ARUP

Natural Resources Wales

Rhymney Great Wharf Habitat Restoration Polders Enhancement Project

Preliminary Water Environmental Regulations Compliance Assessment

Reference: 290063-ARP-00-RP-RP-NX-0003

P03 | 21 December 2023

Job number 290063-00

Ove Arup & Partners Limited
4 Pierhead Street
Capital Waterside
Cardiff
CF10 4QP
United Kingdom
arup.com

ARUP

Document Verification

Project title	Rhymney Great Wharf Habitat Restoration Polders Enhancement Project
Document title	Preliminary Water Environmental Regulations Compliance Assessment
Job number	290063-00
Document ref	290063-ARP-00-RP-RP-NX-0003
File reference	4-40

Revision	Date				
P01	27 Oct 2023	**Filename**	Rhymney WER Assessment		
		Description	Preliminary Water Environment Regulations Compliance Assessment		
			Prepared by	**Checked by**	**Approved by**
		Name	V. Smith	R. Thomas	R. Campbell
		Signature			
P02	8 Dec 2023	**Filename**	Rhymney WER Assessment		
		Description	Preliminary Water Environment Regulations Compliance Assessment – comments from NRW addressed		
			Prepared by	**Checked by**	**Approved by**
		Name	V. Smith	R. Thomas G.Mcilquham	R. Campbell
		Signature			
P03	21 Dec 2023	**Filename**	Rhymney WER Assessment		
		Description	Preliminary Water Environment Regulations Compliance Assessment – Issue		
			Prepared by	**Checked by**	**Approved by**
		Name	V. Smith	R. Thomas G.Mcilquham	R. Campbell
		Signature			

Issue Document Verification with Document ☑

Contents

Tables

Figures

Drawings

No table of figures entries found.

Pictures

No table of figures entries found.

Photographs

No table of figures entries found.

Attachments

No table of figures entries found.

Appendices

Executive Summary

The Rhymney Great Wharf Habitat Restoration Polders Enhancement Project seeks to restore and enhance priority saltmarsh habitats along the Rhymney Great Wharf by repairing some of the existing polders and extending the polder system to the west. Arup has been commissioned by Natural Resources Wales to produce a Preliminary Water Environment Regulations (WER) (also referred to as Water Framework Directive, WFD) Compliance Assessment to support the outline design of the Project.

Rhymney Great Wharf is located approximately 5km to the north-east of Cardiff City Centre on the Severn Estuary foreshore, seaward of the Wentlooge Sea Defences (approximate grid reference ST 23126 77613 to ST 24992 78619).

Relevant WFD water bodies to the Project are the Severn Lower Transitional Water Body (GB530905415401), and the Rhosog Fach Reen – source to Severn Estuary (River) (GB109056026770). Owing to the potential to be directly or indirectly impacted by the scheme components, only the Severn Lower Transitional Water Body was screened in for further assessment. The Severn Lower is designated as heavily modified due to the presence of flood protection. As of WFD Cycle 3 (2021), the water body had an overall status of Moderate, an ecological status of Moderate, and a chemical status of Moderate.

Overall, the WER Scoping Assessment identified potential risks to the following receptors for the Severn Lower: biology (higher and lower sensitivity habitats), hydromorphology, fish, water quality, protected areas, and INNS. A detailed assessment for each of the risks was conducted.

For lower sensitivity habitats it is reasonable to conclude that no adverse impacts are predicted, but that enhancement of the higher sensitivity saltmarsh habitat is likely.

With regards to hydromorphology, the proposed works should not significantly alter the hydromorphology of the Severn Lower at the water body scale.

With regards to fish, risk is considered to be negligible given existing mitigation in the design and construction of the Project. There would be no measurable change to status for the Severn Lower water body and would not prevent future objectives.

With regards to water quality and INNS, there should be negligible effect with no measurable change to WFD status at the water body scale.

For protected sites, it is reasonable to conclude that no adverse impacts are predicted on the protected habitats because of pollution incidents or disturbance during construction. Likely, beneficial impacts are predicted as a result to changes in coastal processes for the protected areas.

This WER Assessment comprises a ‘living document’. A design layout and a construction phase method statement for the Project have been developed. Further refinement of the design and construction methodology are ongoing as part of the consenting of the Project. The assessment should be reviewed if significant changes are made to the layout of the polders or the construction methodology.

1. Introduction

1.1 Project background

This report comprises a Water Environment Regulations (WER) Compliance Assessment prepared by Ove Arup and Partners Ltd. (Arup) on behalf of Natural Resources Wales (NRW) to support the Rhymney Great Wharf Polders Enhancement for Saltmarsh Restoration (herein referred to as 'the Project').

1.2 Purpose of this report

This assessment identifies potential effects of a long list of options, identified at the Initial Assessment stage of the Project, on the current status and future status objectives of water bodies present at the site with reference to the Water Framework Directive (WFD). The key objectives of the assessment are to:

- identify the relevant WFD water bodies that may be affected by the Project and collate the available baseline information;
- identify options with the potential to affect the water bodies at the site;
- undertake a preliminary scoping assessment to identify the baseline condition at the site and the likely impacts of the shortlisted options on the current status and status objectives of the relevant waterbodies (including identification of any additional mitigation requirements);
- identify any risks of non-compliance with water body objectives and associated requirements for further detailed impact assessment and/or mitigation design; and
- identify potential enhancement opportunities to support the delivery of water body objectives.

The report summarises the Project and long list of options and the assessment methodology and results. The assessment has been undertaken in accordance with relevant guidance (see Appendix A) and has involved a desk-based study using readily available baseline information and existing available site information.

The WER assessment comprises a 'living document' and will be reviewed and updated as necessary in liaison with NRW to support future business case stages and the final construction consents and approvals process.

1.3 Other supporting environmental reports

At the time of issue, no other relevant environmental baseline and impact assessment reports have yet been produced to support the Project. This report should be updated to reflect relevant findings from other supporting environmental reports (e.g., ecological assessments) as they become available.

1.4 Assumptions and limitations

The WFD water body classification data in this assessment has been taken from NRW's Water Watch Wales website for WFD Cycle 3 (2021). These classifications are considered to provide the current best estimate of status and are the formal baseline against which the NRW will assess compliance with the 'no deterioration' objective.

The assessment in this document is based on the design information currently available for the Project. As such, the mitigation identified in this assessment as being required to mitigate the likely significant effects reported are based on this worst-case scenario where no or limited design information exists. It may be the case that as detailed design of the Project evolves, it becomes

apparent that a lesser form of mitigation is required to achieve the same outcome. This will be detailed in future iterations of this assessment.

This document is living and should be updated as further design detail, including mitigation, becomes available and will be considered in future iterations of the document.

2. Legislative context

The Water Environment (Water Framework Directive) (England and Wales) Regulations (WER) (amended 2017) is currently the largest and most influential piece of UK legislation for the water environment and transposes the European Commission Water Framework Directive (WFD) into English and Welsh law. Natural Resources Wales is the competent authority responsible for delivering the requirements of the WFD (as transposed) in Wales. Although the UK legislation is now referred to as the 'WER' the common usage term remains as WFD; this is the preferred term of reference for legislation and associated data in this report.

Under the WFD, water bodies are the basic management units. These water bodies form part of a larger River Basin District (RBD), for which River Basin Management Plans (RBMPs) are developed and environmental objectives are set. These RBMPs are produced every six years, in accordance with the river basin management planning cycle.

The WFD requires classification of the current condition of water bodies. This is referred to as their 'status' or, for artificial or Heavily Modified Water Bodies (HMWBs), their 'potential'. The WFD also requires the setting of a series of objectives for maintaining or improving conditions so that water bodies reach and/or maintain at least 'Good' overall status or potential in the future. These overall Environmental Objectives are to:

- prevent the deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters.
- aim to achieve at least 'Good' status or potential for all water bodies by 2015. Where this has not been possible and is subject to the criteria set out in the Directive, aim to achieve Good by 2021 or 2027.
- meet the requirements of WFD Protected Areas.
- promote sustainable use of water as a natural resource.
- conserve habitats and species that depend directly on water.
- progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment.
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.
- contribute to mitigating the effects of floods and droughts.

All new (and on-going) activities in the water environment need to be guided by the requirements of the WFD. This includes ensuring that no changes occur that cause a deterioration of current status of a water body or prevent the achievement of the future status objectives of a water body.

Further details regarding the water body status classification process, the requirements of WER Compliance Assessments, and relevant guidance is provided in Appendix A and B of this report.

3. Assessment methodology

3.1 Scope of assessment

WER Compliance Assessments typically comprise a stepped process undertaken in parallel with the design development for a project. This includes the following key steps:

- Screening assessment;
- Scoping assessment;
- Detailed impact assessment (where required); and
- Application of Article 4.7 / Regulation 19 (where applicable).

Further guidance on the WFD assessment for estuarine and coastal waters is provided by the Environment Agency[1].

This report comprises the screening and scoping assessment stages to support the Marine Licence application for the Project. The assessment is based on a desk-based study using readily available desk-based information.

The spatial scope of the assessment includes all water bodies potentially affected by the proposed works. The assessment considers the potential impacts of the proposed works on the relevant quality elements associated with the water bodies affected, at the water body scale.

The assessment focuses on the permanent impacts of the proposed works. Temporary impacts, typically resulting from construction activities, are not considered to result in a deterioration in WFD status if the water body:

- is only impacted for a short time period;
- is likely to recover within a short time period;
- is likely to recover without the need for any restoration measures.

