

Kaymac Marine & Civil Engineering Ltd.

Morfa Culvert Repair Works

Water Framework Directive

Assessment Report

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COMMERCIAL IN CONFIDENCE



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1. Introduction

1.1 Introduction to the Assessment

This Water Framework Directive (WFD) Assessment Report considers the proposed works required for the remediation of Morfa Culvert, which discharges water from surface run-off and a combined sewer overflow (CSO) into the River Tawe adjacent to Neath Road, Swansea. The culvert has partially collapsed and Kaymac Marine & Civil Engineering Ltd have been commissioned by the City and County of Swansea to perform the remediation work on the collapsed section of the culvert, involving permanent concrete repair to the culvert structure which requires temporary installation of a dam system and steel modular support system.

While the location of the collapse is landward of the riverbank, some in-water works are also required. This part of the River Tawe is transitional and the in-water works are below mean high water spring (MHWS). As such, the works are required to be consented under a Band 2 marine licence issued by Natural Resources Wales (NRW).

The proposed works are within the Tawe – Beaufort weir to barrage WFD transitional water body (ID: GB541005900900) and this WFD assessment has been produced in support of the Band 2 marine licence application. The assessment is required to determine if the proposed works could affect the current status or future potential of the WFD transitional water body.

1.2 Location and Context of the Works

The location of the proposed works within the Tawe – Beaufort weir to barrage water body is indicated in Figure 1 & Figure 2.

The Morfa Culvert is situated 200 m north of the Swansea City Football Stadium, Swansea, Wales. The culvert has partially collapsed causing a partial blockage, which is hindering its normal operation resulting in a significant reduction in flow from the culvert causing discharge water to back-up and pool behind the blockage. Currently, the exact internal condition of the culvert is unknown, but the location of the collapse has been identified.

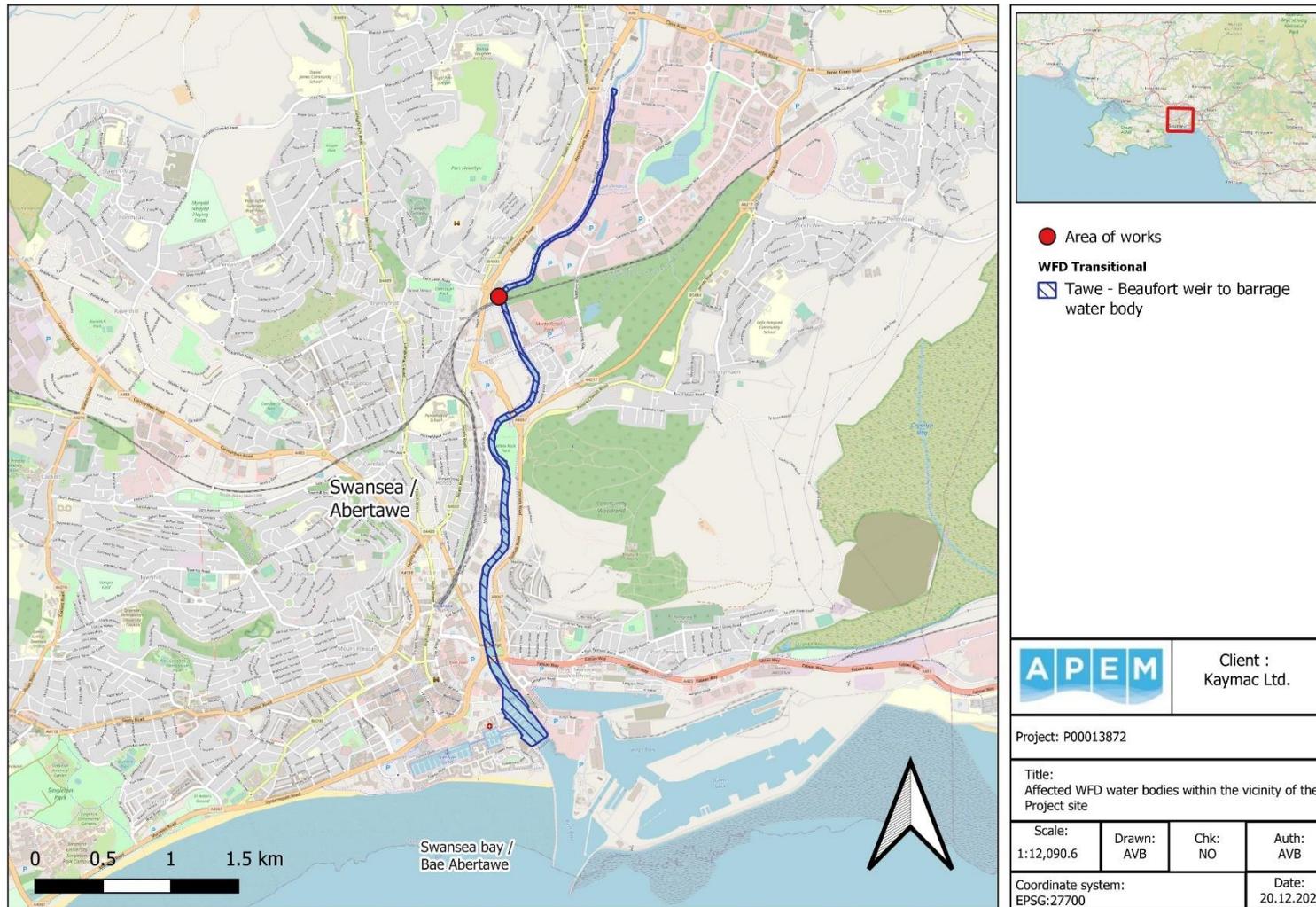


Figure 1: Proposed works in relation to the Tawe – Beaufort weir to barrage water body.

