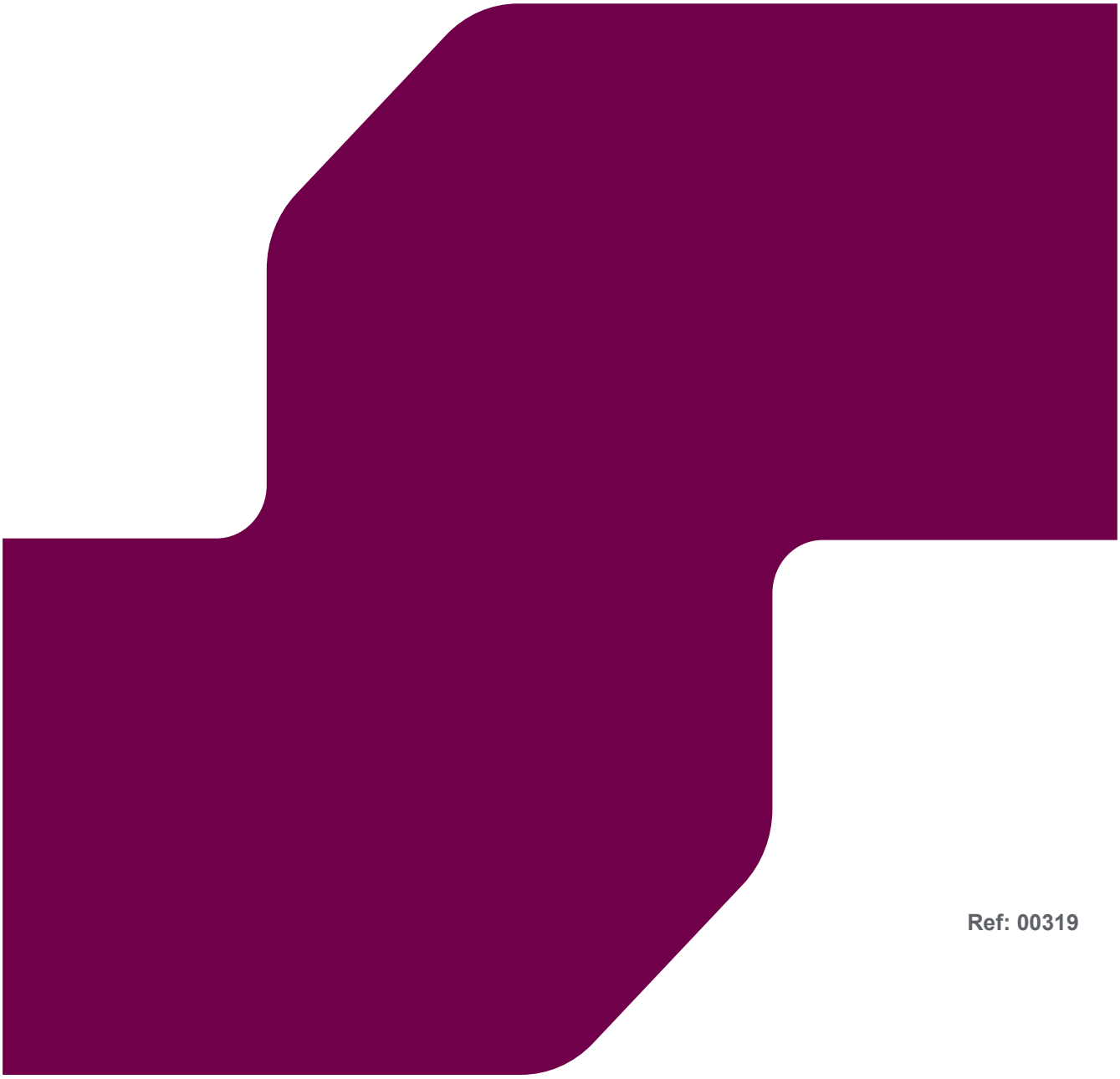
HEOLDDU SOLAR FARM

ENVIRONMENTAL STATEMENT

Chapter 10: Ground Conditions, Hydrology and Hydrogeology



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Glossary

Term	Meaning
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater
Catchment	An area of land drained by a watercourse and defined by a watershed.
CIRIA	The Construction Industry Research and Information Association. It is an independent, not-for-profit, member-based research organisation that exists to champion performance improvement in construction.
Greenfield Runoff Rate	Rates of surface water runoff from a site that is undeveloped (greenfield).

Term	Meaning
Groundwater	All water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.
Lead Local Flood Authority	Authorities that have responsibility for developing a Local Flood Risk Management Strategy for their area identifying local sources of flooding. The local strategy produced must be consistent with the national strategy. It will set out the local organisations with responsibility for flood risk in the area, partnership arrangements to ensure co-ordination between these organisations, an assessment of the flood risk, and plans and actions for managing the risk.
Local Authority	A body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. This includes County Councils, District Councils and County Borough Councils.
Main Rivers	The term used to describe a watercourse designated as a Main River under the Water Resources Act 1991 and shown on the Main River Map.
Ordinary Watercourse	Watercourses (such as a river, stream, ditch, cut, sluice, dyke or non-public sewer) that are not designated a Main River under the Water Resources Act (1991). Responsibility for management lies with the Lead Local Flood Authority, or Internal Drainage Board for some watercourses where there is an Internal Drainage District.
Secondary A Aquifer	Secondary A Aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers.
Site of Special Scientific Interest (SSSI)	An SSSI is a designated area in the UK recognized for its unique natural features, including rare species and important habitats, aimed at conservation and protection.
Source Protection Zone	These zones identify areas of land through which water infiltrates into a groundwater borehole, well or spring that is used for public drinking water supply and provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.
Special Area of Conservation (SAC)	SACs are areas designated for the conservation of certain plant and animal species listed in the Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.
Special Protection Area (SPA)	A site designation specified in the Conservation of Habitats and Species Regulations 2017, classified for rare and vulnerable birds, and for regularly occurring migratory species. Special Protection Areas contribute to the national site network.
Strategic Flood Risk Assessment	An assessment that provides information on areas at risk from all sources of flooding.

Term	Meaning
Surface Water Runoff	Surface water runoff is flow of water that occurs when excess stormwater, meltwater, or other sources of water flows over a surface
Sustainable Drainage Systems	A sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate, and by attenuating and conveying surface water runoff slowly at peak times.
Undifferentiated Aquifers	Undifferentiated or unproductive strata, reflecting the distribution of superficial deposits with low permeability.
Water Framework Directive	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The Water Framework Directive promotes water management through river basin planning. It covers inland surface waters, estuarine waters, coastal waters and groundwater.
Water Quality	The physical, chemical and biological characteristics of water.
Zone of Influence	Water bodies that are within, intersect or which are hydrologically connected to the development.

Abbreviations/ Acronyms

Abbreviation	Meaning
AOD	Above Ordnance Datum
BGS	British Geological Survey
CCC	Carmarthen County Council
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
DNO	Distribution Network Operator
DNS	Development of National Significance
EIA	Envoironmental Impact Assessment
ES	Environmental Statement
FCA	Flood Consequence Assessment
GCSA	Ground Conditions Study Area
HHSA	Hydrology and Hydrogeology Study Area
LPA	Local Planning Authority

Abbreviation	Meaning
NRW	Natural Resources Wales
OS	Ordnance Survey
PEDW	Planning and Environment Descisions Wales
PPW	Planning Policy Wales
PV	Photovoltaic
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage System
WFD	Water Framework Directive

Units

Unit	Description
%	Percentage
ha	Hectare
km	Kilometre
kV	Kilovolt
m	Metre
m^2	Square Metre

10 GROUND CONDITIONS, HYDROLOGY AND HYDROGEOLOGY

10.1 Introduction

10.1.1 The chapter of the Environmental Statement (ES) considers the likely impacts and effects of the proposed Heolddu Solar Farm (referred to as the "Proposed Development") on Ground Conditions, Hydrology and Hydrogeology during the construction, operation and maintenance, and decommissioning phases.

10.1.2 This chapter of the ES has been prepared in accordance with the approach set out in the Heolddu Solar Farm Scoping Report and subsequent EIA Scoping Direction. In addition, this chapter of the ES has been informed by the following documents submitted with the application for the DNS:

ES Chapters

- Volume 1, Chapter 6: Biodiversity

ES Appendices

- Volume 3, Appendix 10.1: Flood Consequence Assessment and Conceptual Drainage Strategy
- Volume 3, Appendix 10.2: Geoenvironmental Desktop Study (GDTS)

10.2 Legislation and Policy

10.2.1 The legislation and planning policy relevant to the assessment of Ground Conditions, Hydrology and Hydrogeology for the Proposed Development are summarised in **Table 10.1** below.