3.2 Data sources

The following datasets and resources are readily available online and have been collated to support this assessment:

- Cycle 3 Severn River Basin Management Plan[2];
- Welsh part of the Severn Cycle 3 RBMP 2021 water body status classification and status objectives data[3];
- WFD Protected Area data[3];

[1] Environment Agency, 2023. Water Framework Directive assessment: estuarine and coastal waters. Available at: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters [Accessed 6th October 2023]

[2] Natural Resources Wales, 2022. 'Welsh part of the Severn River Basin Management Plan (2021-2027)'. Available at: https://cdn.cyfoethnaturiol.cymru/media/695597/severn-rbmp-2021_2027-summary.pdf [Accessed 6th October 2023]

[3] Natural Resources Wales, 2023. 'Water Watch Wales'. Available at: https://waterwatchwales.naturalresourceswales.gov.uk/en/ [Accessed 6th October 2023]

- The British Geological Society Interactive Map (see);[4] and
- Designated Site and WFD Habitat Sensitivity information[5].

[4] British Geological Society, 2023. Geology of Britain Viewer. Available at: https://mapapps.bgs.ac.uk/geologyofbritain/home.html [Accessed 6th October 2023].

[5] Defra, 2023. Multi-Agency Geographic Information for the Countryside (MAGIC) Maps. Available at: https://magic.defra.gov.uk/MagicMap.aspx [Accessed 6th October 2023]

4. Project Study Site

4.1 Project site location

Rhymney Great Wharf is located approximately 5km to the north-east of Cardiff City Centre on the Severn Estuary foreshore, seaward of the Wentlooge Sea Defences (approximate grid reference ST 23126 77613 to ST 24992 78619). The area is to the east of the mouth of the River Rhymney.

The upper vegetated saltmarsh is referred to as the 'wharf' and the lower unvegetated foreshore as the 'mudflats'. The Wentlooge Sea Defences protect an area of low-lying land, of which approximately 32km^2 lies below Mean High Water Springs (MHWS)[6]. The wharf contributes to the flood defence by reducing the incident wave energy on the embankment. Currently there are five existing polders along Rhymney Great Wharf (Polders 1-4 constructed in 2005 and Polder 5 constructed in 1988), which have received little or no maintenance since construction.

4.2 Site description

4.2.1 Geology

The geology of the Project site comprises tidal flat deposits – clay, silt and sand[7].

4.2.2 Topography

Levels in the intertidal area range from circa +7m Above Ordnance Datum (AOD) in the upper vegetated saltmarsh wharf to circa 3m AOD at the existing polders.

4.2.3 Land use

The land use of the Project site is entirely coastal estuarine, with a mix of grassland, built-up areas, and arable and horticultural land to the north[8].

4.2.4 Ecology and biodiversity

Rhymney Great Wharf was surveyed for detailed habitat types by NRW on 25th May 2017[6], the results of which are summarised below.

The saltmarsh of this sector has a simple marsh structure that largely consists of an upper marsh zone and a lower marsh zone, with the two often separated by a small mud cliff up to 1.2 m high, or by rock armour. Middle marsh communities are infrequent and confined to the eastern extreme, where the marsh is at its widest. Most of the upper marsh is referable to SM16 *Festuca rubra* saltmarsh NVC type, with SM16c (*Festuca rubra – Glaux maritima* sub-community) the most frequent sub-community encountered. The seaward edge of the upper marsh is slightly raised in comparison to the landward marsh behind and here, stands of SM24 (*Elymus pycnanthus* saltmarsh) dominated by *Elytrigia atherica* have developed. At the landward boundary, along the seawall, the saltmarsh is surprisingly more transitional between *Festuca rubra* dominated vegetation and *Puccinellia maritima* dominated vegetation and is referable to SM16a (*Puccinellia maritima* sub-community). It appears to lie lower than the adjacent stands of SM16c, but it also shows signs of

[6] Arup, 2023. NRW Rhymney Great Wharf Polders – EIA Screening Opinion Request. 290063-ARP-00-RP-RP-NX-0001

[7] Defra, 2023. Geology Viewer. Available at: https://geologyviewer.bgs.ac.uk/ [Accessed 6th October 2023]

[8] National River Flow Archive, 2023. 57008 – Rhymney at Llanedeyrn. Available at: https://nrfa.ceh.ac.uk/data/station/info/57008 [Accessed 6th October 2023]

previous poaching, so occurrence may be the result of historic grazing, topography, or a combination of these two factors.

The lower marsh is dominated by SM6 (*Spartina anglica* saltmarsh) NVC type. The vegetation is generally species-poor and dominated by *Spartina anglica*, which occurs along with frequent bare mud and a scatter of associates such as *Aster tripolium* and *Cochlearia anglica*. At the western extreme the SM6 is fragmented; moving east stands become much more consolidated and large patches of bare mud are less frequent. Within the eastern most polder the SM6 marsh is more or less continuous.

The intertidal part of the Severn Estuary supports extensive mudflats and sandflats, covering an area of approximately 20,300 hectares (ha) - the fourth largest area in a UK estuary and representing approximately 7% of the total UK resource of this habitat type[9].

The Severn Estuary is of particular importance for migratory fish, particularly for three rare species - river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*) and twaite shad (*Alosa fallax*), which are designated features of the SAC. The estuary habitats, tidal stretches of the feeding rivers and saltmarsh morphological features, such as drainage and marsh channels, provide important feeding, breeding and sheltered nursery areas for a wide range of fish[9].

The Estuary forms part of the complex chain of estuary sites along the western coast of the UK that provide habitats for migratory waterfowl. Bird species designated as qualifying features of the SPA include Bewick's Swan, Common Shelduck, Gadwall, Dunlin, Common Redshank, and Greater White-fronted Goose. The Severn Estuary ranks amongst the top ten British estuaries for the size of visiting waterfowl populations that it supports over winter[9].

Areas of disturbed ground (typically tracks or paths) occur at both the western and eastern extremes, have created a niche for *Puccinellia rupestris* and *Hordeum marinum*. Small saltpans with affinities to SM23 (*Spergularia marina – Puccinellia distans* saltmarsh) were also recorded. Stands of open water and bare ground occur along the narrow western arm behind the rock armour and may indicate further erosion of saltmarsh is occurring. There is some evidence of freshwater influx with very occasional stands of S4 (*Phragmites australis* swamp and reedbed) and the presence of standing brackish water evidenced by the occurrence of small stands of S21 (*Scirpus maritimus* swamp). At the western end several of the creeks and areas behind the rock armour sea defence have been in-filled with block stone, presumably to prevent further erosion of the saltmarsh.

4.2.5 Designated sites.

Internationally Designated Sites

The proposed Project site is located within the Severn Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site (collectively known as Severn Estuary European Marine Site).

The Severn Estuary SAC is designated for the following Annex I habitats : estuaries, mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), sandbanks which are slightly covered by seawater all the time, and reefs. It is also designated for the following Annex II species: sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*) and twaite shad (*Alosa fallax*). Whilst the primary focus of this Project is to restore the saltmarsh (Atlantic salt meadows) SAC feature, the Project is also likely to support the

[9] ABPmer, 2021. Rumney Great Wharf Saltmarsh Restoration / Enhancement Feasibility and Preferred Option Studies. Available at: https://cdn.cyfoethnaturiol.cymru/media/694269/rgw-polders-final-report-accessible-version.docx

intertidal sand and mud feature by retaining sediment and also retaining or restoring transition zones between the two habitats.

The Severn Estuary SPA supports passage ringed plover (*Charadrius hiaticula*) and overwintering Bewick's swan (*Cygnus columbianus bewickii*); curlew (*Numenius arquata*), dunlin (*Calidris alpina*), pintail (*Anas acuta*), redshank (*Tringa tetanus*), and shelduck (*Tadorna tadorna*).

Severn Estuary SPA qualifying interest features:

- internationally important populations of regularly occurring Annex 1 species - Bewick's swan.
- internationally important populations of regularly occurring migratory bird species - European white-fronted goose, dunlin, redshank, shelduck, gadwall.
- internationally important assemblage of waterfowl - Bewick's swan, European white-fronted goose, dunlin, redshank, shelduck, gadwall, wigeon, teal, pintail, pochard, tufted duck, ringed plover, grey plover, curlew, whimbrel, spotted redshank, lapwing, mallard, and shoveler.

Severn Estuary Ramsar site qualifying features:

- estuaries.
- migratory fish species.
- internationally important populations of waterfowl - Bewick's Swan, European white-fronted goose, dunlin, redshank, shelduck, gadwall.
- internationally important assemblage of waterfowl (wintering - w, passage - p)-Bewick's swan (w), European white-fronted goose (w), shelduck (w), dunlin (w, p), redshank (w, p), gadwall (w), ringed plover (w, p), whimbrel (p), teal (w), pintail (w), wigeon (w), pochard (w), tufted duck (w), grey plover (w), curlew (w), spotted redshank (w).

Nationally Designated Sites

The proposed Project site is located adjacent to the Gwent Levels – Rhymney and Peterstone Site of Special Scientific Interest (SSSI) and within the Severn Estuary SSSI.

The Severn Estuary SSSI is of international importance for wintering and passage wading birds[10]. It holds most of the estuary's internationally important curlew and redshank populations, and most of its nationally important ringed plover (*Charadrius hiaticula*) and grey plover (*Pluvialis squatarola*) populations. It is of internationally importance for dunlin (supporting c. 7.5% of the British wintering population). In addition to internationally important populations of waterfowl; invertebrate populations of considerable interest; and large populations of migratory fish, including the nationally rare and endangered Allis Shad (*Alosa alosa*). The SSSI forms a major part of a larger area of estuarine habitat, which includes the Upper Severn Estuary, the Taf/Ely Estuary and Bridgwater Bay.

The Gwent Levels – Rhymney and Peterstone SSSI is one of a series of SSSIs within the area between Chepstow and Cardiff known as the Gwent Levels. The Severn Estuary SSSI is contiguous with the southern boundary of this area. The Gwent Levels constitute the lowlands between Cardiff and Chepstow and are drained by an ordered network of drainage ditches. The Rhymney and Peterstone area supports a number of important plant species including the nationally rare brackish water-crowfoot *Ranunculus baudotii* and several regional rarities including the pondweeds *Potamogeton obtusifolius* and *Potamogeton berchtoldii.*

[10] Countryside Council for Wales, no date. Site of Special Scientific Interest Citation: Severn Estuary. Available at: https://naturalresources.wales/media/643756/SSSI_0461_Citation_EN001f09c.pdf [Accessed 23rd November 2023]

Non-statutory designated sites

Two Sites of Importance for Nature Conservation (SINCs) are located within 1km of the Project site[11], namely the Rumney Great Wharf SINC (within the Project site) and the Lamby Saltmarsh SINC (located 700m west of the Project site).