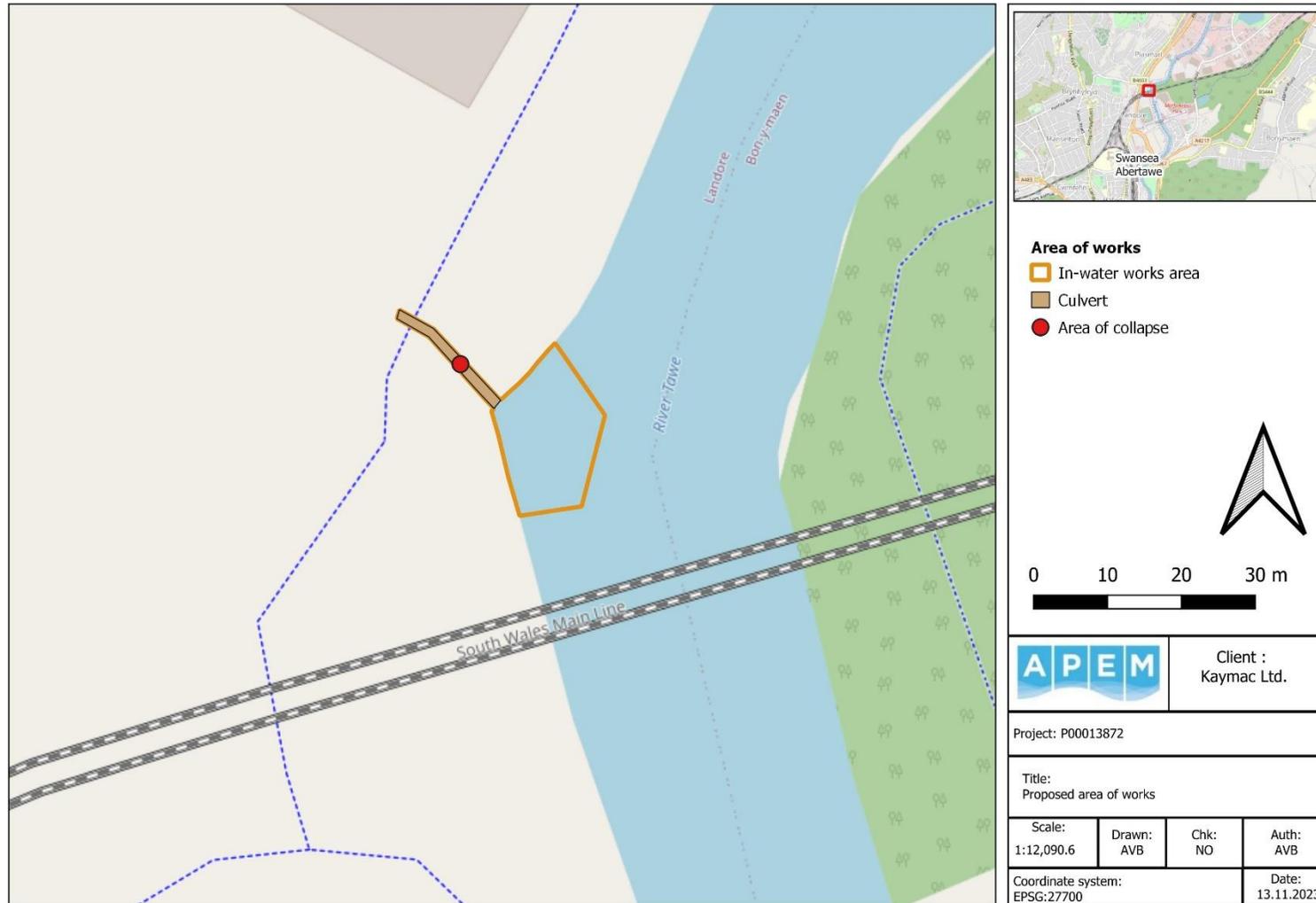


Figure 2: Proposed Area of the Works.