Table 10.1: Summary of legislation and policy relevant to this chapter of the ES

Summary of provision	How and where considered in the ES
Future Wales: The National Plan 2040 (2021)	
Policy 8 – Flooding Opportunities for multiple social, economic and environmental benefits must be maximised when investing in flood risk management infrastructure. It must be ensured that projects do not have adverse impacts on international and national statutory designated sites for nature conservation and the	Flood risk at the Site is summarised in **Section 10.6** of this ES chapter. A full Flood Consequence Assessment (FCA) has been prepared for submission within the DNS application and is presented within **Volume 3, Appendix 10.1: Flood Consequence Assessment.**

Summary of provision	How and where considered in the ES
features for which they have been designated. [Page 74 of Future Wales: The National Plan 2040]	
'A Wales where people live in places that sustainably manage their natural resources and reduce pollution.' [Outcome 9 of Future Wales: The National Plan 2040].	Deterioration of the water environment is assessed within **Section 10.8**.
'Proposals should ensure there is no significant unacceptable detrimental impact on the surrounding natural environment and local communities…' [Policy 17 of Future Wales: The National Plan].	Deterioration of the water environment is assessed within **Section 10.8**.
Planning Policy Wales Edition 12	
Chapter 6: Distinctive and Natural Places Outlines the Welsh Government's objectives in terms of addressing water and flood risk. Section 6.6. of PPW Edition 12 highlights the planning system should: • protect and improve water resources and quality by promoting and encouraging increased efficiency and demand management of water as part of new developments; • ensure that the infrastructure networks, including nature based solutions on which communities and businesses depend is adequate to accommodate proposed development, and takes into consideration the impacts of climate change, so as to minimise risk to human health and the environment and prevent pollution at source; • ensure sustainable drainage systems are an integral part of	A Drainage Strategy has been prepared for submission with the DNS application and is presented within **Volume 3, Appendix 10.1**, which includes pollution mitigation measures and allowances for climate change. Sustainable Drainage Systems (SuDS) have been proposed to provide surface water treatment and attenuation prior to the discharge of surface water flows off-site. Furthermore, mitigation measures ensure the protection of the quantity and quality of water supplies is proposed as part of the Proposed Development are detailed within **Table 10.18.**

Summary of provision	How and where considered in the ES
design approaches for new development; and • ensure the protection of the quantity and quality of surface and ground water supplies is taken into account as part of development proposals.	
'Planning authorities should protect the features and qualities for which Geoparks and RIGS have been designated, and are encouraged to promote opportunities for the incorporation of geological features within the design of development, particularly where relevant evidence is provided by Green Infrastructure Assessments. *Some statutory Sites of Special Scientific Interest (SSSIs) are also designated for their nationally important geological or geomorphological features, and planning authorities have a duty to further the conservation and enhancement of those features.'* [paragraph 6.3.16 and 6.3.17 of Planning Policy Wales Edition 12]	This is scoped out of the ES as detailed within **Table 10.4.** **Table 10.4.**
'Planning authorities should consider the long term and the need for preventative action to avoid the creation of problems in the future. Safeguarding does not indicate an acceptance of mineral working, but that the location and quality of the mineral is known and that the environmental constraints associated with extraction, including the potential for extraction of mineral resources prior to undertaking other forms of development, have been considered.' [paragraph 5.14.7 of Planning Policy Wales Edition 12]	This is scoped out of the ES as detailed within **Table 10.4.** **Table 10.4.**
'When considering development proposals planning authorities	These are assessed within **Volume 3, Appendix 10.2: GDTS** and where

Summary of provision	How and where considered in the ES
should take into account the nature, scale and extent of surface and subsurface hazards which may pose risks to health and environment, to ensure that: • *new development is not undertaken without an understanding of the risks, including those associated with the previous land use, pollution, groundwater, flood risk, subsidence, landslips, rock falls, mine and landfill gas emissions and rising groundwater from abandoned mines.'* [paragraph 6.9.13 of Planning Policy Wales Edition 12]	relevant discussed within **Section 10.8.**
'Relevant considerations in making planning decisions for potentially polluting development are likely to include… • *…effect of pollution on the natural and built environment and the enjoyment of areas of landscape and historic and cultural value;* • *impact on groundwater and surface water quality…'* [paragraph 6.7.16 of Planning Policy Wales Edition 12]	Deterioration of the water environment is assessed within **Section 10.8**.
TAN15 Development, Flooding and Coastal Erosion	
The following information should be considered for proposed developments: • The consequences of flooding on the development, the consequences of the development on flood risk elsewhere and if appropriate mitigation measures can be incorporated into the design. • Mechanisms of flooding, including sources of floodwater, how floodwater enters and flows across a	Flood Risk on-site is considered within Section 10.6 and within **Volume 3, Appendix 10.1 Flood Consequence Assessment**. It is concluded the Site is located within Fluvial and Tidal Flood Zone 1 and is largely at very low risk of Surface Water flooding.

Summary of provision	How and where considered in the ES
site, height, and speed of floodwaters. • Uncertainties in estimating flood events including use of historical records and forecasting. • Security of proposed developments over their lifetime and ensuring those using the development have an awareness of the potential risks from flooding. • Description of consequences under a range of extreme events including mechanisms, sources, depths, speed, rate of rise, overland flood routes, velocity, access and egress, impacts on natural heritage, and impact on flood risk in surrounding areas. • Structural adequacy of defences to contain flows and withstand overtopping and if required the suitability of implementing a buffer zone adjacent to defences. Measures required to ensure flooding is managed to acceptable levels and ensure that the impact upon flood risk elsewhere in the flood plain is managed.	
Carmarthenshire County Council (CCC) Local Development Plan	
Policy EP1: Water Quality and Resources Proposals for development will be permitted where they do not lead to a deterioration of either the water environment and/or the quality of controlled waters. Proposals will, where appropriate, be expected to contribute towards improvements to water quality. Watercourses will be safeguarded through biodiversity/ecological	Groundwater and surface water bodies present within the study area are identified within **Section 10.6** of this ES chapter. Mitigation measures for identified potential impacts are outlined in **Table 10.18.**

Summary of provision	How and where considered in the ES
buffer zones/corridors to protect aspects such as riparian habitats and species; water quality and provide for flood plain capacity. Proposals will be permitted where they do not have an adverse impact on the nature conservation, fisheries, public access or water related recreation use of the rivers in the County. Proposals will wherever possible be required to make efficient use of water resources.	
Policy EP2: Pollution Proposals for development should wherever possible seek to minimise the impacts of pollution. New developments will be required to demonstrate that they: • Do not cause a deterioration in water quality; • Ensure that risks arising from contaminated land are addressed through an appropriate land investigation and assessment of risk and land remediation to ensure its suitability for the proposed use.	Deterioration of the water environment is assessed within Section 10.8. Risks arising from contaminated land are assessed within **Volume 3, Appendix 10.2: GDTS.**
Policy EP3: Sustainable Drainage Proposals for development will be required to demonstrate that the impact of surface water drainage, including the effectiveness of incorporating Sustainable Drainage Systems (SUDS), has been fully investigated. The details and options resulting from the investigation must show that there are justifiable reasons for not incorporating SUDS into the scheme in accordance with section 8 of TAN 15.	A Drainage Strategy has been prepared for submission with the DNS application and is presented within **Volume 3, Appendix 10.1**, which includes pollution mitigation measures and allowances for climate change. Sustainable Drainage Systems (SuDS) have been proposed to provide surface water treatment and attenuation prior to the discharge of surface water flows off-site. Furthermore, mitigation measures ensure the protection of the quantity and quality of water supplies is proposed as part of the Proposed Development are detailed within **Table 10.18.**

Summary of provision	How and where considered in the ES
Policy EP6: Unstable Land In areas where land instability is known, any development proposal must be accompanied by a scoping report to ascertain the nature of the instability. Where instability cannot be overcome satisfactorily, there will be a presumption against development. Where there are grounds for believing that active or potential instability that would affect a proposed development could be overcome in an environmentally acceptable manner, any planning application must be accompanied by a stability report.	Geohazards are assessed within **Volume 3, Appendix 10.2: GDTS**. The potential for any significant land instability has not been identified.
Policy EQ3 Regional and Local Designations Proposals for development that are likely to cause unacceptable harm to a Local Nature Reserve (LNR), or Regionally Important Geological/Geomorphological Sites (RIGS) will only be permitted where the need to safeguard the substantive nature conservation value of the site or feature is clearly outweighed by the reasons for the development or land use change.	This is scoped out of the ES as detailed within **Table 10.4.** **Table 10.4.**
Policy MPP3: Mineral Safeguarding Planning permission will not be granted for development proposals where they would permanently sterilise resources of aggregates and coal identified within the mineral safeguarding areas (areas of search) identified on the proposals map unless: a. The applicant can demonstrate that the extraction of the mineral is impracticable, uneconomic	This is scoped out of the ES as detailed within **Table 10.4.** **Table 10.4.**

Summary of provision	How and where considered in the ES
or environmentally unacceptable (including compromising amenity and social considerations); or b. The mineral resource has already been extracted; or c. The mineral can be extracted satisfactorily prior to the development taking place; or d. The development is of a temporary nature and can be completed and the site restored within the timescale that the mineral is likely to be needed; or e. The nature and location of the development would have no significant impact on the potential working of the resource.	

10.3 Consultation and Engagement

Scoping

10.3.1 In February 2025, the Applicant submitted a Scoping Report to PEDW, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction, operation and maintenance and decommissioning phases of the Proposed Development.

10.3.2 Following consultation with the appropriate statutory bodies, PEDW provided an EIA Scoping Direction on 29 April 2025. Key issues raised by statutory bodies specific to Ground Conditions, Hydrology and Hydrogeology are listed in **Table 10.2** including how and where these have been considered in the ES.

Table 10.2: Summary of key scoping responses relevant to Ground Conditions, Hydrology and Hydrogeology

Comment	How and where considered in the ES
PEDW	
PEDW notes the SR states that a GDTS will be included as a technical appendix to the ES, considering the baseline ground conditions and providing an assessment of issues relating to soils and groundwater, surface water,	A GDTS has been prepared and is presented as **Volume 3, Appendix 10.2** to this chapter.