Rumney Great Wharf SINC is an important site for birds, with species such as short-eared owl (*Asio flammeus*), great egret (*Ardea alba*), garganey (Anas *querquedula*), spotted redshank (*Tringa erythropus*), water pipit (*Anthus spinoletta*), and northern wheatear (*Oenanthe oenanthe*).

The Lamby Saltmarsh SINC comprises the remnant edges of the originally large Lamby Saltings that were reclaimed by land fill. The site is important for rare saltmarsh and coastal plants such as annual sea-blite (*Suaeda maritima*) and glasswort (*Salicornia europaea*) and as a rest place and breeding site for birds frequenting the Rhymney Estuary for feeding.

4.2.6 Water bodies

The Project site is located adjacent to several water bodies[12]:

- Tabbs Gout – running parallel to the coast adjacent to the site, landward of the flood embankment;
- River Rhymney – approximately 600m south-west of the site; and
- Tarwick Reen – approximately 600m north north-east of the site.

The associated WFD river water body for Tabbs Gout (identified via NRW Water Watch Wales) is Rhosog Fach Reen - source to Seven Estuary (GB109056026770). It is classified under the WFD (Cycle 3, 2021) as overall Moderate quality.

The proposed project falls within the Severn Lower Transitional Water body (GB530905415401). This is classified under the WFD (Cycle 3, 2021) as overall Moderate quality and designated as Heavily Modified.

Further details on the WFD status of the water body within the site extent are provided in Section 6.

4.2.7 WFD habitat classification

Higher sensitivity habitats

The proposed Project site is located within a WFD higher sensitivity habitat comprising saltmarsh (Figure 4-1)[5].

[11] Arup, 2023. Rhymney Great Wharf Polders Preliminary Ecological Appraisal. Reference: 290063-ARP-00-RP-RP-NX-0006

[12] NRW, 2023. Flood Map for Planning. Available at: https://flood-map-for-planning.naturalresources.wales/ https://geologyviewer.bgs.ac.uk/ [Accessed 6th October 2023]

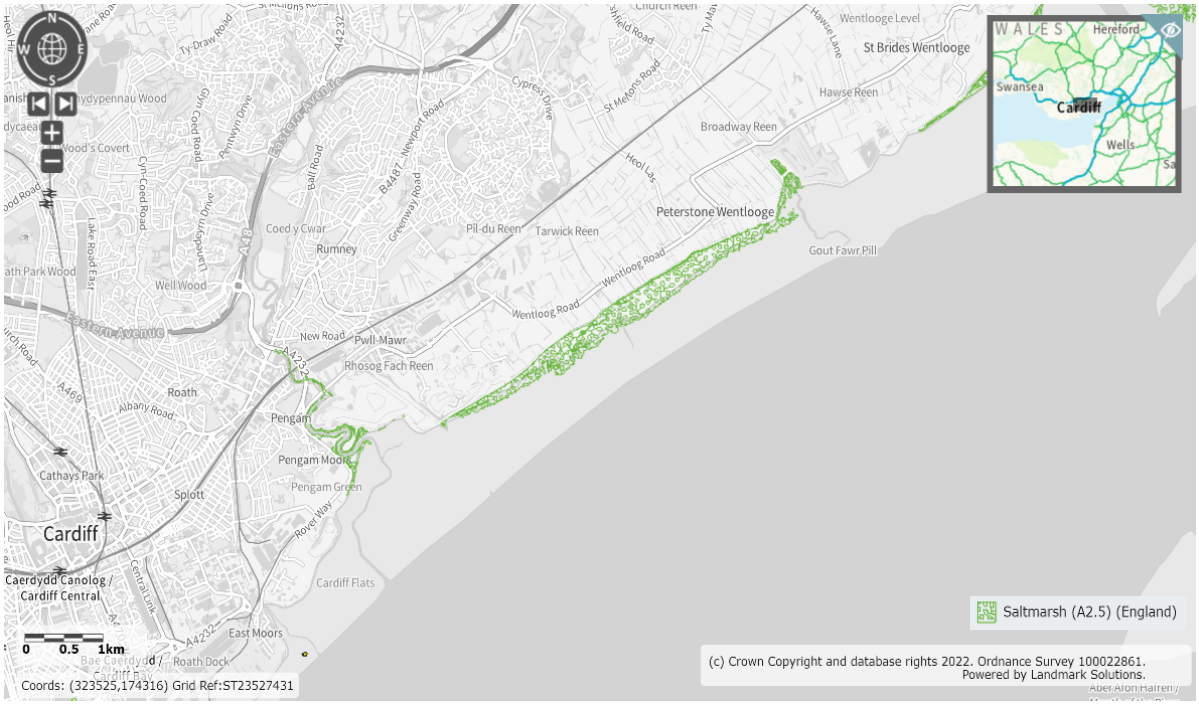

Figure 4-1: WFD higher sensitivity habitats

Lower sensitivity habitats

Three WFD lower sensitivity habitats are located either within and/or adjacent to the proposed Project site. Lower sensitivity habitats include (Figure 4-2)[5]:

- gravel and cobbles do not directly intersect the site but are present ~400m from the western boundary of the site;
- intertidal soft sediment (sandflats and mudflats) within and adjacent to the western and southern boundaries of the site;
- rocky shore (intertidal rock) within the site.

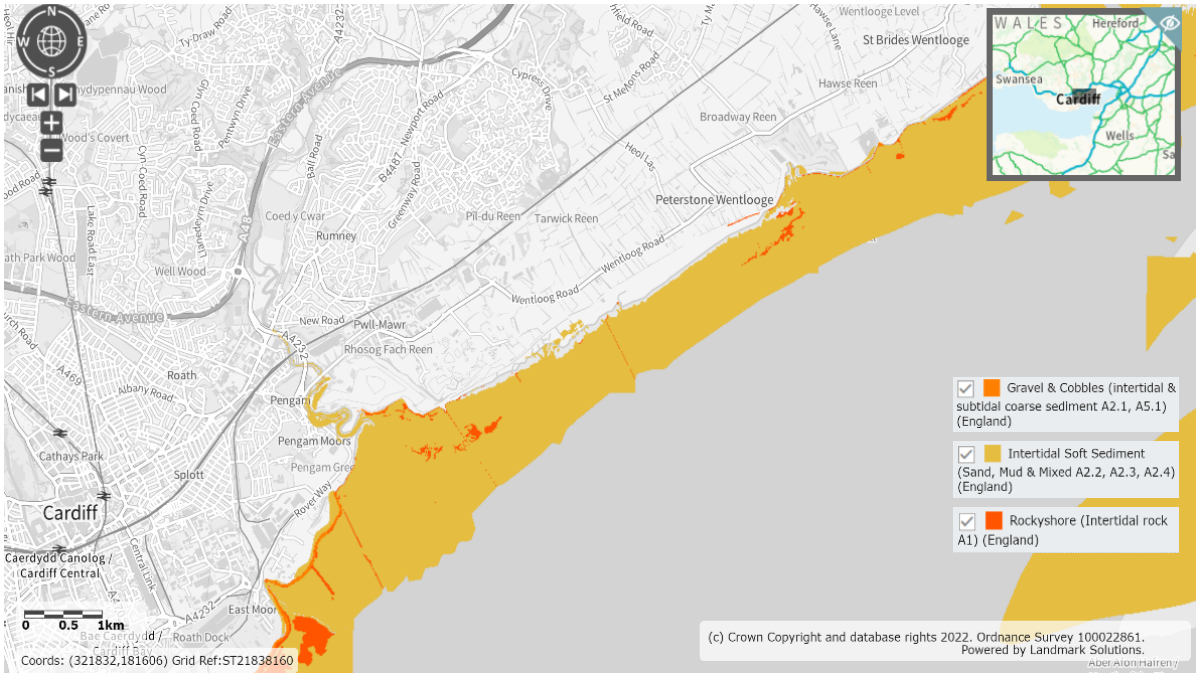

Figure 4-2: WFD lower sensitivity habitats

5. Proposed works

5.1 Project description

This Project seeks to restore and enhance priority saltmarsh habitats along the Rhymney Great Wharf by repairing some of the existing polders and extending the polder system to the west. Polders are fences constructed of brushwood materials (e.g., willow branches) inserted between chestnut fence posts in a rectangular pattern across the mudflat at an appropriate height to facilitate accretion of sediment (c.3m below Mean High Water Springs – MHWS). Tidal currents are slowed by the fences, and wave energy is reduced, so that sediment can more easily settle out of the water column and encourage accretion that supports saltmarsh regeneration. This will provide a multitude of outcomes and benefits, including for biodiversity, flood protection and carbon sequestration.

Rhymney Great Wharf Habitat Restoration Polders Enhancement Project aims to re-establish historic saltmarsh extents along the foreshore of the Severn Estuary (approximate grid reference ST 23126 77613 to ST 24992 78619) (Figure 5-1). The footprint of the polder structures and the proposed construction compound is approximately 0.74 ha.