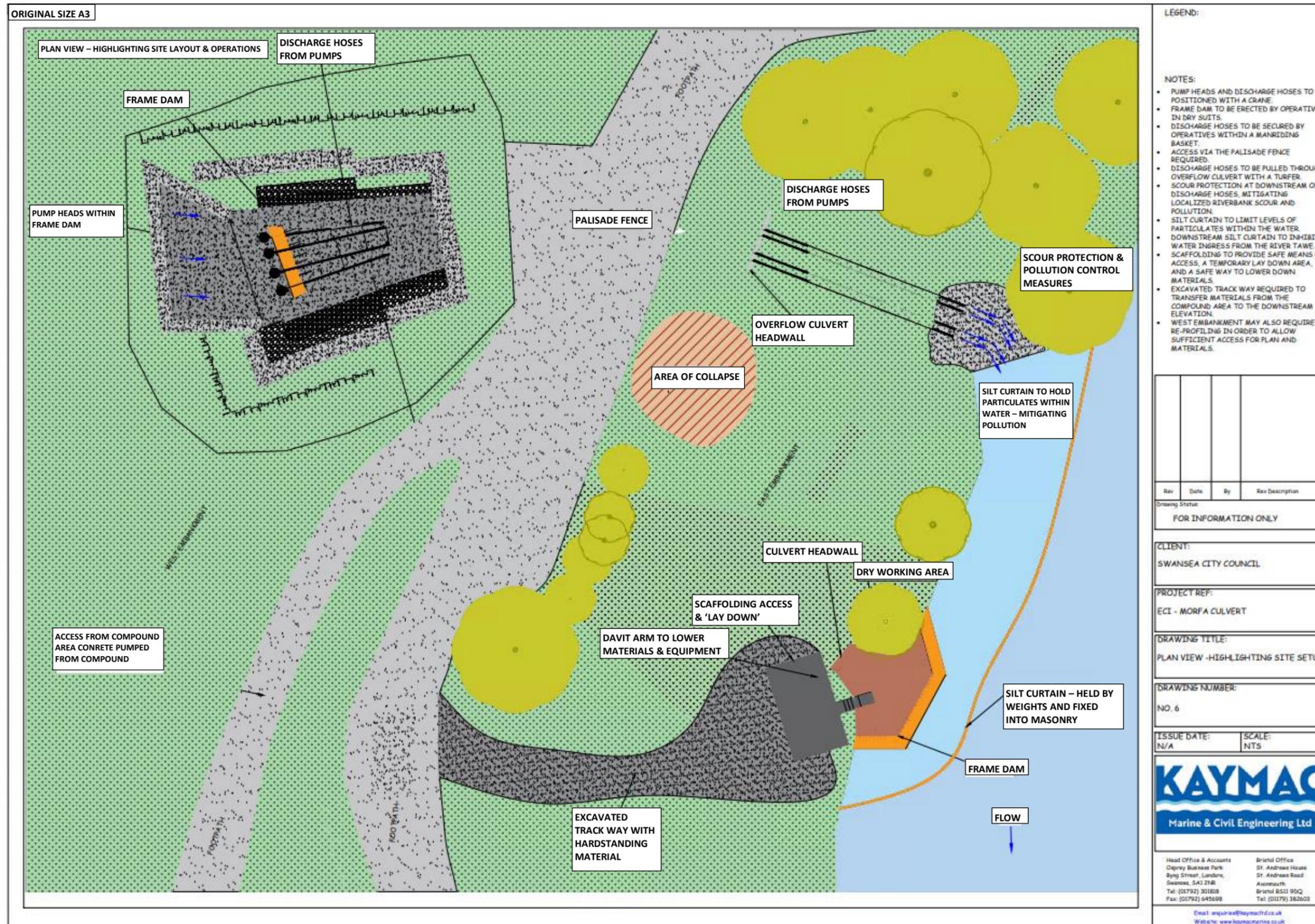


Figure 3: Plan view of both in-water and 'dry' proposed works provided by Kaymac (2023).

1.3 WFD Assessment Objectives

The objective of this assessment is to consider the available data for WFD supporting elements in the Tawe – Beaufort weir to barrage 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 description of the activities and methods associated with the proposed works is provided in Kaymac’s method statement (Kaymac 2023). A summary of key aspects of relevance to this assessment is provided below.

The proposed works are expected to have a footprint of approximately 2753 m² (0.003 km²), however, only an estimated 20% of the overall footprint (0.0006 km²) will occur within the waterbody. Therefore, the in-water footprint constitutes approximately 0.2% of the total area of the Tawe – Beaufort weir to barrage WFD water body (which has an extent of 0.26 km²) (Figure 1).

The works are scheduled to take place between May to July 2024 and are expected to take approximately nine weeks to complete.

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).

The site will be accessed from the Swansea City Football Club Liberty stadium car park located 82 m south of the collapsed culvert work site. A main site compound will be placed 25 m west of the culvert, and a haul road consisting of 'crush and run' gravel mix will be installed to provide plant and equipment access to the downstream culvert.

Discharge hoses will be installed to divert the ongoing culvert discharge around the area of work. The diverted water will be discharged a few metres from the watercourse and the area between the discharge hoses and the waterway will have scour protection measures with Sedi-mats on the riverbank and/or similarly approved pollution control measures. Initially the discharge will flow into the open watercourse, however, when the silt curtain is temporarily in place for the concrete pour (see below) the discharged water will be behind the silt curtain.

A two frame dam system will then be installed. The temporary in-river works (activities occurring below Mean High Water Spring (MHWS)) will include the installation of the part of the two Frame Dam System that is located downstream of the culvert collapse (Figure 3). Another dam will be located on land upstream of the culvert collapse (Figure 3).

Once the temporary dam systems are in place, over pumping of the built-up culvert discharge in the vicinity of the in-river dam will commence to allow for a 'dry' temporary work environment behind the dam. A water-resistant membrane will be placed around the frame dam to form a seal. A pump will then be installed to begin removal of water from the work site within the dam. Once water has been pumped out to create a dry working environment, approximately 8 m of the downstream culvert will be cleared of all debris. The cleared debris will be removed from the culvert and disposed of off-site via a licensed waste carrier to a nearby approved waste facility.

Once the area is dry, temporary guide rails and scaffolding will be installed before entry to the culvert to enable safe access and provide a frame for the culvert repair structure. A Davit Arm System and cranes to facilitate lifting operations will be used on land or in the dry works area only. The culvert repair structure will have front and back shutters to act as stop ends for the initial concrete pour. A temporary Steel Modular Support System and guide rails will be installed within the culvert to facilitate the permanent concrete repair operations. The works to fit the Modular support system near the culvert exit would be within the water body boundary (in the dry area behind the dam).

Before any concrete repair operations commence, a silt curtain will be installed to contain any silt/fines from entering the watercourse. The silt curtain will be floated to the correct position upstream of the works, ensuring that the whole worksite is within the encapsulation zone. Once in the correct position the curtain will be fixed into the masonry upstream.

The concrete will be delivered to the pour location via a static line pump from the site compound. The concrete mix will consist of a C40 with anti-wash-out agents. This mix design will mitigate the risk of a pollution incident and allow a faster setting time. The concrete delivery system will be positioned at least 10 m from the watercourse within a contained and bunded area. All mixing/deliveries will be undertaken within this bunded area. During concrete pour, the silt curtain will ensure the whole in-river works area are within the encapsulation zone during concrete operations. The silt curtain will be removed after the concrete operations and curing period to ensure that diverted water from the culvert does not remain behind the curtain for an extended period without dilution.