Comment	How and where considered in the ES
contamination and geology. As the GDTS is due to assess impacts and where necessary include recommendations to prevent adverse impacts, insufficient information is currently available to determine whether there will be any significant effects. PEDW recommends the applicant liaises directly with the CCC and NRW on the outcome of the GDTS and on the specific matters outlined below. Should following discussion it be decided any matters can be scoped out, a robust rationale for this should be provided in the ES. ID.13 of the Scoping Opinion	
NRW highlights that the site is largely defined as 'High Groundwater Vulnerability' and that the depth to groundwater at the site varies but is shallow close to watercourses. They add that there are several watercourses that border and are in the vicinity of the site. NRW states that the drainage characteristics of the ground system, including the depth to groundwater and how that groundwater may be hydraulically linked to local watercourses, is not known. NRW adds that given the size of the proposed development the ground system will be variable over such a large area. NRW notes the final design layout of the solar farm has not been provided, including the type and location of buried cabling and any other infrastructure such as transformers. The degree to which buried cabling may alter existing drainage characteristics is unknown as is the capacity of the cabling trenches to influence the current flows of shallow groundwater as trenches can act as preferential flow paths. NRW states that information should be provided on existing drainage and operational drainage. PEDW welcomes the SR states that a Conceptual Drainage Design will be prepared and recommends this is included as a technical appendix to the ES. ID.14 of the Scoping Opinion	An outline operational drainage strategy has been prepared and is included in **Volume 3, Appendix 10.1 Flood Consequence Assessment**. The strategy is summarised in **Section 10.6**. The impact of the Proposed Development on groundwater and groundwater dependent features is considered within **Section 10.8.**
NRW advises the ES should include an assessment of the presence and potential interactions of any private water supplies on or	Water abstractions within the study area are included in **Section 10.6** and the

Comment	How and where considered in the ES
near the site. This should also include other water features such as streams, ponds, springs and groundwater. ID.15 of the Scoping Opinion	impacts on abstractions are considered in **Section 10.8**.
NRW notes from the SR that the site is underlain by the Milford Haven Group of rocks, largely atop of bedrock. NRW highlights that these rocks may be fractured and fractures may act as preferential conduits for the rapid movement of any chemicals that may be released during operation. PEDW notes the SR states the Conceptual Drainage Strategy will detail measures in relation to pollution prevention during operation and recommends this is includes as a technical appendix to the ES. NRW also highlights that if at decommissioning buried features such as cabling were to be left in the ground they would eventually degrade and potentially release hazardous chemicals into the environment, including groundwater. NRW in their response also highlights concerns in relation to water quality due to the potential for silt contaminated surface water run-off; cabling routes acting as watercourses during periods of heavy rainfall if sections are left open and not backfilled swiftly; and the poaching of vegetation due to the number of vehicle and machinery movements during the construction phase. The applicant's attention is also drawn to guidance provided in CCC's PAC response regarding the need to provide buffer zones between the development and any watercourses traversing or bordering the site. NRW welcomes the SR details that construction phase mitigation will be implemented through a CEMP. NRW highlights that it should be ensured that contaminated water cannot run uncontrolled into any watercourses (including ditches) or waterbodies. They state the Guidance for Pollution Prevention (GPP) documents should be followed, particularly GPP5 'Works and maintenance in or near water' in terms of protecting the water environment. NRW also states that the ES must demonstrate that the design and construction of the site ensures that all potential pollution pathways are protected. They add that the CEMP should be	The impacts of the Proposed Development on groundwater bodies has been assessed within Section 10.8. Mitigation measures proposed as part of the Proposed Development are detailed in **Error! Reference source not found.10.7,** including a Construction Environmental Management Plan (CEMP) to ensure flood risk and water quality is adequately managed during construction and is to be submitted as part of the DNS application.

Comment	How and where considered in the ES
site-specific, with identified pollution pathways and measures implemented to avoid pollution, taking into account groundwater and diversion of surface water streams beneath the site. The applicant's attention is drawn to their comments outlining the required content of the CEMP. PEDW recommends the CEMP is included as a technical appendix to the ES. ID.16 of the Scoping Opinion	
PEDW notes the SR states that due to environmental conditions and the distance between the proposed development and the Carmarthen Bay Special Protection Area (SPA), the SPA is assessed to be located outside the zone of hydraulic influence and hydrological impacts from the proposed development to the designated site will be undiscernible. The applicant's attention is also drawn to comments from CCC noting that the SR confirms that both the eastern and western areas of the proposed development are crossed by ordinary watercourses that are hydrologically linked to a number of designated sites which include the Carmarthen Bay SPA as well as the Carmarthen Bay and Estuaries Special Area of Conservation (SAC), with potential impacts during the construction and decommissioning phases. The LPA therefore considers that ground conditions, hydrology and hydrogeology should be scoped into the ES insofar as assessing the potential hydrological effects of the development upon the features of the designated sites which should cross reference with the Biodiversity chapter. The applicant's attention is also drawn to comments from NRW highlighting the Carmarthen Bay and Estuaries SAC should be included. ID. 17 of the Scoping Opinion	Designated sites have been considered as a potential receptor of impacts from the development. The impact on water quality of waterbodies (surface water and groundwater) during the operation and maintenance phase has been scoped into the ES. This is assessed within **Section 10.8** of this ES chapter.
PEDW welcomes the SR states that ES will include a description of the key works, activities and processes that would be required during the decommissioning phase. The applicant's attention is drawn to comments from NRW requiring a Preliminary Decommissioning Assessment which identifies the tasks, activities, durations and estimated costs for decommissioning the solar farm. They add that	A description of the decommissioning phase is provided in **Volume 1, Chapter 2: Proposed Development Description.** An assessment of buried infrastructure is

Comment	How and where considered in the ES
the assessment should consider the decommissioning of any buried infrastructure, notably buried cabling as leaving such materials in the ground in perpetuity will eventually result in degradation of that cabling and release of chemicals likely hazardous to the local environment. ID. 18 of the Scoping Opinion	considered within **Section 10.8.**
NRW notes that the Flood Map for Planning identifies the site as located within Flood Zone 1 and therefore NRW has no concerns or comments to raise over flood risk and are satisfied this can be scoped out. PEDW is therefore content for Flood Risk to be scoped out and welcomes the SR states a Flood Consequences Assessment (FCA) will be prepared and included as a technical appendix to the ES. PEDW draws the applicant's attention to the new version of Technical Advice Note 15: development, flooding and coastal erosion, which was published 31 March 2025. ID.19 of the Scoping Opinion	Flood Risk on-site is considered within Section 10.6 and within **Volume 3, Appendix 10.1 Flood Consequence Assessment**. It is concluded the Site is located within Fluvial and Tidal Flood Zone 1 and is largely at very low risk of Surface Water flooding.
Carmarthen County Council	
The SR confirms that both the eastern and western areas of the proposed development are crossed by ordinary watercourses that are hydrologically linked to a number of designated sites which include the Carmarthen Bay and Estuaries SAC and Carmarthen Bay SPA with potential impacts during the construction and decommissioning phases. The LPA therefore consider that ground conditions, hydrology and hydrogeology should be scoped into the ES insofar as assessing the potential hydrological effects of the development upon the features of the designated sites which should cross reference with the Biodiversity chapter. The applicant should be advised of the need for separate Sustainable Drainage Approval (SAB) that will need to demonstrate how surface water will be managed on site and that this should be fully assessed as part of the iterative scheme design. Paragraph 14-15 of the Scoping Opinion	Designated sites have been discussed in Section 10.6 and have been considered as a receptor in Section 10.8. A conceptual surface water drainage strategy has been prepared for the operational phase of the development, included in **Volume 3, Appendix 10.1 Flood Consequence Assessment**. The strategy demonstrated how surface water will be managed on-site.
NRW	

Comment	How and where considered in the ES
The associated appendices to the SR show that the site is underlain by the Milford Haven Group of rocks characterised by interbedded sandstone and conglomerates. These rocks may be fractured and fractures may act as preferential conduits for the rapid movement of any chemicals that may be released by the solar farm during its operational life but also if at decommissioning, it were to be decided that buried features such as cabling were to be left in the ground in perpetuity. Any such cabling left in such a way would eventually degrade and potentially release hazardous chemicals into the environment. Paragraphs 7- 10 of the Scoping Opinion	Geology at the Site is considered within Section 10.6 and the impacts of cabling to the groundwater is considered in **Section 10.8.**
We advise assessment for the presence and potential interactions of any private water supplies that may be either on site or near the development site. This should be included within the ES and should also include other water features such as streams, ponds, springs and groundwater. We note the proposal to scope out Ground Conditions and Hydrology, Hydrogeology and Flood Risk does not appear to be merited this early in the EIA process as there are aspects of these topics that may influence the final configuration and operational performance of the proposed solar farm infrastructure. The redline is considered sizeable and this is also a factor to consider when scoping out particular topics as the ground system will be variable over such a large area. The final design layout of the solar farm has not been provided. This includes the type of buried cabling, the locations of such cabling and any other infrastructure such as transformers. The degree to which buried cabling may alter existing drainage characteristics is unknown as is the capacity of the cabling trenches to influence the current flows of shallow groundwater as trenches can act as preferential flow paths. Information should be provided on existing drainage and operational drainage. Additionally, it is unclear if electrical components such as transformers will be constructed in such as way so that if any chemical leakage of hazardous chemicals were	Private water supplies present within the study area are considered within **Section 10.6** and are included as a receptor within **Table 10.17.**

