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Water Environment

10.1 Introduction

10.1.1. This chapter presents the preliminary assessment of the likely significant effects of the Proposed Development with respect to the Water Environment, including Hydrology, Flood Risk and Drainage. This includes flood risk from tidal, fluvial, pluvial (surface water), canal, manmade (e.g. reservoirs) and infrastructure. The chapter is supported by an Outline Surface Water Drainage Strategy (**Appendix 10A**). The preliminary assessment is based on information obtained to date. The chapter should be read in conjunction with the Proposed Development description provided in **Chapter 4: Development Description** and with respect to relevant parts of the following chapters:

- **Chapter 8: Biodiversity** – although the aquatic environment is limited for this site there are potential aquatic habitats within the Proposed Development boundary; this chapter should therefore be read in conjunction with **Chapter 8** which considers the potential for significant effects on biodiversity;
- **Chapter 11: Ground Conditions** – the groundwater conditions will be driven by soil type and wider hydrogeomorphology; this chapter should therefore be read in conjunction with **Chapter 11** which considers the potential for significant effects related to ground conditions.

10.1.2. This chapter describes:

- the legislation, policy and technical guidance that has informed the assessment (**Section 10.2**);
- consultation and engagement that has been undertaken with stakeholders and how comments from consultees relating to the Water Environment have been addressed (**Section 10.3**);
- the methods used for baseline data gathering (**Section 10.4**);
- baseline conditions (**Section 10.5**);
- embedded measures relevant to the Water Environment (**Section 10.6**);
- the scope of the assessment for the Water Environment (**Section 10.7**);
- the methods used for the assessment (**Section 10.8**);
- preliminary assessment of the Water Environment effects (**Section 10.9**);
- preliminary assessment of cumulative (inter-project) effects (**Section 10.10**);
- a summary of the preliminary significance of effects (**Section 10.11**); and,
- an outline of further work to be undertaken for the Final Environmental Statement (ES) (**Section 10.12**).

Limitations and Assumptions

10.1.3. The information provided in this Draft ES is preliminary, the final assessment of likely significant effects will be reported in the Final ES. The Draft ES has been produced to fulfil the Applicant's consultation duties and enable consultees to develop an informed view of the likely significant effects of the Proposed Development.

- 10.1.4. A preliminary assessment of effects associated with the offline access track between Panside and the unclassified road (see inset A on **Figure 1-2**) has not been undertaken as part of the Draft ES as the design is yet to be determined. The Final ES will be updated to consider any effects associated with this segment of track.

10.2 Relevant legislation, planning policy and technical guidance

- 10.2.1. This section identifies the legislation, planning policy and technical guidance that has informed the assessment of effects with respect to the Water Environment. Further information on policies relevant to the Proposed Development is provided in **Chapter 5: Legislation and policy overview**.

Legislation

- 10.2.2. A summary of the relevant legislation is given in **Table 10.1**.

Table 10-1 Legislation relevant to the Water Environment assessment.

Legislation	Context
Control of Pollution Act 1974¹	Makes further provision with respect to waste disposal, water pollution, noise, atmospheric pollution and public health.
Environmental Protection Act 1990²	<p>Makes provision for the improved control of pollution arising from certain industrial and other processes. It re-enacts the provisions of the Control of Pollution Act 1974 relating to waste on land, including modifications to the functions of the regulatory and other authorities concerned in the collection and disposal of waste and makes further provision in relation to such waste.</p> <p>Part 2 of the Act makes provision for the improved control of pollution arising from certain industrial and other processes. Part 2A of the Act provides the regulatory basis for the identification, designation, and remediation of contaminated land.</p>
The Environmental Damage (Prevention and Remediation) (Amendment) (Wales) Regulations 2015³	<p>Regulations implementing the European Union (EU) Directive on environmental liability setting out the principles for prevention and remedy of environmental damage.</p> <p>Construction and operational activities for the Proposed Development have the potential to cause pollution and the regulations place emphasis on businesses to proactively implement pollution prevention measures so that damage to the environment does not arise.</p>

¹ UK Government. (1974) *Control of Pollution Act 1974*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/1974/40/contents> (Accessed November 2025).

² UK Government. (1990) *Environmental Protection Act 1990*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/1990/43/contents> (Accessed November 2025).

³ UK Government. (2015) *The Environmental Damage (Prevention and Remediation) (Amendment) (Wales) Regulations 2015*. (Online) Available <https://www.legislation.gov.uk/wsi/2015/1394/contents/made> (Accessed November 2025).

Legislation	Context
Land Drainage Act 1991⁴ and 1994⁵	Stipulates, in combination with the Water Resources Act, that before work on or near an 'Ordinary Watercourse' is carried out, an Ordinary Watercourse Consent is required. The Flood Defence consenting regime for 'Main Rivers', which used to be part of this Act, was replaced by flood risk activities permits under the Environmental Permitting Regulations 2016.
Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009⁶ Water Act 2003⁷	States that it is an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter 'Controlled Waters'. The Act was revised by the Water Act 2003, which sets out regulatory controls for water abstraction, water impoundment and protection of water resources. Important for the Proposed Development is the potential requirement to obtain a licence for dewatering of engineering works and to ensure that any impact on the environment can be mitigated. Provisions for the regulation of water discharges to controlled waters are set out in the Environmental Permitting (England and Wales) Regulations 2016. These have replaced provisions in the earlier Acts.
Environment Act 1995⁸	Established the Environment Agency (EA) and gave it responsibility for environmental protection and flood defence. Natural Resources Wales (NRW) was formed in April 2013, largely taking over the functions of the Countryside Council for Wales, Forestry Commission Wales and the Environment Agency in Wales
Flood and Water Management Act 2010⁹	Sets out the Government's proposals to improve flood risk management, water quality and ensure water supplies are more secure. The Act includes consideration and responsibilities for managing flood risk and consideration of drainage including the use of Sustainable Drainage Systems (SuDS).
The European Union (EU) Water Framework Directive (2000/60/EC) (WFD)¹⁹ as enacted into domestic law by the Water Environment WFD (England and Wales) (Amendment) Regulations 2017¹⁰	Sets out the environmental standards to be used for the second cycle of river basin plans, covering the period 2016-21. Along with the updated Water Environment (WFD) (England and Wales) Regulations 2003, they transpose Directive 2013/39/EC on environmental quality standards for priority substances.

4 UK Government. (1991) *Land Drainage Act 1991*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/1991/59/contents> (Accessed November 2025).

5 UK Government. (1994) *Land Drainage Act 1994*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/1994/25/contents> (Accessed November 2025).

6 UK Government. (2009) *The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009*. (Online) Available from: <https://www.legislation.gov.uk/uksi/2009/3104/contents/made> (Accessed November 2025).

7 UK Government. (2003) *Water Act 2003*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/2003/37/contents> (Accessed November 2025).

8 UK Government. (1995) *Environment Act 1995*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/1995/25/contents> (Accessed November 2025)

9 UK Government. (2010) *Flood and Water Management Act 2010*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/2010/29/contents> (Accessed November 2025).

10 UK Government. (2017) *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017*. (Online) Available from: <https://www.legislation.gov.uk/uksi/2017/407/contents/made> (Accessed November 2025).

Legislation	Context
The Environment (Wales) Act 2016¹¹	Aims to enable resources in Wales to be managed in a more proactive, sustainable and joined-up way and to establish the legislative framework necessary to tackle climate change. Includes provisions relating to land drainage and establishes a Flood and Coastal Erosion Committee which oversees and provides guidance on wider risks and benefits of flood and coastal erosion risk management in Wales. The Act also makes provisions within Wales for the planning and managing of natural resources at national and local level. Natural resources are defined in Part 1, 2, as including several resources of relevance to the Ground Conditions assessment: “(a) animals, plants and other organisms; (b) air, water and soil; (c) minerals; (d) geological features and processes.”
Well-being of Future Generations (Wales) Act (2015)¹²	The Act does not refer explicitly to soils or land contamination; however, it requires public bodies in Wales to think about the long-term impact of their decisions. It requires them to act in accordance with sustainable development principles, with the aim of achieving well-being goals.
The Private Water Supplies (Wales) Regulations 2017¹³	The Regulations require Local Authorities to monitor Private Water Supplies.
The Environmental Permitting (England and Wales) (Regulations (EPR), 2016 (as amended)¹⁴	Replaces the previous 2010 regulations. It provides a consolidated framework for environmental permits and exemptions for waste operations and water discharge activities (previously consented under the Water Resources Act 1991, and the Control of Pollution Act 1974), and groundwater activities. It also sets out the powers, functions, and duties of the regulators.
Environment Act, 2021¹⁵	The Environment Act (2021) makes provision for Environmental Improvement Plans (EIPs), including a target-based approach for water bodies, aligned with the Water Framework Directive (WFD) targets. Currently, only one EIP, the Defra 25-year plan has been produced, which sets out the high level (national aspirations) for the environment.

Planning Policy

10.2.3. A summary of the relevant national and local planning policy is given in **Table 10.2**.

11 Welsh Government. (2016) *Environment (Wales) Act 2016*. (Online) Available from: <https://www.legislation.gov.uk/anaw/2016/3/contents> (Accessed November 2025).

12 Welsh Government. (2015) *Well-being of Future Generations (Wales) Act 2015*. (Online) Available from: <https://www.legislation.gov.uk/anaw/2015/2/contents> (Accessed November 2025).

13 Welsh Government. (2017) *The Private Water Supplies (Wales) Regulations 2017*. (Online) Available from: <https://www.legislation.gov.uk/wsi/2017/1041/contents> (Accessed November 2025).

14 UK Government. (2016) *The Environmental Permitting (England and Wales) Regulations 2016* (Online) Available from: <https://www.legislation.gov.uk/uksi/2016/1154/contents> (Accessed November 2025).

15 UK Government. (2021) *The Environment Act 2021*. (Online) Available from: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted> (Accessed November 2025).

Table 10-2 Planning policy relevant to the Water Environment assessment.

Policy	Context
National Planning Policy	
National Development Framework (Future Wales: The National Plan 2040)¹⁶	<p>This is the national development framework for Wales, which has development plan status.</p> <p>Policy 8 – Flooding</p> <p>The policy sets out the requirement for sustainable development which puts a priority on nature-based flood management solutions, as well as supporting strategic growth and regeneration in National and Regional Growth Areas.</p> <p>Policy 19 – Strategic Policies for Regional Planning</p> <p>The policy states that environmental consideration when planning developments and managing resources is vital, on a strategic and local scale. Environmental issues identified must be fully assessed and addressed.</p> <p>Policy 33 – Cardiff, Newport and the Valleys</p> <p>This policy sets out the ambitions for the Cardiff, Newport, and Valleys region of Wales, which includes Caerphilly. This is inclusive of development and growth strategies with reference to natural resources, climate change, flooding and biodiversity.</p>
The National Strategy for Flood and Coastal Erosion Risk Management (FCERM) in Wales, Welsh Government, 2020¹⁷	<p>The National Strategy for FCERM in Wales, as required under the Flood and Water Management Act 2010, sets out the management approach for risks associated with flooding and coastal erosion across Wales over a 10-year period. Natural Resource Wales (NRW) are responsible for managing the flood risks from main rivers and the sea across Wales; whilst Local Authorities as Lead Local Flood Authorities (LLFA) are responsible for managing risks associated with surface water, groundwater, and ordinary watercourses.</p>
Planning Policy Wales (PPW) (Edition 12, February 2024)¹⁸	<p>The PPW sets out the land use planning policies of the Welsh Government.</p> <p>It details the requirements when constructing new developments including the provision of Sustainable Drainage Systems (SuDS) enabling surface water to be managed and consideration of impacts to water resources (groundwater and ecology).</p>

16 Welsh Government. (2021) *Future Wales: The National Plan 2040*. (Online) Available from: <https://www.gov.wales/future-wales-national-plan-2040-0> (Accessed November 2025).

