LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr 1 Floating Offshore Wind Farm

Environmental Statement

Volume 2: Chapter 10 – Terrestrial Water Environment

August 2024

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FLOVENTIS ENERGY

Document Status

Version	Authored by	Reviewed by	Approved by	Date
FINAL	AECOM	AECOM	AECOM	August 2024

Approval for Issue

Prepared by	AECOM
Prepared for	Llŷr Floating Wind Limited
Approved by	Jay Hilton-Miller

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Acronyms and abbreviations

Acronym or abbreviation	Definition	Acronym or abbreviation	Definition
AEP	Annual Exceedance Probability	NTAXA	Number of macrophyte taxa
AOD	Above ordnance datum	NVZ	Nitrate Vulnerable Zone
ASTP	Average Score Per Taxon	OEMP	Operational Environmental Management Plan
bgl	Below ground level	OfECC	Offshore Export Cable Corridor
BGS	British Geological Survey	OnECC	Onshore Export Cable Corridor
BWMP	Biological Monitoring Working Party	PCC	Pembrokeshire County Council
CAMS	Catchment Abstraction Management Strategy	PFRR	Preliminary Flood Risk Report
CEMP	Construction Environmental Management Plan	PINS	Planning Inspectorate
CIRIA	Construction Industry Research and Information Association	PPG	Pollution Prevention Guidance
DEFRA	Department for Environment, Food and Rural Affairs	PSTP	package sewage treatment plant
DEMP	Decommissioning Environmental Management Plan	PWS	Private Water Supply/Supplies
DMRB	Design Manual for Roads and Bridges	RBMP	River basin management plan
DWPA	Drinking water protected area	RMNI	River macrophyte nutrient index
EA	Environment Agency	SAB	SuDS Approval Board
EEA	European Economic Area	SAC	Special Area of Conservation
EQS	Environmental quality standards	SEPA	Scottish Environment Protection Agency
ES	Environmental Statement	SFCA	Strategic Flood Consequence Assessment
EU	European Union	SIA	Simple Index Approach
FCA	Flood Consequence Assessment	SPA	Special Protection Area
FRAP	Flood Risk Activity Permit	SPZ	Source Protection Zone
GPP	Guidance for Pollution Prevention	SSSI	Site of Special Scientific Interest
GWDTE	Groundwater dependent terrestrial ecosystem	SuDS	Sustainable Urban Drainage Systems
HMSO	His Majesty's Stationary Office	TAN	Technical Advice Note
IDD	Internal Drainage District	TCCs	Temporary Construction Compounds
JNCC	Joint Nature Conservation Committee	TJB	Transition joint bay
LLFA	Lead Local Flood Authority	UK	United Kingdom
LNR	Local Nature Reserve	UKCEH	UK Centre for Ecology and Hydrology
LPD	Local Development Plan	WAG	Welsh Assembly Government
MAGIC	Multi Agency Geographic Information for the Countryside	WFD	Water Framework Directive

Acronym or abbreviation	Definition	Acronym or abbreviation	Definition
META	Marine Energy Test Area	WMP	Water Management Plan
MLT	Marine licencing team	WTGs	Wind Turbine Generators
NGR	National Grid Reference	ZoI	Zone of Influence
NNR	National Nature Reserve		
NRW	Natural Resources Wales		

Glossary of project terms

Term	Definition
The Applicant	The developer of the Project, Llŷr Floating Wind Limited.
Array	All wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure within the Array Area, as defined, when considered collectively, excluding the offshore export cable(s).
Array Area	The area within which the wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure will be located.
Floventis Energy	A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary.
Landfall	The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays (TJB).
Llŷr 1	The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases.
Marine Licence	A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers.
Offshore Development Area	The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application.
Offshore Export Cable	The cable(s) that transmit electricity produced by the WTGs to landfall.
Offshore Export Cable Corridor (OfECC)	The area within which the offshore export cable circuit(s) will be located, from the Array Area to the Landfall.
Onshore Development Area	The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor and the Onshore Substation, as defined, and including new access routes and visibility splays, that forms the onshore boundary for the planning application.

Term	Definition
Onshore Export Cable(s)	The cable(s) that transmit electricity from the landfall to the onshore substation.
Onshore Export Cable Corridor (OnECC)	The area within which the onshore export cable circuit(s) will be located.
Project	All aspects of the Llŷr 1 development (i.e. the onshore and offshore components).
Onshore Substation	Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption.
Section 36 consent	Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works.

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10. TERRESTRIAL WATER ENVIRONMENT

10.1 Introduction

1. Llŷr Floating Wind Limited (hereafter the Applicant) is proposing to develop the Llŷr 1 Floating Offshore Wind Farm (hereafter referred to as the proposed Project), located approximately 35 km off the coast of Pembrokeshire in the Celtic Sea.
2. The proposed Project is a test and demonstration wind farm development, comprising up to 10 wind turbine generators (WTGs). The proposed Project will make landfall at Freshwater West before connecting into Pembroke Dock power station and the national grid network.
3. The Applicant is seeking offshore (a Section 36 consent and Marine Licence) and onshore (deemed planning permission) consents for Llŷr 1, and this chapter forms part of the Environmental Statement (ES) which is submitted in support of those consent applications. This chapter describes the potential impacts and effects of the proposed Project on the Terrestrial Water Environment during the construction, operation and maintenance and decommissioning phases, and includes mitigation and good practice measures to reduce the impacts of the proposed Project on the Terrestrial Water Environment.
4. This chapter presents the findings of an assessment of the likely significant effects on the Terrestrial Water Environment as a result of the proposed Project. This includes consideration of surface water features (such as rivers, streams, ditches, and lakes), groundwater assets, flood risk and demand for water resources. The assessment considers potential effects on offshore water receptors in so far as they could be impacted by onshore activities, such as runoff of sediment or pollutants from construction works. Potential effects to offshore water receptors that will be derived from activities in the marine environment are considered in **Chapter 18: Marine Water and Sediment Quality**.
5. **Section 10.9** of this ES chapter provides a summary of the impact assessment undertaken and any residual significant effects on the Terrestrial Water Environment following consideration of any mitigation measures.
6. The assessment presented in this chapter should be read in conjunction with the following linked and supporting chapters:

    - **Chapter 04: Description of the proposed Project –** provides further details of the project design parameters;
    - **Chapter 05: EIA Approach and Methodology –** provides further details of the general framework and approach to the EIA; and
    - **Chapter 18: Marine Water and Sediment Quality** – provides an assessment of the proposed Project on Marine Water and Sediment Quality, for which there is overlap of the Study Area outlined in Chapter 18, and this chapter (**Chapter 10: Water Environment**).

7. Additional information to support the assessment includes:

    - **Appendix 10A: Flood Consequence Assessment;**
    - **Appendix 10A - Annex 10A: Drainage Strategy;**
    - **Appendix 10B: Onshore Water Environment Site Survey Report;**
    - **Appendix 10C: WFD Assessment Onshore;**
    - **Appendix 10D: WFD Assessment Offshore;**

- **Volume 5: Figure 10.1: Onshore Water Environment Study Area;**
- **Volume 5: Figure 10.2: Surface Water Features and their Attributes;**
- **Volume 5: Figure 10.3: Identified Ordinary Watercourses;**
- **Volume 5: Figure 10.4: Groundwater Features and their Attributes;**
- **Volume 5: Figure 10.5: Designated Sites;**
- **Volume 5: Figure 10.6: Water Resource Information; and**
- **Volume 5: Figure 10.7: Cumulative Effects Assessment for Water Environment.**

8. The assessment has been undertaken by AECOM. Further details of the proposed Project Team's competency are provided in **Appendix 1A: Statement of Competence.**

10.2 Legislation, Policy and Guidance

9. The following sections identify specific legislation, policy and guidance that is applicable to the assessment of the Terrestrial Water Environment. Further detail on the wider legislation, policy and guidance relevant to this ES is provided in **Chapter 02: Regulatory and Planning Policy Context**.

10.2.1. Legislation

10. The legislation that is applicable to the assessment of the Terrestrial Water Environment is detailed in **Table 10-1**.

Table 10-1. A summary of legislation relevant to the terrestrial water environment

Summary of Legislation	How and where it is considered in the chapter
Environment Act 2021 (HMSO, 2021). The Act comprises of two thematic halves: First provides a legal framework for environmental governance, second makes provision for specific improvement of the environment including measures on water, nature and biodiversity, and conservation covenants. Enables improved environmental protections to be included into law, includes new binding targets for water, which when set will need to be considered by new development that may affect the water environment.	Consulted as part of the Terrestrial Water Environment impact assessment and to inform the development of the design of the proposed Project and suitable mitigation measures
Environment (Wales) Act 2016 (HMSO, 2016). The Act aims to plan and manage Wales' natural resources in a more proactive, sustainable and joined-up way. The Act received Royal Assent in 2016 and delivers against Welsh Government's Programme for Government commitment. The Act also establishes the legislative framework necessary to tackle climate change. The Act seeks to build greater resilience into Wales' ecosystems and support biodiversity, well-being and sustainable development.	Consulted as part of the Terrestrial Water Environment impact assessment and to inform the development of the design of the proposed Project and suitable mitigation measures
Well-being of Future Generations Act (Wales) 2015 (HMSO, 2015). The act is about improving the social, economic, environmental, and cultural well-being of Wales.	Consulted as part of the Terrestrial Water Environment impact assessment and to inform the development of the design of the proposed Project

Summary of Legislation	How and where it is considered in the chapter
	and suitable mitigation measures
Water Act 2014 (HMSO, 2014). This Act amends the Water Resources Act 1991 and the Water Industry Act 1991. The four broad aims of the Act are the sustainable use of water resources; strengthening the voice of consumers; a measured increase in competition; and the promotion of water conservation. It mainly deals with regulating the impact of water supply on the water environment and the price of water.	Consulted as part of the Terrestrial Water Environment impact assessment and to inform the development of the design of the proposed Project and suitable mitigation measures
Flood and Water Management Act 2010 (HMSO, 2010). The Act takes forward some of the proposals in three previous strategy documents published by the UK Government - Future Water, Making Space for Water and the UK Government's response to the Sir Michael Pitt's Review of the Summer 2007 floods. The Act also takes forward parts of the draft Flood and Water Management Bill. Notably, part 1 - Flood and Coastal Erosion Risk Management - gives the Environment Agency a strategic overview of the management of flood and coastal erosion risk in England.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**
Water Resources Act (England and Wales) 1991 (Amended 2009) (HMSO, 1991). The Water Resources Act regulates water resources, water quality and pollution, and flood defence, although it has been amended multiple times. The Act governs the quality and quantity of water by outlining the functions of the Environment Agency (EA). This act sets out offences relating to water, discharge consents, and possible defences to the offences. Serves as a comprehensive legal framework in the UK to ensure the responsible management, use, and protection of water resources, for which new developments may need to take into account.	Consulted as part of Good Practice measures described in **Section 10.8.2.**
Conservation of Habitats and Species Regulations 2017 (HMSO, 2017). These regulations are one of the pieces of domestic law that transpose the land and marine aspects of the Habitats Directive (Council Directive 92/43/EEC) and certain elements of the Wild Birds Directive (Directive 2009/147/EC) known as the Nature Directives. The objective of the Habitats Directive is to protect biodiversity through the conservation of natural habitats and species of wild fauna and flora.	Consulted as part of Good Practice measures described in **Section 10.8.2.**
Climate Change Act 2008 (HMSO, 2008). The Act sets up a framework for the UK to achieve its long-term goals of reducing greenhouse gas emissions and to ensure steps are taken towards adapting to the impact of climate change.	The proposed Project aims to contribute to the UK and Wales's net zero emission targets and ambitions set by

Summary of Legislation	How and where it is considered in the chapter
	the UK's Committee on Climate Change.
Land Drainage Act 1991 (as amended) (HMSO, 1991). The Act aims to highlight the role of all stakeholders from land owners, local authorities the Environment Agency and Government in the use of land drainage and the responsibilities associated to ensuring drainage takes place. The Land Drainage Act 1991 requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded.	Consulted as part of the Secondary Consents in **Section 10.8.2.**
Salmon and Freshwater Fisheries Act 1975 as amended (HMSO, 1975). The Salmon and Freshwater Fisheries Act 1975 is a law passed by the government of the United Kingdom in an attempt to protect salmon and trout from commercial poaching, to protect migration routes, to prevent willful vandalism and neglect of fisheries, ensure correct licensing and water authority approval.	Consulted as part of **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore**.
The Groundwater (Water Framework Directive) (Wales) Directions 2016 (HMSO, 2016). This document sets out instructions to the Environment Agency on obligations to protect groundwater (water found below the surface). It updates requirements including the monitoring and setting of thresholds for pollutants in groundwater, adding new pollutants to the list of pollutants to be monitored and changing the information to be reported to the European Commission.	Consulted as part of Good Practice measures described in **Section 10.8.2.**
Control of Pollution (Oil Storage) (Wales) Regulations 2016 (HMSO, 2016). These regulations outline recommended 'best practice' measures that go beyond the requirements of the legislation.	Consulted as part of Good Practice measures described in **Section 10.8.2.**
Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (HMSO, 2017). These regulations represent a culmination in European Union (EU) water resource protection. It establishes a legislative framework for the protection of surface waters (including rivers, lakes, transitional waters and coastal waters) and groundwater throughout the EU. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.	Consulted as part of **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore.**
Private Water Supplies (Wales) regulation 2017 (HMSO 2017). The regulations aim to ensure that water from Private Water Supplies (PWS) are wholesome, so that people who drink water or consume food or drinks made from PWS may do so without risk to their health.	Consulted as part of Good Practice measures described in **Section 10.8.2 and Section 10.9 Assessment of Environmental**

Summary of Legislation	How and where it is considered in the chapter
	Effects to ensure no identified PWS are polluted.
Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (HMSO, 2015). The Water Framework Directive 2000/60/EC is an EU directive which commits European Union member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015.	Consulted as part **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore.**
Environmental Permitting (England and Wales) Regulations 2016 (HMSO, 2016). The 2016 Regulations set out an environmental permitting and compliance regime that applies to various activities and industries e.g. for those activities which have the potential to cause harm to human health or the environment.	Consulted as part of the Secondary Consents in **Section 10.8.2.**
Groundwater (England and Wales) Regulations 2009 (HMSO, 2009). These regulations implement the protection of groundwater against pollution and deterioration.	Consulted as part of Good Practice measures described in **Section 10.8.2**
Flood Risk Regulations 2009 (HMSO, 2009). These Regulations transpose Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks for England and Wales.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**
Environmental Damage (Prevention and Remediation (Wales)) Regulations 2009 (HMSO, 2009). These Regulations implement Directive 2004/35/EC of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage. They apply to damage to protected species, natural habitats, sites of special scientific interest, water and land.	Consulted as part of Good Practice measures described in **Section 10.8.2**
Water Resources (Abstraction and Impounding) Regulation 2005 (HMSO, 2005). These Regulations contain provisions relating to the licensing of abstraction and impounding of water in England and Wales in the light of amendments made by the Water Act 2003 to the Water Resources Act 1991 ('the Act').	Consulted as part of the Secondary Consents in **Section 10.8.2.**
Control of Substances Hazardous to Health Regulations 2002 (as amended) (HMSO, 2002). These Regulations re-enact, with modifications, the Control of Substances Hazardous to Health Regulations 1999. The 1999 Regulations imposed duties on employers to protect employees and other persons who may be exposed to substances hazardous to health and also imposed certain duties on employees concerning their own protection from such exposure, and prohibited the import into the UK of	Consulted as part of Good Practice measures described in **Section 10.8.2**

Summary of Legislation	How and where it is considered in the chapter
certain substances and articles from outside the European Economic Area.	

10.2.2. National Planning Policy

11. National Policy Statements (NPS) on Energy have been designated by the UK government to guide decision making on Nationally Significant Infrastructure Projects (NSIPs) consented under the Planning Act 2008. Given that the NPSs only applies to offshore wind projects that exceed 350 MW in capacity, they would not directly guide decision making on the proposed Project. However, because they were written to guide decision making on offshore wind projects, they are considered relevant as material considerations. The National Planning Policy that is applicable to the assessment of the Terrestrial Water Environment is detailed in **Table 10-2**. Overarching or general policy has been included in **Chapter 02: Regulatory and Planning Policy Context** and is therefore not presented in **Table 10-2**.

Table 10-2. A summary of national planning policy relevant to the terrestrial water environment

Summary of policy	How and where it is considered in the chapter
Future Wales: The National Plan (2040). Future Wales – the National Plan 2040 (Welsh Government, 2021) is Wales's national development framework. Published in February 2021 it sets the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of communities. It includes policies on flooding (Policy 8) and resilient ecological networks and green infrastructure (Policy 9).	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**
The National Strategy for Flood and Coastal Erosion Risk Management in Wales (2020). The National Strategy for Flood and Coastal Erosion Risk Management in Wales (Welsh Government, 2020) sets out how the Welsh Government intends to manage the risks from flooding and coastal erosion across Wales. It sets objectives and measures for all partners to work towards over the next 10 years. The strategy aims to a) improve understanding and communication of risk; b) build preparedness and resilience to flooding; c) prioritise investment to the most at risk communities; d) prevent more people from becoming exposed to risk; and e) provide an effective and sustained response to events.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**
Planning Policy Wales – Edition 12 (2024). Planning Policy Wales (Welsh Government, 2024) sets out the land use policies of the Welsh Government and is supplemented by a series of Technical Advice Notes (TANs). Planning Policy Wales states that planning authorities should adopt a precautionary approach of positive avoidance of development in areas of flooding. It states that development should reduce, and must not increase, flood risk arising from the river and/or coastal flooding on	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**

Summary of policy	How and where it is considered in the chapter
and off the development site itself. The priority should be to protect the undeveloped or unobstructed floodplain from development and to prevent the cumulative effects of incremental development.	
TAN 15: Development and Flood Risk (2004). TAN15 Development and Flood Risk 2004 (Welsh Government, 2004) provides guidance which supplements the policy set out in Planning Policy Wales in relation to development and flooding. A precautionary framework is set out which advises caution in respect of new development in areas at high risk of flooding and this is used as a guide for planning decisions. The overall aim of the precautionary framework is to direct new development away from those areas that have a high risk of flooding; and development will only be justified in these areas if it meets the criteria and tests specified in this guidance. To note, an update to TAN15 is due to occur on 1st June 2023 to ensure the planning systems plays a full part in adaptation to climate change.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**

10.2.3. Regional Planning Policy

12. The Regional Planning Policy that is applicable to the assessment of the Terrestrial Water Environment is detailed in **Table 10-3**. Overarching or general policy has been included in **Chapter 02: Regulatory and Planning Policy Context** and is therefore not presented in **Table 10-3**.

Table 10-3. A summary of regional planning policy relevant to the terrestrial water environment.

Summary of policy	How and where it is considered in the chapter
Western Wales River Basin District Management Plan (RBMP). (Natural Resources Wales, 2022). At a regional level, and under the Water Framework Directive (WFD), water management is coordinated through 10 RBMPs across Wales and England. RBMPs are prepared by Natural Resources Wales and the Environment Agency for six-year cycles and set out how organisations, stakeholders and communities will work together to improve the water environment. The most recent plans were published in 2021 (cycle 3) and will remain in place until 2027. The water bodies within the Study Area fall under the Western Wales RBMP 2021 – 2027.	Consulted as part of **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore.**

10.2.4. Local Planning Policy

13. The Regional Planning Policy that is applicable to the assessment of the Terrestrial Water Environment is detailed in **Table 10-4**. Overarching or general policy has been included in **Chapter 02: Regulatory and Planning Policy Context** and is therefore not presented in **Table 10-4**.

Table 10-4. A summary of local planning policy relevant to the terrestrial water environment

Summary of policy	How and where it is considered in the chapter
Pembrokeshire County Council Local Development Plan 2013 (Pembrokeshire County Council, 2013). This plan was adopted in 2013 with an end date of 2021. The Authority is working on a replacement Local Development Plan (LPD). Under the Local Development Plan Review, it was identified that there is a delay to the LPD 2 and specific dates for adoption have not yet been identified. This is following new evidence from the Joint Nature Conservation Committee about the damaging effects of phosphates to water ecosystems and species which has implications on the location and sites which can be included as allocations in LDP 2. The new guidance has implications for the way in which any proposed development within a Riverine SAC is assessed under the Habitats Regulations. The Authority will not be able to know which sites can be retained in the Plan until further information is received and additional research is undertaken. It was originally anticipated that this plan would be adopted in 2022 and will run until 2033.	Consulted as part of the Terrestrial Water Environment impact assessment and to inform the development of the design of the proposed Project and suitable mitigation measures
South West Wales Stage 1 Strategic Flood Consequence Assessment (SFCA) (South West Wales Local Authorities, 2022). This SFCA was published in 2022 and commissioned by a group of six Local planning Authorities, including PCC and Pembrokeshire Coast National Park Authority. The SFCA states that in Pembrokeshire, fluvial flood extents are fairly refined, generally remaining within close proximity to watercourses. Surface water flooding is predicted to predominantly follow topographic flow paths of existing watercourses or dry valleys in rural parts of Wales. In the south of Pembrokeshire, (south of Hill Mountain), groundwater is predominantly between 0.025 m and 5 m below ground level.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**
Pembrokeshire County Council Preliminary Flood Risk Report 2011 (Pembrokeshire County Council, 2011). PCC is the designated Lead Local Flood Authority (LLFA) and produced a Preliminary Flood Risk Report (PFRR) in 2011 which provides an assessment of past and future flood risks. The PFRR was reviewed in 2017 and agreed with NRW with no changes to the PFRR. The key points extracted from this PFRR are: - The Study Area is not recorded as having any historic surface water flooding incidents; - The Study Area has one historic sewer flooding incident recorded, however this was not located along the onshore cable route or at the Substation Search Areas; and - The proposed Project is not listed within an area experiencing significant harmful consequences from a flood event where 10 or more residential properties or 3 or more commercial properties flooded.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**

Summary of policy	How and where it is considered in the chapter
Pembrokeshire County Council Local Flood Risk Management Strategy 2015 (Pembrokeshire County Council, 2015). The Strategy addresses flood risk arising from surface water, groundwater and ordinary watercourses. There are five local objectives stated in the LFRMS: a) Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion. b) Raising awareness of and engaging people in the response to flood and coastal erosion risk. c) Providing effective and sustained response to flood and coastal erosion events. d) Prioritising investment in the most at risk communities. e) Establishing effective routine maintenance regimes.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**
Lavernock Point to St. Ann's Head Shoreline Management Plan SMP2 2012 (Halcrow, 2012). This SMP provides a provides a large-scale assessment of the risks associated with coastal erosion and flooding at the coast. It also presents policies to help manage these risks to people and to the developed, historic and natural environment in a sustainable manner. SMPs form an important part of the Welsh Assembly Government (WAG) strategy for managing risks due to flooding and coastal erosion.	Consulted as part of the FCA in **Appendix 10A: Flood Consequence Assessment.**

10.2.5. Guidance

14. The Guidance that is applicable to the assessment of the Terrestrial Water Environment is detailed in **Table 10-5**. Overarching or general guidance has been included in **Chapter 02: Regulatory and Planning Policy Context** and is therefore not presented in **Table 10-5**.

Table 10-5. A summary of guidance relevant to the terrestrial water environment.

Summary of Guidance	How and where it is considered in the chapter
Sustainable Drainage Statutory Guidance 2019 (Welsh Government, 2019) which Local Authorities must have regard to in relation to their SuDS Approval Board (SAB) function as required under Schedule 3 of the Flood and Water Management Act 2010 (HMSO, 2010). The guidance states that for every new development, it is expected that SABs seek an overall reduction in, or significant attenuation of, surface water volumes reaching public sewers and combined systems in a sustainable way.	Consulted as part of **Appendix 10A - Annex 10A: Drainage Strategy.**
The UK Government's 25 Year Environment Plan (25YEP) (His Majesty's Government, 2018). The plan covers the provision of clean air and water; protection	Consulted as part of the Terrestrial Water Environment impact assessment and to inform the

Summary of Guidance	How and where it is considered in the chapter
and enhancement of habitats, wildlife, and biosecurity; reducing the risk from environmental hazards and mitigating and adapting to climate change; using resources more sustainable and efficiently, minimising waste and managing exposure to chemicals; enhancing beauty, heritage and engagement with the natural environment. The plan includes specific goals to achieve good environmental status in our seas, reduce the environmental impact of water abstraction, meet the objectives of River Basin Management Plans under the WFD, reduce leakage from water mains, improve the quality of bathing waters, restore protected freshwater sites to a favourable condition, and do more to protect communities and businesses from the impact of flooding, coastal erosion and drought. At the heart of the Plan's delivery is the natural capital approach with the aspiring goal of a net gain in biodiversity from new development.	development of the design of the proposed Project and suitable mitigation measures.
The UK Government Environmental Improvement Plan (His Majesty's Government, 2023). The Environmental Improvement Plan (EIP) 2023 for England is the first revision of the 25YEP. It builds on the 25YEP vision with a new plan setting out how the government will work with landowners, communities and businesses to deliver each of the goals for improving the environment, matched with interim targets to measure progress. These actions have the goal to restore nature, reduce environmental pollution, and increase the prosperity of our country.	Consulted as part of the Terrestrial Water Environment impact assessment and to inform the development of the design of the proposed Project and suitable mitigation measures.
Defra's Plan for Water: our integrated plan for delivering clean and plentiful water (Defra, 2023). This plan by Defra aims to deliver clean and plentiful water – a healthy water environment, and a sustainable supply of water for people, businesses and nature. It is a plan built around a catchment approach to managing the water system to improve water quality and deliver a resilient water supply.	This Plan applies mainly to England, but some policies concern the performance of water companies which operate in catchment areas that include parts of Wales. Some policies may apply in parts of Wales as a result. Therefore, this strategic policy has been considered as part of the Terrestrial Water Environment impact assessment and to inform the development of the design of the proposed Project and suitable mitigation measures.
Design Manual for Roads and Bridges (DMRB) LA113 Road Drainage and the Water Environment (Highways England, 2020)	The significance of effects for the Terrestrial Water Environment have been determined using the principles of the guidance and criteria set out in

Summary of Guidance	How and where it is considered in the chapter
	DMRB LA113 (Highways England, 2020).
DMRB LA104 Environmental Assessment and Monitoring (Highways England, 2020)	The significance of effects for the Terrestrial Water Environment have been determined using the principles of the guidance and criteria set out in DMRB LA104 (Highways England, 2020).
Guidance for Pollution Prevention (GPP) (Netregs Website).	Consulted as part of **Section 10.8.2: Good Practice.**
British Standards Institute (2009) BS6031:2009 Code of Practice for Earth Works (British Standards, 2009)	Consulted as part of **Section 10.8.2: Good Practice.**
British Standards Institute (2013) BS8582 Code of Practice for Surface Water Management of Development Sites (British Standards Institute, 2013)	Consulted as part of **Section 10.8.2: Good Practice.**
C753 (2015) The SuDS Manual (second edition) (CIRIA, 2015);	Consulted as part of **Section 10.8.2: Good Practice.**
C811 (2023) Environmental good practice on site guide (fifth edition) (CIRIA, 2023)	Consulted as part of **Section 10.8.2: Good Practice.**
C649 (2006) Control of water pollution from linear construction projects, technical guidance (CIRIA, 2006)	Consulted as part of **Section 10.8.2: Good Practice.**
C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors (CIRIA, 2001)	Consulted as part of **Section 10.8.2: Good Practice.**

10.3 Stakeholder Engagement and Consultation

15. Consultation with statutory and non-statutory organisations is a key element of the EIA process. Consultation with regards to the Terrestrial Water Environment has been undertaken to inform the approach to, and scope of, the assessment.

16. Stakeholders for the proposed Project fiinclude statutory consultees, landowners, local communities and other sea users. In addition to the statutory consultation process, there has been ongoing engagement with statutory and non-statutory consultees to steer the development of the proposed Project and this is detailed in **Table 10-6**. Specifically, **Table 10-6** summarises AECOM's response to the NRW Scoping Opinion responses and queries which were discussed during a virtual meeting on 28th March 2023.

10.3.1. Summary of Stakeholder Consultations

Table 10-6. Summary of the key issues raised by consultees and how each issue was addressed

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
Scoping			
NRW	Email - Water Feature Survey (May 2023)	On the 5th May 2023, NRW commented via email that the applicant must undertake a water feature survey, which should include the following: Identification of all water features both surface and groundwater (ponds, springs, ditches, culverts etc.) within a 300 metres radius of the site or either side of a linear development area, e.g., cabling route; Use made of any of these water features. This should include the construction details of wells and boreholes and details of the lithology into which they are installed; An indication of the flow regime in the spring or surface water feature, for example whether or not the water feature flows throughout the year or dries up during summer months; Accessibility to the spring/well; This information should be identified on a suitably scaled map (i.e. 1:10,000), tabulated and submitted to NRW. It would be useful for the applicant to photograph each of the identified water features during the survey.	On 12th May 2023, AECOM responded with a proposed assessment approach consisting of: "*Identification of water features through desk based study, considering water features within a study area of 1 km from the Onshore Development Area and further where there is hydrological connectivity to downstream receptors.* *Determine potential for impact to water features through a source-pathway-receptor approach. Any features identified that could be impacted are given further consideration.* *Undertake targeted site work to all potentially impacted watercourses e.g. all that might be crossed by the cable route. All features will be photographed and hydromorphological condition recorded along with flow condition at the time of survey. Additional features such as springs would only be surveyed if a pathway is confirmed by the desk study (rather than visiting all features within 300 m of the cable route when they would not all be impacted).* *An Onshore Water Environment Site Survey Report will be produced as a technical appendix to the ES (including photographs) and included in* ***Appendix 10B: Onshore Water Environment***

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
		Based on the results of the survey the applicant must assess the likely impacts from the proposed Project on both quantity and quality of the surface water and groundwater. This should take into consideration both the preferred methods of construction and the assumed hydrogeology in the vicinity of the proposed Project.	***Site Survey Report.*** *Water features will also be mapped on figures that accompany the ES.* *To support the assessment a Private Water Supply data request has been made to Pembrokeshire Council, and a request for groundwater abstraction information to NRW. This will be supplemented by other available information, e.g. Erebus PWS survey data. These will also be considered through the source-pathway-receptor approach, with further site visits to any of these features only undertaken if a pathway to impact is identified*". NRW confirmed on 16th May 2023 that they accepted the proposed assessment approach. The results of the walkover survey are outlined in **Appendix 10B: Onshore Water Environment Site Survey Report** and have been used to inform this assessment.
NRW	EIA Scoping Opinion – WFD (July 2022)	In relation to Section 4.4.1.3, whilst at this stage we recognise it is not possible to determine its suitability, we advise that HDD is the preferred option for cable laying in the nearshore and intertidal area and where the cable makes landfall; HDD is the most benign option in terms of its potential effects in this environment.	Noted. Refer **to Section 10.8.1** for further detail of the HDD approach.

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
NRW	EIA Scoping Report- WFD (July 2022)	No scoping information specific to WFD has been provided. There are also gaps in what has been provided for other topic areas, where there are synergies with WFD elements. We advise that all potential impact pathways identified as part of the EIA process are transposed into the WFD Assessment, where relevant. Clarity is sought on how WFD will be structured within the wider EIA. It is currently unclear how information will be transposed from relevant chapters of the Environmental Statement, and within chapters of the ES, where there is a pathway for effect between receptors.	A WFD assessment has been undertaken incorporating all aspects of the assessment that impact on the various WFD quality elements, this is provided in **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore.** The WFD assessment is phased to include screening, scoping, and detailed assessment, where required. Full details of the methodology are described within the WFD assessment, includes physical processes, hydromorphology, freshwater ecology, and water quality.
NRW	EIA Scoping Report- WFD (July 2022)	Clarity is sought with respect to how the WFD Assessment will be provided as part of the wider EIA package. Section 5.4.3 states that 'A standalone WFD Assessment will be prepared and included as an appendix to the ES' however, this information is omitted from the proposed structure of the ES, presented in Section 6.1. Furthermore, WFD is discussed within Chapter 19, 'Physical Environment' however it is not within Chapters 20 or 21, where there are synergies between topic areas and WFD, which are 'Benthic Ecology' and 'Fish and Shellfish', respectively. Currently, the structure of the chapters appears to be confused.	The onshore WFD will be an appendix to the water environment chapter as presented in **Appendix 10C: WFD Assessment Onshore.** It will sit in the volume of the ES that contains all appendices, and will appropriately cross reference to relevant ES chapters, figures and appendices as necessary.

