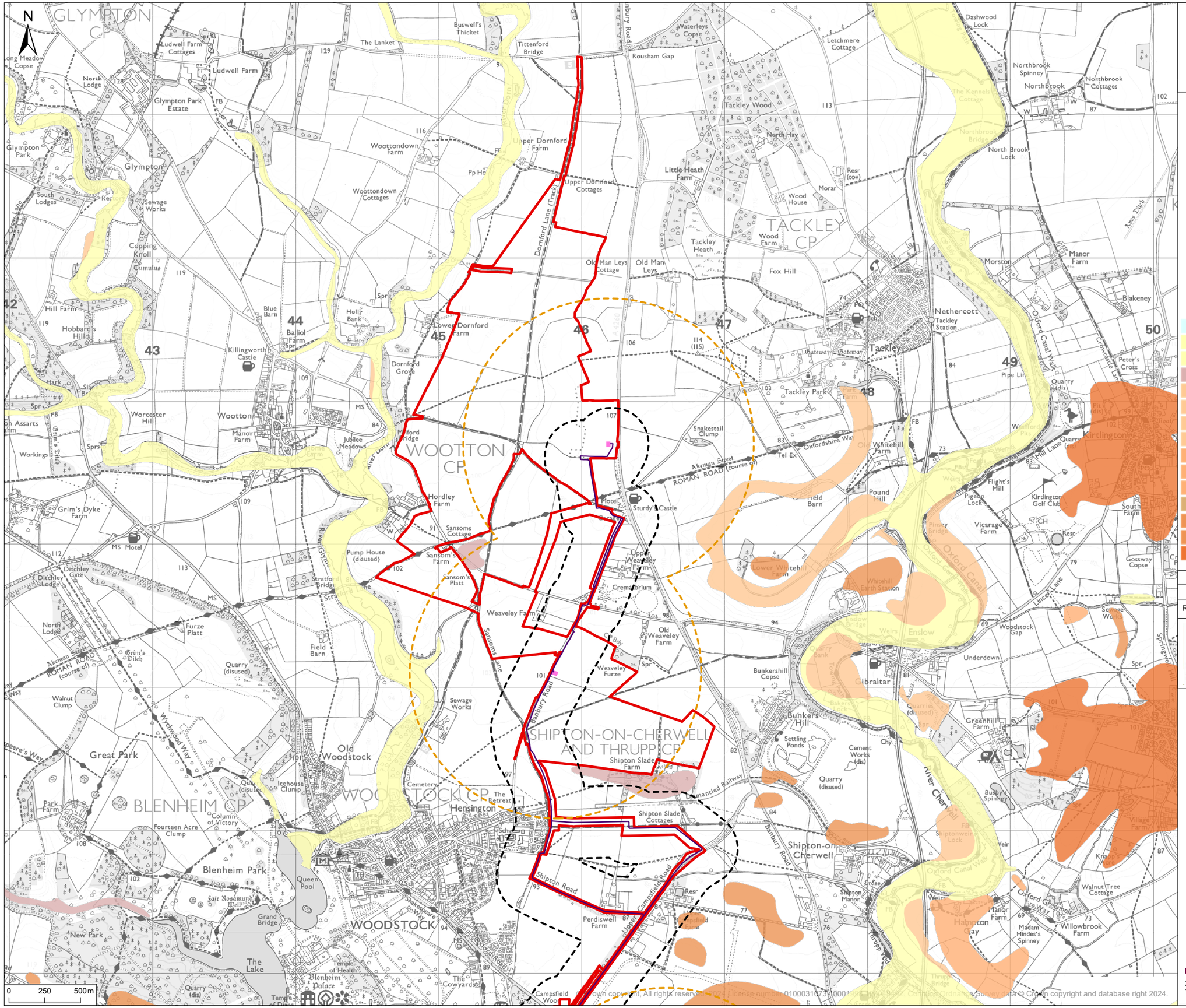

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- Northern Drift Formation - Diamicton
- Alluvium - Clay, Silt, Sand and Gravel
- Tufa - Tufa, Calcareous
- Head - Clay, Silt, Sand and Gravel
- Northmoor Sand and Gravel Member - Sand and Gravel
- Northmoor Sand and Gravel Member, Lower/Upper Facet - Sand and Gravel
- River Terrace Deposits, 1-3 - Sand and Gravel
- River Terrace Deposits, 4 - Gravel
- Summertown-Radley Sand and Gravel Member - Sand and Gravel
- Summertown-Radley Sand and Gravel Member, Lower Facet - Sand and Gravel
- Summertown-Radley Sand and Gravel Member, Upper Facet - Sand and Gravel
- Peat - Peat
- Wolvercote Sand and Gravel Member - Sand and Gravel
- Northern Drift Formation - Sand and Gravel
- Hanborough Gravel Member - Sand and Gravel

