9 WATER RESOURCES

9.1 Introduction

9.1.1 This Chapter appraises the potential impacts of the Proposed Project on water resources within a defined Study Area during its construction, operation and decommissioning phases. Water resources considered include:

- Surface water features;
- Groundwater features;
- Hydromorphology features;
- Water quality; and
- Flooding and drainage.

9.1.2 This Chapter should be read in conjunction with Chapter 10 (Geology, Soils and Contaminated Land) which includes a description of the underlying geology of the Study Area and an appraisal of controlled waters (ground water and surface water) in terms of potential contamination from the presence or mobilisation of existing contaminants, or from accidental release of contaminants during the construction, operational or decommissioning phases of the Proposed Project. This Chapter should also be read in conjunction with the Marine Physical Environment Chapter (Chapter 19).

9.2 Scope and Methodology

Appraisal Methodology

9.2.1 The Water Resources appraisal Chapter comprises a desk-based assessment informed by a site walkover and the results of water quality monitoring of surface and groundwater features.

The Study Area

9.2.2 The Study Area includes all potential surface and groundwater receptors located within 1km of the Area of Search for Permanent and Temporary Works (defined within Chapter 3 and shown on Figure 1.1). The Study Area is also shown on the figures provided in support of this Chapter (Figures 9.1 to Figure 9.3).

Data Sources

9.2.3 To support the appraisal, a wide range of information has been collated to describe the baseline environment within the Study Area. Where data were collected from public domain sources and associated with an Open Government Licence (OGL), these have been summarised in Table 9.1 below.

Table 9.1: Public Domain OGL Sources

Feature title	Location (web address)
OS Open Rivers	https://www.ordnancesurvey.co.uk/business-and-government/products/os-open-rivers.html
• Water Framework Directive (WFD) • River Waterbodies and Catchments Cycle 2 • Groundwater bodies Cycle 2 • Transitional and Coastal • Lake • Lakes Inventory including Reservoirs • Areas Affecting Bathing Waters • Statutory Designated Sites for Nature Conservation • Conservation Area Boundaries • Flood Map and Flood Defences Map • Coastal Erosion Line • Development Advice Map Zones C1 and C2 • Areas Benefiting from Flood Defences • Flood Storage Areas Map • Flood Map (Flood Zones 2 and 3) • Risk of Flooding from Surface Water • Flood Risk Areas	http://lle.gov.wales/catalogue?lang=en
Springs and wells	OS maps
• Bedrock geology/Superficial deposits geology • Boreholes • Hydrogeology	http://www.bgs.ac.uk/opengeoscience/downloads.html
LiDAR Digital Terrain Model (DTM) data	http://lle.gov.wales/Catalogue/Item/LidarCompositeDataset
WFD catchments classification (2015 Cycle 2), objectives, measures and reasons for not achieving good status	https://drive.google.com/file/d/0B2hsDbbdxz1tcUdGV1c5U0dXMkk/view
WFD groundwater bodies classification (2015 Cycle 2), objectives, measures and reasons for not achieving good status	https://drive.google.com/file/d/0B2hsDbbdxz1tcUdGV1c5U0dXMkk/view

9.2.4 In addition, Natural Resources Wales was consulted to obtain relevant data and information associated with specific licence conditions. The information provided by Natural Resources Wales is summarised in Table 9.2.

Table 9.2: Data and Information requested from Natural Resources Wales

Feature title	Comment
Aquifer Designations	Dataset contains British Geological Survey (BGS) intellectual property rights in addition to Natural Resources Wales rights, which limits rights to make the dataset available
Extreme sea level data (Product 4)	Extreme sea level dataset
Asset Location	Dataset showing Natural Resources Wales asset locations (points and lines) in GIS and in an excel spreadsheet
Porthmadog flood modelling report (Product 5)	Modelling Report and appendices (Afon Glaslyn)
Flood modelling GIS outputs (Product 6)	GIS flood modelling outputs including blockage, breach, door failure, fluvial defended, fluvial undefended, tidal defended, tidal undefended (Afon Glaslyn)
Surface Water Safeguard Zone (SGZ)	None within the Study Area
Groundwater Safeguard Zone	None within the Study Area
Licensed Surface Water Abstractions	Data obtained (excel format with coordinates)
Licensed Groundwater Abstractions	None within the Study Area
Groundwater levels	Received for one Station ‘Cors Bodeilio BD4’ - records 2009-2012
River flows and levels	Received for Beddgelert station, with flows of 2014-2016

9.2.5 Additional data and information were also requested from/provided by National Grid or stakeholders. This information is summarised in Table 9.3.

Table 9.3: Data and Information requested from National Grid or other stakeholders

Feature title	Content	Data source
Ponds	GIS file showing pond locations from the Phase 1 Habitat Survey	National Grid/RSK
Geomorphological assessment	Geomorphological assessment report of the Pont Briwet replacement on the Afon Dwyryd	National Grid, prepared by Fluvio in July 2011
Shoreline comparison	Drawing showing shoreline comparison (for the NG 4ZCO30 project)	National Grid, prepared by LSTC

Feature title	Content	Data source
Unlicensed surface water and groundwater abstractions	None available within the Study Area.	Gwynedd Council
Groundwater flooding data	Groundwater flooding data for the Area of Search for Permanent and Temporary Works	Jeremy Benn Associates

Flood Consequences Assessment

9.2.6 A Flood Consequences Assessment (FCA) has been undertaken to determine the flood risks to or from the Proposed Project and any mitigation which may be required and has been prepared to be compliant with Technical Advice Note (TAN) 15[1]. The FCA is submitted as a technical appendix to this Environmental Appraisal (Appendix 9A), although flood risk is also considered in this Chapter.

Sustainable Drainage Systems (SuDS) Strategy

9.2.7 A Sustainable Drainage Systems (SuDS) Strategy has also been prepared. The SuDS Strategy has been produced to demonstrate how the Proposed Project meets the requirements of the Statutory SuDS Standards for Wales[2]. The SuDS Strategy is included as a technical appendix to this Environmental Appraisal (Appendix 9B) and will be submitted to the SuDS Approval Body (SAB) for approval.

Limitations

9.2.8 It should be noted that the location of any discharges of water as a result of tunnel dewatering will need to be agreed with the relevant authority and the appropriate permits and authorisations obtained; the location of such discharges therefore does not form part of this appraisal.

9.2.9 The groundwater quality sampling described in this Chapter was undertaken at relatively shallow depths. The boreholes extended between 7 to 8m below ground level, with groundwater typically being encountered within the first 2m of each. The tunnel and shafts will, however, be constructed at considerable depth below existing ground level (for example, the eastern tunnel shaft will be between 39.5m and 73.5m deep). For practical reasons, it was not possible to test for the presence of groundwater at these depths (or indeed to assess the quality thereof). As such, whilst the sampling at the boreholes indicated that the near-surface groundwater was fresh, it was not possible to extrapolate the same conclusion for any groundwater that may be encountered at greater depths during the construction of the Proposed Project.

