The Droves Solar Farm

Chapter 12: Water Resources (Clean)

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List of Contents

List of Tables

List of Plates

List of Appendices

List of Figures

12 Water Resources

12.1 Introduction

12.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) of effects on Water Resources as a result of the Scheme.

12.1.2 This chapter identifies and proposes measures to address the potential impacts and likely significant effects in relation to Water Resources, during the construction, operation and decommissioning phases.

12.1.3 The information presented within this chapter has been informed by the Scheme information provided in **ES Chapter 5: The Scheme [APP/6.1]**.

12.1.4 The following aspects have been considered within the Water Resources assessment process:

- Potential chemical pollution effects on the hydrological environment
- Potential erosion and sedimentation effects on the hydrological environment
- Potential impediments to stream flow
- Potential changes to groundwater quantity
- Potential effects on private and public water supplies
- Potential changes in soil interflow patterns
- Potential for the compaction of soils; and
- Potential for an increase in runoff and flood risk.

12.1.5 This Water Resources chapter has been prepared by Raincloud Consulting Ltd (See **ES Appendix 1.1: Statement of Competence [APP/6.4]**).

12.1.6 This document has been updated at Deadline 2 to incorporate the Environment Agency (EA) North East Anglian Chalk (NEAC) groundwater model outputs. The document references have not been updated from the original submission. Please refer to the **Guide to the Application [APP/1.3.3]** for the list of current versions of documents.

12.2 Consultation

Scoping Opinion

12.2.1 On 8 November 2024, the Applicant submitted a Scoping Opinion Request to the Planning Inspectorate (PINS) (see **ES Appendix 2.1: EIA Scoping Opinion Request [APP/6.4]**) in support of a request for a Scoping Opinion from the PINS behalf of the Secretary of State pursuant to Regulation 10 of the EIA Regulations.

12.2.2 A Scoping Opinion (see **ES Appendix 2.2: Scoping Opinion [APP/6.4]**) was adopted by PINS on 18 December 2024.

12.2.3 The issues raised in the Scoping Opinion relating to Water Resources are summarised and responded to within **ES Appendix 12.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]** which demonstrates how the matters raised in the Scoping Opinion are addressed in this ES.

Statutory Consultation and Preliminary Environmental Information Report (PEIR)

12.2.4 Statutory consultation was held between 21 May 2025, and 9 July 2025. Relevant responses to the PEIR relating to Water Resources and how these have been addressed through the ES are set out within **ES Appendix 12.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

12.2.5 Further engagement has been undertaken as part of stakeholder engagement specific to Water Resources this, as detailed within **ES Appendix 12.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

12.2.6 A further round of targeted consultation was undertaken between 3 September 2025 and 1 October 2025 following changes to the development boundary area of the Scheme presented in the PEIR and during Stage Two Statutory Consultation. Further detail regarding the targeted consultation is provided in **ES Chapter 1: Introduction [APP/6.1]**.

12.3 Legislation, Planning Policy and Guidance

12.3.1 A summary of applicable legislation, planning policy and other guidance documents against which the Scheme will be considered relating to assessment of Water Resources is set out in **ES Appendix 12.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

12.4 Assessment Assumptions and Limitations

12.4.1 The water resources assessment has considered the following assumptions and limitations:

- Where the number of crossings are stated within this Chapter, they are based on **ES Figure 5.1: Concept Masterplan [APP/6.4]** which provides an indicative worst-case scenario i.e. that the crossings are required
- All data considered necessary to identify and assess the likely significant effects was available, with the exception of full postcodes for PWS within the jurisdiction on the Borough Council of Kings Lynn and West Norfolk (KLWN); and
- The water resources assessment relies on professional judgment to ensure that the effects are appropriately assessed.

12.5 Assessment Methodology

12.5.1 This section sets out the scope and methodology for the assessment of the impacts of the Scheme on water resources.

12.5.2 The key issues for the assessment of potential hydrological and hydrogeological effects relating to the Scheme are likely to be:

- Short-term effects arising from the construction or decommissioning phase, such as potential chemical pollution and sedimentation; and
- Long term effects, such as effects that last throughout the operation phase, such as changes to surface water runoff volume and flow pathways.

Sources of Information

12.5.3 The following sources of information that have been consulted in the preparation of this chapter:

- Topographical survey (Drone Tech, 2024)
- PWS records (KLWN and Breckland Council (BC))
- The Ordnance Survey (OS) 1:50,000 (Digital)
- OS 1:25,000 Map (Digital)
- National River Flow Archive (NRFA)
- EA Flood Map for Planning
- EA Hydrology Data Explorer
- Licensed abstraction records (EA)
- The British Geological Survey (BGS) GeoIndex onshore geology viewer
- BGS Karst Report Series: C3. Karst in the Chalk of East Anglia Environmental Change, Adaptation and Resilience Programme Open Report OR/22/062
- DEFRA Magic Map
- DEFRA Climate Change Allowances Data Explorer; and

- UK Centre for Ecology & Hydrology Flood Estimation Handbook Web Service.

Study Area

12.5.4 The Order limits form the Core Study Area (CSA) which is a defined term specific for this chapter. A smaller 1 km Study Area based upon the CSA has been applied to assess private water supplies (PWS) and public water supplies (PuWS) abstractions and have been termed the Water Supplies Study Area (WSSA). The Water Supplies Study Area is a defined term specific to this chapter.

12.5.5 Baseline data has been used to assess potential effects of the Scheme on hydrological and hydrogeological resources within a 5km Wider Study Area (WSA) of the Site. This WSA is based on the hydrological and hydrogeological connectivity of water bodies located downstream of the Scheme.

12.5.6 The CSA and WSA are shown on **Figure 12-3: Hydrology Study Areas [APP/6.3].**

12.5.7 The WSA distance is based on Paragraph 2.15 of guidance issued by the Scottish Environmental Protection Agency (SEPA), in the absence of guidance relating to Study Area distance issued by the EA or the BGS.

12.5.8 These Study Areas are defined based on the author's professional judgement and experience assessing similar scale DCO solar developments within lowland agricultural environments and similar hydrological catchments in England.

12.5.9 At distances greater than 5km, it is considered that solar developments in low lying catchments are unlikely to contribute to chemical or sedimentation effects due to attenuation, dilution and deposition.

12.5.10 The WSA will also be used for the cumulative effects assessment (CEA) in relation to water resources; see Section 12.11.

Potential Impacts

12.5.11 Embedded mitigation measures which have been incorporated into the design and management of the Scheme are set out in **Section 12.7**. Prior to the implementation of any mitigation (embedded or additional), the Scheme has the potential to have an effect (beneficially or adversely) on water resources, during the Construction, Operation and Decommissioning Phases in the following ways:

- Potential chemical pollution effects on the hydrological environment
- Potential erosion and sedimentation effects on the hydrological environment
- Potential effects on private water supplies
- Potential changes in soil interflow patterns
- Potential for the compaction of soils; and

- Potential for an increase in runoff and flood risk.

Impact Assessment Methodology

12.5.12 The Water Resources assessment follows the general approach to undertaking EIA, explained in **ES Chapter 2: EIA Process and Methodology [APP/6.1]**, albeit it has been modified to take account of relevant industry guidelines and best practice. The methodology for attributing sensitivity of receptors, magnitude of impacts and the significance of effects in relation to Water Resources is described further below in this Chapter.

12.5.13 The assessment has been based on a source-pathway-receptor methodology, where the sensitivity of the receptors and the magnitude of potential impact (change) upon those receptors is identified within the Study Areas identified above.

Flood Risk Assessment

12.5.14 A minor section in the north of the CSA is proposed for Skylark Mitigation (Work No. 11), which is located within Flood Zones 2 and 3a. **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]** is therefore required to demonstrate that, where built development (such as Work Nos. 1 to 8) is proposed in areas with identified risk of flooding from all sources (e.g. fluvial or pluvial (surface water) flooding), it passes the Sequential and Exception Tests outlined in NPS EN-1, NPPG and the NPPF. The need to apply the Sequential and Exception Tests do not apply to Work Nos. 9 to 11.

12.5.15 The climate change allowance data has been obtained from the EA Climate Change Allowances for Peak River Flow in England (2022) for the North West Norfolk Management Catchment, which is the most appropriate and conservative climate change allowances compared to the Cam and Ely Ouse Management Catchment. As the Scheme is classed as ‘Essential Infrastructure’ as per Annex 3: Flood risk vulnerability classification **(Ref. 12-46)** of the NPPF and will be operational between the 2050's and 2080's epochs the Higher Central band of 33 % have been used to assess fluvial flows.

12.5.16 As per the EA's Statutory Consultation response, as the Scheme will be operational between the 2050s and 2080s epochs, the Higher band of 57% has been used to sense check fluvial flows to account for a credible worst case scenario in accordance with the North West Norfolk Management Catchment **(Ref. 12-47)** peak river flow allowances, as shown in Table 12.1.

Table 12.1 North West Norfolk Management Catchment peak river flow allowances – shading denotes allowances to be used

Epoch	Central	Higher	Upper
2020s	13 %	18 %	30 %
2050s	11 %	18 %	34 %

2080s	23 %	33 %	57 %

12.5.17 NCC noted in their statutory consultation response that the peak rainfall climate change allowance value was taken from the North West Norfolk Management Catchment and that values should also be taken from the Cam and Ely Ouse Management Catchment, as it covers the southern extent of the Order limits. It should be noted that the climate change allowances for both catchments are the same for all epochs and return periods.

12.5.18 **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]** focuses on the following elements:

- The risk of flooding to the Scheme from fluvial, pluvial, groundwater and artificial (reservoir and drainage infrastructure) sources
- Assessment of the introduction of new hardstanding and impermeable ground areas on the greenfield run-off rates, using InfoDrainage software
- Storage requirement calculations to accommodate the 3.33% and the 1% AEP storm events including an allowance for climate change i.e. 25% for the Central Allowance for the 2070s epoch (2061 to 2125) as the Scheme has a proposed operation phase of 60 years. In accordance with Paragraph 13.1.5 of the Norfolk LLFA Statutory Consultee Guidance (Document Version 7.3, April 2025) (Ref. 12-48), the SuDS design for the BESS, Customer Substation and Access Tracks will be sensitivity tested, applying a 40% climate change allowance
- The management of surface water run-off rates using RSuDS techniques, such as grassland under the drip lines, for the PV Tables
- **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]** concludes how the Scheme complies with local planning policy, the BC Level 1 Strategic Flood Risk Assessment Update and Section 5.8 of NPS EN-1
- **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]** utilises fluvial data and results from the Eastern Rivers Modelling Report – Upper Nar flood study. Fluvial and tidal flooding has not been modelled based on the validity and acceptance of published flood studies by the LLFA and the EA and are considered suitable for use to inform **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**
- Compliance with the Sequential and Exception Tests; and
- Due to the underlying chalk geology across the CSA, infiltration testing and intrusive GI confirms that disposal of surface water via infiltration is possible.

Sensitivity of Receptor

12.5.19 The sensitivity of likely impacted receptors, defined depending on the vulnerability, recoverability and value/importance of the receptor, to potential effects arising from the Scheme is assessed in line with the below, as detailed in Table 12.2.

12.5.20 The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site or the sensitivity of potentially affected receptors, has been assessed in line with best practice guidance, legislation, statutory designations and professional judgement.

Table 12.2 Sensitivity Criteria of Identified Receptor

Sensitivity	Description
High	• A watercourse or water body with a Water Framework Directive (WFD) Overall Water Body Class of "High" or "Good" • The receptor and associated downstream environment have limited capacity to attenuate fluctuations in hydrochemistry and cannot buffer further changes without profoundly altering its characteristics or natural processes The hydrological receptor is designated as having international importance, such as SACs and SPAs The hydrological receptor is of high environmental importance or is designated as having national importance, such as SSSIs and / or Groundwater Dependent Terrestrial Ecosystems (GWDTEs) Priority Habitat Chalk Rivers • Groundwater Vulnerability Class of High • Areas located in Source Protection Zone 1 • Water abstractions used for the production of mass-produced consumables (food and drink) or for public water supply • The hydrological receptor will support abstractions for public water supply or private water abstractions for more than 25 people • EA registered abstractions • Local or regional groundwater which constitutes a valuable resource because of its high quality and yield, e.g., aquifer(s) of local or regional value and areas classed as Principal and Secondary aquifer designations • Areas classed as a Drinking Water Protected Area • Areas classed as Functional Floodplain (Flood Zone 3b) and flood storage areas not protected by flood defences • Residential and industrial receptors in Flood Zone 1 are located outside pluvial flow pathways; and • Flood defences.

Medium	A watercourse or water body with a WFD Overall Water Body Class of "Moderate" The receptor and associated downstream environment has some capacity to attenuate fluctuations in hydrochemistry but cannot absorb prolonged changes without profoundly altering its baseline characteristics / natural processes Areas classed as Flood Zone 3a The hydrological receptor supports abstractions for private water abstractions for up to 25 people Groundwater Vulnerability Class of Medium–High or Medium Areas located in Source Protection Zone 2; and Areas containing geological features of designated regional importance including Regionally Important Geological/geomorphological Sites (RIGS).
Low	• A watercourse or water body with a WFD Overall Water Body Class of "Poor" or "Bad" and / or a Current Chemical Quality classification of "Fail" excluding ubiquitous, persistent, bioaccumulative and toxic substances (uPBTs) • Heavily modified watercourses or manmade drainage ditches • The receptor is not of regional, national or international environmental importance • Groundwater Vulnerability Class of Medium–Low or Low • The hydrological receptor does not support abstractions for public water supply or private water abstractions • Poor groundwater quality and / or very low permeability make exploitation of groundwater unfeasible • Areas located in Source Protection Zone 3; and • Areas classed as Flood Zone 2.
Negligible	• The receptor is resistant to change and / or is of little environmental value • Groundwater Vulnerability Class of Unproductive; and • Areas classed as Flood Zone 1.

12.5.21 The sensitivities of the identified receptors, and their relationship to the potential effects from all Phases of the Scheme, are outlined in Table 12.3.

Table 12.3 Sensitivity of Hydrological Receptors

Receptor	Potential Effects	Sensitivity	Comment
Watercourses and Drainage Ditches	Increased run-off, erosion and sedimentation, stream flow impediments and pollution as a result of construction groundworks and chemical handling / storage.	High	Considered High sensitivity as the receiving water body (River Nar) and several of its tributaries are Priority Habitat Chalk Rivers. The River Nar has a WFD Overall Water Body Class of “Moderate”, Ecological classification of “Moderate” and a Chemical classification of “Good” (excluding uPBTs). Watercourses downstream of the Scheme within the WSA are not designated as having international importance but are noted as a SSSI and GWDTE.
Groundwater	Pollution as a result of erosion and sedimentation from construction activities and uncontained spills from chemical handling / storage.	High	Considered High sensitivity as hydrocarbon pollution in bedrock fissures has a lengthy attenuation period. Groundwater unit classified as having ‘Good’ status under WFD. Groundwater is also used for potable and agricultural supply.
Near-surface water	Diversion of near-surface flows as a result of track construction and the installation of foundations / hardstanding.	High	Considered High sensitivity as near-surface water supplies flow to groundwater and in turn to the River Nar.
PWS	Pollution as a result of erosion and sedimentation from construction activities and uncontained spills from chemical handling / storage. Depletion or displacement of PWS source as a result of Scheme infrastructure.	Medium	Considered Medium sensitivity as the individual supplies support abstraction for up to 25 people.
PuWS	Pollution as a result of erosion and sedimentation from construction activities	High	Considered High sensitivity as the supplies support abstraction public supply.

Receptor	Potential Effects	Sensitivity	Comment
	and uncontained spills from chemical handling / storage. Depletion or displacement of PuWS source as a result of Scheme infrastructure.		
EA registered abstractions	Pollution as a result of erosion and sedimentation from construction activities and uncontained spills from chemical handling / storage. Depletion or displacement of abstraction source as a result of Scheme infrastructure.	High	Considered High sensitivity as the supplies support agricultural and industrial water use / function.

Magnitude of Impact

12.5.22 The categorisation of the magnitude of impact takes into account the following factors:

- Extent
- Duration
- Frequency; and
- Reversibility.

12.5.23 The magnitude of potential effects has been identified through consideration of the Scheme, the degree of change to baseline conditions predicted as a result of the Scheme, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

12.5.24 The magnitude of impact is the level of change caused by the Scheme and the criteria to determine is defined in Table 12.4.

Table 12.4 Criteria for Determining Magnitude of Impact

Magnitude of Impact	Description
High	Adverse: • A major shift in hydrochemistry or hydrological conditions sufficient to negatively change the function of the receptor.

	This change would result in a downgrading of an WFD Quality classification by two classes, e.g., from “High” to “Moderate” • A material increase in the probability of flooding onsite and offsite receptors, adding to the extent which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water (in accordance with NPPF paragraphs 170 to 182) i.e., loss of functional floodplain (Flood Zone 3b) storage • A permanent or long-term degradation of quality to groundwater quality or a long term reduction in the available yield; and/or • A greater than 50% loss of a hydrogeological receptor or peat / GWDTE habitat site, or where there would be complete severance of a site such as to fundamentally affect the integrity of that site (e.g., severing hydrological connectivity). Beneficial: • A decrease in the probability of flooding onsite and offsite, such as a substantial reduction in the floodplain or pluvial flood depths at conurbation level.
Medium	Adverse: • A fundamental change to the hydrochemistry or hydrological environment, resulting in a change in ecological status. This change would result in a downgrading of a EA water quality classification by one class, e.g., from "Good" to "Moderate" • A loss of between 15% to 50% of a hydrogeological receptor or peat habitat site, complete or substantial severance and effects to its integrity as a feature, or disturbance such that the value of that site would be affected, but could still function • Reversable or temporary changes to yield or quantity of the groundwater regime may affect the use of the receptor or cause • The yield or quality of PWS or PuWS may be temporarily reduced; and/or • A moderate increase in the probability of flooding onsite and offsite, adding to the area of land which requires protection by flood prevention measures or affecting the ability of the functional flood plain to attenuate the effects of flooding by storing flood water i.e., moderate loss of storage within Flood Zone 3a. Beneficial:

	• A moderate decrease in the probability of flooding onsite and offsite, such as a reduction in the floodplain or pluvial flood depths at clusters of dwellings.
Low	Adverse: • A detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. This change would not reduce the WFD status of the receptor • Loss of storage within Flood Zone 2 • Interaction with the groundwater table which will marginally alter local ecology or will lead to a slight detectable displacement of groundwater; and/or • A detectable but non-material effect on the receptor or a moderate effect on its integrity as a feature or where there would be a minor severance or disturbance such that the functionality of the receptor would not be affected. Beneficial: • A slight decrease in the probability of flooding onsite and offsite, such as a reduction in the floodplain or pluvial flood depths at individual dwellings.
Negligible[1]	Adverse / Beneficial: • No perceptible/detectible changes to the baseline hydrochemistry or hydrological environment • No change to the water quality classification; and • No increase in the probability of flooding onsite and offsite.