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Title	BGS Superficial Deposits 1:50,000 - North

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Rev	Description	By	CB	Date

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Title	BGS Superficial Deposits 1:50,000 - Central

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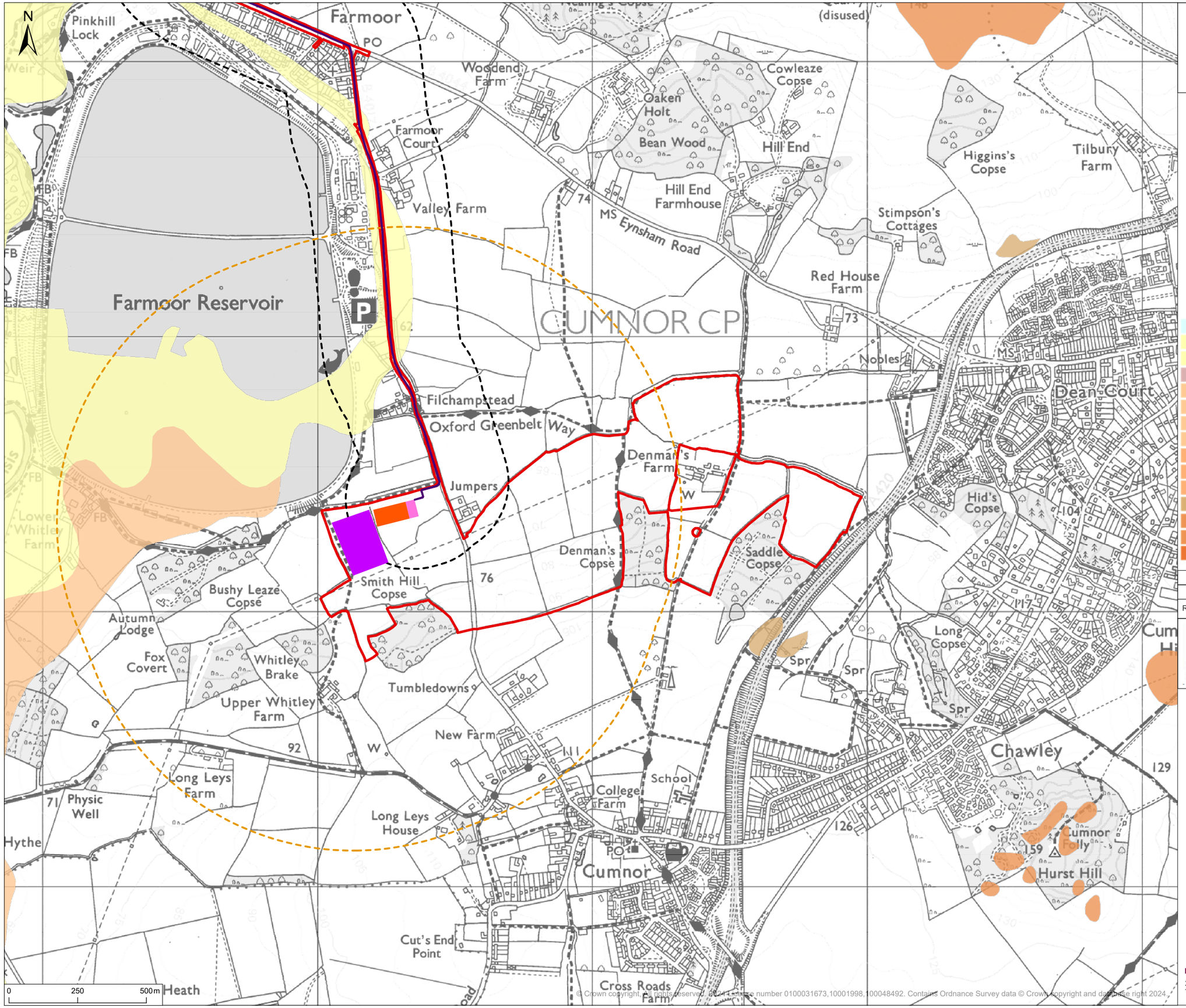

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Rev	Description	By	CB	Date

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Client	PVDP
Project	Botley West Solar Farm
Title	BGS Superficial Deposits 1:50,000 - South

