

The Environment Partnership

River Tywi Gas Pipeline HDD Water Framework Directive Assessment Report

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1. Background Information for the Proposed Works

1.1 Introduction to the WFD Assessment

This Water Framework Directive (WFD) Assessment considers the work activities required to install a new gas pipeline under the River Tywi as part of a redirection of existing gas pipelines. The Environment Partnership (henceforth TEP) have commissioned APEM Ltd to undertake a WFD assessment to support a marine licence application for these works. The pipeline will be installed using Horizontal Directional Drilling (HDD), beginning at an entry point roughly 50 m from the River Tywi, extending approximately 170 m. The works will consist of open-cut trenching within adjacent fields (approximately 500 m in length).

The proposed works are within the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD transitional water body (ID: GB531006013400). The WFD Report is required to determine if the proposed works could affect the current status or future potential of associated WFD supporting elements in the Three Rivers Estuary water body.

1.2 Location and Context of the Works

The location of the proposed works within the Tywi & Taf & Gwendraeth – Three Rivers Estuary water body is indicated in Figure 1 and Figure 2.

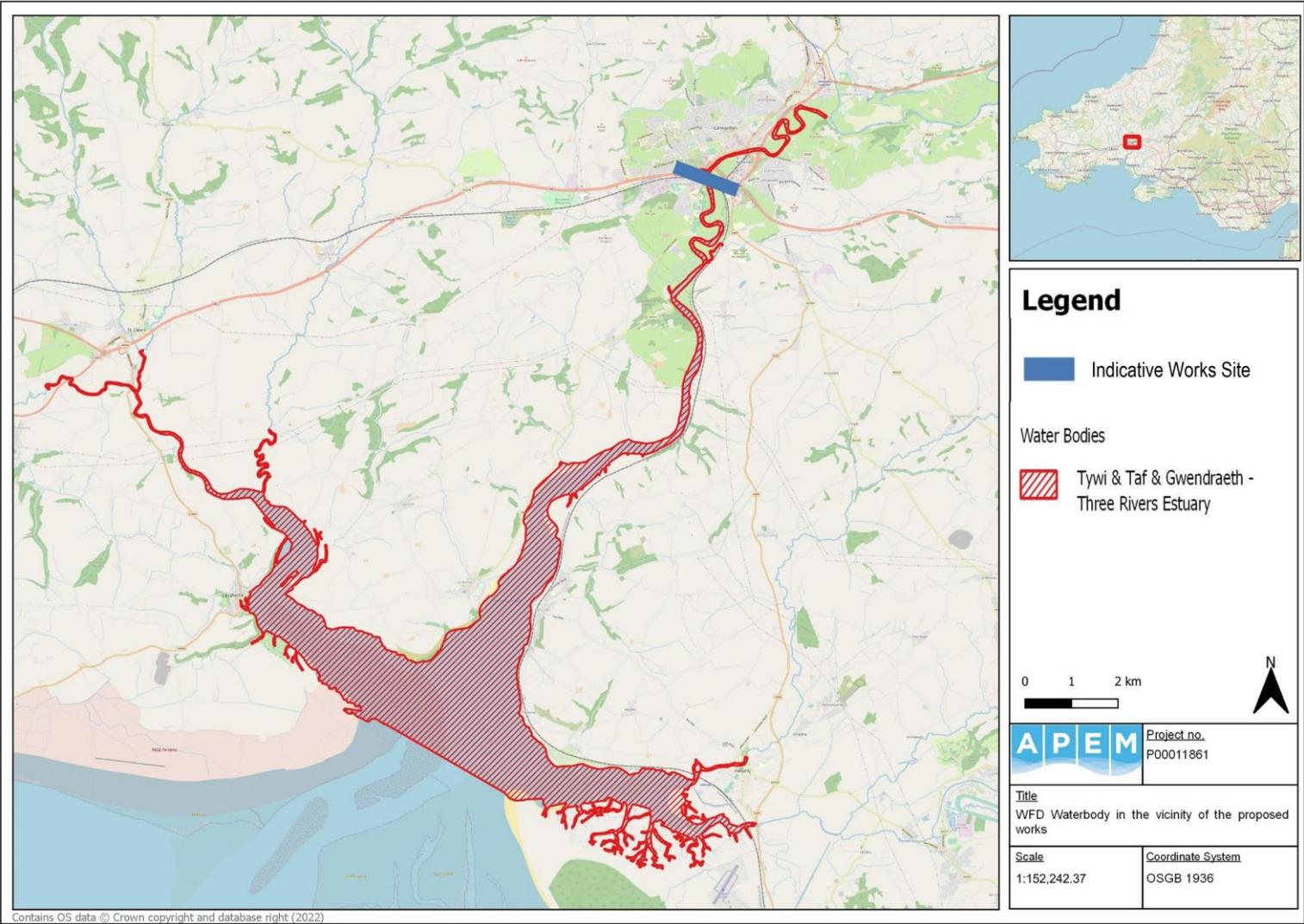


Figure 1: Proposed works in relation to the Tywi & Taf & Gwendraeth – Three Rivers Estuary water body.