Categorising Scale of Effect

12.5.25 The scale of effect that the Scheme (see Table 12.5) may have on an impacted receptor will be influenced by a guiding combination of the sensitivity of the identified receptor and the magnitude of impact in addition to professional judgement.

12.5.26 There are four categories demonstrating the scale of effect:

- Negligible
- Minor
- Moderate; and
- Major.

[1] Negligible magnitude of change also includes magnitude of effects that are assessed as no change to the baseline scenario

Table 12.5 Scale of Effect

Magnitude of Impact	Sensitivity			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Minor	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

12.5.27 The nature of effects will be defined as either: beneficial or adverse.

Determining the Significance of Effect

12.5.28 Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations and are shaded in light grey in Table 12.5.

12.6 Baseline Conditions

The Order Limits

12.6.1 The Scheme is located within the administrative areas of NCC and BC, who are the host authorities. The administrative boundary of Borough Council of KLWN is adjacent to the Scheme. A full description of the Order limits is provided in **ES Chapter 5: The Scheme [APP/6.1]**.

Existing Baseline

12.6.2 The existing baseline conditions are assessed in this section and are derived from the completed desk and field-based studies.

Desk Study

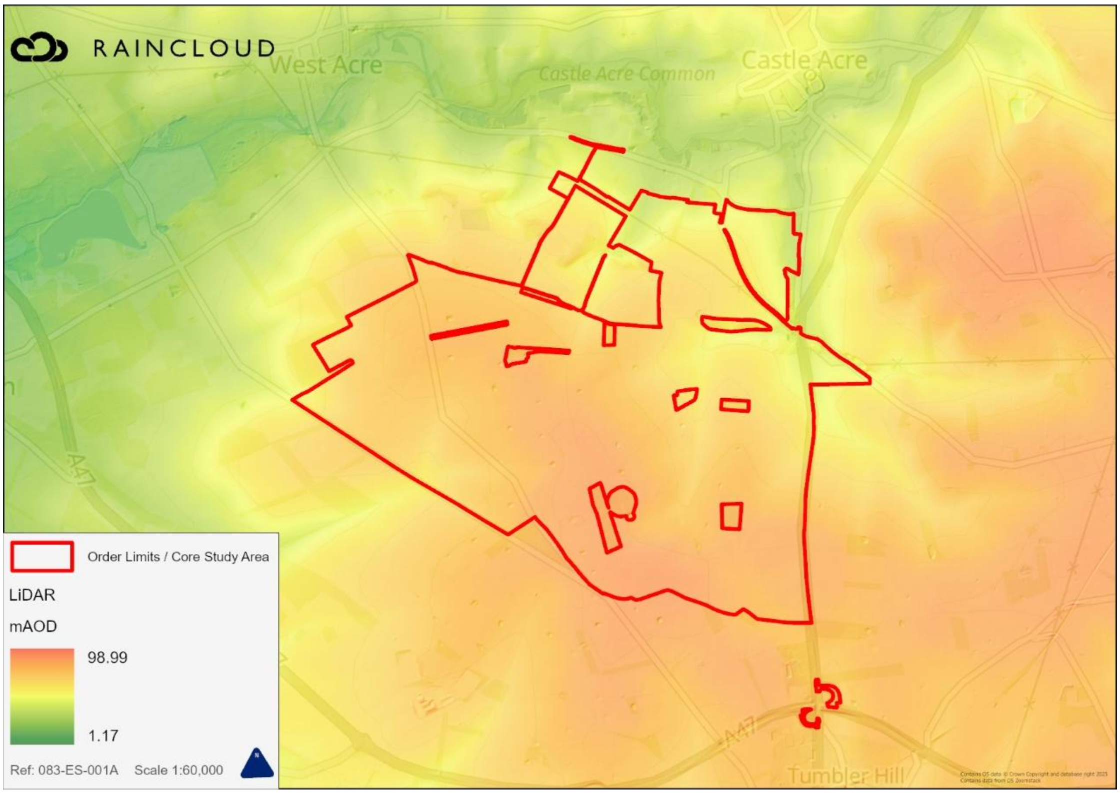
12.6.3 This desk-based study was undertaken in September 2024 and updated in February and October 2025 to provide an overview of the baseline conditions for Water Resources within the CSA.

Topography and Land Use

12.6.4 The CSA and WSA are generally in arable use with areas in the north and south of the CSA used for pig farming and poultry farming. Agricultural land is interspersed with woodland.

12.6.5 1m resolution Lidar data shows that land within the CSA is generally gently sloping, with elevations from 37m above ordnance datum (AOD) in the south to 85m AOD in the north east, as shown in Plate 12-1.

Plate 12-1 Topography within CSA



12.6.6 Most of the CSA is located on land with slopes of less than 6% with only a small area located on land between 6-12% slopes, largely concentred on the area surrounding Fincham Drove in the north of the CSA.

Geology and Ground Conditions

12.6.7 Superficial deposits, are mapped to be largely absent across the CSA, with the exception of minor areas of till (diamicton) and sand and gravels from the Lowestoft Formation in the northern and southern sections of the CSA, as shown on **ES Figure 12-4: Superficial Geology [APP/6.3]**. No sensitive receptors, such as peatland, are present within the CSA.

12.6.8 A BGS borehole record in the north of the CSA shows chalk was encountered at 0.9m below ground level (BGL), suggesting a very thin superficial geology covering, which is consistent with **ES Chapter 11: Soils and Agriculture [APP/6.2]**, where chalk was encountered at a depth of 0.36m.

12.6.9 Infiltration testing was undertaken at nine locations at the indicative siting of the National Grid Substation and the BESS Compound in July 2025. Topsoil was encountered in all test pits to a depth of 0.3m to 0.4m below ground, followed by chalk.

12.6.10 No geological faulting or linear features are noted within the CSA on the BGS dataset.

12.6.11 The Soilscapes dataset **[Ref. 12-49]** indicates that superficial cover across the majority of the CSA is classed as 'freely draining sandy Breckland soils' (Soilscapes ref 11) which are freely draining. The northern section of the CSA is classed as a mix of shallow lime-rich soils over chalk or limestone (Soilscapes ref 3) and freely draining slightly acid sandy soils (Soilscapes ref 10).

12.6.12 Site observations confirm that the superficial cover across the CSA is heterogenous and freely draining with a high sand content, as shown in Plate 12-2.

Plate 12-2 Freely draining sandy soils across the CSA

12.6.13 Due to the freely draining nature of the CSA, the agricultural fields are not served by under field drainage and no outfalls to ephemeral ditches were noted during the site walkovers.

12.6.14 Infiltration testing was conducted by Rogers Geotechnical Services Ltd on 6 August 2025 to determine the viability of infiltration. Results are provided in Annex B of **ES Appendix 12.2: Flood Risk Assessment [APP/6.4.2]** and shows 'good' drainage results. The BGS Minerals and Quarries dataset shows there to be several marl pits (clay removed for agricultural fertiliser) throughout the CSA, none of which are active and some are filled with standing water.

12.6.15 Several marl pits were noted across the CSA and site observations do not indicate that they have been infilled following their excavation, as shown in Plate 12-3.

Plate 12-3 Marl pits in Fields 24 and 15

12.6.16 The BGS Karst Report Series: C3. Karst in the Chalk of East Anglia Environmental Change, Adaptation and Resilience Programme Open Report OR/22/062 notes that that wastewater used in Swaffham town was "*poured into an old chalk pit on the eastern side of the road in the valley between Carol House and North Pickenham Warren*", approximately 6.5km south of Work No. 1: Solar PV Site. No mention of wastewater being disposed of via marl pits within the CSA is noted in the study.

12.6.17 An Envirocheck report detailing potential sources of historical contamination is provided in **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4],** does not indicate the presence of contaminated land with areas requiring excavation for deeper foundations i.e. Work Nos. 2 to 4, or indeed the CSA.

12.6.18 Excavations undertaken as part of the infiltration testing (see Appendix B of **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**) show topsoil to a depth of 0.3m to 0.4m BGL in Work Nos. 2 to 4 and did not encounter made ground or ground suspected of being contaminated.

12.6.19 The land agent for the Scheme provided utility plans showing the presence of an abandoned Ministry of Defence (MoD) fuel pipeline running north south through Work Nos. 1 to 4. Anecdotal evidence suggests that the pipeline is buried at shallow depth (approximately 1 to 1.5 m BGL). Through further engagement with Exolum, it has now been confirmed that Exolum does not have infrastructure within the Scheme.

Hydrogeological Setting

12.6.20 The Hydrogeology 625,000 digital hydrogeological map of the UK (BGS) shows that the CSA is underlain by chalk of the white chalk subgroup, characterised as a High Productivity Aquifer where flow is virtually all through fractures and other discontinuities.

12.6.21 The Aquifer Designation Map (Bedrock) (England) identifies that the Study Area is underlain by aquifers classed as a Principal Aquifer, associated with the White Chalk Subgroup.

12.6.22 The Groundwater Vulnerability Map shows that the CSA is classed as having High to Medium-High vulnerability and geology classed as Soluble Rock Risk.

12.6.23 The majority of the CSA is located in SPZ 2 and the western section located in SPZ 1, as shown in **ES Figure 12-5: Source Protection Zone [APP/6.3]**, associated with an Anglian Water abstraction at Marham, approximately 5.8 km west of the CSA.

12.6.24 A small section in the east of the CSA is located within a Drinking Water Safeguard Zone (Groundwater) which corelates SPZ 1 associated with the Anglian Water abstraction at Marham.

12.6.25 BGS boreholes (TF71SW192) at Marham are recorded to draw groundwater from approximately 9m BGL.

12.6.26 The CSA is located within the Norfolk Bradenham Water Resource Zone (WRZ) where water is supplied from groundwater abstractions from the Norfolk Chalk aquifer. The Anglian Water region is also identified as 'seriously water stressed' in the EA's 2021 classification of water stressed areas. Due to the regional constraints on water resources, Anglian Water limits requests for additional water for non-domestic use to 20 m^3 per day. Anglian Water also noted that through its non-domestic water requests policy, that new non-household water supply requests may not be approved as they could compromise their regulatory priority of supply existing and planned domestic growth.

12.6.27 The EA River Basin Management Plan (RBMP) shows that the North West Norfolk Chalk groundwater body has characteristics as outlined in Table 12.6.

Table 12.6 WFD Groundwater body Characteristics

WFD Indicator	North West Norfolk Chalk groundwater body	Cam and Ely Ouse Chalk WFD Groundwater Body
Water body ID	GB40501G400200	GB40501G400500
Chemical Status	Poor	Poor
Quantitative Status	Poor	Poor

Chemical Objective	Poor by 2015	Poor by 2015
Quantitative Objective	Good by 2027 – Low confidence	Good by 2027 – Low confidence

12.6.28 The EA note that groundwater abstraction, poor nutrient management and sewage discharge as reasons for both groundwater bodies not achieving good status.

12.6.29 The Norfolk Rivers Trust *"The River Nar – A Water Framework Directive Local Catchment Plan"* (2014) **[Ref. 12-50]** notes that the general chemical failures of the chalk groundwater bodies under the CSA are a result of widespread elevated nitrate concentrations. Based upon known pollutant linkages and conceptual knowledge of the catchment the predominant source of leached nitrate is a result of diffuse agricultural pollution.

12.6.30 The Norfolk Rivers Trust Catchment Plan also notes that groundwater abstracted from boreholes at Marham shows high concentrations of nitrate significantly above the drinking water standard of 50mg/l (as NO3), largely due to diffuse agricultural pollution.

12.6.31 The Scheme is located within the Norfolk Bradenham Water Resource Zone (WRZ) where water is supplied from groundwater abstractions from the Norfolk Chalk aquifer. The Anglian Water region is also identified as 'seriously water stressed' in the EA's 2021 classification of water stressed areas.

12.6.32 **ES Chapter 11: Soils and Agriculture [APP/6.2]**, shows that groundwater was not present in shallow excavations (approximately 0.5m depth) across the CSA.

12.6.33 Groundwater was not encountered within the trial pits excavated as part of the infiltration testing undertaken in July 2025.

12.6.34 The Cockley Cley Estate groundwater level monitor approximately 4.5km south of the CSA recorded a maximum level of 32.531m AOD (as reported by DEFRA) (2m BGL), while the Washpit Farm monitor, approximately 5.5km north of the CSA, recorded a maximum level of approximately 44m AOD (36m BGL).

12.6.35 A BGS borehole log (TF71SE68) in the west of the CSA shows that groundwater was encountered at 41.34m BGL. Borehole log (TF81SW12) 22m north of the CSA shows that groundwater was encountered at 9.75m BGL. As groundwater elevations vary across the CSA, a groundwater elevation surface was interpolated using triangulation methods to estimate levels across the CSA.

12.6.36 Measured groundwater elevations the North West Norfolk Management Catchment were plotted within ArcGIS Pro. The levels were obtained from groundwater monitoring locations that collect sub-daily data to capture short-term fluctuations. The locations of the 19 monitoring stations are shown in **Figure 12-6: Groundwater Monitoring Locations**. The maximum groundwater elevation reached was used for each monitoring location for a conservative approach, and shown in Table 12.7.

12.6.37 It should be noted that although groundwater monitoring datasets and the LiDAR used within this assessment are both referenced to m AOD, some minor discrepancies in reported elevations are present, such as elevation of the Church Farm Cottage borehole. These differences are likely due to variations in data acquisition methods, including differences in survey techniques, spatial resolution, temporal coverage, and vertical accuracy. As a result, small offsets between LiDAR-derived ground levels and measured groundwater elevations may occur and should be considered when interpreting the data.

Table 12.7 Groundwater Elevations at Monitoring Locations

Groundwater Monitoring Station	Easting	Northing	Maximum Groundwater Elevation(m AOD)	Depth to groundwater elevation using LiDAR (m)
Boxiron Plantation	578997	316697	29.78	16.96
Brink Hill	576366	321253	24.2	60.41
Broom Belt	574907	316447	18.75	7.58
Button Fen	568982	309796	5.31	1.56
Church Farm Cottage	585105	309829	57.69	19.15
Cockley Cley Estate	581689	305412	32.786	-1.66
Dillington Carr	596891	315356	31.207	-0.80
Drll Hall Adastral	582250	309302	45.34	18.10
East Winch Common	570211	315823	9.483	0.54
Great Thorns Farm	578769	310332	43.67	5.37
Hillfield Farm	596282	312398	52.46	-2.03
Keepers Lodge	566057	312819	2.9	0.02
Leziate Drove Grimston	569732	321014	10.39	0.01

Lynn Road	581160	309266	43.07	26.02
Mill Road	565789	308887	19.25	-0.70
Palgrave Hall	583298	313693	35.45	49.32
Valley Farm Helhoughton	586637	327012	44.83	-0.02
Washpit Farm	581321	319657	71.233	30.16
Woodland Lodge	566345	320073	8.43	-0.82

12.6.38 A triangulated irregular network (TIN) was generated, connecting the monitoring locations to form a series of non-overlapping triangles, with river controls applied as a boundary condition to improve the representation of groundwater levels in areas influenced by surface water features. The maximum groundwater elevation is interpolated across the CSA, based on the plane formed by each triangle, as shown in Figure 12.7. The use of ArcScene is able to model a 3D representation of where groundwater elevation is in relation to ground surface (LiDAR) and Work Nos. foundation extents. .

12.6.39 Nine borehole records within 3km of the CSA were tested against to validate the interpolated groundwater surface. Table 12.8 compares groundwater elevation for each borehole to the interpolated groundwater surface at that location. Borehole records of groundwater elevations struck in boreholes show to not surpass the interpolated groundwater surface, suggesting groundwater elevations has not and unlikely to rise above the interpolated groundwater surface.

Table 12.8 Borehole records and groundwater elevations

Borehole ID	Easting	Northing	Borehole Groundwater Elevations (mAOD)	Interpolated Groundwater Elevations (mAOD)	Depth to Interpolated Groundwater Elevation (m)
TF71SE68	578230	313200	20.28	35.47	32.208
TF71SE69	577200	312870	16.34	33.34	0.640
TF71SE74	577200	312800	17.15	33.44	0.451
TF81NW2	581500	315200	25.43	33.54	21.488
TF81SW12	580850	314210	25.58	35.17	25.660

TF81SW23	581720	310100	35.25	42.23	41.989
TF81SW24	582400	311400	34.91	39.95	37.448
TF81SW8	584920	311900	45.49	47.06	39.767
TF81SW9	583440	312150	36.92	42.71	41.578

12.6.40 The highest groundwater elevations within the CSA (50.8 m AOD) captured from the interpolated groundwater surface, gradually decreases to 23.1 m AOD towards the River Nar. The depth to groundwater elevation can be obtained from this interpolated surface and is shown in ES Figures 12.8: Depth to Triangulated Baseline Groundwater Interpolation. Depth to groundwater is shallowest at the northeastern boundary of the CSA, at approximately 0.68 m. The majority of the CSA has groundwater depths greater than 30m, the largest depth to groundwater at 46 m within the southern section of the Scheme associated with Work No. 1 Solar PV Site.

12.6.41 The southwestern area of the CSA reaches a minimum groundwater depth of approximately 8.5 m and is associated with Work Nos. 1, 6 and 7.