The anticipated duration of the proposed concrete operations will be 14 days. Following the curing period, the steel modular system will be removed.

After completing all the permanent works and removing the modular system and rails, Kaymac operatives will remove all the temporary works, including the frame dams and over-pumping equipment.

In summary, the main in-river temporary works (below MHWS) will consist of the following:

- Diversion of the ongoing culvert discharge into the river (installation of discharge hoses);
- Construction of downstream frame dam of the 2 X frame dam system;
- Over pumping water and built-up material from inside the downstream frame dam;
- Construction of the modular support system sections near the exit of the culvert; and
- Installation of silt curtain during concrete pour.

Some of the main primary plant and equipment to be deployed in the river or required in the vicinity of the in-river works include:

- 15T Long Reach Excavator c/w Bio-oil and Rubber Tracks;
- 8T Excavator c/w Bio-oil and Rubber Tracks;
- 7T Tracked Dumper c/w Bio-oil and Rubber Tracks;
- 10T Crawler Crane;
- Pumping Equipment;
- Davit Arm System;
- Silt Curtain;
- Frame dam systems (one downstream of culvert collapse (in-river), one upstream of culvert collapse (on land));
- Concrete Pump;
- Toproc C40/50 Rapid Concrete with anti washout or similar approved product;
- Visqueen;

- Sand;
- Sandbags;
- Spill kits;
- Steel modular System Formwork, including rollers & runners.

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 (the Tawe – Beaufort weir to barrage WFD water body is a HMWB).

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

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.

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 4. The classification hierarchy for surface waters (for Cycle 2) is illustrated in Figure 5. Only biological supporting elements have classification boundaries defined for 'high' through to 'bad' (Figure 4). Chemicals supporting 'chemical status' that do not meet EQS concentrations are classified as 'Failing to achieve Good' (Figure 4).

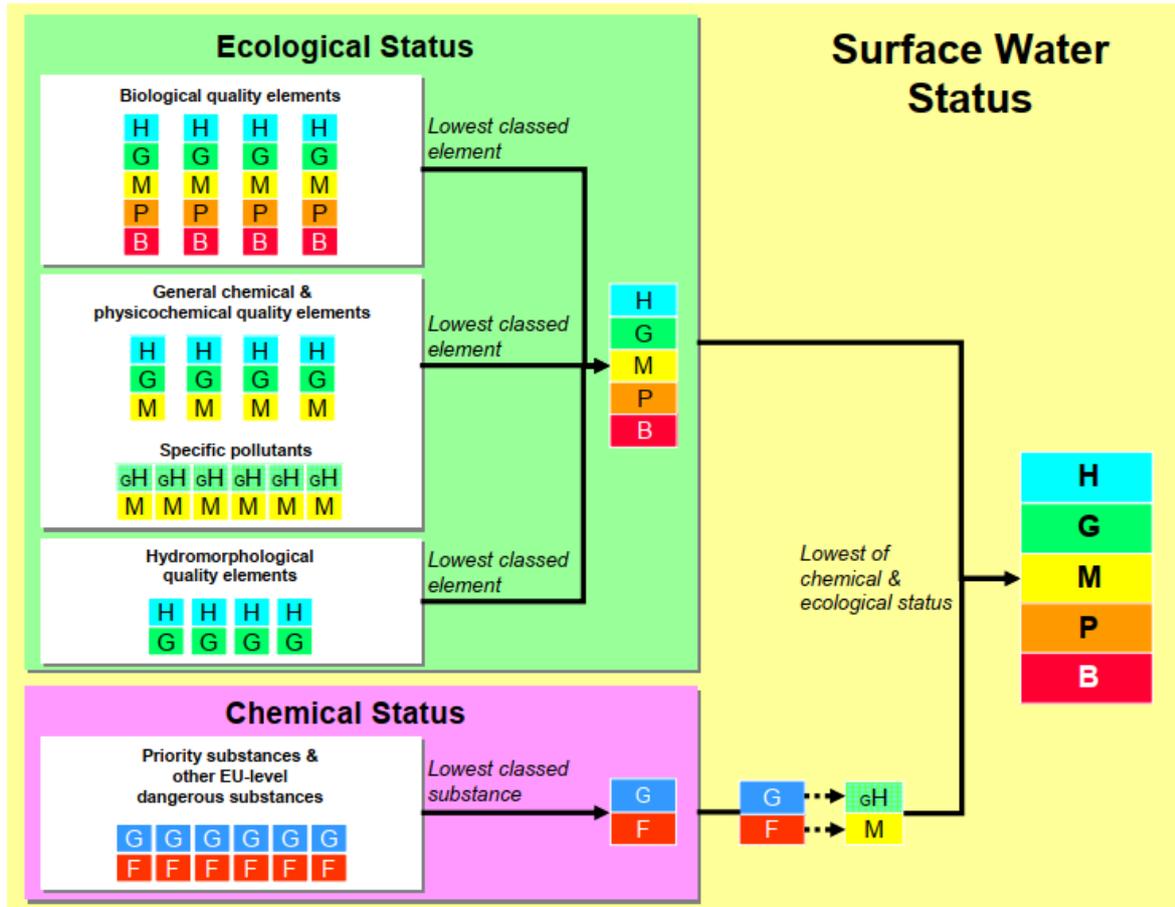


Figure 4: WFD quality elements – Bringing all the strands of evidence together (Environment Agency 2015).