17 Welsh Government. (2020) *The National Strategy for Flood and Coastal Erosion Risk Management in Wales October 2020*. (Online) Available from: <https://www.gov.wales/national-strategy-flood-and-coastal-erosion-risk-management-wales> (Accessed November 2025).

18 Welsh Government. (2018) *Planning policy Wales*, Edition 12, February 2024 (Online) Available from: <https://www.gov.wales/planning-policy-wales> (Accessed November 2025).

Policy	Context
Technical Advice Note 15 (TAN15), March 2025¹⁹	<p>Technical Advice Note 15: Development and Flood Risk (TAN15) was originally produced by the then Welsh Assembly Government (now the Welsh Government) in July 2004. An updated version of TAN15 was released in March 2025.</p> <p>TAN15 provides technical guidance which supplements the policy set out in Planning Policy Wales (Edition 12, February 2024) (Welsh Assembly Government, 2024) in relation to development and flooding, providing a framework within which risks arising from both river and coastal flooding, and from additional run-off from development in any location, can be assessed.</p>
Local Planning Policy	
Caerphilly County Borough Council (CBC) Local Development Plan Up to 2021 (Adopted November 2010)²⁰	CW5 Protection of the Water Environment This policy states that development proposals will only be permitted if they will not have an unacceptable adverse impact upon the Water Environment and will not pose an unacceptable risk to the quality of controlled water (including groundwater and surface water). This assessment should consider the impact of climate change.
Caerphilly CBC EB 12 Strategic Flood Consequences Assessment (October 2022) (Consultation Document)²¹	Flood Consequences Assessment supporting consultation on updating Local Development Plan
Caerphilly Local Flood Risk Management Strategy – Strategy Document April 2013²²	Lead Local Flood Authority (LLFA) prepared Local Flood Risk Management Strategy

Technical Guidance

10.2.4. A summary of the technical guidance for the Water Environment is given in **Table 10.3**

Table 10-3 Technical guidance relevant to the Water Environment assessment.

Technical Guidance Document	Context
NRW – Flood consequence assessments: climate change allowances²³	Guidance regarding uplifts to be applied to hydrological modelling inputs to be used to help minimise vulnerability and provide resilience to the impacts of climate change.

¹⁹ Welsh Government. (2004) *Technical Advice Note 15: Development and Flood Risk*. Updated March 2025 (Online) Available from: <https://www.gov.wales/technical-advice-note-tan-15-development-flooding-and-coastal-erosion> (Accessed November 2025).

²⁰ Caerphilly CBC. (2010) *Local Development Plan 2010 (Adopted)*. (Online) Available at: <https://www.caerphilly.gov.uk/business/planning-and-building-control-for-business/local-development-plan> (Accessed November 2025).

²¹ Caerphilly CBC. (2022) *EB12 Strategic Flood Consequences Assessment* (Online) Available at: [https://caerphilly.oc2.uk/docfiles/17/EB12%20SFCA%20\(ENG\).pdf](https://caerphilly.oc2.uk/docfiles/17/EB12%20SFCA%20(ENG).pdf) (Accessed November 2025).

²² Caerphilly CBC. (2013) *Local Flood Risk Management Strategy* (Online) Available at: <https://www.caerphilly.gov.uk/services/roads-and-pavements/flood-risk-management/flood-risk-strategies,-plans-and-policies/local-flood-risk-management-strategy?lang=en-GB> (Accessed November 2025).

²³ Welsh Government. (2021) *Climate change allowances and flood consequence assessments*. (Online) Available from: <https://www.gov.wales/climate-change-allowances-and-flood-consequence-assessments> (Accessed November 2025).

Technical Guidance Document	Context
Sustainable Drainage (SuDS) Statutory Guidance, Welsh Government²⁴	The SuDS Statutory Guidance establishes the requirements of Schedule 3 of the Flood and Water Management Act 2010; a framework for the approval and adoption of surface water management systems serving new developments. The SuDS Approval Bodies (SABs) are assigned under the same Act, which give local authorities the responsibility to approve drainage systems for new developments. The overall objective of the legislation is to deliver effective, multi-purpose SuDS, which will remain effective for the lifetime of the development.
Natural Resources Wales – How to comply with Sustainable Drainage Systems (SuDS) standard²⁵	Guidance outlining advice to developers and SuDS Advisory Bodies (SABs) on three of the SuDS Standards: S2 hydraulic control, S3 water quality and S5 biodiversity.
Construction Industry Research and Information Association (CIRIA) reports²⁶	
Report C532: Control of Water Pollution from Construction Sites (2001)²⁷	Provides practical support for consultants and contractors on how to plan and manage construction projects to control water pollution.
Report C624: Development and Flood Risk - Guidance for the Construction Industry (2004)²⁸	Guidance for developers and the construction industry on the implementation of good practice in the assessment and management of flood risk as part of the development process and is intended to promote development that is sustainable in terms of flood risk.
Report C650: Environmental Good Practice on Site, second edition (2005)²⁹	Provides practical guidance about managing construction on-site to control environmental impacts.
Report C651: Environmental Good Practice - Pocket Book (2005)³⁰	Contains a series of good practice guidance and practical advice for the management of construction sites to minimise environmental impacts.
Report C692: Environmental Good Practice on Site (2010)³¹	General good practice guidance and practical advice for the management of construction sites to minimise environmental impacts.
Report C698: Site Handbook for the Construction of SuDS (2007)³²	Guidance of site engineers and SuDS practitioners on the construction of SuDS to facilitate their effective implementation with developments.

²⁴ Welsh Government. (2019) *Sustainable Drainage (SuDS) Statutory Guidance*. Available from:

<https://www.gov.wales/sites/default/files/publications/2019-06/statutory-guidance.pdf> (Accessed November 2025)

²⁵ Natural Resources Wales. (2025) *How to comply with Sustainable Drainage Systems (SuDS) standards* (Online)

Available from: <https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/advice-for-developers/how-to-comply-with-sustainable-drainage-systems-standards/?lang=en> (Accessed November 2025).

²⁶ CIRIA. *CIRIA resources* (Online) https://www.ciria.org/CIRIA/Resources/Resource_overview/Resources/ (Accessed 2025)

²⁷ Masters-Williams, H., Heap, A., Kitts, H., Greenshaw, L., Davis, S., Fisher, P., Hendrie, M. and Owens, D. (2001) *Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors*. C532. London: CIRIA.

²⁸ Lancaster, J., Preece, M. and Marshall, C. (2004) *Development and Flood Risk – Guidance for the Construction Industry*. C624. London: CIRIA.

²⁹ Charles, P. and Connelly, S. (2005) *Environmental Good Practice Site Guide* (second edition). C650. London: CIRIA

³⁰ Chant-Hall, G., Charles, P. and Connolly, S. (2005). *Environmental good practice on site – pocket book*. C651. London: CIRIA.

³¹ Audus, I., Charles, P. and Evans, S. (2010) *Environmental good practice on site* (third edition). C692. London: CIRIA.

³² Woods Ballard, B., Kellagher, R., Martin, P., Jefferies, C., Bray, R. and Shaffer, P. (2007) *Site Handbook for the Construction of SUDS*. C698. London: CIRIA.

Technical Guidance Document	Context
Report C753: The SuDS Manual (2015) ³³	Best practice guidance on the planning, designing, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.
<u>Pollution Prevention Guidance Notes (PPGs) and Guidance for Pollution Prevention Notes (GPPs)</u> (both are maintained by NetRegs and provide environmental good practice guidance for the whole UK, and environmental regulatory guidance directly to Northern Ireland, Scotland and Wales only.) ³⁴	
GPP 1: Understanding your environmental responsibilities - good environmental practices (October 2020)	Guidance document based on relevant legislation and reflects current good practice.
GPP 2: Above ground oil storage tanks (January 2018)	Guidance to support the safety of above ground oil storage tanks and minimise the risk of causing pollution.
GPP 3: Use and design of oil separators in surface water drainage systems (March 2022)	Guidelines to support decision making on whether an oil separator is needed for a site, and if so what size and type separator is appropriate.
GPP 5: Works and maintenance in or near water (February 2018)	Guidance document based on relevant legislation and setting out current good practice for working in or near water
PPG 6: Working at construction and demolition sites (2012)	Practical advice and guidance to help prevent pollution from construction and demolition sites. Sets out legislative requirements and good practice measures to reduce the risk of a pollution incident.
GPP 8: Safe storage and disposal of used oils (July 2017)	Guidance based on relevant legislation and setting out current good practice for the safe storage and disposal of used oils.
GPP 20: Dewatering underground ducts and chambers (January 2018)	Guidelines for dewatering underground ducts and chambers, based on relevant legislation and setting out current good practice.
GPP 21: Pollution incident response planning (June 2021)	Guidelines setting out current best practice for producing an incident response plan.
GPP 22: Dealing with spills (October 2018)	Guidance applicable to those responsible for storing and transporting materials that could cause pollution if they spill. It may also be useful for those who respond to spills, or those responsible for transporting or storing waste from spills.
GPP 26 Safe storage - drums and intermediate bulk containers (IBCs) (February 2019)	Guidance aimed at site operators and those responsible for the storing and handling of drums and IBCs.

³³ Woods Ballard, S., Wilson, S., Udale-Clarke, H., Illman, S., Scott, T., Ashley, R. and Kellagher, R. (2015). *The SuDS Manual. C753*. London: CIRIA.

³⁴ NetRegs. *Guidance for Pollution Prevention (GPP) documents* (Online) Available from: <https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/> (Accessed November 2025)

10.3 Consultation and Engagement

Overview

- 10.3.1. The assessment has been informed by consultation responses and ongoing stakeholder engagement. An overview of the approach to consultation is provided in **Section 2.4** of **Chapter 2: Approach to Environmental Impact Assessment**.

Scoping Opinion

- 10.3.2. A Scoping Direction was issued by the Planning and Environmental Decisions Wales (PEDW, formerly Planning Inspectorate Wales), on behalf of the Welsh Ministers, on 04 December 2024 (reference DNS CAS-03701-H3V4Y3: Rhyswg Wind Farm). A summary of the relevant responses received in the Scoping Opinion in relation to the Water Environment and confirmation of how these have been addressed within the assessment to date is presented in **Table 10.4**.
- 10.3.3. The information provided in the Draft ES is preliminary and not all of the Scoping Direction comments have been addressed at this stage, however, all comments will be addressed within the Final ES and required further permits and consents as noted obtained prior to construction.