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
NRW	EIA Scoping Report- WFD (July 2022)	In relation to **Table 19.2 in the Scoping Report,** there appears to be some confusion in terms of how WFD is assessed, based on the information presented in the table. In terms of the WFD Compliance Assessment, while the WFD assessment will draw upon assessments carried out as part of the wider EIA, we advise that any impact assessment will need to be made at the water body scale and will need to consider the potential effects of the project on the WFD status and objectives, at an element level. NRW (A) advise that in considering WFD assessments, the applicant refers to the guidance that has previously been provided on assessing compliance with WFD and has an awareness of derogations under Regulation 19 of the Water Regulations.	A staged WFD (screening, scoping, assessment) has been undertaken drawing on surveys (offshore and onshore) undertaken to inform the EIA. It is a standalone assessment, considering potential for deterioration or prevention of future improvement of all WFD elements for each water body. Regulation 19 derogations are considered, but not deemed necessary for the proposed Project. This is presented in **Appendix 10C: WFD Assessment Onshore.**
NRW	EIA Scoping Report- WFD (July 2022)	The Zone of Influence must be defined based on robust evidence and any Water Framework Directive (WFD) water bodies where there are (a) direct effects (e.g., host the export cable corridor) or (b) there is a pathway for effect (e.g., biotic, or migratory routes), these must be adequately considered within the WFD Assessment.	The Zone of Influence (ZOI) considers all water bodies and designated ecological sites (where water dependent) within 1 km of the Onshore Development Area. A greater distance has been considered where there is hydrological connectivity, for example Milford Haven Outer and Pembrokeshire South water bodies are considered the final downstream receptors that could reasonably be impacted by the construction and operation of the proposed Project's Onshore Development Area.

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
NRW	EIA Scoping Report- WFD (July 2022)	Clarity is sought on what WFD water bodies are proposed for inclusion within the WFD Assessment as currently, there are inconsistencies between chapters. Section 19.4.11 of the Scoping Report states that the proposed Project would interact with two water bodies - Milford Haven Outer and Pembrokeshire South. However, both Milford Haven Inner and Outer water bodies are referred to in the Water Environment chapter. We advise that is necessary to include Milford Haven Inner water body within the marine environment chapter, in addition to Milford Haven Outer and Pembrokeshire South, as there are potential pathways for effect to this water body.	The WFD water bodies considered within **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore** assessments are the Milford Haven Outer transitional water body, Milford Haven Inner transitional water body, Pembrokeshire South coastal water body, Castlemartin Corse – headwaters to tidal limit water body, and Pembrokeshire Carboniferous Limestone groundwater body.
NRW	EIA Scoping Report- WFD (July 2022)	Section 10.2.3.1 of the Scoping Report states that the most recent River Basin Management Plans (RBMPs) were produced for Cycle 2 in 2015. This is no longer correct – the most recent classification data available are the Cycle 3 2021 classifications, which were published and made publicly available in December 2021. The WFD Compliance Assessment must utilise this information as this is the most recent and relevant to use.	Cycle 3 classifications are included in this chapter and within **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore.**
NRW	EIA Scoping Report- WFD (July 2022)	All non-reportable water bodies will need to be considered within the WFD Compliance Assessment, regardless of scale, if there is a	All water bodies in the ZoI are considered by the assessment, whether or not they are reportable reaches.

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
		pathway for effect. Section 10.7.6, suggests that they will not. In terms of mitigation, the proper process for consideration of mitigation in the context of the WFD, is to scope any potential effects into the detailed assessment stage and then consider mitigation, once the impacts have been adequately defined.	Proposed WFD assessment approach is phased (screening, scoping, assessment), following best practice, with the methodology outlined within **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore.**
NRW	EIA Scoping Report- Flood Risk (July 2022)	We have reviewed the Flood Consequences Assessment (FCA) available in section 10.7.7 of the Scoping Report. The FCA is reliant on the final agreed design of the project, which we understand at this point is still in the process of being finalised. Our comments as such are limited at present, until a completed site-specific FCA is available. The criteria, which should normally be undertaken by a suitably qualified person carrying an appropriate professional indemnity, are given in Section 7 and Appendix 1 of TAN15. The FCA should be proportionate to the development proposed. The applicant may also refer to our Building in flood risk areas on the website, which contains technical advice and recommendations.	A detailed FCA and Drainage Strategy has been produced to assess the flood risk to and from the proposed Project during construction, operation, and decommissioning. This has considered the requirements of TAN15 (2004) until the formal adoption of the updated TAN15. The 25-year design life means that any future impacts of climate change will be assessed for total potential change anticipated for 2050s. The FCA is presented in **Appendix 10A: Flood Consequence Assessment** and the Drainage Strategy is presented in **Appendix 10A - Annex 10A: Drainage Strategy.**
NRW	EIA Scoping Report- Flood Risk Activity Permit (July 2022)	The scoping report has identified the need for a Flood Risk Activity Permit (FRAP), but this is again reliant on final designs and location. Until the final design/location has	Although the Onshore Export Cable Corridor (OnECC) is partly located within the Castlemartin Corse catchment, Castlemartin Corse (the only designated Main River within

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
		been chosen, NRW (A) cannot comment further, and as such, advise a FCA which includes but not limited to the information set out above is required.	the Study Area) passes approximately 0.8 - 1.0 km south of OnECC - As such a FRAP is not expected to be required though Ordinary Watercourse Consent will be applied for from the Pembrokeshire County Council. There are no formal flood defences identified on the NRW Flood Risk Assessment Wales Map however, Policy Scenario Area 18 of the Lavernock Point to St Ann's Head SMP2 highlights that West Angle Bay has a defended frontage.
NRW	EIA Scoping Report- Landfall (July 2022)	Sections 4.3.1, 19.3 and 20.2 of the Scoping Report set out the potential Landfall options, currently including West Angle Bay, Angle Bay and Freshwater West Beach. We advise the applicant engages early with NRW to discuss the export cable route and Landfall options so that we can provide advice to minimise the environmental impacts as far as possible.	The Landfall is assessed within this chapter in terms of potential impacts from the Onshore Development Area of the proposed Project.
NRW	EIA Scoping Report- Decommissioning (July 2022)	The project lifespan is predicted to be 25 years and the scoping report sets out that decommissioning options will be considered when the project is nearing the end of its operational life. We advise that all potential decommissioning options remain, including complete removal of all infrastructure associated with the project, at this point in time, when it is not possible to define the	Decommissioning will be considered by the assessment with the worst-case scenario assessed.

Consultee	Consultation type and date	Comment raised	How and where issue has been addressed
		environmental effects of decommissioning with confidence.	
NRW	Data Request, 2021-2024.	Data request for water environment information including water quality, aquatic ecology, and groundwater level data. The original data request was undertaken in 2021, and updated in February 2024.	Data provided has been summarised in **Section 10.5 Baseline.**
NRW	Meeting (28-03-23) with regards to water environment and WFD.	A meeting was held with NRW to outline the project elements as they were at that point in time (March 2023) and to discuss the outcomes of the Scoping Opinion. Issues discussed included the Water Features Survey, WFD assessment approach, Landfall options (as they were in March 2023), relevant WFD waterbodies, dealing with non-reportable waterbodies and flood risk.	NRW advice has been incorporated into the assessment within this chapter and the onshore and offshore WFD assessments as appropriate **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore.**
Pembrokeshire County Council	PWS Request, 2021.	Details of registered PWS were requested the local authority. The original data request was undertaken in 2021, and updated in February 2024.	Data provided has been summarised in **Section 10.5 Baseline.**

10.4 Approach to Assessment

10.4.1. Assessment Methodology

17. **Chapter 05: EIA Approach and Methodology** provides a summary of the general impact assessment methodology applied in this ES. The following sections provide further detail on the specific methodology used to assess the potential impacts on the Terrestrial Water Environment.

18. The approach to the assessment of cumulative impacts, interrelated effects and transboundary impacts is provided in **Sections 10.13, 10.14 and 10.15** respectively.

19. The approach to assessing the impacts on the Terrestrial Water Environment differs from that provided in **Chapter 05: EIA Approach and Methodology** and details of the approach are provided in the following sections.

20. The significance of potential effects has been evaluated using a systematic approach together with the expert judgement of the specialist consultant. The systematic approach is based upon the identification of the importance/value of receptors and their sensitivity to the proposed Project together with the predicted magnitude of the potential impact.

10.4.2. Source Pathway Receptor Approach

21. The qualitative assessment of potential likely significant effects during the construction and operational phases of the proposed Project has been based on a source-pathway-receptor approach. For an impact on the Terrestrial Water Environment to exist, the following is required:

- An impact **source** or cause of effect (such as a structure over a watercourse, the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a water body, cuttings/excavations and associated dewatering activities capable of causing temporary or permanent changes to groundwater level or flow pattern and quality (as in the case of groundwater));
- A **receptor** that is sensitive to that impact (i.e. water bodies and the services they support) that could potentially be affected;
- A **pathway** by which the two are linked; and
- All three elements must be present before a potential impact linkage can be realised.

22. The first stage in applying the source-pathway-receptor approach to the assessment was to identify the causes or sources of potential impact from the proposed Project. The sources were identified through a review of the details of the proposed Project, including the size and nature of the development, potential construction methodologies and timescales.

23. The next step in the approach was to undertake a review of the potential receptors; that is, the Terrestrial Water Environment receptors themselves that have the potential to be affected. Water bodies, including their attributes, have been identified through the desk study, and have been surveyed through a site visit as part of the assessment.

24. Consideration has also been given to the activities associated with the future operational maintenance and management of the proposed Project, and whether these have the potential to result in significant effects on the water environment.

10.4.3. Significance Criteria

25. The evaluation of the significance of an effect is important; it is the significance that determines the resources that should be deployed in avoiding or mitigating a significant adverse effect, or conversely, the actual value of a beneficial effect.

26. The significance of effects for the Terrestrial Water Environment have been determined using the principles of the guidance and criteria set out in the Design Manual for Roads and Bridges (DMRB) LA113 Road Drainage and the Water Environment (Highways England, 2020) and DMRB LA104 Environmental Assessment and Monitoring (Highways England, 2020). Although these assessment criteria were developed for road infrastructure projects, this method is suitable for use on any development project. It provides a robust and well tested method for predicting the significance of effects. The criteria that have been used to determine receptors importance is presented in **Table 10-7.**

27. Whilst other disciplines may consider 'receptor sensitivity', 'receptor importance' is considered here in line with DMRB LA113 Road Drainage and the Water Environment (Highways England, 2020). This is because when considering the Terrestrial Water Environment, the availability of dilution means that there can be a difference in the sensitivity and importance of a water body. For example, a small drainage ditch of low conservation value and biodiversity with limited other socio-economic attributes, is very sensitive to impacts, whereas an important regional scale watercourse, that may have conservation interest of international and national significance and support a wider range of important socio-economic uses, is less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all controlled waters in Wales are protected by law from being polluted.

28. In accordance with the stages of the methodology, there are three stages to the assessment of effects on the water environment, which are as follows:

- A level of importance (low to very high) is assigned to the water resource receptor based on a combination of attributes (such as the size of the watercourses, WFD designation, water supply and other uses, biodiversity, and recreation etc.) and on receptors to flood risk based on the vulnerability of the land use to flooding. This is based on the criteria listed in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004);
- The magnitude of potential and residual impact (classed as negligible, minor, moderate or major adverse / beneficial) is determined based on the criteria listed in **Table 10-8** and the assessor's professional judgement. The likelihood of an effect occurring is based on a scale of certain, likely or unlikely. Likelihood has been considered in the case of water quality and resources only, as likelihood is inherently included within **Appendix 10A: Flood Consequence Assessment**; and
- A comparison of the importance of the receptor and magnitude of the impact (for both potential and residual impacts) results in an assessment of the overall significance of the effect on the receptor using the matrix presented in **Table 10-9**. The significance of each identified effect (both potential and residual) is classed as very large, large, moderate, slight or neutral and either beneficial or adverse significance. Effects of moderate and above are considered significant.

Importance of Receptor

29. The sensitivity of receptors, or importance, of the potentially affected water environment features will be established on the basis of a four-point scale, using the criteria presented in

Table 10-7 which has been adopted from DMRB LA 113 (Highways England, 2020) to account for hydromorphology.

Table 10-7. Sensitivity (importance) of receptors

Importance[1]	Type of Receptor			
	Groundwater	Surface Water	Morphology[2]	Flood Risk[3]
Very High	Principal aquifer providing a regionally important resource and/or supporting a site protected under international and UK legislation Ecology and Nature Conservation. Groundwater locally supports GWDTE Source Protection Zone (SPZ) 1.	Watercourse having a WFD classification shown in a RBMP and Q95 > 1.0 m^3/s. Site protected/designated under international and UK legislation.	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river type	Emergency Services
High	Principal aquifer providing locally important resource or supporting river ecosystem. Groundwater supports a GWDTE. SPZ2.	Watercourse having a WFD classification shown in a RBMP and Q95 m^3/s <1.0 m^3/s. Species protected under international or UK legislation.	Conforms closely to natural, unaltered state and will often exhibit well-developed and diverse geomorphic forms and processes characteristic of river type, with abundant bank side vegetation. Deviates from natural conditions due to direct and/or indirect channel, floodplain, and/or catchment development pressures	Highly Vulnerable Development
Medium	Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3.	WFD not having a WFD classification shown in a RBMP and Q95 >0.001 m^3/s.	Shows signs of previous alteration and / or minor flow regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category	Less vulnerable development
Low	Unproductive strata	Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001 m^3/s.	Substantially modified by past land use, previous engineering works or flow regulation and likely to possess an artificial cross-section (for example trapezoidal) and will probably be deficient in bedforms and bankside vegetation. Could be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches would fall into this category.	Water compatible development[4]

[1]Professional judgement is applied when assigning an importance category to all water features. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and future WFD targets also need to be considered.

[2]Based on the water body 'Reach Conservation Status' presently being adopted for HS2 (and developed originally by Atkins) and developed from the Environment Agency conservation status guidance. DMRB LA113 provides advice on hydromorphological assessment but not criteria for determining hydromorphological importance.

[3]Emergency Services, Highly Vulnerable Development and Less vulnerable Development are defined in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004)

[4]Water Compatible Development are required in a fluvial, tidal or coastal location by virtue of their nature. For further details see TAN15 Development and Flood Risk 2004 (Welsh Government, 2004).

Magnitude of Impact

30. The magnitude of impact on the water environment will be established using the seven-point scale outlined in **Table 10-8**. These impacts take into consideration the extent that the proposed Project will directly or indirectly affect the identified water receptors.

Table 10-8. Magnitude of impacts

Impact	Criteria
Major (Adverse)	Results in a loss of attribute and/or quality and integrity of the attribute
Moderate (Adverse)	Results in effect on integrity of attribute, or loss of part of attribute
Minor (Adverse)	Results in some measurable change in attribute's quality or vulnerability
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity
Minor (Beneficial)	Results in some beneficial impact on attribute or a reduced risk of negative effect occurring
Moderate (Beneficial)	Results in moderate improvement of attribute quality
Major (Beneficial)	Results in major improvement of attribute quality
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

31. In addition to being adverse or beneficial, impacts have also been classified as direct or indirect, temporary or permanent, likely or unlikely, and whether they are short-term, medium-term or long-term. Generally, short-term is considered to be up to 0 - 5 years, medium-term is considered to be between 5 and 15 years and long-term is considered to be greater than 15 years.

Classification and Significance of Effect

32. The approach to deriving the effects significance from receptor value and magnitude of impacts will be based on the significance matrix set out in the DMRB LA 104 (Highways England, 2020) and reproduced in **Table 10-9**. The matrix combines receptor importance (**Table 10-7**) with magnitude of impact (**Table 10-8**). Where the significance of effect is represented by two descriptors in **Table 10-9** (for example large/ very large), professional judgement based on knowledge and experience of similar schemes will be used to determine which of the significance descriptors applies to the effect being assessed. Effects classed as moderate or greater are considered significant in EIA terms (i.e. shaded cells).

Table 10-9. Significance of effects

Magnitude of Impact	Environmental Value - Importance				
	Very High	High	Medium	Low	Negligible
Major	Very large	Large / very large	Moderate / large	Slight / moderate	Slight
Moderate	Large / very large	Moderate / large	Moderate	Slight	Neutral / slight
Minor	Moderate or large	Slight / moderate	Slight	Neutral / slight	Neutral / slight
Negligible	Slight	Slight	Neutral / slight	Neutral/ slight	Neutral
No Change	Neutral	Neutral	Neutral	Neutral	Neutral

10.4.4. Onshore Water Environment Site Survey

33. A combined water quality and hydromorphology walkover survey of watercourses within the grid connection route corridor that could be physically impacted by the proposed Project was undertaken on 22nd and 23rd August 2023 which focussed on the potential crossing points at specific locations that were considered to be representative of the reach within the OnECC plus upstream and downstream character of watercourses to determine hydromorphological baseline. The results of the survey are outlined in **Appendix 10B: Onshore Water Environment Site Survey Report** and have been used to inform this assessment.

10.4.5. Drainage Strategy

34. **Appendix 10A - Annex 10A: Drainage Strategy** has been developed by AECOM for the Onshore Substation as part of the proposed Project. This report assesses the increase in surface water runoff in accordance with sustainable drainage principles from the Onshore Substation in order to not increase flood risk to any downstream area and ensure no deterioration of the water environment. The Drainage Strategy has been used to inform the assessment of surface water runoff for the operational phase, as outlined in **Paragraph 10.4.17**.

10.4.6. Flood Consequence Assessment

35. A Flood Consequence Assessment (FCA) has been prepared for the proposed Project and is contained within **Appendix 10A: Flood Consequence Assessment**. The purpose of this assessment is to review the current and future flood risk to the proposed Project from all sources (including surface water, groundwater and fluvial sources), in-keeping with the Planning Policy Wales and TAN 15 guidance, to inform the proposed Project design and set out any proposed mitigation requirements that are to be addressed within the Drainage Strategy.

10.4.7. Hydromorphological Assessment

36. Potential hydromorphological impacts have been qualitatively appraised based through both a desk study and the Onshore Water Environment Site Survey, as well as a review of the proposed Project components that may affect the physical form of water bodies. Details of this are included in **Appendix 10B: Onshore Water Environment Site Survey Report**.

37. Consideration has been given to how the proposed Project is likely to impact upon the WFD objectives for the relevant watercourses within **Appendix 10C: WFD Assessment Onshore.** Effects are described according to the method for determining effect significance in **Section 10.4.3**.

10.4.8. Water Framework Directive Assessment

38. Proposed schemes that have the potential to impact on current or predicted WFD status are required to assess their compliance against the objectives defined for potentially affected water bodies. As part of its role, the Environment Agency must consider whether proposals for new developments have the potential to:

- Cause a deterioration of a water body from its current status or potential; and/or
- Prevent future attainment of Good status (or potential where not already achieved).

39. Although the following guidance notes are not directly applicable to Wales, they provide the best practice guidance for undertaking WFD assessments and have therefore been used to inform the assessment:

- Environment Agency Advice Note - Water Framework Directive Risk Assessment: How to assess the risk of your activity (Environment Agency, 2016); and
- The Planning Inspectorate Advice Note 18: The Water Framework Directive (National Infrastructure Planning, 2017).

40. The WFD assessment has been undertaken in three stages. The first stage is 'screening', the aim of which is to identify the Project components that could affect WFD status and 'screen out' aspects of the project that do not require any further consideration. The second stage is 'scoping', whereby WFD receptors that are potentially at risk are identified and it is determined how the risk will be assessed. Finally, and if required, stage 3 involves a full impact assessment. It should be noted that this staged process is separate to the EIA screening, scoping and assessment process. Refer to **Appendix 10C: WFD Assessment Onshore (Volume 6)** for further details.

10.4.9. Assessment of Surface Water Runoff for the Operational Phase

41. During operation, surface water runoff from the Onshore Substation may contain pollutants derived from impermeable surfaces (e.g. inert particulates, litter, hydrocarbons, metals, nutrients and de-icing salts). This mixture of pollutants is collectively known as 'urban diffuse pollutants,' and although each pollutant may itself not be present in harmful concentrations, the combined effects over the long term can cause chronic adverse impacts. Changes in impermeable surfaced area within the Onshore Development Area from the Onshore Substation may lead to increases in the rate and quantities of these pollutants being runoff to receiving watercourses. An assessment is therefore needed to determine the potential risk to the receiving water bodies and to inform the development of suitable treatment measures.

42. The appropriateness of the surface water drainage measures in terms of providing adequate treatment of diffuse pollutants has been assessed with reference to the Simple Index Approach (SIA) Assessment method described in The SuDS Manual (CIRIA, 2015) as stated by The SuDS Statutory Guidance (Welsh Government, 2019). The Simple Index Approach follows three steps:

- Step 1 – Determine suitable pollution hazard indices for the land use(s);

- Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index (for three key types of pollutants - total suspended solids, heavy metals and hydrocarbons). Only 50% efficiency should be applied to second, third etc. treatment train components; and
- Step 3 – If the discharge is to a water body protected for drinking water, consider a more precautionary approach.

43. The C753 The SuDS Manual (CIRIA, 2015) provides details on the potential for pollution from total suspended solids, dissolved metals, and hydrocarbon from a number of land uses. These are totalled to provide a pollution hazard index number for each potential pollutant.

44. This is then compared with the addition of the SuDS components mitigation indices. The drainage strategy should aim for the total SuDS mitigation index to be greater than the Pollution Hazard Index.

10.4.10. Study Area

45. The Study Area for the assessment of the Terrestrial Water Environment has been defined as a 1 km buffer around the Onshore Development Area within which all hydrological and hydrogeological receptors that may be directly impacted can be identified. The Study Area is presented in **Volume 5: Figure 10.1: Onshore Water Environment Study Area.** Given that all watercourses in the 1 km study area discharge to coastal waterbodies (Pembrokeshire South, Milford Haven Inner and Milford Haven Outer WFD water bodies) which are also within 1 km of the proposed Project, these are considered the furthest downstream water bodies that could conceivably be impacted.

46. The Onshore Development Area extends to the Mean Low Water Springs[1] and includes the footprint of the Onshore Infrastructure and associated temporary works, comprised of the OnECC and the Onshore Substation, and including new access routes and visibility splays, that form the onshore boundary for the planning application. This is shown on **Volume 5: Figure 10.1: Onshore Water Environment Study Area** and for assessment beyond the Mean Low Water Springs[2], refer to **Chapter 18: Marine Water and Sediment Quality.** The assessment herein considers potential effects on offshore water receptors in so far as they could be impacted by onshore activities, such as runoff of sediment or pollutants from construction works. Potential effects to offshore water receptors that will be derived from activities in the marine environment are considered in **Chapter 18: Marine Water and Sediment Quality**.

10.4.11. Data Sources

Site Specific Surveys

47. To provide site specific information on which to base the impact assessment for the Terrestrial Water Environment, site specific surveys were conducted.

48. A combined water quality and hydromorphology walkover survey of watercourses within the grid connection route corridor that could be physically impacted was undertaken on 22nd

[1] The Study Area for the assessment of effects on marine water and sediment quality as described in **Chapter 18: Marine Water and Sediment Quality** has been defined on the basis of the extent of one spring tidal excursion limit, and it extends to Mean High Water Springs. Therefore, the overlap between this and MLWS ensures all receptors are assessed for impact.

[2] Mean low water springs (MLWS) is the average of the water levels of each pair of successive low waters during that period of about 24 hours in each semi-lunation (approximately every 14 days), when the tidal range is greatest (spring range).

August 2023 and 23rd August 2023 which focussed on all crossing points plus upstream and downstream character of watercourses to determine hydromorphological baseline. The results of this survey are presented in **Appendix 10B: Onshore Water Environment Site Survey Report** and have been used to inform this assessment.

Desk Study

49. A comprehensive desk-based review was undertaken to inform the baseline for the Terrestrial Water Environment. Key data sources used to inform the assessment are set out in **Table 10-10.**

Table 10-10. Summary of key desktop sources

Title	Source	Year	Author
Project Erebus Environmental Statement	Online Report	2021	Blue Gem Wind
Geology Viewer	Website	2021	British Geological Survey
Ordnance Survey layer on Bing Maps	Website	2024	Bing Maps
Geoindex Onshore	Website	2020	British Geological Survey
Soilscapes	Website	n.d.	Cranfield Environment Centre and Cranfield University
Multi Agency Geographical Information for the Countryside (MAGIC)	Website	2024	Department for Environment, Food and Rural Affairs (Defra)
UK Centre for Ecology and Hydrology (UKCEH) 2023, Flood Estimation Handbook Web Service.	Website	2023	UKCEH
Google Maps	Website	2024	Google
Lavernock Point to St Ann's Head SMP2. Appendix I: Water Framework Directive of the South Wales Shoreline Management Plan	Online Report	2012	Halcrow Group limited
Greenlink Marine Environmental Statement – Wales	Online Report	2019	Intertek EWCS
UK Climate Averages	Website	2020	Met Office
Flood Risk Assessment Maps	Website	2024	NRW
Watch Water Wales	Website	2024	NRW
Data Map Wales	Website	2024	Welsh Government
Marine Energy Test Area (META) Environmental Impact Assessment Scoping Report	Report	2018	RPS Energy Ltd

Title	Source	Year	Author
Pembrokeshire Demonstration Zone Feasibility Study Environmental Scoping Report	Report	2018	Wave Hub Ltd
Cleddau and Pembrokeshire Coastal Rivers Management Catchment Summary 2016	Online Report	2016	NRW
Data requests for water quality, invertebrate data, macrophyte data, pollution incidents, environmental quality standards (EQSs), WFD investigation reports, active discharge consents and any other relevant information	Data Request	2022	NRW
Request for information on Private Water Supplies	Data Request	2022 (Original) and 2024 (Updated).	Pembrokeshire County Council

10.5 Baseline

50. The following sections describe the baseline environment relating to the Terrestrial Water Environment Study Area as defined in **Section 10.4.10** and identifies the sensitive receptors and their individual importance.

10.5.1. Existing Baseline

Topography, Climate and Land use

51. The Study Area for the proposed Project is located west of Pembroke and east of the Angle Peninsula. It stretches between Pembroke Power Station in the east and Freshwater West to the west. Milford Haven estuary is located to the north, see **Volume 5: Figure 10.2: Surface Water Features and their Attributes.**

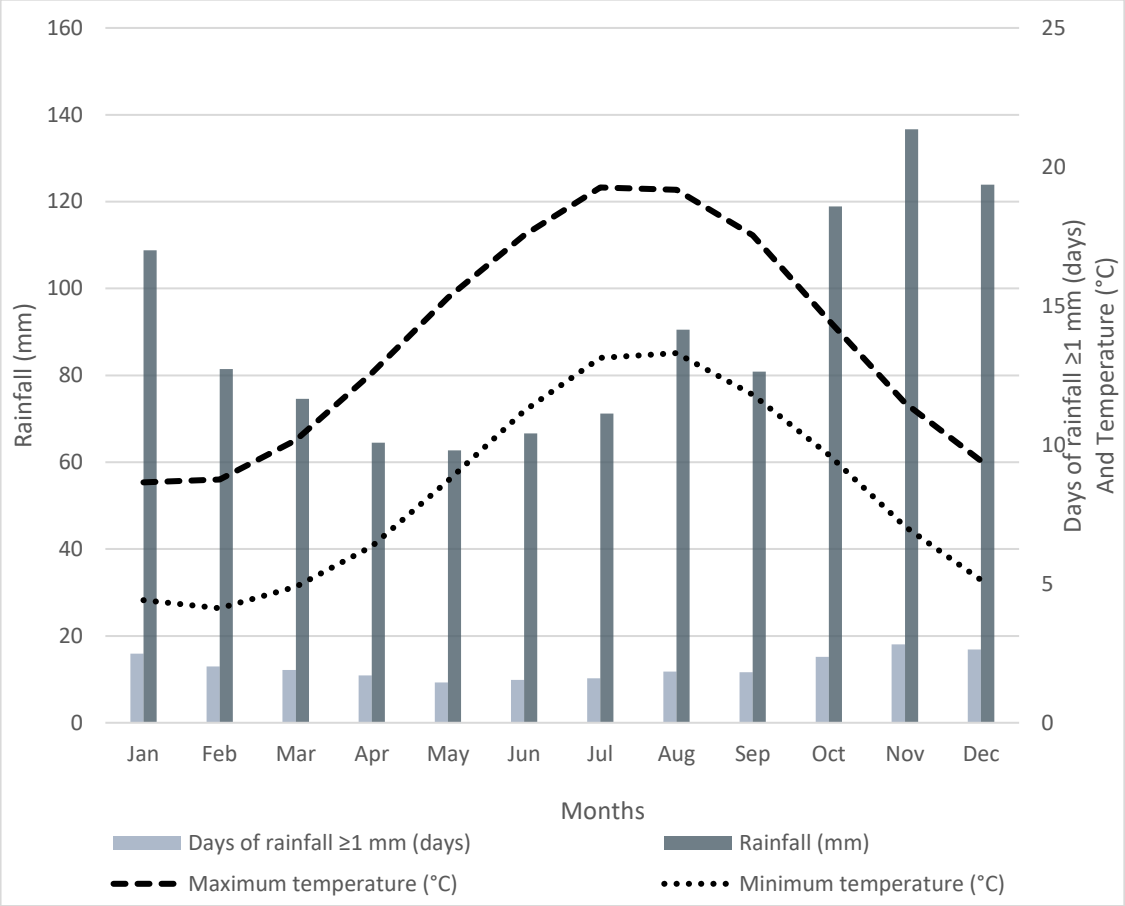
52. Ordnance Survey mapping and topographic mapping websites (Bing maps, 2024 and Topographic-Map, 2024) indicates that the topography of the inland areas is undulating with steep slopes in places, particularly along the coastline. The high point is approximately 72 m above ordnance datum (AOD) at Wallaston Cross to the south of Pembroke Power Station. Southwest of here, the land slopes slightly, but is at elevations of up to 60 m AOD at Hoplass Solar Farm before falling away to the south and southwest. Towards the B4320 (Angle Road), the elevation increases again, particularly at Kilpaison Burrows, with elevations up to 72 m AOD. The land generally slopes away from these points towards the coast to the north, west and southwest.

53. Land use across the Study Area is predominantly a mixture of arable and pastoral agriculture, with a small covering of solar panels at Hoplass Solar Farm. However, the north and northwest of the Study Area includes heavy industry with the presence of Pembroke Power Station; a small section of the Study Area to the north includes the Valero Pembroke Oil Refinery. There are small patches of woodland across the area, with significant expanses of sand dunes at Freshwater West, and the coastline includes numerous bays, beaches, small inlets and rocky escarpments.

54. The nearest weather station with average climate data on the Met Office website is at Milford Haven Conservancy Board (Met Office, 2020). Average rainfall is summarised in **Graph 10-1**.

55. Annual average rainfall at Milford Haven for the period 1991-2020 was 1080 mm per year, which is around the average for the UK, with it raining on an average of 155 days per year. Most rainfall falls between October and January with May tending to be the driest month of the year.

56. Air temperatures were highest from June to August for the period 1991 – 2020, with the highest average temperature recorded in July of 19.26°C. On average, the coldest temperatures were found to be in February, with a minimum air temperature average of 4.12 °C.



Graph 10-1 Milford Haven Conservancy Board Annual Monthly Rainfall, Days of rainfall ≥1 mm, Minimum and Maximum Air Temperatures (°C) (1991-2020) (Met Office, 2020).