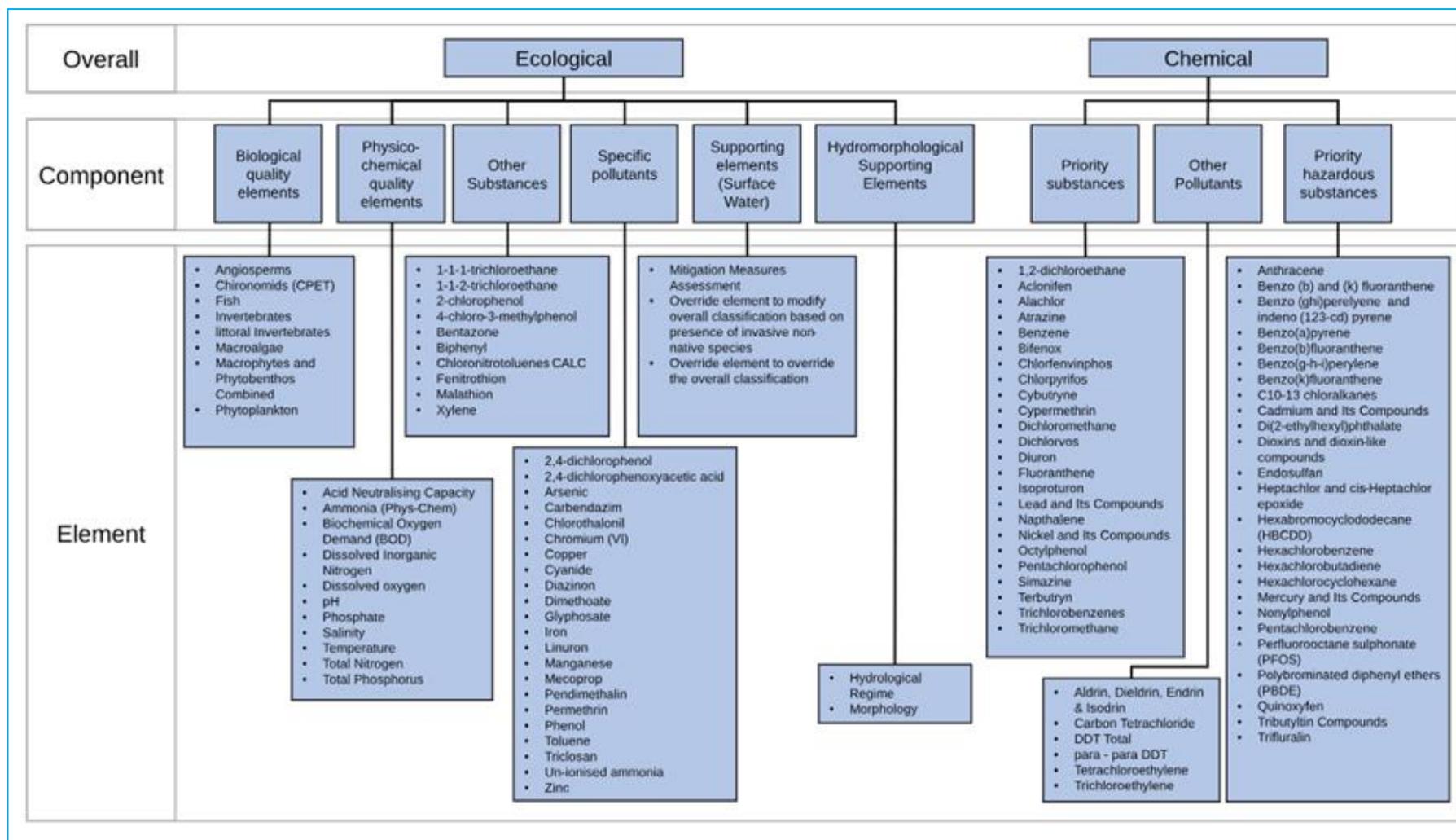


Figure 5: Classification hierarchy for surface waters (from Environment Agency 2023).

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 Tawe – Beaufort weir to barrage 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 Tawe – Beaufort weir to barrage 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 Tawe – Beaufort weir to barrage transitional water body.

Summary		Year
		2021
Water Body ID		GB541005900900
Water Body Area		26 ha
Water Body Type		Transitional Water
Hydromorphological designation		Heavily Modified
Overall Potential		Moderate
Parameter		2021
Chemical Status		Moderate
Priority Substances		Unknown
Priority Hazardous Substances		Unknown
Ecological Potential		Moderate
Biological Quality Elements	Angiosperms	Unknown
	Fish	Unknown
	Invertebrates	Unknown
	Macroalgae	Unknown
	Phytoplankton	Unknown
Physico-chemical Quality Elements	Dissolved Inorganic Nitrogen	Good
	Dissolved Oxygen	High
Specific Pollutants	Various	Moderate

3. WFD Assessment Methodology

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 Tawe – Beaufort weir to barrage 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 the status / potential of WFD quality elements in the Tawe – Beaufort

weir to barrage 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).

This 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

For the Tawe – Beaufort weir to barrage WFD transitional water body, the proposed activities were scoped for potential risks to hydromorphological, biological (habitats and fish), water quality, protected areas and INNS receptors using the scoping templates provided in the EA guidance (EA 2017). The completed scoping template is provided in Appendix 1.

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

- Water Quality:
 - The potential to ‘affect water clarity, temperature, salinity, dissolved oxygen (DO) levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)’ has been scoped in. There is potential for water clarity, DO and nutrient levels to be affected during the works.
 - Potential to release chemicals. The only potential for release of chemicals would be through washout of concrete during the works or the accidental release or spillages of fuel from plant.
- WFD Protected Areas:
 - The proposed activities are within a Nutrient Sensitive Area within the River Tawe.