Table 10-4 Summary of EIA Scoping Direction Responses for the Water Environment

Consultee	Consideration	How addressed in this Draft ES
PEDW	Flood Consequences Assessment (FCA) to inform the ES.	A Flood Consequences Assessment (FCA) is embedded within Section 10.5 , using the Flood Maps for Planning, see also Figure 10.1 – 10.3
Caerphilly CBC	The FCA should consider the potential for flood consequences to the Nant Gawni and Nant Gwyddon due to downstream culverts.	A Flood Consequences Assessment (FCA) is embedded within Section 10.5 . Appendix 10A: Outline Drainage Strategy (ODS) provides an assessment of potential surface water drainage arrangements.
Caerphilly CBC	Any impermeable areas (i.e. access roads, compounds / cabins, turbine pads etc) that equate to over 100m ² require SAB approval prior to onsite works.	Impermeable areas identified within Appendix 10A: Outline Drainage Strategy (ODS) and suitable infrastructure and mitigation identified to allow SAB consultation prior to construction.
Caerphilly CBC	Any works within the 8m Byelaw distance of any of the watercourses (permanent or temporary) will be subject to Land Drainage Byelaws consent under the Land Drainage Act.	LLFA to be consulted regarding suitability prior to construction – no permanent crossings of watercourses currently identified; works within 8m are subject to detailed design.
Caerphilly CBC	Any works that impact upon the cross-section of any of the watercourses will be subject to Ordinary Watercourse Consents under the Land Drainage Act.	No watercourses are identified as requiring permanent crossing. At this time the requirement for temporary crossings cannot be excluded but will be addressed in the CEMP and Final ES.

Technical Engagement

- 10.3.4. Data requests were sent to NRW and CCBC to establish the current water environment baseline for the Proposed Development area. Further engagement will be undertaken with the following consultees: CCBC to discuss and agree the proposed outline drainage strategy; NRW to discuss and agree the proposed embedded measures for mitigation of potential effects on the aquatic environment; and DCWW to discuss and agree the proposed approach for drainage strategy. A summary of the technical engagement will be provided in the final submission of the ES.

10.4 Data gathering methodology

Study Area

- 10.4.1. This chapter outlines the methodology employed to assess the effects of the Proposed Development on Hydrology, Flood Risk and Drainage receptors within the Study Area. The Study Area that extends beyond the EIA Assessment Area (the 'Site'), is shown on **Figure 10.1** and has been used to form the basis of the assessment.
- 10.4.2. The Study Area for this chapter is defined as the geographic region where direct and indirect impacts of the Proposed Development on Hydrology, Flood Risk and Drainage receptors are anticipated. A 1km Study Area from the Site has been applied based on professional judgement, although consideration will be given to potential effects that may extend beyond 1km depending on the findings of the preliminary assessment.

Desk Study

- 10.4.3. A desktop survey to establish the baseline conditions was undertaken in order to:
- Describe surface water hydrology, including watercourses, springs and waterbodies;
 - Identify existing flooding risks;
 - Collate hydrological flow and flooding data for the immediate area and main downstream watercourses; and
 - Confirm surface water catchment areas and watersheds for the Site.
- 10.4.4. A summary of the organisations that have supplied data, together with the nature of that data, is outlined in **Table 10.5**.

Table 10-5 Data sources used to inform the Water Environment assessment

Organisation	Data source	Data provided
British Geological Survey (BGS)	GeoIndex (onshore) - British Geological Survey ³⁵ (accessed September 2025)	1:50,000 scale Bedrock Geology, 1:50,000 scale Superficial Geology, 1:50,000 scale Linear Features, Aquifer Designation, 1:625,000 Hydrogeology, 1,50,000 scale Borehole Records
Ordnance Survey (OS)	Local Ordnance Survey (OS) mapping	Topography and location of springs
NRW	DataMapWales ³⁶	Flood Map for Planning
Department for Environment, Food & Rural Affairs (Defra)	Multi-Agency Geographic information for the Countryside (MAGIC) interactive map ³⁷ .	Topographical mapping

Survey work

- 10.4.5. No survey work additional to the desk study associated with water features, flooding and watercourse crossings has been undertaken as part of this Draft ES chapter.

³⁵ British Geological Survey. (2020) *GeoIndex Onshore* (Online) Available from: <http://mapapps2.bgs.ac.uk/geoindex/home.html> (Accessed September 2025)

³⁶ Welsh Government. (2020) *National Flood Risk Maps* (Online) Available from: <https://datamap.gov.wales/layergroups/inspire-nrw:NationalFloodRiskMaps> (Accessed November 2025).

³⁷ Natural England (2013) Multi-Agency Geographic Information for the Countryside (MAGIC) (Online) Available from: <https://magic.defra.gov.uk/MagicMap.aspx> (Accessed November 2025)

10.5 Overall baseline

Current baseline

Introduction

- 10.5.1. This section provides a review of the current baseline environmental characteristics for the Proposed Development and Study Area, with particular reference to the water environment.

Hydrology

- 10.5.2. By evaluating the hydrology of the Site using a catchment-based approach, assumptions can be made regarding potential influences that Site activities may have downstream and on other water bodies. **Figure 10.1 – 10.3** provides an overview of the hydrology receptors and hydrological characteristics present within the Study Area.

Watercourses

- 10.5.3. The Site is located within the southeast Valleys catchment. The Site lies in close proximity to the Ebbw River, a designated Main River, which flows from north to south approximately 1.3 km to the west of the Site. See **Figure 10.1** for watercourse locations.
- 10.5.4. The Nant Gofapi ordinary watercourse drains the southern section of the Study Area before merging with the Nant Carn. The sub-catchment area of the Nant Gofapi encompasses the Main Windfarm Site.
- 10.5.5. The Nant Carn and tributaries, all ordinary watercourses, drain the southeastern section of the Study Area. They flow southward through Cwmcarn Forest and join the Ebbw River at Cwmcarn. The sub-catchment area of the Nant Carn and tributaries encompasses the proposed access track.
- 10.5.6. The Nant Gwyddon ordinary watercourse drains the northern and western sections of the Study Area and flows west to join the Ebbw River at Abercarn. The sub-catchment area of the Nant Gwyddon encompasses the entire Site.

Hydrological Characteristics

- 10.5.7. The Site is served primarily by three sub-catchments (Carn, Gofapi and Gwyddon) which all form part of the wider Ebbw catchment. The topography of the region heavily influences the natural catchment boundaries.
- 10.5.8. All sub-catchments border one another in the centre of the Site, separated by natural interfluves created by topography. **Figure 10.1** identifies the three watercourses.
- 10.5.9. The southern area of the Site drains into the Nant Gofapi, the eastern area to the Nant Cam, and the northern, central and western areas drain to the Nant Gwyddon.
- 10.5.10. Three mapped ponds have been identified within the Site. Nine mapped springs have been identified within the Study Area using 1:25,000 OS mapping. These are located across the Study Area and are typically small, isolated ponds; consistent with the agricultural use of the Study Area.

10.5.11. No mapped springs have been identified within the Site. Several further ponds are identified within the Study Area using 1:25,000 OS mapping. These are located across the Study Area and are typically the upper extents of watercourses and they coincide with large, flatter boggy areas.

Hydrogeology

10.5.12. See **Chapter 11: Ground Conditions** for further information on underlying ground information.

Bedrock Geology

10.5.13. BGS Geological mapping (2024)³⁴ indicates the formations noted within the Site from north to south:

- Hughes Member: Sandstone. Sedimentary bedrock formed between 309.5 and 308 million years ago during the Carboniferous period.

Superficial Geology

10.5.14. Superficial geology mapping³⁴ indicates the Site has no mapped superficial cover; therefore, shallow bedrock is expected.

Soils And Soil Characteristics

10.5.15. Cranfield Institute Soilscape³⁸ mapping indicates the Site is underlain by Soilscape 13: Freely draining acid loamy soils over rock.

Groundwater

10.5.16. The Proposed Development and the wider study area are not within a Source Protection Zone (SPZ).

Water Quality

10.5.17. As part of the WFD, River Basin Management Plans (RBMPs) have been prepared for all the river basin districts in England and Wales. The RBMPs are designed to protect and improve the water quality of the Water Environment by advising on which actions should be taken to tackle water related issues. This includes measures to improve water quality in rivers, lakes, estuaries, coasts and groundwater. The Water Environment Study Area is covered by the RBMP for the Severn River Basin District.

10.5.18. The Study Area falls within the Ebbw River (conf Ebbw Fach to Maes-glas) (GB109056026910) WFD waterbody catchment. The waterbody has achieved an overall classification of 'Moderate' in the 2021 WFD Classification (Cycle 3).

10.5.19. The contributing elements for the Ebbw River not achieving 'Good' WFD status are reported to be based upon impacts to fish and polycyclic aromatic hydrocarbons (PAHs) within the river. Local targeted measures for the watercourses relate to improved control of diffuse and point source pollutants, as well as improvements to the river hydrogeomorphology for habitat or fish passage.

21.1 ³⁸ LandIS. *Soilscape Viewer* (Online) Available from: <https://www.landis.org.uk/soilscape/> (Accessed November 2025)

Flood Risk

Flood Consequences Assessment

- 10.5.20. The Flood Consequences Assessment (FCA) presented in this section has been undertaken to consider potential flood sources which are listed in Technical Advisory Note 15: Development, Flooding and Coastal Erosion (TAN15)¹⁹ and with reference to the Natural Resources Wales (NRW) Flood Map for Planning (FMfP)³⁵. Therefore, the following assessment considers the flood risk to the Proposed Development as well as the potential to increase flooding downstream that could be caused by the Proposed Development.
- 10.5.21. It is noted that developments within Wales should align with the requirements of Planning Policy Wales (PPW)¹⁸ and TAN15. PPW and TAN15 set out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.
- 10.5.22. TAN15 serves as the framework for assessing flood risk to and from new developments. NRW has developed the FMfP to be used in conjunction with the new TAN15.
- 10.5.23. The FMfP has adopted an updated definition of the flood risk zones according to their use within the new TAN15. Therefore, based on NRW guidance, this EIA has utilised the latest available information provided in the FMfP.
- 10.5.24. In this assessment, the probability of a flood occurring is expressed in terms of Annual Exceedance Probability (AEP), which is the reciprocal of the annual maximum return period. For example, the 1 in 100 flood can be expressed as the 1% AEP flood, i.e., a flood that has a 1% (1 in 100) chance of being exceeded in any year.
- 10.5.25. The flood zone definitions, as described within the FMfP are as follows:

Rivers Flood Zone Definitions

- Flood Zone 1 – Areas with <0.1% AEP of flooding from rivers including climate change;
- Flood Zone 2 – The area with between 0.1% and 1% AEP of flooding from rivers including climate change; and,
- Flood Zone 3 – The area with >1% AEP of flooding from rivers including climate change.

Sea Flood Zone Definitions

- Flood Zone 1 – Areas with <0.1% AEP of flooding from the sea including climate change;
- Flood Zone 2 – The area with 0.1% to 0.5% AEP of flooding from the sea including climate change; and,
- Flood Zone 3 – The area with >0.5% AEP of flooding from rivers including climate change.

Surface Water and Small Watercourses Flood Zone Definitions

- Flood Zone 1 – Areas with <0.1% AEP of flooding from surface water and/or small watercourses, including climate change;
- Flood Zone 2 – Areas with between 0.1% and 1% AEP of flooding from surface water and/or small watercourses, including climate change; and,

- Flood Zone 3 – Areas with more than 1% AEP of flooding from surface water and/or small watercourses, including climate change.