Comment	How and where considered in the ES
to occur, that those chemicals would be fully contained and not released to the local environment causing pollution. Therefore, the default position is that buried cabling must be removed as part of decommissioning. We advise that the submission of the detailed information relating to decommissioning could be provided under a suitably worded planning condition on any permission granted for the development. Paragraphs 14-17 of the Scoping Opinion	
We concur with section 4.2.47 of the SR that the site lies wholly within Flood Zone A according to our Development Advice Map meaning that the site is not at risk of flooding from rivers or the sea. The Flood Map for Planning (FMfP) also identifies the site as being located within Flood Zone 1 and represents the most up-to-date source of flood risk information. We therefore have no concerns or comments to raise over flood risk at the site and are satisfied this can be scoped out for flood risk matters under our remit. Paragraph 18 of the Scoping Opinion	Flood Risk on-site is considered within Section 10.6 and within Volume 3, Appendix 10.1 Flood Consequence Assessment. It is concluded the Site is located within Fluvial and Tidal Flood Zone 1 and is largely at very low risk of Surface Water flooding.
Principle concerns and risks from a water quality perspective from such developments are the potential for silt contaminated surface water run-off, cabling routes acting as watercourses during periods of heavy rainfall if sections are left open and aren't backfilled swiftly, and the poaching of vegetation due to the number of vehicle and machinery movements during the construction phase. Section 4.2.56 details that construction phase mitigation will be implemented through a Construction Environmental Management Plan (CEMP), to protect the local and wider environment during the construction phase, which we welcome. The CEMP should be site-specific, with identified pollution pathways and measures implemented to avoid pollution, taking into account groundwater and diversion of surface water streams beneath the site. The ES must demonstrate that the design and construction of the site ensures that all potential pollution pathways are protected.	Measures to be implemented which minimise risks to water quality are outlined within **Volume 3, Appendix 4.4: Outline CEMP**.

Comment	How and where considered in the ES
Paragraphs19-21 of the Scoping Opinion	

10.4 Assessment Methodology

Relevant Guidance

10.4.1 The assessment of Ground Conditions, Hydrology and Hydrogeology has been undertaken in accordance with the methodology set out in **Volume 1, Chapter 4: Approach to Environmental Assessment** of the ES in addition to the following guidance, where appropriate:

- Design Manual for Roads and Bridges (DMRB) Volume 11, LA104: Environmental assessment and monitoring (Highways England et al., Revision 1 2020), and
- DMRB Volume 11, LA113: Road drainage and the water environment (Highways England et al., Revision 1 2020a).

Scope of the Assessment

10.4.2 The scope of this ES has been developed in consultation with relevant statutory and non-statutory consultees as detailed in **Table 10.2**.

10.4.3 Taking into account the scoping process and other consultation, **Table 10.3** summarises the issues considered as part of this assessment.

Table 10.3: Issues considered within this assessment

Activity	Impacts scoped into the assessment
Construction	
Activities required to facilitate the construction of the Proposed Development (e.g. temporary construction compounds, removal of surface vegetation, compaction of soils, excavations, dewatering) may cause direct impacts to water quality via accidental spillages / contaminant release. Modification of water drainage pathways may occur as a result of cabling.	The impact of the deterioration of waterbodies (surface water and groundwater/groundwater dependent features).
Operation and maintenance	
During the operation of the Proposed Development, pollutants may be present as a result of normal operations, traffic and accidental spillage which may give rise to water quality effects on the surrounding surface watercourses and groundwater. There is also a potential for catastrophic	The impact of the deterioration of waterbodies (surface water and groundwater/groundwater dependent features).

Activity	Impacts scoped into the assessment
failure of permanent development which may also give rise to water quality effects. Modification of water drainage pathways may occur as a result of cabling.	
Decommissioning	
Decommissioning is likely to operate within the parameters identified for construction (i.e., any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction). Modification of water drainage pathways may occur as a result of cabling.	The impact of the deterioration of waterbodies (surface water and groundwater/groundwater dependent features).

10.4.4 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out is presented in **Table 10.4**.

Table 10.4: Issues scoped out of the assessment

Issue	Justification
Impact of increased flood risk as a result of the development.	The Proposed Development is located entirely within NRW Flood Zone 1 from fluvial and tidal sources. There are areas of Flood Zone 2 and 3 associated with Surface Water and small watercourses, however these areas are confined to existing drainage ditches. A Flood Consequence Assessment has been prepared for the proposed development (**Volume 3: Appendix 10.1**), including conceptual surface water drainage strategy to demonstrate the development will have no impact on existing flood risk. This approach was confirmed by PEDW in the Scoping Direction (**Volume 3, Appendix 1.2**) (ID.19).
Sterilisation of safeguarded mineral reserves.	The Proposed Development is not located within a Mineral Safeguarding Area.
Loss or partial loss/damage to designated geological sites.	There are no designated geological sites located within or adjacent to the Proposed Development.
Land instability and geohazards as a result of earthworks and groundwork	Geohazards are assessed within **Volume 3, Appendix 10.2: GDTS**. The potential for any significant land instability has not been identified. Notwithstanding the above the potential for any minor land instability will be considered and managed

Issue	Justification
operations on end users, buildings and infrastructure	through the developing engineering design, in line with relevant design standards and informed by ground investigations.
Ground contamination on construction workers during the construction and decommissioning phase.	It is expected that any relevant potential pollutant linkages will be managed by appropriate health and safety measures. As construction workers are protected under existing health and safety legislation, any potential effects will be avoided, prevented and reduced through the implementation of standard mitigation measures (including personal protective equipment, training and toolbox talks) as included in a CEMP. Work will be carried out in accordance with relevant Construction (Design and Management) Regulations 2015.
Existing ground contamination on end users and buildings during the operations and maintenance phase.	**Volume 3, Appendix 10.2: GDTS** assessed the likelihood of potential pollutant linkages to be present at the Site as low. Ground investigations, which are an embedded mitigation measure, will include sampling and testing of soils to demonstrate absence of significant contamination. Any ground contamination will be identified, risk assessed and remediated (where required) during the construction phase so that the land is suitable for the intended use. Buildings will be designed in accordance with the Building Regulations ensuring any required appropriate ground gas protection measures are incorporated.

Study Area

10.4.5 For the purpose of the assessment, two Study Areas have been utilised which are appropriately applied to various receptors.

10.4.6 The Ground Conditions Study Area (GCSA) comprises a 250 m buffer in relation to ground contamination. This distance has been selected based upon professional judgement. A distance of 250 m is referenced in Guidance for the Safe Development of Housing on Land Affected by Contamination (NHBC, 2008) and is typical at the hazard identification stage of an assessment. It enables the identification on both on-site and off-site sources of potential contamination and other factors which may influence ground conditions.

10.4.7 The Hydrology and Hydrogeology Study Area (HHSA) comprises a 1 km in relation of sensitive controlled water receptors only, which is considered appropriate for indirect effects. The Hydrology and Hydrogeology study area therefore comprises a 1 km buffer around the Proposed Development. Temporary construction will take place within this 1 km buffer.

10.4.8 The Study Areas to be used for the assessment within this chapter has been ascertained using professional judgement and focuses on where potential impacts are most likely to occur on ground conditions, hydrological and hydrogeological features.

10.4.9 The buffers are considered appropriate for data collection taking into account the likely zone of influence to hydrological receptors. Beyond these buffer zones, the magnitude of impact will be reduced as the dilution capacity becomes greater as the hydraulic catchment increases downstream of the development.

10.4.10 The location and geographic extent of the Study Areas are presented in **Volume 2, Figures, Figure 10.1** of the ES.

10.5 Assessment Criteria and Assignment of Significance

10.5.1 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts.

10.5.2 The approach to determining the significance of effects is a two-stage process that involves defining the magnitude of the impact and the sensitivity of the receptor.

10.5.3 The terms used to define magnitude and sensitivity are based on those which are described in further detail in **Volume 1, Chapter 4: Environmental Assessment Methodology**.

Receptor Value and Sensitivity

10.5.4 The criteria for defining sensitivity in this chapter of the ES are outlined in **Table 10.5** below.

Table 10.5: Sensitivity criteria

Sensitivity/Value	Definition
Very High	Very high importance and rarity, international scale, very limited potential for substitution. Surface water bodies: WFD current or with an aim to have an overall status of high. The surface water body supports sensitive aquatic ecological receptors and is extensively used for public water supply and large-scale agricultural use. Groundwater bodies: Groundwater body supports public and/or large-scale industrial water supply and/or is a highly productive aquifer. UNESCO World Heritage Sites, UNESCO Global Geoparks and GCR where citations indicate features of international importance. Geology meeting

Sensitivity/Value	Definition
	international designation citation criteria which is not designated as such. Very high sensitivity land use such as residential or allotments
High	High importance and rarity, national scale and limited potential for substitution. Surface water bodies: WFD current or with an aim to have an overall status of good. Surface water body may support sensitive aquatic ecological receptors and is used is used for public water supply/medium scale industrial or agricultural use. Groundwater bodies: WFD current or with an aim to have an overall status of good, groundwater body supports public water and/or large-scale industrial water supply and/or is a high productive aquifer. Geological site of national importance (e.g., GCR or SSSI or NNR). Geology meeting national designation citation criteria which is not designated as such. High sensitivity land use such as public open space.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Surface water bodies: watercourses within catchments with an aim to have an overall status of moderate. The surface water features may be locally important for spawning of salmonid species. Surface water body is used for private water supply or small scale industrial/agricultural use. Ground water bodies: WFD current or with an aim to have an overall status of moderate, moderately productive aquifer and/or a groundwater body which supports private water supply or medium scale agricultural/industrial abstractions. To ensure no surface waterbody catchment is prevented from achieving a 'good' status under the WFD by the proposed development, all water bodies are classified to have a high sensitivity. Geological site of regional importance (e.g., LGS, LNR). Geology meeting regional designation citation criteria which is not designated as such. Medium sensitivity land use such as commercial or industrial.
Low	Low or medium importance and rarity, local scale. Surface water bodies: WFD current or with an aim to have an overall status of poor.