12.6.42 The interpolated groundwater surface derived from triangulation provides is a local-scale interpretation and presents a reasonable estimate of groundwater elevation using the available data. However, triangulation is an estimation method and comes with assumptions including:

- Limited groundwater elevations, reducing the resolution of the interpolated surface; and
- Triangulation assumes a linear change groundwater elevation, which may not fully model the complexity of subsurface conditions.

EA North East Anglian Chalk Groundwater Model

12.6.43 The EA's North East Anglian Chalk (NEAC) Model is a bespoke groundwater model generated through TUFLOW 5 which produces various hydrological scenarios.

12.6.44 Groundwater elevations have been modelled using data from March 2001 to represent wet conditions. Groundwater flow across the Order limits are shown in Figure 12-10: Groundwater Flow Directions from NEAC Groundwater Model.

12.6.45 Groundwater elevation within the CSA according to the NEAC model outputs ranges from 22.8 m AOD to 33.4 m AOD. The depth to groundwater elevation calculated from LiDAR is shown in **ES Figure 12-9: Depth to EA NEAC Groundwater Wet Conditions**. Groundwater elevation within the CSA is highest at 33.4 m AOD east of the CSA.

12.6.46 The BGS Hydrogeological Map of North East Anglia presents groundwater elevations within the Chalk principal aquifer ranging from 30 m AOD in the east to 15 m AOD in the west. Around the CSA there is a local northward gradient of groundwater flow towards the River Nar valley, whilst the overall flow direction is predominantly westward towards the Marham public water supply abstraction. The groundwater flow directions produced from the NEAC also show an overall flow direction towards the west.

12.6.47 The majority of the CSA has depths to groundwater greater than 30 m; the southwestern section of the Scheme associated with Work No. 1 has a depth of 25 m to groundwater. **Figures 12-13 to 12-**15 illustrates the relative groundwater depth beneath the proposed infrastructure locations of Work Nos. 2 – 4, to identify where piling or foundations may interact with perched or shallow groundwater. The minimum depth to groundwater for each Work Nos. is presented in Table 12.9.

Table 12.9: Maximum Piling Extent

Work No.	Maximum Piling Extent (m)	Minimum depth to groundwater (m)	Potential to Directly Interact
Work No. 1 PV Arrays	4	7	No
Work No. 2 BESS	12	18	No
Work No. 3 Customer Substation	15	22	No
Work No. 4 National Grid Substation	15	14	Yes
Cable routing / pylons	7	5	Yes

12.6.48 Whilst differences are present in the outputs from the Triangulated Baseline Groundwater Elevation assumptions and the EA's NEAC model, the overall range of groundwater levels is consistent between the two datasets.

12.6.49 The EA's NEAC model is seasonally derived from March 2001, whereas the Triangulated Baseline Groundwater Elevation assumption is derived from worst-case elevation data from the 1970s to present day.

12.6.50 The EA's NEAC model outputs can be used to estimate the potential interactions with maximum foundation extents from Work Nos. 1 – 4 with groundwater elevation. The groundwater elevations derived from triangulation can be used as an appropriate data source for validating the NEAC model levels, given the correlation between the two datasets.

12.6.51 The **oCEMP [APP/7.6.2]** commits to monitoring groundwater within the Order limits. This monitoring data will be used to replace or refine the interpolated groundwater surface and the EA's NEAC model outputs presented above. The depth of PV array piles and foundation design for the BESS and Customer and National Grid Substations will be reassessed against the refined highest groundwater elevation.

12.6.52 The monitoring data will be used to confirm whether PV arrays or foundation extents from infrastructure may interact with groundwater which will determine whether specific mitigation measures are needed.

Private Water Supplies

12.6.53 Data requests were sent to BC's and KLWN's Environmental Health departments. BC provided comprehensive records, whilst KLWN responded with records of PWS, however only partial details on the locations of the PWS were provided.

12.6.54 KLWN were contacted in August 2025 to provide accurate locations of registered PWS within the search area. The Council responded stating:

"I can confirm that the Council holds this information. This information is exempt under Section [sic] Section 40 of the Freedom of Information Act 2000. This is because provision of more detailed information, could identify a property and potentially an individual. Having considered the public interest, the Council's decision is to withhold the information".

12.6.55 Whilst only partial postcodes for the KLWN supplies were provided, no partial postcode is within 895 m of the CSA, meaning that there is sufficient detail to proceed with the assessment.

12.6.56 Table 12.10910 outlines the information provided by KLWN.

Table 12.109 PWS Data

Reference	Type	Use	Postcode	Area	Approx. distance to CSA
P230SD006	Borehole	single domestic	PE32 1	Pentney	5.2km
P230SD018	Spring	single domestic	PE32 1	West Acre	2.1km
P230SD019	Spring	single domestic	PE32 1	West Acre	2.1km

P230LC036H	Borehole	large/commercial	PE32 2	Castle Acre	895m

12.6.57 BC confirmed 15 PWS within WSSA, and none are located within the CSA, as outlined in Table 12.1012.11.

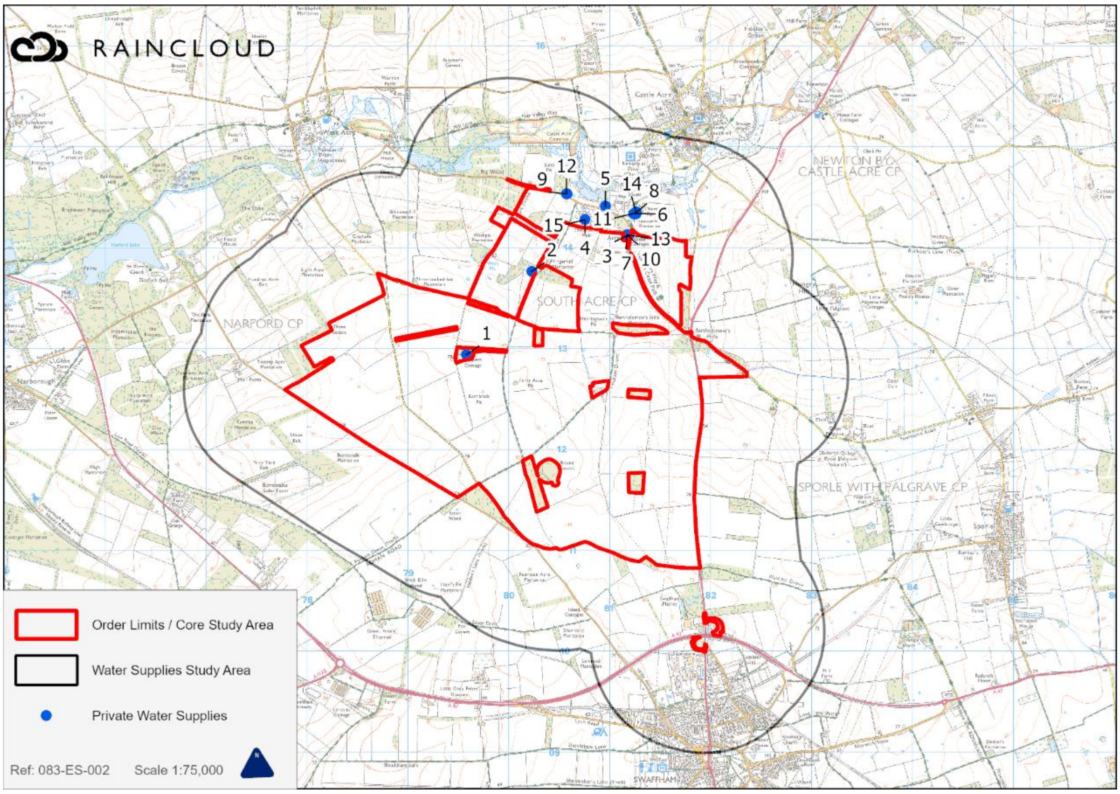
12.6.58 It should be noted that the data supplied by BC used the same reference number for several properties which are geographically distinct from one another, and therefore an ID number has been attributed to each PWS for ease of reference.

Table 12.101 PWS Data

ID	BC Reference	Type	Approx. distance and direction from CSA
1	P227CO0187	Borehole	50m south
2	P227CO0187	Borehole	45m northwest
3	P227CO0187	Borehole	25m north
4	P227CO0187	Borehole	78m north
5	P227SD0613	Borehole	235m north
6	P227CO0020	Borehole	165m north
7	P227CO0187	Borehole	40m north
8	P227CO0020	Borehole	497m north
9	P227CO0187	Borehole	280m north
10	P227CO0187	Borehole	42m north
11	P227CO0020	Borehole	160m north
12	P227CO0187	Borehole	280m north
13	P227CO0187	Borehole	25m west
14	P227CO0020	Borehole	180m north
15	P227CO0187	Borehole	78m north

12.6.59 The locations of the supplies are shown Plate 12-4 and ES Figure 12-11: Private Water Supplies Locations [APP/6.3].

Plate 12-4 PWS Locations



12.6.60 BGS borehole records at PWS P227CO0187 (ID 4 and 15) (BGS Ref TF81SW12) records groundwater within the bore shaft as resting at 32 feet (9.7m) BGL, while records for PWS P227CO0020 (ID 6, 8, 11 and 14) shows an intake depth of 18m BGL (BGS Ref TF81SW26).

Public Water Supplies

12.6.61 Anglian Water agreed that the SPZ1 boundary is associated with their water abstraction at Marham Water Treatment Works, approximately 5.8km to the west of the CSA.

12.6.62 Potable water supply infrastructure has been identified within the eastern section of the CSA, running parallel to the A1065.

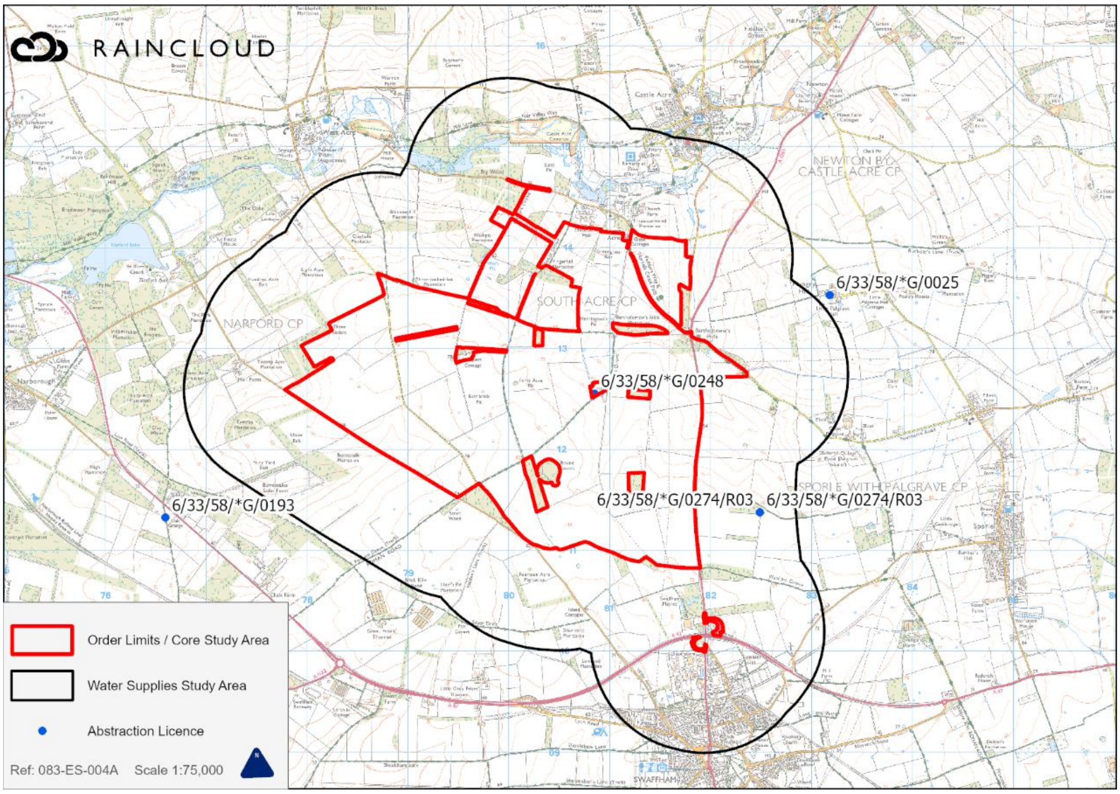
EA Licensed Abstractions

12.6.63 The EA provided data of licensed abstractions within the WSA in August 2025, which are listed in Table 12.112 and shown in Plate 12-5.

Table 12.112 EA Licensed Abstractions

EA Reference	Source	Purpose	Approx. distance and direction from CSA	Modelled groundwater depth from surface
6/33/58/*G/0274/R03	Groundwater	Agriculture	660m east	40m
6/33/58/*G/0025	Groundwater	Agriculture	1.1km east	47m
6/33/58/*G/0248	Groundwater	Agriculture	25m south	25m
6/33/58/*G/0193	Groundwater	Agriculture	1.8km southwest	14m (based on BGS borehole log)

Plate 12-5 EA Licensed Abstractions



12.6.64 Observations from the site walkover in September 2025 indicate that whilst abstraction 6/33/58/*G/0248 towards the central section of the CSA has domestic use listed on the licence, the property is not in a habitable state and is very unlikely to be utilising abstracted water for potable consumption, as shown in Plate 12-6.

Plate 12-6 Derelict property at Abstraction 6/33/58/*G/0248

12.6.65 Consultation with the landowner and land agents identified an irrigation main in the northern section of the CSA, located between Fields 33 and 35.

12.6.66 Observations from the September 2025 site walkover confirmed the presence of an irrigation system, as shown in Plate 12-7.

Plate 12-7 Irrigation Mains 200 m northwest of the CSA (Field 4)

Water Utilities

12.6.67 Initial searches show that a foul water sewer runs parallel to the A1065 in the eastern section of the CSA.

Contaminated Land

12.6.68 The EA's Permitted Waste Sites – Authorised Landfill Site Boundaries dataset identifies that no active landfill sites are present within the CSA.

12.6.69 The EA dataset shows that there are no historic landfill sites within the CSA.

12.6.70 The KLWN Contaminated land register states that "No sites to date have been formerly determined as contaminated in our borough. So there are no sites on our contaminated land register".

12.6.71 An Envirocheck report, provided as Annex G to **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]** does not indicate the presence of contaminated land within Work Nos. 2 to 4, i.e. the aspects of the Scheme which potentially require deeper foundations. The only pollution incident noted in the Envirocheck report is an oil spill in 1994 within an unnamed Ordinary Watercourse adjacent to the Order limits (north east of Field 26). No aspect of the Scheme will interact with this watercourse.

Surface Hydrology

12.6.72 The majority of the CSA and WSA are located within the primary catchment of the River Nar, which is located approximately 300m north of the CSA at its nearest point.

12.6.73 The River Nar flows west towards King's Lynn and discharges to the Tidal River Ouse, approximately 17km northwest of the CSA. The River Nar is part of the North West Norfolk Management Catchment.

12.6.74 At West Acre the River Nar flows over the river valley gravels and then over alluvial silt from Narborough through the fens. The river water is base-rich, alkaline and recharged by clear springs flowing from the underlying chalk.

The River Nar has WFD classifications as outlined in Table 12.123.

Table 12.123 WFD Waterbody Characteristics

WFD Indicator	Nar upstream of Abbey Farm
Water body ID	GB105033047791
Cycle	3
Hydro-morphological designation	Not designated artificial or heavily modified
Ecological Status	Moderate
Chemical Status including uPBTs	Fail (2019) Does not require assessment (2022)
Chemical Status excluding uPBTs	Good
Ecological Objective	Good by 2015
Chemical Objective	Good by 2063

12.6.75 Minor areas of in the south of the CSA are located in the Old Carr Stream and Gadder catchments and there are no agricultural drains linking the CSA with these offsite watercourses.

12.6.76 There are no natural watercourses within the CSA and observations from the Site walkovers confirm that 'dead-end' shallow agricultural ditches have been persistently dry, even following rainfall events, as shown in Plate 12-8 and Plate 12-9.

Plate 12-8 Dry agricultural ditch in centre of CSA

Plate 12-9 Dry agricultural ditch in centre of CSA

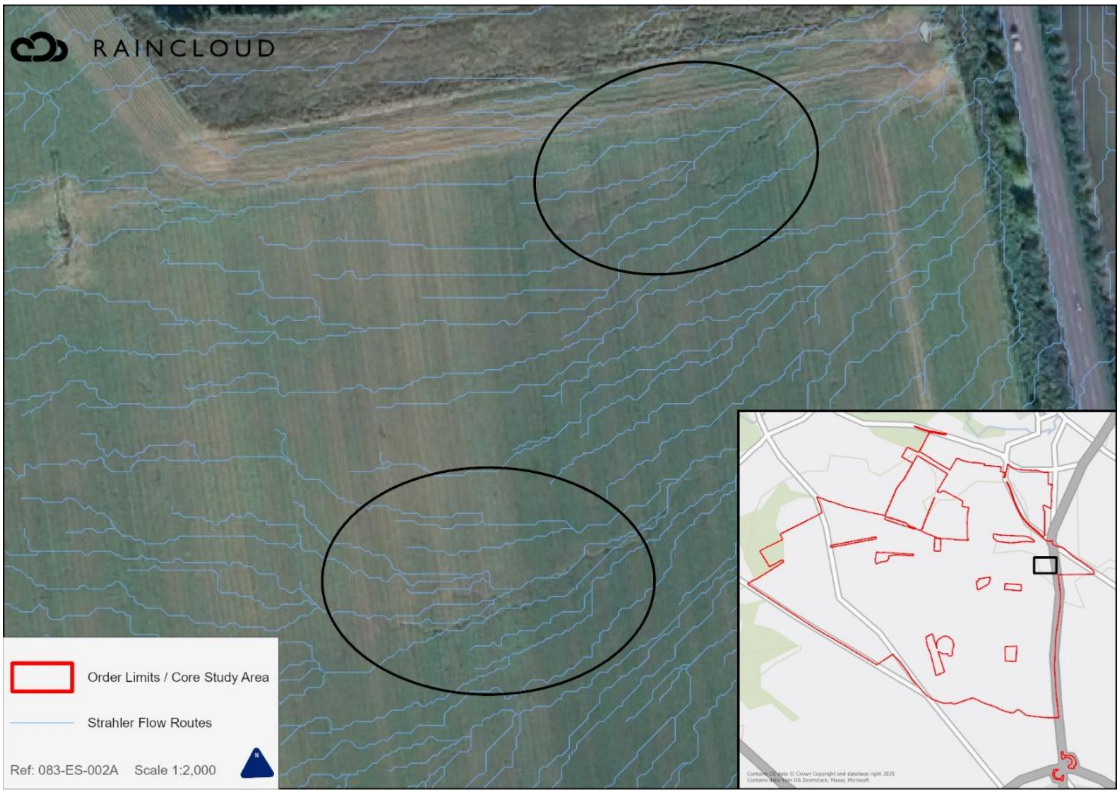
12.6.77 The ditches are not connected to the wider hydrological network, and as such there are no obvious natural watercourses or surface water flow pathways within the CSA to the River Nar or other offsite watercourses, with rainwater anticipated to infiltrate rapidly, rather than generate substantial run-off. This was evident during the site walkover in September 2025 where pooling of water was observed within compacted agricultural routes within the CSA but not within the agricultural fields, which are free draining due to the high sand content of the overlying soils, as shown in Plate 12-10 and Plate 12-11.