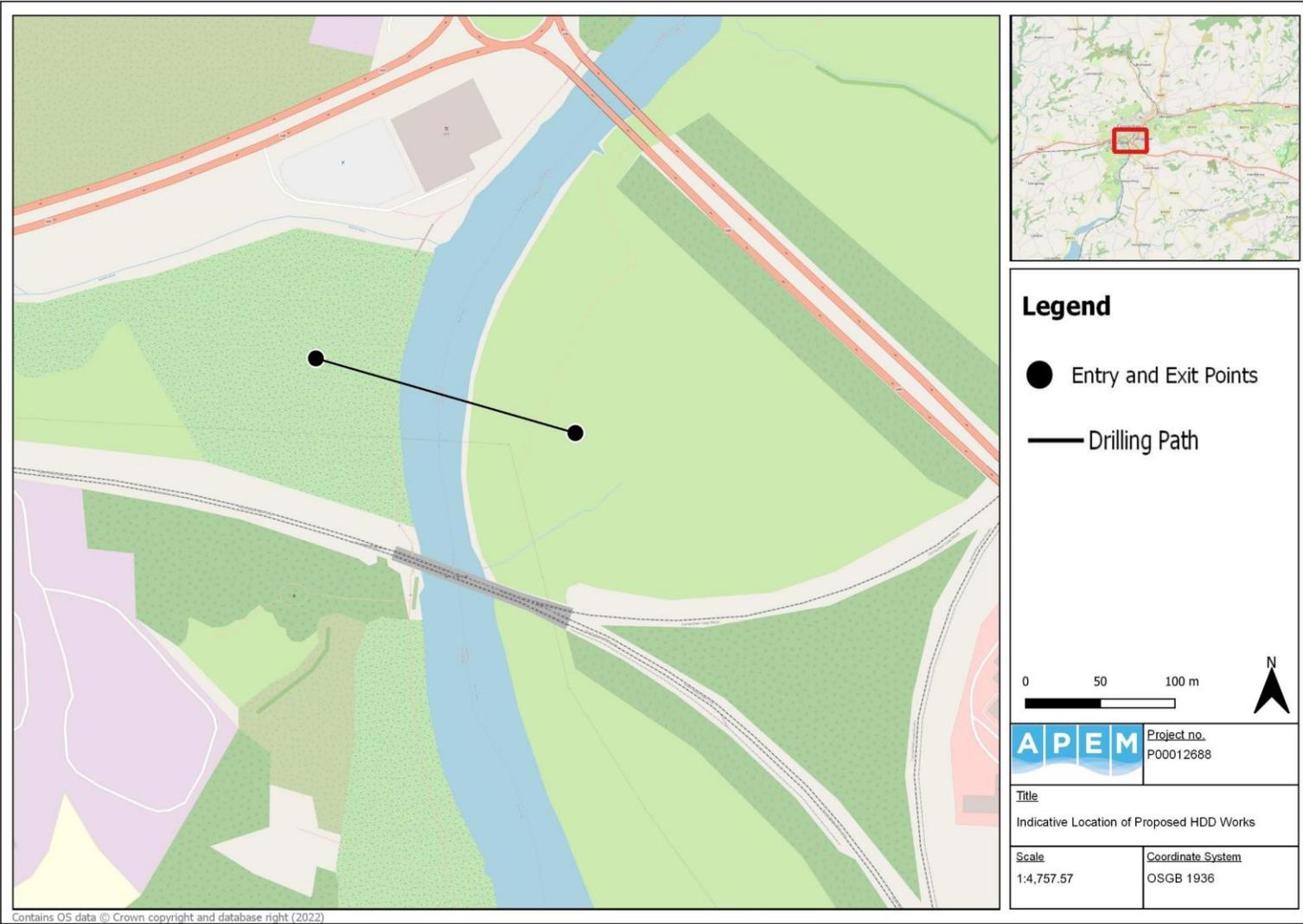


Figure 2: Proposed works, showing the drilling path and entry and exit points of the works.



1.3 WFD Assessment Objectives

The objective of this assessment is to consider the available data for WFD supporting elements in the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD water body in accordance with the Environment Agency’s (EA) ‘Clearing the Waters for All’ guidance (EA 2017), and in this context, consider the potential effects of the work on the status / potential of the following WFD parameters:

- Ecological potential
 - Biological supporting elements
 - Physicochemical supporting elements (and Specific Pollutants¹)
 - Hydromorphological considerations
- Chemical status
 - Priority Substances¹
 - Other Pollutants¹
 - Priority hazardous substances¹

1.4 Summary of the Proposed Works

A full breakdown of the HDD works are provided in CMU Infrastructure Ltd’s methods statement (CMU Infrastructure Ltd 2023). A summary of some of the key elements of relevance to this assessment is provided below.

HDD equipment will be delivered to site via a low-loader lorry and will be offloaded by a team of four personnel: one to operate the drill, one acting as a guide and two others watching for pedestrians and traffic. The drill will manoeuvre to the ‘entry point’ and a launch pit will be excavated. Then, drilling will commence with guidance from a steering engineer. Drilling fluid will be used throughout to remove spoil, provide support, and lubricate the bore path. Drilling fluid will be monitored throughout to ensure it is constantly returning to the excavated pits, preventing a build-up of hydrostatic pressure within the bore. All wet arisings from the operation, will be removed and disposed of. The pipe will then be positioned at the reception pit for installation. A suitable machine will be provided

¹ Limited to chemicals on Environmental Quality Standards Directive (EQSD) list for WFD (as provided in EA 2017). Environmental thresholds are summarised in Defra (2015).

to guide the product pipe during the installation. The existing pipeline will be abandoned. Site compounds and an access track for the works will be required.

The HDD drilling activity is anticipated to have a duration of two weeks, commencing at the end of July 2023.

2. Water Framework Directive Requirements

2.1 Water Framework Directive

2.1.1 Overview

The WFD establishes a framework for the management and protection of Europe's water resources. It is implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the Water Framework Regulations)². Central to the WFD is the philosophy to make water bodies better through sustainable development for the joint benefits of aquatic habitats and the human environment.

Ecological status is an expression of the quality of the structure and functioning of surface water ecosystems as indicated by the condition of a number of 'quality elements'. These include biological and chemical indicators. Where a water body is defined as a Heavily Modified Water Body (HMWB), ecological status is replaced by ecological potential, however, the Tywi & Taf & Gwendraeth – Three Rivers Estuary is not a HMWB so ecological status is the term used in this assessment.

The development and implementation of strategic long-term River Basin Management Plans (RBMPs) is a key requirement of the WFD. They include a programme of measures outlining the on-going monitoring and management actions required for water bodies to achieve future objectives.

Proposed developments or activities that have the potential to affect the water environment require a WFD Assessment. In this context, compliance with the WFD means prevention of deterioration (of ecological status, chemical status and supporting element status) and avoiding prevention of ability to achieve future targets. However, WFD Article 4.7 provides legislation for exemption conditions that could allow implementation of

² At this stage, following Brexit, existing EU environmental legislation will continue to operate under the policy of "roll-over", however, decisions made by the EU will no longer be binding for courts in the UK.

schemes that cause deterioration in ecological status, for example for reasons of overriding public interest.