Sensitivity/Value	Definition
	Surface water bodies are not significant in terms of sensitive ecological receptors or fish spawning. Small scale (single residential or commercial use) abstraction licences are present in close proximity. Ground water bodies: WFD current or with an aim to have an overall status of poor, low productive aquifer with no abstraction licences. Non-designated geological features of local interest (e.g., non-designated geological exposure, former quarries/mining sites, cuttings etc). Low sensitivity land use such as highways and rail.
Negligible	Very low importance and rarity, local scale. Surface water bodies: WFD current or with an aim to have an overall status of bad, no sensitive ecological receptors or fish spawning are present within the surface water bodies. No abstraction licences present within the area. Ground water bodies: WFD current or with an aim to have an overall status of bad, unproductive strata with no abstraction licences. To ensure no surface waterbody catchment is prevented from achieving a 'good' status under the WFD by the proposed development, all water bodies are classified to have a high sensitivity. No geological exposures, little/no local interest Undeveloped surplus land/no sensitive land use proposed

Magnitude of impact

10.5.5 The criteria for defining magnitude in this chapter of the ES are outlined in **Table 10.6**

10.5.6 **Table 10.6** below.

Table 10.6: Impact magnitude criteria

Magnitude of impact		Definition
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements
	Beneficial	Large scale or major improvement or resource quality; extensive restoration or enhancement; major improvement of attribute quality

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

Duration of impacts

10.5.7 The criteria for describing the duration of impacts in this chapter of the ES are outlined in **Table 10.7** below.

Table 10.7: Duration of impacts

Definition	Duration of impact	Definition
Temporary	Short term	Period of months, up to one year.
	Medium term	Period of more than one year, up to five years.
	Long term	Period of greater than five years.
Long term	Operational lifetime	An impact that occurs throughout the operational lifetime of the Proposed Development.

Significance of effect

10.5.8 The method employed significance of the effect is presented in **Table 10.8**. Where a range of significance levels is presented, the final assessment for each effect is based upon expert judgement.

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

Table 10.8: Assessment matrix

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

10.5.10 Where the magnitude of impact is 'no change', no effect would arise. The definitions for significance of effect levels are described in **Table 10.9** below.

Table 10.9: Definitions of significance

Significance	Definition
Major	These beneficial or adverse effects are considered to be very important considerations. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category. Effects upon human receptors may also be attributed this level of significance.
Moderate	These beneficial or adverse effects have the potential to be important and may influence the key decision-making process. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse or beneficial effect on a particular resource or receptor.

Significance	Definition
Minor	These beneficial or adverse effects are generally, but not exclusively, raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Proposed Development.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Assumptions and limitations of the assessment

10.5.11 The report is based on publicly available hydrological and flood risk data extracted from the NRW website (Lle A Geo-Portal for Wales) and data provided by CCC.

10.5.12 The information collected through publicly available searches and through consultation with the relevant stakeholders is considered sufficient to characterise the baseline environment.

10.5.13 The characterisation of the baseline environment could benefit from further detailed information on the following:

- As watercourse flow monitoring has not been undertaken, flow data for surrounding watercourses and drainage channels; and
- As no ground investigation reports have been provided, detailed site specific ground investigation data is unable to be assessed.

10.5.14 Overall, there is a high level of certainty associated with details of the baseline environment and with the findings of the assessment presented in this chapter. The available information is considered sufficient to establish baseline within the hydrological and geological study areas for the purposes of EIA. Therefore, there are no data limitations that affect the robustness of the conclusions of this assessment.

10.5.15 The assessment of effects in terms of ground/groundwater contamination has been determined primarily from a desk-based review of available information, supplemented by site-specific site investigations where available. This is considered to provide a robust basis for EIA.

10.5.16 The assessment is in part based on published information which is generic to an area rather than specific elements of the Proposed Development. Where this is the case, professional judgement will be used to inform and justify the assessment in terms of likelihood and scale of effect associated with the identified land uses and environmental/geological setting. This is accepted practice and therefore does not affect the robustness of the assessment.

10.5.17 Historical maps and aerial photographs used as part of the studies provide a 'snap shot' in time about conditions or activities within the study area, and as such cannot be relied upon as indicators of any events or activities that may have taken place at other times.

10.5.18 It should also be noted that groundwater levels, groundwater chemistry, surface water levels, surface water chemistry, soil gas concentrations and soil gas flow rates can vary due to seasonal, climatic, tidal and man-made effects.

10.6 Baseline Environment Conditions

Desk studies

10.6.1 A comprehensive desk-based review was undertaken to inform the baseline assessment for Ground Conditions, Hydrology and Hydrogeology. The existing studies and datasets referred to as part of the desk-based review for Ground Conditions, Hydrology and Hydrogeology are summarised in **Table 10.10** below.

Table 10.10: Summary of desk study sources

Title/Organisation	Data Source/ Year	Data Used
British Geological Society Geology of Britain Viewer 1:50,000 Geological Mapping	https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/ (2025)	Geology conditions in study area.
Climate change allowances and flood consequence assessments	https://www.gov.wales/climate-change-allowances-and-flood-consequence-assessments (2021)	Appropriate Climate Change Allowances to consider.
Carmarthenshire County Council Local Plan	https://www.carmarthenshire.gov.wales/home/council-services/planning/local-development-plan-2018-2033/#:~:text=The%20Local%20Development%20Plan%20(LDP)%20sets%20out%20proposals,part%20of%20the%20development%20plan%20framework%20for%20Wales. (2014)	Local planning policies.
Data Map Wales	https://datamap.gov.wales/ (2025)	NRW Flood Mapping
GeoIndex Onshore	https://mapapps2.bgs.ac.uk/geoindex	Water wells; Aquifer designation – Bedrock and Superficial Deposits;

Title/Organisation	Data Source/ Year	Data Used
		Groundwater vulnerability
Groundsure Insights Reports Ref GS-B1D-AFO-KUC-3MG, GS-J74-W1Z-1NE-OHV_SS, GS-J74-W1Z-1NE-OHV_LS and GS-J74-W1Z-1NE-OHV_Landline	Groundsure	Geo-environmental data and historical maps
NRW Flood Map for Planning	https://flood-map-for-planning.naturalresources.wales/ (2024)	NRW Flood Mapping
NRW Flood Risk Assessment Wales Map	Natural Resources Wales / Check your flood risk on a map (Flood Risk Assessment Wales Map) (2025)	NRW Flood Mapping
OS Mapping	https://maps.the-hug.net/ (2025)	Surrounding area of the site
Southwest Wales Strategic Flood Consequence Assessment	https://www.carmarthenshire.gov.wales/media/1231250/1-hri-jbau-xx-xx-rp-hm-0002-a1-c01-stage_1_sfca.pdf (2022)	Overview on flood risk within the study area

Overview of Baseline Environment

Hydrological Setting

10.6.2 NRW River Basin District Mapping indicates that the study area is within the Western Wales River Basin District.

10.6.3 The River Towy, an NRW designated main river is present approximately 800 m west of the 1 km buffer. Cwm Mill stream, a tributary of the River Towy, also designated NRW main river is present in the western extent of the 1 km buffer.

10.6.4 OS mapping shows the presence of an unnamed ordinary watercourse through the southern section of the Solar Area East. The watercourse outfalls into the Nant Morlais approximately 380 m east of the Site. The Nant Morlais then flows southeast for 1.2 km before joining the Gwendraeth Fach which continues south/southwest for approximately 7 km where it becomes the Gwendraeth Fawr and discharges into Carmarthen Bay (SAC).

10.6.5 Another unnamed ordinary watercourse is present through the western section of the Solar Area West. The watercourse flows in a westerly direction before joining another unnamed watercourse and flowing north for approximately 1km where it joins a tributary of the River Towy. This tributary flows in a westerly direction before reaching the River Towy where it flows

south and eventually discharges into Carmarthen Bay (SAC) some 6.5km downstream of the Site.

10.6.6 Small field drains are also present in the northern parcels, flowing west into the tributaries of the River Towy.

Surface Water Body Status

10.6.7 Under the Water Framework Directive (WFD), hydrological features often contribute either directly or indirectly to the overall framework designation. Hydrological designations within the study area are provided in **Table 10.11** below.

10.6.8 All WFD Catchments are tasked with the aim of achieving an overall 'Good' status.

Table 10.11 Surface Water Bodies

Management Catchment	Name	Waterbody ID	Classification (2021)
Carmarthen Bay and the Gower	Gwendraeth Fach - headwaters to tidal limit	GB110060029400	Overall – Good

10.6.9 The hydrological setting within the study area is presented within **Volume 2, Figure 10.2: Surface Water Bodies and Catchments within the Study Area**.