9.3 Consultation Undertaken

9.3.1 A Screening and Scoping Report (National Grid, October 2018) was prepared and submitted to Gwynedd Council, Snowdonia National Park Authority and Natural Resources Wales. The information and advice received during the scoping process with regard to water resources is summarised in Appendix 3B. Additional advice received is summarised in Table 9.4 below.

[1] https://gov.wales/topics/planning/policy/tans/tan15/?lang=en.

[2] Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems. Welsh Government, 2018.

Table 9.4: Consultation Responses

Date	Consultee	Summary of Issues	Section where comment is addressed
16 January 2019	Natural Resources Wales - preliminary pre-application flood risk advice	Most of the site falls within the Dwyryd Estuary with a small section (near Garth SEC) falling within the Glaslyn Estuary. Extreme tidal levels are available for the Dwyryd Estuary. However, no fluvial data is available in relation to the main rivers (Afon Dwyryd & Penrhyn Cyt). A full hydraulic model is available for the Glaslyn Estuary - The Afon Glaslyn & Tributaries at Porthmadog, Flood Risk Study, Final Modelling Report, Porthmadog_5_v2.0_2014, FMP-TUFLOW 1D-2D. Any works in, under, over or within 8m of the banks of a main river or flood defence may require a Flood Risk Activity Permit (FRAP). However, if the works are already covered by a Marine Licence, a FRAP will not be required. Any works affecting any watercourse within the Harlech and Maentwrog IDD may require a FRAP or a Land Drainage consent.	FCA in Appendix 9A
29 November 2018	Natural Resources Wales - Senior Peatland Advisor	Peat was found at Cilfor, on the eastern side of the Dwyryd estuary during ground investigations instigating further investigation through peat probing to further understand the extent of the peat. This resulted in the relocation of the eastern permanent access road to reduce impact on the deepest peat. To further reduce impacts to the peat, design options for the access track were investigated, a floating road design was concluded to ensure that peat excavation is minimised. Natural Resources Wales confirmed that the Scottish Natural Heritage (SNH) guidance for floating roads on deep peat is still current and the most appropriate guidance. It was also noted that floating roadss have the potential to sink and increase their impacts on hydrological flows within the surface layers of peat (acrotelm).	Chapter 11: Agriculture and Land Use
16 October 2019	Natural Resources Wales	In its letter dated 16th October 2019 (Natural Resources Wales Ref: CAS-102734-F0V5), Natural Resources Wales confirmed that the Proposed Project would not be required to provide compensatory floodplain storage.	

9.4 Statutory and Planning Context

Legislation

9.4.1 Legislation relevant to the control and protection of water resources and the provision of flood risk management is presented in Table 9.5.

Table 9.5: Legislation relevant to the control and protection of water resources and the provision of flood risk management

Legislation
The EU Water Framework Directive (WFD) (2000/60/EC) is intended to bring surface and groundwater bodies up to a condition where their potential to support healthy ecosystems is maximized.
The EU Floods Directive (2007/60/EC) requires the assessment of all watercourses to determine if they are at risk of flooding; the mapping of flood extents, including assets and humans at risk in these areas; and the implementation of adequate and coordinated measures to reduce the flood risk.
The Water Resources Act 1991 regulates water resources, water quality and pollution, and flood defence.
The Environment Act 1995 relates to a wide range of environmental issues, from the establishment of the Environment Agency and the Scottish Environment Protection Agency, to provisions for contaminated land and abandoned mines, National Parks, the control of pollution, and conservation of the environment.
The Environmental Protection Act 1990 defines the fundamental structure and authority for waste management and control of emissions into the environment.
The Land Drainage Acts 1991 and 1994 require that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded and define the functions of internal drainage boards and local authorities.
The Flood and Water Management Act 2010 aims to provide better, more sustainable management of flood risk for people, homes and businesses, help safeguard community groups from unaffordable rises in surface water drainage charges and protect water supplies to the consumer.

Planning Policy

9.4.2 Relevant national and local planning policies are set within a number of documents adopted by the Snowdonia National Park Authority and Gwynedd Council and are described in Table 9.6.

Table 9.6: National and local planning policy

Policy
Planning Policy Wales (PPW)
PPW aims to ensure that planning decisions taken in Wales will improve the lives of both current and future generations and will build a better environment to accommodate current and future needs.
Technical Advice Note 15 (TAN 15)
TAN 15 provides technical guidance which supplements the policy set out in the PPW in relation to development and flooding. It advises on development and flood risk as this relates to sustainability principles and provides a framework

Policy
within which risks arising from both river and coastal flooding, and from additional run-off from development in any location, can be assessed.
Eryri Local Development Plan 2016 – 2031 (Snowdonia National Park)[3]
Strategic Policy A: National Park Purposes and Sustainable Development (A) seeks to ensure that new development promotes the principles of sustainable development in ways which further National Park purposes and duty whilst conserving and enhancing the National Park's 'Special Qualities'. This includes conserving the quality and quantity of natural resources such as water and preventing inappropriate development in areas which are at risk from flooding or which contribute to the risk of flooding.
Strategic Policy Dd: Climate Change relates to ensuring that any flood protection works have no adverse environmental impacts or that they can be satisfactorily mitigated; and conserving and enhancing areas of peatland to assist in carbon retention, water storage and flood prevention.
Anglesey and Gwynedd Joint Local Development Plan[4]
Strategic Policy PS5: Sustainable Development relates to reducing the amount of water used and wasted; reducing the effect on water resources and quality; managing flood risk and maximizing use of sustainable drainage schemes; and progressing the objectives of the Western Wales River Basin Water Management Plan.
Policy PCYFF 6: Water Conservation states that the proposals should incorporate water conservation measures where practicable, including SuDS. All proposals should implement flood minimisation or mitigation measures where possible, to reduce surface water run-off and minimise its contribution to flood risk elsewhere.
Policy AMG 4: Coastal Protection states that the development does not cause unacceptable harm to water quality.

9.5 Existing Environment

9.5.1 The Study Area encompasses both the Glaslyn and Dwyryd Estuaries which form transition zones between river (fluvial) and maritime (tidal) environments. The following description of the existing environment includes elements associated with both environments such as a description of marine influences (i.e. tidal water), the estuary hydromorphology and fluvial and tidal flood risk.

9.5.2 The topography within the Study Area is varied, with steep slopes occurring on the east and more undulating terrain in the west. Steep slopes cause rainfall run-off to migrate down slope and collect in valley bottoms and other depressions, creating pools of standing water, especially on poorly drained soils, or generating run-off to watercourses.