Plate 12-10 Pooling of water in compacted agricultural traffic route – Field 24

Plate 12-11 Pooling of water in compacted agricultural traffic route – Field 9

12.6.78 The EA identified that a minor section in the east of the CSA shows small fluvial (assumed pluvial) 'gulleys' within the crops of Field 26. Strahler analysis in GIS suggests the gullies (circled on Plate 12-12) are likely to be caused by Hortonian flow rather than groundwater emergence, as shown in Plate 12-12.

Plate 12-12 Strahler flow analysis showing pluvial gulleys



12.6.79 Observations from site walkovers did not indicate the presence of these features and a review of historical and the most recent aerial imagery does not indicate that these features are present on a persistent basis, suggesting that they are caused by pluvial erosion force rather than groundwater emergence, as shown in Plate 12-13.

Plate 12-13 Field 26

12.6.80 The majority of the CSA is located within a Drinking Water Protected Area (Nar upstream of Abbey Farm – EA ID GB105033047791), as shown on **ES Figure 12.12 Drinking Water Protected Area [APP/6.3].**

12.6.81 There is one open / above ground reservoir located in the northern sections of the CSA, within Work No. 11: Mitigation and enhancement area, which is retained grassland for skylark and curlew habitat.

Hydrological Regime and Surface Water Morphology

12.6.82 The hydrological regime within the CSA is typical of lowland agricultural plains, primarily being drained by man-made ditches.

Flood Zones

12.6.83 The majority of the CSA, including Work No. 1: Solar PV, Work No. 2: BESS Compound, Work No. 3: Customer Substation and Work No. 4: National Grid Substation, is located within Flood Zone 1, with the exception of an area of Flood Zone 2 and 3 in the northeast which is associated with a land drain and runs parallel to Southacre Road before it discharges to a pond approximately 170m northeast of the CSA.

12.6.84 The SFRA identifies that no section of the CSA is located within Flood Zone 3b.

12.6.85 Whilst there are very small areas of Flood Zone 2 (0.3524 ha) and Flood Zone 3 (0.7459 ha) located in the northeastern section of the CSA, the Recorded Flood Outlines (EA) dataset shows that no section of the CSA has previously flooded. The nearest recorded flooding from the River Nar is located approximately 10km west (north of Wormegay) and was associated with the 1993 event, where Section 3.4.2 Historic Records of River Flooding of the Strategic Flood Risk Assessment (SFRA) **[Ref. 12-51]** notes that the cause of flooding was a breach of flood defences.

12.6.86 The NCC Flood Investigation Reports for the Breckland Area (2014-2021) and Countywide (2022) **[Ref. 12-52]** do not identify any incidents of flooding within the CSA or within close proximity to the CSA.

12.6.87 The SFRA also notes that hydraulic modelling of the River Nar upstream as far as Marham (downstream of BC) has been undertaken. Royal Haskoning confirmed that even with a major tidal event on the Great Ouse coincident with a fluvial event on the Nar causing it to back up behind the tidal outfall structure, water levels would not be affected as far upstream as Marham, due to the nature of the river gradient (Mott MacDonald 2007).

12.6.88 Flood data was provided by the EA on 25 September 2024. Outputs from the Eastern Rivers Modelling Report – Nar (v1.0 May 2015), show that the 1% – Annual Exceedance Probability (AEP) +20% climate change, the 0.5% AEP and the 0.1% AEP flood outlines do not encroach into the CSA, as shown on Plate 6 within **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**.

12.6.89 Flows used within the River Nar model are 56% higher for the 0.1% AEP than the 1% AEP and, therefore, in the absence of a scenario showing the 1% AEP +33% and +57% CC allowances required for the 2080's Higher Central and Higher allowances for the North West Norfolk Management Catchment peak river flow, the 0.1% AEP has been used as a proxy.

12.6.90 The EA Surface Water Flood Map shows that the modelled surface water flooding extent for the 1% AEP event is largely absent across the entire CSA with the exception of a small area in the north which is confined to a topographical depression and an area in proximity to Fincham Drove.

12.6.91 2D direct rainfall modelling parameters are outlined in Annex F in **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**.

12.6.92 Figure 7 of the SFRA (Areas Susceptible to Groundwater Flooding) shows that the majority of the CSA is located outside an area classified as at risk of groundwater flooding, with minor areas in the north of the CSA classed as having a 25-50% (minor section of Works Nos. 1 to 4) and 50-75% (Work No. 11: Mitigation and enhancement) risk of groundwater emergence. The identified areas broadly correspond with the triangulated groundwater modelling in this Chapter. Areas identified at risk of flooding from groundwater are mostly within the Mitigation and Enhancement Areas.

12.6.93 The CSA is located outside the extents of the Fluvial Contribution and Wet Day scenarios should the retaining walls of Manor Farm Reservoir (Wells) fail.

12.6.94 Borehole records (BGS borehole IDs 511123 and 509969) **[Ref. 12-53]** in the north of the CSA show an absence of groundwater to a depth of 14m BGL, while triangulation of the regional groundwater elevations, derived from hydrometric monitoring data available on Hydrology Data Explorer, show maximal groundwater elevations within 12m of the surface within Work Nos. 2 to 4, and at below 4m across the majority of Work No. 1.

Designations

Designations located within the WSA (i.e., 5km from the Site) are outlined in Table 12.134.

Table 12.134 Designations within WSA

Designation	Qualifying Interest	Approximate distance and direction from the CSA	Hydrological link to CSA?
River Nar SSSI	A variety of wetland species, including southern marsh orchid	45m northeast	Yes – via chalk aquifer baseflow
Castle Acre Common SSSI	Unimproved grazing marsh on the banks of the River Nar has diverse grassland habitats, and the marshy conditions provide nesting sites for several wetland bird species. There are acidic flushes where springs emerge from sands in the bottom of the valley	425m north	Yes – via chalk aquifer baseflow

East Walton and Adcock's Common SSSI and SAC	Chalk grassland, springs, open water and scrub	2.3km north west	No – aquifer baseflow likely severed by River Nar
Breckland Forest SSSI	Breeding habitat for woodlark and nightjar	2.4km south	Yes – via chalk aquifer baseflow
Narborough Railway Embankment SSSI	Diverse chalk grassland	2.5km west	Yes – via chalk aquifer baseflow

12.6.95 Designations are shown on ES Figure 7.1: Ecological Designations [APP/6.3].

12.6.96 The River Nar, located approximately 1km north of the CSA, and an unnamed tributary of the River Nar located adjacent to Work No. 11: Skylark and Curlew Mitigation Area) are designated as Priority Habitat Chalk Rivers and is noted as a GWDTE.

Surveys

12.6.97 Initial walkover surveys undertaken in October 2024 were supplemented by additional walkover surveys in September 2025.

12.6.98 Infiltration testing was undertaken in July 2025 at nine locations in Fields 24, 26 and 27.

Future Baseline

12.6.99 This section considers changes to the baseline conditions as far as changes can be established, described above, that might occur in the absence of the Scheme coming forward during the time period over which the Scheme would be in place. The future baseline scenarios are set out in **ES Chapter 2: EIA Process and Methodology [APP/6.1]**.

12.6.100 The future baseline of the CSA and WSA without the implementation of the Scheme would be unlikely to change substantially. The CSA and WSA would continue to be intensively managed for agricultural purposes and there would likely be a continued deterioration in surface water and groundwater quality and quantity, through diffuse agricultural pollution and abstraction, contrary to the aims of the WFD.

12.6.101 In addition, other permitted developments outside of the CSA (i.e. within the WSA) are likely to be ongoing.

12.6.102 Without the Scheme, the baseline is unlikely to change substantially, however, there would be a natural evolution, including as a result of climate change. This may include impacts on rainfall, watercourse quality and increased flood risk.

12.7 Embedded Mitigation

12.7.1 Likely environmental effects have been or will be avoided, minimised, mitigated or reduced through design measures and/or management of the Scheme, as outlined in this section. Proposed environmental enhancements are also described where relevant.

12.7.2 The following embedded mitigation measures have been incorporated into the Scheme's design.

Embedded Construction Phase Mitigation

12.7.3 The following embedded mitigation measures have been incorporated into the Scheme's design for the construction phase:

12.7.4 Embedded Scheme design measures are set out within the **oCEMP [APP/7.6]**. The **oCEMP [APP/7.6]** provides a framework for a final CEMP, to be provided for approval as secured under a requirement in the **draft DCO [APP/3.1]**, which will set out specific measures which relate to the Scheme. The measures will consist of good practice methods and works that are established and effective.

12.7.5 While the **oCEMP [APP/7.6]** is an outline document and will evolve to take account of consultee feedback and detailed design prior to the construction phase, the effectiveness of the measures set out in the **oCEMP [APP/7.6]** has been witnessed during the construction of large-scale renewable energy sites for them to be treated as part of the Scheme for this assessment.

12.7.6 Measures and practices provided in the **oCEMP [APP/7.6]** will be adopted and incorporated into a working document to be agreed with statutory consultees and the planning authority following consent by way of an appropriately worded requirement in the **draft DCO [APP/3.1]**. For ease of reference throughout this Chapter, reference to specific sections in the **oCEMP [APP/7.6]**, detailing the appropriate embedded mitigation measures, are provided.

12.7.7 The following mitigation measures relating to the hydrological environment are embedded into the design and construction of the Scheme:

- 10m watercourse edge buffers for all infrastructure works (i.e. Solar PV Site and Ancillary Infrastructure, Associated Development, and construction compounds) with the exception of watercourse crossings for cables and Access Tracks
- 10m buffer of IDB maintained watercourses
- 10m buffer of marl pits
- HDD for watercourses
- Locating the Scheme outside of utilities' protected zones and avoiding pipelines as part of detailed design of the Scheme. This includes partaking in discussions with relevant utility providers as part of the detailed design evolution of the Scheme to ensure legal,

safety, and practical design considerations to ensure these have been actively integrated into the Scheme. Additionally, pipelines will be located using techniques such as CAT scanning

- The Scheme will utilise existing access roads and agricultural tracks already in place where possible, and this will help to minimise ground disturbance and requirements for further watercourse crossings
- Watercourse crossings will take one of several forms depending on the nature of works, habitat sensitivity, and other environmental and technical design considerations. HDD will be the default option for watercourse crossings by cables and is the least invasive, most sensitive method, although it may not be suitable or necessary in some locations, such as for small field drains. In such locations, watercourse crossings will take one of the following forms, which are listed in order of least to most impact and are likely to be appropriate, respectively, for the most to least sensitive features:
- Single-span structures that do not interfere with the channel (banksides, bed or water column)
- Span structures with in-stream supports or pre-cast structures with natural bed
- Closed culverts with artificial invert; and
- Open trench with over-pumping.
- Crossings will be designed as part of detailed design, post-consent, and the **oCEMP [APP/7.6]** commits to the soffit level of any bridges sitting above the design flood level. The design flood level for permanent crossings would be the 1% AEP plus Upper End climate change scenario (+40% CC) and will involve the following parameters:
- Soffit height of the bridge will be a minimum of 600mm above the 1% AEP + Climate change allowance flood level
- All abutments must be set back a minimum 1m from the top of the bank and as minimal as possible
- Any loss of floodplain due to abutments and ramps will need to be compensated for, as outlined in the **oCEMP [APP/7.6];** and
- All parapets and railings need to be permeable and open as possible with a minimum 10mm spacing.

12.7.8 The fields within the Order limits are used for arable and pastoral farming. The Scheme does not include the application of nitrates or phosphates to the land, which is carried out periodically via the current land use, and this cessation may lead to improvements in surface water quality, compared to the baseline scenario.

12.7.9 Access will be taken from existing access points, where suitable, and would initially be asphalt followed by graded Type 2 or 3 washed/clean aggregate or just use graded Type 2 or 3 washed/clean aggregate. Where new access points are required the bellmouth will typically be asphalt and would be limited in extent. This limits the potential for increased surface water runoff rates and sedimentation effects during rainfall events.

12.7.10 As outlined in **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**, the Scheme has been sequentially designed to locate the most electrically sensitive infrastructure (e.g. PV arrays, the substation compounds, inverters and transformers) outside of Flood Zones 2 and 3 to mitigate against the risk of flooding.

12.7.11 The **oCEMP [APP/7.6]** describes water management measures to control surface water runoff and drain hardstanding and other structures during the construction, operation and decommissioning of the Scheme. A Pollution Prevention Plan (PPP) will also form part of a detailed CEMP.

Embedded Operation Phase Mitigation

12.7.12 The following embedded mitigation measures have been incorporated into the Scheme's design for the operation phase, as outlined in **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**:

- The following built aspects will be served by a SuDS network designed to the 1% AEP event plus 40% climate change allowance:
  - Work No. 2: BESS Compound
  - Work No. 3: Customer Substation; and
  - Work No. 4: National Grid Substation.
- Access tracks will be served by trackside drainage ditches and will include check dams at regular intervals, as stipulated in the SuDS Manual, to prevent the rapid transfer of water downslope.

12.7.13 The **oCEMP [APP/7.6.2]** commits to a detailed drainage design being carried out prior to the construction phase. The **outline Battery Safety Management Plan (oBSMP) [APP-194]** commits the Scheme to having dedicated contaminated water tanks with automated penstocks with a manual override to prevent fire suppressant reaching the infiltration components of the SuDS network, in the rare event of a fire within Work Nos. 2, 3 or 4.

Embedded Decommissioning Phase Mitigation

12.7.14 An **outline Decommissioning Strategy (oDS) [APP/7.10]** has been prepared and submitted with the DCO Application. This sets out the general principles to be followed in the decommissioning phase of the Scheme. The **draft DCO [APP/3.1]** includes a requirement that a detailed Decommissioning Strategy would be prepared substantially in accordance with the oDS and approved by BC at that time of decommissioning, in advance of the commencement of decommissioning works, and would include timescales and transportation methods. The detailed Decommissioning Strategy would ensure that decommissioning was undertaken safely and with regard to the environmental legislation at the time of decommissioning, including relevant waste legislation.

12.7.15 When the operation and maintenance phase ends, the Solar PV Site would be decommissioned and the land returned to the landowner. All PV Panels, Mounting

Structures, above ground cabling (not including the Grid Connection Infrastructure), Conversion Units/33kV Sub-distribution Switch Rooms, BESS Units and the Customer Substation would be removed from within the Solar PV Site and recycled or disposed of in accordance with good practice and market conditions at that time. Foundations and other below ground infrastructure will be cut to 1.2m below the surface to enable future ploughing. Any piles would be removed.

12.7.16 The National Grid Substation and the Grid Connection Infrastructure would remain in situ. Mitigation planting specifically required to support the location of the National Grid Substation, as indicatively identified on the Construction Masterplan, would be handed over to National Grid who would be responsible for its maintenance and management.

12.7.17 Post-decommissioning, the landowners would choose how the land is to be used and managed; the landowner may return all of the land to agricultural use, although it is likely that established habitats such as hedgerows and woodland would be retained, given their potential benefits to agricultural land and the wider farming estate.

12.8 Assessment of Likely Effects

12.8.1 This section of the Water Resources chapter identifies and characterises potential impacts arising during the construction, operation and decommissioning phases of the Scheme.

12.8.2 Taking into account the embedded mitigation measures as detailed in Section 12.7, the potential for the likely effects of the Scheme on Water Resources receptors was assessed using the methodology as detailed in Section 12.5 of this Chapter. In the sections below, effects during the construction, operation and decommissioning phases of the Scheme are assessed for Water Resources receptors scoped into this Assessment.

12.8.3 Any additional mitigation required to reduce these effects is then set out in Section 12.9. Thereafter, an assessment is made of the significance of any residual effects after all mitigation measures have been accounted for.

12.8.4 The potential effects of the Scheme on hydrological receptors have been assessed for the construction, operation and decommissioning phases. Effects occurring during construction and decommissioning phases are considered to be short-term effects due to the duration of these phases (up to 24 months in total, though less in any one location due to phasing of the works), while those occurring as a result of the operational phase considered to be long-term effects (up to 60 years).

Construction Phase

12.8.5 The nature and scale of effects and magnitude of impacts that could result from construction activities are assessed in the following paragraphs, which include:

- The use of existing agricultural access tracks from the current agricultural operations for the construction of the Scheme

- The installation of new tracks
- Installation of the PV panels and Mounting Structures
- Construction of new Access Tracks, hardstanding, fencing, and security measures
- Construction of the BESS
- Construction of the Customer Substation and National Grid Substation, including foundations and temporary construction compounds; and
- Installation of cabling linking the Solar PV Arrays to Conversion Units/33kV Sub-distribution Switch Rooms within the Solar PV Site, and Cabling linking those to the BESS.

12.8.6 The assessment of the nature and scale of effects and magnitude of impact that could result from construction activities during the construction phase is based on the information within **ES Chapter 5: The Scheme [APP/6.1]**.