Geology, Hydrogeology and Soils

57. The onshore geology in the Study Area shows the outcropping of rock strata trending northwest- south east, with Ordovician, Silurian and Devonian age rocks in the south of the Study Area and Carboniferous rocks in the north. Carboniferous rocks are younger than Devonian, and the outcropping on a landscape scale of these within the centre of the Devonian illustrates a structural fold of the rocks, with the axis of the fold being approximately located from West Angle Bay to Angle and onto Pembroke and beyond to the east (BGS, 2021 and BGS, 2020). The geology of the area is shown on **Volume 5: Figure 10.3a: Bedrock Geology and Figure 10.3b: Superficial Geology.**

58. The BGS Geoindex website indicates that the underlying bedrock at Landfall in the west comprises outcropping Ludlow Rocks consisting of Sandstone, and Aber Mawr Shale Formation consisting of Mudstone (BGS, 2020). Immediately to the north, the Onshore Project Boundary is underlain by the Milford Haven Group which comprises calcareous marls and sandstone. The Onshore Project Boundary to the northeast and the Study Area consists a series of thin bands of outcropping Ridgeway Conglomerate Formation, Skrinkle Sandstone Formation, the Avon Group consisting of limestone and mudstone, Black Rock Subgroup and Gully Oolite Formation consisting of limestone. Further to the east, around Pembroke, the Pembrokeshire Limestone Formation is present although is not within the Study Area.

59. The Milford Haven Group, consisting of calcareous marls and sandstone, forms the centre of the structural fold, before the sequence is repeated along the southern limb of the fold and southern part of the peninsula.

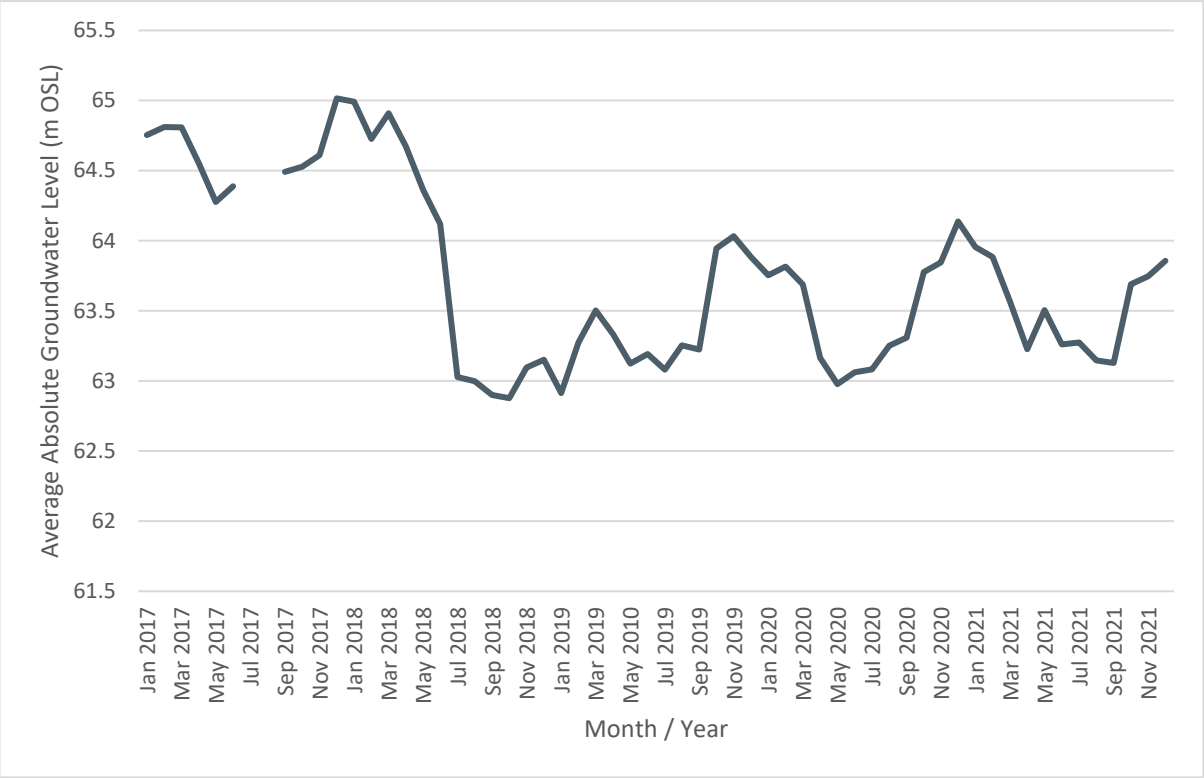
60. Large areas of the Study Area have no superficial deposits cover. However, there are extensive patches of Marine Beach Deposit (sand) at the coast to the west, Blown Sand (sand) northeast of Freshwater West, and Alluvium (clay, silt, sand and gravel) around watercourses (particularly around the Castlemartin Corse watercourse) all of which are classified as Secondary A aquifers. There are Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) northeast of Pembroke Power Station. These are classified as Secondary A aquifers. There are some Tidal Flat Deposits (sand, silt and clay) in the Pembroke River Estuary, extending out into Milford Haven however these are classified as Secondary (undifferentiated) aquifers.

61. The Cranfield University Soilscapes website (Cranfield University, n.d.) indicates that the natural, undisturbed soils in the Study Area should be generally a mix of freely draining slightly acid loamy soils and freely draining slightly acid but base-rich soils. South of the B4320 Angle Road, there are two thin bands extending into the Study Area consisting of loamy and clayey floodplain soils with naturally high groundwater and slowly permeable seasonally wet acid loamy and clayey soils. There are sand dune soils at the Landfall, to the northeast of Freshwater West.

62. Defra's MAGIC map (Defra, 2023) indicates that the bedrock within the Study Area is largely classified as a Secondary A aquifer, which corresponds with the Carboniferous limestone and Devonian sandstone formations. The Ludlow Rocks and Aber Mawr Shale are classified as a Secondary B aquifer. The Black Rock Subgroup and Gully Oolite Formation and the Pembrokeshire Limestone are classified as a Principal Aquifer; these extend slightly into the Study Area at the northwest corner, but do not make up a significant proportion of the bedrock geology. These Carboniferous limestones are described as '*a massive, well-fissured karstic limestone that gives large water supplies of up to 175 l/sec from resurgences in the Mendips and South Wales, and borehole yields of up to 40 l/sec from the upper parts of the aquifer*' (BGS, 2021).

63. Where superficial deposits are present, these are classified as a Secondary A aquifer, except for the Tidal Flat Deposits which are classified as a Secondary undifferentiated aquifer.

64. A NRW groundwater monitoring station, as shown in **Volume 5: Figure 10.6: Groundwater Features and Their Attributes**, is located approximately 1.5 km outside of the Onshore Development Area, to the south, in the townland of Warren. Groundwater levels, recorded here between 2017 and 2021, were provided to this study. the monthly groundwater level average is shown in **Graph 10-2**.



Graph 10-2 Average groundwater level from 2017 to 2021. (Natural Resources Wales, 2021)

Surface Water Features

Pembroke River

65. Pembroke River is a short waterway, Rising at Hogeston Hill, near Manorbier Newton. The Main River (Welsh Government, 2023) meanders through Lamphey and flows past Pembroke Castle to its confluence with Milford Haven Waterway at Pennar Mouth. Pembroke River is not within the Onshore Development Area but is within the Study Area and is downstream of Goldborough Pill and other unnamed watercourses (Refer to **Section 10.5.1: Ordinary Watercourses**), and therefore is identified as a receptor.

Castlemartin Corse

66. Castlemartin Corse enters the Study Area at NGR SR 91598 99319. It is approximately 9.5 km in length and rises at St Petrox (5.9 km southeast of the Study Area) from a series of springs. It flows in a westerly direction past Chapel Hill, Axton Hill and then in between Castlemartin (B4319) and Newton (B4320) to discharge to the sea at Freshwater West (NGR SR 88532 99720). Castlemartin Corse is located immediately south of the Onshore Development Area with approximately 3.3 km of the reach being within the Study Area. Despite this, the watercourse does not cross the Onshore Project Boundary and is located to the south of the Landfall and OnECC, thus avoiding any direct crossing of Castlemartin Corse. However, the wider WFD catchment will interact with the Onshore Development Area.

67. The Castlemartin Corse watercourse and a small tributary immediately south of it are classified by Natural Resources Wales (NRW) as a Main River **Volume 5: Figure 10.2: Surface Water Features and Their Attributes** where flood risk is managed by NRW (Welsh Government, 2023). It is also surrounded by expansive wetlands and has numerous unnamed small watercourses draining into it, especially within the area between the B4320 and the B4319 (here, Castlemartin Corse is labelled as Brownslade Lake on MAGIC [Defra, 2023], and Ordnance Survey mapping [OS, 2023]). These tributaries join perpendicular to the

watercourse from the steep valley side, therefore are likely to be high energy streams and a source of sediment to the watercourse. The tributaries to the north of Castlemartin Corse have been labelled 'WC16 – WC20' on **Volume 5: Figure 10.3: Identified Ordinary Watercourses.** The tributaries to the south of Castlemartin Corse, including the designated Main River reach have been labelled as 'Southern Tributaries of Castlemartin Corse' on **Volume 5: Figure 10.3: Identified Ordinary Watercourses.**

68. The watercourse drains a catchment of approximately 17.8 km^2 at its mouth (Wallingford HydroSolutions, 2023). Land use within the catchment is predominantly improved grassland, with some areas of arable land and woodland. Land use adjacent to the watercourse is similar to that within the wider catchment.

69. There are no physical or intrusive works proposed on or in proximity to Castlemartin Corse, therefore it is scoped out of further assessment for morphology impacts. There is also no potential impact pathway to Castlemartin Corse for water quality impacts. Despite the catchment for Castlemartin Corse extending into the OnECC as seen in **Volume 5: Figure 10.2: Surface Water Features and their Attributes,** and the topography of the land falling away from the OnECC towards the channel, the main channel is 350 m south of the OnECC and is separated by hummocky grass covered sand dunes. These mounds and depressions combined with the permeability of the land and distance from the OnECC is considered to provide no impact pathway for water quality impacts to Castlemartin Corse through any uncontrolled site run-off during construction.

Goldborough Pill East

70. Goldborough Pill East is an Ordinary Watercourse as shown on **Volume 5: Figure 10.3: Identified Ordinary Watercourses** rises outside the Study Area to the south east at Light a Pipe Farm (NGR SR 94563 99952) and flows in a northerly direction into the Study Area (approximately 0.27 km to the south of Goldborough Road) to meet the Pembroke River Estuary. Goldborough Pill East has a tributary flowing from Angle Penninsula New Primary School (NGR SM 95690 00315). From the source until its discharge into the Pembroke River Estuary, it flows though woodland and is in close proximity to improved grassland, with some areas of arable and pastoral land.

71. The catchment of Goldborough Pill East (UKCEH, 2023) drains approximately 1.9 km^2 at its mouth, and does interact with the Study Area however it is unlikely to be hydrological pathway from the OnECC to Goldborough Pill East due to being separated from the OnECC by the catchment of Goldborough Pill West. Thus, Goldborough Pill East is not assessed further.

Goldborough Pill West

72. Goldborough Pill West is an Ordinary Watercourse as shown on **Volume 5: Figure 10.3: Identified Ordinary Watercourses** rises north of the B4320 at Sommerton (NGR SM 92951 00033). It flows in a north easterly direction to meet the Pembroke River Estuary. From the source until its discharge into the Pembroke River Estuary, it flows though woodland and is in close proximity to improved grassland, with some areas of arable and pastoral land. Numerous unnamed tributaries join this branch perpendicular to the watercourse from the steep valley side. These are likely to be high energy streams and a source of sediment to the watercourse. The western branch of Goldborough Pill drains a catchment of approximately 2 km^2**.**

73. Goldborough Pill West and its tributaries are located within the Study Area, with two of its tributaries (and a portion of its catchment) located within the OnECC (UKCEH, 2023), therefore

there is a hydrological pathway between the Onshore Development Area and Goldborough Pill West.

Ordinary Watercourses

74. There are also springs throughout the Study Area, which give rise to the numerous unnamed small ordinary watercourses which drain to the coast around Angle Bay, Freshwater West and the Pembroke River Estuary. These have been identified and labelled on **Volume 5: Figure 10.3: Identified Ordinary Watercourses** whereby the 'main channel' is depicted by 'WC' and its tributaries depicted by 'T'; the ordinary watercourses located within the Study Area are summarised in **Table 10-11**.

Table 10-11 Summary of ordinary watercourses within the Study Area and whether they are scoped in or out of further assessment.

Surface Water Feature Label on Volume 5: Figure 10.3: Identified Ordinary Watercourses	Crossed by the Onshore Export Cable[3] (Y/N)	Scoped in or out
Goldborough Pill East	N	**Scoped out:** Unlikely to be hydrological pathway from the OnECC to Goldborough Pill East due to being separated from the OnECC by the catchment of Goldborough Pill West.
Goldborough Pill West	Y	**Scoped in:** Two of its tributaries (and a portion of its catchment) located within the OnECC (UKCEH, 2023), therefore there is a hydrological pathway between the Onshore Development Area and Goldborough Pill West.
WC01	N	**Scoped out:** Watercourse located > 0.9 km to the north west of the OnECC, and no hydrological pathway identified.
WC02	N	**Scoped out:** Watercourse located < 0.6 km to the north west of the OnECC, with no direct hydrological pathway, and the B4320 separates WC02 from the proposed Project, and would act as a barrier to overland flow.
WC03	N	**Scoped out:** Watercourse located < 0.3 km to the north of the OnECC, with no direct hydrological pathway, and the B4320 separates WC03 from the proposed Project, and would act as a barrier to overland flow.
WC04	N	**Scoped In:** Watercourse located < 0.2 km to the north of Landfall and < 0.1 km north of the OnECC. The topography of land falls away from the OnECC (high point being Angle Road, B4320) towards Angle Bay, therefore impacts may be conveyed via surface water runoff or indirectly via any existing road drainage. WC04 also supports a licenced abstraction - A3 on **Volume 5: Figure 10.6: Water Resource Information**
WC05	Y	**Scoped In:** Watercourse crossed by OnECC, therefore there is a direct

[3] Where a watercourse is located within the OnECC it has been assumed it will be crossed by the Onshore Export Cable as a reasonable worst case scenario approach.

Surface Water Feature Label on Volume 5: Figure 10.3: Identified Ordinary Watercourses	Crossed by the Onshore Export Cable[3] (Y/N)	Scoped in or out
T05a	Y	hydrological pathway between the Onshore Development Area and WC05.
WC06	Y	**Scoped In:** Watercourse crossed by the OnECC, therefore there is a direct hydrological pathway between the Onshore Development Area and WC06.
WC07	Y	**Scoped In:** Watercourse and tributaries (except T07a) are crossed by the OnECC therefore there is a direct hydrological pathway. WC07 and T07a also supports licenced abstractions - A12 and A13 on **Volume 5: Figure 10.6: Water Resource Information**
T07a	Y	
T07b	Y	
T07c	Y	
T07d	N	**Scoped out:** Tributary not crossed by the OnECC and any impacts to WC07 should not propagate upstream into the tributary. No direct hydrological pathway identified.
WC08	N	**Scoped out:** Watercourse and its catchment do not interact with the Onshore Substation.
T08a	N	**Scoped out:** These tributaries do not cross the OnECC, and any impacts to WC08 should not propagate upstream into the tributaries. No direct hydrological pathway identified.
T08b	N	
T08c	N	
T08d	N	
WC09	N	**Scoped out:** Watercourse catchment does not interact with the OnECC (UKCEH, 2023) therefore no hydrological pathway identified, either directly or through surface water runoff due to ground topography.
WC10	N	**Scoped out:** Watercourse catchment does not interact with the OnECC (UKCEH, 2023) therefore no hydrological pathway identified, either directly or through surface water runoff due to ground topography.
WC11	N	**Scoped out:** Watercourses do not interact with the OnECC therefore there is no direct or indirect hydrological pathway. An unnamed road leading to Lambeeth Farm also separates the OnECC from WC11 and T11a, therefore would act as a barrier to overland flow.
T11a	N	
WC12	Y	**Scoped in:** Watercourse located within OnECC therefore there is potential for direct impacts from the Onshore Export Cable.
T12a	Y	

Surface Water Feature Label on Volume 5: Figure 10.3: Identified Ordinary Watercourses	Crossed by the Onshore Export Cable[3] (Y/N)	Scoped in or out
WC13	N	**Scoped out:** Watercourse located upstream of the OnECC therefore no hydrological pathway identified.
WC14	Y	**Scoped in:** Watercourse located within OnECC and will be crossed by the Onshore Export Cable. Potential for direct impacts.
WC15	N	**Scoped out:** Land north of Angle Road (B4320) falls away to the north, thus any impacts from the OnECC (located north of Angle Road) will propagate northwards. These tributaries of Castlemartin Corse are located to the south of Angle Road (and south of the OnECC) therefore there is no hydrological pathway for either direct impacts, or indirect impacts through surface water runoff due to ground topography. Castlemartin Corse is equally scoped out, due to no hydrological pathway for water quality impacts, and no physical works to take place on or near the channel; therefore there is no impact pathway to the main channel or its tributaries.
WC16	N	
WC17	N	
WC18	N	
WC19	N	
WC20	N	
WC21	N	**Scoped out:** These watercourses are scoped out due to no hydrological pathways for impacts due to these watercourses being at a higher topography than the Landfall works at Freshwater West, and no potential for overland flow from the OnECC due to ground topography.
WC22	N	
WC23	N	**Scoped out:** Watercourse scoped out due to distance from OnECC and Landfall (> 0.9 km).
Southern Tributaries of Castlemartin Corse	N	**Scoped out:** Any tributaries south of the main Castlemartin Corse have been scoped out due to Castlemartin Corse being the receptor to impacts. Impacts should not propagate upstream to these tributaries.

Angle Bay

75. Angle Bay is partly located within the Study Area, to the north west, and is the receiving bay for Ordinary Watercourses WC01 – WC08 (see **Volume 5: Figure 10.3: Identified Ordinary Watercourses**. When the tide is out, Angle Bay is a mud and sand wilderness, providing a breeding ground for invertebrates and thus supporting wildlife such as waders, divers, and wildfowl.

Freshwater West

76. Freshwater West is a wide, sandy, south-westerly facing beach with an extensive system of sand dunes, located in the west of the Onshore Development Boundary and Study Area. The Landfall is located at the northern (sandy) end of the beach; there's a rocky reef at the southern end. Castlemartin Corse flows into Freshwater West, at NGR SR 88534 99714. Numerous bays to the north encompass ordinary watercourses, including WC21-WC23 within

the Study Area. Freshwater west is scoped out of morphology impacts due to the Landfall installation methodology of HDD, no morphology impacts are anticipated and are therefore not considered further. Freshwater West remains scoped in for surface water (water quality) impacts.

Milford Haven Waterway / Dyfrffordd Aberdaugleddau

77. Milford Haven Waterway is a natural harbour, and one of the deepest natural harbours in the world. It is located in north of the Study Area (between Rhoscrowther and Milford Haven), and is partly located within the Study Area in the northeast, adjacent to the Pennar Mouth (where the Pembroke River discharges into the waterway). Much of the coastline of the waterway is designated as a Site of Special Scientific Interest (SSSI), listed as Milford Haven Waterway SSSI.

Ponds and Still Waters (e.g., reservoirs)

78. There are numerous ponds located in the Study Area, the majority of which are online with, or adjacent to the ordinary watercourses identified above, while others are associated with topographic depressions (Defra, 2023). Those that are online watercourses are likely to be former impoundments rather than natural ponds. **Table 10-12** summarises the ponds identified within the Study Area and whether these are considered further in the assessment; the ponds are also shown on **Volume 5: Figure 10.2: Surface Water Features and Their Attributes**.

Table 10-12. Ponds identified in the Study Area

Pond label on Volume 5: Figure 10.2	Associated licenced abstractions. See Volume 5: Figure 10.6.	Identified Ordinary Watercourse which the pond is online with (Figure 10.3)	Scoped in or out
P1	None	None	**Scoped out:** Pond located > 0.9 km to the north west of the OnECC, and no hydrological pathway identified.
P2	A2	WC03	**Scoped out:** WC03 located < 0.3 km to the north of the OnECC, with no direct hydrological pathway, and the B4320 separates WC03 from the proposed Project, and would act as a barrier to overland flow.
P3	None		
P4	None		
P5	None	WC04	**Scoped In:** Pond online with WC04 and located < 0.3 km to the north of Landfall and < 0.1 km north of the OnECC. The topography of land falls away from the OnECC (high point being Angle Road, B4320) towards Angle Bay, therefore impacts may be conveyed via surface water runoff.
P6	A4	WC05	**Scoped In:** Ponds online with WC05 which is crossed by the OnECC therefore there is a direct hydrological pathway. Supports licenced abstractions.
P7	A5		
P8	A6 (immediately downstream of pond)		

Pond label on Volume 5: Figure 10.2	Associated licenced abstractions. See Volume 5: Figure 10.6.	Identified Ordinary Watercourse which the pond is online with (Figure 10.3)	Scoped in or out
P9	A7, A8	WC06	**Scoped In:** Pond located north of the OnECC and online with WC06 which is crossed by the OnECC and has associated licenced abstractions.
P10	None		**Scoped In:** Pond online with WC06 and downstream of WC06 which is crossed by the OnECC, therefore there is a direct hydrological pathway between the Onshore Development Area and P10. No associated licenced abstractions.
P11	A9, A10	T07c	**Scoped in:** Ponds online with T07c which is crossed by the OnECC therefore there is a direct hydrological pathway. P11 and P12 supports licenced abstractions.
P12	A11		
P13	None	Not Known	**Scoped in:** Scoped in as a precautionary measure, as it is unknown whether P13 is online with T07c (which is crossed by the OnECC therefore there is a potential direct hydrological pathway). No associated licenced abstractions.
P14	None	T07b	**Scoped in:** Pond online with T07b which is crossed by the OnECC therefore there is a direct hydrological pathway. No associated licenced abstractions.
P15	None	T07a	**Scoped in:** Pond online with T07a which is crossed by the OnECC therefore there is a direct hydrological pathway. No associated licenced abstractions.
P16	A16	WC08	**Scoped out:** WC08 and its catchment do not interact with the OnECC / Onshore Substation therefore no impact pathway identified.
P17	None		
P18	A14, A15	WC07	**Scoped In:** Ponds online with WC07 which is crossed by the OnECC therefore there is a direct hydrological pathway. Supports licenced abstractions.
P19	A17, A18		
P20	None	WC14 / WC07	**Scoped In:** Pond downstream of WC14 which will be crossed by the Onshore Export Cable. Potential for direct impacts. No associated licenced abstractions.
P21	A19, A20	WC09	**Scoped Out:** P21 is online with WC09 whereby the catchment does not interact with the OnECC (UKCEH, 2023) therefore no hydrological pathway identified, either directly or through surface water runoff due to ground topography.

Pond label on Volume 5: Figure 10.2	Associated licenced abstractions. See Volume 5: Figure 10.6.	Identified Ordinary Watercourse which the pond is online with (Figure 10.3)	Scoped in or out
P22	None	WC10	**Scoped Out:** P22 is online with WC10 whereby the catchment does not interact with the OnECC (UKCEH, 2023) therefore no hydrological pathway identified, either directly or through surface water runoff due to ground topography.
P23	A21, A22	T11a	**Scoped out:** T11a and its catchment does not interact with the OnECC therefore there is no direct or indirect hydrological pathway. An unnamed road leading to Lambeeth Farm also separates the OnECC from WC11 and T11a, therefore would act as a barrier to overland flow.
P24	None	None	**Scoped out:** P24 and P25 located > 0.9 km from the OnECC and not within any catchments of scoped in watercourses.
P25	None	WC13	
P26	None	WC11/T11a	**Scoped out:** WC11/T11a and its catchment does not interact with the OnECC therefore there is no direct or indirect hydrological pathway. An unnamed road leading to Lambeeth Farm also separates the OnECC from WC11 and T11a, therefore would act as a barrier to overland flow.
P27	A24	Goldborough Pill West	**Scoped out:** P27 is located east of Goldborough Pill West which would act as a buffer for any potential impacts. Supports licenced abstractions.
P28	None	Goldborough Pill West	**Scoped out:** Located < 0.5 km south of the OnECC, online with a tributary of Goldborough Pill West however it is located upstream of the tributary of Goldborough Pill West which is crossed by the OnECC, therefore there is no impact pathway.
P29	None	WC15	**Scoped out:** Land north of Angle Road (B4320) falls away to the north, thus any impacts from the OnECC (located north of Angle Road) will propagate northwards. P29 and P30 are located to the south of Angle Road (and south of the OnECC) therefore there is no hydrological pathway for either direct impacts, or indirect impacts through surface water runoff due to ground topography.
P30	None		
P31	None	None	**Scoped out:** Pond located 0.45 km south of the OnECC and separated from the OnECC by hummocky grass covered sand dunes. These mounds and

Pond label on Volume 5: Figure 10.2	Associated licenced abstractions. See Volume 5: Figure 10.6.	Identified Ordinary Watercourse which the pond is online with (Figure 10.3)	Scoped in or out
			depressions combined with the permeability of the land and distance from the OnECC is considered to provide no impact pathway for water quality impacts. *P31 is located within an SSSI, SAC and SPA however the ponds is not the reason for their respective designations.*
P32	None	None	**Scoped in:** P32 is located mostly within the OnECC near Kilpaison Burrows therefore could potentially be crossed by the Onshore Export Cable. *P32 is located within an SSSI, SAC and SPA however the ponds is not the reason for their respective designations.*
P33	A1	WC22	**Scoped out:** P33 is located upstream on WC22, and it is unlikely for impacts from Landfall to propagate upstream.

79. There are small reservoirs in the Study Area at Green Hill (Green Hill Reservoir, NGR SM 92572 01470, approximately 9,400 m^2 in area) and immediately south of the Pembroke Power Station (NGR SM 92848 02088, approximately 3,000 m^2 in area). There are numerous other artificial water features associated with the oil refinery site but this is north of the Study Area. It is not anticipated that the reservoirs or drains near the oil refinery will be impacted by the proposed Project, due to being outside the OnECC and are therefore not considered any further.

Water Bodies and WFD Status.

Coastal Water Bodies

80. The Study Area will interact with two WFD coastal water bodies (NRW, 2021). The WFD coastal water bodies are described fully within **Appendix 10C: WFD Assessment Onshore** and **Appendix 10D: WFD Assessment Offshore** but are also included here given that the Study Area for the Onshore Development Area extends to Mean Low Water Springs and therefore includes the margins of the WFD coastal water bodies which could be crossed by the Onshore Export Cable. Furthermore, they are hydrologically connected to inland watercourses within the Study Area, see **Volume 5: Figure 10.2: Surface Water Features and their Attributes**.

81. The coastal water bodies are firstly the Milford Haven Outer WFD water body (WFD ID: GB641008220000) which spans Milford Haven from Penna Mouth to St Anne's Head. This water body is at Moderate Overall Status, with Moderate Ecological Status and Moderate Chemical Status under the Cycle 3 (2021) classifications. The water body is failing to achieve good status because of high concentrations of dissolved oxygen (Natural Resources Wales, 2021).

82. Beyond Milford Haven Outer is the Pembrokeshire South WFD coastal water body (WFD ID: GB611008590003). This water body spans the coastline from St David's Head to the north, extending south and east to Manorbier Bay. This water body is at Good Overall Status, Good

Ecological Status and Good Chemical Status (Natural Resources Wales, 2021). Pembrokeshire South WFD coastal water body is scoped out of morphology impacts due to the Landfall installation methodology of HDD, no morphology impacts are anticipated and are therefore not considered further. Pembrokeshire South WFD coastal water body remains scoped in for surface water (water quality) impacts.

83. Further details on coastal processes (including tidal information, water levels, waves, and geomorphology) as well as water quality data for the coastal WFD water bodies is provided in **Chapter 21: Physical Environment** and **Chapter 18 Marine Water Quality and Sediment Quality.**

Transitional Water Bodies

84. The WFD transitional water body is the Milford Haven Inner water body (WFD ID: GB531006114100). This is considered within this chapter given that it is within the Study Area and there may be potential for impacts from the proposed Project. The Milford Haven Inner transitional water body incorporates the Western Cleddau and Eastern Cleddau rivers south of their tidal limits at Haverfordwest and Canaston Bridge, respectively. The designation extends downstream to the mouth of the Pembroke River (Pennar Mouth) where the water body becomes the Milford Haven Outer WFD coastal water body. The Milford Haven Inner WFD water body is at Moderate Overall Status with Moderate Ecological and Chemical Status (Natural Resources Wales, 2023).

River Water Bodies

85. Castlemartin Corse (from NGR SR 94694 98117 to the point of discharge at Freshwater West) is WFD designated. Castlemartin Corse – headwaters to Tidal Limit WFD river water body (WFD ID: GB110061025000), and is classified as Moderate Overall Status, and heavily modified. The Moderate Status is due to a Moderate macrophyte and phytobenthos classification, and a Bad dissolved oxygen classification (Natural Resources Wales, 2021).

Groundwater Bodies

86. The entire Study Area is underlain by the 'Pembrokeshire Carboniferous Limestone' groundwater body (GB41002G206000). The Cycle 3 data indicates this water body is at Good Status with Good Quantitative and Chemical Status (Natural Resources Wales, 2021).

Surface Water Quality

87. There is a limited number of freshwater sampling locations available on the NRW Water Quality Archive. The following stations have been identified within the Study Area **(see Volume 5: Figure 10.2: Surface Water Features and heir Attributes)**:

- Castlemartin Corse River (Station S83627), Status: Closed.
- Freshwater West Stream at B4319 (Station S86237), Status: Open

88. Outside of the Study Area, there are no freshwater sampling locations upstream of Castlemartin Corse, or on any of the other identified surface water features (Welsh Government, 2023).

89. **Table 10-13** shows the averages of the latest available data for the two freshwater sampling locations within the Study Area. These stations are also shown on **Volume 5: Figure 10.2: Surface Water Features and Their Attributes**.

Table 10-13. NRW water quality archive water quality data for two stations within the Study Area

Station Name and ID	NGR	Parameter	Average	Sample Date Range
Castlemartin Corse River - S83627	SR 90000 99800	pH	7.52	2002 – 2004
		Calcium	96.74 mg/l	
		Ammoniacal Nitrogen as N	0.155 mg/l	
		Nitrite as N	0.037 mg/l	
		Chloride	125.4 mg/l	
		Phosphate	0.087 mg/l	
Freshwater West Stream at B4319 – S86237	SR 88545 99727	pH	7.64	2013-2015
		Oxygen, Dissolved, % Saturation	71 %	
		Orthophosphate, reactive as P	0.53 mg/l	2013-2014
		Nitrite as N	0.025 mg/l	2013-2015
		Conductivity at 25°C	824.45	
		Ammoniacal Nitrogen as N	0.049 mg/l	

Hydrology

90. There are no flow gauges either in the Study Area, or upstream (within 4 km) of the Study Area on identified surface water features. The nearest flow gauging station (according to Water Watch Wales [NRW, 2024]) is located on the Pembroke River near Kingsbridge, approximately 4.5 km outside the Study Area at NGR: SM 99600 01600 although, no data is freely available from this station. There are no flow gauges according to the National River Flow Archive within 15 km of the Study Area (UKCEH, 2024).

91. For the scoped in ordinary watercourses (T05a, WC12, and T12a) (and where their importance isn't superseded by other more important receptors such as abstraction licences) the Q95 has been estimated using existing National River Flow Archive data (UKCEH, 2024) from two nearest flow gauging stations: 60004 - Dewi Fawr at Glasfryn Ford and 60003 - Taf at Clog-y-Fran. These stations are located outside of the Study Area but share similar underlying geology to the Study Area and were deemed suitable to use in proportion calculations for the watercourse catchments within the Study Area.