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

- Hydromorphology:
 - The works are not associated with activities for which the water body is classed as ‘heavily modified’.
 - Given the small scale and temporary nature of the works, it is highly unlikely to have any impact on the hydromorphology of the water body.
- Biology – Fish
 - Given the small scale and isolated nature of the works, and the fact that the works footprint covers less than one fifth of the width of the river, it is highly unlikely to have any impact on fish populations within the water body. The proposed works are considered to be unlikely to impact on normal fish

behaviour nor cause a barrier to fish movement for the duration of the in-river works.

- **Biology – Habitats (high and low sensitivity):**
 - The works are not within 500 m of any higher sensitivity habitats.
 - The footprint of the Proposed Development is not greater than 1% of any lower sensitivity habitat.

- **Water Quality:**
 - Phytoplankton is only scoped into further assessment if it has a status of Moderate, Poor or Bad in the WFD water body of interest (see Section 3 of the Scoping Templates in Appendix 1). In the Tawe – Beaufort weir to barrage water body phytoplankton has not been monitored so was scoped out of further assessment.
 - Harmful algae was scoped out as there is no history of harmful algae in the Tawe – Beaufort weir to barrage water body (not monitored).
 - Release of chemicals in a mixing zone was scoped out of further assessment. Although the project includes a mixing zone (culvert discharge), there will be no change to the nature or volume of the current discharge.
 - Potential to release chemicals above CEFAS Action Level 1 was scoped out of further assessment as the project does not involve the disturbance of sediment that could result in the release of chemicals.

- **Invasive Non-native Species:**
 - INNS were scoped out as contact with the waterbody by plant/equipment will be minimal and plant and wheel washing is to be carried out prior and post works, so the introduction of INNS is considered unlikely. Best practice measures will be followed to prevent introduction and spread of INNS.

4.3 Impact Assessment

4.3.1 Water quality

The reason for inclusion of water quality in the impact assessment as outlined in the scoping template in Appendix I is that the proposed activities:

- Could affect physico-chemical parameters including water clarity, temperature, salinity, DO levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days); and

- There is the potential to release chemicals on the EQSD list in the form of accidental spillages of fuel from works plant.

Effect on physico-chemical parameters

The scoping assessment considered whether the works could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days). Some of these physico-chemical parameters could be affected during the works.

Assessment

The over-pumping of water from behind the culvert collapse to create a dry working area is scheduled to take approximately 0.5 days so was scoped out of further assessment as this activity does not have the potential to affect physico-chemical parameters for more than a spring neap tidal cycle. The diversion of the operational culvert discharge will be required for the duration of the works (approximately 9 weeks) so has the potential to have effects for longer than a spring neap tidal cycle. Diverting the discharge has the potential to cause scour of the riverbank resulting in increased input of sediment to the river with potential to subsequently cause an increase in suspended sediment and a decrease in water clarity. However, this potential effect was also scoped out due to the use of scour protection on the riverbank and Sedi-mats placed downstream of the flow as pollution control measures, which are embedded mitigation measures detailed in the method statement (Kaymac 2023).

As such, the main activity that is considered to potentially have an effect on physico-chemical parameters for longer than a spring-neap tidal cycle is the use of a silt curtain during the concrete pour operations. The silt curtain will be installed prior to the start of concrete pour operations as an additional, precautionary measure against washout of concrete into the watercourse (the primary measure is the in-river frame dam that will allow all works to be undertaken in the dry). The concrete pour operations will be undertaken in four stages. The first stage includes placing concrete into the area of defective invert, followed by three pours around the steel modular system to create the new culvert structure).

The silt curtain will be installed in-river around the frame dam (see Figure 3), enclosing an area of water around the works. The diverted culvert discharge will continue to be discharged during this period and the silt curtain will enclose this discharge point. As such, there is the potential for a reduction in physico-chemical parameters of the water enclosed within the silt curtain, where flow will be greatly reduced, and the culvert discharge will concentrate without the benefit of being immediately diluted and dispersed by the full flow of the river.

The concrete pour operations are scheduled to take 14 days but is weather dependent so there is potential for weather delays resulting in the silt curtain being in place for longer than a spring-neap tidal cycle.

The area within which the diverted culvert discharge may concentrate inside the silt curtain is small relative to the river width and overall water body extent (see Figure 3 which shows the area of river that will be enclosed within the silt curtain). While the silt curtain has the potential to be in place for longer than 14 days, it is not scheduled to be longer than this and any weather-related delays are only likely to extend its use for a short period longer than 14 days, if at all. As such, any reduction in physico-chemical parameters within the silt curtain will be temporary. In addition, the silt curtain will only slow the exchange of water between the river and the area within the silt curtain and not prevent exchange completely, so the area will be subject to some dilution while the silt curtain is in place. Once the silt curtain is removed, any concentrated culvert discharge water will be rapidly diluted and dispersed by the river flow.

Consequently, it is concluded that there are not expected to be any non-temporary effects on the water quality element in terms of effects on physico-chemical parameters at the local or water body level, and the proposed works would not prevent the Tawe – Beaufort weir to barrage transitional water body from meeting its WFD objectives for chemical status.

Release of chemicals

The primary route for possible release of chemicals is through the accidental release / spillages of fuels and oils from site plant during the works or the potential washout of concrete.

The concrete pour operations will be tightly controlled as per the Kaymac method statement (Kaymac 2023). All concrete works will be undertaken in the dry within the frame dams upstream and downstream of the culvert collapse location (with the downstream frame dam being in-river). The concrete to be used for the works is Toproc C40/50 Rapid Concrete (or a similarly approved product) with anti washout. This is a quick curing concrete that reduces the duration the concrete is susceptible to washout. In addition, the silt curtain will be installed in-river during concrete operations, which would reduce the potential for the spread of concrete within the river should a washout occur. With these measures in place, the chance of a washout is reduced, and the potential spread of a washout is reduced, in the unlikely event that this occurs.