10.5.26. A summary of flood risk from all sources of flooding is provided below and shown on **Figures 10.2 and 10.3**. The assessment has considered the existing flood risk to the Site, both in the present day and when the potential effects of climate change are considered.

10.5.27. The FMfP for the Site shows that no infrastructure lies within a fluvial or tidal flood zone, although some potential flooding from surface water is shown along the southern boundary of the Site. This is discussed further below.

Tidal Flood Risk

10.5.28. Review of the NRW FMfP (Sea) shows that the Site is at very low risk of tidal flooding. This is on account of the elevation above sea level and the considerable distance from the coast. As such, the risk of flooding from coastal sources is considered **negligible**.

Fluvial Flood Risk

10.5.29. Review of the NRW FMfP (Rivers) shows that the Site is in Flood Zone 1 and at very low risk of fluvial flooding.

10.5.30. Fluvial flood risk is indicated downstream of the Site in the villages of Abercarn and Cwmcarn where the Nant Carn and Nant Gwyddon join the Ebbw River.

10.5.31. **Figure 10.2 and 10.3** shows the fluvial flood risk to the Site according to the FMfP.

10.5.32. It is concluded that the risk from fluvial flooding to the Site is **negligible**. The development of the Site could influence existing downstream flood risk, see Section 10.9.16 and 10.9.33 for assessment.

Surface Water Flood Risk and Small Watercourses

10.5.33. Review of the NRW FMfP (Surface Water and Small Watercourses) shows the Site is at very low risk of surface water flooding. Corridors of increased risk correspond to the small tributaries that discharge to the ordinary watercourses discussed above, representing the preferential flow paths of surface water runoff towards the ordinary watercourses. The width of the mapped flood extent extends 5 to 20m from the mid-channel in places. The Site is located outside of the mapped flood extents, with the exception of a very small encroachment on the southern Site boundary.

10.5.34. As the Site is on the upper slopes of the watercourses catchments there is very limited risk to the turbine locations and the access track with the higher risks limited to the edges of the Site area.

10.5.35. **Figure 10.2** includes the surface water flood risk to the Site according to the FMfP.

10.5.36. It is concluded that the overall risk from surface water flooding to the Site is **negligible**.

Groundwater Flood Risk

10.5.37. Groundwater flooding occurs because of water issuing to the surface from underlying aquifers. This tends to occur after long periods of sustained high rainfall, with areas most at risk being situated on permeable geology and low-lying compared to the local water table. See **Chapter 11: Ground Conditions** for further information on underlying ground information.

10.5.38. Groundwater conditions at the Site are likely to be primarily influenced by surface water and direct rainfall, with groundwater having minimal influence, and this influence decreasing at higher altitude.

10.5.39. It is concluded that the risk from groundwater flooding to the Site is **negligible**.

Sewer Flood Risk

10.5.40. The Site is situated away from developed areas, and it is anticipated that there are no sewer drainage networks in the proposed development area.

10.5.41. The risk of sewer flooding in the area is considered to be **negligible**.

Artificial Flood Risk – Reservoirs and Canals

10.5.42. There are no canals within the vicinity of the Site for consideration.

10.5.43. Review of the NRW FMfP (Reservoirs), see **Figure 10.3**, shows that areas within the Ebbw Valley are at risk from reservoir flooding associated with the Llangynidr and Carno Reservoirs. However, this risk does not extend to the Site or to the tributary catchments (Carn, Gofari and Gwyddon) considered within this assessment.

10.5.44. The flood risk to the Site from artificial sources is considered to be **negligible**.

Historical Flooding

10.5.45. NRW's FMfP includes extents of historical flood events. The mapping shows that there are no recorded historical flood events within or in proximity to the Proposed Development.

Overall Flood Risk

10.5.46. Based on the above, the flood risk to the Site can be considered **negligible** from all sources of flooding.

10.5.47. The downstream villages of Abercarn and Cwmcarn are indicated to be at risk of fluvial flooding where the Nant Carn and Nant Gwyddon join the Ebbw River, see Section 10.9.16 and 10.9.33 for assessment.

Water use

Public Water Supplies

10.5.48. No public water supplies are identified within the Site.

10.5.49. Public water supplies are present for domestic and commercial properties on and around Nantcarn Road in Cwmbarn and Gwyddon and Llan-Fach Road, Abercarn. These areas are within the 1km Study Area – Abercarn (650m), Cwmcarn (700m).

Abstractions

10.5.50. Data provided by CCBC indicates that there are two private abstractions within the Site details provided in **Table 10.6**.

Table 10-6 Abstraction receptors within Study Area

Name	NGR	Usage	Distance from EIA Assessment Boundary
Rhyswg Fawr Farm House, Cwmcarn	ST 22662 94602	Domestic Use	Within boundary
Rhyswg Ganol Farm, Rhyswg Mountain Road, Cwmcarn	ST 23807 94807	Domestic Use	Within boundary

Biodiversity Sites

10.5.51. Designated sites for biodiversity conservation has been identified within the Water Environment study area and surroundings which has a substantial aquatic habitat, see **Chapter 8: Biodiversity** of the Draft ES for further details of non-aquatic habitats.

Designation	Key Attributes
Mynydd Maen, East of Newbridge SINC	The proposed access track is located within this SINC. The SINC comprises a large upland common with extensive areas of acid grassland, heath and bracken (<i>Pteridium aquilinum</i>) with a number of indicator species. Locally significant bryophyte species also present. Secondary features include rock outcrops/dry stone walls, marshy grassland, semi-improved acid grassland aquatic features.
Distillery Pond, Abercarn SINC	0.85km west of the Site. A pond on the Nant Gwyddon stream held back by a dam on its western side, its pond margins supporting a range of wetland species.

Future baseline

10.5.52. Without the Proposed Development, the main change to the future baseline would be as a result of climate change. Climate change studies predict a general decrease in summer precipitation and an increase in winter precipitation alongside slightly higher annual average temperatures. Storms, both summer & winter, are also predicted to be of greater intensity; therefore, peak fluvial flows associated with extreme storm events may also increase in volume and velocity.

10.5.53. The FMfP includes allowances for the potential effects of climate change and these are therefore considered in the text above. This has applied increases in peak river flow and rainfall intensity based on the Central estimate for the 2080s. These allowances are considered appropriate for the Proposed Development.

10.6 Embedded measures

10.6.1. Several environmental measures have been embedded into the Proposed Development, including to manage the potential effects on flood risk wherever possible, as outlined in **Section 4.9**.

10.6.2. **Table 10.7** outlines how these embedded measures will influence the Water Environment assessment. As a consequence, the potential effects of the Proposed Development are evaluated with these embedded measures in place.

Table 10-7 Summary of the embedded environmental measures

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
Construction Phase			
WFD surface waterbodies (Ebbw River), watercourses (Nant Gwyddon, Nant Gofapi, Nant Carn), ponds and non-statutory designated sites for biodiversity conservation (SINCS)	Temporary increase in sediment-loading of surface water runoff from construction areas leading to deterioration in the surface water quality environment, deterioration in the status of WFD surface water bodies and deterioration in the conditions supporting local designates sites for biodiversity conservation.	ID1 - Good working practices Good working practices will be implemented during construction, with adherence to the Outline Construction Environmental Management Plan (CEMP), which will be secured through a planning consent condition, and relevant guidance.	Construction Environment Management Plan (CEMP)
		ID2- Water Management Plan (WMP) Implementation of an appropriate Water Management Plan (WMP) for the construction phase of the Proposed Development, utilising SuDS principles, including collection, conveyance and attenuation/infiltration storage where suitable. Suitable temporary silt fencing, bunding and water quality measures (i.e., silt capture to maintain storage volume) will be included in the design of these works. Sufficient capacity will be provided onsite to hold runoff prior to discharge runoff to ground and/or any water discharge into watercourses is limited to greenfield rates. A water quality monitoring programme will be agreed with NRW and implemented prior, during and following construction to ensure that the measures taken to protect the water environment are effective.	CEMP
		ID3 – Water discharges Further investigation of the viability of infiltration as a means by which surface water runoff and, if required, any water accumulating at the base of the excavations (most likely comprising rainfall runoff) could be discharged to ground will be undertaken through liaison with CCBC and by undertaking soakaway testing exercises. Information from the future Phase 2 Geo-environmental Ground Investigation (details provided in Chapter 11: Ground Conditions of the Draft ES) will also be considered to assess the potential for introducing pollutants pathways to groundwater via leaching from contaminated soils. In the case that the soakaway testing concludes that infiltration is not solely sufficient in managing runoff, and discharge to the watercourses is required, this will be subject to a consent from the NRW or CCBC. The water discharge would be suspended if a flood alert or flood	CEMP

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
		<p>warning is in place downstream (and the discharges from the Proposed Development site could feasibly contribute to the flood event). Any discharge to surface water would be restricted to the greenfield runoff rate and will be treated in a suitable basin/trench before discharging.</p> <p>ID4 - Materials Management Plan Excavated materials during construction works should be segregated and stored/ re-used on-Site in accordance with a Materials Management Plan (in compliance with the CL:AIRE Definition of Waste: Code of Practice). Any temporary on-site storage of excavated materials suspected or confirmed to be contaminated will be on impermeable sheeting, covered over and with adequate leachate / runoff drainage to prevent migration of contaminants from the stockpile. Materials will be segregated where possible to prevent cross-contamination occurring. Such materials will only be reused if they are confirmed as suitable for use in line with the requirements of the Materials Management Plan.</p> <p>ID5 – Soil stockpiles Stockpiles will be appropriately maintained and have the minimum lifespan possible, with materials being reinstated as construction works progress. Where these remain in situ for 3 months or longer, seeding management techniques will be used. Stockpiles will be stored exclusively within areas of very low flood risk (Flood Zone 1 in the FMfP).</p> <p>ID6 - Standoff distance No works will be undertaken within 3m of any watercourse (other than for watercourse crossings and drainage mitigation). Any works within 8m of an Ordinary Watercourse will be subject to a Land Drainage Consent (LDC) from CCBC.</p>	CEMP
WFD surface waterbodies (Ebbw River), watercourses (Nant Gwyddon, Nant Gafopi, Nant Carn), ponds and non-statutory designated sites for	Potential effects on the hydromorphology and flow conveyance as a result of increased sediment inputs or direct watercourse disturbance.	<p>See measures ID1 (Good working practices), ID2 (WMP), ID3 (Water discharges), ID5 (Materials Management Plan) and ID5 (Soil stockpiles)</p> <p>ID7 - Watercourse/surface water flow path crossings No mapped watercourses are currently crossed as part of the design. There is the potential that ephemeral preferential flow paths may need a crossing</p>	CEMP CEMP