92. It was estimated that T05a has a Q95 <0.001 m3/s as this ordinary watercourse is minor, with a small catchment and runs adjacent to field boundaries, likely being a small agricultural ditch or drain feature. Although WC12 and T12a displays similar features to that of T05a (and all other ordinary watercourses within the Study Area), the estimated Q95 was >0.001 m3/s owing to a slightly larger catchment area.

Hydromorphology

Castlemartin Corse

93. The watercourse exhibits characteristics of a passive meandering typology. During the site visit, Castlemartin Corse was not in a state of high or low flow. It is unlikely that the modified banks of the watercourse will allow water to spill onto the floodplain, even during particularly wet periods of the year, so there is expected to be only partial connectivity between the channel and the floodplain. During the site visit, the bed material was not visible due to extensive vegetation cover, but it is assumed to primarily consist of finer sediment, given the low-energy nature of the watercourse and the adjacent agricultural land use. Historic mapping dating from the early 1900s shows that the watercourse followed the same course as it does

at present, indicating that the modifications, particularly the straightening in the downstream reaches, occurred prior to this date (National Library of Scotland, 2024). Palaeo-meanders visible on aerial imagery indicate that the channel was probably located further south at one time but has since been realigned against the valley side to make way for agricultural land. Several artificial, straight field drains are connected to the watercourse on the left, likely serving as agricultural drainage.

Goldborough Pill West

94. Historical mapping suggests limited local changes in Goldborough Pill West since the early 1900s (National Library of Scotland, 2024), indicating that much of the river modification occurred before this era. During the site visit, Goldborough Pill West was not in a state of high or low flow. It is unlikely that the banks of the watercourse will allow water to spill onto the floodplain, even during particularly wet periods of the year, so there is expected to be only partial connectivity between the channel and the floodplain. The watercourse is characterised by a pool-riffle typology with a combination of run and riffle flows. The bed consists of small gravels and fine sediment. The turbidity of Goldborough Pill West was low, however it's crucial to note that turbidity levels can vary based on factors such as flow conditions, land use, and biological activity. Higher turbidity might be expected during periods of increased flow, when fields are bare and have been dry for an extended period, or during autumn recharge events.

Ordinary Watercourses

95. Several smaller unnamed watercourses (i.e. ditches) are present within the Study Area. These watercourses are predominantly artificial, likely created or modified to aid agricultural land drainage. Historical mapping of the Study Area demonstrates that this occurred during the second half of the 20th century. Characteristics of these watercourses include straightness, uniformity, and an over-deep profile. The majority of these straightened channels are ephemeral in nature due to both natural processes and human activities in agricultural landscapes. The design of these modified watercourses aims to facilitate drainage and prevent waterlogging in fields. The grading of land and the installation of drainage systems may influence the intermittent nature of these ditches. Flow within these unnamed watercourses is expected to be seasonal, with little to no flow in summer, and the channels exhibit relatively low energy compared to larger watercourses within the Study Area. It's improbable that the modified banks of these watercourses will permit water spillage onto the floodplain, even during particularly wet periods of the year. Consequently, there is expected to be limited connection between the channel and the floodplain. However, these channels may contribute to providing aquatic habitat within the area.

96. More detail regarding the hydromorphology of watercourses that interact with the Scheme can be found in **Appendix 10B: Onshore Water Environment Site Survey Report**.

Aquatic Ecology

97. Data on biological quality elements was requested from NRW; data on macrophytes and macroinvertebrates was provided from 2018.

Macroinvertebrates

98. Macroinvertebrate sampling was undertaken for Castlemartin Corse - headwaters to tidal limit river WFD water body in May and October 2018, at NGR SR 91190 99430 via 3-minute active kick sampling and 1 minute hand search. In May 2018, 44 species were recorded (of which 30

were BWMP scoring taxa[4]) with estimated number of live species ranging from 1 to 4200. The most abundant species recorded are listed below with their respective counts:

- Mud Snail (*Potamopyrgus antipodarum*) – 4200;
- Pill clams (*Pisidium*) – 412;
- Freshwater shrimp (*Gammarus pulex/fossarum agg.*) – 128;
- Flatworm (*Polycelis felina*) – 67;
- Pond Slater (*Asellus (Asellus) aquaticus*) – 61; and
- Freshwater Snail (*Physella acuta*) – 42.

99. Overall, the Biological Monitoring Working Party (BMWP) Score[5] for May 2018 was 168 and the BWMP Average Score Per Taxon[6] (ASPT) Score for May 2018 was 5.6, indicating excellent water quality.

100. In October 2018, fewer species were recorded; 35, of which 20 were BWMP-scoring taxa. The estimated number of live species ranged from 1 to 1530, a decrease since May 2018. The most abundant species recorded are listed below with their respective counts:

- Chironomid Midge (*Tanypodinae*) – 6;
- Chornomid Midge (*Tanytarsini*) – 6;
- Riffle Beetle (*Elmis aenea*) – 9;
- Gammarids (*Gammaridae*) -14;
- Freshwater Shrimp (*Gammarus pulex/fossarum agg.*) – 23; and
- Mud Snail (*Potamopyrgus antipodarum*) – 1530.

101. Overall, the BWMP for October 2018 was 79, and the BWMP ASPT Score for October 2018 was 3.95, indicating a decrease in water quality from May 2018, however a generally neutral water quality (neither grossly polluted nor excellent).

Macrophytes

102. A Macrophyte survey was undertaken in June 2018, for Castlemartin Corse - headwaters to tidal limit river WFD Water body at NGR SR 91190 99430. The standard WFD compliant method for macrophyte sampling was used (WFD UK Tag, 2014), and the following species were identified:

- Yellow flag iris (*Iris pseudacorus*);
- Exotic bur-reed (*Sparganium erectum*);
- Lesser pond sedge (*Carex acutiformis*);
- Common reed (*Phragmites australis*);
- Reed canarygrass (*Phalaris arundinacea*);

[4] Number of BMWP scoring families found in the sample.

[5] Scores are assigned to invertebrate families depending on their tolerance of organic pollution. The individual family scores are added together to give a sample BMWP score, higher scores indicate cleaner conditions. BMWP scores can vary from 0 (grossly polluted) to 150+ (excellent quality).

[6] This is the total BMWP score divided by the number of BMWP scoring taxa and is therefore independent of sample size. ASPT can vary from 0.00 (grossly polluted) to 6.00+ (excellent quality).

- Hemlock water-dropwort (*Oenanthe crocata*);
- Marshpepper knotweed (*Persicaria hydropiper*);
- Green algae (*Zygnematalean*); and
- Giant horsetail (*Equisetum telmateia*).

103. Overall, the river macrophyte nutrient index (RMNI) was determined to be 7.34 and number of macrophyte taxa (NTAXA) (a diversity metric) scored 2. The species covering the highest percentage of the surveyed reach was exotic bur-reed (*Sparganium erectum*) and hemlock water-dropwort (*Oenanthe crocata*).

Otters, Water Vole and Great Crested Newts

104. Chapter 08: Ecology and Biodiversity and **Volume 6 (Appendix 8B: PEA Report)** provide details on baseline data for amphibians (great crested newts), otters and water vole.

105. A desk study found that there are no recent records of great crested newt (*Triturus cristatus*) within the Study Area. Great crested newt is considered absent from Pembrokeshire and is therefore not considered any further.

106. There are four recent records of otter within the **Chapter 08: Ecology and Biodiversity** Study Area, the closest of which is within 0.2 km west of the onshore development area at Freshwater West.

107. Surveys undertaken for the Greenlink project in 2018 (Greenlink Interconnector Ltd, 2019) identified two potential otter holts and three couches associated with a water body and watercourse in the northeast of the onshore development area adjacent to the Pembroke Power Station. A further potential holt was identified during the 2018 surveys along a watercourse north of Vine Cottage, near Hoplass and multiple field signs including spraint, footprints, and feeding remains were identified throughout the area.

108. Surveys undertaken in 2021 (ITPEnergised, 2021) for the Erebus onshore cable route recorded 21 areas of habitat with high potential for otter holt/resting sites, four spraints, seven slides and one set of feeding remains.

109. There are no recent records of water vole (*Arvicola amphibius*) within the **Chapter 08: Ecology and Biodiversity** Study Area. Non conclusive water vole field signs were observed during the 2018 surveys for the Greenlink project, and the surrounding habitat was classified as Low quality for water vole (Greenlink Interconnector Ltd, 2019). Water vole is considered absent from Pembrokeshire.

Water Resources and Designations

Drinking Water Protected Areas ('DWPAs')

110. According to Data Map Wales and Water Watch Wales, there are no DWPAs for rivers or lakes in the Study Area (Welsh Government, 2023 and NRW, 2023).

111. There is a DWPA for groundwater which covers the whole Study Area: Pembrokeshire Carboniferous Limestone WFD groundwater body is a DWPA for groundwater and was identified to be 'At Risk' in 2020 of failing to meet its objectives as a result of bacteria, nutrients and pesticides (Welsh Government, 2023 and NRW, 2023).

Source Protection Zones ('SPZs')

112. SPZs are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through

constraining the proximity of an activity that may impact upon a drinking water abstraction. According to Data Map Wales, there are no groundwater SPZs in the Study Area (Welsh Government, 2023). The nearest SPZ is 7 km east of the Study Area.

Nitrate Vulnerable Zones ('NVZs')

113. According to Data Map Wales and Water Watch Wales, there are no NVZs in the Study Area (Welsh Government, 2023 and NRW, 2023). The nearest NVZ is > 1.5 km to the south east of the Study Area.

Licensed Abstractions

114. According to Data Map Wales, there are 26 surface water abstraction licenses present within the Study Area, none of which are situated within the Onshore Development Area. The water abstractions dataset obtained from Data Map Wales details all sites covered under the Water Act 2003 (HMSO, 2014) where all abstractions of 20 cubic metres or more require an abstraction licence. These are summarised in **Table 10-14** below and shown on **Volume 5: Figure 10.6: Water Resource Information**. There are no groundwater abstraction licences present within the Study Area.

Table 10-14. Licenced abstractions within the Study Area from data map Wales (Welsh Government, 2023).

Permit Number	Ref on Volume 5: Figure 10.6	Operator	Site Name	Easting	Northing	Primary Purpose	Annual qty (m^3).	Scoped in/out
22/61/6/0134	A1	David Llewellyn Jones	None provided	187710	201040	Impounding	Not applicable	**Scoped out:** Impounding primary purpose and no pathway for impact.
22/61/6/0042	A2	Senlis g Hathway	Land at Middlehill Farm	188220	201400	Agriculture	4110	**Scoped out:** Located < 0.6 km to the north west of the OnECC, with no direct hydrological pathway, and the B4320 separates WC02 from the proposed Project, and would act as a barrier to overland flow.
22/61/6/0121	A3	Brian Eric & Barry John Hathway	Land at Broomhill Farm	188490	201940	Agriculture	6025	**Scoped in:** Pathway for impact via ground topography and surface water runoff.
22/61/6/0014	A4	Brian Eric & Barry John Hathway	Land at Broomhill and Kilpaison Farms	188890	201450	Agriculture	12397	**Scoped in:** WC05, T05a crossed by OnECC upstream of abstraction location, therefore a direct hydrological pathway for impacts to propagate downstream.
22/61/6/0014	A5	Brian Eric & Barry John Hathway	Land at Broomhill and Kilpaison Farms	188960	201510	Agriculture	12397	
22/61/6/0123	A6	Brian Eric & Barry John Hathway	None provided	189000	201670	Impounding	not applicable	**Scoped out:** Impounding primary purpose.
22/61/6/0113	A7	Brian Eric & Barry John Hathway	None provided	189350	201440	Impounding	not applicable	
22/61/6/0114	A8	Brian Eric & Barry John Hathway	Land at Kilpaison Farm	189350	201440	Agriculture	13636	**Scoped in:** WC06 crossed by OnECC upstream of abstraction location, therefore a direct hydrological pathway for impacts to propagate downstream.
22/61/6/0122	A9	Brian Eric & Barry John Hathway	None provided	189950	201260	Impounding	not applicable	**Scoped out:** Impounding primary purpose.

Permit Number	Ref on Volume 5: Figure 10.6	Operator	Site Name	Easting	Northing	Primary Purpose	Annual qty (m^3).	Scoped in/out
22/61/6/0120	A10	Brian Eric & Barry John Hathway	Land at Kilpaison Farm	189950	201260	Agriculture	2700	**Scoped in:** WC07 and T07c crossed by OnECC upstream of abstraction location, therefore a direct hydrological pathway for impacts to propagate downstream.
22/61/6/0105	A11	Mr & Mrs H G L & E M L Woods	Land at Neath Farm	190080	201460	Agriculture	13638	
22/61/6/0069	A12	H G L Woods	Land at Wogaston Farm and N W of Neath Bridge	190290	201420	Agriculture	13638	**Scoped in:** WC07 crossed by OnECC upstream of abstraction location, therefore a direct hydrological pathway for impacts to propagate downstream.
22/61/6/0021	A13	H G L Woods	Land at Neath Farm	190630	201060	Agriculture	9092	**Scoped in:** No watercourse crossing proposed upstream of abstraction location however pathway for impact via ground topography and surface water runoff.
22/61/6/0118	A14	Mr & Mrs H G L & E M L Woods	None provided	191120	201050	Impounding	not applicable	**Scoped out:** Impounding primary purpose.
22/61/6/0117	A15	Mr & Mrs H G L & E M L Woods	Land at Rhoscrowther	191120	201050	Agriculture	15911	**Scoped in:** WC07 crossed by OnECC upstream of abstraction location, therefore a direct hydrological pathway for impacts to propagate downstream.
22/61/6/0040	A16	J.S. Allen-Mirehouse	Land at Cheveralton Farm	191090	201680	Agriculture	7545.5	**Scoped out:** No watercourse crossing proposed upstream of abstraction location
22/61/6/0135	A17	Mr & Mrs P T & N M Kenniford	None provided	191740	200890	Impounding	not applicable	**Scoped out:** Impounding primary purpose.
22/61/6/0068	A18	Mr & Mrs P T & N M Kenniford	Land at Hoplass	191820	200860	Agriculture	13638	**Scoped in:** WC07 crossed by OnECC upstream of abstraction location, therefore a

Permit Number	Ref on Volume 5: Figure 10.6	Operator	Site Name	Easting	Northing	Primary Purpose	Annual qty (m^3).	Scoped in/out
								direct hydrological pathway for impacts to propagate downstream.
22/61/6/0147	A19	D G Kenniford	None provided	192020	202250	Impounding	not applicable	**Scoped out:** Impounding primary purpose.
22/61/6/0081	A20	RWE Generation UK plc	Land at Greenhill Farm	192050	202220	Agriculture	6060	**Scoped out:** Watercourse catchment does not interact with the OnECC (UKCEH, 2023) therefore no hydrological pathway identified
22/61/6/0064	A21	RWE Generation UK plc	Reservoir south of Greenhill Farm	192850	201800	Agriculture	4546	**Scoped out:** No watercourse crossing proposed upstream of abstraction location
22/61/6/0144	A22	D G Kenniford	None provided	192880	201810	Impounding	not applicable	**Scoped out:** Impounding primary purpose.
22/61/6/0156	A23	RWE Generation UK plc	None provided	193650	202650	Production of Energy	1200000000	**Scoped out:** No pathway for impact identified.
22/61/6/0091	A24	S A Harries	None provided	193000	200210	Impounding	not applicable	**Scoped out:** Impounding primary purpose.
22/61/6/0039	A25	SPL Woods & Son	Land at Trebowen Farm	191810	199600	Agriculture	18184	**Scoped out:** No hydrological pathway for impacts through surface water runoff due to ground topography.
22/61/6/0046	A26	Senlis g Hathway	Land at Middle Hill Farm	190210	199850	Agriculture	1178	

Pollution Incidents

115. According to NRW data for the period of 2016 to 2023 (NRW, 2023), there are no Category 1 (high or major incident) or Category 2 (high minor or significant) pollution incidents within the Study Area. The closest pollution incident is located at Llanreath, approximately 1 km from the Study Area which was recorded as a Category 2 incident, with gas and fuel oils being the primary pollutant, and principally impacting the water environment (Milford Haven) at NGR SM 95156 03354.

Permitted Discharges to Controlled Waters With Conditions

116. Permit holder information for permitted discharges in Wales as required by the Environmental Permit (England and Wales) Regulations 2016 (HMSO, 2016) is held by the Welsh Government on Data Map Wales. According to this data, there are 5 within the Study Area, with 2 being situated within the Onshore Project Boundary, these are detailed in **Table 10-15** below and shown on **Volume 5: Figure 10.6: Water Resource Information.**

Table 10-15. Permitted discharges to waters with conditions within the Study Area from data map Wales (Welsh Government, 2023). Contains natural resources Wales information © Natural Resources Wales and Database Right. All rights Reserved.

Permit Number	Ref on Volume 5: Figure 10.6	Site Name	Outlet NGR	Discharge type	Receiving watercourse	Location relevance to proposed Project
BB3194HM	D1	The Burrows	SM 88447 00985	Sewage - non Water Undertaker	WC04	Located adjacent to the west of the Onshore Development Area where the B4320 meets the B4319 road.
BG0029101	D2	Rhoscrowther STW	SM 90000 02200	Sewage - Water Undertaker	WC08	Located to the north west within the Study Area, to the north, approximately 0.24 km from Angle Bay.
HP3820XU	D3	Pembroke Power Station Site Drain	SM 93883 02362	Trade	WC12 / Pennar Mouth	Located to the north east, within the Study Area, at Pembrokeshire Power Station.
TB3890HM	D4	Oil Interceptor @ National Grid	SM 93662 02269	Trade	WC12	Located to the northeast of the Onshore

Permit Number	Ref on Volume 5: Figure 10.6	Site Name	Outlet NGR	Discharge type	Receiving watercourse	Location relevance to proposed Project
GB3690HF	D5	Oil Interceptor @ Pembroke Power Station	SM 93662 02269	Trade		Development Area.

Private Water Supplies ('PWS')

117. Details of registered PWS were requested by the local authority, Pembrokeshire County Council (PCC) and also obtained from publicly available information available in Project Erebus ES Chapter 19 (Onshore Geology, Hydrogeology and Hydrology) Appendix 19.1 Private Water Supply Assessment (Blue Gem Wind, 2021); the study area of Project Erebus overlaps in part with the proposed Project.

118. The publicly available information from Project Erebus ES Appendix 19.1 (Blue Gem Wind, 2021), has been revaluated and updated following some discrepancies in the data between the NGR's of the PWS and the names identified in Table 1 of Project Erebus Appendix 19.1. The re-evaluated data has been combined with the data received from PCC and a list of PWS with updated references and correct names is provided in **Table 10-16.**

119. PWS7 to PWS14 have been sampled historically but PCC could not confirm if these single domestic supplies are still in use or not.

120. Only PWS03a and PWS03b are scoped in for further assessment due to PWS03a being located near to the Landfall, and PWS03b being within the Onshore Development Area. The remainder PWS are all considered to be hydrologically separate from the proposed Project with no perceived pathway for impact to occur and so are not assessed further.

Table 10-16. Identified PWS (Blue Gem Wind, 2021 and PCC Data Request)

PWS Reference on Volume 5: Figure 10.6	Name	Type*	Source	X (Easting)	Y (Northing)	Location relevant to proposed Project
PWS01	South Studdock	Borehole	Blue Gem Wind, 2021	185313	202006	>3 km from Onshore Development Area; Outside of Study Area.
PWS02	Chapel Bay	Spring		186148	203515	
PWS03a	Broomhill (i)	Borehole		188687	201433	< 0.075 km from Onshore Development Area.
PWS03b	Broomhill (ii)	Well		188668	201052	Within Onshore Development Area
PWS04	Cheveralton	Spring		191156	202000	>1.2 km from Onshore Development Area.
PWS05	Coreside Nursery	Spring		191002	200070	0.3 km south of Onshore Development Area.

PWS Reference on Volume 5: Figure 10.6	Name	Type*	Source	X (Easting)	Y (Northing)	Location relevant to proposed Project
PWS06a	Moreston (i)	Borehole		193615	200735	0.5 km from Onshore Development Area.
PWS06b	Moreston (ii)	Borehole		193588	200773	
PWS07	Moreston Cottage	Spring	Blue Gem Wind, 2021 and PCC Data Request, 2021	193610	200985	<0.3 km from Onshore Development Area.
PWS08	Bangeston Farm	Unconfirmed	PCC Data Request, 2021	187330	201596	1.2 km from Onshore Development Area; Outside of Study Area
PWS09	King's Mill			192433	198687	1.7 km from Onshore Development Area; Outside of Study Area
PWS10	Crickmarren Farm			194338	198795	2.7 km from Onshore Development Area; Outside of Study Area
PWS11	Brownslate Farm			195380	201186	1.6 km from Onshore Development Area
PWS12	Goldborough			194009	200870	0.56 km from Onshore Development Area
PWS13	South of Angle Peninsula New Primary School			195745	200107	2.6 km from Onshore Development Area; Outside of Study Area
PWS14	Highgate Cottage			196024	200100	2.6 km from Onshore Development Area; Outside of Study Area

Designated Sites

121. There are numerous designated ecological sites of relevance to the Water Environment within the proposed Project site and Study Area, and these are listed in **Table 10-17** below. This includes marine designations where they fall within the Study Area. There are no National

Nature Reserves (NNR), Local Nature Reserves (LNR) or Ramsar Sites within the Study Area. The designated sites are shown on **Volume 5: Figure 10.5: Designated Sites**.

Table 10-17. Designated sites

Statutory Site Name	Potential Impact Pathway	Reference NGR	Reason(s) for Designation
Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru Special Area of Conservation (SAC)	Located within the Study Area and including interacting with the Landfall at Freshwater West and associated HDD Landfall work areas, so could be directly impacted. However, this designated site is not water dependent and thus is not relevant to this terrestrial water environment impact assessment.	SR 89086 98041	Designated primarily for great horseshoe bat (*Rhinolophus ferrumequinum)* and early gentian (*Gentianella anglica)*, and vegetated sea cliff habitat and fixed coastal dunes with herbaceous vegetation (JNCC, n.d).
Pembrokeshire Marine / Sir Benfro Forol SAC	Hydrologically connected to the proposed Project via numerous small coastal streams which discharge into the designated area at Freshwater West as well as to the designated areas at Pembroke River, Angle Bay and Milford Haven.	SM 92305 04138	Designated primarily due to presence of grey seal (*Halichoerus grypus)* and shore dock (*Rumex rupestris)* and for estuary, large shallow inlet and bays and reef habitat.
Castlemartin Coast Special Protection Area (SPA)	Located within the Study Area and Onshore Development Area and directly impacted by Landfall at Freshwater West and associated HDD works.	SR 89086 98041	Notable for breeding birds (chough).
Milford Haven Waterway Site of Special Scientific Interest (SSSI)	Hydrologically connected to the Onshore Development Area via numerous small coastal streams which discharge into the designated area for the Angle Bay, Pembroke River and Milford Haven.	SM 88168 02769 (but SSSI is widespread along the coastline)	Designated as an exceptional example of a ria (a system of valleys drowned by post-glacial rise in sea level) that consists of several estuaries, embayments and inlets.

Statutory Site Name	Potential Impact Pathway	Reference NGR	Reason(s) for Designation
Broomhill Burrows SSSI	Located partly within the Onshore Development Area, and wholly within the Study Area. This SSSI is also intersected by the Landfall of the Offshore Export Cable at Freshwater West, and associated HDD works and is therefore directly impacted.	SM 88859 00286	Designated due to providing valuable exposures demonstrating some important structural characteristics of one of the major zones of the Variscan orogenic belt in Pembrokeshire. It is also One of Pembrokeshire's largest dune systems with the most extensive and most diverse dune slack vegetation.
Castlemartin Corse SSSI	Located outside of the Onshore Development Area, but partly within the Study Area. It is hydrologically linked to the proposed Project through surface water runoff due to ground elevations: i.e., the topography at the Onshore Development Area falls away to the south towards Castlemartin Corse SSSI, therefore there is potential for impacts via surface water runoff.	SR 89916 99806	The site is designated as the best example of a calcareous fen in Pembrokeshire. The 20 hectare reed-bed is also the largest and most diverse in the county. Calcareous flushes support rare plants and there are numerous scarce fen plants in this SSSI. Rare species includes fen pondweed (*Potamogeton coloratus).*
Castlemartin Range SSSI	Located partly within the Study Area. Does not directly interact with the Offshore or Onshore Export Cable, or Landfall at Freshwater West, however part of the SSSI encompasses the point where Castlemartin Corse discharges to Freshwater West, therefore any impacts to Castlemartin Corse (upstream) may propagate downstream to the SSSI, therefore could be indirectly impacted.	SR 88847 98365	Designated for noted geology and coastal, cliff, maritime grassland and heath habitats and species.

Statutory Site Name	Potential Impact Pathway	Reference NGR	Reason(s) for Designation
Gweunydd Somerton Meadows SSSI	Located outside of the Onshore Development Area but within the Study Area (and beyond). Goldborough Pill West flows alongside the SSSI boundary, and appears to flow within the SSSI towards the north of the site.	SM 93131 00131	Designated for grassland fungi.
Angle Peninsula Coast / Arfordir Penrhyn Angle SSSI	Located within Study Area and less than 0.7 km from the Landfall, therefore could be directly impacted.	SM 84177 02725	Designated for its geology, its wide range of intertidal rock, sand, and gravel habitats and communities, particularly rockpools, caves, tide-swept and under-boulder communities, and for its population of roosting and feeding chough.

Groundwater Dependent Terrestrial Ecosystems ('GWDTE's')

122. GWDTE's may be defined as ecosystems for which current composition, structure and function are reliant on a supply of groundwater (Kløve et al., 2011). They are particularly sensitive to hydrological and ecological changes. There is 1 GWDTE present within the Study Area named Castlemartin Corse GWDTE, located to the southwest of the Study Area, upstream of where Castlemartin Corse discharges into Freshwater West (NRW, 2023). This is shown on **Volume 5: Figure 10.4: Groundwater Features and Their Attributes.**

123. The Castlemartin Corse GWDTE covers the same area as the Castlemartin Corse SSSI; for further details, see **Table 10-17** above.

Baseline Flood Risk

124. **Appendix 10A: Flood Consequence Assessment** presents the FCA undertaken for the Onshore Development Area. The FCA has considered all sources of flood risk to and from the proposed Project and identified flood risk management measures where required.

125. **Table 10-18** and **Table** 10-19 show a summary of the flood risk to the proposed Project during the construction and decommissioning phase, and the operational phase respectively.

126. The FCA concluded that during construction and decommissioning that the cable route will be vulnerable to fluvial, tidal, surface water and groundwater flooding as seen in **Table 10-18,** with little risk to the substation. Once operational, the proposed Project will not be vulnerable to flooding as the cable route will be buried and land returned to pre-development conditions. A Drainage Strategy will be prepared to prevent any increase in flood risk to the substation.

127. Mitigation measures for the construction and decommissioning, and operational phases of the proposed Project in respect to flood risk are discussed in **Section 10.8**. Taking account of these

mitigation measures, the sensitivity of the proposed Project to flooding is considered to be low and therefore flood risk is not considered further.

Table 10-18. Summary of flood risk to the Onshore Development Area during construction and decommissioning phases

Flood Source	Assessment of flood risk for cable route	Assessment of flood risk for substation	Justification	Requiring mitigation measures?
Fluvial	Medium	Low	According to NRW's Flood Map for Planning, the entirety of the OnECC does not fall within an area associated with fluvial flood risk. However, up to 11 ordinary watercourses will be required to be crossed to install the cable route. The Substation Search Area is not located in an area of fluvial flood risk according to NRW's Flood Map for Planning.	Yes (for cable route)
Tidal	Medium	Negligible	Most of the cable route is not located in an area of tidal flood risk according to NRW's Flood Map for Planning, with the only exceptions to this being at the Landfall location and the grid connection point at Pembroke Power Station, which are sited within areas tidal Flood Zone 3. The Substation Search Area is not located in an area of tidal flood risk according to NRW's Flood Map for Planning.	Yes (for cable route)
Surface Water	Low	Low	According to NRW's Flood Map for Planning, there are several isolated areas along the proposed onshore cable route that are at risk of surface water flooding and flooding from small watercourses. The Substation Search Area is not located within an area at risk of flooding from surface water or small watercourses according to the NRW Flood Map for Planning.	Yes (for cable route)
Sewer	Low	Low	The cable route and Substation Search Area is in a rural area and according to the Project Erebus FCA, the cable route between Freshwater West and the grid connection point is not serviced by a sewer network.	No
Groundwater	Low	Low	According to the Project Erebus FCA ground investigations along the onshore cable route corridor have identified the	Yes (for cable route)

Flood Source	Assessment of flood risk for cable route	Assessment of flood risk for substation	Justification	Requiring mitigation measures?
			presence of groundwater in 9 of the 45 exploratory logs at depths between 0.5 m below ground level (bgl) to 5.3 m bgl, showing limited presence of groundwater. According to the Project Erebus FCA, a borehole located to the eastern boundary of the Substation Search Area struck water between 2 m and 3 m below ground level (bgl).	
Artificial Sources	Low	Low	According to NRW's Map for Planning, the majority of cable route is not located within an area at risk of flooding from reservoirs. The Substation Search Area is not located within an area at risk of flooding from reservoirs according to NRW's Flood Map for Planning.	No

Table 10-19. Summary of flood risk to the Onshore Development Area during operational phase

Flood Source	Assessment of flood risk for cable route	Assessment of flood risk for substation	Justification	Requiring mitigation measures?
Fluvial	Low	Low	The cable route and Substation Search Area is not located within any areas of fluvial flood risk according to NRW's Flood Map for Planning. With respect to the cable route, the onshore export cables will be buried in trenches at least 1.7 m below the clean hard bed of the watercourse, minimising their exposure to fluvial flood sources.	No
Tidal	Low	Low	According to NRW's Flood Map for Planning, the cable route is generally not located within areas at risk of tidal flooding. The only exceptions to this are short sections at the Landfall location and the grid connection point near Pembroke Power Station where there are areas tidal Flood Zone 3. The Substation Search Area is not located within an area at risk of tidal flooding according to NRW's Flood Map for Planning.	Yes (for cable route)
Surface Water	Low	Low	Most of the cable route is positioned outside of areas of flood risk from surface water and small watercourses according to NRW's Flood Map for Planning. The only exceptions to this are several isolated spots in areas of Flood Zones 2 and 3 for surface water and small watercourses that are dispersed across the onshore cable route. As the onshore export cables will be buried in trenches, this will minimise their exposure to surface water and small watercourses flood sources. The Substation Search Area is not located within an area of surface water and small watercourse flood risk according to NRW's Flood Map for Planning.	No (A Drainage Strategy has been prepared for the substation including the use of SuDS to manage surface water runoff from the substation)
Sewer	Low	Low	The cable route and Substation Search Area is in a rural area and according to the Project Erebus FCA, the cable route between Freshwater West and	No

Flood Source	Assessment of flood risk for cable route	Assessment of flood risk for substation	Justification	Requiring mitigation measures?
			the grid connection point is not serviced by a sewer network.	
Groundwater	Low	Low	According to the Project Erebus FCA ground investigations along the onshore cable route corridor have identified the presence of groundwater in 9 of the 45 exploratory logs at depths between 0.5 m bgl to 5.3 m bgl. The cable and cable ducting will be designed to prevent water ingress. According to the Project Erebus FCA, a borehole located to the eastern boundary of the Substation Search Area struck water between 2 m and 3 m below ground level (bgl).	No
Artificial Sources	Low	Low	According to NRW's Map for Planning, the majority of cable route is not located within an area at risk of flooding from reservoirs. The Substation Search Area is not located within an area at risk of flooding from reservoirs according to NRW's Flood Map for Planning.	No

10.5.2. Future Baseline

128. This section considers any changes to the baseline conditions described above that might occur over the lifespan of the proposed Project, but in their absence (i.e. in the event that they are not installed).

129. The future baseline has been determined qualitatively by considering the likelihood of changes in the attributes that are considered when deciding the importance of water bodies in the Study Area.