Chemical Pollution

12.8.7 Potential effects involved with the management of construction are a risk management issue, with the effects being assessed should the risk be realised. Should the Scheme progress as described in **ES Chapter 5: The Scheme [APP/6.1]**, i.e., with no spills, then there would be no effects.

12.8.8 Potential risks include the spillage or leakage of chemicals, fresh concrete, foul water, fuel, coolant or oil, during use or storage onsite. These pollutants have the potential to adversely affect subsurface and surface water quality, and groundwater.

Surface Water Resources/Watercourses

12.8.9 Whilst there is an absence of natural watercourses within the CSA, there are two ephemeral ditches within Fields 29 and 30, a number of 'dry channel' pathways, such as Fincham Drove and the pluvial 'gulleys' within the east of the CSA, which may transfer surface water during heavy or prolonged precipitation to offsite surface water receptors such as the River Nar and unnamed ordinary watercourses. Offsite watercourses, drainage ditches and water bodies could therefore be at risk from a pollution incident during the construction phase and these receptors are considered to be of medium sensitivity.

12.8.10 A 10m buffer distance between proposed construction activities during the construction phase and watercourses and drainage ditches have been implemented for all works other than watercourse crossings by cables and access tracks, to reduce the potential for chemical pollutants to be transferred to the water environment.

12.8.11 Embedded design commitments such as absorbent spill pads/kits and other measures are secured within the **oCEMP [APP/7.6]** and would effectively limit the uncontrolled release of chemicals to minor fugitive releases (or no releases at all). These will be minimised through best practice construction methods such as vehicle speed limits and regular vehicle and machine maintenance.

12.8.12 As vegetation becomes established under the PV panels there is likely to be a decrease in surface water runoff rates and a reduction in the potential for agricultural chemicals (e.g., phosphates and nitrates) to transfer into the wider hydrological catchment compared to the baseline scenario.

12.8.13 Therefore, based on the above, the impact of a chemical pollutant incident during the Construction Phase of the Scheme on surface water resources/watercourses of high sensitivity and designations, such as the River Nar SSSI is considered to be of negligible adverse magnitude, equating to no perceptible / detectible changes to the baseline hydrochemistry or hydrological environment and no change to the water quality classification. Therefore, the residual effect on surface water resources/watercourses is considered Negligible, which is not significant.

Groundwater and Near-surface Water

12.8.14 Groundwater could be at risk from a pollution incident during the construction phase. Pollutants interacting with bedrock also have the potential to alter the pH of the groundwater resource. Chemical and pH alterations to bedrock are difficult to rectify due to the fractured nature of the rock and the lengthy attenuation and dispersal of chemicals.

12.8.15 The Mounting Structures for the Solar PV Arrays (Work No. 1) will be piled into the ground at a superficial level (anticipated to be driven into the ground to a maximum depth of approximately 4m) and will have limited potential to release pollutants into groundwater, as the groundwater resource under the CSA is associated with the Lewes nodular, Seaford, Newhaven and Culver chalk formations is modelled to have a maximal depth from surface level between 4 to 40m BGL underlying the majority of Work No. 1: Solar PV Site.

12.8.16 Only a very small section in the northeast of Field 26 has maximum groundwater elevations above 4m BGL where there could be direct contact with the Mounting Structure. Given the piles will be made from high-grade aluminium and stainless steel and as such, there will be limited potential for degradation or biproducts to be leached to the soils and percolate to groundwater. Plate 12-14 shows the thin nature and footprint of a typical Mounting Structure pile, which is likely to be used at the Scheme.

Plate 12-14 Typical PV Mounting System pile and physical footprint[2]


12.8.17 Should concrete feet be required for isolated areas, these will be pre-cast and no concrete will be poured in-situ on Site.

12.8.18 Work No. 2: BESS Compound, Work No. 3: Customer Substation and Work No. 4: National Grid Substation are the only Scheme infrastructure during the construction phase which have any potential to impact the groundwater resource due to the absence of concrete pouring and substantial excavation associated with other infrastructure which makes up the Scheme.

12.8.19 Triangulation of hydrometric monitoring data available on Hydrology Data Explorer shows that groundwater elevation do not interact with potential foundations of Work Nos. 2-4.

12.8.20 The EA's NEAC model shows that groundwater elevations during the wet day scenario generally are not within 15m of surface level, with the exception of a small northern section of Work No. 4. There is a potential for groundwater to interact with Work No. 4 by approximately 1 m, based on a 15 m foundation pile depth.

12.8.21 Figures 12.13.2 to 12.15.2 show the potential direct interaction with the groundwater unit underlying Work Nos. 2 to 4.

12.8.22 The EA's NEAC model shows that groundwater elevations during the wet day scenario do not interact with Work Nos. 2 and 3. There is potential to interact with Work No. 4 by approximately 1 m, based on a 15 m foundation pile depth.

12.8.23 Once the detailed design is complete, and if the required piling depth exceeds the highest recorded groundwater elevation, a CFA piling solution will be adopted and installation will only occur when groundwater elevations are not at a depth to interact with the piling

[2] Photograph credit - Rob Sutton - Cotswold Archaeology. Reproduced with permission.

solution. If artesian pressures are identified locally, works will be designed or sequenced to ensure no groundwater breakthrough or loss of control during piling.

12.8.24 Measures secured in the **oCEMP [APP/7.6]**, such as spill pads and impermeable geotextile membranes will effectively limit the uncontained release of chemicals to minor fugitive releases. Further details of these measures are set out in the **oCEMP [APP/7.6]**.

12.8.25 Additionally, the use of HDD for cable installation could interact with groundwater should the technique be utilised in sections of Fields 25 to 27, 29 and 30 and the risk of pollution includes the release / breakout of drilling fluid. Measures in the **oCEMP [APP/7.6]**, such as a specific design of each HDD crossing will be carried out, including:

- Appropriate GI of the location
- Intended drill path in relation to the identified ground conditions
- Hydro fracture analysis and calculation; and
- Drilling fluid viscosity and properties selection suitable for the identified ground conditions.

12.8.26 Should HDD techniques be required in Fields 25 to 27, 29 and 30 then these works would be undertaken when groundwater elevations are not within 15m of ground level, and this would be informed by monitoring boreholes to be installed within these fields prior to the construction phase. The **oCEMP [APP/7.6]** also commits to monitoring during HDD and Breakout Clean Up procedure, which will limit the potential of uncontained releases of contaminants to the hydrogeological environment.

12.8.27 Regarding foundation types for Work No. 2: BESS Compound, Work No. 3: Customer Substation and Work No. 4: National Grid Substation, in accordance with the EA's Piling in layered ground: risks to groundwater and archaeology Science Report SC020074/SR, should a piling option be required following detailed GI then piles should be installed using a Continuous Flight Auger (CFA) technique for Work Nos. 2 to 4.

12.8.28 The final design levels and loading requirements are not finalised at this stage of design and the use of different piling techniques should be confirmed following further design clarification at the detailed design phase, once the ground investigations have been undertaken. A Foundation Works Risk Assessment will likely be required to ensure piled foundations do not create additional contaminant pathways and any potential impacts on the underlying aquifers, such as turbidity, are managed. This should be completed once construction methods are confirmed and ground investigation data are available.

12.8.29 The EA classifies both CFA and rotary bored (cast in situ) piling as replacement/non-displacement techniques. The CFA piles are formed by the excavation of soil using a hollow stemmed CFA to form a void which is then filled with concrete or cementitious grout introduced under pressure via the hollow stem into the base of the borehole.

12.8.30 The auger is then withdrawn at a controlled rate, whilst maintaining the concrete or grout at a positive pressure. Spoil is withdrawn from the hole on the auger flights and the concrete fills the hole under the auger head, the positive pressure forcing it into contact with the surrounding superficial geology. Rotary bored (cast in situ) piling uses an auger or other tools to create the pile bore which is supported by temporary casing to ensure stability. Concrete is then poured into the tremie as the temporary casings are withdrawn to form the pile.

12.8.31 CFA techniques improve pile–soil interaction by generating a low-permeability interface through the high-pressure placement of concrete, which ensures effective contact with the surrounding soil. The short interval between auger extraction and concrete placement limits the potential for soil relaxation and prevents significant reductions in effective stress. Although a transient preferential pathway for pore water migration may be created during auger withdrawal, this is rapidly sealed as the concrete displaces soil particles and reinstates confinement. This mechanism is critical in maintaining lateral support, particularly in soils of low cohesion where instability or excessive deformation may otherwise occur. To achieve these conditions, it is essential that the concrete pumping rate is precisely synchronized with auger withdrawal to avoid the formation of voids or inclusions, thereby ensuring continuous confinement along the pile shaft. Such procedures are consistent with best-practice guidance outlined in CIRIA C653 (2007) and Eurocode 7 (BS EN 1997-1), which emphasize the importance of controlled construction processes to preserve pile integrity and soil stability.

12.8.32 Blinding concrete will be poured at the base of the piles to prevent the structural concrete from seeping into the surrounding geology and will provide a level of protection to the piles from moisture and chemical damage.

12.8.33 Three monitoring boreholes will be installed in in Work Nos. 2 to 4 to ensure that piling works only occur when groundwater elevations are below the depths where piling could directly interact with the groundwater resource.

12.8.34 The redundant MoD fuel pipeline traversing Work Nos. 1 to 4 will be avoided during the detailed design phase i.e. not placing infrastructure within a working area of the pipelines and therefore reducing the risk of introducing contaminants to the underlying aquifer via construction activities.

12.8.35 Based on the above, the impact of a chemical pollutant incident during the construction phase of the Scheme on groundwater and near surface water resources, such as groundwater abstractions and associated SPZs receptors of high sensitivity is considered to be of low adverse magnitude, equating to a detectable non-detrimental change to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect on groundwater and near surface water is considered Minor, which is **not significant**.

12.8.36 Further to engagement with NGET immediately prior to the DCO Application, Work No. 4 has been extended to the north to allow flexibility for the consideration of feedback from NGET. Further ground assessment work will be undertaken to assess the effect of this extension and identify suitable mitigation measures, such as avoiding direct interaction with the groundwater unit, in order to avoid any potential significant effects arising.

Erosion and Sedimentation

Surface Hydrology

12.8.37 Erosion and sedimentation can occur from excavations, ground disturbance (such as soil stripping), de-watering (pumping of water from excavations), and overburden stockpiling (superficial geology / topsoil spoil heaps), the largest elements of which would be with the construction of the National Grid Substation, and Customer Substation, BESS Compound, Conversion Units/33kV Sub-distribution Switch Rooms and Cabling.

12.8.38 Sediment entering drainage ditches has the potential to affect water quality, ecology and flood storage capacity.

12.8.39 The following embedded mitigation measures during the construction phase of the Scheme have been incorporated into the Scheme design, with detailed proposals and locations to be submitted with the DCO Application.

12.8.40 Measures include, but are not limited to, planting and seeding with a suitable grass or wildflower mix to areas of the Site, silt traps and buffer strips to minimise sedimentation and erosion and construction drainage measures, such as the use of settlement lagoons, swales and interception bunds, to limit the potential for sediment entering offsite watercourses via overland flow.

12.8.41 As a result of embedded mitigation in the design of the Scheme, such as the decision to seed Work No. 1: Solar PV Site with a suitable grass or wildflower mix and to allow vegetation to establish, through techniques such as drilling appropriate crops in advance of the construction phase, there will be less potential for silt/sediment to be generated during the construction phase, as the vegetation will bind the soils in the CSA.

12.8.42 Measures within the **oSMP [APP/7.13]** accompanying the DCO Application in partnership with, the overland separation distance between areas of the Site for construction related activities areas and drainage ditches as included in the Scheme design process and the general flat topography within the fields which comprise the Work No. 1: Solar PV Site, will likely minimise overland flow generation and any silt generated during the construction phase will be entrained within cut off ditches before reaching land drains.

12.8.43 In fields which comprise PV panels, overland flow generation is likely to be minimal and any silt generated during construction will be entrained within cut off ditches, as outlined in the **oCEMP [APP/7.6]**, before reaching watercourses and land drains. Measures such as silt traps and buffer strips will minimise sedimentation and erosion.

12.8.44 Other construction drainage measures, such as the use of settlement lagoons, swales and interception bunds, will limit the potential for sediment entering offsite watercourses via overland flow. Treated water in settlement lagoons may need to be pumped using Siltbuster pumps before discharging onto a vegetated surface. This will reduce the potential for silt blinding.

12.8.45 Where new crossings are required then works will be isolated from the water environment by coffer dams and over pumping, if works are undertaken when ephemeral ditches (ditches that sometimes have water in them and sometimes do not) have water in them. This will limit the potential for sediment and siltation to be transferred into the watercourses or transferred downstream through direct disturbance.

12.8.46 Based on the above, the impact of sedimentation and erosion during the construction phase of the Scheme on surface hydrology such as offsite watercourses and onsite drainage ditches of high sensitivity receptors is considered to be of negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect on surface hydrology is considered Negligible, which is not significant.

Sub-surface Hydrology

12.8.47 Sediment has the potential to change near-surface water flows within superficial geology deposits by creating a physical barrier within naturally occurring drainage micropores. Sediment entering near-surface water in superficial deposits also has the potential to impact on groundwater quality within bedrock deposits.

12.8.48 Embedded mitigation measures during the construction phase of the Scheme include the implementation of managed vegetation growth which will assist in promoting the retainment of soil (at the surface) and increasing the strength of the soil mass (at depth) and reducing the potential for sediment to enter sub-surface hydrology compared to the baseline existing scenario of tilled agricultural arable fields and fields which contain livestock at the Site. Additionally, embedded measures such as ground membranes and stockpiled areas, will effectively limit sediment entering sub-surface water in superficial deposits.

12.8.49 Should dewatering of excavations be required, 'Siltbusters' will be used to treat pumped/surplus water from lagoons during periods of heavy or persistent rainfall. to limit silt blinding.

12.8.50 Vehicle washing will utilise dry wheel wash facilities, where possible, to limit the potential to generate silt laden water.

12.8.51 The use of CFA for piling for Work Nos. 2 to 4 and undertaking works when the groundwater elevations are below the depths of the pile extent also limits the potential for soils/sediment to be transferred to the underlying hydrogeology resource.

12.8.52 Based on the above, the impact of sedimentation and erosion during the construction phase of the Scheme on sub-surface hydrology of high sensitivity is considered to be of negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrological environment. Therefore, the significance of effect on sub-surface hydrology is considered Negligible, which is **not significant**.

Impediments to Flow

12.8.53 New Access Tracks may require the installation of new watercourse crossings and the upgrade or reuse of existing crossings across all sections of the CSA. Existing access routes and agricultural tracks, where practicable, will be retained, limiting the requirement to install new ditch/watercourse crossings, therefore minimising the potential for impediments to flow. The minimisation of the number of proposed watercourse crossings reduces one of the main activities during construction phase that could give rise to impediment of flows.

12.8.54 Mitigation measures such as the use of a wide arch culverts, are likely to prevent impediments to flow being created and detailed design will be carried out prior to the construction phase and will be developed with the LLFA and the EA as the detailed design of the Scheme progresses, and will be secured through a requirement of the **draft DCO [APP/3.1]**.

12.8.55 No drainage ditch diversions are proposed as part of the Scheme.

12.8.56 Crossings will be designed following granting of the DCO and the Applicant will commit to the soffit level of any crossing to sit above the design flood level. The design flood level for permanent crossings would be the 1% AEP plus Higher central climate change scenario (57% CC) and will involve the following parameters:

- Soffit height of the crossing will be a minimum of 600mm above the 1% AEP + Climate change allowance flood level
- All abutments must be set back a minimum 1m from the top of bank and as minimal as possible
- Any loss of floodplain due to abutments and ramps will need to be compensated for; and
- All parapets and railings need to be permeable and open as possible with a minimum 100mm spacing.

12.8.57 As part of the construction phase, of the Scheme cables may also cross areas of the Site, in particular drains between Fields 29 and 30 on Site. The type of crossings will be determined during the detailed design phase prior to ES and with watercourse crossing strategies/techniques such as HDD or open cut method and cover with a temporary diversion, damming or pumping explored.

12.8.58 Soil stripping will be required for areas of hardstanding such as adjacent to cable trenches. Associated sedimentation effects could occur during the excavation of the cable trench.

12.8.59 Any silty water generated during the construction phase on Site will be subject to a settlement process through drainage mitigation measures (silt traps, silt fencing etc.) and channelled into vegetated areas, to allow the settlement of solids, as outlined in the **oCEMP [APP/7.6]**.

12.8.60 Excavated soil that is required to be stored for future reinstatement purposes, whether just for the construction phase or whether for the operation phase, would be managed in accordance with a detailed SMP which will be finalised post-consent at detailed design stage, and will be based on the measures in the **oSMP [APP/7.13]**. This will be secured by a requirement in the **draft DCO [APP/3.1]**. The **oSMP [APP/7.13]** includes a section on the management of drainage around excavated soils to minimise risk of erosion of the stored soils.

12.8.61 As the ephemeral ditches in Fields 29 and 30 are not connected to the wider hydrological network they are not classed as Ordinary Watercourses, as discussed with the LLFA September 2025. As such, in-stream engineering works will not require Ordinary Watercourse consent form the LLFA.

12.8.62 Detailed method statements and plans will be provided to the LLFA and EA prior to the construction phase for all in stream construction works and all temporary watercourse pumping will be discussed in detail prior to the Construction Phase.

12.8.63 Based on the above, the impact of sedimentation and erosion during the construction phase of the Scheme on watercourses and surface water features of high sensitivity is considered to be of negligible adverse magnitude, equating to no increase in the probability of flooding onsite and offsite. Therefore, the significance of effect on flow impediment to watercourses is Negligible, which is not significant.

Compaction of Soils

12.8.64 The movement of construction traffic, in the absence of construction good practice, can lead to compaction of the soil. This can reduce soil permeability, potentially leading to increased run-off rates and increased erosion. The superficial geology underlying the Site is generally of low permeability and is in agricultural use, so the effects of compaction would not result in a substantial increase in runoff from existing conditions.

12.8.65 In order to maintain or improve on the current level, it is necessary to ensure that construction methods do not seriously disrupt the established drainage network and that no areas are surcharged, either by water discharge or spoil.