The subsequent Priority Substances Directive to the WFD sets out Environmental Quality Standards (EQSs, 2008/105/EC) for priority substances which is known as the Environmental Quality Standards (EQS) Directive and there have been subsequent amendments (2013/39/EU, Defra 2015 and EA 2015). The environmental objectives of the WFD and its associated directives include the following:

- to prevent deterioration of aquatic ecosystems;
- to protect, enhance and restore water bodies to 'good' status; based on ecology (with its supporting hydromorphological and physico-chemical factors) and chemical factors for surface waters; and
- to progressively reduce pollution from priority substances and cease or phase out discharges of priority hazardous substances.

The default objective of the WFD is for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve 'good' status by 2027 at the latest. Where it is not possible to achieve this, alternative objectives can be set. The existing status, and measures required to achieve the 2027 status objective, are set out for each water body in the relevant RBMPs. The plans set out the current baseline condition of the water environment at the time of publication and provide details on the measures needed and timescales required to attain their target status.

For the following surface water bodies: rivers, lakes, estuaries and coastal waters, the overall water body status has both an ecological and a chemical component. Good 'ecological status' is defined as a 'slight variation from undisturbed natural conditions, with minimal distortion arising from human activity'. The ecological status of water bodies is determined by examining biological elements (e.g. fish, invertebrates, plants) and a number of supporting elements and conditions, including physico-chemical (e.g. metals and organic compounds), and hydromorphological (e.g. depth, width, flow, and 'structure') factors (these are WFD quality elements, also referred to as receptors for the purposes of this assessment).

A flow chart illustrating how quality elements are combined (Cycle 3) to provide an overall water body status is provided in Figure 3. The classification hierarchy for surface waters (for Cycle 2) is illustrated in Figure 4. Only biological supporting elements have classification boundaries defined for 'high' through to 'bad' (Figure 3). Chemicals supporting 'chemical status' that do not meet EQS concentrations are classified as 'Failing to achieve Good' (Figure 3).

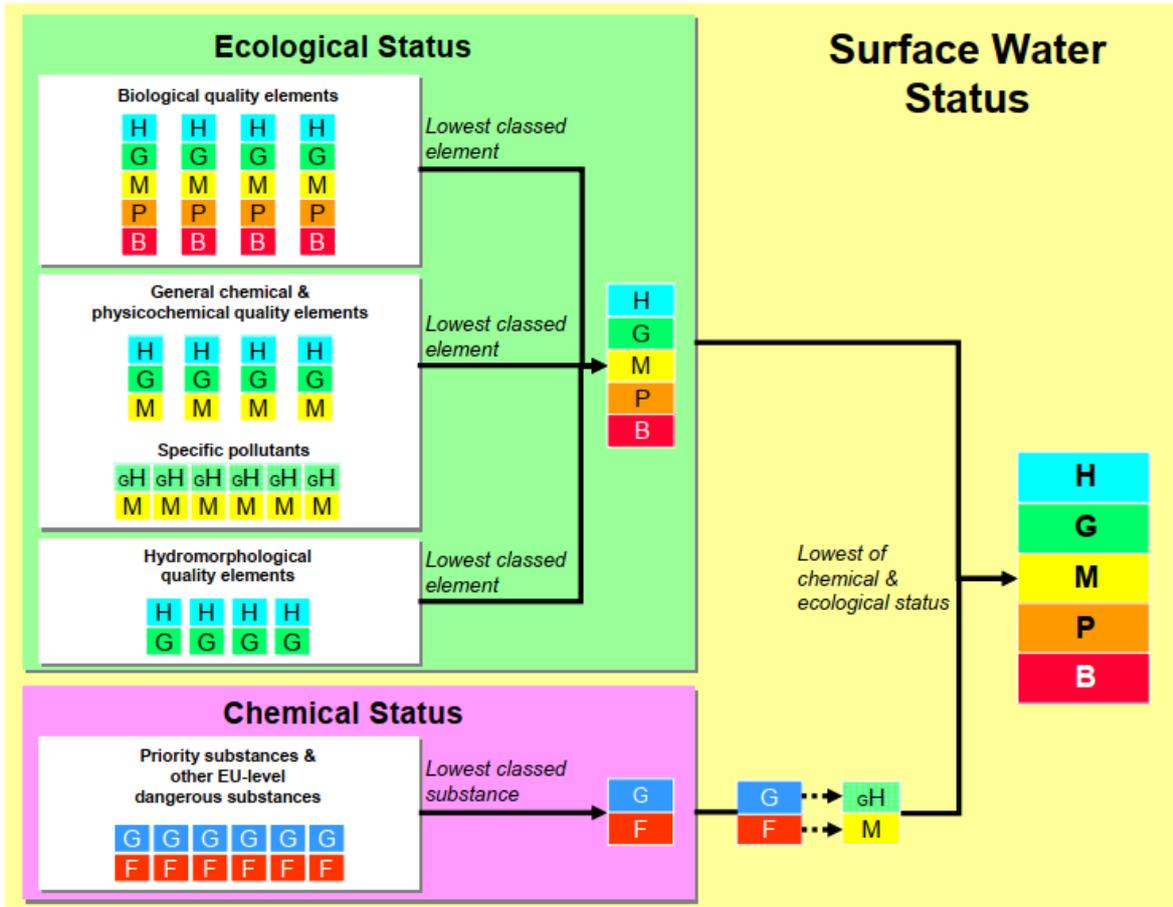


Figure 3: WFD quality elements – Bringing all the strands of evidence together (Environment Agency 2015).