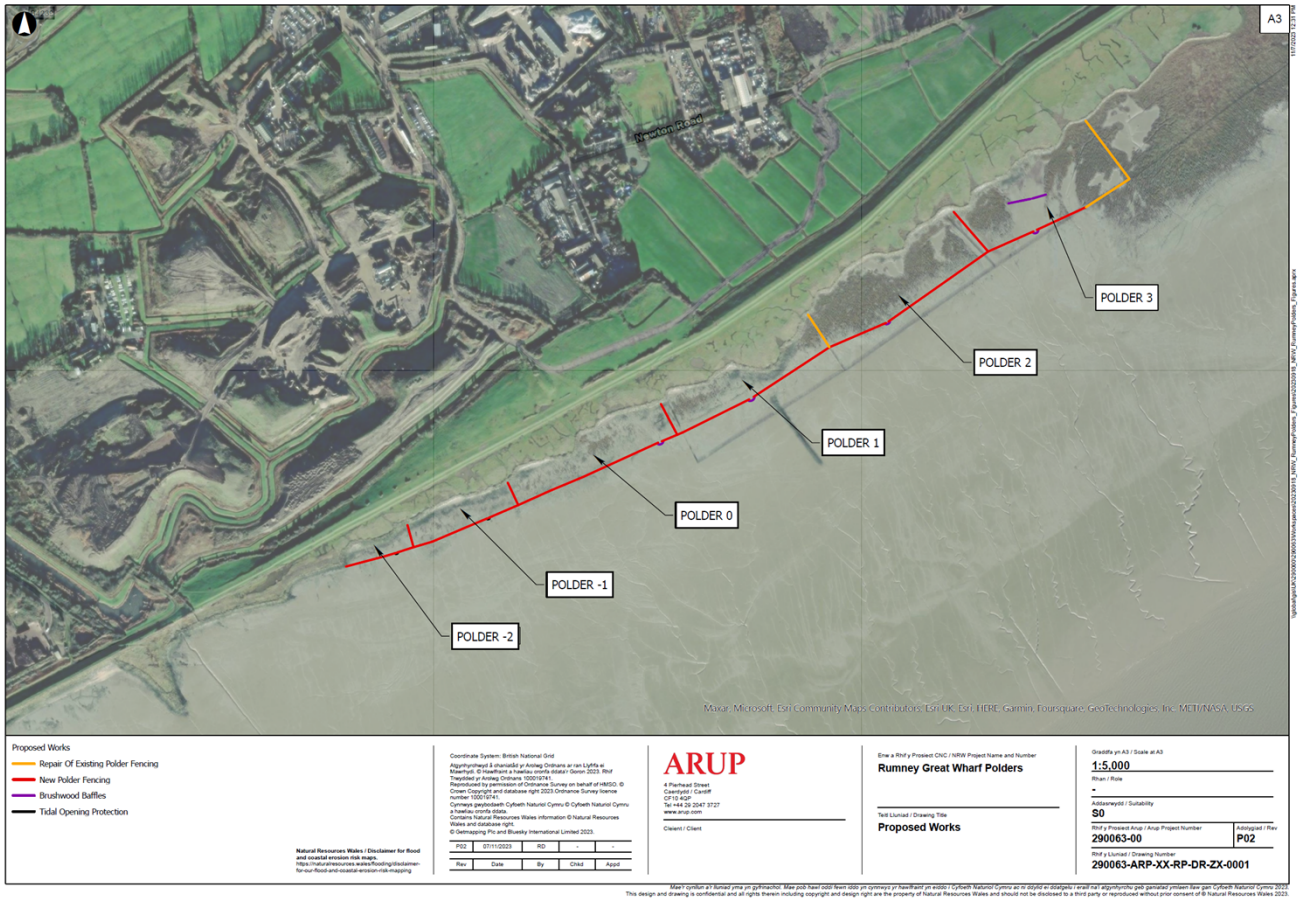

Figure 5-1: Proposed works

The polders that were constructed approximately 20 years ago have been successful in reducing hydrodynamic energy, allowing sediment to settle and expansion of saltmarsh and other intertidal habitat in the more easterly polders. By repairing and extending the polders along this frontage, the aim is to promote sediment deposition in the first instance, to reduce or ideally reverse the erosive trends currently being experienced. This should have benefits for the mudflat feature initially, and then saltmarsh may develop in areas where the conditions allow. It has been estimated that over

time there is potential for up to a maximum of 5.4 ha of saltmarsh gain. This would assume that all of the area within the polders that isn't already vegetated becomes vegetated with saltmarsh.

Successful delivery will promote the expansion of saltmarsh and other intertidal habitat within the SAC – Atlantic salt meadows is a designated feature of the SAC - and SSSI, functional supporting habitat of the Special Protection Area (SPA) and Ramsar site, a Priority Habitat of Principle Importance in Wales, a critical nursery and spawning habitat for fish, a highly efficient carbon sink, and will support coastal resilience by reducing erosional forces and encouraging further accretion.

An additional benefit of the Project is to support flood risk management. There is already a significant embankment in this location, and works have been undertaken previously to place rock armour at the edge of the saltmarsh and within creeks to protect the remaining saltmarsh that is present. There is significant flood risk behind the structure and the long-term Shoreline Management Plan (SMP) policy is Hold the Line. The Project should help to delay more significant investment/works to the more formal/traditional flood risk infrastructure, which would likely involve raising the embankment, and protection works to the toe of the structure due to mudflat/saltmarsh erosion etc. These alternatives may be needed eventually, but there is an opportunity to at least delay a project of that nature, and potentially avoid it.

5.2 Construction activities

Construction activity details are at outline stage. It is anticipated that the Project will require the following construction methodology:

- The scheme will be constructed using specialist plant operating on the foreshore. This will be a combination of tracked and amphibious plant, selected to suit the soft underlying ground. Specialist plant means that damage to intertidal habitat will be minimal, and recovery is anticipated within a short time frame.
- Plant will access the site area using the existing access routes from Wentloog Avenue, subject to agreement with third party landowners. Minor works may be required to widen accesses through fences or to create passing places.
- A new temporary access ramp onto the foreshore will be required, crossing the existing revetment. This will be constructed from stone and would be removed following construction to allow for habitat recovery.
- The Project will require temporary access onto the foreshore for the installation of wooden stakes to form the polders, utilising specialist tracked vehicles. Where possible, polder openings will align with existing naturally occurring channels to minimise disturbance to the sediment and work with natural processes.
- Construction is planned to take place over the summer of 2024, to avoid the wintering bird season. A temporary storage compound location remains to be confirmed, but any temporary construction infrastructure will be located within areas of lower ecological sensitivity – informed by knowledge of existing habitats and agreed with NRW before construction starts, including any discussions around mitigation to reduce temporary impacts such as bog mats.

5.3 Construction phase mitigation

For construction, general principles of construction best practice and risk mitigation should be followed.

An Environmental Action Plan (EAP) should be prepared in advance of construction. This should outline environmental risks and constraints identified within the site and define best practice and mitigation measures required for inclusion within the construction method statements, to ensure compliance with relevant environmental legislation, consents, and approvals.

The EAP should include measures to avoid and minimise impacts to the water environment during construction, in alignment with NRW best practice guidance. For the basis of this assessment, it is assumed that environmental good practice advice set out in the Pollution Prevention Guidance (PPG[13]) and replacement Guidance for Pollution Prevention (GPP[14]) series will be implemented on site during the construction phase. Whilst PPGs and GPPs do not provide regulatory, they form environmental good practice guidance for the whole UK. Key aspects that should be considered are summarised in the following sections.

5.3.1 Pollution control

It is assumed that best practice will be adopted in line with GPP 5 to minimise the risk of pollution to the estuary during construction activities.

A pollution risk assessment should be carried out for the proposed site ahead of construction, considering both the storage and transportation of materials used. This would identify potentially hazardous materials or activities and assess the probability and magnitude of potentially harmful effects. From this, a pollution incident response plan (see GPP 21[15]) would be compiled to identify the specific measures needed to reduce the likelihood of a spillage happening, and to minimise the impact of any spills that may occur.

5.3.2 Minimising disturbance

Appropriate measures should be included within the work method statements to reduce potential environmental impacts of any in-channel construction activities. This includes measures to:

- Minimise the footprint of any in channel works as far as reasonable possible to reduce the degree of physical disturbance of the existing estuarine and coastal environment;
- Reinstate any impacted benthic or marginal habitats where necessary;
- Reduce associated noise, vibration, and any artificial lighting impacts where possible; and
- Control the timing of works so they are programmed to take place outside of sensitive times of year for protected species, such as wintering birds.

5.3.3 Biosecurity

Good biosecurity practices are vital for preventing the spread of invasive non-native species (INNS) and pathogens such as waterborne fish diseases. Measures should be adopted to minimise the risk of construction activities leading to the spread of invasive non-native species or pathogens.

Measures should be adopted to minimise the risk of construction activities leading to the spread of these invasive non-native species. A Biodiversity Risk Assessment (EIA regs) and any necessary provisions relating to Invasive Alien Species Order 2019 (seek advice of NRW Enforcement and Permitting team) should be prepared to support construction works.

To avoid the spread of these invasive species the following measures should be adhered to, and detailed within the EAP, during construction:

---

[13] GOV.UK. Pollution prevention guidance (withdrawn). Available at: https://www.gov.uk/government/collections/pollution-prevention-guidance-ppg [Accessed 6th October 2023].

[14] NetRegs, 2023. Guidance for Pollution Prevention (GPP) documents. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/ [Accessed 6th October 2023]

[15] NetRegs, 2021. GPP 21: Pollution incident response planning. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-21-pollution-incident-response-planning/ [Accessed 6th October 2023]

- contractor’s Ecologist to undertake toolbox talks for any INNS prior to works starting. Toolbox talks are to be signed by contractor on site;
- ensure all site teams are briefed on INNS prevention procedures and made aware of areas on site where INNS are known to be present; and
- avoid working in areas where INNS are present. Where this is not possible, appropriate biosecurity measures are to be adopted.

This section should be updated to reflect site-specific and construction-activity-specific details and any additional mitigation measures that are specified during the detailed design phase.

6. Baseline (screening) assessment

6.1 Overview

A baseline assessment has been undertaken to identify the relevant WFD water bodies affected by the proposed works and to collate latest available WFD baseline data, in order to inform a scoping assessment of the likely effects of the proposed works on WFD status and objectives.