Geology and Hydrogeology

10.6.10 A summary of the geological and hydrogeological setting within the study area is provided below.

Superficial Deposits

10.6.11 Superficial deposits of Devensian Till are found in the north, east and west of the study area.

Bedrock Geology

10.6.12 The study area is entirely underlain by Argillaceous rocks and sandstone belonging to the Milford Haven Group.

10.6.13 The stratigraphic sequence and aquifer classifications beneath the Site are indicated to be as follows

Table 10.12 Geological Sequence and Aquifer Classifications

Strata	Description and Approximate Thickness	Aquifer Classification
Glacial Till (limited to the very north of Field 24 access route, along the southern extremity of Solar Area East and localised area in the east of Field 29)	Typically comprises unsorted and poorly sorted sand, clay, gravely and silt. Generally variable in thickness.	Secondary Undifferentiated
Milford Haven Group – Interbedded argillaceous rocks and [Subordinate/subequal] sandstone and conglomerate (beneath entirety of Site)	Typically comprises hard, red calcareous marls with sporadic red and green sandstones, basal beds of green marl, conglomerate and breccia. Approx. 1,500 m in thickness.	Secondary A

10.6.14 It is likely that the majority of cable placement will be within the Milford Haven Group bedrock outcropping across the majority of the Site, which may impair excavation to depth. It is likely that the bedrock will comprise predominantly marls or mudstones with occasional beds of sandstone. Within the marls the main anticipated means of groundwater flow is limited to through fracture flow. It is unlikely that shallow excavations will have a significant effect on the existing groundwater drainage pattern assuming that there is no shallow groundwater.

Groundwater Body Status

10.6.15 Superficial deposits present are classified as Secondary (undifferentiated) aquifers, these formations have varying characteristics in different locations. The bedrock is classified as a Secondary A aquifer, these formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers.

10.6.16 NRW Interactive Map Viewer shows the majority of the study area to have a 'High' groundwater vulnerability. Areas of 'Medium-High' and 'Medium' vulnerability are seen in the central and western areas of the study area respectively.

10.6.17 NRW online groundwater Source Protection Zone (SPZ) mapping indicates that the Site is not located within a groundwater SPZ.

Table 10.13 Groundwater Bodies

Name (NRW ID)	Water body ID	Classification (2019)
Tywi, Taf and Gwendraeths	GB41002G200500	Overall – Poor

Designated Sites

10.6.18 No sites designated as Sites of Specific Scientific Interest (SSSI), Special Protection Areas (SPA) or Special Areas of Conservation (SAC) are located within the study area.

10.6.19 The Carmarthen Bay and Estuaries SAC is located approximately 800m west and 2000m south of the study area.

10.6.20 The Afon Tywi SSSI is located approximately 800m west of the study area and the Pembrey Coast SSSI is found approximately 2000m south of the study area.

10.6.21 The Gwel y Coed SSSI is also found approximately 1.5km southwest of the Site.

Flood Risk

10.6.22 The FCA is presented within **Volume 3, Appendix 10.1: Flood Consequence Assessment.** A summary of flood risk is presented below.

TAN15 Flood Map for Planning

10.6.23 The NRW Flood Map for Planning[1] classifies areas into the following zones:

- Flood Zone 1 is defined as areas with an annual probability of flooding of up to 0.1% (1 in 1,000), including the effects of climate change.
- Flood Zone 2 is defined as areas with an annual probability of flooding of between 0.1% to 1% (1 in 1,000 to 1 in 100), including the effects of climate change.
- Flood Zone 3 is defined as areas with an annual probability of flooding of over 1% (1 in 100), including the effects of climate change.

10.6.24 The TAN15 mapping is presented within Volume 3, Appendix 10.1: Flood Consequence Assessment. The Proposed Development is shown to be located within Flood Zone 1 from Rivers and Sea.

10.6.25 The NRW Flood Map for Planning for Surface Water and Small Watercourses shows areas of Flood Zone 2 and Flood Zone 3 associated with overland flow paths / drains across the study area.

Groundwater Flood Risk

10.6.26 BGS Aquifer Designation mapping[2] shows bedrock deposits are categorised as a Secondary A Aquifer and Secondary (Undifferentiated). The NRW natural

[1] Natural Resources Wales / Flood map for planning

[2] https://mapapps2.bgs.ac.uk/geoindex/home.html

environment mapping shows that the Site is located within an area of Medium – High groundwater vulnerability.

10.6.27 Southwest Wales - Stage 1 Strategic Flood Consequences Assessment (November 2022), Appendix A2 Flood Risk Mapping contains mapping relevant to Carmarthenshire. It shows the Site has a 'low' risk of groundwater flooding.

Reservoir Flood Risk

10.6.28 The NRW Flood Risk Assessment Wales mapping[3], available online, shows the Site is located outside the mapped extent of being at risk of flooding from reservoirs.

Water Resources

10.6.29 Water abstractions and discharge consents within the study area are presented within this section.

Water Abstractions

10.6.30 NRW provided links to online abstraction data for the study area, it shows 1no. licenced abstraction from a tributary of the Cwm Mill stream in the northwest of the study area. The abstraction is registered to J A Davies under reference 22/60/3/0042 and is a surface water abstraction with 'impoundment' in use all year.

10.6.31 BGS mapping identifies a water well located within the study area (Reference SN30/1) at Cwmfforddgoch Broadley (Grid Reference 238520, 209300).

Pollution Incidents

10.6.32 NRW recorded pollution incidents show no records of incidents within the study area.

10.6.33 Environment Agency data indicates that there is one record of a 'major' or 'significant' pollution incident within 500 m of the Site. This is recorded as a significance water impact from slurry and dilute slurry in 2009.

Discharge Consents

10.6.34 From NRW records, there is 1no. discharge consent within the study area, in the east discharging to the Nant Morlais. The consent is registered to R T Richards under permit number BC0020201.

Ground Contamination

10.6.35 Historical maps indicate that potential pond features were present in the north and south-east of Field 15 but were no longer identifiable by 1971. It is likely

[3] https://flood-risk-maps.naturalresources.wales/?locale=en

that the features were infilled at some point pre-1971 - the nature of the infill (where present) is therefore unknown. Where present, this could present a potential source of localised contamination and ground gas.

10.6.36 Former earthworks to the north-east of Field 15 may also present a potential source of Made Ground and ground gas.

10.6.37 Recent mapping indicates a number of farms within 250 m of the Site. All may include sheep dips, slurry beds, storage of fuels, agricultural chemicals and fertilisers as well as plant/vehicle storage that could be prone to leaks and spills in their daily operations. From a review of mapping and aerial imagery, there are also a number of tanks at some of the farms, including Cilfeithy Uchaf and Maes Mawr.

Site-specific surveys

10.6.38 Site specific surveys were undertaken to inform the baseline assessment for Ground Conditions, Hydrology and Hydrogeology. A summary of the Site specific surveys undertaken to inform this chapter of the ES are provided in **Table 10.14**.

Table 10.14: Summary of Site specific surveys undertaken

Survey type	Purpose of survey	Date undertaken
Site walkover	Geo-environmental walkover survey	25 June 2025

10.6.39 Solar Area East fields comprised pasture for grazing cattle, whilst the fields making up Solar Area West were unoccupied pasture at time of inspection. No significant sources of contamination were identified. Details of the survey are provided within **Volume 3, Appendix 10.2: GDTS**.

Future baseline conditions

10.6.40 Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 require that 'an outline of the likely evolution thereof [the baseline] without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge' is included within the ES. This section provides an outline of the likely future baseline conditions in the absence of the Proposed Development.

10.6.41 The main change to the Ground Conditions, Hydrology and Hydrogeology baseline in future is likely to be associated with the potential effects of climate change, which may impact on future peak river flow rates and rainfall intensity. The Welsh Government has considered the likely future changes and provides climate change allowances for flood consequence in land use planning (Welsh Government, 2021).

10.6.42 A summary of the relevant climate change considerations for the Site are provided below. Due to the Site being located inland, sea level rise has not been considered as the Site is not at tidal risk.

Peak River Flow

10.6.43 Peak river flow allowances show the anticipated changes to peak flows within rivers as a result of climate change. A predicted increase in peak river flow rates and rainfall intensity, as outlined within the Welsh Government 2021 guidance is likely to affect Wales and the Western Wales catchment.

10.6.44 The projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, it is recommended that the central estimate, or change factor, for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of an FCA and to inform design levels.

Table 10.15. Peak River Flow Increases for the West Wales River Basin District

West Wales	Total potential change anticipated for '2020s' (2015- 39)	Total potential change anticipated for '2050s' (2040-2069)	Total potential change anticipated for the '2080s' (2070-2115)
Upper Estimate	25%	40%	75%
Central Estimate	15%	25%	30%
Lower estimate	5%	10%	15%

10.6.45 In regards to peak river flow, the Welsh Government (2021) guidance recommends that the central estimate, or change factor, for the 2080s epoch should be used to assess the potential impact of climate change as part of a flood consequence assessment. As such the 25% allowance should be applied to Flood Zones 2 and 3.

Peak Rainfall Intensity

10.6.46 Increases in rainfall intensity due to climate change are likely to affect river levels, particularly within smaller catchments (less than 5 km²) and on land and urban drainage systems. Rainfall allowances should be used to better understand the impacts of climate change on smaller watercourses, which may see their channel capacity reduced as a result of increased run-off.

10.6.47 Both the central and upper end allowances should be assessed to understand the range of impact. As a minimum, proposals should be assessed against the central allowance to inform design levels.

10.6.48 Rainfall allowances should also be applied when considering surface water flooding and drainage assessments. Drainage systems should be designed to ensure there is no increase in Site run-off when assessed against the upper estimate.

Table 10.16 Changes in Peak Rainfall Intensity

Applies across all of Wakes	Total potential change anticipated for '2020s' (2015- 39)	Total potential change anticipated for '2050s' (2040-2069)	Total potential change anticipated for the '2080s' (2070-2115)
Upper Estimate	10%	20%	40%
Central Estimate	5%	10%	20%

10.6.49 The Proposed Development is considered to have a design life of 40 years. Therefore, for the purposes of this assessment, taking into account NRW's climate change allowances (published in September 2021), a 20% increase in peak rainfall intensity has been included as climate change allowance, which caters up to the year 2100. No climate change guidance is available beyond 2100.