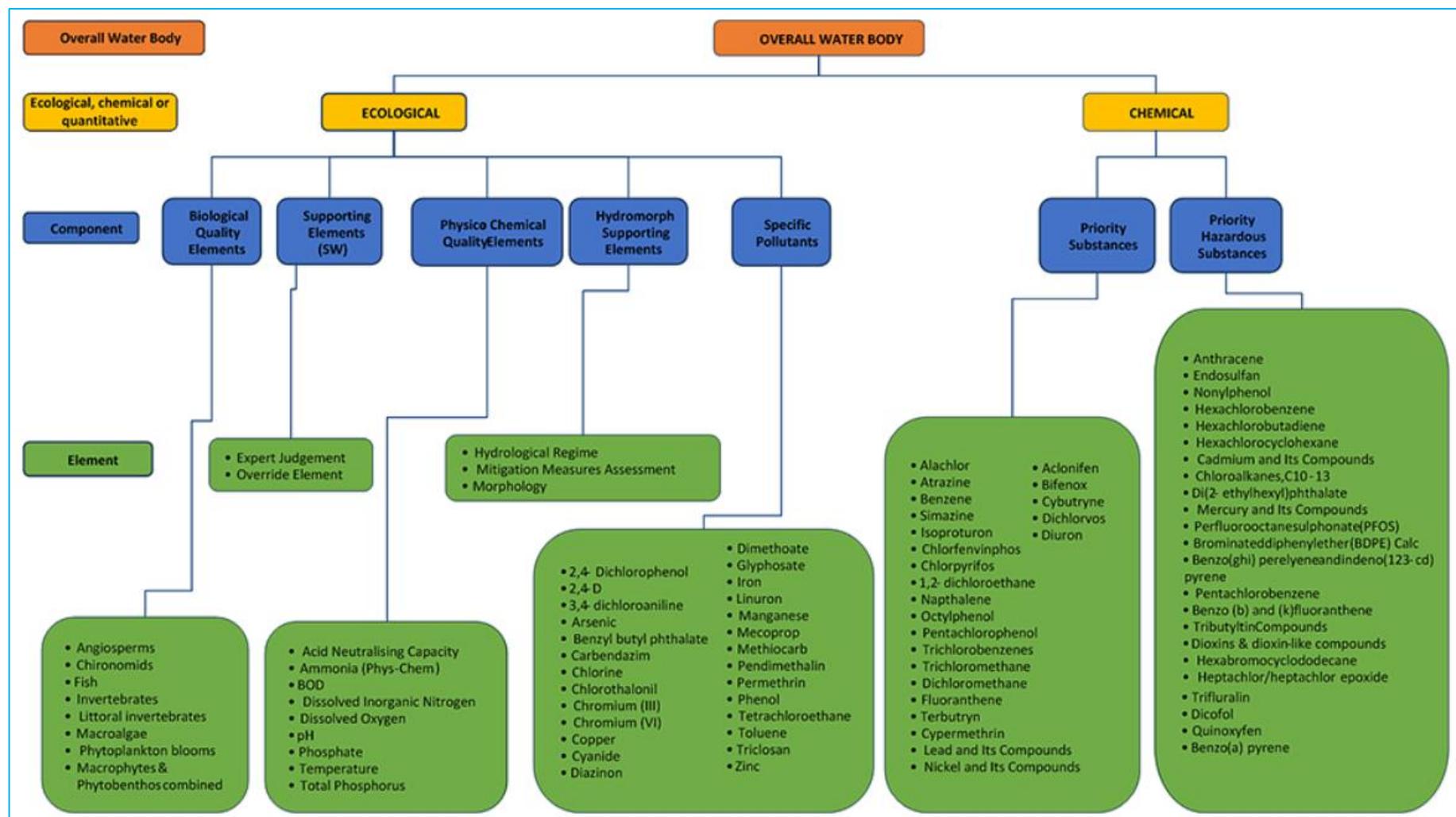


Figure 4: Classification hierarchy for surface waters (from Environment Agency 2018).

2.1.2 Transitional Water Bodies

Transitional water bodies include bodies of surface water in the vicinity of river mouths that typically correspond to estuaries. Therefore, they are influenced by tides and are characterised both by saline water due to their proximity to coastal waters and by freshwater due to inputs of river flows. The proposed works are situated within the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD transitional water body. The status of the water body is indicated in Table 1.

The WFD quality elements for transitional WFD water bodies such as the Tywi & Taf & Gwendraeth – Three Rivers Estuary water body are as follows:

- Hydromorphological:
 - tidal regime:
 - freshwater flow; and
 - wave exposure.
 - morphological conditions:
 - depth variation;
 - quantity, structure, and substrate of the bed; and
 - structure of the intertidal zone.
- Biological:
 - phytoplankton;
 - other aquatic flora;
 - benthic invertebrates; and
 - fish.
- Physico-chemical and chemical:
 - transparency;
 - thermal conditions;
 - dissolved oxygen;
 - nutrients;
 - salinity; and
 - pollution by substances being discharged (e.g. chemicals, metals, pesticides).

Table 1: Cycle 3 classifications for 2021 for the Tywi & Taf & Gwendraeth – Three Rivers Estuary transitional water body.

Parameter	Year	
	2021	
Water Body ID	GB531006013400	
Water Body Area	5767.21 ha	
Water Body Type	Transitional Water	
Hydromorphological designation	Natural	
Overall Potential	Moderate	
Chemical Status	High	
Priority Substances	Unknown	
Priority Hazardous Substances	Unknown	
Ecological Potential	Moderate	
Biological Quality Elements	Angiosperms	High
	Fish	Unknown
	Invertebrates	Good
	Macroalgae	High
	Phytoplankton	Moderate
Physico-chemical Quality Elements	Dissolved Inorganic Nitrogen	Moderate
	Dissolved Oxygen	High
Specific Pollutants	Various	High

3. Methods

The assessment followed the EA's 'Clearing the Waters for All' guidance (EA 2017), which was developed specifically to assess the effects of activities in transitional and coastal waters in relation to WFD targets. The assessment approach is based on the following three stages:

- Screening;
- Scoping; and
- Assessment.

3.1 Screening

The screening stage is used to determine if the activities for the proposed works are classed as low risk activities. The EA guidance (EA 2017) identifies the following activities to qualify as low risk activities:

- a self-service marine licence activity or an accelerated marine licence activity that meets specific conditions;
- Maintaining pumps at pumping stations;
- Removing blockages or obstacles like litter or debris within 10 m of an existing structure to maintain flow;
- Replacing or removing existing pipes, cables or services crossing over a water body – but not including any new structure or supports, or new bed or bank reinforcement; and
- ‘Over water’ replacement or repairs to, for example, bridge, pier, and jetty surfaces, if you minimise bank or bed disturbance.

Where the proposed works do not fulfil criteria for a low-risk activity, the assessment continues to the scoping stage.