Surface Water Features

9.5.3 The location of the main surface water features within the Study Area are shown in Figure 9.1.

[3] http://www.snowdonia.gov.wales/__data/assets/pdf_file/0008/1471985/Pre-Pub-LDP-Hyperlinks.pdf

[4]https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Anglesey-and-Gwynedd-Joint-Local-Development-Plan-Written-Statement.pdf

9.5.4 The Afon Dwyryd passes through the eastern side of the Study Area flowing south west. This watercourse is classified as a main river and its source is in the hills to the north of Ffestiniog, upstream of the Study Area, and it discharges into Tremadog Bay, downstream of the Study Area. The Afon Dwyryd is tidal from the A487 road crossing at Maentrog, upstream of the Study Area. Numerous watercourses (both fluvial and tidal) drain across the Study Area to the Afon Dwyryd (Figure 9.1).

9.5.5 The Afon Glaslyn passes through the western side of the Study Area flowing southwest. This watercourse is also a main river and discharges into the Glaslyn Estuary in the western part of the Study Area. The A497 road crossing over the Glaslyn Estuary also forms a significant tidal flood defence, known locally as 'The Cob'. Numerous watercourses (both fluvial and tidal) drain across the Study Area to the Afon Glaslyn (Figure 9.1).

9.5.6 The Llyn Tecwyn Uchaf reservoir is located near to the eastern extent of the Study Area. This reservoir discharges into a small watercourse known as Nant yr Efail. This watercourse flows westwards from this reservoir through the Study Area (north of the proposed eastern Sealing End Compound - SEC - before passing beneath the A496 and subsequently discharging to the Afon Dwyryd further to the west (Figure 9.1).

9.5.7 Ditches along field margins and shallow land drains are also present within the Study Area. Standing water is present on poorly drained soils, and in some locations occurs throughout much of the year.

Designated Sites

9.5.8 Statutory designated sites for nature conservation located within the Study Area are shown in Figure 7.1. As such, the Proposed Project has the potential to interact with the water environment of some of these designated sites. Further details are provided in Chapter 7: Ecology.

River waterbody WFD status and objectives

9.5.9 The Study Area is located within three main WFD catchments, namely:

- The Glyn (Dwyryd);
- The Gaseg – upper; and
- The Glaslyn – tidal to Afon Croesor.

9.5.10 The current overall WFD status and objectives for these waterbodies are presented in Table 9.7 and Figure 9.2.

Table 9.7: WFD status and objectives for the river waterbodies

WFD elements	WFD status and objectives of Glyn (Dwyryd)[5]	WFD status and objectives of Gaseg – upper (Note 1)	WFD status and objectives of Glaslyn – tidal to Afon Croesor (Note 1)
Current Overall Status	Good	Moderate	Moderate
Overall Status Objective	Good by 2015	Good by 2021	Good by 2021
Current Ecological Status/Potential (for Heavily Modified waterbody)	Good	Moderate	Moderate
Ecological Status Objective	Good by 2015	Good by 2021	Good by 2021
Current Chemical Status	Good	Good	Good
Chemical Status Objective	Good by 2015	Good by 2015	Good by 2015

(Note 1): The waterbody of interest is designated as a Heavily Modified Waterbody.

Transitional and Coastal waterbody WFD status and objectives

9.5.11 In addition to these three waterbodies, there is one transitional and coastal (TraC) waterbody, the Glaslyn, located within the Study Area. The current overall WFD status and objectives for the Glaslyn (TraC) waterbody are presented in Table 9.8 and Figure 9.2.

Table 9.8: WFD status and objectives for the Glaslyn (TraC) waterbody

WFD elements	WFD status and objectives of the Glaslyn (TraC) waterbody
Current Overall Status	Good
Overall Status Objective	Good by 2015
Current Ecological Status/Potential (for Heavily Modified waterbody)	Good
Ecological Status Objective	Good by 2015
Current Chemical Status	Good
Chemical Status Objective	Good by 2015

Surface water abstractions (licenced)

9.5.12 Two licensed surface water abstractions have been identified within the Study Area (shown on Figure 9.3):

[5] Wales waterbody objectives and measures update 2017 - https://drive.google.com/file/d/0B2hsDbbdxz1tcUdGV1c5U0dXMkk/view – only contains objectives by 2015

- Permit 23/65/3/0001 is related to the Llyn Tecwyn Uchaf reservoir and is used for public water supply by Welsh Water. The maximum annual total abstraction for this site is 829,645m^3/yr; and
- Permit WA/065/0006/006 is located on the north-west side of the Study Area and is operated by Tarmac Trading Ltd. This abstraction is located on the Afon Glaslyn and abstracted water is used for dust suppression. The maximum annual total abstraction for this site is 2,436m^3/yr.

Groundwater Features

Geology and aquifers

9.5.13 Much of the Study Area overlies a 'Secondary B Aquifer'. These aquifers include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary B aquifers are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

9.5.14 There are no licenced groundwater abstractions within the Study Area, or details available of unlicensed groundwater abstractions (Tables 9.2 and 9.3).

Groundwater WFD status and objectives

9.5.15 The Study Area is located within the 'Llyn and Eryri' WFD groundwater body. The current overall WFD status and objectives for this groundwater body are presented in Table 9.9. The 'Llyn and Eryri' WFD groundwater body has a "Poor" chemical status and consequently "Poor" overall status. This is due to the presence of an abandoned mine (non-coal) and diffuse source pollution from agriculture.

Table 9.9: WFD status and objectives of the 'Llyn and Eryri' groundwater body

Groundwater Body Name: '*Llyn and Eryri*'	WFD Status and Objectives
Current Overall Status	Poor
Overall Status Objective	Poor by 2015
Quantitative Status	Good
Quantitative Status Objective	Good by 2015
Quantitative Dependent Surface Waterbody Status	Good
Quantitative Dependent Surface Waterbody Objective	Good by 2015
Current Chemical Status	Poor
Chemical Status Objective	Poor by 2015

Water Quality

Surface Water Quality Analysis

9.5.16 Water quality monitoring of the ordinary watercourses located near to the western and eastern tunnel head house was undertaken in May 2019. The primary objective of this monitoring was to determine whether these watercourse habitats are principally freshwater, inter-tidal (i.e. 'brackish'), or tidal (i.e. saline) in nature. The following sections provide an overview of the results of the water quality monitoring undertaken.

9.5.17 The western tunnel head house will be located just to the north of an ordinary watercourse that runs east to west, and discharges into the Glaslyn Estuary. Water quality samples from six locations along this watercourse were taken in May 2019. The sample locations were evenly distributed along the reach of this watercourse located within the Study Area.

9.5.18 Electrical Conductivity (EC) values at these six sample locations ranged from 186 to 223 µS/cm. These values are indicative of freshwater, which normally has an EC value range of between 0 to 800 µS/cm. All six samples returned pH values of between 6.11 to 7.82 which, again, is indicative of the normal pH range for freshwater.