Status	Drawn By	PM/Checked By
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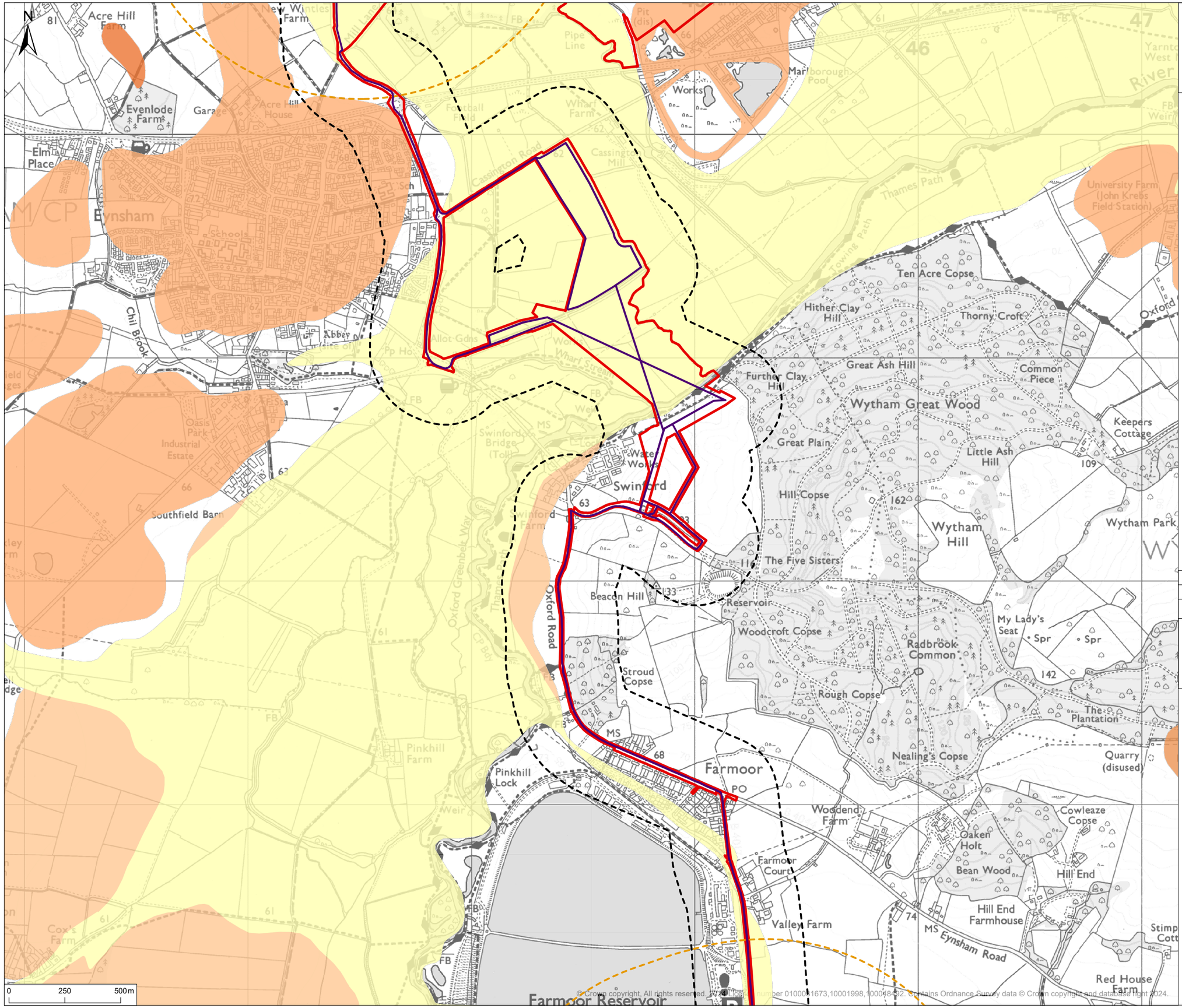

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Client	PVDP
Project	Botley West Solar Farm
Title	BGS Superficial Deposits 1:50,000 - Cable Route