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
biodiversity conservation (SINCs)		<p>during the construction phase. The design of any new temporary crossings will be confirmed as part of the detailed drainage design, and any requirement for Ordinary Watercourse consent by CCBC confirmed. Suitable mitigation measures will be identified and proposed, where necessary and applicable, to ensure no detrimental impact.</p> <p>ID8 - Underground cables The underground cables linking the turbines to the substation will be constructed in discrete sections with the reinstatement process commenced in as short a timeframe as practicable.</p>	
WFD surface waterbodies (Ebbw River), watercourses (Nant Gwyddon, Nant Gafopi, Nant Carn), ponds and non-statutory designated sites for biodiversity conservation (SINCs)	Accidental release of pollution into surface water or ground by leaks/spillages of oil/fuel, leaching from excavated soils and concrete leaching leading to deterioration in the surface water and groundwater quality environment, deterioration in the status of WFD water bodies and deterioration in the conditions supporting local designates sites for biodiversity conservation.	<p>See measures ID1 (Good working practices), ID2 (WMP), ID3 (Water discharges) and ID4 (Materials Management Plan)</p> <p>ID9 – Fuel, oil and chemicals storage (construction phase) Areas of construction compounds that are used for fuel storage, plant maintenance and refuelling will be surfaced with fully impermeable materials to prevent any infiltration of contaminated runoff and contain bunding. An effective accident response protocol will be developed to ensure any spillages or potential pollution incidents are dealt with appropriately including the provision of containment for spills of contaminated liquids. Plant and machinery will be maintained to minimise the risks of oil leaks or similar. Any tanks containing oils, fuels and chemicals will be double skinned. There will be a bunded capacity of 100% of the maximum tank volume for non-hazardous fluids. For fuels or oils the bund capacity will be the larger of 110% of the largest tank volume for single tank bunds, (or, in the case of multi tank bunds, 110% of the largest tank capacity or 25% of the combined tank capacity, whichever is the largest). Fuel storage will be in accordance with Pollution Prevention Guidelines (PPGs). All stores of fuel will be located at least 20m from any watercourses and away from areas at risk of flooding. If concrete batching is to happen on Site, appropriate controls and water treatment facilities are to be agreed with NRW prior to construction. The use of sulphate resistant concrete is recommended.</p>	CEMP CEMP CEMP
WFD surface waterbodies (Ebbw River), watercourses	Discharge of potentially polluted water generated from	See measures ID1 (Good working practices), ID2 (WMP), ID3 (Water discharges) and ID4 (Materials Management Plan)	CEMP

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
(Nant Gwyddon, Nant Gafopi, Nant Carn), ponds and non-statutory designated sites for biodiversity conservation (SINCS)	construction activities (e.g. concrete batching, surface water runoff) into surface water or ground leading to deterioration in the surface water and groundwater quality environment, deterioration in the status of WFD water bodies and deterioration in the conditions supporting local designates sites for biodiversity conservation.		
WFD surface waterbodies (Ebbw River), watercourses (Nant Gwyddon, Nant Gafopi, Nant Carn), ponds and non-statutory designated sites for biodiversity conservation (SINCS)	Potential change in groundwater levels due to dewatering of excavations resulting in decrease in groundwater baseflow to watercourses, ponds and springs and deterioration in the status of WFD water bodies and deterioration in the conditions supporting local designates sites for biodiversity conservation	ID10 – Turbine excavation Although shallow groundwater in the underlying ground is not anticipated, as a precautionary approach, it is proposed that the Phase 2 geo-environmental ground investigation be completed at the pre-construction stage (Chapter 11: Ground Conditions of the Draft ES),	CEMP
Private abstractions for Rhyswg Fawr Farm House and Rhyswg Ganol Farm	Potential change to water quality of a water supply resource which may affect the viability of an abstraction	See measures ID1 (Good working practices), ID2 (WMP), ID3 (Water discharges), ID4 (Fuel/oil/chemicals storage) and ID5 (Materials Management Plan)	CEMP
Private abstractions for Rhyswg Fawr Farm House and Rhyswg Ganol Farm	Potential change to yield of a water supply resource which may affect the viability of an abstraction	No mitigation required	N/A
Operational Phase			
WFD surface waterbodies (Ebbw River), watercourses	Accidental spillage of pollutants (fuel or oil) during maintenance	See measure ID3 (Water discharges)	DNS planning condition

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
(Nant Gwyddon, Nant Gafopi, Nant Carn), ponds and non-statutory designated sites for biodiversity conservation (SINCS)	activities leading to deterioration in the surface water and groundwater quality environment, deterioration in the status of WFD water bodies and deterioration in the conditions supporting local designates sites for biodiversity conservation.	<p>ID11 – Detailed drainage design</p> <p>Detailed drainage design for the operational wind farm development, utilising SuDS principles including attenuation storage where necessary, to ensure sufficient capacity is available on Site to discharge runoff to ground and/or watercourses (discharge limited to greenfield rates). The detailed drainage design will be prepared in accordance with the Drainage Strategy for the operational wind farm development included in Appendix 10A of the Draft ES.</p> <p>ID12 – Fuel, oil and chemicals usage (operational phase)</p> <p>Following the construction phase there will be no requirement for fuel, oil or chemicals to be stored on Site, however, small quantities of fuel/oil/chemicals may need to be brought onto Site for maintenance activities. In these cases, only the minimum quantities possible should be brought on to Site and must be removed from Site following completion of works. The fuel/oil/chemicals must be kept in the appropriate containers and sealed when not used for refuelling. An effective accident response protocol will be developed to ensure any spillages or potential pollution incidents are dealt with appropriately including the provision of containment for spills of contaminated liquids. Plant and machinery will be maintained to minimise the risks of oil leaks or similar.</p>	
	Potential change to water quality of a water supply resource which may affect the viability of an abstraction during maintenance activities	See measures ID3 (Water discharges), ID11(Detailed Drainage Design) and ID12(Fuel/oil/chemicals storage (operational phase))	DNS planning condition
	Changes to surface water flood risk due to changes in runoff rates resulting creation of impermeable surfaces (e.g., substation, access tracks, crane pads)	See measures ID3 (Water discharges) and ID11 (Detailed Drainage Design)	DNS planning condition
		<p>ID13 – Temporary components</p> <p>Once construction is complete, any temporary components (such as working areas) will be removed, and the ground reinstated to preconstruction conditions. Any excavations will be backfilled using soil stockpile materials, slightly above natural ground level to allow for settlement.</p>	

Receptor	Potential changes and effects	Embedded measures	Compliance mechanism
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Decommissioning Phase

It is anticipated that similar measures to those embedded into the project design for the construction phase will be implemented.

- 10.6.3. The layout and location of the Proposed Development has, as far as possible, been selected to avoid direct effects on watercourses. As part of the layout design strategy, interactions with watercourses have been limited wherever possible. Construction features have been limited in their effect as far as possible by, for example, minimising access tracks running parallel to watercourses and trying to avoid track junctions being constructed in these zones.
- 10.6.4. Track length is to be kept to a minimum and utilises existing access tracks where possible to reduce environmental impact.
- 10.6.5. To service both impermeable and semi-permeable surfaces, the surface water drainage system will be installed following sustainable drainage system (SuDS) principles. SuDS provide benefits in terms of flow attenuation and water quality and are standard practice on new developments, typically including measures such as attenuation basins, swales and filter drains.
- 10.6.6. These measures are framed within a hierarchy of source and Site runoff control measures that prioritise infiltration to ground or use a combination of measures to retain or slow surface water runoff to at least the 1 in 2 baseline (greenfield) runoff rate (for up to the 1 in 100 critical storm + climate change uplift) prior to being discharged to watercourses, sewers, or other receptors.
- 10.6.7. The final layout of SuDS naturally follows detailed design and considers ground conditions, gradient, constraints, temporary works and maintenance requirements, and will aim to mimic natural Site drainage. The governing principles outlined above will be used to ensure the final SuDS design operates effectively in managing runoff and flood risk.
- 10.6.8. The ODS (Outline Drainage Strategy) **Appendix 10A** has been prepared for the Proposed Development to establish a strategy for managing surface water runoff within the Site and to ensure that no flood risk is created elsewhere. The assessment focuses on the operational phase of the Proposed Development only, with details of construction phase surface water drainage to be included in the Final Construction Environment Management Plan (CEMP) that will be submitted to discharge a planning condition. Foul flows in construction phase will be managed using a temporary set up on Site with no additional network.
- 10.6.9. The ODS has evaluated the drainage disposal route and determined that surface water runoff will be discharged into the local watercourse network. SuDS features will be incorporated to provide flow attenuation, maintain adequate water quality, and deliver biodiversity and amenity benefits. Surface water runoff will be restricted to the pre-development Q_{BAR}^{39} runoff rate, with allowances made for climate change effects in estimating total surface water storage requirements.

Good Practice Mitigation

- 10.6.10. Standard good practice mitigation measures to be delivered during the construction of the Proposed Development will be delivered through the approval and implementation of a CEMP. It is recommended that a Water Management Plan (WMP) be produced will provide further detail on the specific techniques and measures to be put in place to manage local activities to prevent or minimise increases in runoff, modification of surface drainage patterns and compaction of soils, the details of WMP to be included with Final ES.
- 10.6.11. A contractual management requirement of the Principal Contractor would be the development and implementation of a comprehensive and site-specific CEMP. This document would detail how the appointed Principal Contractor would manage the works in accordance with all commitments and

³⁹ Q_{BAR} is the mean annual maximum flow rate

mitigation detailed in the EIA, statutory consents and authorisations, and industry best practice and guidance such as CIRIA, Pollution Prevention Guidance (PPG) and Guidance for Pollution Prevention (GPP).

10.7 Scope of the assessment

Proposed Development

- 10.7.1. The greatest risk of the Proposed Development affecting the hydrological environment will occur during the construction phase, due to activities which could influence the environment being undertaken during this phase. The potential for effects to arise would substantially reduce during the operational and decommissioning phases given the limited scope for environment interaction in comparison to the construction phase.
- 10.7.2. Taking this into account the following issues will be addressed during all phases of the Proposed Development:
- Hydrology changes to drainage regime and associated alteration of surface water runoff rates and volumes affecting flood risk, erosion/sedimentation and water quality characteristics across the Site and the wider catchment.

Spatial Scope

- 10.7.3. The spatial scope of the assessment of the Water Environment covers the area of the Proposed Development contained within the EIA Assessment Area, together with the Zones of Influence (Zols) that have formed the basis of the Study Area described in **Section 10.5**. **Figure 10.1** shows the location of identified watercourses.

Temporal Scope

- 10.7.4. The temporal scope of the assessment of the Water Environment is consistent with the period over which the Proposed Development would be carried out and therefore covers the period of 22 months of construction, 30 years of operation and six months of decommissioning.

Potential Receptors

- 10.7.5. The Water Environment receptors that have been identified as being potentially subject to effects are summarised in **Table 10.8**.

Table 10-8 Water Environment receptors subject to potential effects

Receptor	Sensitivity	Reason for consideration
WFD surface water body GB109056026910 Ebbw R – conf. Ebbw Fach R to Maes-glas	Medium	Main River, WFD surface water body, Q ₉₅ expected to be <1.0 m ³ /s.
Ordinary Watercourses and Tributaries of Ebbw River – Nant Gwyddon, Nant Gofapi and Nant Carn	Low	Named Ordinary Watercourses which form the local catchment tributaries of the Ebbw River.

Receptor	Sensitivity	Reason for consideration
Ponds in Study Area	Low	Several small ponds located within the Proposed Development Area. Distillery Pond 0.85km west of Site.
Mynydd Maen - Site of Importance for Nature Conservation (SINC)	Low	Local SINC with integral Aquatic Habitat, see Chapter 8: Biodiversity for further details.
Private abstractions for Rhyswg Fawr Farm House and Rhyswg Ganol Farm	Low	Private abstractions within Proposed Development area.
Area at risk of flooding	Medium	Urban areas located downstream of the Proposed Development that are indicated to be at flood risk.