9.5.19 The eastern tunnel head house will be located in the vicinity of a system of ordinary watercourses and land drains dominated by the Nant yr Efail. This watercourse exits the Llyn Tecwyn Uchaf reservoir and flows east to west around and to the north of the eastern tunnel head house before passing beneath the A496 and subsequently discharging into the Dwyryd Estuary. Water quality samples from 10 locations along this watercourse were taken in May 2019. The sample locations were distributed along the reach of this watercourse downstream of the eastern tunnel head house, between the A496 and the confluence of this watercourse and the Dwyryd Estuary.

9.5.20 Electrical Conductivity (EC) values at these 10 sample locations ranged from 65 to 90 µS/cm. These values are indicative of freshwater, which normally has an EC value range of between 0 to 800 µS/cm. All 10 samples returned pH values of between 6.04 to 7.12 which, again, is indicative of the normal pH range for freshwater.

Groundwater Quality Analysis

9.5.21 Geochemical analysis of groundwater samples collected across the Study Area has also been undertaken as part of this Environmental Appraisal. The primary objective of this monitoring was to determine whether any groundwater encountered during the construction of the Proposed Project is likely to be fresh, or saline.

9.5.22 Groundwater samples were taken at seven borehole locations within the Study Area in March 2019. Electrical Conductivity (EC) values at these seven sample locations ranged from 133 to 350 µS/cm. These values are indicative of freshwater, which normally has an EC value range of between 0 to 800 µS/cm. All seven samples returned pH values of between 6.21 to 8.51 which, again, is indicative of the normal pH range for freshwater.

9.5.23 These groundwater samples were, however, taken at relatively shallow depths. The boreholes extended between 7 to 8m below ground level, with groundwater typically being encountered within the first 2m of each. The tunnel and shafts will, however, be constructed at considerable depth below existing ground level (for example, the eastern tunnel shaft will be between 39.5m and 73.5m deep). For practical reasons, it was not possible to test for the presence of groundwater at these depths (or indeed to assess the quality thereof). As such, whilst the sampling at the seven boreholes indicated that the near-surface groundwater was fresh, it is not possible to extrapolate the same conclusion for any groundwater that may be encountered at greater depths during the construction of the Proposed Project.

Hydromorphology Features

Hydromorphology setting

9.5.24 Within the Study Area, the Afon Dwyryd shows signs of an active channel as evidenced by the presence of large meandering loops and braided channels and confirmed in a 2011 report undertaken by Fluvio, which presented a

geomorphological assessment of the Pont Briwet replacement on the Afon Dwyryd. The Afon Dwyryd is also subject to coastal erosion; the extent of which is shown on Figure 9.1.

Hydromorphology WFD status and objectives

9.5.25 The 'Gaseg-upper' and 'Glaslyn-tidal to Afon Croesor' WFD waterbodies are classified as heavily modified. Their related hydromorphology status and objectives are presented in Table 9.10.

Table 9.10: Hydromorphology related WFD Status and Objectives

WFD elements	WFD status and objectives of Glyn (Dwyryd)	WFD status and objectives of Gaseg – upper (1)	WFD status and objectives of Glaslyn – tidal to Afon Croesor (1)
Hydrological Regime Status	Supports Good	High	Supports Good
Hydrological Regime Objective	n/a	n/a	n/a
Morphology Status	Supports Good	n/a	n/a
Morphology Objective	n/a	n/a	n/a

Notes (1) The waterbody of interest is designated as a Heavily Modified Waterbody

Flooding and Drainage

Development Advice Map

9.5.26 The Natural Resources Wales Development Advice Map (DAM) shows areas at risk of flooding for the purposes of land-use planning. The DAM should be used alongside Planning Policy Wales and TAN 15 to guide new development away from areas at risk of flooding wherever possible. The DAM shows the Study Area to contain Flood Zones C1 and C2, with limited amounts of Flood Zone B[6].

9.5.27 Further information on flood risk is provided in the FCA contained in Appendix 9A.

Other drainage issues

9.5.28 Although the Study Area is predominantly underlain by Tidal flat deposits/Alluvium comprising fine to medium sand and silt, BGS records indicate that to the north-east of the Study Area small zones of peat are present. Peat has the potential to hold significant amounts of water and has implications for construction due to poor cohesion of the deposits. Peat was found at Cilfor on the eastern side of the Dwyryd Estuary during ground investigations, prompting a further study to better understand the extent depth of the peat deposits (see Chapter 11 on Agriculture and Land use for further details). These peat areas are recharged through a) direct rainfall; b) the flow of water through soils in up-gradient areas (i.e. soil 'through-flow'); and through the position of the local soil water table in lower-lying areas.

[6] Zone A - Considered to be at little or no risk of fluvial or tidal/coastal flooding. Zone B - Areas known to have been flooded in the past evidenced by sedimentary deposits. Zone C - Based on extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal). Zone C1 - Areas of the floodplain which are developed and served by significant infrastructure, including flood defences. Zone C2 - Areas of the floodplain without significant flood defence infrastructure.

9.6 Key Parameters for Assessment

9.6.1 The Environmental Appraisal of the Proposed Project assumes the implementation of the measures contained within the Construction Environmental Management Plan (CEMP, including the Peat Management Plan) and the Proposed Project's embedded mitigation measures (provided in 2A and 3A). This appraisal is also based on the design of the Operational Phase elements of the Proposed Project as set in Figures 2.5 and 2.8.

9.7 Predicted Impacts During Construction

9.7.1 This section appraises the water resources impacts of the Proposed Project during the construction phase.

Tunnel Head House, Sealing End Compounds and 400kV Cable (Undergrounding)

Infrastructure Western Side of the Dwyryd Estuary

Surface and Groundwater Resources

9.7.2 The construction of the shaft, tunnel and linear trench to facilitate the short length of new cable route to connect the western tunnel head house to the existing SEC at Garth could lead to the creation of preferential surface and groundwater flow pathways. This could alter the configuration of flow pathways that currently feed the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC. The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that this potential impact would be avoided.

Hydromorphology

9.7.3 The presence of temporary impermeable areas, stockpiling of soil, stripping of vegetation cover and topsoil removal during the construction activities could lead to an increase in sediment load delivered to the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC. This could lead to increased sedimentation, reduced sunlight, and an increased risk of blockage of these watercourses.

9.7.4 Up to two temporary access routes will be required for the western tunnel head house. These will need to cross the surface watercourse that runs east-west directly to the south of the location of this compound. These temporary watercourse crossings (i.e. temporary culverts) could create 'pinch-points' on this watercourse, which could also present an increased risk of blockage.

9.7.5 The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that these potential impacts would be avoided (for example, the CEMP includes details of construction phase soil management and confirmation that all temporary culverts will be appropriately sized to accommodate the full range of flows likely to occur on this watercourse).