130. Generally, there is an improving trend in water quality and the environmental health of waterways in the UK through the action of new legislative requirements and ever more stringent planning policy and regulation, although there are challenges such as adapting to a changing climate and pressures of population growth that could have a retarding impact (as has been exemplified by the debate around discharges of untreated sewerage from sewers and sewerage treatment works) as well as emerging issues associated with micro-plastics and unusual chemical compounds. However, importance criteria places greater emphasis on designations and holistic attributes of water bodies that reflect general water quality changes over the longer term. Thus, overall in terms of water quality impacts, the future baseline assumes that all WFD water bodies achieve their planned target status by 2027. It is also likely that the health of the water environment will continue to improve post-2027 as new interventions associated with the Environment Act 2021 etc. begin to take effect.

131. Where water bodies are currently at their target overall status, there must be no deterioration from this, and there are also objectives for individual elements of the WFD classification that are to be achieved (e.g. biological quality elements, physico-chemical parameters). It is assumed that these objectives will be achieved.

132. The assessment of the importance of water bodies within the EIA assessment considers a large range of attributes and does not focus solely on water quality. This assessment considers other attributes such as scale, nature conservation designations, fish habitat type, the presence of protected species, social and economic uses. For some of these attributes, it is unlikely that they will change in the future (e.g., water body size, whether a river is likely to support cyprinid or salmonid fish populations, the presence of a designated nature conservation site or bathing water).

133. The same future baseline conditions expected during construction will apply to the operation phase (i.e. all WFD targets are met, improving water quality, no change in the presence and status of designated sites).

134. In terms of flood risk, this could change over the 25-year lifetime of the Llŷr Project because of changes in climate and land use. These factors will be taken into account as part of the assessment. Based on information available at this stage, no significant differences to the baseline are envisaged.

10.6 Summary of Receptor Importance

135. **Table 10-20** provides a summary of the Water Environment receptors that may be impacted by the proposed Project, stating the importance with reference to the baseline presented above and the criteria set out in **Table 10-7**. Please note that for watercourses a separate importance grade is provided for water quality and morphology.

Table 10-20. Water feature importance

Water feature / Receptor	Component	Importance (Sensitivity)
Pembroke River / Milford Haven Inner transitional WFD water body	Morphology	N/a - Scoped out of morphology impacts. See **Section 10.5.1: Existing Baseline.**
	Surface Water	**Very High –** Classified transitional WFD water body and within Milford Haven Waterway SSSI, Pembrokeshire Marine / Sir Benfro Forol SAC.
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body	Morphology	N/a - Scoped out of morphology impacts. See **Section 10.5.1: Existing Baseline.**
	Surface Water	**Very High** – Classified coastal WFD water body and within Milford Haven Waterway SSSI, Angle Peninsula Coast / Arfordir Penrhyn Angle SSSI, Pembrokeshire Marine / Sir Benfro Forol SAC.
Freshwater West / Pembrokeshire South WFD coastal water body	Morphology	N/a - Scoped out of morphology impacts. See **Section 10.5.1: Existing Baseline.**
	Surface Water	**Very High** – Classified coastal WFD water body and within Broomhill Burrows SSSI, Castlemartin Range SSSI, Castlemartin Coast SAC, Pembrokeshire Marine / Sir Benfro Forol SAC, Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru SAC, West Wales Marine / Gorllewin

Water feature / Receptor	Component	Importance (Sensitivity)
		Cymru Forol SAC and Castlemartin Coast SPA.
Castlemartin Corse / Castlemartin Corse river WFD water body	Morphology	**N/a** – Scoped out of morphology impacts. See **Section 10.5.1: Existing Baseline.**
	Surface Water	N/a – Scoped out. See **Section 10.5.1: Existing Baseline.**
Goldborough Pill East	Morphology	N/a - Scoped out of morphology impacts. See **Section 10.5.1: Existing Baseline.**
	Surface Water	N/a – Scoped out. See **Section 10.5.1: Existing Baseline.**
Goldborough Pill West	Morphology	**Medium** – Watercourse shows previous signs of realignment but is characterized by a pool-riffle typology with a combination of run and riffle flows, and a low turbidity.
	Surface Water	**Very High** – Watercourse flows adjacent to and within the Gweunydd Somerton Meadows SSSI.
Ordinary Watercourses WC01, WC02, WC03, T07d, WC08, T08a, T08b, T08c, T08d, WC09, WC10, WC11, T11a, WC13, WC15, WC16, WC17, WC18, WC19, WC20, WC21, WC22, WC23, Southern Tributaries of Castlemartin Corse.	Morphology	N/a Scoped out – See **Section 10.7**.
	Surface Water	N/a Scoped out – See **Section 10.7**.
Ordinary Watercourse: • T05a	Morphology	**Low** - This watercourse is characterised by an artificially straightened channel and is likely ephemeral in nature. The channel exhibits steep banks.
	Surface Water	**Low -** This ordinary watercourse is not a river WFD water body in its own right and the downstream WFD water body is a different typology (i.e. coastal/Trac). It is not known to host any species protected under international or UK legislation. Assumed Q95 <0.001 m^3/s[7] as this ordinary watercourse is minor, with a small catchment and runs adjacent to field boundaries, likely being small agricultural ditches and drain features. There are no licensed abstractions along its course.
Ordinary Watercourses: • WC12 • T12a	Morphology	**Low** - These watercourses are characterised by an artificially straightened channel and are likely ephemeral in nature. Channels exhibits steep banks.
	Surface Water	**Medium** – These ordinary watercourses are not river WFD water bodies in their own right and the downstream WFD water body is a different typology (i.e. coastal/Trac). They are not known to host any species protected under international or UK

Water feature / Receptor	Component	Importance (Sensitivity)
		legislation. Estimated Q95 >0.001 m^3/s[7]. There are no licensed abstractions along their course.
Ordinary Watercourses with associated abstraction license: • T07a/A13 • WC04/A3 • WC07/A12	Morphology	**Low** - These watercourses are characterised by an artificially straightened channel and are likely ephemeral in nature. Channels exhibits steep banks.
	Surface Water	**High –** These ordinary watercourses have licensed abstractions along their course, with their primary use for agricultural purposes providing a locally important resource. A local resource used for agriculture only might be considered medium. However, on a precautionary basis the importance has been classified as high.
Ordinary Watercourses with online ponds and associated abstraction licenses: • WC05/P6/P7/P8/A4/A5 • WC06/P9/A8 • WC07/P18/P19/A18/A15 • T07c/P11/A10	Morphology	**Low** - These watercourses are characterised by an artificially straightened channel and are likely ephemeral in nature. Channels exhibits steep banks.
	Surface Water	**High –** These ordinary watercourses have online ponds with associated licensed abstractions along their course, with their primary use for agricultural purposes providing a locally importance resource. A local resource used for agriculture only might be considered medium. However, on a precautionary basis the importance has been classified as high.
Ordinary Watercourses with online ponds but no licensed abstractions: • WC04/P5 • WC06/P10 • T07b/P14 • WC14/P20 • T07a/P15 • T07c/P12/P13	Morphology	**Low** - These watercourses are characterised by an artificially straightened channel and are likely ephemeral in nature. Channels exhibits steep banks.
	Surface Water	**Medium -** These ordinary watercourses are not river WFD water bodies in their own right and the downstream WFD water body is a different typology (i.e. coastal/Trac). They are not known to host any species protected under international or UK legislation. Precautionary estimated Q95 >0.001 m^3/s[8]. The online ponds do not support any species of ecological

[7] As there are no flow gauges on any watercourses within the Study Area, the Q95 has been estimated using existing National River Flow Archive data (UKCEH, 2024) from two nearest flow gauging stations: 60004 - Dewi Fawr at Glasfryn Ford and 60003 - Taf at Clog-y-Fran. These stations are located outside of the Study Area but share similar underlying geology to the Study Area and were deemed suitable to use in proportion calculations for the watercourse catchments within the Study Area.

[8] As there are no flow gauges on any watercourses within the Study Area, the Q95 has been estimated using existing National River Flow Archive data (UKCEH, 2024) from two nearest flow gauging stations: 60004 - Dewi Fawr at Glasfryn Ford and 60003 - Taf at Clog-y-Fran. These stations are located outside of the Study Area but share similar underlying geology to the Study Area and were deemed suitable to use in proportion calculations for the watercourse catchments within the Study Area.

Water feature / Receptor	Component	Importance (Sensitivity)
		importance nor are they reliant upon for licensed abstractions.
Discrete Pond Feature: • P32	Surface Water	**Low** – this pond is not known to support any species of ecological importance nor is it reliant upon for licensed abstractions. *P32 is located within an SSSI, SAC and SPA however the ponds is not the reason for their respective designations.*
Other ponds: P1, P2, P3, P4, P16, P17, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P33.	Surface Water	N/a Scoped Out – See **Section 10.5.1: Existing Baseline.**
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	Surface Water	**High -** A local resource used for agriculture only might be considered medium. However, on a precautionary basis the importance has been classified as high.
Surface water users - Licenced water abstractions: A1, A2, A6, A7, A9, A14, A16, A17, A19, A20, A21, A22, A23, A24, A25, A26.	Surface Water	N/a Scoped out – See **Section 10.5.1: Existing Baseline.**
Groundwater users – Private Water Supplies: PWS03a and PWS03b	Groundwater	**High** - they provide a locally important resource. All other PWS are scoped out of assessment - See **Section 10.7**.
Reservoirs (Green Hill Reservoir and Reservoir south of the Pembroke Power Station)	Surface Water	N/a Scoped Out – **Section 10.5.1: Existing Baseline.**
Castlemartin Corse GWDTE	Groundwater	**Very High –** Groundwater supports a GWDTE including swamp (which supports wetland plants, birds and insects), fen meadow, fen pondweed habitats and a 20 ha reed-bed. Castlemartin Corse GWDTE is also the Castlemartin Corse SSSI.
Carboniferous Black Rock Subgroup Principal Aquifer	Groundwater	**High –** Principal aquifer providing a locally importance resource.
Gully Oolite Formation / Principal Aquifer	Groundwater	**High –** Principal aquifer providing a locally importance resource.
Avon Group Limestone, Secondary A Aquifer	Groundwater	**Medium –** Bedrock Secondary A Aquifer
Ridgeway Conglomerate / Secondary A Aquifer	Groundwater	**Medium –** Bedrock Secondary A Aquifer
Skrinkle Sandstone / Secondary A Aquifer	Groundwater	**Medium –** Bedrock Secondary A Aquifer
Milford Haven Group formations / Secondary A Aquifer	Groundwater	**Medium –** Bedrock Secondary A Aquifer
Aber Mawr Shale / Secondary B Aquifer	Groundwater	**Medium** – Bedrock Secondary B Aquifer
Ludlow Rocks Formation / Secondary B Aquifer	Groundwater	**Medium** – Bedrock Secondary B Aquifer
Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) - Secondary A Aquifer	Groundwater	**Medium –**Secondary A Aquifer

Water feature / Receptor	Component	Importance (Sensitivity)
Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) - Secondary A Aquifer	Groundwater	**Medium** –Secondary A Aquifer
Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Groundwater	**Low** –Secondary (undifferentiated) aquifer
Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Groundwater	**Very High** –WFD designated, principal aquifer and supports GWDTE.
Construction workers (during construction and decommissioning)	Flood Risk	**Very High** – The construction workers are classified as high importance due to the value of human life and the importance of health and safety at work.
Residential areas in surrounding area (during construction, decommissioning and operation)	Flood Risk	**High** – Residential areas classified as 'Highly Vulnerable Development' in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004).
Personnel for maintenance of proposed Project (during operation only)	Flood Risk	**High** – Operational personnel are classified as high importance due to the value of human life and the importance of health and safety at work.
Onshore Substation (during operation only)	Flood Risk	**High** – Classified as 'Highly Vulnerable Development' in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004).
Onshore Export Cable (during operation only)	Flood Risk	**Medium** – Classified as 'Less Vulnerable Development' in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004).
Grid Connection (during operation only)	Flood Risk	**High** – Classified as 'Highly Vulnerable Development' in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004).

10.7 Scope of the Assessment

136. An EIA Scoping Report for the proposed Project was submitted in April 2022. The Scoping Report was also shared with relevant consultees, inviting comment on the proposed approach adopted by the Applicant. A Scoping Opinion was provided to the Applicant in July 2022. Based on the Scoping Opinion received and further consultation undertaken, potential impacts on the water environment scoped into the assessment are listed below in **Table 10-22.**

137. This assessment considers the design parameters of the proposed Project which are predicted to result in the greatest environmental impact, known as the 'realistic worst case scenario'. The realistic worst case scenario represents, for any given receptor and potential impact on that receptor, various options in the Design Envelope that will result in the greatest potential for change to the receptor in question. Given that the realistic worst case scenario is based on the design option (or combination of options) that represents the greatest potential for change, confidence can be held that the development of any alternative options within the design parameters will give rise to effects no greater or worse than those included in this impact assessment. The realistic worst case scenarios with the potential to result in the greatest effect on an identified receptor or receptor group within the water environment Study Area are also described in **Table 10-21**. These scenarios have been selected from the details provided in **Chapter 04: Description of the proposed Project**.

Table 10-21. Design scenario considered for the assessment

Potential impact	Design scenario	Justification
Construction		
Pollution of surface water from excess fine sediment and chemical spillage risk. Temporary impacts on surface watercourses from temporary dewatering or changes in hydrology. Temporary impacts on the hydromorphology of watercourses from open cut watercourse crossings. Impacts on groundwater resources, local water supplies and baseflow to watercourses from temporary dewatering of excavations or changes in groundwater flow. Temporary changes in flood risk from changes in flow or surface water runoff.	Construction of Onshore Infrastructure: Watercourse Crossings. Maximum number of watercourse crossings assumed for the assessment is 11. This includes the following identified ordinary watercourses as shown on **Volume 5: Figure 10.3: Identified Ordinary Watercourses** WC05, T05a, WC06, T07c, T07b, WC14, WC07, two tributaries of Goldborough Pill West, WC12 and T12a.	The reasonable worst case design scenario for the maximum number of watercourse crossings for water environment impact assessment will result from all watercourses within the OnECC being crossed by the Onshore Export Cable.
	Construction of Onshore Infrastructure: Watercourse Crossings - Trenching through small watercourses. It is assumed that the 11 identified ordinary watercourses within the OnECC (see row above) will be crossed by the Onshore Export Cable via dry open cut trench methodology. Seven roads will also be crossed by trenching and eight underground utilities by HDD.	The reasonable worst case design scenario for the type of watercourse crossings for water environment impact assessment will result from all watercourses within the OnECC being crossed by the Onshore Export Cable via dry open cut trench methodology
	Construction of Onshore Infrastructure: Temporary access tracks and haul roads. Where there is no direct access available to the working areas from the local highway network, temporary access tracks and haul roads will be constructed and will be approximately 10 m wide. The method of construction is unknown at this stage and depends on topography and access requirements. However, it is assumed that the 11 identified ordinary	Although efforts to avoid temporary watercourse crossings for access should be made by the Contractor, for the purpose of this water environment impact assessment the reasonable worst case design scenario is that all watercourses that need to be crossed by the Onshore Export Cable within the OnECC will also be temporarily culverted in order to construct temporary access tracks and haul roads. The culverts will be temporary pipe culverts sized to accommodate a design flow/channel cross section, and will be no more than 12 m long (i.e. to accommodate for the approximately 10 m wide haul

Potential impact	Design scenario	Justification
	watercourses within the OnECC (see first row) will be crossed.	road). The temporary culverts for access will be removed as soon as possible after the relevant works are completed.
Operation and maintenance		
Permanent hydromorphological impacts to watercourses from watercourse crossings if not reinstated to baseline conditions.	Construction of Onshore Infrastructure: Watercourse Crossings - Maximum number of watercourse crossings assumed for the assessment is 11. This includes the following identified ordinary watercourses as shown on **Volume 5: Figure 10.3: Identified Ordinary Watercourses** WC05, T05a, WC06, T07c, T07b, WC14, WC07, two tributaries of Goldborough Pill West, WC12 and T12a.	The reasonable worst case design scenario for the maximum number of watercourse crossings for the water environment impact assessment will result from all watercourses within the OnECC being crossed by the Onshore Export Cable.
	Construction of Onshore Infrastructure: Watercourse Crossings - Trenching through small watercourses. It is assumed that the 11 identified ordinary watercourses within the OnECC (see row above) will be crossed by the Onshore Export Cable via dry open cut trench methodology.	The reasonable worst case design scenario for the type of watercourse crossings for water environment impact assessment will result from all watercourses within the OnECC being crossed by the Onshore Export Cable via dry open cut trench methodology.
Impacts on surface water and groundwater quality from surface water runoff including excess fine sediment or potential accidental spillages during maintenance activities. Impacts on the rate and volumes of surface water run-off entering local watercourses and subsequent increase in flood risk.	Removal and re-installation of sections of the Onshore Export Cable during maintenance of the Onshore Infrastructure if specific maintenance is required.	The reasonable worst case design scenario during operation and maintenance is the removal and re-installation of sections of the Onshore Export Cable as this presents the greatest risk of disturbance and potential for hydromorphological impacts to watercourses and downstream users such as licensed abstractions, and changes in flood risk. Where specific maintenance on the Onshore Export Cable is required, a section (usually tens of metres long) will be removed, a new section (cable spare) will be spliced in with field joints, and the cable will be

Potential impact	Design scenario	Justification
		reinstalled. This is not anticipated to be a frequent requirement.
Decommissioning		
Pollution of surface water from excess fine sediment and chemical spillage risk. Temporary changes in flood risk from changes in volume and rate of surface water runoff.	Complete decommissioning of the onshore substation, which will be removed and the site reinstated to its original function or for alternative use. Underground cables will also be removed where practical and possible to do so. It is not envisaged that watercourses will be open cut for the removal of cables, which will remain in situ unless they can be pulled back from an excavation away from the watercourse (e.g. 20 m).	The reasonable worst case design scenario during decommissioning is the complete removal of the Onshore Substation as this presents the greatest disturbance, potential risk of sediment and contaminants being released, changes to flood risk, impacts to water resources and watercourse hydromorphology. However, due to the potential adverse impacts that will occur by attempting to remove cables beneath watercourses, these will be left in situ unless they can be extracted by pulling back from an excavation away from the watercourse.
Pollution of surface water from excess fine sediment and chemical spillage risk. Temporary changes in flood risk.	Complete decommissioning of the Onshore Export Cable, which will be removed and the site re-instated to its original state (other than where beneath watercourses as per above row).	The reasonable worst case design scenario during decommissioning is the complete removal of the Onshore Export Cable (other than where beneath watercourses as per above row), as this presents the greatest disturbance and potential for pollution impacts, changes to flood risk, impacts to water resources and watercourse hydromorphology.

10.7.1. Impacts scoped out of assessment

138. Several potential impacts have been scoped out of the assessment for the terrestrial water environment during EIA scoping. These impacts are outlined, together with the justification for scoping them out, in **Table 10-22**.

Table 10-22. Potential impacts scoped out the assessment for water environment

Potential impact	Justification
Construction	
Demand for water during construction	During construction it is assumed that a temporary potable water supply will be provided for workers. Water for construction will similarly not be anticipated to use a mains supply. As there will not be a new formal supply required for construction, assessment of water supply during construction has not been considered further.
Tidal flood risk at landfall location	Not likely to result in significant effect as good practice methods will be used when installing cables.

Potential impact	Justification
Operation and maintenance	
Maintenance of landfall cables in areas of known tidal flood risk. People at risk when working in areas of known tidal flood risk when installing cables at landfall.	Not likely to result in significant effect as good practice methods will be used when installing cables as described in **Section 10.8.**
Pollution of surface water features due to deposition or spillage of soils, sediment, oils, fuels, or other construction chemicals, or through uncontrolled site run-off	Not likely to result in significant effect as the adoption of the Drainage Strategy and OEMP will ensure no significant impacts during operation.
Decommissioning	
Potential impacts on local water supplies	During decommissioning it is assumed that a temporary potable water supply will be provided for workers. Water for decommissioning will similarly not be anticipated to use a mains supply. As there will not be a new formal supply required for construction, assessment of water supply during construction has not been considered further.

10.7.2. Assessment *Assumptions and Limitations*

139. The assessment is based on the proposed Project design set out in **Chapter 04: Description of the proposed Project.**

140. Water quality monitoring has not been undertaken at this stage. Reference is made to the nearest NRW water quality monitoring data. This was considered sufficiently robust for consideration of water feature importance across the area (which adopts a holistic approach and considered a wide range of attributes in addition to water quality) and the determination of impacts on the surface water environment.

141. The importance of the water environment receptors has been defined using published data sources and observations from a walkover hydromorphological surveys of the watercourses crossed by the proposed Project. The availability of data with which to define the receptor importance of these attributes is considered robust and therefore this approach is considered acceptable.

142. It was not possible to survey the entire length of all watercourses within the OnECC due to land access arrangements, health and safety and time constraints. However, the survey data that has been obtained and presented in **Appendix 10B: Onshore Water Environment Site Survey Report** is representative of each watercourse and sufficient for the prediction of effects. Site specific variances for final crossing locations will be surveyed as part of pre-works surveys and used to inform reinstatement.

143. As there are no flow gauges on any watercourses within the Study Area, the Q95 flow has been estimated using existing National River Flow Archive data (UKCEH, 2024) from two nearest flow gauging stations: 60004 - Dewi Fawr at Glasfryn Ford and 60003 - Taf at Clog-y-Fran. These stations are located outside of the Study Area but share similar underlying geology to the Study Area and were deemed suitable to use in proportion calculations for the watercourse catchments within the Study Area.

144. Groundwater levels will be confirmed by ground investigation post consent to confirm cable burial depth across the OnECC and attenuation basin design (depth, permanent water level etc) at the Onshore Substation. This will take place as part of the detailed design, post consent in line with **Appendix 4A: Outline CEMP.**

145. Where a watercourse is located within the OnECC it has been assumed it will be crossed by the Onshore Export Cable (as well as any temporary access tracks and haul roads) as a reasonable worst-case scenario approach.

146. It is assumed (as reasonable worst-case scenario) that any watercourse within the OnECC will be crossed via dry open cut trench methodology when installing the Onshore Export Cable.

147. It is assumed (as a reasonable worst-case scenario) that any watercourse within the OnECC will also be culverted for the construction of temporary access tracks and haul roads, which may run alongside it. In practice, there are likely to be existing accesses into fields that can be used, although at this stage this level of design information is not known. It is assumed that any temporary culvert for access will be between 10-12 m long (the haul road will be approximately 10 m wide) and will be a suitably sized pipe culvert for the estimated flows that may be experienced and to fit the channel cross section. A geotextile will be placed across the bed and clean, washed aggregates placed on top as the pipe bed and to build up to the required road level. A parapet made of pea-gravel filled sacks will be provided on either side and regularly maintained during the works. The pipes will extend beyond this to reduce the risk that aggregate falls into the channel. The temporary crossing will be removed as soon as possible, and the watercourse reinstated as found. To allow this a Pre-construction Morphology and Riparian Habitat Survey will be carried out.

148. The construction methodology of the Onshore Export Cable and installation below watercourses is outlined in **Section 10.8.1** of this chapter and will follow good industry practice methods. The dimensions stated are indicative but represent the likely maximum parameters, with the exact burial depths to be determined following future site and ground investigations within the detailed design stage which will take place post-consent.

149. At the time of writing of this report, the number of staff that will be present at the operational substation is not confirmed (both permanent and temporary). Given the size of the layout, a conservative assumption of 10 permanent and 10 part-time staff is considered in order to estimate the foul discharge loadings for the treatment and discharge proposals of the Onshore Substation. There will be no discharge to the public sewer system, instead it is proposed that a sewage treatment plan (Klargester BioDisc or similar) is used to treat the effluent and, foul water post-secondary treatment, is discharged to WC07 under a permit from NRW (if required). Application for the permit will be applied for post-consent.

150. At the time of writing, the construction methodology for any temporary access tracks or haul roads is unknown, as it is subject to investigations into ground conditions and topographical surveys. It is assumed that the temporary access tracks or haul roads may need to cross the 11 identified ordinary watercourses in the OnECC and the reasonable worst case scenario will involve the installation of temporary pipe(s) culverts to ensure continuity in flow.

151. The risk from surface water runoff during operation from the proposed substation to WC07 has been assessed qualitatively based on design principles that have been presented in **Appendix 10A - Annex 10A: Drainage Strategy**. It is assumed that any future planning permission will be pursuant to a planning condition requiring a detailed Drainage Strategy to be provided. This will be supported by an appropriate water quality risk assessment ensuring that the required number of treatment train components are provided.

152. The Sustainable Drainage Systems (SuDS) Manual (CIRIA, 2015) only provides a limited number of land use types and so those selected will be the most suitable for the components of the Onshore Substation, based on professional judgement. Where more than one pollution hazard category applies to a component of the Onshore Substation, the worst pollution hazard will be selected for the conveyance features.

153. The reasonable worst case design scenario during operation is for the attenuation pond associated with the drainage design of the Onshore Substation to be unlined as this presents the greatest risk to groundwater pollution through infiltration.

10.8 Embedded Mitigation, Management Plans and Good Practice

154. The proposed Project has been designed, as far as possible, to avoid and minimise impacts and effects on the water environment through the process of design development. As part of the project design process, several designed-in measures have been proposed to reduce the potential for impacts on the water environment (see **Table 10-23**). The design of the proposed Project therefore includes embedded mitigation measures including reference to various management plans that will be produced as conditions of consent. This approach has been employed to demonstrate commitment to mitigation measures by including them in the design of the proposed Project and as such these measures have been considered within the assessment presented in **Section 10.9**. Assessment of importance/sensitivity, magnitude and therefore significance includes the implementation of these measures. This section details the embedded mitigation and standard good practice measures incorporated into the proposed Project.

Table 10-23. Mitigation measures, management plans and best practice adopted as part of the proposed Project

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Design Embedded Measures	
Surface water Drainage Strategy including a Foul Water Management Strategy	A Drainage Strategy (**See Appendix 10A – Annex 10A: Drainage Strategy)** has been prepared for the proposed Project that proposes a sustainable drainage strategy to ensure flood risk is not increased from changes to surface water runoff and that surface water runoff is suitably treated prior to discharge. Details of this and the foul water management strategy are summarised in **Section 10.8.1**.
Installation of Onshore Cables: Watercourse Crossings	The methodology for the installation of the Onshore Export Cable at watercourse crossings is described in Section. Although the reasonable worst case scenario (i.e. dry open cut methodology) is considered for all potential 11 watercourse crossings, appropriate mitigation is required to ensure there is no significant impacts to the watercourses. Details of the proposed mitigation are summarised in **Section 10.8.1**.
Installation of Onshore Cables: Watercourse crossings for temporary access	It is assumed (as reasonable worst-case scenario) that any watercourse within the OnECC will also be culverted for the construction of temporary access tracks and haul roads, which may run alongside. In practice, there is likely to be existing accesses into fields that can be used, although at this stage this level of design information is not known. It is assumed that any temporary culvert for access will be between 10-12 m long (the haul road will be approximately 10 m wide) and will be a suitably sized pipe(s) culvert

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
	for the estimated flows that may be experienced and channel cross section. A geotextile will be placed across the bed and clean, washed aggregates placed on top as the pipe bed and to build up to the required road level. A parapet made of pea-gravel filled sacks will be provided on either side and regularly maintained during the works. The pipes will extend behind this to reduce the risk that aggregate falls into the channel. The temporary crossing will be removed as soon as possible, and the watercourse reinstated as found. To allow this a Pre-construction Morphology and Riparian Habitat Survey will be carried out, and this is included in described in the embedded mitigation measures set out in **Section 10.8** and in **Appendix 4A: Outline CEMP**.
Landfall installation methodology: HDD	The methodology for the Onshore Export Cable installation at landfall is detailed in **Section 10.8.1**. Although this methodology includes measures to minimise the risk to the coastal waters at Freshwater West, there are risks associated with the use of drilling muds and plant operation that need to be managed. Details of the proposed mitigation are summarised in **Section 10.8.1**.
Management of flood risk during construction	The measures outlined in detail in **Section 10.8.1** relate to the Onshore Export Cable and Substation flood risk management measures during construction, decommissioning and operation.
Good Practice	
Guidance for pollution prevention	Environmental regulatory Guidance for Pollution Prevention (GPP) for Wales (as well as Northern Ireland and Scotland) (NetRegs Website) is described in **Section 10.8.2** and provide information on environmental good practice. Following this guidance helps manage the environmental responsibilities to prevent pollution and comply with the environmental law.
Management of construction site runoff	The measures outlined below in **Section 10.8.2** are included in the **Appendix 4A: Outline CEMP** submitted alongside the application and will be required for the management of fine particulates in surface water runoff that may occur as a result of the construction activities.
Management of spillage risk	The measures outlined below in **Section 10.8.2**are included in **Appendix 4A: Outline CEMP** submitted alongside the application and include mitigation measures relating to the control of spillages and minor leaks adopted during the construction works.
Working in, over, under and adjacent to water features	Details of minimum requirements of the contractor when working in, over, under and adjacent to water features are provided in **Section 10.8.2**. These also include management of risk to morphology of watercourses from watercourse crossings, and the management of risk to watercourses from temporary access tracks and haul road crossings.

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Management of groundwater related activities	Where excavations are required (e.g. the construction of the attenuation basin at the Onshore Substation and construction of crossings over ordinary watercourses from the Onshore Export Cable) suitable mitigation measures are proposed. These are detailed in **Section 10.8.2.**
Management Plans	
Construction Environmental Management Plan	The construction of the proposed Project will take place under **Appendix 4A: Outline CEMP**. The Outline CEMP details the measures that will be undertaken during construction to manage the risk of water pollution and physical damage to water features. The final CEMP will be prepared by the Contractor Application in advance of construction works based on the final recommendations of the ES and consultation with statutory bodies during determination of The CEMP. The CEMP will include good practice methods that are established and effective measures to which the proposed Project will be committed through the development consent. The measures within the document relevant to the water environment will focus on managing the risk of pollution to surface waters and the groundwater environment. It will also consider the management of activities within floodplain areas (i.e. kept to a minimum and with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable). **Appendix 4A: Outline CEMP** will be reviewed, revised and updated as the proposed Project progresses towards construction to ensure potential impacts and residual effects are considered and addressed as far as practicable, in keeping with available good practice at that point in time.
Water Management Plan (WMP)	**Appendix 4A: Outline CEMP** will be supported by a Water Management Plan (WMP) that will provide greater detail regarding the mitigation to be implemented to protect the water environment from adverse effects during construction. The WMP will be secured through a Condition as part of **Appendix 4A: Outline CEMP**. The potential for adverse impacts will be minimised by the adoption of the general mitigation measures described later in this chapter, and which will be set out in further detail in the WMP.

Embedded Mitigation Measures, Management Plans and Best Practice	Justification
Operation Environmental Management Plan (OEMP)	The operation of the proposed Project will take place under an OEMP. An OEMP describes the measures that will be followed during operation and maintenance in line with up to date environmental legislation, policy and guidance to manage any risk of impacts on the water environment. Operational and maintenance actives will potentially include specific maintenance of the Onshore Export Cable, whereby a section could be removed, and a new section re-installed. Maintenance and operational requirements of the substation is expected to be relatively low in the initial five to ten years, but may increase during later stages of its design lifespan. Good practice measures outlined in **Section 10.8.2** and as outlined in **Appendix 4A: Outline CEMP** for construction activities will apply to the operation and maintenance activities of the Onshore Export Cable, and any potential works to the Onshore Substation.
Decommissioning Environmental Management Plan (DEMP)	The decommissioning of the proposed Project will take place under a DEMP. A DEMP details the measures that will be undertaken during decommissioning in line with up to date environmental legislation, policy and guidance to manage any risks to the water environment. Good practice measures outlined in **Section 10.8.2** and as outlined in **Appendix 4A: Outline CEMP** for construction activities will apply to the decommissioning phase of the proposed Project.

10.8.1. Design Embedded Measures

Surface Water Drainage Strategy

155. A surface water Drainage Strategy (**Appendix 10A – Annex 10A: Drainage Strategy)** has been prepared for the proposed Project which focuses on the Onshore Substation and assesses the increase in surface water runoff in accordance with sustainable drainage principles from the substation platform area in order to not increase flood risk to any downstream area and ensure no deterioration of the water environment from pollution risk.