Status	Drawn By	PM/Checked By
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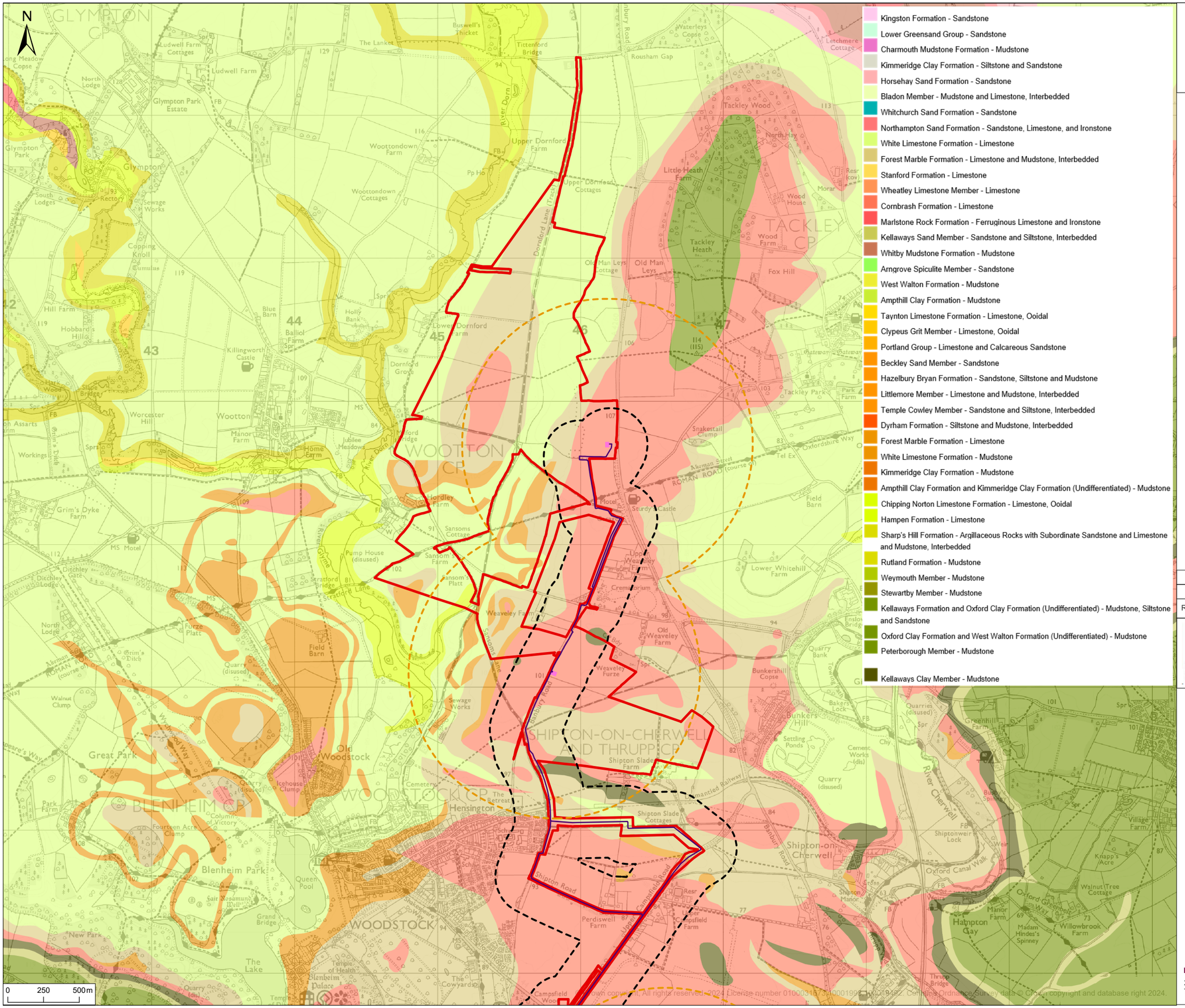

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Client	PVDP
Project	Botley West Solar Farm
Title	BGS Bedrock Geology 1:50,000- North