3.2 Scoping

The Scoping stage is used to determine if the proposed activities pose potential risks to the following receptors based on the quality elements of the water body of concern. The EA guidance (EA 2017) specifies consideration of the following quality elements for transitional water bodies such as the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD water body:

- Hydromorphology;
- Biology – habitats;
- Biology – fish;
- Water quality;
- Protected areas; and
- Invasive non-native species (INNS)

Scoping for transitional water bodies has been undertaken by using the Scoping template provided in the EA guidance (EA 2017). The Scoping template identifies a range of criteria against which proposed activities can be considered to determine whether they pose potential risks to receptors and, therefore, whether there is a requirement to carry out an impact assessment for those receptors.

3.3 Impact Assessment

The impact assessment stage involves determination of the potential impacts of the proposed activities on the specific parameters that are taken forward from Scoping (EA 2017).

The assessment involved consideration of whether the proposed activities will have a non-temporary impact on status of WFD quality elements in the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD water body (i.e. cause deterioration or compromise the achievement of measures set out in the Western Wales RBMP programme of measures and therefore future objective status) (EA 2015). The scope of the assessment was determined following the steps in the impact assessment section of the EA guidance (EA 2017).

The WFD assessment has also followed principles of EIA guidance where applicable in that the following aspects have been considered when assessing the potential for a change in WFD status due to impacts on WFD quality elements (CIEEM 2018). Although these aspects have been considered, they are not necessarily referred to directly in the assessment text:

- Nature of effect i.e. beneficial / adverse; direct / indirect;
- Extent of the effect (geographical area e.g. site-wide, local, district, regional, and the size of the population affected);
- Likelihood of effect occurring;
- Value and sensitivity of receptor;
- Magnitude of effect;
- Duration; and
- Temporary or permanent effect. If the effect occurs on all of, or a proportion of, a community/population on a continual basis it can be considered to be permanent (e.g. a continual cooling water discharge). If it is not on a continual basis when considering the community / assemblage / population or habitat level, it can be described as temporary

If it was considered that the activity would not affect the status of a given WFD receptor (taking account of any embedded mitigation measures) then no further evaluation or mitigation was required for the WFD assessment for that receptor (WFD supporting element). If possible adverse effects were identified, then the next step was to identify suitable mitigation measures to address the potential effect (EA 2017).

4. WFD Assessment

4.1 Screening

The proposed activities were considered against the list of low-risk activities identified under the EA guidance (EA 2017). It was concluded that they do not qualify as low risk activities and, accordingly, they were taken forward to the Scoping stage.

4.2 Scoping

The completed Scoping template for the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD transitional water body is provided in Appendix 1.

As indicated in the Scoping template, the following WFD quality elements were taken forward for more detailed assessment:

- Biology – Fish:
 - Proposed activities could produce underwater noise or vibration that could affect fish in the estuary, outside the estuary and could delay or prevent fish entering it or could affect fish migrating through the estuary; and
 - Proposed activities could impact on normal fish behaviour like movement, migration or spawning do to underwater noise.
- Water Quality:
 - The only potential for chemicals on the EQSD to be introduced to the environment is due to spillage of fuels or other chemicals at the point of entry of the HDD into the ground which is 55 m from the river.
 - There is potential for some chemicals to enter the water column if there is a break-out on the river bed but these substances (clay derived drill lubricants) are not anticipated to be on the Environmental Quality Standards Directive (EQSD). Such break out could result in increased levels of suspended solids in the water column (a break-out contingency plan has been prepared, mitigating this risk to negligible).
 - The phytoplankton status of the Tywi & Taf & Gwendraeth Three Rivers Estuary water body is moderate.
- WFD Protected Areas:
 - Proposed activities are within 2 km of the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC, and the Afon Tywi / River Tywi SAC.

Several risks to receptors were scoped out of the requirement for more detailed assessment for the construction phase (see Appendix 1).

- Hydromorphology:
 - Activities will take place significantly below the water body with no direct pathway of effect for hydromorphology.
- Biology – Habitats (lower sensitivity):
 - The Proposed Development does not cover more than 1% of any lower sensitivity habitat.
 - The Proposed Development is not within 500 m of a higher sensitivity habitat.
- Water Quality:
 - Harmful algae was scoped out of the assessment for the transitional water body. Although there is no information available on harmful algae within the water body, the works will be taking place significantly below the water column with no direct pathway of effect for harmful algae.
- Invasive Non-native Species:
 - INNS were scoped out as there will be no interaction with the transitional water body. The works will be taking place significantly below the water column with no direct pathway of effect.

4.3 Impact Assessment

4.3.1 Biology - Fish

Reasons for inclusion as outlined in the Scoping Template in Appendix 1 are the proposed activities:

- are in an estuary and could affect fish in the estuary, outside the estuary and could delay or prevent fish entering it or could affect fish migrating through the estuary; and
- 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).

Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, European eel *Anguilla anguilla* and Atlantic salmon *Salmo salar* are diadromous species that have been recorded

within the Afon Tywi / River Tywi SAC, or Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC (NBN Atlas Wales 2023). Sea and river lamprey are Annex II species which are designated features for both SACs. The European eel is protected under European eel management plan legislation (Eel Recovery Plan, Council Regulation No 110/2007) implemented under The Eels (Wales and England) Regulations 2009.

Construction impacts

The potential effects of the works on fish within the Tywi & Taf & Gwendraeth – Three Rivers Estuary transitional water body are as follows.

- Effects of underwater noise and vibration

Assessment

Underwater noise and vibration from drilling works (HDD operation) has the potential to pose a barrier to migratory movements, resulting in delayed migration up-river and subsequent delays in spawning activity. The HDD has been designed with best practice in mind, and the drilling profile is >10 m beneath the riverbed.

Underwater noise and vibration may cause the following effects on fish:

- Behavioural effects (e.g. reduced detection of predators/prey, inhibited communication between conspecifics, alteration in swimming behaviour);
- Masking effects (i.e. the reduced detectability of a given sound owing to the simultaneous occurrence of another sound);
- Temporary threshold shift (TTS) in hearing (short or long-term changes in hearing sensitivity that may or may not reduce fitness);
- Recoverable tissue injury (not resulting in mortality e.g. hair cell damage, minor internal or external hematoma etc.); and
- Mortality or potential mortal injury (immediate or delayed death).