12.8.66 Maintenance of existing drainage infrastructure should be prioritised to avoid compaction of soils, therefore all existing drainage network channels will be maintained through measures such as plastic spanning under the access tracks to ensure conveyance of flows.

12.8.67 Existing access tracks or agricultural machinery routes will be used in preference to making new ones, where practicable, further reducing the potential for soil compaction. Depending on weather conditions during construction, temporary roadways (e.g., plastic or metal track matting) may be utilised to access parts of the Scheme to avoid excessive soil disturbance or compaction, as outlined in the **oCEMP [APP/7.6]** and **oSMP [APP/7.13]**.

12.8.68 Based on the above, the impact of sedimentation and erosion and increases in surface water runoff rates during the construction phase of the Scheme on surface water sub-surface water features of medium sensitivity receptors is considered to be of negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment and no increase in the probability of flooding onsite and offsite. Therefore, the significance of effect on compaction of soils is Negligible, which is **not significant**.

Changes in Soil Interflow Patterns

12.8.69 Some excavations, such as those for Work No. 2: BESS, Work No. 3: Customer Substation and Work No. 4: National Grid Substation may need temporary sub-surface water controls, such as physical cut-offs or de-watering. These temporarily divert flows away from the excavation and temporarily lower the local water table and sub-surface water levels in the superficial geology. Localised temporary changes to soil interflow patterns may therefore arise.

12.8.70 Depending on the final foundation choice and design, Work No. 2: BESS Compound, Work No. 3: Customer Substation and Work No. 4: National Grid Substation also have the potential to change sub-surface water flow by creating physical barriers within naturally occurring drainage macropores in soil.

12.8.71 In accordance with the EA's Piling in layered ground: risks to groundwater and archaeology Science Report SC020074/SR, should a piling option be required following detailed GI then piles should be installed using a CFA technique for Works Nos. 2 to 4.

12.8.72 No substantial impediments to near-surface water flow disruption will occur for the installation and use of access tracks, as the detailed drainage design for the Scheme will take into account any severance of saturated areas to ensure hydrological connectivity is maintained through the use of, as set out in in the **oCEMP [APP/7.6]** secured by a requirement of the **draft DCO [APP/3.1]**.

12.8.73 In Work No. 1: Solar PV Site, the Scheme will involve the installation of PV panels of photovoltaic cells arranged on solar panel Mounting Structures. The solar panel Mounting Structures will be driven into the ground to a depth of maximum depth of 4m.

12.8.74 It is considered that installing Mounting Structures to a depth of 4m will have a negligible effect on the displacement or change in sub-surface water flow underlying the CSA due to the thin nature of the supporting frame, as shown in Plate 12-15 shows the thin nature and footprint of a piled Mounting Structure.

Plate 12-15 Indicative thin racking system driven into ground

12.8.75 As outlined in **ES Chapter 11: Soils and Agriculture [APP/6.2]**, there are no agricultural fields which are served by a subsurface network of drainage pipes. As such the installation of the Mounting Structure does not have the potential to damage this network by piercing the pipework and impairing its functionality through blockage.

12.8.76 Cable trench excavations may require temporary sub-surface water controls, such as physical cut-offs or de-watering. Such controls temporarily divert flows away from the excavation, de-watering temporarily lowers the local water table and subsurface water levels in superficial geology deposits. Localised temporary changes to soil interflow patterns may therefore arise. Cable trench excavation also has the potential to change subsurface water flow by creating physical barriers within naturally occurring drainage macropores in soil. Given the shallow excavation depths of the cable trench (up to 2m depth) and narrow width (a maximum working corridor of approximately 50m width) no substantial impediments to subsurface water flow will be created and site drainage design will take into account any severance of saturated areas to ensure hydrological connectivity is maintained. Should HDD be utilised, the physical disturbance through the trenchless technique will be less than the open cut method.

12.8.77 Based on the above, the impact of sedimentation and erosion during the construction phase of the Scheme on groundwater of high sensitivity is considered to be of low adverse magnitude, equating to interaction with the groundwater table which will marginally alter local ecology or will lead to a slight detectable displacement of groundwater. Therefore, the significance of effect on soil interflow is Minor, which is **not significant.**

Groundwater Quantity

12.8.78 Construction activities may locally diminish the rate of aquifer recharge where surface runoff is managed and subsequently discharged, with the potential to lower groundwater elevations and alter subsurface flow pathways. Consequently, this may reduce baseflow contributions to dependent receptors, including watercourses such as the River Nar.

12.8.79 As identified by the EA and AW the region is severely water stressed and demand for water could negatively affect water resources regionally.

12.8.80 The annual volume of water currently used for irrigation, livestock etc within the CSA, is approximately 885m^3, which is sourced from reservoirs and groundwater.

Water Demand During Construction Phase

12.8.81 Water demand for the Scheme can be categorised into those arising during the construction phase. The potential demands for each phase are outlined in the following sections.

Amenity Use

12.8.82 Amenity use within the construction phase consists of toilet and washing facilities, rest and dining areas, and drinking water.

12.8.83 A total of 366 full time employees over the course of a year is estimated during the construction phase and a peak construction workforce of 740 employees.

12.8.84 The estimated water use for each employee is 0.06m^3 according to BS 8551:2015: Provision and management of temporary water supplies and distribution networks (not including provisions for statutory emergencies) for an open industrial site (e.g. construction, quarry, without canteen). The figures presented in Table 12.14**5** are a conservative estimate and can be lowered by considering options such as non-flushing chemical toilets, etc.

Table 12.1415 Amenity Use Water Demand

Amenity Use	Value	Unit
Average	21.96	m^3/day
Peak	44.40	m^3/day

Vehicle washing

12.8.85 Deliveries of materials to the Site during the construction phase will involve an estimated 48 heavy goods vehicles (HGVs). An additional 263 estimated vehicles will be used to transport staff and other requirements to the site.

12.8.86 Wheel-wash facilities will be installed at construction exits to reduce the risk of mud or debris being carried onto the local highway network. Dry wheel wash facilities will be explored to reduce the potential water consumption of the Scheme and therefore the figures presented in Table 12.15Table 12.16 are a conservative estimate.

Table 12.1516 Vehicle Washing Water Demand

Vehicle Washing	Value	Unit
Average	15.46	m^3/day
Peak	46.65	m^3/day

Equipment cleaning

12.8.87 Equipment cleaning involves the wash-down of both fixed and portable plants. Each Work No. will be equipped with a cleaning station.

12.8.88 An average daily hose use of 0.25 hours at 1.5m^3 will be used throughout the construction phase and average and peak water demand for washing equipment is shown in Table 12.167.

Table 12.167 Equipment Cleaning Water Demand

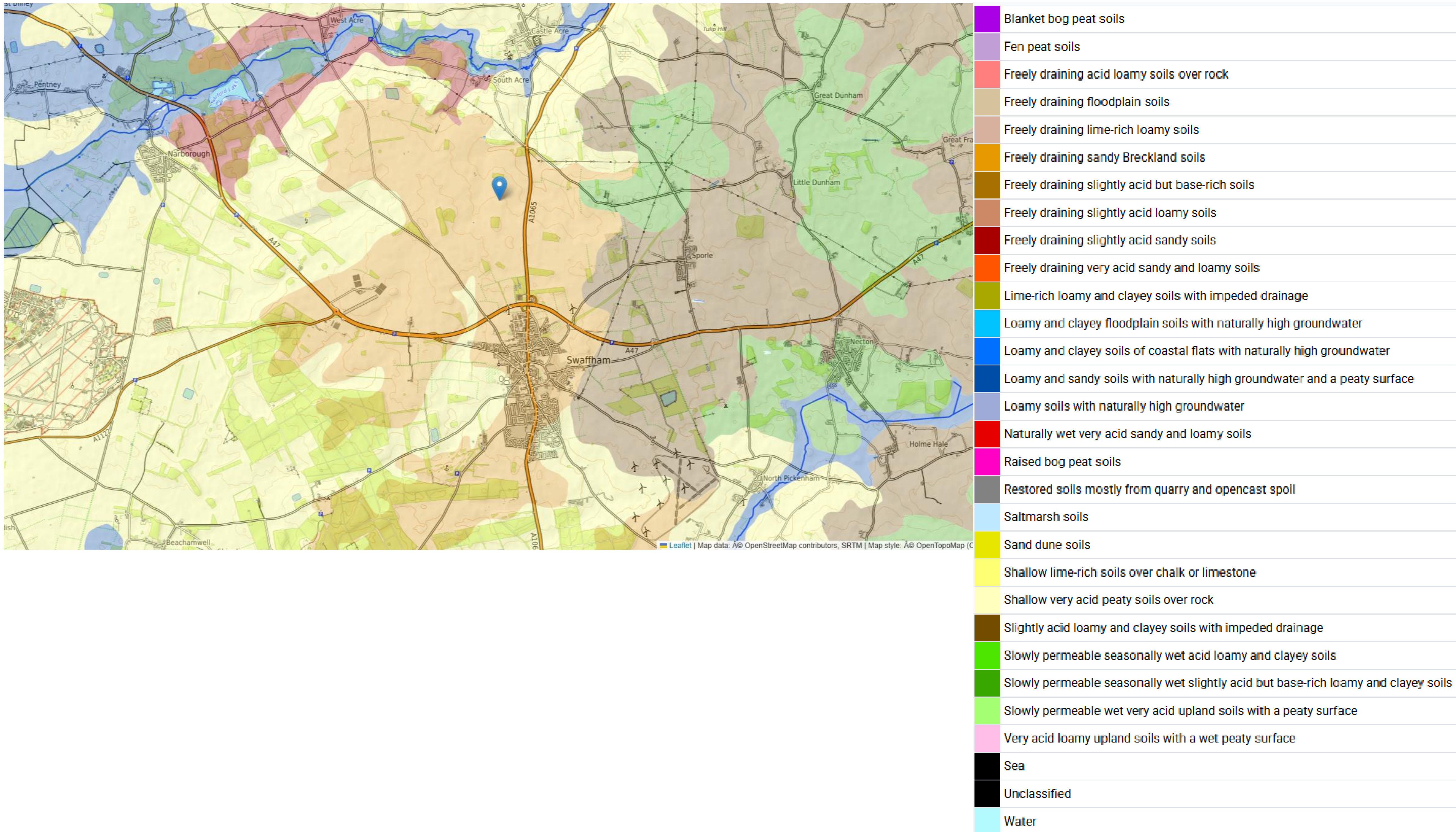
Equipment Washing	Value	Unit
Average	4.13	m^3/day
Peak	12.39	m^3/day

Horizontal Directional Drilling

12.8.89 HDD estimated water demand is based on the volume (m^3) of material excavated during drilling.

12.8.90 The Soilscape categorisation for the Scheme has been assessed accordingly, where most of the CSA is underlain by Soilscape Ref 11: Freely draining sandy Breckland soils **[Ref. 12-54]**, as shown in Plate 12-16.

Plate 12-16 Soilscape around CSA



12.8.91 The mix of low to lime-rich sandy and loamy shallow lime-rich soils around the CSA, a ratio of 2:1 water:earth is used to estimate the HDD water usage.

12.8.92 It is assumed that only one directional drill will occur at a time and a maximum of one drill will occur each day.

12.8.93 The total drilled length is a conservative estimate of 1km as the design stage is not yet detailed.

12.8.94 The total volume of earth removed is a conservative estimate of 126 m^3.

12.8.95 Table 12.178 summarises the water demand required during the construction phase.

Table 12.178 HDD Water Demand

HDD	Value	Unit
Average	0.5	m^3/day
Peak	25.1	m^3/day

Total Water Demand

12.8.96 Total water demand required throughout the construction phase is shown within Table 12.189

Table 12.189 Total water demand for construction phase

Construction Phase Water Use	Value	Unit
Amenity use	11,068	m^3
Vehicle Washing	3,897	m^3
Equipment cleaning	2,079	m^3
HDD	252	m^3
Total Water Demand	**17296**	**m^3**

12.8.97 The estimate for overall water demand is conservative, as it is unlikely that each element of usage would peak simultaneously.

Scheme Water Supply

12.8.98 Anglian Water confirmed through consultation that they could only supply up to 20 m3 per day to the Scheme, due to the region being water stressed. As such, this is not sufficient to meet the demands of the construction phase and would require a secondary source, such as tankering.

12.8.99 The Scheme is underlain by a highly productive aquifer. Therefore, depending on factors such as aquifer depth, the number of existing boreholes, and their total abstraction volumes, a borehole water source may be possible for the Scheme. The landowner has provided an annual estimate of water consumption of 885m3 across the CSA for agricultural use, which is sourced from groundwater and could be used to meet some of the Scheme's construction phase water demand.

12.8.100 Whilst a new borehole(s) could supply the Scheme, this would represent a substantial abstraction which is likely to exacerbate the conditions leading to water stress in the region.

12.8.101 There are no watercourses within the CSA which would be suitable for abstraction and similarly, abstraction from the River Nar is not considered a viable option.

12.8.102 As such, the Scheme is likely to be supplied by a combination of Anglian Water Mains, the landowners' existing agricultural supply and a water tankered option.

12.8.103 The potential impact on groundwater yield (High sensitivity receptor) is therefore considered to be of Low adverse magnitude, equating to a detectable non-detrimental change to the baseline hydrological environment. Therefore, the significance of effect from the Scheme on groundwater resources during the construction phase is Minor, which is **not significant**.

Migration of Pollutants from Contaminated Land

12.8.104 No historical landfills or permitted waste site/authorised landfills are located within 1km of the CSA.

12.8.105 Several Marl Pits are located within the CSA. Whilst there is evidence from published BGS studies that marl pits within Swaffham were infilled with waste water, there is no published evidence that this practice occurred within the CSA.

12.8.106 Marl Pits were buffered to 10m and no excavation or below ground installations will occur in this zone.

12.8.107 Excavations in proximity to Marl Pits will be tested and appropriate action taken, such as removal from site by a licensed contractor (if required) in accordance with The Environmental Protection Act 1990.

12.8.108 No other areas of contamination have been identified within the CSA.

12.8.109 Given the isolated areas of potential contamination in the CSA, impacts of sedimentation and erosion associated with contaminated land are therefore considered to be of negligible adverse magnitude for receptors of medium sensitivity (watercourses and drainage ditches) and of high sensitivity (groundwater), equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect of migration of pollutants from contaminated land from the Scheme during the construction phase is Negligible, which is **not significant**.

Effects on Private Water Supplies and other Abstractions

Private Water Supplies (PWS)

12.8.110 PWS could be at risk of a reduction in the quality or quantity of water serving a property from construction of the Scheme.

12.8.111 Works in proximity to Keepers Cottage comprise ‘area for mitigation, enhancement and/or retained agricultural land/buildings’ and Work No. 1: Solar PV Site, the latter with potential to involve piling of the solar panel Mounting Structures to a depth of up to 4m BGL into the superficial geology cover. Given the borehole is anticipated to abstract from a depth of between 9m and 40m BGL associated with groundwater from the chalk units underlying the WSA, based on triangulation of hydrometric monitoring data available on Hydrology Data Explorer which shows groundwater to have a maximal level of 39m below ground level in proximity to Keepers Cottage (also see adjacent BGS borehole TF71SE68), there will be no direct effects on the groundwater resource being utilised for the supply.

12.8.112 This also applies to other PWS to the north of the CSA, where groundwater was encountered at 9m to 18m BGL.

12.8.113 The Mounting Structures will be made from high-grade aluminium and stainless steel and as such, there will be limited potential for degradation or bi-products to be leached to the soils and percolate to groundwater.

12.8.114 Measures identified in the **oCEMP [APP/7.6]** such as the safe handling procedure in accordance with the Control of Substances Hazardous to Health Regulations 2002, and the Control of Pollution (Oil Storage) (England) Regulations 2001, will be implemented to manage the handling of chemicals and fuels will limit the potential for spillage or leakages to minimal fugitive releases (or no releases at all).

12.8.115 No other PWS are located within 250m of built infrastructure for the Scheme.

12.8.116 PWS to the north of the CSA (IDs 3, 7, 10 and 13) are located approximately 25m of Work No. 11: Skylark and Curlew Mitigation Area, which will provide arable and grassland habitat. Given the land surrounding these supplies is currently used for pig rearing and arable crop production, there is likely to be a marginal improvement in the quality of surface runoff and inputs to groundwater within the CSA through the reduction in the application of nitrates and phosphates, and inputs from animal waste, which is cited as a pressure on the River Nar in the Norfolk Rivers Trust in the Water Framework Directive

Local Catchment Plan. It should be noted that if livestock are simply relocated to fields within the catchment of the PWS then there will be no change in the quality of surface water runoff and inputs to groundwater.

12.8.117 Based on the above, the impact during the construction phase of the Scheme on PWS identified as a medium sensitivity receptors is considered to be of negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the effect on PWS is Negligible, which is **not significant**.

Public Supplies (PuWS)

12.8.118 PuWS could also be at risk of a reduction in water quality or quantity during the construction phase of the Scheme if groundwater is affected.

12.8.119 The western section of the CSA is located within SPZ1, as shown on **ES Figure 12.5: Source Protection Zone [APP/6.3],** associated with the AW's PuWS abstraction at Marham, approximately 6.3km west of the CSA.

12.8.120 Groundwater was encountered at 9m BGL within boreholes at Marham, which has an existing solar PV array installed in the field immediately to the north of the treatment facility.

12.8.121 Triangulation of hydrometric monitoring data available on Hydrology Data Explorer shows groundwater to have a maximal level range from 14m BGL to 40m BGL within Work No. 1: Solar PV Site located within SPZ1. At this depth it is very unlikely that subsurface water will be influenced by the Ground mounted PV Modules, which could be driven into the ground to a maximum of 4m.

12.8.122 There is a potential for chemical effects from oil and fuel spillages or leakage. Measures to manage the handling of chemicals and fuels, such as designated refuelling points and bunds for storage, are outlined in the **oCEMP [APP/7.6]** and will limit the potential for spillage or leakages to minimal fugitive releases (or no releases at all).