Status	Drawn By	PM/Checked By
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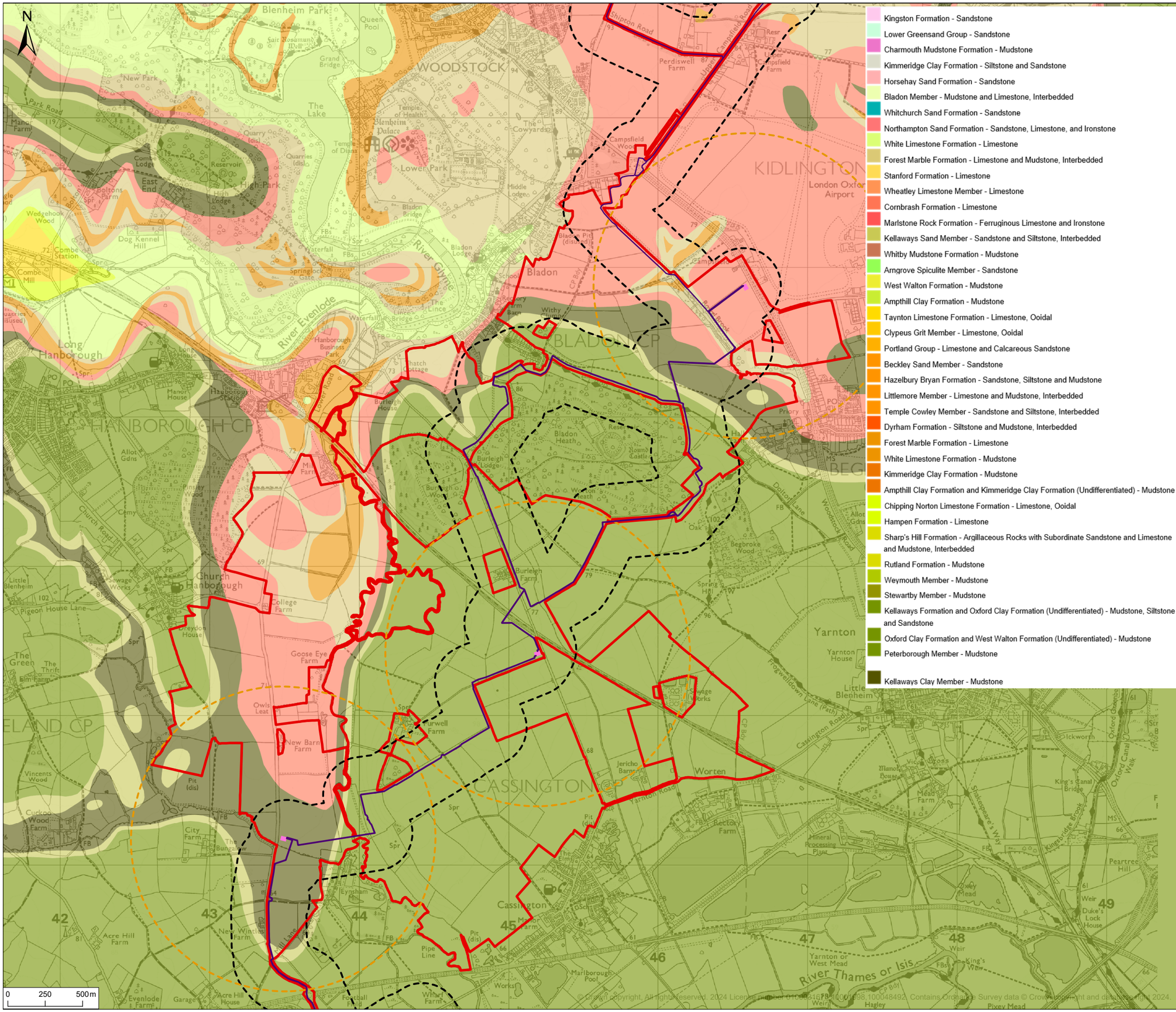

- Kingston Formation - Sandstone
- Lower Greensand Group - Sandstone
- Charmouth Mudstone Formation - Mudstone
- Kimmeridge Clay Formation - Siltstone and Sandstone
- Horsehay Sand Formation - Sandstone
- Bladon Member - Mudstone and Limestone, Interbedded
- Whitchurch Sand Formation - Sandstone
- Northampton Sand Formation - Sandstone, Limestone, and Ironstone
- White Limestone Formation - Limestone
- Forest Marble Formation - Limestone and Mudstone, Interbedded
- Stanford Formation - Limestone
- Wheatley Limestone Member - Limestone
- Cornbrash Formation - Limestone
- Marlstone Rock Formation - Ferruginous Limestone and Ironstone
- Kellaways Sand Member - Sandstone and Siltstone, Interbedded
- Whitby Mudstone Formation - Mudstone
- Arngrove Spiculite Member - Sandstone
- West Walton Formation - Mudstone
- Ampthill Clay Formation - Mudstone
- Taynton Limestone Formation - Limestone, Ooidal
- Clypeus Grit Member - Limestone, Ooidal
- Portland Group - Limestone and Calcareous Sandstone
- Beckley Sand Member - Sandstone
- Hazelbury Bryan Formation - Sandstone, Siltstone and Mudstone
- Littlemore Member - Limestone and Mudstone, Interbedded
- Temple Cowley Member - Sandstone and Siltstone, Interbedded
- Dyrham Formation - Siltstone and Mudstone, Interbedded
- Forest Marble Formation - Limestone
- White Limestone Formation - Mudstone
- Kimmeridge Clay Formation - Mudstone
- Ampthill Clay Formation and Kimmeridge Clay Formation (Undifferentiated) - Mudstone
- Chipping Norton Limestone Formation - Limestone, Ooidal
- Hampen Formation - Limestone
- Sharp's Hill Formation - Argillaceous Rocks with Subordinate Sandstone and Limestone and Mudstone, Interbedded
- Rutland Formation - Mudstone
- Weymouth Member - Mudstone
- Stewartby Member - Mudstone
- Kellaways Formation and Oxford Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone
- Oxford Clay Formation and West Walton Formation (Undifferentiated) - Mudstone
- Peterborough Member - Mudstone
- Kellaways Clay Member - Mudstone