Likely significant effects

- 10.7.6. The effects on Water Environment receptors which have the potential to be significant and have been taken forward for detailed assessment are summarised in **Table 10.9**.

Table 10-9 Summary of effects assessed in the Water Environment assessment

Activity	Receptor	Effect
Construction and Decommissioning Phase		
Land preparation (earthworks, excavation)	WFD surface water body	<u>Pollution Incidents</u>
	Ordinary Watercourses Area at risk of flooding	Accidental release of pollution into the Water Environment by leaks/spillages of oil/fuel and concrete leaching leading to deterioration. Discharge of potentially polluted water generated from construction activities (e.g., dewatering/water ingress activities, surface water runoff) into surface water leading to deterioration in the water quality of the Water Environment receptors. <u>Erosion and Sedimentation</u> Temporary increase in sediment-loading of surface water runoff from construction/dismantling areas leading to deterioration in the surface water quality environment and deterioration in the status of WFD surface water bodies. <u>Modification of Surface Water Drainage Patterns and Flooding</u> Potential effects on the hydromorphology and flow conveyance as a result of increased sediment inputs or direct watercourse disturbance. <u>Dewatering Activities</u> Dewatering of excavations that may affect watercourse hydrology.
Impermeable land associated with access tracks and construction/dismantling areas	Area at risk of flooding	<u>Modification of Surface Water Drainage Patterns and Flooding</u> Increase in surface water runoff and therefore increase in flood risk downstream and increase in potential erosional power of surface overland flow.
Development of temporary infrastructure (e.g., Site compound) near watercourses and potential temporary watercourse crossings (to be confirmed within final designs)	WFD surface water body	<u>Pollution Incidents</u>
	Ordinary Watercourses Area at risk of flooding	Accidental release of pollution into the Water Environment by leaks/spillages of oil/fuel and concrete leaching leading to deterioration. <u>Erosion and Sedimentation</u> Temporary changes to watercourse flow conveyance leading to deterioration in the status of WFD surface water bodies.
Operational Phase		

Activity	Receptor	Effect
Impermeable land take (solid concrete foundations for turbines, substation and access tracks)	WFD surface water body	<u>Modification of Surface Water Drainage Patterns and Flooding</u> Increase in surface water runoff and therefore increase in flood risk downstream and increase in potential erosional power of surface overland flow. Changes to watercourse flow conveyance as a result of new drainage or interception ditch creation (to be confirmed within final designs).
	Ordinary Watercourses	
	Area at risk of flooding	
Maintenance Activities	WFD surface water body	<u>Pollution Incidents</u> Accidental spillage of pollutants (fuel or oil) brought to Site for maintenance activities leading to deterioration in the water quality.
	Ordinary Watercourses	

10.7.7. The receptors / effects detailed in **Table 10.10** have been scoped out from further assessment because the potential effects are considered unlikely to be significant.

Table 10-10 Summary of effects scoped out of the Water Environment assessment

Receptors	Justification
Public Water Supplies (PWS)	No PWS within Site. Given the distance to PWS within the Study Area (Abercarn 650m and Cwmcarn 700m) and limited interactions possible this receptor has been scoped out of the assessment.
Fisheries	No permanent crossings of watercourses. Temporary crossings, if required, would be confined to very upper reaches with no foreseeable fisheries interaction. Therefore, this receptor has been scoped out of the assessment.
Abstractions	There are two private abstractions with the Site. There are no further abstractions identified within Study Area. Given the limited scale of these receptors and the Embedded mitigation already proposed for the Proposed Development these receptors have been scoped out of the assessment.
Ponds	There are several small local ponds with the Site and Study Area, including Distillery Pond. Given the limited scale of these receptors and the Embedded mitigation already proposed for the Proposed Development these receptors have been scoped out of the assessment.
Mynydd Maen SINC	This SINC is crossed by the proposed access track for the Site. This area is served by existing agricultural and forestry access. Given the limited scale of the changes to this receptor and the Embedded mitigation already proposed for the Proposed Development these receptors have been scoped out of the assessment.
WFD Waterbody (GB109056026910)	Based on information provided within this Draft ES, no components or phases of the Proposed Development are considered to lead to a deterioration of any WFD elements or the WFD status of any water body in the study area. This conclusion is to be confirmed by NRW and any changes updated for Final ES.

10.8 Assessment methodology

10.8.1. The generic project-wide approach to the assessment methodology is set out in **Chapter 2: Approach to Environmental Impact Assessment**, and specifically in **Sections 2.6 to 2.9**. However, whilst this has informed the approach that has been used in this Water Environment

assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this Water Environment assessment.

Significance Criteria

Definition of Significance

- 10.8.2. It is recognised that the Proposed Development will affect different environmental elements to differing degrees, and as such, that not all of these are of sufficient concern to warrant a detailed investigation or assessment. EIA regulations note that only elements “*likely to be significantly affected by the development*” require further investigation.
- 10.8.3. The significance of an effect resulting from a development during construction or operation is most commonly assessed by reference to the sensitivity (or value) of a receptor and the magnitude of the effect. This helps identify areas where mitigation measures may be required and to identify the most appropriate measures to alleviate any risks presented by the development.

Sensitivity of Receptor

- 10.8.4. Sensitivity has been determined on the basis of the receptor’s ability to absorb the anticipated effect without perceptible change resulting. Three levels of sensitivity have been used, as shown in **Table 10.11**. Evaluation of sensitivity of hydrology requires a considerable degree of judgement, based on defined characteristics and values, and calling on professional experience, which is accordingly applied during evaluation.

Table 10-11 Receptor Sensitivity Criteria

Sensitivity & Criteria	Examples of Potential Receptors
<p>High – The receptor has very limited ability to absorb change without fundamentally altering its present character, is of very high environmental value and/or is of international importance.</p>	<p>Receptor is a designated Site protected under national or international legislation, such as Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), or Special Protection Area (SPA).</p> <p>Watercourse having a WFD classification shown in a RBMP and $Q_{95} \geq 1.0 \text{ m}^3/\text{s}$. Receptor supports key species and habitats sensitive to changes in suspended sediment concentrations and turbidity, such as salmon or freshwater pearl mussels.</p> <p>Receptor contains a range of hydromorphological features with very little modification.</p> <p>Land use type defined as ‘Emergency Services’ in the TAN15 development categories and essential infrastructure equivalent</p> <p>Receptor is a watercourse or floodplain, with a possibility of direct flood risk to populated areas, which are sensitive to increased flood risk by the possible increase in water levels.</p> <p>Receptor provides clear flood alleviation benefits.</p>
<p>Medium – The receptor has some ability to absorb change without significantly altering its present character, is of medium environmental value and/or</p>	<p>Conditions supporting a site with a national or local conservation designation (e.g., SSSI, NNR), where the designation is based specifically on aquatic features.</p> <p>Watercourse having a WFD classification shown in a RBMP and $Q_{95} < 1.0 \text{ m}^3/\text{s}$. A watercourse in natural equilibrium and exhibiting a natural range of fluvial processes.</p>

Sensitivity & Criteria	Examples of Potential Receptors
is of national/regional importance,	<p>Unlicensed potable surface water and groundwater abstraction e.g., private domestic water supply</p> <p>Water use supporting human health and economic activity at a local scale.</p> <p>Medium/ small licensed non-public surface water supply abstraction.</p> <p>Features with a medium vulnerability to flooding.</p> <p>Land use type defined as ‘Highly vulnerable development’ in the TAN15 development categories.</p> <p>Receptor is a watercourse or floodplain, with a possibility of direct flood risk to high value agricultural areas, which are moderately sensitive to increased flood risk by the possible increase in water levels.</p> <p>Receptor provides limited flood alleviation benefits.</p>
<p>Low –</p> <p>The receptor is tolerant of change without detriment to its present character, is of low environmental value and/or of local importance</p>	<p>Conditions supporting a site with a local conservation designation (e.g., SINC, Local Nature Reserve (LNR), where the designation is based specifically on aquatic features, or an undesignated but highly/moderately water-dependent ecosystem, including a Local Wildlife Site (LWS) and a GWDTE.</p> <p>Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001m³/s. A modified or highly modified watercourse showing signs of modification and recovery to a natural equilibrium and currently exhibiting a limited range of fluvial processes or no active flow processes or morphological diversity.</p> <p>Unlicensed non-potable surface water abstraction (and associated catchment)</p> <p>Land use type defined as ‘Less vulnerable development’ or ‘Other’ in the TAN15 development categories, including ‘water compatible’ development equivalents</p> <p>Receptor is a watercourse or floodplain which passes through low value agricultural areas, less sensitive to increased flood risk by the possible increase in water levels.</p>

Magnitude of Impact

- 10.8.5. The magnitude of impact includes the timing, scale, size and duration of any potential environmental effects. Four levels of magnitude have been used, as defined in **Table 10-12** below.
- 10.8.6. The magnitude of change on water receptors is independent of the value of the receptor, and its assessment is semi-quantitative, based on professional judgement.

Table 10-12 Magnitude of Change Criteria

Magnitude	Criteria	Examples of Potential Receptors
Major	Effects result in major changes, over a significant area, to key characteristics such that the post development character/ composition/attributes will be fundamentally changed for a significant/ permanent period of time, that will affect the use or integrity of the element.	Deterioration in river flow regime, morphology, or water quality, leading to sustained, permanent or long-term breach of relevant Conservation Objectives (COs) or non-temporary downgrading of status of a WFD surface water body or resulting in the inability of the surface water body to attain Good Status.

		Complete or severely reduced water availability and/or quality, compromising the ability of water users to abstract. Change in flood risk resulting in potential loss of life or major damage to the property or infrastructure.
Moderate	Noticeable but not substantial changes. Changes of sufficient magnitude to affect the use/integrity in some circumstances. over a substantial area, to key characteristics. Changes may not be permanent and may recover.	Deterioration in river flow regime, morphology or water quality, leading to periodic, short-term and reversible breaches of relevant COs, or potential temporary downgrading of status of surface water body status, although not affecting the ability of the body to achieve future WFD objectives. Moderate reduction in water availability and/or quality, which may compromise the ability of the water user to abstract on a temporary basis or for limited periods, with no longer-term impact on the purpose for which the water is used. Change in flood risk resulting in potential for moderate damage to the property or infrastructure.
Low	Noticeable but minor changes with barely discernible changes for any length of time, with insufficient magnitude to affect its use/integrity in most circumstances. Such changes may also be reversible with time.	Slight change in river flow regime, morphology or water quality, but remaining generally within COs, and with no short-term or permanent change to status of WFD surface water body. Minor reduction in water availability and/or quality, but unlikely to affect the ability of a water user to abstract. Change in flood risk resulting in potential for minor damage to property or infrastructure.
Negligible	Little or no change to element, with insufficient magnitude to affect its use/ integrity Any changes would be negligible, unnoticeable or have no predicted changes.	No or very slight change in river flow regime or surface water quality, and no consequences in terms of COs or status of WFD surface water body or dependent receptors. No, or very slight change in water availability or quality and no change in ability of the water user to exercise licenced rights or continue with small private abstraction. Increased frequency of flood flows, but which does not pose an increased risk to property or infrastructure.