In addition, concrete pours will only be undertaken during dry weather periods, which will further reduce the potential for concrete washouts. As such, it is considered highly unlikely that a pollution event could occur due to concrete washout.

The other potential route for the release of chemicals is due to accidental spillages or leaks of fuels and oils from plant and equipment such as excavators, cranes, dumpers, pumps and generators that will be required on site.

None of these will be required to be used in-river so direct inputs to the water body are considered highly unlikely. However, they will be working and in use on the riverbank so there is a potential pathway for spillages and accidental releases into the river.

Various best practice measures will be implemented to prevent accidental spillages from plant and equipment used in construction, which will be captured in a Construction Environmental Management Plan (CEMP) for the works. Examples of best practice measures include:

- Following best practice guidance (EA Pollution Prevention Guidelines and SEPA Engineering in the Water Environment, Good Practice Guide – Temporary Construction Methods);
- Any plant delivered to site will have been cleaned, properly maintained and will be fit for purpose;
- On arrival at site, the Kaymac Supervisor will inspect all plant for visible signs of fuel / oil leaks;
- All plant will come equipped with spill kits which all site personnel will be trained in the use of;
- All plant / equipment will be appropriately bunded to prevent the release of any accidental spillages;
- No refuelling of plant or equipment will be undertaken next to the river. All refuelling will take place greater than 10m from any watercourse, at the site compound in the Liberty Stadium car park; and
- Only biodegradable oils will be used for all plant on site.

Given the nature of the works, and the above measures to minimise the release of any chemicals from construction plant and equipment, the risk of effects on the Tawe – Beaufort weir to barrage transitional water body from the accidental release of chemicals is considered to be negligible.

Consequently, it is concluded that there are not expected to be any non-temporary effects on the water quality element in terms of release of chemicals at local or water body level, and

the proposed works would not prevent the Tawe – Beaufort weir to barrage transitional water body from meeting its WFD objectives for chemical status.

4.3.2 WFD Protected Areas

WFD protected areas was scoped into further assessment because the works are within an area of the River Tawe that is designated as a nutrient sensitive area (eutrophic).

The Urban Waste Water Treatment Regulations (UWWTR) identify eutrophication as ‘the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorous, causing an accelerated growth of algae and other undesirable plant life, which may cause disturbance and alterations to water quality and subsequently to the local habitats and species present.’

Assessment

The works do not involve any changes to the nature or volume of the existing discharge from the culvert. There is the potential for culvert discharge water to be ‘trapped’ within the silt curtain during the concrete pour operations (see Section 4.3.1 above). This may result in a localised (within the silt curtain) increase in nutrients from the discharge, because the discharge is not being diluted as efficiently compared to when it is discharged directly into the river flow. While some dilution and exchange is expected while the silt curtain is in place, this will be reduced for the duration of the concrete operations (scheduled for 14 days). However, when the silt curtain is removed, any concentrated culvert discharge water will be rapidly diluted and dispersed by the river flow. As such, it is considered that the risk of eutrophication while the silt curtain is in place is negligible. The risk to local species and habitats is also considered to be negligible.

Consequently, it is concluded that there are not expected to be any non-temporary effects on the Tawe River UWWTR nutrient sensitive area, and the proposed works would not prevent the Tawe – Beaufort weir to barrage transitional water body from meeting its WFD objectives for chemical status.

5. In-combination 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 Tawe – Beaufort weir to barrage 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 Swansea 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
2023/0735/DOC	Plots Pc And Pj Land South Of Fabian Way And East Of River Tawe Swansea	External finishes to the Swansea Waterfront Innovation Quarter – University of Wales Trinity Saint David.	No cumulative effects on water body are expected as there will be no temporal or spatial overlap between this project and the proposed Morfa Culvert repair works.
2023/0680/DOC	Plots Pc And Pj Land South Of Fabian Way And East Of River Tawe Swansea	Swansea Waterfront Innovation Quarter - Partial discharge of condition 17 (scheme for foul water/surface water and land drainage) of Planning Permission 2015/1584 granted 13th May 2016 in relation to the Innovation Matrix Building	No cumulative effects on water body are expected as there will be no temporal or spatial overlap between this project and the proposed Morfa Culvert repair works.
DML2042	Swansea Bay	Swansea Maintenance Dredge - Water injection dredging projects to restore the required navigational depths within the Swansea SYSAC Marina between the Tawe Barrage and the Sail Bridge walkway in the winter	No cumulative effects on water body are expected as there will be no temporal overlap between this project and the proposed

Planning reference / Site code	Location	Description	Potential cumulative effect on water body
		months of 2022 (January and February) and 2023/24 (December, January and February).	Morfa Culvert repair works.
RML2244	Prince of Wales Dock, Swansea	Communication channel linking the Prince of Wales Dock to the adjacent dock area to be filled to accommodate an additional external quay side pathway.	No cumulative effects on waterbody as there be no spatial overlap between projects and this project falls within a different WFD water body (Tawe Estuary barrage including docks) compared to the proposed Morfa Culvert repair works.

6. Summary

This assessment has considered the potential effects of the proposed works on WFD quality elements in the Tawe – Beaufort weir to barrage 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 into further assessment:

- Water quality – Physicochemical parameters and release of chemicals on the EQSD list.
- WFD Protected Areas – nutrient sensitive areas.