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Legend

- Order Limits
- 275kV Cable Route
- Secondary Substation
- 250m cable route buffer
- 1km substation buffer

Rev	Description	By	CB	Date

PHOTOVOLT DEVELOPMENT PARTNERS

rps A TETRA TECH COMPANY

Client	PVDP
Project	Botley West Solar Farm
Title	BGS Bedrock Geology 1:50,000- Central

Status	Drawn By	PM/Checked By
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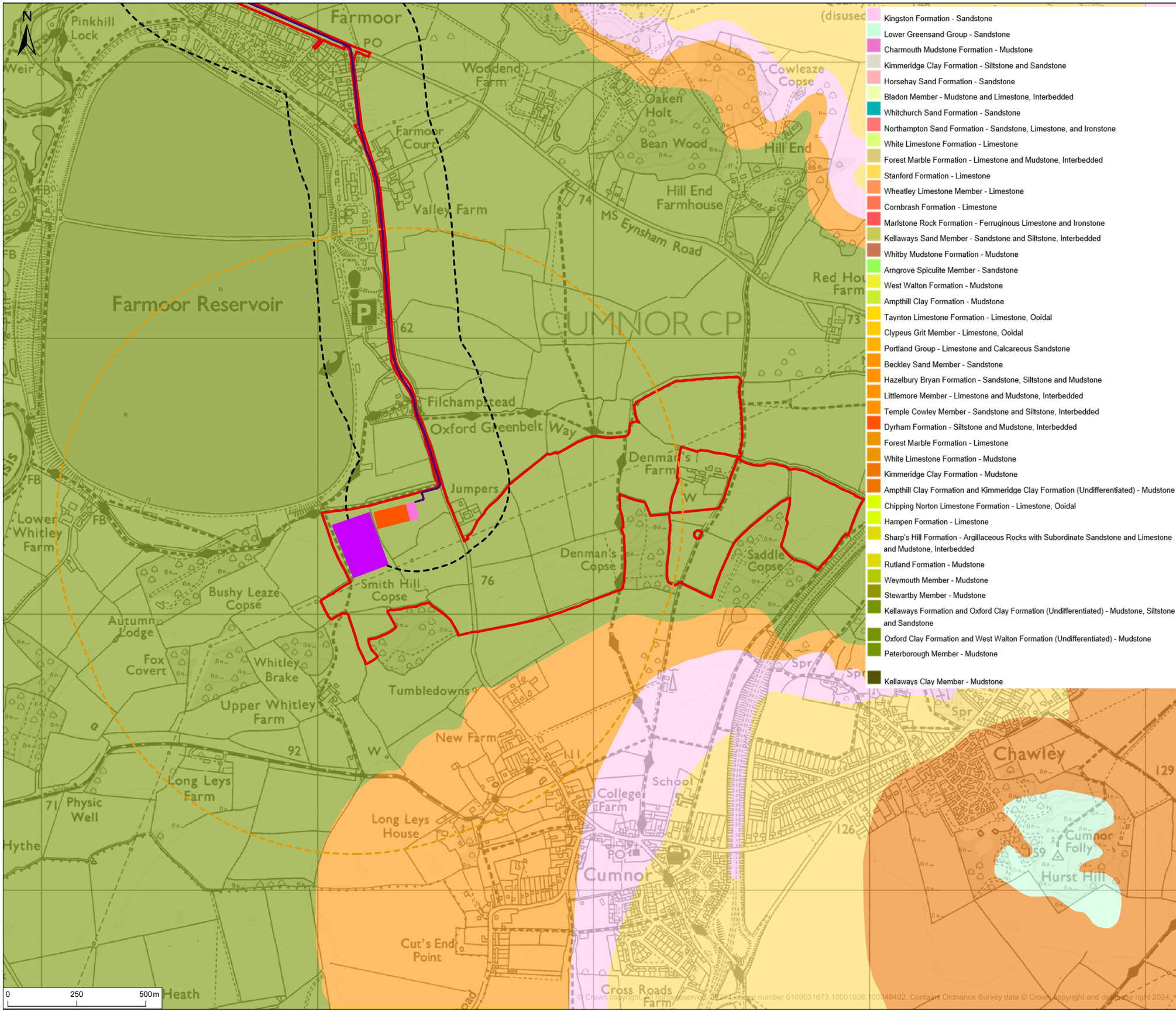

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Legend

- Order Limits
- 275kV Cable Route
- Secondary Substation
- Main Substation
- NG Substatation
- 250m cable route buffer
- 1km substation buffer

Rev	Description	By	CB	Date

PHOTOVOLT DEVELOPMENT PARTNERS

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Client	PVDP
Project	Botley West Solar Farm
Title	BGS Bedrock Geology 1:50,000-South