Sparse data are available for sound levels generated by HDD works, however, for HDD operations within a riverine environment 39 m below the riverbed, Nedwell *et al.* (2012) indicated that an unweighted Sound Pressure Level of 129.5 dB re: 1 μ Pa rms was recorded, although no frequency data were available. Studies undertaken for the Felindre to Tirley gas

pipeline project in South Wales found there were likely to be no significant effects of vibration and noise on fish species using the rivers where tunnelling was taking place (Nedwell *et al.* 2008).

Use of the HDD technique for pipe laying will avoid the requirement to use more aggressive (and noisy) methods of cable installation, such as blasting and trenching.

Hearing abilities of fish will vary in relation to morphological adaptations of the acoustico-lateralis apparatus, in particular the distance of the swim bladder to the inner ear (Bone *et al.* 1995, Hasting & Popper 2005, Mason 2013). Species that do not possess a swim bladder such as river and sea lamprey have a lower hearing ability than many other fish species and as such, rely on the detection of particle motion (the oscillatory displacement of fluid particles in a sound field) (Popper *et al.* 2014). Species with swim bladders with no connection to the inner ear (e.g. Atlantic salmon) have better hearing but can also only detect particle motion (Higgs *et al.* 2004, Gill *et al.* 2012).

Popper *et al.* (2014) provides exceedance criteria for fish which indicates continuous noise sources of 170 dB re: 1 µPa rms for 48 hrs could result in recoverable injuries and 158 dB re: 1 µPa rms for 12 hours could result in temporary threshold shifts (TTS) in hearing.

The noise generated by HDD is expected to be considerably below the exceedance criteria. Considering the low potential noise levels generated by the HDD in the water column the impact of noise on fish is assessed to be negligible.

Recent studies of vibration levels have been conducted for a 450 mm diameter HDD operation in south Dublin, Ireland (Reilly *et al.* 2020). The operation was on land and during this project vibration limits of no more than 10 mm/s were imposed by the Planning Authority during the HDD works. The HDD profile was approximately 150 m long and the drill was 9 m below the ground level. The vibration levels recorded were typically less than 1 mm/s with a maximum of 5 mm/s.

The British Standards Institute has published empirical predictors for groundborne vibration arising from mechanised construction works including tunnelling (BS 5228-2:2009, BSI 2009). This equation is:

$$v_{res} \leq \frac{180}{x^{1.3}}$$

Where v_{res} is the resultant Peak Particle Velocity (PPV) in millimetres per second (mm/s) and x is the distance measured along the ground surface in metres (m).

This assessment has assumed that vibration travels up through the sediment under the Tywi & Taf & Gwendraeth – Three Rivers Estuary in the same way as along the ground surface. As the drill depth is a minimum of 10 m below the river the v_{res} is calculated to be 9.02 mm/s which is greater than the range reported by Reilly *et al.* (2020) but less than the limit imposed by the Dublin Planning Authority for HDD works. It should be noted that the 9 mm/s estimated would be the vibration level immediately above the HDD works, and it would rapidly decrease with increased distance from the works.

Salmonid embryo mortality has been reported from vibrations of 146 mm/s, and the State of Alaska Department of Fish and Game standards limit blast-induced streambed vibrations to 0.5 in/s (13 mm/s) to protect salmonid embryos (Dunlap 2009). As previously described, vibration levels of 9.02 mm/s are predicted to reach the riverbed in the immediate vicinity of the works and so no effects from vibration are predicted to occur for benthic egg or larval stages of fish.

In conclusion, effects of underwater noise and vibration on fish are anticipated to be negligible.

In addition, the classification of fish as a quality element in WFD transitional water bodies, is based on the Transitional Fish Classification Index (TFCI) (WFD-UKTAG 2014). The Tywi & Taf & Gwendraeth – Three Rivers Estuary transitional water body has not been assessed for fish (2021 assessment).

The TFCI is a multi-metric index composed of ten individual components, known as metrics, and each metric is assessed by comparing the observed metric values with those expected metric values under reference conditions. The ten metrics are:

- species composition;
- presence of indicator species;
- species relative abundance;
- number of taxa that make up 90% of the abundance;
- number of estuarine resident taxa;
- number of estuarine-dependent marine taxa;
- functional guild composition;
- number of benthic invertebrate feeding taxa;
- number of piscivorous taxa; and
- feeding guild composition.

The HDD works are temporary (anticipated duration of two weeks) and are not anticipated to notably affect any of the ten metrics indicated above for the TFCI.

Overall, it is concluded that there are not expected to be any non-temporary effects on the fish quality element at water body level and the HDD activities would not prevent the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD transitional water body from meeting its WFD objectives for fish.

4.3.2 *Water Quality*

Regarding potential introduction of chemicals to the water column, the risk of accidental spillage is minimised due to the distance of the working areas and the drill pits themselves from the Tywi & Taf & Gwendraeth – Three Rivers Estuary water body (the entry point is c.55 m from the Tywi & Taf & Gwendraeth – Three Rivers Estuary). In addition, a wide range of measures will be applied to prevent chemical spillages and pollution of the environment (outlined in CMU Infrastructure Ltd 2023).

During drilling of the hole, drilling fluid will lubricate the drill string, remove solids from the borehole, and cool the drilling bit and downhole instruments. A freshwater bentonite suspension (chemically inert) will be used as the drilling fluid.

The biological parameter ‘Phytoplankton’ is currently at moderate status for the Tywi & Taf & Gwendraeth – Three Rivers Estuary water body. Due to the location of the works, and the wide range of measures to prevent spillages and pollution, it is considered unlikely that the proposed development will contribute to a significant change in phytoplankton composition and abundance, nor prevent this parameter from meeting future WFD objectives (i.e. to achieve good status).

Assessment

The assessment included consideration of the following embedded mitigation:

- The range of mitigation measures to prevent spillage and pollution of the environment in the method statement (CMU Infrastructure Ltd 2023);
- The waste strategy for collection and disposal of drill fluid and particle arisings (CMU Infrastructure Ltd 2023);
- The pressure in the fluid will be monitored continuously so that any break outs will be identified quickly and the volumes that would be released are small;

- A contingency plan is in place for break outs consisting of the following stages: Prevention; Containment; Control (CMU Infrastructure Ltd 2023).