Probability

- 10.8.7. The probability of the occurrence of an effect has been evaluated as being high, medium, or low during the phase of work being assessed. Professional judgment is used to determine the probability of occurrence.
- 10.8.8. Considering the implementation of good practice measures and embedded mitigation as part of the design and construction of the Proposed Development, the probability of an effect occurring will be reduced.

Significance

10.8.9. The findings of the three criteria considered in the evaluation of an effect has been used via a matrix for each potential effect (**Table 10-13**) to determine the significance of an effect.

Table 10-13 Significance of Effects Criteria

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

10.8.32. Through the assessment, potential effects are concluded to be of major, moderate, minor, or negligible significance. Major and moderate effects are considered significant (noted in bold in **Table 10-13**) and minor and negligible effects are considered not significant. Effects are considered adverse unless stated otherwise.

10.9 Preliminary assessment of Water Environment effects

10.9.1. The potential for effects on the hydrological environment is greatest during the construction phase due to the high levels of activity on-site and when there is greatest change to the existing environment. The potential effects associated with the construction of the Proposed Development is discussed and assessed in the following section.

Construction Phase Effects

10.9.2. The assessment results are based on the successful implementation of the embedded, including good practice, mitigation measures.

Pollution Incidents

10.9.3. During the construction phase several potential pollutants would be present on Site to facilitate civil engineering activities, including oil, fuels, chemicals, unset cement and concrete, and waste and wastewater from construction activities. With chemicals and oil being stored and used onsite, along with concrete batching, there is the potential for a pollution incident. Any pollution incident occurring on the Site could have a detrimental effect on the water quality of the nearby surface waters, groundwater and/or soil, thereby also indirectly affecting ecology.

10.9.4. The following receptors are anticipated to be potentially impacted by pollution incidents:

- WFD waterbody; and,
- Ordinary Watercourses.

10.9.5. The adoption of the applicable good practice measures would reduce the probability of an incident occurring and reduce the magnitude of any incident due to a combination of good Site

environmental management procedures, including minimised storage volumes, staff training, contingency equipment and emergency plans.

10.9.6. The working methods, as defined in the CEMP, to protect surface water from pollution and adverse impacts should include:

- Areas of construction compounds that are used for fuel storage, plant maintenance and refuelling will be designed to collect contaminated runoff and not permitted to drain freely;
- An effective accident response protocol will be developed to ensure any spillages or potential pollution incidents are dealt with appropriately including the provision of containment for spills of contaminated liquids;
- Plant and machinery will be maintained to minimise the risks of oil leaks or similar. Any tanks containing oils, fuels and chemicals will be double skinned;
- Fuel storage will be in accordance with Pollution Prevention Guidelines (PPGs). All stores of fuel will be located at least 20m from any watercourses and away from areas at risk of flooding;
- Secure oil and chemical storage in over-ground bunded areas, limited to the minimum volume required to serve immediate needs with specified delivery and refuelling areas; and
- Emergency spill kits retained onsite with regular briefings and training for site operatives on emergency response arrangements.

10.9.7. Taking into account the design, CEMP and embedded mitigation, the effects are assessed as follows:

- The magnitude of pollution effects on Surface Water WFD waterbodies (**Medium** sensitivity) is considered **Negligible** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant); and,
- The magnitude of pollution effects on site Ordinary Watercourses (**Low** Sensitivity) is considered **Low** and of **low** probability to occur, giving an overall significance of **Minor effect** (not significant).

Erosion and Sedimentation

10.9.8. Soil erosion, loss of soil and sediment generation may occur in areas where the ground has been disturbed during construction, including in situations where: engineering activities occur close to watercourses; where higher velocity surface water flows may occur due to local slopes and drainage design. Surface water passing through the drainage could exhibit high localised flows, increasing the potential for bank erosion.

10.9.9. Sediment transport in watercourses can result in high turbidity levels and can reduce the flood storage capacity of channels and block culverts, resulting in an increased flood risk.

10.9.10. Requirements for soil excavation, transport and storage may lead to additional sedimentation of surface water at locations where new track, widened existing track, crane hardstandings or foundation construction activities are necessary.

10.9.11. The following receptors are anticipated to be potentially impacted by erosion, sedimentation and subsequent flooding:

- WFD waterbody;
- Ordinary Watercourses; and,
- on-site and downstream areas at risk of flooding.

- 10.9.12. The location of access track and turbines is across the relatively flat upper sections of the wider Study Area. Control of sediment from these construction areas will be on the shallow upper gradients of the local topography. The use of suitable interception features between the turbines the Proposed Development will not be influenced by steeper catchment gradients on lower slopes.
- 10.9.13. The adoption of applicable good practice measures would reduce the probability of an incident occurring and reduce the magnitude of any incident due to a combination of good site environmental management procedures, including additional precautions when operating machinery close to watercourses, soil management, staff training, contingency equipment and emergency plans.
- 10.9.14. The working methods, as defined in a CEMP, identified to reduce erosion and sedimentation and limit adverse impacts should include:
- Vegetation clearance to be scheduled only as needed, buffer strips would be retained as vegetated features and revegetation encouraged with native species;
 - Silt traps would be employed and maintained in appropriate locations;
 - Temporary interception bunds and drainage ditches would be constructed upslope of excavations such as turbine foundations to minimise surface runoff ingress and in advance of excavation activities;
 - The integration of SuDS, with a specific focus on source and site control measures;
 - Excavation and earthworks would be suspended during and immediately following periods of heavy rainfall to minimise sediment generation and soil damage;
 - In the case of pollution incident effects, good practice site environmental management measures and the dilution factor involved would be expected to reduce any potential sedimentation effect downstream;
 - A programme of monitoring and inspection to ensure that all drainage functions effectively and as intended; and
 - A surface water quality monitoring programme is recommended. During construction, this would include an adaptive monitoring system enabling early investigation of parameters outwith expected ranges, with prompt alerts to the construction team to amend any work activities causing an adverse effect.
- 10.9.15. Taking into account the design, CEMP and embedded mitigation, the effects are assessed as follows:
- The magnitude of impact from potential erosion and sedimentation on WFD waterbody (**Medium** sensitivity) is considered **Low** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant);
 - The magnitude of impact from potential erosion and sedimentation on Ordinary Watercourses (**Low** Sensitivity) is considered **Moderate** and of **Medium** probability to occur, giving an overall significance of **Minor effect** (not significant); and,
 - The magnitude of impact from potential erosion and sedimentation on areas at risk of flooding receptors (**Medium** sensitivity) is considered **Low** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant).

Modification of Surface Water Drainage Patterns and Flooding

- 10.9.16. Surface flows could be impeded by construction activity in or adjacent to stream channels, including requirement for additional temporary water crossings. Blockages could be caused by inadequate control of earthmoving plant, sedimentation and poor waste management, all of which could lead to flooding upstream.
- 10.9.17. Turbine bases and other constructed impermeable surfaces could restrict the infiltration of rainfall into the soil and underlying superficial deposits, resulting in localised increased volumes of surface runoff. The interception of diffuse overland flow by new access tracks and their drains could disrupt the natural drainage regime of the Site by concentrating flows and influencing drainage in soils and deep peat.
- 10.9.18. The following receptors are anticipated to be potentially impacted by the modification of surface water:
- WFD Waterbodies;
 - Ordinary Watercourses; and,
 - On-site and downstream areas at risk of flooding.
- 10.9.19. The adoption of good practice measures would reduce the impact of modification to surface water drainage patterns, with artificial drainage installed where necessary and would, wherever practical, be installed in advance of ground being cleared of vegetation. All structures would be designed and constructed following good practice techniques and would be of sufficient capacity to receive storm flows with an allowance for increased flows due to climate change.
- 10.9.20. The CEMP in place for the Site for any temporary construction works as well as the permanent drainage strategy will be designed to mimic natural discharge pathways.
- 10.9.21. Effective source control will be in place within the drainage strategy to effectively mitigate downstream flood risk. Standards followed include controls on peak flow and volume of run-off and flood risk internal to the Proposed Development and downstream.
- 10.9.22. Key measures identified to minimise alterations to watercourses and surface water drainage patterns include:
- Excluding watercourse crossings through site layout and design;
 - Application of sustainable drainage techniques to increase peak lag time and implementation of cross-drains at appropriate intervals and frequent discharge points to reduce scour potential;
 - Drainage to use regular cross drains in areas of flow convergence, to ensure water is contained within the same catchment as is naturally in place;
 - The area of impermeable surface created 0.028km² would be very small in comparison with sub-catchment areas 13km², or wider Ebbw catchments of 225km². Only the turbine, hardstandings and control building bases would be designed as impermeable, with the unbound tracks likely to act as semi-permeable features with limited infiltration potential; and
 - Development of detailed temporary and permanent construction drainage plans prior to construction. The detailed drainage plan would be developed to accompany the Detailed CEMP post-consent and will be informed by the EIA as well as additional investigation completed to inform detailed design.

10.9.23. Considering the design and embedded mitigation, the effects are assessed as follows:

- The magnitude of impact from effects to surface water drainage patterns on WFD waterbody (**Medium** sensitivity) is considered **Negligible** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant);
- The magnitude of impact from effects to surface water drainage patterns on Ordinary Watercourses (**Low** Sensitivity) is considered **Low** and of **Medium** probability to occur, giving an overall significance of **Minor effect** (not significant); and,
- The magnitude of impact from effects to surface water drainage patterns on areas at risk of flooding (**Medium** sensitivity) is considered **Negligible** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant).

Dewatering Activities

10.9.24. Consideration of soil type and geological conditions are presented in **Chapter 11: Ground Conditions**.

10.9.25. Excavations, such as those required for turbine foundations, could disrupt shallow groundwater systems. Groundwater controls, such as physical cut-offs or dewatering, would be utilised to prevent the excavations filling with water. This may result in the lowering of groundwater levels in the immediate vicinity of the excavations and alterations to local overland flow paths during dewatering activities.

10.9.26. However, it would be expected that natural conditions of groundwater level and flow would recur close to these locations and any groundwater which is present is likely to flow around discrete obstructions such as turbine foundations, thereby maintaining flows. Excavations associated with the construction phase of the Proposed Development (turbine foundations) are likely to be of limited spatial extent in comparison to the entire Site boundary.

10.9.27. Soil water conditions at the Site are likely to be primarily influenced by surface water and direct rainfall, with groundwater having minimal influence, with this influence decreasing at higher altitude. Dewatering is likely to be primarily associated with the ingress of small amounts of surface water as direct rainfall, with the ingress of groundwater likely to be relatively minor on account of the bedrock aquifer having a very low productivity. Minor amounts of shallow groundwater in flush areas could be expected.

10.9.28. The following receptors are anticipated to be potentially impacted by dewatering activities:

- WFD waterbody; and,
- Ordinary Watercourses.

10.9.29. A detailed temporary dewatering strategy would be developed prior to construction to accompany the CEMP supporting Final ES and will be informed by the EIA as well as additional investigation completed to inform detailed design.

10.9.30. Considering the design, limited number of excavations required. The Site conditions, limited ground water potential in a shallow soil profile and watercourse primarily rainfall fed than groundwater fed, the effects are assessed as follows:

- The magnitude of dewatering effects on Surface Water WFD waterbodies (**Medium** sensitivity) is considered **Negligible** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant); and,
- The magnitude of dewatering effects on Ordinary watercourses (**Low** Sensitivity) is considered **Low** and of **low** probability to occur, giving an overall significance of **Minor effect** (not significant).