12.8.123 Where works are carried out within proximity to water distribution or sewer infrastructure, a 'Watching Brief' will be conducted during works by a Hydrologist or Engineer. The Watching Brief should be used to clearly mark and demarcate any sensitive areas around the pipes which serve the property and aim to isolate pipes from construction works and avoid impact on the pipe infrastructure. Employees will be briefed of the pipework and locations and be briefed on any controls and conditions put in place prior to the commencement of works. Should any works cross the pipes then measures will be implemented to prevent damage to the pipes, such as laying of steel matting or concrete above the pipework, and is detailed in the **oCEMP [APP/7.6]**.

12.8.124 Based on the above, the impact during the construction phase of the Scheme on PuWS identified as a high sensitivity receptors is considered to be of negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect on PuWS is Negligible, which is **not significant**.

EA Licenced Abstractions

12.8.125 As outlined in Table 12-11, two EA licenced groundwater abstractions are located within the WSSA.

12.8.126 Supply 6/33/58/*G/0248 is located approximately 50m from Work No. 1: Solar PV Site and 145m from Work No. 2: BESS Compound. Whilst the property is derelict and uninhabited, the licence is still extant and therefore requires assessment. Triangulation/interpolation of hydrometric monitoring data available on Hydrology Data Explorer, which shows a maximal groundwater elevation of 25.2m BGL.

12.8.127 Supply 6/33/58/*G/0274/R03 is located approximately 675m east Work No. 1: Solar PV Site and borehole records show abstraction depths of approximately 40m BGL. This corresponds with the triangulation/interpolation of hydrometric monitoring data available on Hydrology Data Explorer, which shows a maximal groundwater elevation of 37.6m BGL.

12.8.128 Therefore, there will be no direct effects on the groundwater resource being utilised for the supplies.

12.8.129 Measures outlined in the **oCEMP [APP/7.6]** to manage the handling of chemicals and fuels will limit the potential for spillage or leakages to minimal fugitive releases (or no releases at all).

12.8.130 Based on the above, the impact during the construction phase of the Scheme on EA registered abstractions identified as a high sensitivity receptors is considered to be of negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect on EA Licenced Abstractions is Negligible, which is **not significant**

Water Framework Directive (WFD)

12.8.131 The WFD Assessment (**Appendix 12.3 [APP/6.4],** concludes that with the implementation of good practice construction measures, there will be no degradation in the WFD status (chemical or ecological) of waterbodies which interact with the Scheme.

Operational Phase

12.8.132 Potential effects associated with the operational phase of the Scheme are:

- Increased or decreased surface water run-off rates
- Continued or decreased erosion and sedimentation from runoff from areas of hardstanding and areas under the PV panels
- Alterations to natural flow pathways from runoff from areas of hardstanding

- Reduced chemical loading of watercourses associated with the cessation of fertiliser/nitrate application
- Altered groundwater elevations or yield through water use
- A risk of a pollution event from minor spills caused by maintenance vehicles
- Risk of pollution from infrastructure damage; and
- A risk of a pollution event in the rare event of a battery or substation fire.

Chemical pollution from PV panels

12.8.133 The nature of these effects, with the exception of a battery fire (discussed below in the relevant subsection of this Chapter), have been discussed in relation to the construction phase. However, as there should be substantially less activity and ground disturbance within the Order limits during the operation phase, it is expected that the magnitude of impact of many of these effects will be far less than in the construction phase. This is with the exception of rainfall run-off from the Solar PV Arrays, which is expected to remain the same as during the construction phase, as the Solar PV Arrays will be in place early during the construction phase. Due to the composition of PV panels, chemical pollution from damaged PV panels/leakages from the PV panels has been assessed.

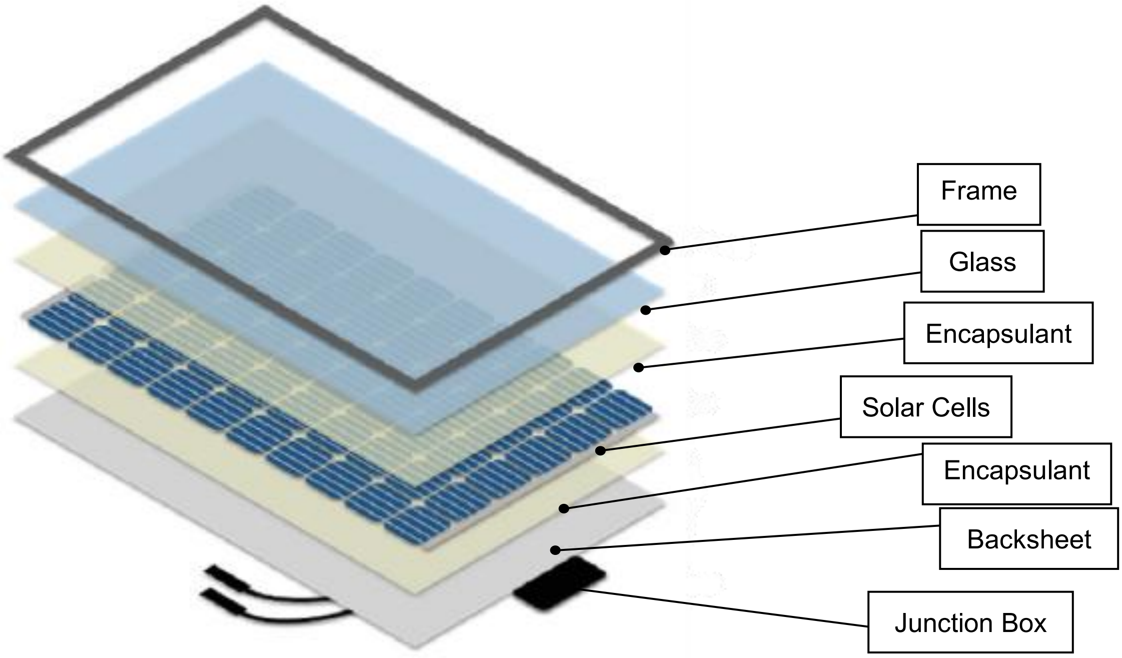
12.8.134 Raincloud staff have undertaken site walkovers on operational solar farms where vandalism has resulted in the PV panel surface being breached through impact from projectiles, as shown in Plate 12-17 and Plate 12-178.

Plate 12-17 and Plate 12-18 Vandalised PV Arrays, Thorne Solar Farm, Doncaster (2024)

12.8.135 The extensive impact from heavy and sharp projectiles shown in Plate 12-17 and Plate 12-178 did not penetrate the backsheet of the PV panel.

12.8.136 For illustrative purposes, PV panels can be laminated between two sheets of sealed transparent encapsulant, covered in tempered glass, fitted with another layer of plastic or glass at the back, and sealed in an aluminium frame/backsheet, as illustrated in Plate 12-19 [Ref. 12-55].

Plate 12-19 Illustrative configurations of PV module



12.8.137 Due to the composition of the surface of the PV panels, they are likely to remain intact both at the surface and underside near the racking system, even in the event of damage/impact and not leak. As such, there is limited potential to transfer chemicals to the hydrological environment. This is supported by the Solar Energy Industries Association (SEIA) **[Ref. 12-56]** who conclude that even in the event of the glass breaking and is left unrepaired, it would take years to extract any type of substance from the broken panels.

12.8.138 A programme of regular maintenance and inspection, as outlined in **ES Chapter 5 The Scheme [APP/6.1]**, will ensure that faulty or damaged PV panels are replaced promptly, further reducing the risk of a transfer of chemicals to the hydrological environment.

12.8.139 An **oOEMP [APP/7.8]** includes control measures to ensure no significant impacts will arise during the maintenance and replacement activities, which includes not undertaking cleaning of the PV panels during temperate which could rise to thermal shock and lead to microcracking of the glass layer, as outlined in the NREL study **[Ref. 12-1]**.

12.8.140 Additionally, the **oOEMP [APP/7.8]** outlines that cleaning of Work No 1: Solar PV Site is likely to only occur once a year and no chemical cleaning products would be used, with stubborn dirt brushed or wiped off the panels.

12.8.141 Based on the above, the impact from PV panels to chemical pollution during the operational phase of the Scheme on watercourses, drainage ditches and waterbodies of medium sensitivity and groundwater of high sensitivity is considered to be of negligible adverse magnitude equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect from chemical pollution is Negligible, which is **not significant**.

Chemical pollution from BESS fire

12.8.142 Regarding the potential transfer of pollutants from a battery fire, watercourses and groundwater could be at risk of pollution through the application of firefighting water as a suppressant. Due to the composition of commercial battery units, an **oBSMP [APP/7.14]** has been submitted in support of the DCO Application, which identifies that hydrofluoric acid could be created if cooling water for adjacent BESS units comes into contact with smoke from a battery fire.

12.8.143 In addition, the **oBSMP [APP/7.14]** outlines that the Applicant will follow the strategy of allowing a battery related fire to self-consume, reducing unnecessary risk of injury to site and firefighting personnel. Should a fire occur, the affected enclosure will be allowed to self-consume until the fire is extinguished through consumption of the combustible materials within the battery container/enclosure. The firefighting procedure may include a suppression system and will be to apply water to adjacent BESS enclosures to keep them cool and further prevent their overheating. As water will not be directly applied to affected BESS container, there is reduced potential for water to become contaminated and the volume of water required during a firefighting event is reduced.

12.8.144 As outlined in **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**, based on recommendations in NFPA 855 Standard for the Installation of Stationary Energy Storage Systems and the NFCC Grid Scale Energy Storage System Planning - Guidance for Fire and Rescue Services, a burn time of 2 hours and a requirement of 1,900l/min of fire suppression water has been used to calculate the volume of fire suppressant water required to be stored onsite in the event of a container fire. This equates to 228m^3 of storage.

12.8.145 Draft NFCC guidance requires a reduced fire suppression volume of 1,500l/m equating to 180m^3, however this has not been adopted at the time of undertaking the assessment of Water Resources within this chapter and it is assumed for the purposes of this chapter will not be adopted by the time the DCO Application is submitted.

12.8.146 The containment of spent firefighting water will be captured within a dedicated underground contaminated water tank(s) and will be sized to contain 228m3 of spent fire suppressant plus the 1% AEP event.

12.8.147 An automated penstock will be placed on the outlet of the contaminated water tank or SuDS unit and would be closed in the event of BESS containers adjacent to the affected BESS container needing to be cooled during a fire event. Fire suppressant will not be applied directly to the affected container, limiting the potential for suppressant to come into direct contact with contaminants. It would remain closed until testing of the captured water has taken place. Water will then either be removed offsite by tankers to a licenced facility (subject to the captured suppressant not having elevated levels of contaminants) or discharged to groundwater, subject to agreement with the EA.

12.8.148 It will be confirmed whether more than one contaminated water tank is needed to serve Work No. 2: BESS Compound during the detailed design phase, once the SuDS system has been designed and this is secured through requirement of the **draft DCO [APP/3.1]**.

12.8.149 As a result, the magnitude of impact and scale of all effects associated with chemical pollution from a BESS fire for the operation phase of the Scheme on surface water and groundwater of medium and high sensitivity are considered as negligible adverse magnitude equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. . Therefore, the significance of effect from chemical pollution from a BESS fire at the Scheme during the operation phase is Negligible, which is **not significant**.

Chemical pollution from substation fire

12.8.150 Work No. 3: Customer Substation and Work No. 4: National Grid Substation will have a similar closed drainage system to Work No. 2: BESS Compound, whereby there will be a dedicated sump or containment tank(s) to capture spent fire suppressant, which is isolated from the infiltration components of the Scheme.

12.8.151 As a result, the magnitude and scale of all effects associated with chemical pollution for the operation phase of the Scheme on groundwater and surface water receptors of high and medium sensitivity are assessed as being Negligible adverse magnitude equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect from chemical pollution from a substation fire at the Scheme during the operation phase is Negligible, which is **not significant**.

Foul Water

12.8.152 A decision regarding the storage method for foul water prior to disposal will depend on the number of staff likely to be onsite during the operation phase and the frequency of visits. The decision will be made prior to the construction phase by the appointed principal construction contractor, in discussion with the EA. The operation phase welfare facilities will drain to a contained cesspit, to be regularly emptied by a licensed contractor, or to a mains sewer connection, meaning and the potential pollution associated with soakaway disposal will not occur.

12.8.153 As a result, the magnitude and scale of all effects associated with foul water on groundwater of high sensitivity and watercourses of medium sensitivity are assessed as Negligible adverse magnitude equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect from foul water associated with Scheme during the operation phase is Negligible, which is **not significant**.

Groundwater Quantity

12.8.154 As outlined in **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]**, infiltration testing has confirmed that disposal of surface water for Work No. 2: BESS Compound, Work No. 3: Customer Substation and Work No. 4: National Grid Substation is possible, meaning the quantity of water infiltrating should remain similar the baseline scenario.

12.8.155 Solar PV Panels require annual cleaning to maintain effectiveness and energy generation efficiency. A total surface area of 5,752,470m^2 solar panels are estimated on site to be cleaned over 60 workdays per year and 0.27L/m^3/cycle is required for PV cleaning **[Ref. 12-57]** .

12.8.156 Cleaning of the PV panels will be undertaken once every two years and is anticipated will use 776.5m^3 annually. This will be sourced from a water tanker supplier as deionised water will be used.

12.8.157 As a result, the magnitude and significance of all effects associated with groundwater quantity (high sensitivity receptor) are assessed as being Negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrological environment. Therefore, the significance of effect on groundwater quantity from Scheme during the operational phase is Negligible, which is **not significant**.

Cable Faults

12.8.158 Regarding cables, the underground cables require minimal maintenance, although faults do occur which require the use of test equipment to locate the fault and potentially excavation to cut out and replace the faulted section with new joint bays required to be installed for the joints.

12.8.159 A small number of ad hoc and planned maintenance visits will be undertaken during the operation phase of the Scheme, refer to **ES Chapter 5: The Scheme [APP/6.1]** for more detail on replacement and maintenance schedule. These maintenance visits are not expected to involve excavation works beyond the foundations of buildings (such as the National Grid Substation or Customer Substation) or below the cables. As such, there will be no interaction with the underlying groundwater unit and thus, no direct effects are predicted on the hydrogeology resource.

12.8.160 Based on typical fault rates encountered with similar cables [Ref. 12-58 and Ref. 12-59], statistically the Scheme will have an expected fault rate to be approximately 0.4 faults per 100km per annum. In practice, this relates to approximately 0.0152 faults per annum (1 fault every 66 years).

12.8.161 The cables associated with the Scheme will not be fluid filled or contain hydrocarbons.

12.8.162 Therefore, the magnitude of this impact is considered to be Negligible adverse on groundwater identified as high sensitivity receptor and watercourses identified as a medium sensitivity receptor, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect from chemical pollution from cable faults at the Scheme during the operation phase is Negligible, which is **not significant**.

Increase in Surface Water Runoff

12.8.163 The PV panels have the potential to concentrate rainfall under the drip lines (regular gaps between PV tables). Once the rainfall has fallen off a PV panel, the water will be able to spread and flow along the ground under the PV panels. Given the topography of the CSA is generally flat lying it is likely that rain falling on each row of solar panels would flow evenly into the rain-shadow of the row below, so as to mobilise the same percentage of the ground for infiltration as was available before the panels were installed. As a result, there is unlikely to be an increase in runoff as a result of the PV panels.

12.8.164 Plate 12-20 shows that in practice, the vegetation proposed to be sown in Work Area 1 will act to bind the soil under the PV panel drip lines and allow runoff to be evenly distributed under the PV panels and not cause erosion/gullying.

Plate 12-20 Operational solar farm with established vegetation and drip lines

12.8.165 Plate 12-21 shows examples of poor practice vegetation establishment at solar farms, as a result of vehicular movements on poorly seeded ground, which required remedial action to reduce runoff.

Plate 12-21: Poor practice vegetation establishment examples on solar sites

12.8.166 As set out in the **outline Landscape and Ecological Management Plan (oLEMP) [APP/7.11]** the area under the PV panels will be seeded with a suitable grass/flower mix to prevent rilling (incisions in soil caused by concentrated water flow) and an increase in surface water runoff rates. With the implementation of suitable planting, the ground cover is unlikely to generate surface water runoff rates beyond the baseline scenario.

12.8.167 **ES Appendix 12.2: Flood Risk Assessment (FRA) [APP/6.4]** identifies that the installation of PV panels does not have the potential to substantially increase surface water runoff rates compared to the baseline scenario as vegetation under the drip lines establishes and acts to slow the transfer of runoff to the hydrological catchment downslope.

12.8.168 Land under the PV Tables would be allowed to naturally vegetate following sowing with a suitable seed mix and would be managed by livestock grazing or by mechanical means.

12.8.169 As outlined in Kampherbeek et al. (2023), using sheep for vegetation maintenance on solar farms can assist in improving biodiversity and soil activity, if grazing pressure is not too high. Sheep can create micro-climates with their hooves in the soil (through compaction), spread seeds with their wool, and spread diaspores from some plants with their hooves and faeces. Therefore, there needs to be a balance between biomass management and livestock stocking rate to ensure the grass mix is maintained and soil cohesion is managed, especially following periods of heavy or prolonged rainfall. Management of vegetation within the Order limits is set out in the **oLEMP [APP/7.11]**.

12.8.170 As vegetation becomes fully established under the PV panels there is likely to be a decrease in surface water runoff rates and a reduction in the potential for sediment and agricultural chemicals (e.g., phosphates and nitrates) to transfer into the wider hydrological catchment compared to the baseline scenario.

12.8.171 Work No. 2:BESS, Work No. 3: Customer Substation and Work No. 4: National Grid Substation will be served by a SuDS network designed to the 1% AEP event plus 40% climate change allowance, utilising infiltration as the means of surface water disposal.

12.8.172 As a result, the magnitude and scale of all effects associated with increased runoff are assessed as being Negligible beneficial / adverse, equating to no increase in the probability of flooding onsite and offsite. Therefore, the significance of effect on surface water runoff rates at the Scheme during the operation phase is Negligible, which is **not significant**.