6.2 Relevant WFD water bodies

Relevant water bodies to the Project are presented in Table 6-1.

Table 6-1: Water bodies present at the site of the Project

Operational catchment	WFD water body	ID	Hydro-morphological designation	Screen in for further assessment?	Screen out for further assessment
Reens West	Rhosog Fach Reen – source to Severn Estuary (River)	GB109056026770	Artificial	No	Yes – Screened out as will not be directly or indirectly impacted by scheme components. Upstream of site.
Severn Lower	Severn Lower (Transitional water body)	GB530905415401	Heavily modified	Yes	No – Screened in as potential to be directly or indirectly impacted by various scheme components.

6.3 Severn Lower Water Body

6.3.1 Water body description

The Severn Lower Transitional Water Body (GB530905415401) is designated as heavily modified owing to flood protection use, with an area of 46598 ha.

6.3.2 Status and objectives

In WFD Cycle 3 2021, water body had an overall status of Moderate, with an ecological status of Moderate and a chemical status of Moderate. A breakdown of the current status and status objectives of the water body is provided in Table 6-2.

Table 6-2: Summary of 2021 WFD status for the Severn Lower Transitional Water Body

Water body	Description, notes or more information
WFD water body name	Severn Lower
Water body ID	GB530905415401
RBD name	Severn
Water body type (estuarine or coastal)	Estuarine
Water body total area (ha)	46,598 ha
Ecological status Biological quality elements Fish Invertebrates	Moderate Moderate Good Moderate

Water body	Description, notes or more information
Phytoplankton	Good
Angiosperm	Moderate
Physico-chemical quality elements	
Dissolved Inorganic Nitrogen	Good
Dissolved Oxygen	High
Chemical status	Moderate
Specific pollutants	High
Arsenic	High
Copper	High
Iron	High
Zinc	High
Cadmium	High
Mercury	Moderate
Noyphenol	High
Lead	High
Nickel	High
Octylphen	High
Target water body status and deadline	Good by 2023
Hydromorphology status of water body	Not designated
Heavily modified water body and for what use	Heavily modified due to flood protection use
Higher sensitivity habitats present	Intertidal seagrass Mussel beds (including blue and horse mussel) Polychaete reef Saltmarsh
Lower sensitivity habitats present	Cobbles, gravel and shingle Intertidal soft sediment Rocky shore Subtidal rocky reef Subtidal soft sediment
Phyto-plankton class	Good
History of harmful algae	Not monitored
WFD protected areas within 2km	Severn Estuary SPA - UK9015022 Severn Estuary SAC - UK0013030

6.4 Screening conclusions

The Severn Lower Transitional Water Body has been screened into the next stage of the assessment on the basis that the proposed works have the potential to impact the WFD status of the water body.

7. Scoping Assessment

7.1 Hydromorphology

Table 7-1: Hydromorphology scoping assessment

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status		Impact assessment not required	Not a WFD water body of high status.
Could significantly impact the hydromorphology of any water body	Impact assessment required		Potential to significantly impact on the hydromorphology of the Severn Lower water body.
Is in a water body that is heavily modified for the same use as your activity		Impact assessment not required	Severn Lower designated as a heavily modified water body due to flood protection use. Flood protection is a byproduct of the habitat restoration, not the main aim.

7.2 Biology

Habitats

Table 7-2: Higher sensitivity and lower sensitivity habitats – for information only

Higher sensitivity habitats[16]	Lower sensitivity habitats[17]
Chalk reef	Cobbles, gravel and shingle
Clam, cockle and oyster beds	Intertidal soft sediments like sand and mud
Intertidal seagrass	Rocky shore
Maerl	Subtidal boulder fields
Mussel beds, including blue and horse mussel	Subtidal rocky reef
Polychaete reef	Subtidal soft sediments like sand and mud
Saltmarsh	
Subtidal kelp beds	
Subtidal seagrass	

[16] Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

[17] Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Table 7-3: Habitats scoping assessment

Consider if the footprint[18] of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes, to one or more – requires impact assessment		Project site area (polder footprint) is 0.74 ha (0.0074 km^2), therefore does not exceed 0.5km^2.
1% or more of the water body's area			Project site area is less than 1% of the water body's area.
Within 500m of any higher sensitivity habitat			Project site is located within 500m of saltmarsh, which is a higher sensitivity habitat.
1% or more of any lower sensitivity habitat			Project site area contains two lower sensitivity habitats; Intertidal Soft Sediment and Rockyshore. The Project site area (polder footprint) that interacts with these habitats is less than 1% of the total area of these habitats within the water body.

Fish

Table 7-4: Fish scoping assessment

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary		No	Whilst the polders are designed to trap sediment, the design necessitates efficient drainage to allow the settlement of suspended sediments. As such, the design has obligatory drainage centred on existing creeks and channels to ensure efficient movement of water at low tides – this necessary feature will avoid fish becoming trapped within the polder as the tide recedes. Consequently, the polders are not considered a barrier to migration.
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Yes		Fish features of the Severn Estuary can utilise a vast area (73,714 ha); however, in the event of a pollution incident, fish species within the immediate locality could be affected. Direct impacts are unlikely since all works must take place at low tide. Any

[18] Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
			spills from construction will be addressed through the EAP.
Could cause entrainment or impingement of fish		No	Not applicable

7.3 Water quality

Table 7-5: Water quality scoping assessment

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients, or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment		Potential for construction activities carried out over a six-week period are likely to displace sediment. Potential pathway for temporary increase in suspended sediments and decreased oxygen levels.
Is in a water body with a phytoplankton status of moderate, poor or bad		No – Impact assessment not required	Phytoplankton status 'Good'.
Is in a water body with a history of harmful algae		No – Impact assessment not required	Not monitored.
If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	**Yes**	**No**	**Water quality risk issue(s)**
The chemicals are on the Environmental Quality Standards Directive (EQSD) list		No – Impact assessment not required	No proposal to discharge chemicals into the marine environment. Any spills from construction will be addressed through the EAP.
It disturbs sediment with contaminants above Cefas Action Level 1[19]		No – Impact assessment not required	No proposal to undertake dredging or disposal of sediment as part of these works. Incidental sediment mobilisation will be limited by control measures implemented by the contractor.
The chemicals are on the Environmental Quality Standards Directive (EQSD) list		No - Impact assessment not required	No proposal to discharge chemicals into the marine environment.

[19] Cefas Action Level 1 compounds: https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans#sample-plans-and-sediment-analysis

7.4 WFD protected areas

Table 7-6: WFD protected areas scoping assessment

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area[6]	Impact assessment required		Severn Estuary SPA and SAC within 2km.

7.5 INNS

Table 7-7: INNS scoping assessment

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Impact assessment required		There is a potential risk of introduction of invasive species via machinery. EAP to include biosecurity risk assessment[20].

7.6 Scoping summary

Table 7-8: Scoping assessment summary

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	Yes	Potential to significantly impact on the hydromorphology of the Severn Lower water body
Biology: habitats	Yes	Project site is located within 500m of saltmarsh, which is a higher sensitivity habitat; and site area is more than 1% of the area of cobbles, gravel and shingle within the water body, see Table 7-3.
Biology: fish	Yes	Potential for impacts on fish within the Severn Estuary, see Table 7-4.
Water quality	Yes	Potential for construction activities to displace sediment. Potential pathway for construction materials to enter water body. See Table 7-5.
Protected areas	Yes	Severn Estuary SAC and SPA, see Table 7-6.
INNS	Yes	Potential risk of introduction of invasive species via machinery to be covered within EAP biosecurity risk assessment.

[20] Cook, E.J., Macleod, A. Payne, R.D., and Brown, S. (2014) edited by Natural England and Natural Resources Wales, 2015. *Marine Biosecurity Planning – Guidance for producing site and operation-based plans for preventing the introduction and spread of non-native species in England and Wales*.

8. Detailed Assessment

The WER Scoping Assessment identified potential risks to the following receptors: hydromorphology, biology (higher and lower sensitivity habitats, and fish), water quality, protected areas, and INNS.

8.1 Potential risks

8.1.1 Hydromorphology

The proposed works have the potential to significantly impact the hydromorphology of the estuary. However, the alteration to flow is only within and in close proximity to the polders. Any accretion of sediment will only be to a level similar to adjacent areas and will happen gradually as sediment is deposited and stabilised by vegetation. Given the scale of the works relative to the water body and the gradual nature of the change, the proposed works are not considered to pose significant impacts that could impact upon the hydromorphology status of the Severn Lower water body.

8.1.2 Biology: habitats – lower and higher sensitivity habitats

Lower sensitivity habitats comprising intertidal soft sediments and rocky shore are located within the proposed polder footprint. The higher sensitivity habitat of saltmarsh is also located within the project footprint.

In the absence of best practice, lower sensitivity habitats may be at risk of direct effects or pollution incidents, e.g., trampling (from vehicle tracking) or accidental spillages (leaks from machinery/plant), and potential compaction, damage and loss to vegetation, if tracking over saltmarsh is required to reach the mudflats.

Construction works will affect localised areas of intertidal mudflats but will not directly affect rocky reef within the water body. The installation of the polders will be a temporary activity implementing specialist low impact / low ground pressure plant to access the intertidal zone. Installation will occur within intertidal mudflat that is resilient to disturbance, typically re-naturalising within a short time frame.

Works within the intertidal zone will be undertaken at low tide to avoid any high tide roost disturbance and minimise sediment suspension. Production of waste is likely to be minimal and best practice procedures will be integrated to avoid potential pollution incidents.

Best practice pollution prevention measures will be employed for marine working, as follows; in addition to biosecurity measures as discussed in Section 5.3.3.