Status	Drawn By	PM/Checked By
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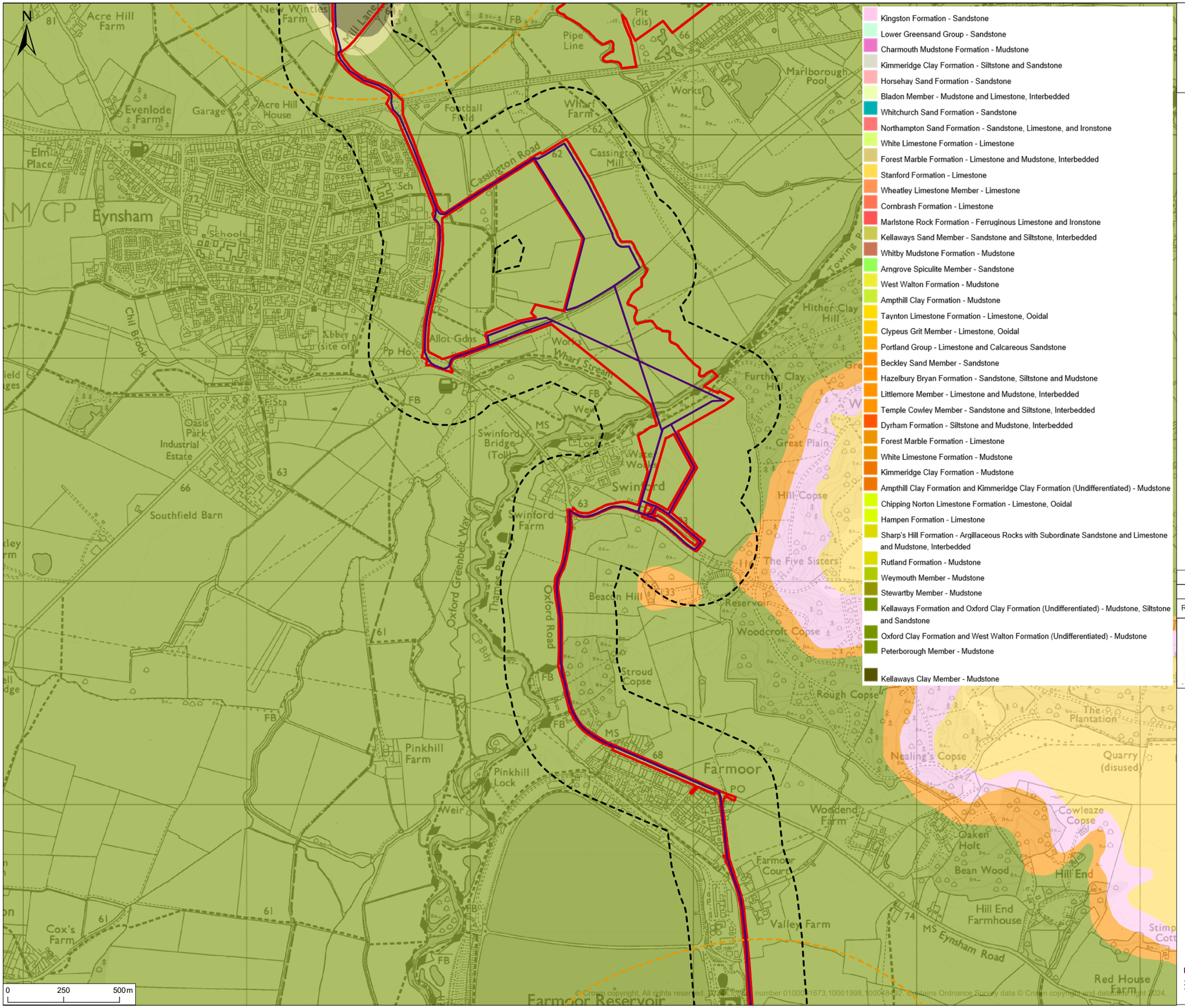

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Legend

- Order Limits
- 275kV Cable Route
- 250m cable route buffer
- 1km substation buffer

- Kingston Formation - Sandstone
- Lower Greensand Group - Sandstone
- Charmouth Mudstone Formation - Mudstone
- Kimmeridge Clay Formation - Siltstone and Sandstone
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- Wheatley Limestone Member - Limestone
- Cornbrash Formation - Limestone
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- Peterborough Member - Mudstone
- Kellaways Clay Member - Mudstone

Rev	Description	By	CB	Date

PHOTOVOLT DEVELOPMENT PARTNERS

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Client	PVDP
Project	Botley West Solar Farm
Title	BGS Bedrock Geology 1:50,000- Cable Route