Effects on Private Water Supplies and other Abstractions

Private Water Supplies (PWS)

12.8.173 The risk of chemical pollution and a reduction in yield to PWS is reduced during the operation phase as there is substantially less activity which would give rise to these effects i.e. occasional maintenance visits.

12.8.174 Consequently, effects on PWS identified as a medium sensitivity receptor are considered to be of Negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment.

12.8.175 Therefore, the significance of effect to PWS from the Scheme during the operation phase is Negligible, which is **not significant.**

Public Supplies (PuWS)

12.8.176 The risk of chemical pollution and a reduction in yield to PuWS is reduced during the operation phase as there is substantially less activity which would give rise to these effects i.e. occasional maintenance visits.

12.8.177 As vegetation becomes established under the PV Tables there is likely to be a decrease in surface water runoff rates and a reduction in the potential for agricultural chemicals (e.g., phosphates and nitrates) to transfer into the wider hydrological and hydrogeological environment compared to the baseline scenario.

12.8.178 Consequently, effects on PuWS identified as a high sensitivity receptor are considered to be of negligible adverse magnitude, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect to PuWS from the Scheme during the operation phase is Negligible, which is **not significant.**

EA Licensed Abstractions

12.8.179 The risk of chemical pollution and a reduction in yield to EA Licensed Abstractions is reduced during the operation phase as there is substantially less activity which would give rise to these effects (i.e. occasional maintenance visits).

12.8.180 As vegetation becomes established under the PV Tables there is likely to be a decrease in surface water runoff rates and a reduction in the potential for agricultural chemicals (e.g., phosphates and nitrates) to transfer into the wider hydrological and hydrogeological environment compared to the baseline scenario.

12.8.181 Consequently, effects on EA Licenced Abstractions identified as a high sensitivity receptor are considered to be of negligible adverse magnitude of impact, equating to no perceptible/detectible changes to the baseline hydrochemistry or hydrological environment. Therefore, the significance of effect to EA Licensed Abstractions from the Scheme during the operation phase is Negligible, which is **not significant**.

Decommissioning Phase

12.8.182 An **oDS [APP/7.10]**, sets out the mitigation measures identified through the EIA assessments that form this Chapter.

12.8.183 Potential effects of decommissioning the Scheme are similar in nature to those during the construction phase, as some ground-work would be required to remove Mounting Structures, foundations and hardstanding. These effects would be lesser in magnitude than during the construction phase as infrastructure to facilitate site movements etc. will already be in place and would be controlled by a detailed DEMP. Where infrastructure would be left in place (e.g. foundations for onsite buildings), drainage features would also remain where this is compatible with the detailed CEMP.

12.8.184 As outlined in **ES Chapter 5: The Scheme [APP/6.1]**, the cables will either be removed and recycled/disposed of (depending on technology at the time) or be left in situ.

12.8.185 Due to the composition of modern cables (XLPE (cross-linked polyethylene with no fluids or hydrocarbons) should cables be left in situ the risk to the hydrogeological environment through degradation is minimal.

12.8.186 Cables are usually installed to a depth of between 0.6m and 1.2m and therefore should not interact with typical ploughing techniques.

12.8.187 Consequently, effects of decommissioning activities on groundwater and surface water receptors of high and medium sensitivity are considered to be of negligible magnitude of impact and Negligible adverse effect. Therefore, the effect to receptors identified from the Scheme during the decommissioning phase is considered to be **not significant**.

12.9 Additional Mitigation Measures

12.9.1 As no significant effects have been identified above for receptors during any phase of the Scheme, once embedded mitigation is taken into account, no additional mitigation measures for the Scheme are required.

12.10 Residual Effects

12.10.1 As there are no significant effects identified the effects will remain unchanged as those reported above in the assessment of likely effects.

12.11 Cumulative Effects Assessment

12.11.1 This section presents an assessment of cumulative effects between the Scheme and other existing and/or approved developments.

12.11.2 As set out in **ES Chapter 2: EIA Process and Methodology [APP/6.1]**, a Cumulative Effects Assessment (CEA) has been undertaken as part of the EIA in accordance with PINS Advice on Cumulative Effects Assessment (September 2024) and has considered two types of cumulative effects:

- In combination effects: the combined effect generated by individual effects on a particular receptor (presented within **ES Chapter 17: In-Combination Effects [APP/6.2]**; and
- Cumulative effects: effects generated by the Scheme and other planned or approved developments on the same receptor (presented in **ES Chapter 6 to 16 [APP/6.2]**).

In-Combination Effects

12.11.3 In-combination effects occur when receptors are subject to effects under more than one environmental topic. As such, the effects presented in **Chapter 6 to 16 [APP/6.2]** (regardless of whether they are classed as significant or not significant) have been reviewed to identify receptors subject to one or more types of effect to ensure that the interrelationship between each of the aspects of the environment likely to be affected by the Scheme has been properly evaluated and considered.

12.11.4 No likely significant in-combination effects relating to Water Resources have been identified.

Cumulative Effects

12.11.5 A cumulative effect is considered to be an additional effect on hydrological receptors (within the same hydrological catchment) arising from the Scheme in addition to the combination of other developments likely to affect the hydrological environment.

12.11.6 The approach to assessing cumulative effects is outlined in **ES Chapter 2: EIA Process and Methodology [APP/6.1]**. Cumulative developments to be taken forward to Stages 3 and 4 (assessment) are set out in **ES Appendix 2.1: Cumulative Schemes [APP/6.4]**. The stage 3 and 4 assessments for cumulative effect on water resources are assessed in this Section.

12.11.7 At distances greater than 5km, it is considered that solar and battery storage schemes are unlikely to contribute to a cumulative hydrological effect due to attenuation and dilution over distance of potentially polluting chemicals. Therefore, for the purposes of the assessment of potential cumulative effects on the immediate catchment and hydrological regime, only proposed developments, which require large scale construction/excavation, within approximately 5km of the Order limits have been considered.

12.11.8 As outlined in the assessment previously, there are no significant effects from the Scheme.

12.11.9 The greatest potential for cumulative effects arises when the construction phase of another development overlaps with the construction phase of the Scheme. Cumulative effects are considered to have the potential to be significant only where such an overlap may exist, as activities such as excavation works, concrete pouring in the construction phase that could be potentially detrimental to the hydrological environment are greatly reduced during the operation phase of developments.

Relevant Developments

12.11.10 Only developments which have a valid planning application (i.e. not at scoping stage or allocated under the Local Development Plan) with sufficient information to inform a cumulative assessment and have the potential to result in cumulative effects on Water Resources within the associated study area. High Grove Solar is the only cumulative development in the WSA, as set out in Table 12-20. The remaining schemes are not considered to have cumulative effects on within the WSA.

Table 12-20 Cumulative Scheme

Short List Ref	Planning Ref	Description	Distance from the Scheme
1	EN0110010	High Grove Solar – The Scheme comprises the installation of solar photovoltaic (PV) generating panels,	Adjoining the Scheme

		on-site energy storage facilities, grid connection infrastructure and ancillary works. The Scheme would have a generating capacity of approximately 720MW.	

Construction Phase

12.11.11 PEIR Chapter 14 Water Resources and Flood Risk for High Grove Solar committed to an oCEMP at the PEIR stage, which are based on the same principles as the measures presented within the **oCEMP [APP/7.6]** which will limit the potential for sediment and pollutants to be transferred from the Scheme, meaning there is very limited potential for the Scheme to contribute to a cumulative effect on water quality. All sites associated with High Grove Solar also include a SuDS strategy, as they are classed as major developments, to restrict surface water run-off sates and assist in the removal of sediment and pollutants from the site. The increase in flow rates is of negligible magnitude for the Scheme. Therefore, cumulative effects during the construction phase on all receptors identified in this assessment (high and medium sensitivity) are considered to be of negligible magnitude of impact and therefore Negligible adverse effect. This is **not significant**.

Operational Phase

12.11.12 It is anticipated that there will be a minor reduction in flow rates during the operation Phase of all developments due to the implementation of SuDS and through managed grassland, when compared to the construction phase.

12.11.13 Therefore, cumulative effects during the operation phase on all identified receptors in this assessment (medium and high sensitivity) are considered to be negligible magnitude of impact and therefore of Negligible adverse effect. his is considered **not significant**.

Decommissioning Phase

12.11.14 Potential effects of decommissioning the Scheme are similar in nature to those during construction, as some ground-work would be required to remove foundations and hardstanding. These effects would be lesser in magnitude than during construction (e.g. cables would not be excavated). Where infrastructure may be left in place (e.g., substations), drainage features would also remain where this is compatible with the **oDS [APP/7.10]**. It is expected that the High Grove Solar development will also have a DS or similar to that of the Scheme.

12.11.15 As such, the effects of decommissioning activities receptors of high and medium sensitivity are considered to be of negligible to low magnitude of impact and therefore to have a Negligible to Minor adverse effect, as per the construction phase assessment and therefore considered **not significant**.

12.12 Conclusion

12.12.1 This Chapter has set out and assessed the likely effects of the Scheme in relation to Water Resources. Likely effects have been assessed for the construction, operation and decommissioning phases of the Scheme. Following the implementation of embedded mitigation and additional as detailed in Section 12.7, residual effects have not been identified in relation to Water Resources during the construction, operation and decommissioning phases

12.12.2 Table 12-21 sets out a summary of the Water Resources environmental effects.

Table 12-21 Summary of Effects for Water Resources

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring Requirements
Construction Phase								
Watercourses, drainage ditches, and near-surface water	High	Chemical Pollution	Negligible adverse	10m buffer of ditches. Measures within the oCEMP.	Negligible	None	Not Significant	Surface water sampling programme
		Erosion and Sedimentation	Negligible adverse	10m buffer of ditches. Measures within the oCEMP.	Negligible	None	Not Significant	Surface water sampling programme
		Increased Runoff Rates / Volume	Negligible adverse / beneficial	Measures within the oCEMP	Negligible	None	Not Significant	Visual inspections by Scheme operatives

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring Requirements
		Impediments to Flow	Negligible adverse	Crossing design to convey 1% AEP flow, plus headroom.	Negligible	None	Not Significant	Visual inspections by Contractor
Groundwater	High	Chemical Pollution	Low adverse	Measures within the oCEMP.	Minor	Piling Foundations Risk Assessment	Not Significant	Groundwater sampling programme
Groundwater	High	Erosion and Sedimentation	Negligible adverse	Measures within the oCEMP.	Negligible	Piling Foundations Risk Assessment	Not Significant	Groundwater sampling programme
Near-surface water	High	Changes in Soil Interflow Patterns	Negligible adverse		Negligible	None	Not Significant	Visual inspections by Contractor
Watercourses and drainage ditches	High	Migration of Pollutants from Contaminated Land	Negligible adverse	Measures within the oCEMP.	Negligible	None	Not Significant	Surface water sampling programme

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring Requirements
PWS, PuWS and EA licenced abstractions	Medium and High	Changes in quality or quantity of supply	Negligible adverse	Measures within the oCEMP.	Negligible	None	Not Significant	Groundwater sampling programme
Operational Phase								
Watercourses, drainage ditches, and near-surface water	High	Chemical Pollution (e.g. PV cell leakage)	Negligible adverse	Measures within the oLEMP	Negligible	None	Not Significant	n/a
		Increased Runoff Rates / Volume	Negligible adverse / beneficial	Measures within the oLEMP	Negligible	None	Not Significant	Visual inspections by Scheme operatives
		Erosion and Sedimentation	Negligible adverse	Measures within the oLEMP	Negligible	None	Not Significant	n/a

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring Requirements
PWS, PuWS and EA abstractions	Medium and High	Changes in quality or quantity of supply	Negligible adverse	Measures within the oLEMP	Negligible	None	Not Significant	n/a
Groundwater	High	Chemical pollution e.g. battery fire	Negligible adverse	Measures within the oLEMP	Negligible	None	Not Significant	n/a
Decommissioning Phase								
Watercourses, drainage ditches, and near-surface water	High	Chemical Pollution	Negligible adverse	Measures within the oDS	Negligible	None	Not Significant	To be confirmed in DS
		Erosion and Sedimentation	Negligible adverse	Measures within the oDS	Negligible	None	Not Significant	To be confirmed in DS
		Impediments to Flow	Negligible adverse	Measures within the oDS	Negligible	None	Not Significant	To be confirmed in DS

Receptor	Sensitivity	Description of Impact	Magnitude of Impact	Embedded Mitigation	Scale and Nature of Effect (with embedded mitigation)	Additional Mitigation	Residual effect (with additional mitigation)	Monitoring Requirements
Groundwater	High	Chemical Pollution	Low adverse	Measures within the oDS	Minor	None	Not Significant	To be confirmed in DS
Groundwater	High	Erosion and Sedimentation	Negligible adverse	Measures within the oDS	Negligible	None	Not Significant	To be confirmed in DS
Near-surface water	High	Changes in Soil Interflow Patterns	Negligible adverse	Measures within the oDS	Negligible	None	Not Significant	To be confirmed in DS
Watercourses and drainage ditches	High	Migration of Pollutants from Contaminated Land	Negligible adverse	Measures within the oDS	Negligible	None	Not Significant	To be confirmed in DS
PWS, PuWS and EA licenced abstractions	Medium and High	Changes in quality or quantity of supply	Negligible adverse	Measures within the oDS	Negligible	None	Not Significant	To be confirmed in DS

References

Ref 12-1	NREL - Solar Thermal Reactor Materials Characterization
Ref 12-2	Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009
Ref 12-3	Land Drainage Act 1991 as amended 1994
Ref 12-4	Flood and Water Management Act 2010
Ref 12-5	Water Act 2003 as amended 2014
Ref 12-6	Water Supply Regulations 2016 as amended 2018
Ref 12-7	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
Ref 12-8	The Water Resources (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017
Ref 12-9	The Groundwater (England and Wales) Regulations 2009
Ref 12-10	Groundwater Daughter Directive (2006/118/EC) 2006
Ref 12-11	Anti-Pollution Works Regulations 1999
Ref 12-12	The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
Ref 12-13	Conservation of Habitats and Species Regulations 2017
Ref 12-14	Environment Act 1995
Ref 12-15	The Environmental Permitting (England and Wales) (Amendment) Regulations 2018
Ref 12-16	Environment Act (2021)
Ref 12-17	Environmental Permitting (England and Wales) Regulations (2016)
Ref 12-18	The Floods Directive (Directive 2007/60/EC)
Ref 12-19	The Nitrates Directive

Ref 12-20 National Policy Statement (NPS): Overarching National Policy Statement for Energy (EN-1, November 2023)

Ref 12-21 National Policy Statement (NPS): Overarching National Policy Statement for Energy (EN-1, November 2023)

Ref 12-22 NPS for Renewable Energy Infrastructure (EN-3, November 2023)

Ref 12-23 NPS for Electricity Networks Infrastructure (EN-5, November 2023)

Ref 12-24 National Planning Policy Framework

Ref 12-25 Planning Practice guidance

Ref 12-26 BC - Breckland Local Plan (Adopted September 2023)

Ref 12-27 The EA - Accounting for residual uncertainty: an update to the fluvial freeboard guide

Ref 12-28 The EA's approach to groundwater protection (2018 v1.2)

Ref 12-29 EA - Pollution Prevention Guidelines (PPG) Controlled Burn: PPG28

Ref 12-30 EA - Flood risk activities: environmental permits

Ref 12-31 EA - Land contamination risk management (LCRM)

Ref 12-32 British Standard (BS) 5930 Code of Practice for Ground Investigations

Ref 12-33 BS 10175 - Investigation of potentially contaminated sites – Code of practice

Ref 12-34 SEPA - Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (2024)

Ref 12-35 SEPA Land Use Planning System Guidance Note 31

Ref 12-36 Construction Industry Research and Information Association (CIRIA) - Containment systems for the prevention of pollution. Secondary, tertiary and other measures for industrial and commercial premises (C736)

Ref 12-37 National Fire Chiefs Council (NFCC) - Grid Scale Battery Energy Storage System planning - Guidance for FRS

Ref 12-38 The National Fire Protection Association (NFPA) 855 Standard for the Installation of Stationary Energy Storage Systems

Ref 12-39 Good Practice Guide for Environmental Impact Assessment (EIA), 2006 (withdrawn but still considered relevant in the absence of superseding guidance)

Ref 12-40 Department for Environment, Food and Rural Affairs (DEFRA) - National standards for sustainable drainage systems (SuDS) (July 2025)

Ref 12-41 CIRIA C753 'The SuDS Manual' (CIRIA, 2015)

Ref 12-42 Environmental good practice on site guide (5th edition) C811 (CIRIA, 2023)

Ref 12-43 Norfolk Rivers and East of the Ouse, Polver & Nar Internal Drainage Boards (IDB)

Ref 12-44 Breckland Council Water Cycle Study Update (2017)

Ref 12-45 Anglian Water - Water Resource Management Plan 2025-2050 (WRMP24)

Ref 12-46 Annex 3: Flood risk vulnerability classification of the NPPF

Ref 12-47 North West Norfolk Management Catchment

Ref 12-48 Norfolk Lead Local Flood Authority (LLFA) Statutory Consultee Guidance (Document Version 7.3, April 2025)

Ref 12-49 Soilscapes dataset

Ref 12-50 The Norfolk Rivers Trust "The River Nar - A Water Framework Directive Local Catchment Plan" (2014)

Ref 12-51 Breckland Council Level 1 Strategic Flood Risk Assessment Update

Ref 12-52 Norfolk County Council (NCC) Flood Investigation Reports for the Breckland Area (2014-2021) and Countywide (2022)

Ref 12-53 BGS Borehole Records

Ref 12-54 Landis Soilscapes

Ref 12-55 Solar Energy Industries Association (SEIA)

Ref 12-56 Reproduced from M. Aghaei *et al*. Review of degradation and failure phenomena in photovoltaic modules (2022). Renewable and Sustainable Energy Reviews Volume 159 , May 2022, 112160

Ref 12-57 Water requirement for PV cleaning

Ref 12-58 EPRI Underground Systems Reference Book 2023 Edition – Chapters 12 & 17

Ref 12-59 Lawson JH and Thue WA: “Summary of service failure of high voltage extruded dielectric insulated cables in the United States,” ICEI Boston, 1980, pp. 100-104

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