Operational Phase Effects

- 10.9.31. Many of the effects identified during the construction phase would not be expected to lead to significant effects during the operational phase; this includes effects associated with pollution as well as erosion and sedimentation.
- 10.9.32. This section sets out the likely operational effects of the Proposed Development.

Modification of Surface Water Drainage Patterns and Flooding

- 10.9.33. Surface water drainage patterns may be altered by a new permanent drainage system that would serve the Proposed Development.
- 10.9.34. The following receptors are anticipated to be potentially impacted by the modification of Surface Water drainage patterns and flooding:
- WFD Waterbodies;
 - Ordinary Watercourses; and,
 - Areas at risk of flooding on-site and downstream.
- 10.9.35. However, the adoption of good practice measures would include a sustainable drainage strategy that minimises disturbance of existing hydrological systems to reduce adverse effect on surface water drainage patterns.
- 10.9.36. Furthermore, prescriptions associated with appraising and implementing natural flood management measures outlined in **Appendix 10A: Outline Drainage Strategy** have the potential to provide a beneficial effect associated with improving the hydrological regime of the Site as well as flood risk.
- 10.9.37. No additional changes to overland drainage and surface water flows are anticipated during the operational phase of the Proposed Development. All permanent drainage infrastructure would remain in place during the Proposed Development's operation in accordance with the final drainage strategy. A monitoring and maintenance programme would be put in place for the drainage infrastructure, to include regular visual inspection of drainage ditches and sustainable drainage features, including an on-going maintenance strategy. The plan would be adopted by the Site's operator to ensure sustainable drainage features continue working effectively.
- 10.9.38. Considering the design and embedded mitigation, the effects are assessed as follows:
- The magnitude of impact from effects to surface water drainage patterns on WFD waterbodies (**Medium** sensitivity) is considered **Negligible** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant);
 - The magnitude of impact from effects to surface water drainage patterns on Ordinary Watercourses (**Low** Sensitivity) is considered **Negligible** and of **Medium** probability to occur, giving an overall significance of **Minor effect** (not significant); and

- The magnitude of impact from effects to surface water drainage patterns on areas at risk of flooding receptors (**Medium** sensitivity) is considered **Negligible** and of **Low** probability to occur, giving an overall significance of **Minor effect** (not significant).

Decommissioning Phase

- 10.9.39. During decommissioning of the Proposed Development, potential impacts on the Water Environment are expected to be less than those encountered during the construction phase and therefore not significant.
- 10.9.40. At this time requirement to leave turbine bases in-situ has not been established. This will be confirmed in the Final ES chapter.
- 10.9.41. All relevant and good practice methods noted within the construction mitigation is expected to be applied when decommissioning.
- 10.9.42. No additional specific mitigation measures are therefore identified. The decommissioning of the Proposed Development will adhere to the latest legislative and guidance requirements at the relevant time.

10.10 Preliminary assessment of cumulative (inter-project) effects

- 10.10.1. A preliminary cumulative effects assessment (CEA) has been undertaken for the Proposed Development which considers the combined impacts with other developments on the same single receptor or resource (inter-project effects). The detailed method followed in identifying and assessing potential cumulative effects is set out in **Section 2.9 of Chapter 2**.
- 10.10.2. Only those developments that fall within the Water Environment Study Area have significant potential to result in cumulative effects with the Proposed Development. All developments falling outside the Water Environment Study Area are excluded from the CEA on the basis that either:
- There is no pathway for cumulative hydrological effects; or
 - The embedded measures that will be included in the other developments are suitable to fully avoid, manage and if appropriate mitigate potential Water Environment effects associated with that development (e.g. flooding).
- 10.10.3. On the basis of the above, the specific developments contained within **Section 2.9 of Chapter 2** that fall within the Water Environment Study Area are considered in this CEA:
- Trecelyn Wind Farm;
 - Mynydd Maen Wind Farm; and
 - Cil-Lonydd Solar Farm.
- 10.10.4. Assuming that effective SuDS controls for each individual development and CEMPs are applied, cumulative effects are not anticipated, even if the other developments present potentially significant effects on the receiving water environment.
- 10.10.5. Furthermore, the differing construction programming and activities that would be anticipated to occur across various developments reduce the probability that water quality and flow issues would be coincident across the catchments.

- 10.10.6. Inherent across all development are proposals for the reinstatement of impacted habitats and mitigation for any losses/degradation of SINC, in accordance with the development CEMPs. These measures are anticipated to ensure the protection of the Water Environment features. Overall, given the extent of habitat loss and/or disturbance possibly required to facilitate developments, relative to the significant size of the impacted SINC, coupled with a requirement to sufficiently mitigate for impacts arising in accordance with local planning policy, is anticipated, will ensure no significant cumulative adverse effects will arise upon non-statutorily designated sites.
- 10.10.7. It is concluded that following the successful implementation of a CEMP and the good practice measures outlined in the Construction and Operation Section, cumulative effects of the Proposed Development during construction and operation would be **Minor** (not significant).

10.11 Preliminary significance conclusions

10.11.1. A summary of the results of the preliminary Water Environment assessment is provided in **Table 10.14**.

Table 10-14 Preliminary summary of significance of effects

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
Construction Phase				
Ebbw River – WFD Surface Water Waterbody (GB109056026910) Potential Effects: Water Quality deterioration from pollution including increased sediment loading; and, Increased flood risk through additional impermeable area.	Medium	Low	Minor	<p>Implementation of the embedded measures designed to prevent pollution of surface water. These include appropriate pollution prevention measures in line with recommended guidance, pollution incident response planning, water quality monitoring programme, implementation of the CEMP for the construction phase.</p> <p>Effective implementation of the embedded measures designed to avoid the release of silt-laden runoff.</p> <p>Adoption of the applicable good practice measures would reduce the impact of modification to surface water drainage patterns, with artificial drainage installed only where necessary and would, wherever practical, be installed in advance of ground being cleared of vegetation.</p> <p>Development of a detailed temporary dewatering strategy prior to construction would be developed to accompany the Detailed CEMP and will be informed by the EIA as well as additional investigation completed to inform detailed design.</p>

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
Ordinary Watercourses: Nant Gwyddon Nant Gofapi Nant Carn Potential Effects: Water Quality deterioration from pollution including increased sediment loading; and, Increased flood risk through additional impermeable area.	Low	Low	Minor	<p>Implementation of the embedded measures designed to prevent pollution of surface water. These include appropriate pollution prevention measures in line with recommended guidance, pollution incident response planning, water quality monitoring programme, implementation of the CEMP for the construction phase.</p> <p>Effective implementation of the embedded measures designed to avoid the release of silt-laden runoff.</p> <p>Adoption of the applicable good practice measures would reduce the impact of modification to surface water drainage patterns, with artificial drainage installed only where necessary and would, wherever practical, be installed in advance of ground being cleared of vegetation.</p> <p>Development of a detailed temporary dewatering strategy prior to construction would be developed to accompany the Detailed CEMP and will be informed by the EIA as well as additional investigation completed to inform detailed design.</p>
Areas at risk of flooding Potential Effects: Increased flood risk through additional impermeable area.	Medium	Low	Minor	<p>Adoption of the applicable good practice measures would reduce the impact of modification to surface water drainage patterns, with artificial drainage installed only where necessary and would, wherever practical, be installed in advance of ground being cleared of vegetation.</p> <p>Any temporary structures required would be designed and constructed following good practice techniques and would be of sufficient capacity to receive storm flows with an allowance for increased flows due to climate change.</p>
Operational Phase				

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
Ebbw River – WFD Surface Water Waterbody (GB109056026910) Potential Effects: Water Quality deterioration from pollution including increased sediment loading; and, Increased flood risk through additional impermeable area.	Medium	Low	Minor	<p>Adoption of the applicable good practice measures would incorporate a sustainable drainage strategy that minimises disturbance of existing hydrological system to reduce adverse effect on surface water drainage patterns.</p> <p>Implementing flood management measures outlined in Outline Drainage Strategy to ensure no deterioration in the hydrological regime of the Site.</p> <p>No additional changes to overland drainage and surface water flows are anticipated during the operational phase of the Proposed Development. All permanent drainage infrastructure would remain in place during the Proposed Development's operation in accordance with the final drainage strategy.</p> <p>A monitoring and maintenance programme would be put in place for the drainage infrastructure, to include regular visual inspection of drainage ditches and sustainable drainage features, including an on-going maintenance strategy.</p>
Ordinary Watercourses: Nant Gwyddon Nant Gofapi Nant Carn Potential Effects: Water Quality deterioration from pollution including increased sediment loading; and, Increased flood risk through additional impermeable area.	Low	Low	Minor	<p>Adoption of the applicable good practice measures would incorporate a sustainable drainage strategy that minimises disturbance of existing hydrological system to reduce adverse effect on surface water drainage patterns.</p> <p>Implementing flood management measures outlined in Outline Drainage Strategy to ensure no deterioration in the hydrological regime of the Site.</p> <p>No additional changes to overland drainage and surface water flows are anticipated during the operational phase of the Proposed Development. All permanent drainage infrastructure would remain in place during the Proposed Development's operation in accordance with the final drainage strategy.</p>

Receptor and summary of predicted effects	Sensitivity / importance / value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
				A monitoring and maintenance programme would be put in place for the drainage infrastructure, to include regular visual inspection of drainage ditches and sustainable drainage features, including an on-going maintenance strategy.
Areas at risk of flooding Potential Effects: Increased flood risk through additional impermeable area.	Medium	Low	Minor	Implementing flood management measures outlined in the Outline Drainage Strategy (Appendix 10A) to ensure no deterioration in the hydrological regime of the Site.
Decommissioning Phase				
Ebbw River – WFD Surface Water Waterbody (GB109056026910) Potential Effects: Water Quality deterioration from pollution including increased sediment loading	Medium	Low	Minor	Relevant and applicable good practise as identified for the construction mitigation is expected to be applied when decommissioning. The decommissioning of the Proposed Development will adhere to the latest legislative and guidance requirements at the time.
Ordinary Watercourses: Nant Gwyddon Nant Gofapi Nant Carn Potential Effects: Water Quality deterioration from pollution including increased sediment loading	Low	Low	Minor	Relevant and applicable good practise as identified for the construction mitigation is expected to be applied when decommissioning. The decommissioning of the Proposed Development will adhere to the latest legislative and guidance requirements at the time.

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in Section 10.8 and is defined as low, medium and high.

2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in Section 1.8 and is defined as negligible low, medium and high.
3. The significance of the environmental effects is based on the combination of the sensitivity/importance/value of a receptor and the magnitude of change and is expressed as major (significant), moderate (significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in Section 10.8.

10.12 Further work to be undertaken

- 10.12.1. The proposed outline surface water drainage strategy for the Proposed Development included in **Appendix 10A** will be agreed in consultation with Caerphilly CBC and a detailed drainage strategy presented in the submission of the Final ES.
- 10.12.2. The proposed embedded measures for mitigation of potential effects on the Water Environment will be agreed in consultation with NRW and confirmed in the submission of the Final ES.