Water Quality

9.7.6 Chemical/fuel use during the construction phases has the potential to result in contamination of the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC.

9.7.7 Bentonite release during the tunnelling activities has the potential to contaminate groundwater and also surface watercourses in the event that it is released as a result of groundwater pumping (discussed further below).

9.7.8 The material excavated as part of the construction of the tunnel has the potential to contain pyrite. If pyrite is present in significant quantities within the excavated spoil and is allowed to come into contact with direct rainfall or surface runoff, this could lead to acidification of the subsequent leachate that would be generated. This could lead to pollution of the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC.

9.7.9 Similarly, there is the potential that the pumped groundwater (discussed further below) may have come into contact with pryrite deposits as a result of the tunnelling activities. If pyrite is allowed to oxidise before contact with water, this can lead to acidification, which could potentially contaminate the surface watercourses within the vicinity of the western tunnel head house and Garth SEC.

9.7.10 The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that these potential impacts would be avoided.

Flooding and Drainage

9.7.11 The presence of temporary impermeable areas, stockpiling of soil, stripping of vegetation cover and topsoil removal during the construction activities could lead to an increase in surface water runoff delivered to the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC. This could lead to an increase in flood risk.

9.7.12 Up to two temporary access routes will be required for the western tunnel head house. These will need to cross the surface watercourse that runs east-west directly to the south of the location of this compound. These temporary watercourse crossings (i.e. temporary culverts) could create a 'pinch-point' on this watercourse, which could also present an increased risk of blockage.

9.7.13 The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that these potential impacts would be avoided (for example, the CEMP includes details of construction phase soil management and confirmation that all temporary culverts will be appropriately sized to accommodate the full range of flows likely to occur on this watercourse).

9.7.14 There is the potential that groundwater will be encountered whilst constructing the tunnel shafts, necessitating the requirement to remove (via pumping) ground water from within the shaft during its construction with subsequent transfer of water to a surface water course.

9.7.15 It is currently unknown whether the water to be discharged will be fresh or saline due to proximity to the Glaslyn Estuary. Groundwater monitoring undertaken to date does not indicate saline waters, however this cannot be ruled out at this stage. Chapter 2 (Project Description) outlines an appropriate disposal strategy for the pumped groundwater, given this uncertainty over its likely water quality. All appropriate permits and licences will be applied for by the contractor.

9.7.16 The FCA contained within Appendix 9A considers the impacts of the likely quantity of water to be discharged during construction. The FCA concludes that normal temporary pumped discharges[7] are not likely to result in an increase in flood risk or morphological damage to the receiving watercourse.

9.7.17 In the event that occasional larger flows (i.e. due to fissures at the tunnel face) are encountered, the FCA recommends that antecedent conditions on the receiving

[7] Water inflows will be variable depending on the depth of the shaft but average water inflows are estimated to be 102 m^3/day over 34 days for the western shaft.

watercourses (i.e. water level and velocity) should be checked by the contractor to determine if the higher flows could be accommodated without causing adverse impacts. The water storage attenuation system (outlined in Chapter 2 Project Description) could be utilised to provide temporary storage in the event that water levels in the receiving watercourse are high prior to discharging these larger flows. Pumping should cease if both the water storage attenuation system and the receiving watercourse are full. This measure would be sufficient to ensure that the temporary pumped discharges would not have an impact on flooding or drainage.

9.7.18 To facilitate the construction of the Proposed Project, temporary working areas (i.e. construction compounds) will be required in the vicinity of the western tunnel head house. These working areas will be located within DAM Flood Zone C1. The temporary compounds will need to house welfare facilities, construction plant and equipment, and will also need to temporarily store spoil arising from the construction of the tunnel itself. Due to the temporary nature of these working areas, measures to mitigate any attendant (and likely minor) impacts on the floodplain (in terms of storage) are not considered necessary. This has been confirmed by Natural Resources Wales (refer to Table 9.4 above).

Infrastructure Eastern Side of the Dwyryd Estuary

Surface Water Resources

9.7.19 A small Ordinary watercourse is currently located within the area intended for the eastern tunnel head house. The construction of the eastern tunnel head house and SEC, therefore, has the potential to impede the flow of this watercourse. This could lead the loss of a localised surface water resource and habitat. As part of the CEMP and embedded mitigation measures, however, this ordinary watercourse will be realigned to flow around the eastern tunnel head house and reinstated as far as reasonably practicable to its current nature and form. This will avoid the loss of this surface water resource and habitat.

Groundwater Resources

9.7.20 The construction of the shaft and tunnel at the eastern tunnel head house and SEC could lead to the creation of preferential groundwater flow pathways. This could alter the configuration of flow pathways that currently feed the surface watercourse system located in the vicinity of the eastern tunnel head house and SEC. The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that this potential impact would be avoided. Further consideration of the impact of the construction phase on groundwater resources is provided in the section on Flood Risk and Drainage below.

Hydromorphology

9.7.21 The presence of temporary impermeable areas, stockpiling of soil, stripping of vegetation cover and topsoil removal during the construction activities could lead to an increase in sediment load delivered to the surface watercourses located in the vicinity of the eastern tunnel head house and SEC. This could lead to increased sedimentation, reduced sunlight, and an increased risk of blockage of these watercourses. The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that this potential impact would be avoided (for example, the CEMP includes details of construction phase soil management).

Water Quality

9.7.22 Chemical/fuel use during the construction phases has the potential to result in contamination of the surface watercourses located in the vicinity of the eastern tunnel head house and SEC.

9.7.23 Bentonite release during the tunnelling activities has the potential to contaminate groundwater and also surface watercourses in the event that it is released as a result of groundwater pumping (discussed further below).

9.7.24 There is the potential that the pumped groundwater (discussed further below) may have come into contact with pryrite deposits as a result of the tunnelling activities. If pyrite is allowed to oxidise before contact with water, this can lead to acidification, which could potentially contaminate the surface watercourses within the vicinity of the eastern tunnel head house and SEC.

9.7.25 The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that these potential impacts would be avoided.

Flooding and Drainage

9.7.26 The presence of temporary impermeable areas, stockpiling of soil, stripping of vegetation cover and topsoil removal during the construction activities could lead to an increase in surface water runoff delivered to the surface watercourses located in the vicinity of the eastern tunnel head house and SEC. This could lead to an increase in flood risk. The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that this potential impact would be avoided (for example, the CEMP includes details of construction phase soil management).

9.7.27 There is the potential that groundwater will be encountered whilst constructing the eastern tunnel shaft, necessitating the requirement to remove (via pumping) ground water from within the shaft during its construction with subsequent transfer to a surface water course.