Key receptors

10.6.50 **Table 10.17** identifies the receptors taken forward for the assessment.

Table 10.17: Key receptors taken forward for assessment

Receptor	Description and Reason for Consideration
Waterbodies (including surface water and ground water bodies)	OS mapping shows there are ordinary watercourses and within the study areas which are tributaries of Nant Morlais, Gwendraeth Fach, Gwendraeth Fawr and the River Towy. Taking a precautionary approach in assuming surrounding water bodies have achieved/maintained 'Good' status at the time when construction begins, the surface water bodies and ground water bodies within the study area have been assessed with a WFD status of 'Good'.
Water Supplies	NRW records show 1no. private water supply is located within the study area. BGS records show 1no. potential well within the study area.

Receptor	Description and Reason for Consideration
Designated Sites	The Carmarthen Bay and Estuaries SAC, The Afon Tywi SSSI, the Pembrey Coast SSSI and the Gwel y Coed SSSI are located outside of the study area but may recieve flows from watercourses present within the Proposed Development area.
Aquifers	Superficial deposits within the Study Area are classified as 'Secondary undifferentiated' Aquifers. The bedrock within the Study Area is classified as a 'Secondary A' Aquifer. Surface waters from the study area have potential to enter the groundwater and thus private water supplies.

10.7 Mitigation and Enhancement Measures Adopted as Part of the Proposed Development

10.7.1 Both embedded and additional mitigation measures relevant to the assessment of Ground Conditions, Hydrology and Hydrogeology are summarised in

10.7.2 **Table 10.18** below. Where relevant, measures have been identified that may result in enhancement of existing environmental conditions.

Table 10.18: Mitigation measures to be adopted as part of the Proposed Development

Mitigation measure	How the measure will be secured
Embedded mitigation	
The Conceptual Drainage Strategy (**Volume 3, Appendix 10.1**) has been informed by the findings of the FCA (**Volume 3, Appendix 10.1**) and proposes site-specific measures in the form of Sustainable Urban Drainage techniques (such as gravel sub-bases and natural filter strips) to work in conjunction with existing field drainage to manage the discharge of any excess water from the Site.	It is anticipated that the Conceptual Drainage Strategy (**Volume 3, Appendix 10.1**) will be secured by a condition of the DNS consent.
Establishment of watercourse buffers and approval of land drainage consents where applicable. **Volume 2, Figure 2.1: Site Layout Plan** has incorporated 8 m buffers between the banks of ordinary	It is anticipated that **Volume 2, Figure 2.1: Site Layout Plan** will form an approved plan on the DNS consent. Where watercourse crossings are required, relevant consents will be

Mitigation measure	How the measure will be secured
watercourses and any proposed infrastructure.	obtained from NRW and CCC in relation to land drainage to be obtained prior to construction.
Implementation of environmental best practice measures that would include, but are not limited to maintenance of water flow and levels, sediment control, and pollution control.	Measures are contained in **Volume 3, Appendix 4.4: Outline CEMP** that is submitted with the DNS application. It is anticipated that implementation of the CEMP will be secured through a condition of the DNS consent.
Mitigation measures within the Decommissioning Plan including sediment control and pollution prevention.	A Decommissioning Environmental Management Plan would be produced and agreed with the relevant authorities prior to decommissioning works and will be in line with the latest relevant available guidance. It is anticipated that this will be required by a condition of the consent.
Implementation of a Construction Environmental Management Plan (CEMP), which will include measures to manage environmental risks (e.g. pollution) through the duration of the construction phase. Such measures would include: • Storage of excavated materials (soils and arisings) to prevent run-off by means of temporary bunding. • Storage of stockpiled materials on an impermeable surface to prevent leaching of contaminants and use of covers when not in use to prevent materials being dispersed and to protect from rain. • The implementation of dust suppression measures during construction to minimise nuisance dust emissions during the works. • Stockpiles will be sited a minimum distance from watercourses to avoid pollution and sediment runoff.	Measures are contained in **Volume 3, Appendix 4.4: Outline CEMP** that is submitted with the DNS application. It is anticipated that implementation of the CEMP will be secured through a condition of the DNS consent. Measures contained in the CEMP will ensure flood risk and water quality is adequately managed during construction.

Mitigation measure	How the measure will be secured
• Bulk storage areas to be secured and provided with secondary containment (in accordance with the Oil Storage Regulations and best practice). • Use of a documented spill procedure and use of spill kits kept in the vicinity of chemical/oil storage. • The disposal of solid waste, including surplus spoil, would be managed to maximise the environmental and developmental benefits from the use of surplus material and to minimise any adverse effects of disposal. In general, the principles of the waste management hierarchy, reduce-reuse-recycle would be applied. • Surface water, perched waters or groundwater from dewatering operations would not be discharged to surface water, or ground without the appropriate consents from the Environment Agency. The disposal of this effluent would be the responsibility of the contractor.	
A ground investigation is required to confirm the absence of contamination at the Site and inform final geotechnical design of the final Proposed Development.	It is anticipated that this will be secured through a condition of the DNS consent.

10.8 Assessment of effects

10.8.1 The impacts of the construction, operation and maintenance, and decommissioning phases of the Proposed Development have been assessed. The potential impacts arising from the construction, operation and maintenance and decommissioning phases of the Proposed Development are listed in

10.8.2 **Table 10.3**. A description of the potential effect on receptors caused by each identified impact is given below.

The impact of the deterioration of waterbodies (surface water and groundwater/groundwater dependent features)

Construction phase

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

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

- fine particulate materials (e.g. silts and clays);
- cement;
- oil and chemicals (from plant machinery and processes); and
- other wastes such as wood, plastics, sewage and rubble.

10.8.5 These pollutants may be present as a result of normal construction activities, such as excavation, incorrect storage of oils and chemicals and/or accidental spillage. The significance of the incident is dependent on the nature of the pollutant, on the mitigation measures adopted and their timing and effectiveness, and on the sensitivity of the receiving waterbody.

10.8.6 Minor modification of water drainage pathways may occur as a result of cabling. All of the cabling within the Site will be laid underground via surface dug trenches of up to approximately 1m deep and 50cm wide and backfilled. These will utilise existing access tracks wherever practicable, particularly where sensitive habitats or archaeology are potentially present. Depth of trench may be inhibited by presence of shallow bedrock across the majority of the Site.

10.8.7 Construction activities have the potential to disturb any existing areas of ground/groundwater contamination. Water quality in the underlying bedrock aquifer could be affected by mobilisation of contaminants during construction of temporary haul roads, excavations or compounds.

Sensitivity of the receptor

10.8.8 The study area is located within Carmarthen Bay and the Gower surface water body management catchment and the Tywi, Taf and Gwendraeths groundwater body catchment. Flows from the proposed development.

10.8.9 Water bodies (ground water and surface water) within the study area are currently assessed to have ‘good’ and ‘poor’ overall WFD status. Taking a precautionary approach in assuming surrounding water bodies have

achieved/maintained ‘good’ status at the time when construction begins, the surface watercourses and groundwater bodies within the ground conditions, hydrology and hydrogeology study area will have been assessed with a WFD status of ‘good’. The watercourses and groundwater bodies are therefore considered to be highly vulnerable in relation to WFD classification status, and moderate value in relation to the local economy. The sensitivity of the receptor is therefore, considered to be **high**.

10.8.10 The Carmarthen Bay and Estuaries SAC, The Afon Tywi SSSI and the Pembrey Coast SSSI are located downstream of the study area and may receive flows from the tributaries present within the Proposed Development. The vulnerability of the receptors is considered to be high and the recoverability of receptors is considered to be low due to time required for receptors to recover from aforementioned impacts. The sensitivity of the receptor is therefore, considered to be **high**.

10.8.11 Surface water abstractions within the study area are a receptor that may be impacted by the deterioration of quarter quality. There is 1no. surface water abstraction present within the study area and it is considered to be of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered **high**.

10.8.12 A potential groundwater well is also located within the study area. This is located topographically lower than Solar Area West with a minor watercourse between them. Therefore it is expected that there is limited groundwater pathway connectivity between the Proposed Development and the well which is also in a different water catchment divide for surface water runoff. The well is considered to be of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore, considered **high**.

10.8.13 Superficial deposits are classified as Secondary (undifferentiated) aquifers, these formations have varying characteristics in different locations. The bedrock is classified as a Secondary A aquifer, these formations are formed of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers. The vulnerability of aquifers is considered to be high and the recoverability of receptors is considered to be low due to time required for receptors to recover from aforementioned impacts. The sensitivity of the receptor is therefore, considered to be **high**.

Magnitude of impact

10.8.14 During the construction phase, construction activities may give rise to increases in turbid runoff, an increase in the pH of runoff and remobilisation of contaminants within the ground. Leakages and spills may also occur from machinery use or refuelling of machinery. Within temporary construction compounds and construction areas, the incorrect storage and handling of construction materials, oils and chemicals may result in spills and leaks. Leakages may also arise from welfare facilities within construction compounds. There is a potential for contaminants to impact any potential receiving water body quality and cause a reduction in water body WFD classification.

10.8.15 Activities involved in the construction process would follow the measures set out in the CEMP to intercept run-off and ensure that discharges from the Site are controlled in quality and volume causing no degradation in WFD classification. In addition, water quality monitoring would be carried out throughout the construction phase to ensure no discharge of pollutants or increase in suspended sediment occurs.