156. The location of the Onshore Substation in its current condition has no formal surface water drainage system. The topography of the Onshore Substation site has a general south westerly fall with a high point of around 67 mAOD located in the northeastern portion of the Onshore Substation site. The elevations decrease towards the bottom left corner of the substation land parcel where they reach elevations of around 52 mAOD. The elevations continue to decrease towards the existing ordinary watercourse (WC07) and are shown to be around 47 mAOD in that area. As the entirety of the Onshore Substation site is currently greenfield, it is unlikely that there is an existing underground drainage network located within the onshore project boundary for the Onshore Substation.

157. The ground conditions at the Onshore Substation site are considered suitable for infiltration, however this is subject to further ground investigation and infiltration testing on Onshore Substation site, therefore has not been considered at this stage of the design development[9].

158. Surface water from the Onshore Substation is proposed to discharge to the existing ordinary watercourse (WC07) as this option permits a gravity connection for surface water disposal. Surface water flows will be temporarily stored in an attenuation basin (suitably attenuated up to 1% Annual Exceedance Probability (AEP) plus climate change allowance of 40%) and discharged to the watercourse at a restricted rate. The outfall to the existing ordinary watercourse is proposed to be an engineered outfall supported by a concrete headwall (**See Appendix 10A Annex A: Drainage Strategy)** due to the proposals of a piped network from the attenuation basin to the outfall. However, subject to future topographical surveys and ground investigation for the next stage of design, options for SuDS such as swales will be considered in favour of piped networks. Furthermore, the designs will consider avoiding the use of an engineered outfall in favour of new ditches/ditch outfalls. By connecting to the existing watercourse using ditches, the adverse impact of new engineered structures can be avoided. However, there may be topographical or other constraints to achieving this.

159. Overland flow coming from the north of the proposed Project will be captured and conveyed from the proposed infrastructure via a cut-off swale which will discharge the flows into the surrounding area away of the proposed Project and slowly infiltrate into the surrounding ground.

160. The outline design parameters for the proposed attenuation basin is as follows:

- Total Depth – 1.2 m;
- Freeboard – min. 300 mm;
- Slope – 1:4;
- Surface Area – 1,709 m^2;
- 1% AEP + 40% climate change allowance – Design event; and
- Limited discharge to maximum 2.88 l/s.

161. The C753 SuDS Manual's Simple Index Approach (CIRIA, 2016) has been applied to the land use for the Onshore Substation for the proposed Project from which pollution from diffuse urban runoff might occur, to understand the potential risks to the water environment.

162. Within **Appendix 10A Annex A: Drainage Strategy** the SuDS Mitigation Indices is compared against the Pollution Hazard Indices for the proposed Project. The pollution indices are based on the operational site land use. It is anticipated that surface water runoff from the hardstanding areas will be exposed to pollution from the roof of buildings and infrequent non-residential vehicular parking.

163. The Drainage Strategy **(Appendix 10A Annex A: Drainage Strategy)** concludes that each individual pollution mitigation indices exceeds the development pollution indices. Therefore, the mitigation measures are considered to be satisfied for the proposed Project.

[9] The disposal of surface water should be considered by means of soakaways as the primary method. If this is not practical, discharge should be to the closest watercourse or land drain. Discharging to public sewers is a last resort if discharging to soakaways and watercourses is unachievable.

Foul Water Management Strategy

164. A Foul Water Management Strategy is included within **Appendix 10A – Annex 10A: Drainage Strategy.**

165. NRW's order of preference for means of foul water discharge are:

- Connect to a public sewer.
- Discharge to land; and
- Discharge to watercourse.

166. As stated in the Drainage Strategy (presented in **Appendix 10A – Annex 10A: Drainage Strategy**) connection to a public sewer is not viable due to the rural setting of the Onshore Substation site and no public sewers present within the immediate vicinity. Therefore, the proposed foul water drainage strategy is to collect foul flows from the proposed facilities via conventional piped drainage and collectively passed through a packaged treatment plant providing at least secondary treatment of effluent.

167. It is proposed that a sewage treatment plant (e.g. Klargester BioDisc or similar) is used to provide secondary treatment to the effluent and that foul water post-secondary treatment is discharged to the same ordinary watercourse as the surface water (i.e. WC07).

168. NRW provides guidance to those running and maintaining a septic tank or small sewage plant (NRW, n.d.) and states that most package sewage treatment plants (PSTP) require professional servicing every 12 months and detailed checks every 6 months. Maintenance will be carried out by suitably trained and qualified personnel in line with the manufacturer's specification. This is often through a maintenance agreement with an authorised servicing company. The PSTP will need to be registered with NRW, and a permit to discharge domestic sewage is expected to be required from NRW, for more information see **Section 10.8.2, Secondary Consents.**

Installation of Onshore Cables: Dry Open Cut Trenched Watercourse Crossings

169. The reasonable worst case design scenario for the type of watercourse crossings for Terrestrial Water Environment Impacts will result from all watercourses within the OnECC being crossed by the Onshore Export Cable via dry open cut trench methodology. Therefore, the methodology for the installation of the Onshore Export Cable using dry open cut trenching techniques will include measures to minimise the risk to the water environment. The cable will be buried at sufficient depth to prevent exposure (minimum 1.5 m below the bed).

170. The 11 ordinary watercourses which could be crossed by the Onshore Export Cable are: WC05, T05a, WC06, WC07, T07c, T07b, WC14, WC12, T12a and two tributaries of Goldborough Pill West.

171. The methodology for dry open cut trenching will be either by using temporary flume pipes or damming and over pumping. Details of these methodologies can be found in **Chapter 04: Description of the proposed Project.**

172. Where intrusive crossing techniques will be used, a Pre-construction Hydromorphological and Riparian Corridor Survey will be undertaken to record channel features and provide the baseline against which reinstatement will be provided. Reinstatement will aim to provide an improved channel form with enhancement works to be carried out (where relevant and appropriate to do so) between 5 and 10 m upstream and downstream of the open trench where possible, and with landowner agreement of beyond any future easement distance.

173. Where possible intrusive watercourse crossings will be carried out during drier periods of the year or during a period of dry weather where flows in the watercourse are low (this may be baseflow or where the channels are very small and not as well connected to groundwater, they may even be dry). However, this cannot be guaranteed and so any water flow within the watercourse will need to be over-pumped/flumed through the works area to maintain a dry trench. Although this has a temporary impact on the flow/channel, as well as flood risk, it reduces the pollution risks by reducing the pollutant pathways. Where flows are over-pumped the outlet should be baffled to avoid encouraging erosion of the bed or banks locally.

174. Bank and bed sediments must be stored separately and in distinct layers as excavated on geotextile layers so they can be reinstated as found following completion of the works. The banks and the bed will need to be appropriately reprofiled with the inclusion of suitable geomorphic features with the aim to provide betterment on the original channel. Banks will be replanted with suitable riparian species. A suitable geotextile will need to be pinned in place to provide bank protection while new planting establishes (or other suitable measures to prevent soil erosion and bank instability).

175. Temporary fencing may also need to be installed where local land use will remain unchanged and fields are used for livestock to prevent bank poaching while new planting re-establishes. The temporary fencing may need to be in place for a few years.

176. The quality of water for downstream users will be protected through the implementation of the Good Practice measures outlined in **Section 10.8.2**. The supply of water is to be maintained through the methodology of over-pumping or fluming of the flow. Any works to ordinary watercourses are likely to require a temporary impoundment/abstraction licence, as detailed in **Section 10.8.2, Secondary Consents**, and this licence will consider the impact on third parties with appropriate controls. The contractor will also engage with the licenced abstraction users to ensure their needs are accounted for during the works. The installation of the Onshore Export Cable is expected to take 3 weeks per 1 km of cable, therefore for watercourse crossings (of the up to 11 potentially crossed ordinary watercourses) which are <3 m in width, the anticipated time taken to cross a watercourse will be days not weeks.

Landfall installation and other crossings (where open cut not possible): HDD

177. In addition to the control and management measures for site runoff and spillage risk noted below, the methodology of the landfall installation at Freshwater West using HDD techniques, will include measures to minimise the risk to the Terrestrial Water Environment.

178. Details of this methodology are provided in **Chapter 04: Description of the proposed Project.** Although the use of this technique avoids the need to excavate a cable trench at Freshwater West, there are risks associated with the use of drilling fluids and plant within and close to the sea and other surface water features. For example, although rare, without due care there is a risk that drilling fluids, including naturally occurring minerals, can 'break out' into the sea leading to pollution. There is also a need to manage drilling fluids and wastewater so that this will not be spilt into the sea when working on.

179. Although the landfall is located approximately 0.3 km from Freshwater West, the topography of the land falls away from the Landfall towards Freshwater West to the south west. Construction traffic travelling along the B4320 may also lead to muddy deposits that might have an indirect pathway to WC04. However, where there may be the need for other HDD crossings (e.g. of roads) there could be impacts to other water features.

180. The method of HDD seeks to minimise the risk of pollution to any nearby water features (i.e. the coastal waters at Freshwater West and indirectly to WC04 in relation to the Landfall but potentially other water features if HDD used elsewhere such as to cross any roads). The send and receive pit excavations will be located at least 10 m from any nearby watercourse (measured from the water's/channel edge under normal flows) under which they will be directional drilled. The HDD burial depth of the cable at landfall will be determined during detailed design, however currently it is proposed to be up to 40 m below the seabed.

181. The exact dimensions of the send and receive pits will be determined by site and ground conditions but will be kept to a safe minimum in terms of length, width and depth. For this assessment, it has been assumed that the send and receive pits will be no greater than 10 m by 5 m by 5 m deep. A shoring system appropriate to the ground conditions will be used to minimise water ingress into the pits. This may be timbers, sheet piling, or a modular system and will be chosen based on suitability for the site conditions. The ingress of any groundwater will be carefully managed through design of the send or receive pit, shoring method, and a pumping and treatment system. Excessive ingress of water will make the pit unsafe and thus it is important that ingress is minimised and that a suitable system of managing that water is implemented. Once the cable is installed beneath the water feature or other feature being crossed the pits and any cable trenches will be backfilled to the original ground level and seeded to reduce the risk of runoff and fine sediments entering the watercourse. For HDD, the drill fluids used will be water based, mixed with naturally occurring minerals like bentonite clay. The water component of the drilling fluid will be mains water, obtained from a nearby supply and delivered to site when required.

182. The bentonite within the drilling fluid is a naturally occurring mineral and enables the fluid to have sufficient viscosity to carry the cutting chips back to the surface machine whilst lubricating and keeping cool the drilling bit. HDD, or other trenchless techniques, will be undertaken by a specialist Contractor and the water column above the drill path will be continuously monitored during drilling. It is acknowledged that drill fluid leakage into a watercourse is not a common problem. However, where any leakage of drilling fluid is observed in the watercourse or there is an increased perceived risk (i.e. lack of drilling fluid returns) the HDD operation will be suspended, remediation action implemented, and subsequently the methodology for the HDD re-evaluated.

183. With some methodologies the drilling fluid returns to the drilling rig and is recycled within the drilling rig (e.g. the Ditch Witch). Any wastewater / drilling products which are not recycled must be stored and removed from the HDD compound by a suitable waste management Contractor and disposed of at a licensed wastewater facility.

184. There is a small risk of drilling fluid break out from drilling to the watercourse or the sea if not appropriately mitigated for site specific conditions. A site-specific hydraulic fracture risk assessment will be produced prior to commencing works to define the mitigation required based on ground conditions. This requirement is included within the **Appendix 4A: Outline CEMP.**

Management of Flood Risk during Construction

185. As a minimum, the contractor will adhere to the following measures as outlined in **Appendix 10A: Flood Consequence Assessment**:

- Placement of construction compounds and stockpile facilities outside of areas of fluvial, tidal, and surface water flood risk.

- Storage of mobile equipment outside of areas of tidal, fluvial, and surface water flood risk, when they are not required for scheduled works.
- Development of a Flood Emergency Plan in collaboration with the appointed Contractor(s) for the grid connection, which will include information about the safe access and egress routes.
- Maintenance of flow continuity at watercourse crossing points through the implementation of damming and over pumping.
- Where possible, work will be planned to be completed during months of lower rainfall levels.
- The crossing of watercourses will take place during periods of normal to low flow only (i.e. avoiding spate conditions). The Contractor will be required to monitor weather forecasts and commence works on a crossing only when there is a suitable weather window of no heavy or prolonged rain forecast to complete them.
- Access tracks will not be elevated so that they do not interrupt natural overland drainage pathways.
- Storage of excavated material adjacent to the cable trenches will not be continuous.
- Pre-construction drainage measures will be implemented within the working corridor to reduce disruption to natural drainage pathways.
- Existing field ditches and culverts will be cleaned prior to the commencement of construction activities.
- Temporary cut-off drains will be installed parallel to the proposed trenches to prevent soil and groundwater entering the trenches.
- Designation of individuals to register for flood warnings, flood alerts, and weather warnings for the local area. Appropriate actions will be taken in the event of adverse weather conditions.

186. For further information on flood risk mitigation measures please refer to **Appendix 10A: Flood Consequence Assessment**.

10.8.2. Good Practice

Guidance for Pollution Prevention

187. The following relevant Guidance for Pollution Prevention (GPP) has been released to date on the NetRegs website (Netregs Website). These are environmental regulatory guidance for Wales:

- GPP 1: Understanding your environmental responsibilities – good environmental practices;
- GPP 2: Above ground oil storage;
- GPP 3: Use and design of oil separators in surface water drainage systems;
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer;
- GPP 5: Works and maintenance in or near water;
- GPP 6: Working at construction and demolition sites;
- GPP 8: Safe storage and disposal of used oils;

- GPP 13: Vehicle washing and cleaning;
- GPP 19: Vehicles: Service and Repair;
- GPP 20: Dewatering underground ducts and chambers;
- GPP 21: Pollution Incident Response Plans;
- GPP22: Dealing with spills; and
- GPP26: Safe storage – drums and intermediate bulk containers.

188. Where new GPP is yet to be published, previous Pollution Prevention Guidance (PPG) still provides useful advice on the management of construction to avoid, minimise and reduce environmental impacts, although they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. Construction phase operations will be carried out in accordance with guidance contained within the following PPG (NetRegs Website):

- PPG7: Safe storage – the safe operation of refuelling facilities
- PPG18: Managing fire water and major spillages

189. Additional good practice guidance for mitigation to protect the water environment can be found in the following key CIRIA documents and British Standards Institute documents:

- British Standards Institute (2009) BS6031:2009 Code of Practice for Earth Works (British Standards, 2009);
- British Standards Institute (2013) BS8582 Code of Practice for Surface Water Management of Development Sites (British Standards Institute, 2013);
- C753 (2015) The SuDS Manual (second edition) (CIRIA, 2015);
- C811 (2023) Environmental good practice on site guide (fifth edition) (CIRIA, 2023);
- C649 (2006) Control of water pollution from linear construction projects, technical guidance (CIRIA, 2006);
- C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice (CIRIA, 2004); and
- C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors (CIRIA, 2001).

Management of Construction Site Runoff

190. Measures to manage fine sediment in surface water runoff as a result of construction activities are included in **Appendix 4A: Outline CEMP.** There are a wide range of measures that can be adopted by the Contractor to reduce the risk of excessive fine sediment in runoff (e.g. the timing of works, minimising earthworks and seeding or covering them), to intercept runoff to prevent uncontrolled runoff from the proposed Project (e.g. by using cut off drains, fabric silt fences and matts (in channel), bunds and straw bales (that may be placed in small channels), designated areas for cleaning plant and equipment, wheel washes and road sweepers), and to treat runoff to remove excessive levels of fine sediment. It will be for the Contractor to continually monitor the need for measures depending on the nature of the works being undertaken, the weather conditions, and the performance of sustainable drainage systems installed.

Management of Spillage Risk

191. Measures will be implemented to manage the risk of accidental spillages on the proposed Project and potential conveyance to nearby water features via surface runoff or land drains. These measures relating to the control of spillages and leaks are summarised in **Appendix 4A: Outline CEMP** and will be adopted during the construction works. Measures will be implemented in accordance with prevailing pollution prevention legislation and following good practice guidance summarised in the Good Practice Guidance sub-section above. They will include details of how fuel and other chemicals (including cementitious products) will be stored, used on site, and equipment and plant cleaned, as well as how leaks and spillages will be prevented or remediated if needed. This will also include the implementation of a Pollution Prevention Plan. In addition, any site welfare facilities will be appropriately managed, and all foul waste disposed of by a licensed contractor to a suitably permitted facility.

Working in, Over, Under, and Adjacent to Water Features

192. As a minimum the contractor will adhere to the following measures:

- Works in, over, under or adjacent to water features will be avoided, but if this is not possible (i.e. for watercourse crossings) dry working areas will be created using the least intrusive techniques with downstream measures to prevent any silt and chemical spillages propagating (e.g. straw bales across the channel and in series, silt mats or bubble curtains in larger channels);
- For smaller scale bank works (e.g. construction of new engineered outfalls from the Onshore Substation runoff and foul water discharge) it is assumed that the works can be temporarily isolated from the flow using sand bags or other similar ways to create a dry working environment. Headwalls should be pre-fabricated were possible to avoid pouring wet concrete near open water;
- Any temporary barriers to flow must be partially removed at the end of shifts once pumps/equipment and any debris/materials have been removed from the channel. Discharges of water back into the channel (from diversion or general site temporary drainage) must be adequately baffled to avoid localised erosion of the bed and banks. Spare pumps must be maintained on site should they be needed due to failure of the primary pump or if flows increase. These works are to be undertaken at periods of lower flows only; and
- As stated below, temporary works to remediate any adverse impact of intrusive flow control measures will be implemented to ensure the channel is left as found. Where riparian vegetation is cleared adequate protection of soils will be provided (e.g. using a biodegradable geotextile staked into the ground using wooden pegs) until vegetation re-establishes.

Management of Risk to Morphology of Watercourses from Watercourse Crossings:

193. It is assumed that all watercourses are likely to be crossed using dry cut open trench methodology. A Pre-construction Morphology and Riparian Corridor Survey of the channel of each watercourse to be crossed by the Onshore Export Cable or temporary construction access will be undertaken prior to construction, in line with **Appendix 4A: Outline CEMP**. The Pre-construction Morphological and Riparian Corridor Survey is to ensure that there is a formal record of the condition of each watercourse prior to commencement of works to install cables beneath the channel. The survey is a precautionary measure so that should there be any

unforeseen adverse impacts there is a record against which any remedial action can be determined.

Management of Risk to Watercourses from Temporary Access Track and Haul Road Crossings

194. If no direct access is available to the working areas from the local highway network, a temporary haul road for the cable corridor route and construction access arrangements for working areas may be required. If needed, temporary access tracks and haul roads will be constructed and will typically be approximately 10 m wide, including verges and drainage channels, although these could be wider in places depending upon topography and access requirements. The method of construction will also depend on ground conditions and topography.

195. It is assumed that all watercourse crossings required as part of the construction of a temporary access track and/or haul road will require installation of temporary culverts. Generally, existing bridges or access tracks should be utilised where possible to avoid crossing watercourses altogether and where there is no existing crossing, a temporary crossing should be constructed.

196. General good practice for temporary crossings can be found in SEPA's Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods (SEPA, 2009) and consists of:

- Preventing road runoff from entering watercourses by having the deck sealed or lined, having an edge upstand (e.g., timber, straw bales, sandbags, textiles) and ensuring a slight gradient to ensure surface water is not shed into the watercourse.
- Reduce risk of bed and bank erosion by avoiding crossing over active areas (e.g., outside of meander bends), ensuring the crossing is perpendicular to the river to ensure that the crossing is as short as possible, reducing risk of localised scour. Mitigate flood risk impact through appropriately sizzed crossings by understanding the hydrology of the watercourse being crossed.

197. Mitigate flood risk impact through appropriately sized crossings by understanding the hydrology of the watercourse being crossed.

198. Specifically, for temporary culvert crossings, the following points (SEPA, 2009) should be considered to avoid potentially adverse impacts on the watercourses being crossed by temporary access tracks or haul roads:

- Maintaining natural bed level.
- Maintaining the natural slope of the watercourse.
- Maintaining channel width.
- The culvert soffit (top) should be higher that the natural bank height.
- Minimise the potential for localised bed and bank erosion (scour) around the crossing structure.

199. Preferably, temporary access tracks and haul roads will be temporary bailey bridge type construction. The configuration of the bridging units will be confirmed at detailed design stage. Ideally the length of the bridge deck will be sufficient to ensure no works within the channel as a minimum and have the abutments set back as far as possible.

200. However, adopting a precautionary principle this assessment has assumed that temporary culverts will be required for access. It is assumed that any temporary culvert for access will be

between 10-12 m long (the haul road will be approximately 10 m wide) and will be a suitably sized pipe(s) culvert for the estimated flows that may be experienced and channel cross section. A geotextile will be placed across the bed and clean, washed aggregates placed on top as the pipe bed and to build up to the required road level. A parapet made of pea-gravel filled sacks will be provided on either side and regularly maintained during the works. The pipes will extend beyond this to reduce the risk that aggregate falls into the channel. The temporary crossing will be removed as soon as possible and the watercourse reinstated as found. To allow this a Pre-construction Morphology and Riparian Habitat Survey will be carried out.

Management of Groundwater Activities

201. There may be localised control of shallow groundwater, or perched water, required to enable the construction of some aspects of the proposed Project, particularly at the locations where excavations are required (e.g. the construction of the attenuation basin at the Onshore Substation, the excavation for the cable route, and construction of crossings over ordinary watercourses from the Onshore Export Cable). However, no significant inflows of groundwater are expected given the predominantly low permeability nature of the underlying strata across most of the Onshore Substation site.

202. Accordingly, it is expected that the ingress of any shallow groundwater, or perched water, into any excavations will be carefully managed through the design of the excavation, shoring method, or by standard construction techniques such as use of sump pumps or similar methods within the excavations. Excessive ingress of water will make excavations unsafe and thus it is important that ingress is minimised and that a suitable system of managing water is implemented. Any pumped water will be collected and discharged accordingly following standard practice such as use of settlement ponds (where appropriate) prior to final discharge (e.g. to the nearby watercourse). These measures will be followed to avoid and or minimise impact on watercourses and are included in **Appendix 4A: Outline CEMP**.

203. As a minimum, the contractor will adhere to the following mitigation measures:

- If discharging water to a nearby watercourse, the rate of discharge will need to be agreed with NRW to ensure that there is no unacceptable increase in flood risk or risk of scour. Any discharge may require a permit if the water is considered ‘unclean’ and exemptions or other position statements do not apply. The contractor will need to comply with the pollution prevention requirements set out in **Appendix 4A: Outline CEMP**; and
- Managing the risk from groundwater flooding through appropriate working practices (during excavations) and with adequate plans and equipment in place for de-watering to ensure safe dry working environments.

204. No deep excavations are expected as part of the proposed Project, although shallow groundwater may be encountered in the vicinity of crossings of ordinary watercourses as shown on **Volume 5: Figure 10.4: Groundwater Features and their Attributes**. However, it is anticipated that the groundwater control requirements will be minimal and good practice measures that will be developed and implemented as per **Appendix 4A: Outline CEMP**.

Drainage Outfalls

205. If engineered outfalls are required for the discharge surface water and foul-water from the Onshore Substation, the location, position and orientation of them will be carefully determined and informed by a hydromorphological survey to minimise any adverse local impacts on river processes. Appropriate micro-siting of the outfall will minimise loss of bank habitat, the need for bed scour or hard bank protection, and localised flow disturbance or

disruption to sediment transport processes (e.g. angled 30-60° downstream to the direction of flow). It will also avoid the creation of 'dead' spaces with sedimentation and vegetation blockage risks and to that effect it is not proposed that outfalls are recessed into the bank. It is assumed that the site survey and micro-siting of outfalls will occur post consent in compliance with the Drainage Strategy as presented in **Appendix 10A Annex A: Drainage Strategy**.

Secondary Consents

206. Under the Land Drainage Act 1991 as amended by the Floods and Water Management Act 2010, Land Drainage Consents are required from the Lead Local Flood Authority (LLFA) where certain activities are proposed that may affect the flow in an Ordinary Watercourses[10]. Land Drainage Consents from NRW are required for works on ordinary watercourses within an Internal Drainage District (IDD); as the proposed Project is not within an IDD then the authority responsible for the watercourse should be consulted to apply for an ordinary watercourse consent. The LFFA for the area is responsible for distributing these permits.

207. In accordance with the Environmental Permitting Regulations (England and Wales) 2016 works to and close to Main Rivers may require a Flood Risk Activity Permit from NRW. Although, the Pembroke River Estuary and Castlemartin Corse are Main Rivers, no works appear to be occurring in this area. Therefore, at this stage it is not considered that a FRAP will be needed.

208. Also, in accordance with the Environmental Permitting Regulations (England and Wales) 2016 (as amended), environmental permits may be needed from NRW for any discharges of uncontaminated construction site runoff, or other operation runoff to be discharged to ground or a controlled water unless there are exemptions that can be applied .

209. There may be the need for full and / or temporary water abstraction Licence(s) from NRW for water supply or where dewatering requires more than 20 m^3 per day to be removed (e.g. deep excavations). For dewatering, it may be necessary to also obtain a water activity permit(s) from NRW to discharge the water to ground or a watercourse if the water is considered 'unclean' (i.e. not predominantly rainwater).

210. A temporary or permanent water impoundment Licence under Section 25 of the Water Resources Act 1991 may be required if structures are proposed that require the flow in a water feature to be altered in any way.

211. An Environmental permit will be required to dispose of domestic sewage from the proposed sewage treatment plant if the discharge of domestic sewage cannot be registered with NRW as exempt (NRW, n.d.).

10.9 Assessment of Environmental Effects

212. The impacts and effects (both beneficial or adverse) associated with the construction, operation, maintenance and decommissioning of the proposed Project are outlined in the sections below. The assessments take into account the embedded and standard good practice mitigation measures described in **Section 10.8**.

[10]NRW is responsible for Land Drainage Consents in Internal Drainage Districts in Wales but there are none in the Study Area according to https://datamap.gov.wales/layergroups/geonode:nrw_internal_drainage_district.

10.9.1. Construction Effects

213. During construction works within the Onshore Development Area (including the installation of the Onshore Export Cable, Landfall and construction of the Onshore Substation) the following adverse impacts may occur.

Pollution of surface water from excess fine sediment and chemical spillage risk

214. Pollution of surface water features due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through uncontrolled site runoff including dewatering of excavations is possible during construction.

215. Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna.

216. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation. Other potential sources of fine sediment during construction works include water runoff from earth stockpiles, dewatering of excavations (surface and groundwater), mud deposited on site and local access roads, and that which is generated by the construction works themselves or from vehicle washing.

217. Generally, excessive fine sediment in runoff is chemically inert and affects the water environment through smothering riverbeds and plants, temporarily changing water quality (e.g. increased turbidity and reduced photosynthesis) and causing physical and physiological adverse impacts on aquatic organisms (such as abrasion or irritation).

218. During construction, fuel, hydraulic fluids, solvents, grouts, paints and detergents and other potentially polluting substances will be stored and/or used on-site. Leaks and spillages of these substances could pollute the nearby surface watercourses if their use or removal is not carefully controlled, and spillages enter existing flow pathways or water features directly. Like excessive fine sediment in construction site runoff, the risk is greatest where works occur close to and within water features.

Magnitude of impact

219. Embedded mitigation measures and good practice guidance as set out in **Section 10.8.1** and **Section 10.8.2** and **Appendix 4A: Outline CEMP** will be implemented during the construction of the proposed Project such as barrier controls (e.g. geotextile silt fences, sand bags), buffers between the works and the water feature (minimum 10 m from the edge of the channel), and undertaking works in dry conditions, and will avoid impacts other than the installation and removal of over-pumping or fluming methodology for watercourse crossings. As such, the magnitude of impact is considered a short term, indirect, temporary **negligible adverse** impact.

Sensitivity of the receptors

220. The receptors in **Table 10-24** have been identified to have a potential pathway from the source of impact. Their importance is summarised below in **Table 10-24** but further justification for their importance is provided in **Table 10-20**.

Table 10-24. Importance of surface water receptors

Receptor	Surface Water Importance
Pembroke River / Milford Haven Inner transitional WFD Water body	Very High
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High
Freshwater West / Pembrokeshire South WFD coastal water body	Very High
Goldborough Pill West	Very High
Ordinary Watercourse: T05a	Low
Ordinary Watercourses: WC12, T12a	Medium
Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High
Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High
Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium
Discrete Pond Feature: P32	Low
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High

Significance of the effect

221. The significance of effect is summarised in **Table 10-25** below.

Table 10-25. Significance of effect

Receptor	Surface Water Importance	Magnitude of Impact	Significance of Effect
Pembroke River / Milford Haven Inner transitional WFD Water body	Very High	Negligible (adverse)	**Slight adverse effect** (not significant)
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High	Negligible (adverse)	**Slight adverse effect** (not significant)
Freshwater West / Pembrokeshire South WFD coastal water body	Very High	Negligible (adverse)	**Slight adverse effect** (not significant)
Goldborough Pill West	Very High	Negligible (adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourse: T05a	Low	Negligible (adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourses: WC12, T12a	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High	Negligible (adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourses with online ponds and associated abstraction	High	Negligible (adverse)	**Slight adverse effect** (not significant)

Receptor	Surface Water Importance	Magnitude of Impact	Significance of Effect
licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10			
Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Discrete Pond Feature: P32	Low	Negligible (adverse)	**Slight adverse effect** (not significant)
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High	Negligible (adverse)	**Slight adverse effect** (not significant)

Further mitigation and residual effect

222. No further mitigation is proposed.

Pollution of groundwater from construction chemical spillage risk

223. Pollution of groundwater due to deposition or spillage of oils, fuels, or other construction chemicals, or through uncontrolled site runoff including dewatering of excavations is possible during construction.

224. During construction, fuel, hydraulic fluids, solvents, grouts, paints and detergents and other potentially polluting substances will be stored and/or used on-site. Leaks and spillages of these substances could pollute underlying groundwater if their use or removal is not carefully controlled, and spillages enter existing flow pathways or are eventually transported to watercourses where it can then infiltrate to ground and result in adverse impacts on groundwater quality. The risk is greatest where works occur close to and within areas of high groundwater.

Magnitude of Impact

225. Embedded mitigation measures and good practice guidance as set out in **Section 10.8.1** and **Section 10.8.2** and **Appendix 4A: Outline CEMP** will be implemented during the construction of the proposed Project such as barrier controls (e.g. geotextile silt fences, sand bags), buffers on activities such as plant refuelling and storage of excavated material, and undertaking works in dry conditions. As such, the magnitude of impact is considered to be a short term, indirect, temporary **negligible adverse** impact.

Sensitivity of Receptor

226. The receptors in **Table 10-26** have been identified to have a potential pathway from the source of impact. Their importance is summarised below in **Table 10-26** but further justification for their importance is provided in **Table 10-20.**

Table 10-26.Importance of groundwater receptors

Receptor	Groundwater Importance
Castlemartin Corse GWDTE	Very High

Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High
Avon Group Limestone/ Secondary A Aquifer	Medium
Ridgeway Conglomerate / Secondary A Aquifer	Medium
Skrinkle Sandstone / Secondary A Aquifer	Medium
Milford Haven Group formations / Secondary A Aquifer	Medium
Aber Mawr Shale / Secondary B Aquifer	Medium
Ludlow Rocks Formation / Secondary B Aquifer	Medium
Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium
Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium
Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low

Significance of Effect

227. The significance of effect is summarised in **Table 10-27** below.

Table 10-27. Significance of effect on groundwater receptors

Receptor	Groundwater Importance	Magnitude of Impact	Significance of Effect
Castlemartin Corse GWDTE	Very High	Negligible (Adverse)	**Slight adverse effect** (not significant)
Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High	Negligible (Adverse)	**Slight adverse effect** (not significant)
Avon Group Limestone/ Secondary A Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)
Ridgeway Conglomerate / Secondary A Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)
Skrinkle Sandstone / Secondary A Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)
Milford Haven Group formations / Secondary A Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)
Aber Mawr Shale / Secondary B Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)
Ludlow Rocks Formation / Secondary B Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)
Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)
Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium	Negligible (Adverse)	**Slight adverse effect** (not significant)

Receptor	Groundwater Importance	Magnitude of Impact	Significance of Effect
Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low	Negligible (Adverse)	**Slight adverse effect** (not significant)

Further Mitigation and residual effects

228. No further mitigation is proposed.

Impacts on watercourses from temporary changes in hydrology

229. Temporary impacts on surface watercourses (and associated surface water abstraction licences as listed in **Table 10-28**) such as changes in hydrology from interruption of flow are possible from the watercourse crossing methodology of dry open cut trenching.