9.7.28 It is currently unknown whether the water to be discharged will be fresh or saline due to proximity to the Dwyryd Estuary. Groundwater monitoring undertaken to date does not indicate saline waters, however this cannot be ruled out at this stage. Chapter 2 (Project Description) outlines an appropriate disposal strategy for the pumped groundwater, given this uncertainty over its likely water quality. All appropriate permits and licences will be applied for by the contractor.

9.7.29 The FCA contained within Appendix 9A considers the impacts of the likely quantity of water to be discharged during construction. The FCA concludes that normal temporary pumped discharges[8] are not likely to result in an increase in flood risk or morphological damage to the receiving watercourse.

9.7.30 In the event that occasional larger flows (i.e. due to fissures at the tunnel face) are encountered, the FCA recommends that antecedent conditions on the receiving watercourses (i.e. water level and velocity) should be checked by the contractor to determine if the higher flows could be accommodated without causing adverse impacts. The water storage attenuation system (outlined in Chapter 2 Project Description) could be utilised to provide temporary storage in the event that water levels in the receiving watercourse are high prior to discharging these larger flows. Pumping should cease if both the water storage attenuation system and the

[8] Water inflows will be variable depending on the depth of the shaft but average water inflows are estimated to be 265 m^3/day over 74 days for the eastern shaft.

receiving watercourse are full. This measure would be sufficient to ensure that the temporary pumped discharges would not have an impact on flooding or drainage.

9.7.31 The eastern tunnel head house and tunnel shaft will be constructed in an area of existing peatland. As mentioned above, it is probable that ground water will need to be pumped from within the shaft during its construction. Groundwater pumping can result in a 'draw-down' effect, which can in some instances reduce local groundwater levels.

9.7.32 Surveyed peat depths in the area around the eastern side infrastructure are, however, relatively shallow, typically up to 1m, with only limited areas shown to have surveyed depths of greater than this. Once constructed, the eastern tunnel shaft will be between 39.5m and 73.5m deep.

9.7.33 The pumping of any near-surface groundwater ingress would, therefore, only occur during the initial drilling of the shaft. As the construction of the shaft progresses, pumping of any groundwater ingress would need to occur at progressively lower depths, until the ultimate construction depth of the shaft of between 39.5m and 73.5m below ground level is reached. At this depth, and given the anticipated volume and rate of pumping, it is unlikely that the transmissivity of the geology above the ultimate tunnel and shaft base elevation would be sufficient to allow a 'draw-down' effect that could impact the water content of the near-surface peat layers. As such, any impact of pumping of any near-surface groundwater ingress on the existing peat layers would inherently be temporary.

9.7.34 The OCEMP contains a detailed Peat Management Plan. This will provide guidance on how any peat removed during the construction phase could be relocated in order to preserve the peat on site (for example, by relocating peat into local drainage ditches within the peat layers in order to help retain water). This will help to support Strategic Policy Dd of the Eryri Local Development Plan for the Snowdonia National Park (see Table 9.6 above). In addition, the SuDS Strategy (Appendix 9B) also contains measures that will help to retain the water content of the existing peat deposits. These combined measures will help to ensure that the peat deposits are able to quickly recover from any temporary impacts of near-surface ground water pumping.

Removal of Existing Infrastructure (VIP subsection)

Surface and Groundwater Resources

9.7.35 The removal of the VIP subsection is not anticipated to have any impact on surface or groundwater resources during the construction phase.

Hydromorphology

9.7.36 The presence of temporary impermeable areas, stockpiling of excavated soil, and stripping of vegetation cover and topsoil during the removal of the VIP subsection foundations could lead to an increase in sediment load delivered to local surface watercourses. This could lead to increased sedimentation, reduced sunlight, and an increased risk of blockage of these watercourses. The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that this potential impact would be avoided (for example, the CEMP includes details of construction phase soil management).

Water Quality

9.7.37 Chemical/fuel use during the removal of the VIP subsection foundations has the potential to result in contamination of local surface watercourses. However, the CEMP contains best practice measures ensure that would ensure that this potential impact would be avoided.

Flooding and Drainage

9.7.38 The presence of temporary impermeable areas, stockpiling of excavated soil, and stripping of vegetation cover and topsoil during the removal of the VIP subsection foundations could lead to an increase in surface water runoff delivered to local surface watercourses. This could lead to an increase in flood risk. The implementation of the CEMP and embedded mitigation measures are, however, considered sufficient to ensure that this potential impact would be avoided.

9.8 Predicted Impacts During Operation

9.8.1 This section appraises the water resources impacts of the Proposed Project during the operational phase.

Tunnel Head House, Sealing End Compounds and 400kV Cable (Undergrounding)

Infrastructure Western Side of the Dwyryd Estuary

Surface and Groundwater Resources

9.8.2 The infrastructure on the western side of the Dwyryd Estuary is not anticipated to have any impact on surface or groundwater resources during the operational phase.

Hydromorphology

9.8.3 The presence of permanent impermeable areas during the operational phase could lead to an increase in sediment load delivered to the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC. This could lead to increased sedimentation, reduced sunlight, and an increased risk of blockage of these watercourses. The embedded mitigation measures and the design of the western tunnel head house itself are, however, considered sufficient to ensure that this potential impact would be avoided.

9.8.4 A permanent access route will be required for the western tunnel head house. This will need to cross the surface watercourse that runs east-west directly to the south of the location of this compound. This watercourse crossing (i.e. permanent culvert) could create a ‘pinch-point’ on this watercourse, which could present an increased risk of blockage. The embedded mitigation measures are, however, considered sufficient to ensure that this potential impact would be avoided (for example, the culvert will be appropriately sized to accommodate the full range of flows likely to occur on this watercourse over the lifetime of the operational phase of the Proposed Project).

Water Quality

9.8.5 Chemical/fuel use during the operational phase has the potential to result in contamination of the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC. However, the embedded mitigation measures would ensure that this potential impact would be avoided.

Flooding and Drainage

9.8.6 The presence of permanent impermeable areas during the operational phase could lead to an increase in surface water runoff delivered to the surface watercourses located in the vicinity of the western tunnel head house and the Garth SEC. This could lead to an increase in flood risk.

9.8.7 The SuDS Strategy (Appendix 9B) confirms that the design of the western tunnel head house (i.e. as shown in Figure 2.5) is sufficient to ensure the sustainable

management of surface water runoff over the duration of its design lifetime. The design of the access road to this compound, however, requires additional mitigation.

9.8.8 The SuDS Strategy recommends that the ramped access road into the western compound should be surfaced with reinforced grass/permeable tarmac with a layer of MOT Type 1 and 2 crushed stone aggregate underneath. The void space contained within these crushed stone layers will serve to provide the necessary storage for the runoff that infiltrates through the permeable surface of the access road. This measure will be sufficient to ensure that the access road to the western compound will not cause an adverse effect on surface water drainage.