- Site-specific methods will ensure that all site activities are controlled and are in accordance with standard operating procedures, e.g., PPG[13] and CIRIA best practice.
- Limiting the physical works footprint and the dimensions of the access corridor as far as reasonably practicable.
- All plant will be sourced from a trusted reputable company and will come with spill kits which site personnel will be trained to use.
- Vehicles will be loaded with all plant and materials necessary to undertake the works to minimise plant movements below MHWS.
- Minimal quantities of fuels, materials, etc. will be taken on to the foreshore with biodegradable fuel oils implemented where practicable.

- All storage containers will remain within the site compound and be appropriately bunded to prevent any spillages or leaks. No storage of materials or refuelling operations will be permitted outside the site compound.

As such, it is reasonable to conclude that no adverse impacts are predicted on lower or higher sensitivity habitats, but that enhancement of higher sensitivity saltmarsh is likely. The proposed development comprises reinstatement and extension of sedimentation polders to restore and enhance priority saltmarsh habitats along the Rhymney Great Wharf. This will have multiple benefits, including priority habitat creation, carbon sequestration and flood defence. This will support the local community, businesses and critical assets with increased flood protection resilience. The Project is also likely to support the intertidal sand and mud feature by retaining sediment and retaining or restoring transition zones between the two habitats.

8.1.3 Fish

Atlantic salmon, sea trout, allis shad, twaite shad and sea lamprey are anadromous, spending most of their life cycle at sea and actively migrating upstream to the major rivers of the Severn Estuary only to spawn. European eel is the exception and are catadromous spending most of their life cycle in the estuary's major rivers and tributaries. Similarly, river lamprey spends the majority of the life cycle within the Severn Estuary's major rivers and occasionally within the river mouths at their confluence with the estuary.

Whilst the polders are designed to trap sediment, the design necessitates efficient drainage to allow the settlement of suspended sediments. As such, the design has obligatory drainage centred on existing creeks and channels to ensure efficient movement of water at low tides – this necessary feature will avoid fish becoming trapped within the polder as the tide recedes. Consequently, the polders are not considered a barrier to migration.

Fish features of the Severn Estuary can utilise a vast area (73,714 ha); however, in the event of a pollution incident, fish species within the immediate locality could be affected. Direct impacts are unlikely since all works must take place at low tide.

Best practice pollution prevention measures will be employed for marine working, as detailed in Section 8.1.2 above; in addition to biosecurity measures as discussed in Section 5.3.3. As such, it is reasonable to conclude that no adverse impacts are predicted on fish because of pollution incidents. The risk to fish is therefore considered to be negligible, with no measurable change to status at the water body scale for the Severn Lower in terms of current WFD status and in the achievement of 'Good' status of WFD elements.

8.1.4 Water quality

Construction activities will displace sediment below MHWS. This provides a potential pathway for effect through sub-surface sediment being exposed to surface waters.

With no visual or olfactory evidence of contamination at the site, it is likely the site is made up of natural material. The risk of incidental disturbance resulting in contamination is therefore considered to be negligible, with no measurable change to status at the water body scale for the Severn Lower in terms of current WFD status and in the achievement of 'Good' status of WFD elements.

The EAP will be reviewed when available to ensure standard best practice pollution control measures as detailed in Section 5.3.1 above are included.

8.1.5 Protected areas

The proposed project is situated within the Severn Estuary SAC, SPA, SSSI and Ramsar sites. Potential pathways for effect include pollution incidents or disturbance during construction and changes in coastal processes, which will change the balance of habitats present in the area protected by the polders. Disturbance could consist of compaction and/or vegetation loss and damage by vehicles tracking over existing saltmarsh.

Best practice pollution prevention measures will be employed for marine working, as detailed in Section 8.1.2 above; in addition to biosecurity measures as discussed in Section 5.3.3. Specialist low ground pressure plant will be used to reduce potential for disturbance and access to the construction area will be via the mudflats rather than over existing saltmarsh.

As such, it is reasonable to conclude that no adverse impacts are predicted on the protected habitats as a result of pollution incidents.

Whilst the primary focus of this Project is to restore the saltmarsh (Atlantic salt meadows) SAC feature, the Project is also likely to support the intertidal sand and mud feature by retaining sediment and retaining or restoring transition zones between the two habitats. Therefore, it is reasonable to conclude that beneficial impacts are predicted as a result to changes in coastal processes for the protected areas.

8.1.6 INNS

Introducing plant to the marine environment incurs the risk of transporting INNS from one site to the next. To address this risk, the Contractor will include a Biosecurity Risk Assessment within their EAP to ensure that all plant and equipment is deep cleaned prior to arrival on site and following completion of works. The biosecurity measures proposed will accord with the latest NRW guidance. It is thus assumed that there will be negligible effect with no measurable change to status at the water body scale for the Severn Lower in terms of current WFD status and in the achievement of ‘Good’ status of WFD elements.

8.2 Mitigation measures

The EAP will be assessed when available and will outline the mitigation measures incorporated into the construction of the scheme, including the following:

- Site-specific methods will ensure that all site activities are controlled and are in accordance with standard operating procedures, e.g., PPG and CIRIA best practice.
- Limiting the physical works footprint and the dimensions of the access corridor as far as reasonably practicable.
- All plant will be sourced from a trusted reputable company and will come with spill kits which site personnel will be trained to use.
- Vehicles will be loaded with all plant and materials necessary to undertake the works to minimise plant movements below MHWS.
- Minimal quantities of fuels, materials, etc. will be taken on to the foreshore with biodegradable fuel oils implemented where practicable.
- All storage containers will remain within the site compound and be appropriately bunded to prevent any spillages or leaks. No storage of materials or refuelling operations will be permitted outside the site compound.

- The scheme being undertaken in compliance with the relevant GPP and industry best practice (e.g., GPP 5[21], GPP 21[15], CIRIA best practice).

[21] NetRegs, 2018. GPP5: Works and maintenance in or near water. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-5-works-and-maintenance-in-or-near-water/ [Accessed 6th October 2023]

9. Conclusion

The screening stage identified two water bodies that the scheme could potentially impact the WFD status of, the Rhosog Fach Reen – source to Severn Estuary (River) and the Severn Lower transitional water body. The Severn Lower water body was screened into the preliminary scoping assessment, due to it having the potential to be directly or indirectly impacted by various components of the proposed scheme.

Based on the information available, the WER Scoping Assessment identified potential risks to the following receptors: hydromorphology, lower and higher sensitivity habitats, fish, water quality, protected areas and INNS. A detailed assessment for each of the risks was conducted.

With regards to hydromorphology, the proposed works should not significantly alter the hydromorphology of the Severn Lower at the water body scale.

For lower sensitivity habitats it is reasonable to conclude that no adverse impacts are predicted, but that enhancement of the higher sensitivity saltmarsh habitat is likely.

With regards to fish, risk is considered to be negligible given integrated mitigation in the design and construction of the Project. There would be no measurable change to status for the Severn Lower water body and would not prevent future objectives. With regards to water quality, there should be negligible effect with no measurable change to status at the water body scale for the Severn Lower in terms of current WFD status and in the achievement of 'Good' status of WER elements with regards to temporary construction activities with the implementation of an EAP following best practice and guidance.

For protected sites, assuming best practice pollution prevention measures are employed, it is reasonable to conclude that no adverse impacts are predicted on the protected habitats as a result of pollution incidents or disturbance during construction. Likely, beneficial impacts are predicted as a result to changes in coastal processes and the enhancement of saltmarsh habitat, a qualifying feature for the SAC protected area.

Like water quality, there should be negligible effect with no measurable change to status at the water body scale with regards to INNS for the Severn Lower in terms of current WFD status and in the achievement of 'Good' status of WER elements with regards to temporary construction activities with the implementation of an EAP following best practice and guidance.

In conclusion, the Project is considered to be compliant with the objectives of the Water Framework Directive. This assessment comprises a 'living document'. The assessment is based up the current proposed layout of the polders and the construction method statement. Refinement of the design and construction methodology is ongoing. The assessment should be reviewed if significant changes are made to the layout of the polders or the construction methodology.

Appendix A: Background information – WER status determination and compliance assessment process

A.1 Determination of WER Status

A.1.1 Introduction

Surface water bodies and groundwater bodies are defined within WER legislation. There are three types of surface water body, as follows:

- Natural water bodies;
- Heavily modified water bodies (HMWBs); and,
- Artificial water bodies (AWBs).

The Overall Status of natural surface water bodies is determined on the basis of their Ecological Status and Chemical Status. The overall status of heavily modified and artificial water bodies is classified based on their ecological potential and chemical status. The overall status of groundwater bodies is determined on the basis of their Quantitative Status and Chemical Status.

Groundwater bodies are defined within WER legislation as Groundwater Management Units (GWMU) and Water Resource Management Units (WRMU) and their status is determined on the basis of quantitative and chemical sub-elements.

The means by which these determinations are made for both surface water and ground water bodies is described in this section.

A.1.2 Surface water bodies

A.1.2.1 Ecological status

Ecological Status is defined by the overall quality of the structure and functioning of aquatic ecosystems associated with surface waters, i.e. the condition of the watercourse. This is assigned on a scale of high, good, moderate, poor or bad, and on the basis of four classification elements or 'tests', as follows:

- Biological - this test is designed to assess the status indicated by biological quality elements such as fish, invertebrates, macrophytes or phytobenthos (diatoms). The biological quality elements can influence an overall water body status from bad through to high. It is also important to note that the presence of invasive species prevents a water body from achieving high status when all other elements attain high;
- Physicochemical - this test is designed to assess the status indicated by physicochemical quality elements such as dissolved oxygen, phosphorus and ammonia, against environmental standards. The physicochemical quality elements can only influence an overall water body status from moderate through to high;
- Specific pollutants - this test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic. As with the physicochemical test, the specific pollutant assessment can only influence an overall water body status from moderate through to high; and,
- Hydromorphology - for natural surface water bodies this test is undertaken by the NRW during classification when the biological and physicochemical tests indicate that a water body may be of high Overall Status. It specifically assesses hydromorphological quality elements such as water flow, sediment composition and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydromorphological quality elements do not support high Ecological Status, then the status of the water body is limited to good Overall Status. Hydromorphological assessments are used to determine 'high' Overall Status only and are not used to drive a water body status class below good. The 'does not support good' classification should be reported for the purposes of identifying water bodies which fail the flow test.