230. Up to 11 ordinary watercourses may be crossed as a result of the Onshore Export Cable installation, using dry open cut trench methodology. The two methodologies outlined in **Chapter 04: Description of the proposed Project** include either using temporary flume pipes or damming and over pumping. Thus, there is potential for adverse impacts to downstream surface water users where there are licenced surface water abstractions present if the flow in a watercourses is disturbed or altered in any way.

Magnitude of impact

231. Embedded mitigation measures and good practice guidance as set out in **Section 10.8.1** and **Section 10.8.2** and in **Appendix 4A: Outline CEMP** will be implemented during construction of the proposed Project; The quality of water for downstream users will be protected through the implementation of the Good Practice measures outlined in **Section 10.8.2**. The supply of water is to be maintained through the methodology of over-pumping or fluming of the flow. Furthermore, any works to ordinary watercourses are likely to require a temporary impoundment/abstraction licence, as detailed in **Section 10.8.2, Secondary Consents**, and this licence will consider the impact on third parties with appropriate controls. The contractor will also engage with the licensed abstraction users to ensure their needs are accounted for during the works. The installation of the Onshore Export Cable is expected to take 3 weeks per 1 km of cable, therefore for watercourse crossings (of the up to 11 potentially crossed ordinary watercourses[11]) which are no more than 3 m in width, the anticipated time taken to cross a watercourse will be days not weeks. As such, the magnitude is therefore considered to be short term, direct, temporary **negligible adverse**.

Sensitivity of the receptor

232. The receptors in **Table 10-28** have been identified to have a potential pathway from the source of impact. Their importance is summarised below in **Table 10-28** but further justification for their importance is provided in **Table 10-20.**

Table 10-28. Surface water importance of receptors

Receptor	Surface Water Importance
Ordinary Watercourse: T05a	Low

[11] WC05, T05a, WC06, T07c, T07b, WC14, WC07, two tributaries of Goldborough Pill West, WC12 and T12a.

Ordinary Watercourses: WC12, T12a	Medium
Ordinary Watercourses with associated abstraction license: WC07/A12	High
Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, T07c/P12/P13, T07b/P14, WC14/P20	High
Goldborough Pill West	Very High
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High

Significance of the effect

233. The significance of effect is summarised in **Table 10-29** below.

Table 10-29. Significance of effect

Receptor	Surface Water Importance	Magnitude of Impact	Significance of Effect
Ordinary Watercourse: T05a	Low	Negligible (adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourses: WC12, T12a	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourses with associated abstraction license: WC07/A12	High	Negligible (adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, T07c/P12/P13, T07b/P14, WC14/P20	High	Negligible (adverse)	**Slight adverse effect** (not significant)
Goldborough Pill West	Very High	Negligible (adverse)	**Slight adverse effect** (not significant)
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High	Negligible (adverse)	**Slight adverse effect** (not significant)

Further mitigation and residual effects

234. No further mitigation is proposed.

Temporary impacts on the hydromorphology of watercourses from open cut watercourse crossings and temporary vehicle access

235. Temporary impacts on the hydromorphology of watercourses from open-cut watercourse crossings or temporary culverting for vehicle access will occur during construction.

236. There is potential for adverse impacts on the channel morphology, riparian habitats, and the hydrological and sediment regimes of the (up to) 11 ordinary watercourses crossed by the Onshore Export Cable during construction. There is also potential for hydromorphological impacts on the channel from the temporary access tracks and haul roads (if required) which may involve the installation of culverts to enable crossings of watercourses. Culverts can have adverse impacts such as the loss of riparian habitat, impede ecological connectivity and direct mortality of invertebrates, lead to an increase in the release of fine sediment, loss of

morphological diversity and change in structure, permeability and connectivity of the river bed.

Magnitude of impact

237. Embedded mitigation measures and good practice guidance are set out in **Section 10.8.2** and in **Appendix 4A: Outline CEMP**. This includes the need for a Pre-Construction Morphology and Riparian Habitat Survey will be undertaken in advance of the works to provide the baseline for reinstatement of the channel as found. Where possible, options to enhance the channel between 5 m and 10 m upstream and downstream of the crossing will be considered, although this may encroach beyond any easement the Applicant may retain and so might require land owner permission. Additional pollution prevention measures and post works monitoring will be required while vegetation of the banks re-establishes itself. Temporary fencing should the crossing be in a location used by livestock will also be needed to prevent poaching of the banks. Therefore, a likely, direct, and medium term **minor adverse** impact is predicted.

Sensitivity of the receptor

238. The receptors in **Table 10-30** have been identified to have a potential pathway from the source of impact due to being crossed by the Onshore Export Cable. Their importance is summarised below but further justification for their importance is provided in **Table 10-20.**

Table 10-30. Morphology importance of receptors

Receptor	Morphology Importance
Goldborough Pill West (two tributaries)	Medium
Ordinary Watercourses: WC05, T05a, WC06, T07c, T07b, WC14, WC07, WC12 and T12a.	Low

Significance of the effect

239. The significance of effect is summarised in **Table 10-31** below.

Table 10-31. Significance of effect

Receptor	Morphology Importance	Magnitude of Impact	Significance of Effect
Goldborough Pill West (two tributaries)	Medium	Minor (Adverse)	**Slight adverse effect** (not significant)
Ordinary Watercourses: WC05, T05a, WC06, T07c, T07b, WC14, WC07, WC12 and T12a.	Low	Minor (Adverse)	**Slight adverse effect** (not significant)

Further mitigation and residual effects

240. No further mitigation is proposed.

Impacts on groundwater and baseflow to watercourses from dewatering of temporary excavations or changes in groundwater flow

241. Excavation activities will result from the construction of the HDD send and receive pits at Landfall and any other required crossings, and the underground Transition Joint Bays (TJB's) and Cable Joint Bays. The dimensions for the HDD send and receive pits are not known at this stage, and are subject to future ground investigations but has been assumed they will be no greater than 10 m length by 5 m width by 5 m deep. There will be up to two TJBs and each will be up to 12 m long, 6 m wide and 2.25 m deep, with a target burial depth of 1 m

(dependent on ground conditions). The Cable Joint Bays will also have a maximum trench depth of 2.25 m.

242. Minor excavation activities will also occur where watercourses, roads and underground utilities are to be crossed by the Onshore Export Cable. The cable is assumed to be buried a minimum of 1.5 m below watercourses to avoid any disturbance of the watercourse bed. During these excavation and trenching activities for construction there is the potential for impacts on groundwater resources, local water supplies (PWS), and potentially, the baseflow to watercourses from temporary dewatering of excavations or changes in groundwater flow.

Magnitude of impact

243. There is limited groundwater level data across the Study Area, however, it is likely that groundwater in the area of watercourses is likely to be shallow at <1 m below the ground level; this will be confirmed at detailed design post consent and following site ground investigation. Therefore, shallow groundwater may be encountered during construction within the superficial deposits in the area of watercourse crossings.

244. Potential for groundwater ingress to the pits and excavations. This will be managed following standard construction techniques potentially including pumping, damming, and shoring up the pits. A Groundwater Risk Assessment should be undertaken post consent. This will assess potential for groundwater ingress and outline the dewatering requirements to be adopted in order to ensure no adverse impacts on the receiving water environment.

245. A temporary abstraction licence may be required from NRW when abstracting more than 20 m^3 of water per day. Any discharge of groundwater to a watercourse may also require a discharge consent from NRW if it is considered to be 'unclean' and the conditions of the Environment Agency's Regulatory Position Statement 'Temporary dewatering from excavations to surface water' (Environment Agency, 2023b and also applicable to Wales) cannot be met. This document states that uncontaminated, clean water, is water that is wholly or mainly clear rainwater or infiltrated groundwater that has collected in the bottom of temporary excavations on an uncontaminated site.

246. The pits and excavations will be backfilled with the original excavated material upon completion and will not affect groundwater base flow in the longer term. In addition, the profile of the pipelines is considered to be small compared to the spatial and vertical extent of the secondary superficial aquifers. While groundwater may be encountered, taking into account that it will be appropriately managed in line with any required permit conditions, informed by appropriate risk assessment and best industry practice outlined in **Appendix 4A: Outline CEMP**, it is considered there will be a direct, short term, **negligible adverse** impact on groundwater receptors relating to dewatering and changes in groundwater flow in the Study Area. Given this, there will not be expected to be any impact to baseflow for watercourses in the Study Area or any impact on abstractions relating to PWS.

Sensitivity of the receptor

247. The receptors in **Table 10-32** have been identified to have a potential pathway from the source of impact given that they all underlie the proposed Project boundary. Their importance is summarised below but further justification for their importance is provided in **Table 10-20.**

Table 10-32. Groundwater importance of receptors

Receptor	Groundwater Importance
Castlemartin Corse GWDTE	Very High

Receptor	Groundwater Importance
Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High
Avon Group Limestone/ Secondary A Aquifer	Medium
Ridgeway Conglomerate / Secondary A Aquifer	Medium
Skrinkle Sandstone / Secondary A Aquifer	Medium
Milford Haven Group formations / Secondary A Aquifer	Medium
Aber Mawr Shale / Secondary B Aquifer	Medium
Ludlow Rocks Formation / Secondary B Aquifer	Medium
Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium
Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium
Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low

Significance of the effect

248. The significance of effect is summarised in **Table 10-33** below.

Table 10-33. Significance of effect on groundwater receptors

Receptor	Groundwater Importance	Magnitude of Impact	Significance of effect
Castlemartin Corse GWDTE	Very High	Negligible (Adverse)	**Slight adverse effect** (not significant)
Carboniferous Black Rock Subgroup and Gully Oolite Principal Aquifer	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Avon Group Limestone/ Secondary A Aquifer	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Ridgeway Conglomerate / Secondary A Aquifer	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Skrinkle Sandstone / Secondary A Aquifer	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Milford Haven Group formations / Secondary A Aquifer	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Aber Mawr Shale / Secondary B Aquifer	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Ludlow Rocks Formation / Secondary B Aquifer	Medium	Negligible (adverse)	**Slight adverse effect** (not significant)
Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Low	Negligible (adverse)	**Slight adverse effect** (not significant)

Receptor	Groundwater Importance	Magnitude of Impact	Significance of effect
Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Very High	Negligible (adverse)	**Slight adverse effect** (not significant)
Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	High	Negligible (adverse)	**Slight adverse effect** (not significant)

Further mitigation and residual effects

249. No further mitigation is proposed.

Temporary changes in flood risk from changes in surface water runoff

250. Temporary changes in flood risk could occur from changes in surface water runoff (e.g. disruption of stream flows during the Onshore Export Cable installation, temporary watercourse crossings and construction of the Onshore Substation) and exacerbation of localised pluvial flooding, due to deposition of silt, sediment in drains, ditches.

251. During construction, earthworks may alter the topography of the Onshore Substation site and the infiltration capacity of the ground (e.g. vegetation removal and soil compaction). Stockpiles of earth and other materials may also affect local surface water flow paths. Overall, the construction works can lead to an increase in the volume and rate of surface water runoff from the Onshore Substation site, which can create a flood risk to workers present or third parties adjacent to it. In addition, debris from vegetation clearance, sediment or other materials could result in the temporary blockage of any existing land drains or downstream culverts, again potentially increasing the risk of flooding local to that structure. A similar risk exists for the (up to) 11 ordinary watercourses that are crossed by the Onshore Export Cable through over-pumping or fluming through the works.

Magnitude of impact

252. Embedded mitigation measures and good practice guidance as set out in **Appendix 4A: Outline CEMP**, in **Section 10.8.1** and **Section 10.8.2** such maintaining of flow continuity, undertaking watercourse crossing works during periods of normal to low flows, and storage of excavated material outside of flood zones will be implemented during construction of the proposed Project. Therefore, the magnitude is therefore considered to be **negligible adverse**.

Sensitivity of the receptor

253. During construction, the third party receptors susceptible to impacts from flood risk are construction workers and surrounding isolated residential properties. Construction workers are considered to be of **very high** importance. Surrounding residential areas are considered to be **high** importance as residential areas classified as 'Highly Vulnerable Development' in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004).

Significance of the effect

254. The sensitivity of construction workers is considered to be **very high** and the magnitude of the impact is assessed as **negligible**. Therefore, the effect will, be of **slight adverse** significance, which is not significant in EIA terms.

255. The sensitivity of the surrounding residential areas is considered **high**, and the magnitude of the impact is assessed as **negligible adverse**. Therefore, the effect will be of **slight adverse** significance which is not significant in EIA terms.

Further mitigation and residual effects

256. No further mitigation is proposed.

10.9.2. Operation and Maintenance Effects

257. During operation and maintenance of the Cable and Substation the following adverse impacts may occur:

Impacts on surface water quality from diffuse urban run-off and foul water post-secondary treatment from the Onshore Substation

258. During operation, surface water runoff from the Onshore Substation may contain pollutants derived from impermeable surfaces (e.g. inert particulates, litter, hydrocarbons, metals, nutrients and de-icing salts). This mixture of pollutants is collectively known as 'urban diffuse pollutants,' and although each pollutant may itself not be present in harmful concentrations, the combined effects over the long term can cause chronic adverse impacts. Changes in impermeable surfaced area within the Onshore Development Area from the Onshore Substation may lead to increases in the rate and quantities of these pollutants being conveyed to the receiving ordinary watercourse, WC07.

259. The proposed Foul Water Drainage Strategy as presented in **Appendix 10A - Annex 10A: Drainage Strategy** proposes to collect foul flows from the Onshore Substation via conventional piped drainage and collectively passed through a packaged treatment plant before discharging to the same ordinary watercourse, WC07. Excess nutrients (especially phosphorus and nitrogen), high turbidity, and reduced oxygen levels can result from foul water (sewage) discharges if it is not treated adequately. Nutrient pollution in freshwater habitats can speed up the growth of certain plants leading to eutrophication, disrupting natural processes and impacting wildlife. High levels of sediment can result in the siltation of the bed. Further decomposition of organic matter can result in an oxygen demand and reduce dissolved oxygen levels for aquatic organisms.

Magnitude of impact

260. The embedded mitigation measures outlined in **Section 10.8.2** regarding the **Appendix 10A - Annex 10A: Drainage Strategy** will be implemented. The C753 SuDS Manual's Simple Index Approach has been used to demonstrate the suitability of the proposed design SuDS treatment of an attenuation pond, which is deemed sufficient to mitigate the impact from the new hardstanding areas, roofs and non-residential parking areas. The magnitude of impact to WC07, surface water users and ponds, is therefore considered to be **negligible adverse** from new urban surface water runoff. There will be no impact to Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body due to the distance downstream and large dilution effect.

261. The embedded mitigation measures outlined in **Section 10.8.2** regarding the Foul Water Management Strategy within **Appendix 10A - Annex 10A: Drainage Strategy** be implemented: a sewage treatment plant (e.g. Klargester BioDisc or similar) will be provided to treat the effluent before being discharged (under any relevant environmental permits, as outlined in **Section 10.8.2, Secondary Consents)** to ordinary watercourse WC07. The magnitude of impact to WC07, surface water users and ponds, is therefore considered to be **minor adverse**. There

will be no impact to Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body due to the distance downstream and large dilution effect.

Sensitivity of the receptor

262. The receptors in **Table 10-34** have been identified to have a potential pathway from the source of impact. Their importance is summarised below but further justification for their importance is provided in **Table 10-20.**

Table 10-34. Surface water importance of receptors

Receptor	Surface Water Importance
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body	Very High
Ordinary Watercourses with associated abstraction license: WC07/A12	High
Ordinary Watercourses with online ponds and associated abstraction licenses: WC07/P18/P19/A18/A15	High

Significance of the effect

263. The sensitivity of WC07 (with associated ponds and abstraction licences) is considered to be **high** and the magnitude of the impact (from both diffuse urban runoff and foul water post secondary treatment) is assessed as **minor adverse**. Therefore, the effect will, be of **slight adverse** significance, which is not significant in EIA terms.

264. The sensitivity of Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body is considered **very high** and the magnitude of impact (from both diffuse urban runoff and foul water dioscharge) is assessed as **no impact**. Thus, there is **no effect**.

Further mitigation and residual risk

265. Subject to future topographical surveys and ground investigation during the detailed design stage, options for SuDS such as swales (in addition to the attenuation basin) will be considered in favour of piped networks at the substation site.

Impacts on groundwater quality from diffuse run-off from the Onshore Substation

266. During operation, surface water runoff from the Onshore Substation may contain pollutants derived from impermeable surfaces (e.g. inert particulates, litter, hydrocarbons, metals, nutrients and de-icing salts). This mixture of pollutants is collectively known as ‘urban diffuse pollutants,’ and although each pollutant may itself not be present in harmful concentrations, the combined effects over the long term can cause chronic adverse impacts. Changes in impermeable surfaced area within the Onshore Development Area from the Onshore Substation may lead to increases in the rate and quantities of these pollutants being conveyed to ground if the attenuation pond is unlined.

267. For the foul water post-secondary treatment, this is directed to WC07 once treated to a sufficient quality, via a pipe system. Thus, there is no pathway to groundwater for this potential source, unless there is a low flow within WC07.

Magnitude of impact

268. It is considered there is the potential for a **negligible** impact to groundwater from any infiltration from the attenuation pond.

Sensitivity of the receptor

269. The receptors in **Table 10-35** have been identified to have a potential pathway from the source of impact. Their importance is summarised below in **Table 10-35** but further justification for their importance is provided in **Table 10-20.**

Table 10-35. Importance of groundwater receptors

Receptor	Groundwater Importance
Ridgeway Conglomerate / Secondary A Aquifer	Medium
Milford Haven Group formations / Secondary A Aquifer	Medium
Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Very High

Significance of the effect

270. It is considered that the **negligible** impact on the **very high** importance receptor (Pembrokeshire Carboniferous Limestone WFD groundwater body) will result in a **slight effect** which is not significant in EIA terms.

271. It is considered that the **negligible** impact on the **medium** importance receptors in will result in a **slight effect** which is not significant in EIA terms.

Further mitigation and residual effects

272. No significant effect was identified, and as a result no further mitigation is specified.

Impacts on surface water quality from excess fine sediment or potential accidental spillages during maintenance activities

273. Operation and maintenance of Onshore Infrastructure will be required periodically throughout the proposed 25 year lifespan (from final commissioning).

274. Cable operation and maintenance activities primarily involves annual visual inspections along the cable route. Where specific maintenance on the Onshore Export Cable will be required, a section (usually tens of meters long) will be removed, a new section (cable spare) will be spliced in with field joints, and the cable will be reinstalled.

275. If specific maintenance of the Onshore Export Cable is required, pollution of surface water features due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through uncontrolled site runoff including dewatering of excavations is possible. Disturbance of soils, mobilisation of fine sediments, and leaks and spillages of fuel, hydraulic fluids, solvents, and other potentially polluting substances could occur.

Magnitude of impact

276. Embedded mitigation measures and best practice guidance as set out in **Appendix 4A: Outline CEMP** will be implemented during any maintenance activities on the Onshore Export Cable, therefore the magnitude of impact is considered to be **negligible adverse**.

Sensitivity of the receptor

277. The receptors in **Table 10-36** have been identified to have a potential pathway from the source of impact. Their importance is summarised below but further justification for their importance is provided in **Table 10-20.**

Table 10-36. Surface water importance of receptors

Receptor	Surface Water Importance
Pembroke River / Milford Haven Inner transitional WFD Water body	Very High
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High
Freshwater West / Pembrokeshire South WFD coastal water body	Very High
Goldborough Pill West	Very High
Ordinary Watercourse: T05a	Low
Ordinary Watercourses: WC12, T12a	Medium
Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High
Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High
Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium
Discrete Pond Feature: P32	Low
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High

Significance of the effect

278. The significance of effect is summarised in **Table 10-37** below.

Table 10-37. Significance of effect

Receptor	Surface Water Importance	Magnitude of Impact	Significance of Effect
Pembroke River / Milford Haven Inner transitional WFD Water body	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Freshwater West / Pembrokeshire South WFD coastal water body	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Goldborough Pill West	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourse: T05a	Low	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourses: WC12, T12a	Medium	Negligible (adverse)	**Slight effect:** not significant in EIA terms.

Receptor	Surface Water Importance	Magnitude of Impact	Significance of Effect
Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Discrete Pond Feature: P32	Low	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.

Further mitigation and residual effects

279. No further mitigation is proposed.

Impacts on groundwater quality from potential accidental spillages during maintenance activities

280. During the operation of the Onshore Substation there will be a requirement for various maintenance activities on the infrastructure. These activities have the potential for accidental spillages. The Drainage Strategy (**Appendix 10A – Annex 10A: Drainage Strategy),** shows that all drainage from the Onshore Substation is collected and discharged via pipes to the proposed attenuation pond, which is assumed to be unlined, and then discharged to WC07 via a piped network. The management of maintenance operations will be controlled with an OEMP. The detailed design stage will ensure the attenuation pond is designed with a penstock, which will be secured via a planning condition.

Magnitude of impact

281. With the maintenance activities being managed by an OEMP, and the drainage strategy design which will include a penstock on the attenuation pond, it is considered there will be a **negligible adverse** impact from the potential for spillages impacting groundwater resources.

Sensitivity of the receptor

282. The receptors in **Table 10-38** have been identified to have a potential pathway from the source of impact. Their importance is summarised below in **Table 10-38** but further justification for their importance is provided in **Table 10-20.**

Table 10-38. Importance of groundwater receptors

Receptor	Groundwater Importance
Ridgeway Conglomerate / Secondary A Aquifer	Medium
Milford Haven Group formations / Secondary A Aquifer	Medium
Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Very High

Significance of the effect

283. It is considered that the **negligible** impact on the **very high** importance receptor (Pembrokeshire Carboniferous Limestone WFD groundwater body) will result in a **slight effect** which is not significant in EIA terms.

284. It is considered that the **negligible** impact on the **medium** importance receptors in will result in a **slight effect** which is not significant in EIA terms.

Further mitigation and residual effects

285. No further mitigation is proposed.

Permanent hydromorphological impacts to watercourses from the Onshore Substation surface water and foul water outfalls

286. Surface water and foul water post secondary treatment from the Onshore Substation are proposed to discharge (separately) to the existing ordinary watercourse (WC07 on **Volume 5: Figure 10.3: Identified Ordinary Watercourses)** via two separate engineered concrete headwalls (See **Appendix 10A, Annex A: Drainage Strategy)).**

287. The construction of engineered outfalls can impact the hydromorphology of a watercourse, with the magnitude of impact depending on their size and scale, location and orientation, how many are required, and whether scour protection is needed or not. Engineered outfalls require a concrete headwall and this together with any concrete apron or bed and bank scour protection can result in the direct loss of a portion of the bank and bed of a watercourse. Where there are multiple outfalls, the cumulative total of habitat lost will be greater. The position and orientation of an outfall can also lead to localised erosion, sedimentation, or 'dead spaces', and these are all important considerations for micro-siting the outfall prior to construction.

Magnitude of impact

288. Embedded mitigation measures and best practice in relation to drainage outfalls will be implemented during the design of any required outfalls for the surface water and foul water post secondary treatment outfalls from the Onshore Substation. Therefore, by ensuring the outfalls are of an appropriate size, with any scour protection minimised, and orientated at a 30-60 degrees to the angle of flow downstream adverse impacts will be minimised. The magnitude is therefore considered to be **minor adverse.**

Sensitivity of the receptor

289. WC07 is characterised by an artificially straightened channel, likely ephemeral in nature and is not WFD designated, nor is it known to support any internationally or UK designated species. The morphology importance of this receptor (WC07) is therefore considered to be **low**.

Significance of the effect

290. The sensitivity of WC07 is considered **low** and the magnitude of the impact is assessed as **minor adverse**. Therefore, the effect will, be of **slight adverse** significance, which is not significant in EIA terms. Where engineered outfalls could be avoided in favour of a ditch connection this impact will not occur.

Further mitigation and residual effects

291. During detailed design it is proposed that options to avoid engineered outfalls will be considered. The alternative may be a ditch connection that will be more natural and have less impact on the existing watercourse (WC07). However, there may be topographical or other constraints to achieving this.

Impacts on groundwater resources (flows and level)

292. During operation of the Scheme the Onshore Export Cable will be buried beneath ground level (to a target depth of 1.8 m), and there will be foundations associated with the Onshore Substation. Both activities have the potential to provide a barrier to groundwater flow within the underlying deposits. As there are no continuous foundations in the proposed Project design, and that groundwater is likely to be present only within shallow superficial units close to watercourses, the Onshore Export Cable trenches and foundations for the Onshore Substation are not anticipated to have any impact on groundwater flow.

Magnitude of impact

293. The magnitude of impact is considered to be **no change** based on the above for all the groundwater receptors in the area impacted by the operation and maintenance activities associated with the Onshore Export Cable and Onshore Substation.

Sensitivity of the receptor

294. The receptors in **Table 10-39** have been identified to have a potential pathway from the source of impact. Their importance is summarised below in **Table 10-39** but further justification for their importance is provided in **Table 10-20.**

Table 10-39. Importance of groundwater receptors

Receptor	Groundwater Importance
Castlemartin Corse GWDTE	Very High
Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High
Avon Group Limestone/ Secondary A Aquifer	Medium
Ridgeway Conglomerate / Secondary A Aquifer	Medium
Skrinkle Sandstone / Secondary A Aquifer	Medium
Milford Haven Group formations / Secondary A Aquifer	Medium
Aber Mawr Shale / Secondary B Aquifer	Medium
Ludlow Rocks Formation / Secondary B Aquifer	Medium
Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium
Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium

Receptor	Groundwater Importance
Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low

Significance of the effect

295. The sensitivity of the receptors varies from **low** to **very high**, however the magnitude of impact is assessed as **no change**. Therefore, the effect will be of **neutral** significance which is not significant in EIA terms.

Further mitigation and residual effects

296. No further mitigation is proposed.

Impacts on the rate and volumes of surface water run-off entering local watercourses and subsequent increase in flood risk.

297. During the operational phase, there will be surface water runoff from the Onshore Substation. This could impact the receiving ordinary watercourse of surface water runoff: WC07. The change of land use (and subsequent increase in impermeable hardstanding areas) due to the construction of the Onshore Substation has the potential to result in a change in flood potential to Onshore infrastructure as well as off-site receptors during the operational phase.

Magnitude of impact

298. **Appendix 10A - Annex 10A: Drainage Strategy** includes SuDS provision in the form of an attenuation pond, which will attenuate flows and discharge to WC07 at the existing (calculated) greenfield runoff rate. The magnitude is therefore considered to be **no change.**

Sensitivity of the receptor

299. The receptors in **Table 10-40** have been identified to have a potential pathway from the source of impact. Their importance is summarised below but further justification for their importance is provided in **Table 10-20.**

Table 10-40. Flood risk importance of receptors

Receptor	Flood Risk Importance
Residential areas in surrounding area	High
Onshore Substation	High
Onshore Export Cable	Medium

Significance of the effect

300. The sensitivity of residential areas in surrounding area is considered **high** and the magnitude of the impact is assessed as **no change**. Therefore, the effect will, be of **neutral adverse** significance, which is not significant in EIA terms.

301. The sensitivity of the Onshore Substation is considered to be high and the magnitude of the impact is assessed as no change. Therefore, the effect will, be of neutral significance, which is not significant in EIA terms.

302. The sensitivity of the Onshore Export Cable is considered to be medium and the magnitude of the impact is assessed as no change. Therefore, the effect will, be of neutral significance, which is not significant in EIA terms.

Further mitigation and residual effects

303. No significant effect was identified, and as a result no further mitigation is specified.

10.9.3. Decommissioning Effects

304. The decommissioning process will largely mirror the installation processes during the construction phase in reverse, with the entire decommissioning phase expected to be completed within a 12-month period between the years of 2052 and 2054. This will involve the complete removal of all infrastructure as a worst case. It should be noted that the decommissioning process for the proposed Project will be consulted upon and agreed via the production of a DEMP.

305. Potential impacts from the decommissioning of the proposed Project are similar in nature to those during construction, as some ground works will be required to remove infrastructure installed. The mode of cable decommissioning for the Onshore Export Cable will be dependent upon government policy and good practice at that time. Currently, the most environmentally acceptable option is leaving the cables in situ, as this avoids disturbance to overlying land and habitats and to neighbouring communities. Alternatively, the cables can be removed by opening the ground at regular intervals and pulling the cable through to the extraction point, avoiding the need to open up the entire length of the cable route. It is assumed that cables beneath watercourses will only be removed by extraction and will not be open cut again, as this will lead to an unnecessary adverse impact. The DEMP will set out required measures to prevent pollution and flooding during this phase of the development.

Pollution of surface water from excess fine sediment and chemical spillage risk

306. Pollution of surface water features due to deposition or spillages of soils, sediments, oils, fuels, or other construction chemicals, or through uncontrolled site runoff including dewatering of excavations is possible during decommissioning during the removal of the Onshore Export Cable and demolition of the Onshore Substation.

307. However, the pollution of surface water associated with decommissioning activities are expected to be no greater than that associated with construction. Further information is provided in the construction phase assessment. In addition, all activities will take place in accordance with a Decommissioning Strategy and a DEMP.

Magnitude of impact

308. Embedded mitigation measures and good practice guidance to be set out in the Decommissioning Strategy and DEMP will be implemented during the decommissioning of the proposed Project, therefore the magnitude of impact is considered **negligible adverse.**

Sensitivity of the receptors

309. The receptors in **Table 10-41** have been identified to have a potential pathway from the source of impact. Their importance is summarised below but further justification for their importance is provided in **Table 10-20.**

Table 10-41. Surface water importance of receptors

Receptor	Surface Water Importance
Pembroke River / Milford Haven Inner transitional WFD Water body	Very High
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High

Freshwater West / Pembrokeshire South WFD coastal water body	Very High
Goldborough Pill West	Very High
Ordinary Watercourse: T05a	Low
Ordinary Watercourses: WC12, T12a	Medium
Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High
Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High
Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium
Discrete Pond Feature: P32	Low
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High

Significance of the effect

310. The significance of effect is summarised in **Table 10-42** below.

Table 10-42. Significance of effect

Receptor	Surface Water Importance	Magnitude of Impact	Significance of Effect
Pembroke River / Milford Haven Inner transitional WFD Water body	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Freshwater West / Pembrokeshire South WFD coastal water body	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Goldborough Pill West	Very High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourse: T05a	Low	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourses: WC12, T12a	Medium	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Ordinary Watercourses with online ponds but no licensed abstractions:	Medium	Negligible (adverse)	**Slight effect:** not significant in EIA terms.

Receptor	Surface Water Importance	Magnitude of Impact	Significance of Effect
WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13			
Discrete Pond Feature: P32	Low	Negligible (adverse)	**Slight effect:** not significant in EIA terms.
Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High	Negligible (adverse)	**Slight effect:** not significant in EIA terms.

Further mitigation and residual effect

311. No further mitigation is proposed.

Impacts on groundwater resources, local water supplies from temporary dewatering of excavations or changes in hydrology

312. During construction the following adverse impacts on the groundwater environment may occur; impacts on groundwater resources, local water supplies (including any private water supplies) from temporary dewatering of excavations or changes in hydrology from activities such as the complete removal of the Onshore Export Cable and the Onshore Substation.