10.8.16 Appropriate buffers will be maintained between the banks of the watercourses present within the study area and temporary construction areas. Where relevant, land drainage consents will also be applied for prior to the commencement of construction to ensure construction works within proximity to ordinary watercourses and main rivers are consented by CCC and/or NRW.

10.8.17 No confirmed potential sources of contamination have been identified on the Site. Small areas of potentially infilled pond features may be present. The Customer Control Room and DNO Control Room are not located within these areas and are sited away from surface watercourses.

10.8.18 It is not anticipated groundwater will be encountered during the shallow excavations for the cable trenches which are sited away from surface watercourses. Excavated materials will be used to backfill the trenches, and the impact on shallow groundwater level and flow is expected to be small. There is unlikely to be a significant measurable change in levels.

10.8.19 Groundwater levels will recover after construction assuming that the excavated materials are used as backfill and are not subject to artificial compaction, will maintain similar drainage characteristics. This will be controlled through the CEMP and the Surface Water and Groundwater Management Plan.

10.8.20 Considering the above mitigation measures, the impact is predicted to be direct, of local spatial extent, short term duration, intermittent and medium reversibility. The magnitude is therefore, considered to be **negligible adverse**.

Significance of the effect

10.8.21 On the basis that the sensitivity of the receptor is **high** and the magnitude of the impact is **negligible adverse** with mitigation measures, it is assessed that there will be a **minor adverse** effect, which not significant in EIA terms.

Additional mitigation and residual effect

10.8.22 Suitable mitigation measures have been adopted as part of the Proposed Development and would be implemented through the CEMP. Land drainage consents will be obtained where required. The assessment has demonstrated that the overall effect on ground conditions, hydrology and hydrogeology during construction would be ‘not significant’. It is, therefore, not considered necessary to propose further mitigation measures for this Proposed Development.

Operation and Maintenance Phase

10.8.23 During the operation and maintenance phase of the Proposed Development, pollutants may be present as a result of normal operations, traffic and accidental spillage which may give rise to water quality effects on the surrounding surface watercourses and groundwater. There is also a potential for catastrophic failure of permanent development which may also give rise to water quality effects. These include:

- fine particulate materials (e.g. silts and clays); and
- oils and chemicals (from plant machinery and processes).

Sensitivity of the receptor

10.8.24 During the operation and maintenance phase, it is expected the receptors will remain as identified during construction, please refer to paragraphs **10.8.8** to **10.8.13**.

Magnitude of impact

10.8.25 **Volume 3, Appendix 10.1: Flood Consequences and Conceptual Drainage Strategy** proposes the use of gravel sub-bases to provide surface water attenuation. Other measures will also be implemented to capture and convey surface water. The Conceptual Drainage Strategy is to be approved by CCC via a SAB application in order to meet the requirements of national and local planning policy and best practice.

10.8.26 Pollutants may be present as a result of normal operations, traffic and accidental spillage. Catastrophic failure of the Proposed Development elements may also give rise to pollutants. These activities could lead to an increase in turbid run-off and spillages/leaks of fuel, oil and chemicals associated with the substation and transformers that could runoff to watercourses and infiltrate to underlying ground within the study area.

10.8.27 It is proposed that transformers will be houses within a bund, which will be sized to hold 110% of substances held within the transformer, reducing the likelihood of substances being released into the wider environment.

10.8.28 The Conceptual Drainage Strategy included in the FCA (**Appendix 10.1: Flood Consequence Assessment**) includes the provision of SuDS as a form of pollution mitigation. Gravel subbases beneath hardstanding infrastructure within the Proposed Development are expected to provide sufficient treatment to the run-off from impermeable areas.

10.8.29 The Substation, Customer Control Room and DNO Control Room will be underlain by a 400 mm gravel base with a 30% porosity which can be used for surface water attenuation. It is proposed that runoff will be stored in these gravel bases prior to infiltration to the ground at existing rates. Gravel subbases with depths of 300mm will be placed beneath Spares Containers within the PV arrays to provide suitable storage prior to infiltration.

10.8.30 It is expected general operational procedures will prevent any increase in pollutants to the surrounding environment and will be implemented during the operation and maintenance phase. Site operatives will be fully debriefed of operational procedures on-site, including pollution prevention and response procedures.

10.8.31 With the provision of operational measures and on-site drainage networks, the impact is predicted to be direct, of local spatial extent, long term duration, intermittent and medium reversibility. The magnitude is therefore, considered to be **negligible adverse**.

Significance of the effect

10.8.32 On the basis that the sensitivity of the receptor is high and the magnitude of the impact is negligible adverse with mitigation measures, it is assessed that there will be a minor adverse effect, which not significant in EIA terms.

Additional mitigation and residual effect

10.8.33 The drainage strategy prepared for the Site (**Volume 3, Appendix 10.1**) will include suitable pollution mitigation prevent the decline of water quality in both surface and groundwater receptors in the study area. It is, therefore, not considered necessary to propose further mitigation measures for this Proposed Development.

Decommissioning Phase

10.8.34 Decommissioning is likely to operate within the parameters identified for construction (i.e. any activities are likely to occur within construction working areas and to require no greater amount or duration of activity than assessed for construction). A decommissioning plan will be implemented to minimise any potential effects.

10.8.35 Therefore, the effects during the decommissioning phase of the Proposed Development would be no worse than that during construction.

10.8.36 On decommissioning the cable trenches will be reopened, with the topsoil set aside, and the cables and ducts will be removed, or cut and left in situ where at sufficient depth. As the cables are removed, the trenches will be backfilled with the soil that has been set aside. The cables will be bundled and taken for recycling or sale to a scrap metal yard, and the ducts will be disposed of at an approved landfill.

10.8.37 Where appropriate to avoid unnecessary ground disturbance, some of the cables may be cut at a point where they are sufficiently buried and decommissioned *in situ*. There is potential for degradation of the underground cables leading to leakage and leaching of contaminants over time. The cables are however not fluid filled and protected by an outer sheath, resistant to degradation, and installed within ducts. This will be detailed within the decommissioning plan with prior agreement with NRW.

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

Future monitoring

10.8.39 No future monitoring is required as a consequence of the assessment of Ground Conditions, Hydrology and Hydrogeology.

10.9 Cumulative Effects Assessment

10.9.1 The assessment of cumulative effects for Ground Conditions, Hydrology and Hydrogeology has followed the methodology set out in **Volume 1, Chapter 4: Environment Assessment Methodology**.

10.9.2 The other projects have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the information provided in **Volume 1, Chapter 2: Proposed Development Description**, of the ES as well as the information available on other projects.

10.9.3 A review of approved and proposed developments within a 1 km search area from the Site has been undertaken. A 1 km search area is considered appropriate for data collection taking into account the nature of the development and likely zone of influence on hydrological receptors. Given the landscape surrounding the Site, current and ongoing activities, as well natural baseline fluctuations, it would be difficult to ascertain the exact source of any impacts on water quality beyond 1 km.

10.9.4 No proposed development are found within the 1km search area, therefore no cumulative impacts have been assessed.

10.10 Inter-related effects

Receptor led effects

10.10.1 With respect to receptor led effects, the assessment has considered the potential for inter-related effects between Ground Conditions, Hydrology and Hydrogeology and the following environmental receptors:

10.10.2 Contaminated surface water runoff associated with construction and decommissioning activities has the potential to enter and contaminate habitats downstream of contamination and detrimentally effect species. Due to embedded mitigation measures included as part of the Proposed Development design and to meet legislative requirements, it is unlikely that receptors would experience an increase in significance of inter-related effects that which has already been reported in the individual chapters for the identified receptors. Therefore, there is no change resulting from the inter-related assessment.

10.10.3 Taking the above information into account, it is concluded that inter-related effects between Ground conditions, hydrology and hydrogeology and other environmental topics on identified receptors would not result in effects of greater significance than those already assessed within this chapter of the ES.

Project lifetime effects

10.10.4 With respect to project lifetime effects the assessment has considered the potential for inter-related effects across each phase of the Proposed Development on the following receptors:

The impact of the deterioration of waterbodies (surface water and groundwater/groundwater dependent features)

10.10.5 Contaminated runoff associated with construction, operation and maintenance, and decommissioning activities has the potential to enter and contaminate surface water and groundwater receptors. Direct impacts to water quality via accidental spillages / contaminant release may occur, along with modification of water drainage pathways as a result of cabling.

10.10.6 Due to embedded measures included as part of the project design required to meet legislative requirements, it is unlikely that receptors would experience increase significance of inter-related effects that which has already been reported in the individual chapters for the identified receptors. Therefore, there is no change result from the inter-related assessment.

10.10.7 Taking the above information into account, it is concluded that inter-related effects on Ground Conditions, Hydrology and Hydrogeology on identified receptors would not result in effects of greater significance than if assessed in isolation within this chapter of the ES.

10.11 Summary of environmental effects, mitigation measures and monitoring

10.11.1 **Table 10.19** presents a summary of the potential environmental effects, additional mitigation, residual effects and further monitoring identified in this chapter of the ES.

Table 10.19: Summary of potential environmental effects, mitigation and monitoring.

Description of impact	Phase[a]			Mitigation measures	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect
	C	O	D						
The impact of the deterioration of waterbodies (surface water and ground water/groundwater dependent features)	✓	✓	✓	Drainage Strategy CEMP Watercourse buffers / land drainage consents	C: negligible adverse O: negligible adverse D: negligible adverse	C: High O: High D: High	C: minor adverse O: minor adverse D: minor adverse	None	C: minor adverse (not significant) O: minor adverse (not significant) D: minor adverse (not significant)

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

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