The worst-case classification is assigned as the overall surface water body status, in a 'one-out all-out' system. This system is summarised in Figure 9-1.

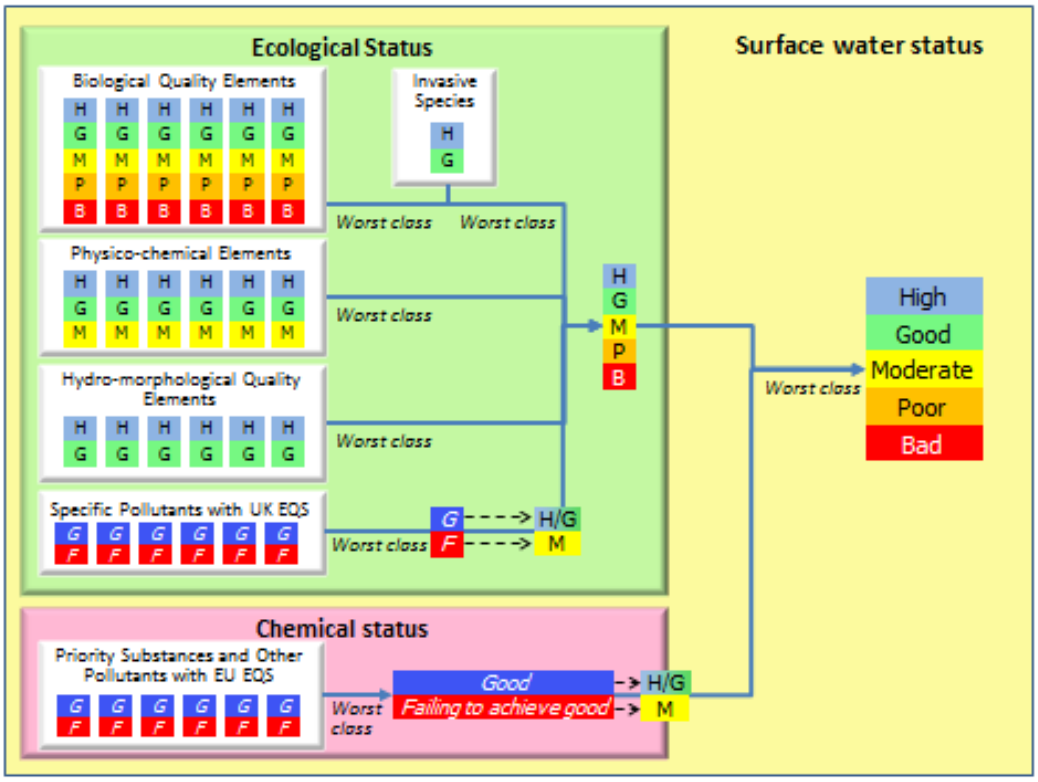

Figure 9-1: Ecological status classification process (Source: Environment Agency (2015)

A.1.2.2 Chemical status

Chemical Status is defined by compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances, in accordance with the Environmental Quality Standards Directive (2008/105/EC)[22]. This is assigned on a scale of good or fail.

Surface water bodies are only monitored for priority substances where there are known discharges of these pollutants; otherwise surface water bodies are reported as being of good Chemical Status.

A.1.2.3 Ecological potential for heavily modified (and artificial) water bodies

Ecological Potential is assigned to AWB (such as reservoirs and canals), or natural water bodies which, as a result of physical alterations by human activity, are substantially changed in character. The latter are termed HMWB. The term 'ecological potential' is used to classify AWBs and HMWBs as it may be impossible for these water bodies to achieve good Ecological Status (GES) because of their creation or modification for a specific use, such as navigation, water supply or flood protection. The Ecological Potential of an AWB or HMWB represents the degree to which the quality of the water body approaches the optimum condition it could achieve given its artificial or heavily modified state.

AWB and HMWB are subject to an additional set of rules that need to be implemented prior to running the one-out-all-out process. These rules determine which biological quality elements should be used in the water body Ecological Potential classification. Under normal circumstances, AWB and HMWB are classified

[22] Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008; *on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council*. Strasbourg, European Parliament and European Council

according to an assessment of mitigation measures, which defines good Ecological Potential (GEP) in water bodies where all applicable mitigation is in place, and moderate ecological potential in water bodies where some or all relevant mitigation is missing. However, to prevent AWB and HMWB being incorrectly classified as good potential in situations where all mitigation is in place, but other pressures are causing an impact (e.g. nutrient enrichment or pollution from toxic substances), the methodology adopted in the UK additionally considers biological indicators providing they are not sensitive to the heavily modified nature of the water body.

AWB and HMWB hydromorphological elements are assessed using a three-stage process, firstly looking at flow, then mitigation measures and biological quality elements.

Flow conditions are assessed initially on a fail or pass basis to determine which of the biological and physicochemical quality elements should be used in the classification of Ecological Potential.

Where the flow conditions are unaffected by the physical modification (flow conditions pass), the water body Ecological Potential is determined by the worst of either the mitigation measures assessment, or any element that is not sensitive to the modified nature of the water body.

Where the flow conditions are significantly impacted by the physical modification (flow conditions fail), the water body Ecological Potential is determined by the worst of any of the mitigation measures assessments or the assessment of biological quality elements, physicochemical quality elements or specific pollutants.

Where a water body is designated as artificial or heavily modified for water resources usage, either solely or jointly with other uses, the flow condition is assumed to be good (pass).

A.1.2.4 Groundwater bodies

Under the WER, groundwater body Overall Status is classified on the basis of Quantitative Status and Chemical Status. The groundwater bodies are separated into GWMU and WRMU. GWMU are sub-divisions of the groundwater to aid the resource assessment process. WRMU are sub-divisions according to the water resource availability and the management of water.

The worst-case classification dictates the Overall Status, via a ‘one-out all-out’ system. This system is summarised below in Figure 9-2.

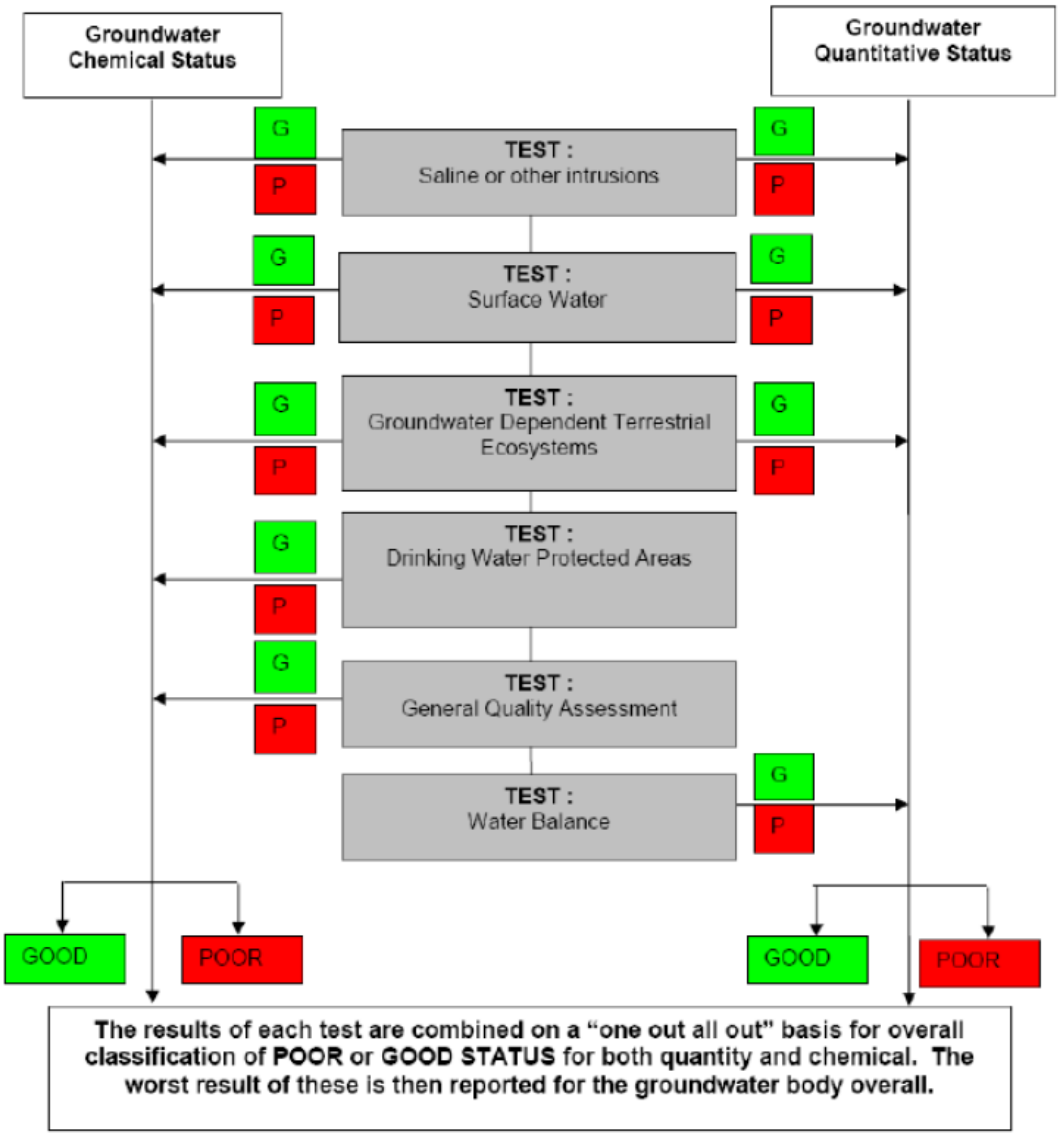

Figure 9-2: Groundwater body status classification (Source: UKTAG, 2012)

A.1.2.5 Quantitative status

Quantitative Status is defined by the quantity of groundwater available as base flow to watercourses and water-dependent ecosystems and as 'resource' available for use as drinking water and other consumptive purposes. It is assigned on a scale of good or poor, and on the basis of four classification elements or 'tests' as follows:

- Saline or other intrusions - this test is designed to identify groundwater bodies where the intrusion of poor quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions;
- Surface water - this test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the Ecological Status of associated surface water bodies;
- Groundwater Dependent Terrestrial Ecosystems (GWDTE) - this test is designed to identify groundwater bodies where groundwater abstraction is leading to significant damage to associated GWDTE; and,
- Water balance - this test is designed to identify groundwater bodies where groundwater abstraction exceeds the 'available groundwater resource', defined as the rate of overall recharge to the groundwater

body itself less the rate of flow required to meet the ecological needs of associated surface water bodies and GWDTE.