With these measures in place the risk of break outs and any accidental fuel spillages are considered to be small and As Low As Reasonably Practicable (ALARP).

Overall, it is concluded that there are not expected to be any non-temporary effects on the water quality element at water body level and the HDD activities would not prevent the water body from meeting its WFD objectives in terms of chemical status.

4.3.3 WFD Protected Areas

The works are within 2 km of the Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC and the Afon Tywi / River Tywi SAC.

A Habitats Regulations Assessment (HRA) report has been prepared by TEP (TEP 2023) which assessed the potential for the scheme to adversely impact these protected sites.

The following potential adverse effects were identified that could potentially impact on species or habitats that are the interest features of relevant designated sites:

- Potential pollution of hydrologically linked watercourses and downstream impact on SAC qualifying habitats during the construction phase (Afon Tywi / River Tywi SAC, and Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC);
- Potential pollution of supporting habitats of qualifying species during the construction phase (Afon Tywi / River Tywi SAC, and Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC: 1.7km South);
- Disturbance to qualifying species during the construction and operational phase (Afon Tywi / River Tywi SAC).

The HRA concluded that, without mitigation, there will not be a significant effect on the habitats or species associated with the Afon Tywi /River Tywi or Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC, both alone and in combination, from the construction phase or operational use. Therefore, progression through to Stage 2 (Appropriate Assessment) was not required.

Consequently, no effects on WFD Protected Areas are anticipated.

5. Cumulative Effects Assessment

The identification of plans and projects to include in the cumulative effects assessment may include:

- Approved plans;
- Constructed projects;
- Approved but as yet unconstructed projects; and
- Projects for which an application has been made, and currently under consideration and will be consented before the proposed activities begin.

The cumulative effects assessment considers the effects of the proposed activities on the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD water body supporting elements when combined with the effects of other plans and projects in the area.

To identify the plans and projects the following data sources were used: Data Map Wales, the NRW public register and the Carmarthenshire County Council Planning Portal.

Only plans and projects that have the potential to interact with the water column were considered further. These are summarised in Table 2, with further details below.

Table 2: Projects near the Proposed Development

Planning reference / Site code	Location	Description	Potential cumulative effect on water body
CML2246	Eastern shore of the mouth of the Tywi	Remedial works to masonry along the sea defences on the eastern edge of the river Tywi.	No
PL/04627	Land at Frondeg, Carmarthen	Residential development of 93 dwellings and associated landscaping and infrastructure	No
PL/01905	Land west of St David's Park, Carmarthen	Proposed solar farm and associated works	No

CML2246 – Marine licence application - Saint Ishmaels and Ferryside Sea Defence Maintenance

Dyer and Butler Ltd have scheduled remedial works to the masonry along the Sea Defences located between St Ishmael and Ferryside North along the eastern shore of the mouth of

the Twyi. The marine licence started in October 2022 and is valid until October 2023. The works include the removal of failed masonry pointing (along all defences), repairs to a significant failure of the Saint Ishmaels toe beam and urgent repairs to an upper embankment breach of Ferryside north. Due to the distance from the proposed development and the nature of the work being performed, it is considered that there are no anticipated cumulative effects across both projects.

PL/04627 – Planning application - Residential development of 93 dwellings and associated landscaping and infrastructure

Persimmon Homes West Wales are proposing to develop a parcel of land known as the Elias and Jones Fondeg Land, which forms part of the larger West Carmarthen Expansion Area for residential end-use. The proposed development will be comprised of residential housing, gardens, access roads, car parking areas and associated infrastructure. The site is bordered by a hydrologically connected watercourse to the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD water body. Due to the distance from the proposed development and the nature of the work being performed, it is considered that there are no anticipated cumulative effects across both projects.

PL/01905 – Planning application - Proposed solar farm and associated works

This project relates to the erection of a solar farm on land to the west of St David's Park. Planning permission was granted on the 17/08/2021. The site is adjacent to a watercourse which is hydrologically linked to the Tywi & Taf & Gwendraeth – Three Rivers Estuary WFD water body. Due to the distance from the proposed development and the nature of the work being performed, it is considered that there are no anticipated cumulative effects across both projects.

6. Summary

This assessment has considered the potential effects of the proposed works on WFD quality elements in the Tywi & Taf and Gwendraeth – Three Rivers Estuary WFD water body. The assessment has considered potential effects of the proposed activities on the hydromorphological, biological, and chemical quality elements for this water body.

The Scoping stage identified that the following receptors could potentially be affected by the works and were scoped in to further assessment:

- Biology – Fish
- Water quality –Phytoplankton status and chemicals (potentially including chemicals on the EQSD)
- WFD Protected Areas

The receptors that could be scoped out, with no need for further assessment, were:

- Hydromorphology
- Biology - Habitats (higher sensitivity)
- Biology - Habitats (lower sensitivity)
- Water quality - Chemicals above Cefas Action Level 1
- Water quality – Physiochemical parameters
- Water quality - Harmful algae
- INNS

The assessment has taken into account the following embedded mitigation measures which would be implemented in line with best practice:

- The range of mitigation measures to prevent spillage and pollution of the environment in CMU Infrastructure Ltd methods statement (2023);
- The pressure in the drill fluid will be monitored continuously so that any break outs will be identified quickly and the volumes that would be released are small;
- A contingency plan is in place for break outs consisting of the stages prevention, containment and control (CMU Infrastructure Ltd 2023);
- The drill profile which will pass under the river with >10m of overlying strata (between the HDD and the river bed).

It was concluded that with these embedded mitigation/avoidance measures in place the Proposed Development is not expected to produce non-temporary effects on the biological, hydromorphological and chemical quality elements of the Tywi & Taf and Gwendraeth – Three Rivers Estuary transitional WFD water body and is not expected to prevent the water body from meeting its WFD objectives.

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Appendix 1 WFD Scoping Template

Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The [WFD assessment guidance for estuarine and coastal waters](#) will help you complete the table.