9.8.9 To ensure that the western headhouse compound remains operational during times of flooding, the compound will need to be raised by between ca. 1.11 to 1.31m above surrounding ground levels. This degree of ground level raising would take place in an area of undefended fluvial floodplain. Consequently, this will result in the displacement fluvial floodwater. The FCA (Appendix 9A) provides a detailed analysis of this floodplain displacement and concludes that the impact does not require mitigation in the form of compensatory floodplain storage. This has been confirmed by Natural Resources Wales (refer to Table 9.4 above).

9.8.10 There is the potential that groundwater will leak into the tunnel and the tunnel shafts during the operational phase, necessitating the requirement to remove (via pumping) ground water with subsequent transfer to a surface water course.

9.8.11 It is currently unknown whether the water to be discharged will be fresh or saline due to proximity to the Glaslyn Estuary. Groundwater monitoring undertaken to date does not indicate saline waters, however this cannot be ruled out at this stage. Chapter 2 (Project Description) outlines an appropriate disposal strategy for the pumped groundwater, given this uncertainty over its likely water quality.

9.8.12 The FCA contained within Appendix 9A considers the impacts of the likely quantity of water to be discharged. The FCA concludes that the assumed constant rates of pumping during the operational phase are very low. Given that constant pumping is, unlikely to be required (i.e. the pumped discharges could occur up to three times each day) it is probable that the peak rates of instantaneous pumping would be higher (although the exact peak rates are not known at the time of writing).

9.8.13 As such, the FCA recommends that the peak rates of instantaneous discharges into the receiving watercourse do not exceed 5l/s[9], which is often used as the minimum discharge rate for single points of discharge from new developments in order to prevent blockage of the discharge outfall point[10].

9.8.14 This additional mitigation measure will ensure that the need to pump and discharge groundwater from the western shaft over the operational phase of the Proposed Project will not lead to an increase in flood risk or morphological damage to the receiving watercourse.

Infrastructure Eastern Side of the Dwyryd Estuary

Surface and Groundwater Resources

9.8.15 The infrastructure on the eastern side of the Dwyryd Estuary is not anticipated to have any impact on surface or groundwater resources during the operational phase.

[9] Given the stipulated 'constant' rates of discharge, however, it is likely that the peak rates of instantaneous discharges will be considerably lower than 5l/s. In this instance, outfall rates of less than 5l/s would not be prone to blockage given that the discharges would be pumped.

[10] For example, see G2.21 in the Sustainable Drainage Systems Standards for Wales.

The impact of the operational phase of the Proposed Project on the peat deposits is discussed below under Flooding and Drainage.

Hydromorphology

9.8.16 The presence of permanent impermeable areas during the operational phase could lead to an increase in sediment load delivered to the surface watercourses located in the vicinity of the eastern tunnel head house and SEC. This could lead to increased sedimentation, reduced sunlight, and an increased risk of blockage of these watercourses. The embedded mitigation measures and the design of the eastern tunnel head house and SEC itself are, however, considered sufficient to ensure that this potential impact would be avoided.

Water Quality

9.8.17 Chemical/fuel use during the operational phase has the potential to result in contamination of the surface watercourses located in the vicinity of the eastern tunnel head house and SEC. However, the embedded mitigation measures would ensure that this potential impact would be avoided.

Flooding and Drainage

9.8.18 The presence of permanent impermeable areas during the operational phase could lead to an increase in surface water runoff delivered to the surface watercourses located in the vicinity of the eastern tunnel head house and SEC. This could lead to an increase in flood risk.

9.8.19 The SuDS Strategy (Appendix 9B) confirms that the design of the eastern tunnel head house and SEC (i.e. as shown in Figure 2.8) is sufficient to ensure the sustainable management of surface water runoff over the duration of its design lifetime. The design of the access road to this compound, however, requires additional mitigation.

9.8.20 The permanent access road to the SEC and eastern tunnel head house compound will be a ‘floating-road’ design in order to minimise the impact of its construction on the surrounding peat layers. This new access road will be flanked on either side by a linear French drain arrangement comprising crushed stone. The crushed stone within these linear French drains will provide the necessary attenuation storage to accommodate the runoff from the new road. Discharge from the French drains will be encouraged to enter the surrounding peat layers in order to help to ensure that the hydrological regime of these peat layers remains unchanged. The contractor will also ensure that appropriate pollution control measures are incorporated into the design of this new access road (such as light liquid bypass/oil separators in gully pots) in order to capture any hydrocarbon leaks from vehicles and/or dust/silt from the road surface before it can enter the French drain system. These interception systems will need to be appropriately maintained over the design lifetime of this new access road. These additional mitigation measures will be sufficient to ensure that the access road to the SEC and eastern tunnel head house compound will not cause an adverse effect on surface water drainage.

9.8.21 There is the potential that groundwater will leak into the tunnel and the tunnel shafts during the operational phase, necessitating the requirement to remove (via pumping) ground water with subsequent transfer to a surface water course.

9.8.22 It is currently unknown whether the water to be discharged will be fresh or saline due to proximity to the Dwyryd Estuary. Groundwater monitoring undertaken to date does not indicate saline waters, however this cannot be ruled out at this stage. Chapter 2 (Project Description) outlines an appropriate disposal strategy for the pumped groundwater, given this uncertainty over its likely water quality.

9.8.23 The FCA contained within Appendix 9A considers the impacts of the likely quantity of water to be discharged. The FCA concludes that the assumed constant rates of pumping during the operational phase are very low. Given that constant pumping is, unlikely to be required (i.e. the pumped discharges could occur up to three times each day) it is probable that the peak rates of instantaneous pumping would be higher (although the exact peak rates are not known at the time of writing).

9.8.24 As such, the FCA recommends that the peak rates of instantaneous discharges into the receiving watercourse do not exceed 5l/s[11], which is often used as the minimum discharge rate for single points of discharge from new developments in order to prevent blockage of the discharge outfall point[12].

9.8.25 This additional mitigation measure will ensure that the need to pump and discharge groundwater from the eastern shaft over the operational phase of the Proposed Project will not lead to an increase in flood risk or morphological damage to the receiving watercourse.

9.8.26 The eastern tunnel head house and tunnel shaft will be constructed in an area of existing peatland. As mentioned above, it is probable that ground water will need to be pumped from within the tunnel and shaft during the operational phase. Groundwater pumping can result in a 'draw-down' effect, which can in some instances reduce local groundwater levels.

9.8.27 Surveyed peat depths in the area around the eastern side infrastructure are, relatively shallow, typically up to 1m, with only limited areas shown to have surveyed depths of greater than this. Once constructed, the eastern tunnel shaft will be between 39.5m and 73.5m deep. At this depth, and given the anticipated volume and rate of pumping, it is unlikely that the transmissivity of the geology above the operational tunnel and shaft base elevation would be sufficient to allow a 'draw-down' effect that could impact the water content of the near-surface peat layers throughout the operational phase of the Proposed Project.