A.1.2.5.1 Chemical status

Chemical Status is defined by the concentrations of a range of key pollutants, by the quality of groundwater feeding into watercourses and water-dependent ecosystems and by the quality of groundwater available for drinking water purposes. This is assigned on a scale of good or poor, and on the basis of five classifications elements or 'tests', as follows:

- Saline or other intrusions - this test is designed to identify groundwater bodies where the intrusion of poor quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions;
- Surface water - this test is designed to identify groundwater bodies where groundwater is leading to a significant diminution of the Chemical Status of associated surface water bodies;
- GWDTE - this test is designed to identify groundwater bodies where groundwater is leading to significant damage to associated GWDTE;
- Drinking Water Protected Areas (DrWPA) - this test is designed to identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WER or at risk of failing in the future. The aim is no deterioration in quality of waters for human consumption; and,
- General quality assessment - this test is designed to identify groundwater bodies where widespread deterioration in quality has, or will, compromise the strategic use of groundwater. The aim is no significant impairment of human use of groundwater and no significant environmental risk from pollutants across a groundwater body. Status is assessed primarily using data collected from NRW monitoring network; therefore, the scale of assessment means that groundwater status is mainly influenced by larger scale effects such as significant abstraction or widespread diffuse pollution.

A.1.2.6 Environmental standards

Under the WER, a range of environmental standards and condition limits are applied in order to help the classification of water body status and the setting of status objectives via the RBMP process. These environmental standards define the range of environmental conditions that support "healthy" aquatic life. For instance, standards are set for the composition of biological communities, the physicochemical water quality parameters, the concentration of pollutants, and the level of flows in rivers (as described above).

These standards[23] inform the EA on the implementation of the RBMP process, including the identification of measures required to support the achievement of the GES / GEP objectives, as well as underpinning efforts to protect the water environment by helping to regulate activities that could cause adverse impacts.

A.1.3 WER Assessment requirements for new developments

To ensure compliance with the WER, decision makers must consider whether proposals for new developments have the potential to:

- Cause a deterioration of a water body from its current status or potential;
- Prevent future attainment of good status or potential where not already achieved;
- Impact on protected or priority species and habitats; and/or,
- Provide opportunities to improve the water environment.

[23] The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015

A ruling by the European Union Court of Justice on 1 July 2015[24] has significant implications for projects that may impact water bodies, namely:

- Consent for development must not be granted by an authorising authority – unless a derogation is granted - where the project may cause a deterioration in the status of a body of surface water or where it jeopardises the attainment of good Ecological Status or of good Ecological Potential and good Chemical Status by the date laid down in the Directive;
- That deterioration of the status of the relevant body of surface water includes a fall by one class of any element of the quality elements within the meaning of Annex V of the WER even if the fall does not result in a fall of the classification of the body of surface water as a whole; and,
- If the quality element is already in the lowest class, any deterioration of that element represents deterioration of status within the meaning of Article 4(1)(a)(i).

A.1.4 Guidance

Whilst there is no established methodology for assessing compliance with WER legislation, the WER Compliance Assessment will be based upon expert judgement, established best practice and consultation with NRW and will be undertaken in accordance with relevant NRW guidance and the recent advisory guidance provided by The Planning Inspectorate[25].

[24] Case 461/13 Bund für – Umwelt Und Naturschutz Deutschland v Bundesrepublik Deutschland ('the Bund case') concerning the interpretation of Article 4(1)(a)(i) to (iii) of the Water Framework Directive 2000/60/EC (WFD)

[25] The Planning Inspectorate (2017), *Advice note eighteen: The Water Framework Directive*.

Appendix B: WER Assessment Process

B.1 WER Assessment Process

B.1.1 Overview

WER Compliance Assessment is undertaken as an iterative, stepped process, which typically includes the following:

- Step 1: Baseline assessment (screening);
- Step 2: Preliminary assessment (scoping);
- Step 3: Detailed impact assessment (where required); and,
- Step 4: Application of Article 4.7 (where applicable).

These key process steps are described in further detail in the following sections. Consultation with regulatory authority should be undertaken to share the findings of each step, where necessary/applicable.

B.1.2 Baseline assessment (screening)

The key objective of the baseline (screening) assessment is to identify the relevant WER surface water and groundwater bodies (including any undesignated tributary watercourses) potentially affected by the proposed development and to establish their baseline condition.

The water body baseline condition of relevant water bodies has been identified via desk-top assessment, utilising readily available information and environmental, asset and operations data obtained from relevant stakeholders, including the EA, Natural England, and Yorkshire Water.

WER baseline datasets have been obtained from Water Watch Wales[3]. This includes:

- RBMP Cycle 2 current status and status objectives data;
- WER Protected Areas data;
- Reasons for to achieving good status (RNAG) data; and,
- Measures data.

The 2019 and 2022 NRW WER water body status data has been used to inform the assessment. These data are considered to provide the current best estimate of status and the formal baseline against which NRW will assess compliance with the 'no deterioration' objective. Where baseline data is limited, professional judgement has been used in the assessment and a precautionary approach taken with regard to screening.

The relevant WER water bodies present within the potential zone of influence of the proposed development are taken through to the subsequent preliminary assessment (scoping) stage.

B.1.3 Preliminary assessment (scoping)

The objective of the preliminary (scoping) assessment is to establish the relevant likely effects of the proposed development on the WER status elements of the relevant WER surface water and groundwater bodies. This includes identification of potential impact types and any relevant mitigation measures embedded within the design of proposed development at this stage.

The preliminary assessment considers both the beneficial and adverse effects of the relevant elements of the proposed development and applies a risk-based method in line with existing NRW guidance.

Effects are considered with regard to the risk of the proposed development causing a deterioration in current status and/or a failure to achieve status objectives. The assessment identifies those scheme components /

impacts that pose a risk current status or status objectives and thus may require more detailed impact assessment.

The preliminary assessment therefore comprises two parts, as follows:

- Likely effects on current status or potential, involving:

  identification of relevant scheme components with potential to impact upon water body status;
  identification of likely potential impact and magnitude of effects of the relevant scheme components on the current status of the water body (taking account of any 'embedded' mitigation; and,
  identification of potential risks of deterioration in current status and associated requirements for additional mitigation and/or further detailed assessment.

- Likely effects on status objectives, involving:

  scoping of the relevant scheme components to identify where the proposed development may pose a risk of worsening existing pressures responsible for current status failures (RNAGs) and/or prevent the implementation of measures identified by NRW to address existing status failures; and,
  scoping of relevant scheme components against any available NRW HMWB/ AWB 'mitigation measure assessment' outputs, in order to identify where the proposed development may pose a potential risk of inhibiting the implementation of measures derived to mitigate the impacts of existing physical modifications and operational regimes to support the achievement of good Ecological Potential objectives.

B.1.4 Detailed impact assessment

Where deemed required, the objective of the detailed impact assessment is to establish the nature and anticipated magnitude of the effects of relevant elements of the proposed development on the WER quality elements of the surface water and groundwater bodies affected. These effects are considered in terms of the potential for deterioration of current status and/or the prevention of status objectives. This detailed assessment may be based on targeted baseline surveys, monitoring or modelling assessments completed at the impact sites.

As with the preliminary assessment stage, the detailed impact assessment is therefore comprised of two key parts, as follows:

- Assessment of effects on current status of quality element; and,
- Assessment of effects on status objectives, with regards to any water body RNAG or measures/actions identified as potentially being at risk from the proposed development under the preceding preliminary (scoping) assessment. This is done via expert judgement and consultation with the EA, based on the currently available information.

Where significant effects are identified with regard to the risk of status deterioration and/or the prevention of status objectives, the assessment should identify 'further mitigation' required in order to avoid and/or minimise risks and the residual effects on quality elements at the water body scale.

The detailed impact assessment will also identify if Article 4.7 tests need to be prepared for affected water bodies, where a residual risk to status deterioration and/or prevention of future status objectives has been identified.

A detailed impact assessment has not been deemed required for the proposed development, based on the information available at this stage.

B.1.5 Article 4.7 tests

Article 4.7 of the WER states that Member States will not be in breach of the Directive when failure to meet its environmental objectives is the result of either new modifications to the physical characteristics of a water body or as a result of new human sustainable development, on the proviso that the modifications or new

development proposed are compliant with the four key conditions listed below. In doing so, Article 4.7 provides a means whereby a derogation for a proposed modification or sustainable development may be granted where it meets these four conditions.

1. All practicable steps have been taken to mitigate the adverse impact on the status of the water body;
2. The reasons for the modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development; and
3. The beneficial objectives served by the modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.
4. The reasons for the modifications or alterations are clearly identified to NRW, so that they can be specifically set out and explained in the relevant RBMP (as required under Article 13).

Article 4.7 tests are not deemed required for the proposed development, based on the information available at this stage.