Magnitude of impact

313. There is limited groundwater level data across the Study Area, however, it is likely that groundwater in the area of watercourses is likely to be shallow at <1 m below the ground level. Therefore, shallow groundwater may be encountered during construction within the superficial deposits in the area of watercourse crossings.

314. Taking into account the scale of the construction excavation works that may encounter groundwater, and taking into account the measures to be included within **Appendix 4A: Outline CEMP**, it is considered there will be a **no change** magnitude of impact on groundwater receptors in the areas.

Sensitivity of the receptor

315. The receptors in **Table 10-43** have been identified to have a potential pathway from the source of impact. Their importance is summarised below but further justification for their importance is provided in **Table 10-20.**

Table 10-43. Groundwater importance of receptors

Receptor	Groundwater Importance
Castlemartin Corse GWDTE	Very High
Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High
Avon Group Limestone/ Secondary A Aquifer	Medium
Ridgeway Conglomerate / Secondary A Aquifer	Medium
Skrinkle Sandstone / Secondary A Aquifer	Medium
Milford Haven Group formations / Secondary A Aquifer	Medium
Aber Mawr Shale / Secondary B Aquifer	Medium

Receptor	Groundwater Importance
Ludlow Rocks Formation / Secondary B Aquifer	Medium
Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium
Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium
Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low

Significance of the effect

316. A **no change** magnitude of impact on groundwater resources, local water supply, and baseflow to rivers, will result in a neutral effect (not significant) for all the different receptors.

Further mitigation and residual effects

317. No further mitigation is proposed.

Temporary changes in flood risk from changes in surface water runoff

318. Temporary changes in flood risk could occur from changes in surface water runoff (e.g. changes in surface water runoff during removal of the Onshore Export Cable and demolition of the Onshore Substation) and potential temporary increase in local flood risk due to deposition of silt, sediment in drains, ditches.

319. During decommissioning, earthworks may alter the topography of the Onshore Substation site and the infiltration capacity of the ground (e.g. vegetation removal and soil compaction). Stockpiles of earth and other materials may also affect local surface water flow paths. Overall, the decommissioning works can lead to an increase in the volume and rate of surface water runoff from the Onshore Substation site, which can create a flood risk to workers present or third parties adjacent to it. In addition, sediment or other materials could result in the temporary blockage of any existing land drains or downstream culverts, again potentially increasing the risk of flooding local to that structure.

Magnitude of impact

320. Embedded mitigation measures and best practice guidance as set out in the Decommissioning Strategy and DEMP and in **Section 10.8.1** and **Section 10.8.2** above such as maintenance of flow continuity, undertaking the removal of the Onshore Export Cable where it crosses watercourses works during low flows, and storage of excavated material outside of flood zones and implementation of best practice measures will be implemented during construction of the proposed Project. Therefore, the magnitude is therefore considered to be **negligible adverse**.

Sensitivity of the receptor

321. During decommissioning, the third party receptors susceptible to impacts from flood risk are construction workers and surrounding residential areas. Construction workers are considered to be of **very high** importance. Surrounding residential areas are considered to be **high** importance as residential areas classified as 'Highly Vulnerable Development' in TAN15 Development and Flood Risk 2004 (Welsh Government, 2004).

Significance of the effect

322. The sensitivity of construction workers is considered to be **very high** and the magnitude of the impact is assessed as **negligible adverse**. Therefore, the effect will, be of **slight adverse** significance, which is not significant in EIA terms.

323. The sensitivity of the surrounding residential areas is considered to be **high**, and the magnitude of the impact is assessed as **negligible adverse**. Therefore, the effect will be of **slight adverse** significance which is not significant in EIA terms.

Further mitigation and residual effects

324. No further mitigation is proposed.

10.10 Summary of Residual Environmental Effects

325. This chapter of the ES has assessed the potential environmental effects on the Terrestrial Water Environment from the construction, operation and maintenance and decommissioning phases of the proposed Project. Where significant effects have been identified, additional mitigation has been considered and incorporated into the assessment.

326. **Table 10-44** summarises the impact assessment undertaken and confirms the significance of any residual effects, following the application of additional mitigation.

10.11 Summary of Additional Mitigation Measures

327. As outlined above, no significant residual effects were identified and as a result, no additional mitigation measures are required.

10.11.1. Monitoring

328. Mitigation of adverse impacts on the water environment during the construction phase will be achieved principally through embedded measures as identified in **Section 10.8.2**, notably the adoption of the **Appendix 4A: Outline CEMP**.

329. In particular, in terms of the embedded measures a water quality monitoring programme will be set out in the Final WMP within the Final CEMP or, where necessary, during the process of obtaining Environmental Permits / Consents / Licences for works affecting, or for temporary discharges to, water bodies during the construction period.

330. The programme will be expected to include a combination of daily observations and monitoring using a calibrated, handheld water quality probe through the upstream and downstream reaches of water features hydrologically connected to the Onshore Development Area. It is expected that water quality sampling will be undertaken on a periodic as well as ad-hoc basis, dependent upon circumstances / activities on site. Monitoring and sampling will be undertaken prior to the commencement of construction to allow for sufficient baseline data.

10.12 Summary of Effects and Conclusions

331. This section summarises the residual significant effects of the proposed Project on the Terrestrial Water Environment following the implementation of mitigation.

Table 10-44. Assessment summary

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
Construction						
Pollution of surface water from excess fine sediment and chemical spillage risk	Pembroke River / Milford Haven Inner transitional WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight adverse	None required	Slight (Not Significant)
	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Freshwater West / Pembrokeshire South WFD coastal water body	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Goldborough Pill West	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourse: T05a	Low (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses: WC12, T12a	Medium (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Discrete Pond Feature: P32	Low (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
Pollution of groundwater from construction chemical spillage risk	Castlemartin Corse GWDTE	Very High (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Avon Group Limestone/ Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Skrinkle Sandstone / Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Aber Mawr Shale / Secondary B Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low (Groundwater)	Negligible (Adverse)	Slight	None required	Slight (Not Significant)
Temporary impacts on surface water recourses from temporary changes in hydrology	Ordinary Watercourse: T05a	Low (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses: WC12, T12a	Medium (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with associated abstraction license: WC07/A12	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, T07c/P12/P13, T07b/P14, WC14/P20	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Goldborough Pill West	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
Temporary Impacts on the hydromorphology of watercourses from open cut watercourse crossings and temporary vehicle access	Goldborough Pill West (two tributaries)	Medium (Morphology)	Minor	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses: WC05, T05a, WC06, T07c, T07b, WC14, WC07, WC12 and T12a.	Low (Morphology)	Minor	Slight	None required	Slight (Not Significant)
Impacts on groundwater and baseflow to watercourses from dewatering of temporary excavations or changes in groundwater flow	Castlemartin Corse GWDTE	Very High (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Carboniferous Black Rock Subgroup and Gully Oolite Principal Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Avon Group Limestone/ Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Skrinkle Sandstone / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Aber Mawr Shale / Secondary B Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Low (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Very High (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Avon Group Limestone/ Secondary A Aquifer	High (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Very High (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
Temporary changes in flood risk from changes in surface water runoff	Construction Workers	Very High (Flood Risk)	Negligible	Slight	None required	Slight (Not Significant)
	Surrounding Residential Areas	High (Flood Risk)	Negligible	Slight	None required	Slight (Not Significant)
Operation and Maintenance						

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
Impacts on surface water quality from diffuse run-off and foul water post-secondary treatment from the Onshore Substation	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body	Very High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with associated abstraction license: WC07/A12	High (Surface Water)	Minor (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC07/P18/P19/A18/A15	High (Surface Water)	Minor (adverse)	Slight	None required	Slight (Not Significant)
Impacts on groundwater quality from diffuse run-off from the Onshore Substation	Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Very High (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
Impacts on surface water quality from excess fine sediment or potential accidental spillages during maintenance activities	Pembroke River / Milford Haven Inner transitional WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Freshwater West / Pembrokeshire South WFD coastal water body	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Goldborough Pill West	Very High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourse: T05a	Low (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses: WC12, T12a	Medium (Surface Water)	Negligible (adverse)	Slight	None required	Neutral Slight (Not Significant)
	Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High (Surface Water)	Negligible (adverse)	Slight	None required	Neutral / Slight (Not Significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium (Surface Water)	Negligible (adverse)	Slight	None required	Neutral Slight (Not Significant)
	Discrete Pond Feature: P32	Low (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High (Surface Water)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
Impacts on groundwater quality from potential	Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Very High (Groundwater)	Negligible (adverse)	Slight	None required	Neutral Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
accidental spillages during maintenance activities	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight	None required	Slight (Not Significant)
Permanent hydromorphological impacts to watercourses from Onshore Substation surface water and foul water post secondary treatment outfalls	Ordinary Watercourses – WC07	Low (Morphology)	Minor (adverse)	Slight	None required	Slight (Not Significant)
Impacts on surface water and groundwater resources (flows and level)	Castlemartin Corse GWDTE	Very High (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Avon Group Limestone/ Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Skrinkle Sandstone / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Aber Mawr Shale / Secondary B Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
Impacts on the rate and volumes of surface water run-off entering local	Residential areas in surrounding area	High (Flood Risk)	No Change	Neutral	None Required	Neutral (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
watercourses and subsequent increase in flood risk.	Onshore Substation	High (Flood Risk)	No Change	Neutral	None Required	Neutral (Not Significant)
	Onshore Export Cable	Medium (Flood Risk)	No Change	Neutral	None Required	Neutral (Not Significant)
Decommissioning						
Pollution of surface water from excess fine sediment and chemical spillage risk	Pembroke River / Milford Haven Inner transitional WFD Water body	Very High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Freshwater West / Pembrokeshire South WFD coastal water body	Very High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Goldborough Pill West	Very High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Ordinary Watercourse: T05a	Low (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses: WC12, T12a	Medium (Surface Water)	Negligible	Slight	None required	Neutral Slight (Not Significant)
	Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High (Surface Water)	Negligible	Slight	None required	Neutral / Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium (Surface Water)	Negligible	Slight	None required	Neutral Slight (Not Significant)
	Discrete Pond Feature: P32	Low (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
Temporary impacts on groundwater resources or local water supplies from temporary dewatering of excavations or changes in hydrology.	Surface water users – Licenced water abstractions: A2, A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High (Surface Water)	Negligible	Slight	None required	Slight (Not Significant)
	Castlemartin Corse GWDTE	Very High (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Avon Group Limestone/ Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
	Skrinkle Sandstone / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Aber Mawr Shale / Secondary B Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Groundwater users – Private Water Supplies: PWS03a and PWS03b	High (Groundwater)	No Change	Neutral	None required	Slight (Not Significant)
	Construction Workers	Very High (Flood Risk)	Negligible	Slight	None required	Slight (Not Significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of effect	Additional Mitigation	Residual Significance of Effect
Temporary changes in flood risk from changes in surface water runoff	Residents and residential areas in surrounding area	High (Flood Risk)	Negligible	Slight	None required	Slight (Not Significant)

10.13 Cumulative Effects of the Project

10.13.1. Introduction

332. Cumulative effects are those effects upon receptors arising from the proposed Project alongside all existing, and/ or reasonably foreseeable projects, plans and activities that result in cumulative effects with any element of the proposed Project. Existing Projects are generally considered as part of the baseline and as such are considered within the impact assessment presented in **Section 10.9** above.

333. This section assesses potential cumulative effects on the Terrestrial Water Environment from identified projects, plans and activities that have the potential to act cumulatively with the proposed Project.

334. PINS Advice 17: Cumulative Effects Assessment (2019) suggests that CEA follows a four-stage process. The aim of this approach is to accurately determine relevant projects and associated relationships with scoped in receptors identified in the ES, to be included within the interproject CEA.

335. The approach to the assessment of cumulative effects is detailed in **Appendix 5B: Approach to Cumulative Effects Assessment**, and is also summarised in **Table** *10-45***.**

Table 10-45. PINS advice 17 stages of the CEA process

CEA Stage	Activity
Stage 1	Determine a zone of influence (ZoI) via desk study for each topic receptor scoped into the ES. This will establish a *long list* of projects within each ZoI that will be shortlisted in Stage 2. This list of plans and projects/activities is drawn up through a desk study of planning applications, development plan documents, relevant development frameworks and any other available sources to identify 'other development' within the ZoI. Information on each project (location, development type, status, etc.) is documented, along with the certainty or tier assigned to the 'other development' (i.e. confidence it will take place in the current form and when it will take place in relation to the project). PINS notes that the project should then consult with the relevant planning authority/ authorities and statutory consultees regarding the long list.
Stage 2	Screening of the long list identified in Stage 1, to establish a short list for the CEA. Screening is based on the criteria presented in the scoping report and subsequent comments by the regulator and statutory consultees. PINS has provided inclusions/ exclusion threshold criteria, against which the potential for 'other developments' to give rise to significant cumulative effects by virtue of overlaps in temporal scope, the scale and nature of the 'other developments' and /or receiving environment, or any other relevant factors is assessed. From this assessment, a shortlist of 'other developments' to be included in the CEA is produced. It is noted that documented information on each of the 'other developments' is likely to be high level at this stage, outlining the key issues to take forward.
Stage 3	Gathering of all information available on short listed projects generated in Stage 2. At this stage all available data and information about the shortlisted projects that will be included in the CEA is collected to inform the assessment. This should utilise the most current information for each project in the public domain, and assess the assumptions and limitations of the information collected on each shortlisted project.
Stage 4	Each of the shortlisted projects are reviewed in turn by the different topics to assess whether cumulative effects may arise and the nature of those effects (i.e. beneficial or adverse). The significance of the effects on environmental receptors

CEA Stage	Activity
	is established within each ES technical chapters. Where significant adverse cumulative effects are identified, mitigation measures are also considered within the CEA alongside the mechanism to secure that mitigation, e.g. consent condition requirements.

10.13.2. Scope of Cumulative Effects Assessment on the Terrestrial Water Environment

336. The following impacts have been scoped into the CEA for the Terrestrial Water Environment. These are the impacts identified when considering the proposed Project alone, thus, there is a possibility that these could be increased should the impacts coincide with those of external projects that might overlap temporally or spatially and have identified similar such effects, and therefore need to be assessed further in the CEA.

Construction

- Pollution of surface water from excess fine sediment and chemical spillage risk;
- Temporary impacts on surface water recourses from temporary dewatering or changes in hydrology;
- Temporary impacts on the hydromorphology of watercourses from open cut watercourse crossings;
- Impacts on groundwater resources, local water supplies and baseflow to watercourses from temporary dewatering of excavations or changes in hydrology;
- Temporary changes in flood risk from changes in surface water runoff;

Operation and maintenance

- Impacts on surface and groundwater water quality from diffuse urban run-off;
- Impacts on surface and groundwater water quality from excess fine sediment or potential accidental spillages during maintenance activities;
- Permanent hydromorphological impacts to watercourses from watercourse crossings;
- Impacts on surface water and groundwater resources (flows and level); and
- Impacts on the rate and volumes of surface water run-off entering local watercourses and subsequent increase in flood risk.

Decommissioning

- Pollution of surface water from excess fine sediment and chemical spillage risk;
- Temporary impacts on surface water recourses from temporary dewatering or changes in hydrology;
- Temporary impacts on the hydromorphology of watercourses from open cut watercourse crossings;
- Impacts on groundwater resources, local water supplies and baseflow to watercourses from temporary dewatering of excavations or changes in hydrology; and
- Temporary changes in flood risk from changes in surface water runoff

337. **Table 10-46** presents the short list of projects identified and included within the CEA for the Water Environment. These are projects identified from the long list as considered to be present within the 1 km Zone of Influence (ZoI) - and 2 km ZoI where projects are adjacent to a watercourse that is also potentially impacted by the proposed Project – and for which there

could be temporal overlap. The Water Environment ZoI is shown on **Volume 5: Figure 10.7: Cumulative Effects Assessment for Water Environment** along with the short listed projects outlined in **Table 10-46.**

Table 10-46. List of projects considered for the water environment cumulative effects assessment

Project Name/Developer	Project Type	Tier and Status	Approx. distance from the Onshore Project Boundary
Pembroke Oil Refinery	Inshore energy	Operational – Tier 1	1.8 km
Erebus - cable and sub-station (floating wind). Land to south of power station & cable route across Angle Peninsula	Offshore wind Energy	Approved – Tier 1	0 m
Valorous (Blue Gem Wind) - onshore component	Offshore wind Energy	Scoping opinion issued – Tier 2	0 m
Greenlink interconnector – cable route & converter station. Land to south of power station & cable route across Angle Peninsula	Offshore wind Energy	Under construction – Tier 1	0 m
Installation of an underground grid connection cable and associated infrastructure	Construction	Approved – Tier 1	0.4 km NW
Pembroke Power Station. Synchronous condenser	Inshore energy	Under construction – Tier 1	50 m N
Battery Energy Storage System at Lambeth	Energy storage	Scoping opinion issued – Tier 2	100 m E
Battery Energy Storage System at Handleson	Energy storage	Application submitted – Tier 3	700 m SE
Celtic Sea Power - cable and sub-station (floating wind) Land to south of power station & cable route across Angle Peninsula	Offshore wind Energy	Scoping opinion issued – Tier 2	Within RLB
Pembroke Power Station Hydrogen Electrolyser	Energy	Scoping opinion issued - Tier 2	0 m

Project Name/Developer	Project Type	Tier and Status	Approx. distance from the Onshore Project Boundary
Battery energy storage system at Pembroke Power Station	Energy storage	Scoping opinion issued - Tier 2	0 m
Proposed Battery Energy Storage System Hundleton	Energy storage	Scoping opinion issued - Tier 2	0 m

10.13.3. Cumulative Effect Assessment

Construction

338. There is potential for overlap between construction of this proposed Project and impacts from adjacent schemes. Thus, there is the potential for short term, temporary construction related pollutants generated from both the proposed Project and adjacent developments to impact on watercourses in the Study Area. There is also the potential for impacts on surface and groundwater resources, local water supplies, hydromorphology of watercourses and increased flood risk. However, provided that standard and good practice mitigation is implemented on the construction sites through their respective CEMPs and as per the conditions of the relevant planning permission, environmental permits and licences, as is being proposed for this proposed Project, the cumulative effects risk can be effectively managed and there will not be a significant increase in the risks to any relevant water bodies. As such, there is not expected to be any significant cumulative effects anticipated during construction.

339. The magnitude of any cumulative impact during construction for all identified potential impacts will therefore be **negligible**. The resultant significance of effect is presented for each impact pathway and each receptor in **Table 10-47**. No significant effects have been identified.

Table 10-47. Summarised cumulative effects assessment for construction activities

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
Construction				
Pollution of surface water from excess fine sediment and chemical spillage risk	Pembroke River / Milford Haven Inner transitional WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Freshwater West / Pembrokeshire South	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
	WFD coastal water body			
	Goldborough Pill West	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourse: T05a	Low (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses: WC12, T12a	Medium (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/ A5, WC06/P9/A8, WC07/P18/P19/A18/ A15 T07c/P11/A10	High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5 , WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Discrete Pond Feature: P32	Low (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Surface water users – Licenced water abstractions: A3, A4, A5, A8, A10, A11, A12, A13, A15, A18.	High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
Pollution of groundwater	Castlemartin Corse GWDTE	Very High (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
from construction chemical spillage risk	Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Avon Group Limestone/ Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Skrinkle Sandstone / Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Aber Mawr Shale / Secondary B Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low (Groundwater)	Negligible (Adverse)	Slight adverse (not significant)
Temporary impacts on	Ordinary Watercourse: T05a	Low (Surface Water)	Negligible (adverse)	Slight adverse (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
surface water recourses from temporary changes in hydrology	Ordinary Watercourses: WC12, T12a	Medium (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with associated abstraction license: WC07/A12	High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/ A5, WC06/P9/A8, T07c/P12/P13, T07b/P14, WC14/P20	High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Goldborough Pill West	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
Temporary Impacts on the hydromorpholo gy of watercourses from open cut watercourse crossings and temporary vehicle access	Goldborough Pill West (two tributaries)	Medium (Morphology)	Minor	Slight adverse (not significant)
	Ordinary Watercourses: WC05, T05a, WC06, T07c, T07b, WC14, WC07, WC12 and T12a.	Low (Morphology)	Minor	Slight adverse (not significant)
Impacts on groundwater and baseflow to watercourses from dewatering of temporary excavations or changes in groundwater flow	Castlemartin Corse GWDTE	Very High (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Carboniferous Black Rock Subgroup and Gully Oolite Principal Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Avon Group Limestone/ Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
	Skrinkle Sandstone / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Aber Mawr Shale / Secondary B Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Low (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Very High (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Avon Group Limestone/ Secondary A Aquifer	High (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Very High (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
Temporary changes in flood risk from changes in surface water runoff	Construction Workers	Very High (Flood Risk)	Negligible (adverse)	Slight adverse (not significant)
	Surrounding Residential Areas	High (Flood Risk)	Negligible (adverse)	Slight adverse (not significant)

Operation and Maintenance

340. There will be overlap between the operation of the proposed Project and those shortlisted in **Table 10-46.** Thus, there is the potential for long term, permanent related impacts such as impacts to surface and groundwater quality from diffuse urban runoff, impacts on surface and

groundwater resources and impacts on the rate and volume of surface water runoff leading to increased flood risk.

341. It is assumed that drainage strategies for all of the developments in **Table 10-46** have been or will be produced with reference to the relevant policies and guidance documents. The proposed Project assessed in this chapter has similarly been designed to ensure no long-term deterioration in water quality or increase in flooding. Attenuation and treatment will be provided for runoff from the Onshore Substation prior to discharge to WC07 as has been outlined in this chapter. As such, provided that all the mitigation measures are implemented for all schemes, then the cumulative impacts from the proposed Project and the above schemes will not be significant for flood risk, water quality or water resources.

342. The magnitude of any cumulative impact during construction for all identified potential impacts will therefore be **negligible**. The resultant significance of effect is presented for each impact pathway and each receptor in **Table 10-48**. No significant effects have been identified.

Table 10-48. Summary of cumulative effects assessment for operational and maintenance impacts

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
Operation and Maintenance				
Impacts on surface water quality from diffuse run-off and foul water post-secondary treatment from the Onshore Substation	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body	Very High (Surface Water)	Negligible	Slight adverse (not significant)
	Ordinary Watercourses with associated abstraction license: WC07/A12	High (Surface Water)	Minor (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC07/P18/P19/A18/A15	High (Surface Water)	Minor (adverse)	Slight adverse (not significant)
Impacts on groundwater quality from diffuse run-off from the Onshore Substation	Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Very High (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
Impacts on surface water quality from excess fine sediment or potential accidental spillages during maintenance activities	Pembroke River / Milford Haven Inner transitional WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD Water body	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Freshwater West / Pembrokeshire South WFD coastal water body	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Goldborough Pill West	Very High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourse: T05a	Low (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses: WC12, T12a	Medium (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with associated abstraction license: T07a/A13, WC04/A3, WC07/A12	High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with online ponds and associated abstraction licenses: WC05/P6/P7/P8/A4/A5, WC06/P9/A8, WC07/P18/P19/A18/A15 T07c/P11/A10	High (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
	Ordinary Watercourses with online ponds but no licensed abstractions: WC04/P5, WC06/P10, T07b/P14, WC14/P20, T07a/P15, T07c/P12/P13	Medium (Surface Water)	Negligible (adverse)	Slight adverse (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
	Discrete Pond Feature: P32	Low (Surface Water)	Negligible (adverse)	Slight adverse (not significant)
Impacts on groundwater quality from potential accidental spillages during maintenance activities	Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Very High (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	Negligible (adverse)	Slight adverse (not significant)
Permanent hydromorphological impacts to watercourses from Onshore Substation surface water and foul water post secondary treatment outfalls	Ordinary Watercourses – WC07	Low (Morphology)	Minor (adverse)	Slight adverse (not significant)
Impacts on surface water and groundwater resources (flows and level)	Castlemartin Corse GWDTE	Very High (Groundwater)	No Change	Neutral (not significant)
	Carboniferous Black Rock Subgroup and Gully Oolite Formation Principal Aquifer	High (Groundwater)	No Change	Neutral (not significant)
	Avon Group Limestone/ Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)
	Skrinkle Sandstone / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
	Milford Haven Group formations / Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)
	Aber Mawr Shale / Secondary B Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) – Secondary A Aquifer	Medium (Groundwater)	No Change	Neutral (not significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low (Groundwater)	No Change	Neutral (not significant)
Impacts on the rate and volumes of surface water run-off entering local watercourses and subsequent increase in flood risk.	Residential areas in surrounding area	High (Flood Risk)	No Change	Neutral (not significant)
	Onshore Substation	High (Flood Risk)	No Change	Neutral (not significant)
	Onshore Export Cable	Medium (Flood Risk)	No Change	Neutral (not significant)

Decommissioning

343. Decommissioning activities for the proposed Project will take place after 30 years and therefore will follow the decommissioning period of the Erebus project (after 25 years of operation). There may also be potential for overlap with decommissioning of the other identified developments although full details of the decommissioning timescales are unclear.

344. Similar cumulative effects will be anticipated during decommissioning as those outlined above for construction. For this assessment and to provide a worst-case assessment, it has been assumed that all onshore infrastructure from the proposed Project will be removed including the Onshore Export Cable, and Onshore Substation. It is probable that equipment like that used to install the infrastructure could be used to reverse the installation process. Accordingly, the area of the Onshore Development Area impacted during decommissioning will be like the area impacted during installation. While there is potential for cumulative effects to occur in relation to pollution of surface and groundwaters, impacts on hydrology, hydromorphology of watercourses, local water supplies and flood risk, the impacts of decommissioning activities are expected to be no greater than that associated with construction for the proposed Project.

345. The magnitude of any cumulative impact during construction for all identified potential impacts will therefore be **negligible**. The resultant significance of effect is presented for each impact pathway and each receptor in **Table 10-49**. No significant effects have been identified.

Table 10-49. Summary of cumulative effect assessment for decommissioning impacts

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
Decommissioning				
Pollution of surface water from excess fine sediment and chemical spillage risk	Pembroke River / Milford Haven Inner transitional WFD water body	Very High	Negligible (adverse)	Slight adverse (not significant)
	Milford Haven Waterway / Dyfrffordd Aberdaugleddau / Angle Bay / Milford Haven Outer WFD water body	Very High	Negligible (adverse)	Slight (not significant)
	Freshwater West / Pembrokeshire South WFD coastal water body	Very High	Negligible (adverse)	Slight (not significant)
	Castlemartin Corse / Castlemartin Corse river WFD water body	Very High	Negligible (adverse)	Slight (not significant)
	Goldborough Pill West	Very High	Negligible (adverse)	Slight (not significant)
	Ordinary Watercourses – WC02, WC03, WC04, WC05, T05a, WC06.	Low	Negligible (adverse)	Slight (not significant)
	Ordinary Watercourses – WC07, T07a, T07b, T07c, WC08, WC11, T11a, WC12, T12a, WC14, WC21, WC22	Medium	Negligible (adverse)	Slight (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
	Surface water users – Licenced water abstractions	High	Negligible (adverse)	Slight (not significant)
	Ponds not associated with Licenced Abstractions: P3, P4, P5, P10, P13, P14, P15, P17, P20, P26, P28, P31, P32.	Low	Negligible (adverse)	Slight (not significant)
	Ponds associated with Licenced abstractions: P2, P6, P7, P8, P9, P11, P12, P16, P18, P19, P23.	High	Negligible (adverse)	Slight (not significant)
Temporary impacts on surface water recourses from temporary dewatering or changes in hydrology	Surface water users – Licenced water abstractions: A2, A3, A4, A5, A8, A10, A11, A12, A13, A15, A18 and A21)	High	Negligible (adverse)	Slight (not significant)
Temporary Impacts on the hydromorphology of watercourses from the removal of the Onshore Export Cable	Goldborough Pill West	Medium (Morphology)	Minor adverse	Slight (not significant)
	Ordinary Watercourses – WC05, T05a, WC06.	Low (Morphology)	Minor adverse	Slight (not significant)
	Ordinary Watercourses WC07, T07b, T07c, WC12, T12a, WC14	Low (Morphology)	Minor adverse	Slight (not significant)
Impacts on groundwater resources, local water supplies and baseflow to watercourses from temporary dewatering of excavations or changes in hydrology	Groundwater users – Private Water Supplies: PWS03a and PWS03b	High	No Change	Neutral (not significant)
	Carboniferous Black Rock Subgroup Principal Aquifer	High	No Change	Neutral (not significant)
	Gully Oolite Formation / Principal Aquifer	High	No Change	Neutral (not significant)
	Avon Group Limestone, Secondary A Aquifer	Medium	No Change	Neutral (not significant)
	Ridgeway Conglomerate / Secondary A Aquifer	Medium	No Change	Neutral (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of impact	Significance of cumulative effect
	Skrinkle Sandstone / Secondary A Aquifer	Medium	No Change	Neutral (not significant)
	Milford Haven Group formations / Secondary A Aquifer	Medium	No Change	Neutral (not significant)
	Aber Mawr Shale / Secondary B Aquifer	Medium	No Change	Neutral (not significant)
	Ludlow Rocks Formation / Secondary B Aquifer	Medium	No Change	Neutral (not significant)
	Superficial Marine Beach Deposit (sand), Blown Sand (sand) and Alluvium (clay, silt, sand and gravel) - Secondary A Aquifer	Medium	No Change	Neutral (not significant)
	Superficial Raised Beach Deposits (sand and gravel) and Alluvium Deposits (clay, silt, sand and gravel) - Secondary A Aquifer	Medium	No Change	Neutral (not significant)
	Superficial Tidal Flat Deposits (sand, silt and clay) – Secondary undifferentiated	Low	No Change	Neutral (not significant)
	Pembrokeshire Carboniferous Limestone WFD groundwater body (GB41002G206000)	Very High	No Change	Neutral (not significant)
	Carboniferous Black Rock Subgroup Principal Aquifer	High	No Change	Neutral (not significant)
Temporary changes in flood risk from changes in surface water runoff	Construction Workers	Very High	Negligible (adverse)	Slight (not significant)
	Residents and residential areas in surrounding area	High	Negligible (adverse)	Slight (not significant)

10.14 Inter-related Effects of the proposed Project

346. The term 'Inter-related' considers the environmental interactions ('inter-relationships') with other receptors within the proposed Project. These are referred to in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 and further described in **Chapter 31: Inter-related Effect Assessment.**

347. As set out in PINS Advice Note 17 (PINS), 2019, *inter-related -project effects*, or 'interrelationships between topics', derive from combinations of different project specific impacts which, when acting together on the same receptor, could result in a new or different effect, or an effect of greater significance than the project effects, when considered in isolation.

348. Inter-related effects comprise the following:

- *Project lifetime effects*: effects that have the potential to occur during more than one phase of the proposed Project (i.e. construction, operation and maintenance and decommissioning) and to interact in a way that could potentially create a more significant effect than if it was assessed in isolation.
- *Receptor-led effects*: effects that have the potential to interact, spatially and temporally, to create inter-related effects on a receptor.

349. **Chapter 31: Inter-related Effects Assessment** details the approach to the inter-related effects assessment and includes a description of the likely inter-related effects that may occur as a result of the proposed Project on the Terrestrial Water Environment.

350. The assessment of inter-related effects on the Terrestrial Water Environment has been scoped out of the inter-related effects assessment. The impacts set out and assessed in this chapter already take into consideration potential inter-relationships between impacts on geology and hydrogeology and impacts on the water environment, agriculture and soil, air quality, terrestrial ecology, noise and vibrations, as the effects assessed as the natural and physical processes behind them are inherently connected.

10.15 Transboundary Effects

351. A transboundary effect refers to the impacts or effects of a project that extend beyond the boundaries of the United Kingdom and have the potential to affect the environment of other countries within the European Economic Area (EEA). These effects can occur either from the proposed Project on its own or when combined with the effects of other projects or activities in the wider geographical area.

352. In terms of the impacts on Terrestrial Water Environment receptors, impacts will be localised to the extent of the Study Area. Given the intervening distance to neighbouring EEA states, there is no potential for transboundary impacts and resultant effects to occur.

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