Status	Drawn By	PM/Checked By
FINAL	JM	TJ
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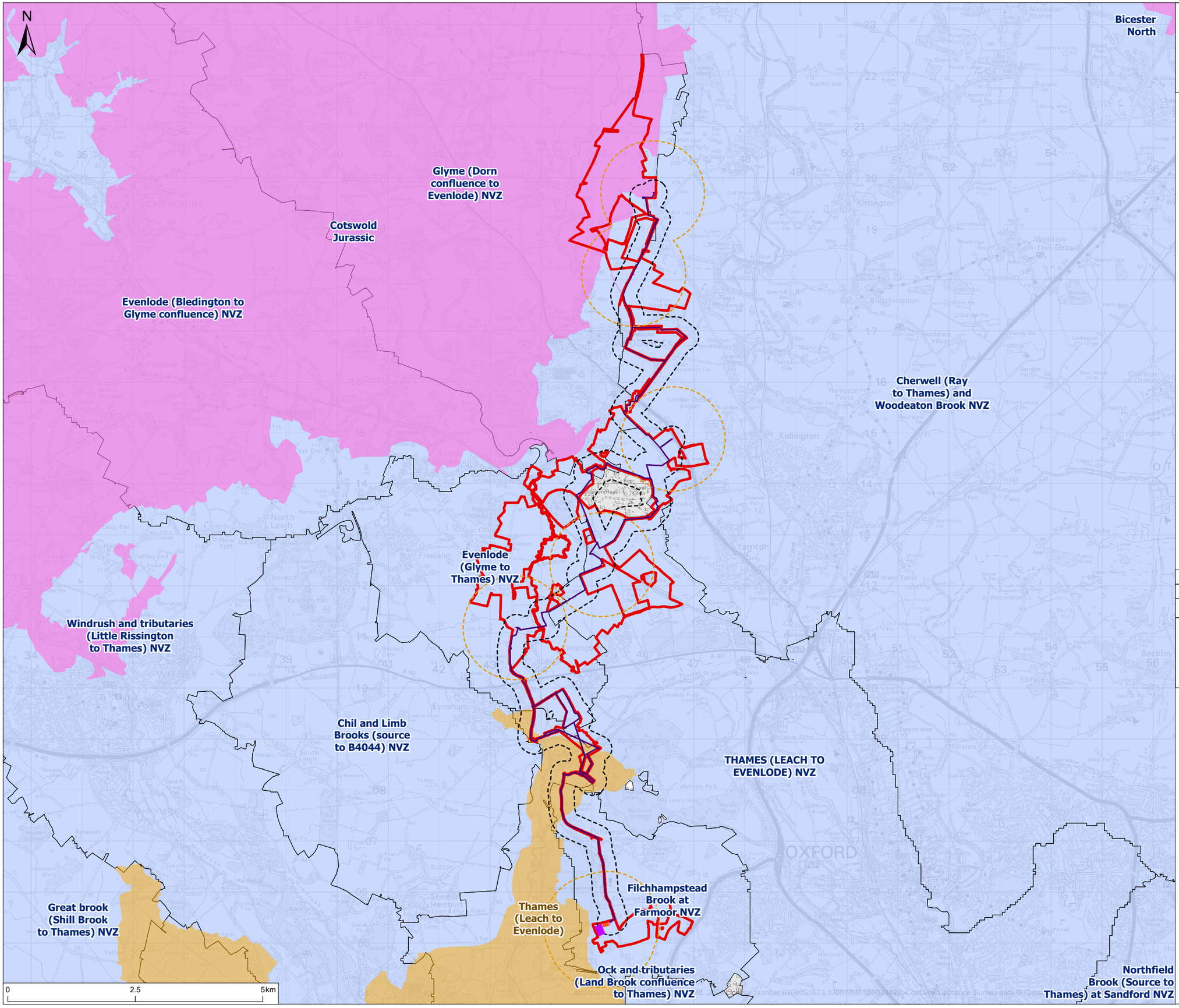

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Legend

- Order Limits
- 275kV Cable Route
- Secondary Substation
- Main Substation
- NG Substatation
- 250m cable route buffer
- 1km substation buffer
- Drinking Water Protected Areas (Surface Water)
- Groundwater Nitrate Vulnerable Zone
- Surface Water Nitrate Vulnerable Zone

Rev	Description	By	CB	Date

PHOTOVOLT DEVELOPMENT PARTNERS

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Client: PVDP

Project: Botley West Solar Farm

Title: Drinking Water Protected Areas, Drinking Water Safeguard Zones & Nitrate Vulnerable Zones

Status	Drawn By	PM/Checked By
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