Your activity	Description, notes or more information
Applicant name	The Environment Partnership
Application reference number (where applicable)	Not available
Name of activity	Gas Pipeline Installation
Brief description of activity	The project involves the installation of a new gas pipeline in the floodplain of the Afon Tywi/River Tywi to the South of Carmarthen to act as a diversion from the existing pipeline. The works will include open-cut trenching and horizontal directional drilling (HDD) for about 170 m beneath the river Tywi.
Location of activity (central point XY coordinates or national grid reference)	The co-ordinates for the entry and exit of the HDD are below, <ul style="list-style-type: none"> • IP3 240430451, 219392961

	<ul style="list-style-type: none"> IP4 240602905, 219337891
Footprint of activity (ha)	0.4 (ha)
Timings of activity (including start and finish dates)	Start: 31/07/2023 – Finish: 14/08/2023
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	Horizontal Directional Drilling for a distance of about 170m.
Use or release of chemicals (state which ones)	None

Water body ¹	Description, notes or more information
WFD water body name	<i>Tywi & Taf Gwendraeth – Three Rivers Estuary</i>
Water body ID	<i>GB531006013400</i>
River basin district name	<i>Western Wales</i>
Water body type (estuarine or coastal)	<i>Transitional</i>
Water body total area (ha)	<i>2212</i>
Overall water body status (2015)	<i>Moderate</i>
Ecological status	<i>Moderate</i>
Chemical status	<i>Good</i>
Target water body status and deadline	<i>N/A</i>
Hydromorphology status of water body	<i>Supports Good</i>
Heavily modified water body and for what use	<i>No</i>
Higher sensitivity habitats present	<i>Yes: Saltmarsh, mussel beds</i>
Lower sensitivity habitats present	<i>Yes: Intertidal soft sediment, gravels and cobbles, subtidal soft sediment, rocky shore</i>
Phytoplankton status	<i>Moderate</i>
History of harmful algae	<i>Not Provided – Water Watch Wales and Magic Map used</i>

WFD protected areas within 2km	<i>Camarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC</i> <i>Afon Tywi / River Tywi SAC</i> <i>Camarthen Bay Dunes / Twyni Bae Caerfyrddin SAC</i>
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¹ Water body information can be found in the Environment Agency's catchment data explorer and the water body summary table. Magic maps provide additional information on habitats and protected areas. Links to these information sources can be found in the WFD assessment guidance for estuarine and coastal waters.

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

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 ✓	The works are estimated to be more than 10 m below the river Tywi and are thus not expected to have any impact to the hydromorphology of the river. The water body in which the works are set to take place is not a high status water body.
Could significantly impact the hydromorphology of any water body		Impact assessment not required ✓	The works are estimated to be more than 10 m below the river Tywi and are thus not expected to have any impact to the hydromorphology of the river.
Is in a water body that is heavily modified for the same use as your activity		Impact assessment not required ✓	The water body in which the works are set to take place is not a heavily modified water body.

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats ²	Lower sensitivity habitats ³
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	

² Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures.

³ Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Consider if the footprint ⁴ of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km ² or larger		No to all – impact assessment not required ✓	The footprint of the works is below 0.5 km ²
1% or more of the water body's area			The footprint of the activity is lower than 1% of the water body's area
Within 500m of any higher sensitivity habitat			Saltmarsh is present near (1.4km) to the proposed works (based IP3 240430451, 219392961 and IP4 240602905, 219337891).
1% or more of any lower sensitivity habitat			Intertidal soft sediments like sand and mud intersect with the proposed works, but the works footprint is less than 1% of this habitat.

⁴ Note that a footprint may also be a temperature or sediment plume. For dredging activity, a footprint is 1.5 times the dredge area.

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or could affect fish in or entering an estuary.

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	Requires impact assessment ✓		Underwater noise and vibration from drilling could affect migratory fish species.
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)	Requires impact assessment ✓		Underwater noise and vibration caused from drilling could disturb fish movement, migration or spawning.
Could cause entrainment or impingement of fish		Impact assessment not required ✓	There is no entrainment or impingement risk from the drilling activities.

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

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)		Impact assessment not required ✓	Works are significantly below the water body (>10 m) and will not have a pathway to affect water quality.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment ✓		The phytoplankton status of the Tywi & Taf & Gwendraeth Three Rivers Estuary water body is moderate.
Is in a water body with a history of harmful algae		Impact assessment not required ✓	No information is provided on the history of harmful algae for the water body (Provide sources). There is no direct pathway for any effects on harmful algae due to the Proposed Development.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

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	Requires impact assessment ✓		Chemicals could potentially be released although it is anticipated the only chemicals that would be on the EQSD list could be derived from fuel. This has been screened in taking a precautionary approach.
It disturbs sediment with contaminants above Cefas Action Level 1		Impact assessment not required ✓	The ground-penetrating works will take place roughly 55 m from the water body itself and there is no evidence of chemical contamination of these sediments.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list		Impact assessment not required ✓	N/A – Activity does not have a mixing zone.

⁵ Carry out your impact assessment using the Environment Agency’s surface water pollution risk assessment guidance, part of Environmental Permitting Regulations guidance.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area ⁶	Requires impact assessment ✓		Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC; and Afon Tywi / River Tywi SAC.

⁶ Note that a regulator can extend the 2km boundary if your activity has an especially high environmental risk.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity could introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS		Impact assessment not required ✓	Works are sufficiently removed from the water body so as not to present a pathway for the introduction or spread of INNS.

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	Works are below the water body (>10 m) and will not have a direct pathway to affect hydromorphology.
Biology: habitats	No	The works are not within 500 m any higher sensitivity habitat and do not occupy more than 1% of any lower sensitivity habitat.
Biology: fish	Yes	Underwater noise and vibration from drilling could affect migratory fish species.
Water quality	Yes	The phytoplankton status of the water body is moderate. There is potential for some release of chemicals to the environment during the works.
Protected areas	Yes	The works are within 2km of the WFD protected sites: <ul style="list-style-type: none"> • Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC • Afon Tywi / River Tywi SAC.
Invasive non-native species	No	Works are significantly below the bed of the water body and will not have a direct pathway of effect for INNS.

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.