Removal of Existing Infrastructure (VIP subsection)

9.8.28 The removal of the existing infrastructure would result in a modest reduction in impermeable hardstanding area over the operational phase of the Proposed Project, through the removal of pylon foundations. This will result in a small reduction in surface water runoff generated from these areas of the Proposed Project, which will contribute to reducing overall flood risk over the operational phase.

9.9 Predicted Impacts during Decommissioning

9.9.1 The detailed methodology cannot be finalised until immediately prior to decommissioning, but would be in line with relevant policy at that time. However, it is likely that the embedded mitigation outlined for the construction phase would all be relevant and would be used to minimise any potential impacts.

9.10 Mitigation and Summary of Residual Effects

9.10.1 The implementation of the CEMP, the embedded mitigation measures, and the additional mitigation measures outlined above will be sufficient to ensure that the

[11] Given the stipulated 'constant' rates of discharge, however, it is likely that the peak rates of instantaneous discharges will be considerably lower than 5l/s. In this instance, outfall rates of less than 5l/s would not be prone to blockage given that the discharges would be pumped.

[12] For example, see G2.21 in the Sustainable Drainage Systems Standards for Wales.

Proposed Project will not have any adverse impacts on water resources during the construction, operational, and decommissioning phases.

9.11 Summary of Water Framework Directive Assessment

9.11.1 The WFD requires an appraisal of the River Basin Management Plan (RBMP) objectives showing with a high level of confidence that the activities related to the Proposed Project support the RBMP objectives. The two environmental objectives to consider are:

- Objective 1: To prevent deterioration of the existing or potential status of surface waters and groundwater; and
- Objective 2: To aim to achieve good status or potential for all water bodies and good surface water chemical status.

9.11.2 The WFD appraisal was indirectly covered within this Chapter. Table 9.11 summarises the WFD impacts of the Proposed Project, assuming the implementation of the CEMP, the embedded mitigation measures, and the additional mitigation measures outlined above.

Table 9.11: Summary of WFD Risk Assessment Related to Water Resources Receptors

WFD Receptors	WFD Status	Summary of Risk Assessment with Reference to Objective 1	Summary of Risk Assessment with Reference to Objective 2
Water quality of the Afon Dwyryd part of the Glyn (Dwyryd) WFD river waterbody catchment	Current Overall Status is Good Overall Status Objective is Good by 2015	With the mitigation measures in place to address any water quality deterioration due to potential chemical or fuel contamination or spillage of hazardous substances, the Proposed Project would not affect the Current Overall or Potential Status of the Afon Dwyryd.	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Afon Dwyryd to achieve an Overall Status Objective of Good.
Water quality of the Gaseg-upper WFD river water body catchment	Current Overall Status is Moderate Overall Potential is Good by 2021	With the mitigation measures in place to address any water quality deterioration due to potential chemical or fuel contamination or spillage of hazardous substances, the Proposed Project would not affect the Current Overall or Potential Status of the Gaseg.	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Gaseg to achieve an Overall Potential of Good by 2021.
Water quality of the Afon Glaslyn part of the Glaslyn – tidal to Afon Croesor WFD river water body catchment	Current Overall Status is Moderate Overall Potential is Moderate by 2021	With the mitigation measures in place to address any water quality deterioration due to potential chemical or fuel contamination or spillage of hazardous substances, the Proposed Project would not affect the Current Overall or Potential Status of the Afon Glaslyn.	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Afon Glaslyn to achieve an Overall Potential of Moderate by 2021.
Water quality of the Afon Glaslyn part of the Glaslyn WFD transitional and coastal water body catchment	Current Overall Status is Good Overall Status Objective is Good by 2015	With the mitigation measures in place to address any water quality deterioration due to potential chemical or fuel contamination or spillage of hazardous substances, the Proposed Project would not affect the Current Overall or Potential Status of the Afon Glaslyn (transitional and coastal water body).	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Afon Glaslyn (transitional and coastal water body) to achieve an Overall Status Objective of Good.
Water quality of the Llyn and Eryri WFD	Current Overall Status is Poor	With the mitigation measures in place to address any water quality deterioration due to potential chemical or fuel contamination or	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Llyn and

WFD Receptors	WFD Status	Summary of Risk Assessment with Reference to Objective 1	Summary of Risk Assessment with Reference to Objective 2
groundwater body catchment	Overall Status Objective is Poor by 2015 Current Chemical Status is Poor Chemical Status Objective is Poor by 2015	spillage of hazardous substances, the Proposed Project would not affect the Current Overall or Potential Status of the Llyn and Eryi groundwater body catchment.	Eryri WFD groundwater body to achieve an Overall Status Objective of Good.
Physical habitat of the Afon Dwyryd part of the Glyn (Dwyryd) WFD river water body catchment	Current Overall Status is Good Overall Status Objective is Good by 2015 Morphology Status is Good Morphology Status Objective is not available	With the mitigation measures in place to address any hydromorphological impacts, the Proposed Project would not affect the Current Overall or Potential Status of the Afon Dwyryd.	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Afon Dwyryd to achieve an Overall Status Objective of Good.
Physical habitat of the Gaseg - upper WFD river water body catchment	Current Overall Status is Moderate Overall Potential is Good by 2021 Morphology Status and Morphology Potential are not available	With the mitigation measures in place to address any hydromorphological impacts, the Proposed Project would not affect the Current Overall or Potential Status of the Gaseg.	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Gaseg to achieve an Overall Potential of Good by 2021.

WFD Receptors	WFD Status	Summary of Risk Assessment with Reference to Objective 1	Summary of Risk Assessment with Reference to Objective 2
	Classed as Heavily Modified Water Body (HMWB)		
Physical habitat of the Afon Glaslyn part of the Glaslyn – tidal to Afon Croesor WFD river water body catchment	Current Overall Status is Moderate Overall Potential is Moderate by 2021 Morphology Status and Morphology Potential are not available Classed as Heavily Modified Water Body (HMWB)	With the mitigation measures in place to address any hydromorphological impacts, the Proposed Project would not affect the Current Overall or Potential Status of the Afon Glaslyn.	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Afon Glaslyn to achieve an Overall Potential of Moderate by 2021.
Physical habitat of the Afon Glaslyn part of Glaslyn WFD transitional and coastal water body catchment	Current Overall Status is Good Overall Status Objective is Good by 2015 Morphology Status and Morphology Status Objective are not available	With the mitigation measures in place to address any hydromorphological impacts, the Proposed Project would not affect the Current Overall or Potential Status of the Afon Glaslyn (transitional and coastal water body).	Provided the mitigation measures are in place, the Proposed Project would not compromise the ability of the Afon Glaslyn (transitional and coastal water body) to achieve an Overall Status Objective of Good.