The receptors that were be scoped out of further assessment, were:

- Biology – Fish
- Hydromorphology
- Biology - Habitats (higher sensitivity)
- Biology - Habitats (lower sensitivity)
- Water quality - Chemicals above Cefas Action Level 1
- Water quality – Phytoplankton status and chemicals (potentially including chemicals on the EQSD)
- Water quality - Harmful algae
- INNS

The assessment has taken into account the following embedded mitigation measures which would be implemented during the project:

- Following best practice guidance (e.g. EA Pollution Prevention Guidelines and SEPA Engineering in the Water Environment, Good Practice Guide – Temporary Construction Methods);
- Any plant delivered to site will have been cleaned, properly maintained and will be fit for purpose;
- On arrival at site, the Kaymac Supervisor will inspect all plant for visible signs of fuel / oil leaks;

- All plant will come equipped with spill kits which all site personnel will be trained in the use of;
- All plant / equipment will be appropriately bunded to prevent the release of any accidental spillages;
- No refuelling of plant or equipment will be undertaken next to the river. All refuelling will take place greater than 10m from any watercourse, at the site compound in the Liberty Stadium car park; and
- Only biodegradable oils will be used for all plant on site.

It was concluded that with the appropriate 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 Tawe – Beaufort weir to barrage 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	Kaymac Marine & Civil Engineering Ltd.
Application reference number (where applicable)	Not applicable
Name of activity	Morfa Culvert repair works
Brief description of activity	A section of the Morfa Culvert, located on the River Tawe, has collapsed and requires repair works. This includes the installation of a temporary dam system within the river and over pumping of water within the culvert to dry out the area immediately around the collapse, allowing for the removal of debris and installation of a concrete repair structure.

Location of activity (central point XY coordinates or national grid reference)	X: 266255, Y:195860 Grid Ref: SS 66255 95860
Footprint of activity (ha)	0.275
Timings of activity (including start and finish dates)	Start: May 2024 End: September 2024
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	The site will be accessed through the Liberty Stadium car park, 81.5 m south of the project site and a temporary site compound for the plant will be located 25 m west of the collapse area. The footprint of the site is approximately 0.275 ha however, only approximately 20% of the overall footprint (0.0006 km ²) will be within the waterbody (incl. installation of temporary dam, clearance of debris, installation of temporary steel modular system and permanent concrete repair structure). The footprint of the concrete structure will not exceed the footprint of the existing culvert. Activities will occur between 8:00 am – 18:00 pm Monday -Saturday, with no work on Sundays. The works will not change the composition or volume of the current discharge.
Use or release of chemicals (state which ones)	No chemicals are intended to be used during the works besides fuel for plant and none are anticipated to be released to the water column.

Water body¹	Description, notes or more information
WFD water body name	Tawe – Beaufort weir to barrage
Water body ID	GB541005900900
River basin district name	Tawe
Water body type (estuarine or coastal)	Estuarine

Water body total area (ha)	26
Overall water body status (2015)	Moderate
Ecological potential	Moderate
Chemical status	Moderate
Target water body status and deadline	Good by 2027
Hydromorphology status of water body	Not assessed
Heavily modified water body and for what use	Yes – for flood protection and navigation.
Higher sensitivity habitats present	No higher sensitivity habitats are present within this waterbody
Lower sensitivity habitats present	No lower sensitivity habitats have been identified within this waterbody.
Phytoplankton status	Not monitored
History of harmful algae	Not monitored
WFD protected areas within 2 km	The River Tawe is designated as a UWWTR nutrient sensitive area – Eutrophic.

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 will be confined to a small area of the Tawe – Beaufort weir to barrage water body which is classed as ‘not assessed’ for its hydromorphology status. The proposed works involve repairs to an existing culvert that discharges into the river. The culvert will be repaired using a concrete structure and a temporary cofferdam will be used in order to allow the works to be undertaken in the dry. The footprint of the in-water works is small (less than one fifth of the width of the river) and temporary so significant changes to flow rate, morphology and tidal patterns are not anticipated. There will be no permanent physical modifications to the water body. As such, the works are not considered to have the potential to impact the hydromorphological regime of the waterbody.
Could significantly impact the hydromorphology of any water body		Impact assessment not required	The proposed works involve repairs to an existing culvert that discharges into the river and do not involve any new

			permanent features that could affect the hydromorphology of the water body in which they will take place nor any other surrounding water bodies.
Is in a water body that is heavily modified for the same use as your activity		Impact assessment not required	The Tawe – Beaufort weir to barrage water body is classed as heavily modified for navigation, flood protection, Quayline and structure. The proposed works are not directly related to any of these activities.

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
None	None

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 works footprint is not larger than 0.5 km ²
1% or more of the water body's area			The works footprint does not constitute 1% or more of the water body's area
Within 500m of any higher sensitivity habitat			The works footprint is not within 500 m of any higher sensitivity habitats
1% or more of any lower sensitivity habitat			The works footprint does not constitute 1% or more of lower sensitivity habitats within the Tawe – Beaufort weir to barrage water body.

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		Impact assessment not required	The works are located within the transitional waters of the River Tawe. The footprint of the in-water works is less than one fifth of the width of the estuary and the works do not have the potential to prevent or delay fish from entering or passing through the estuary.

<p>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)</p>		<p>Impact assessment not required</p>	<p>The in-water works do not have the potential to be a source of significant underwater noise that could impact on normal fish behaviour.</p> <p>No works activities have the potential to change depth or flow rates or cause chemical change to the water body. The silt curtain that will be installed during the concrete pour operations will create a temporary barrier to a small part of the river, but this will be less than one fifth of the width of the river so will not prevent fish passage or be a barrier to normal fish movement. There may be a temporary and localised increase in suspended sediments on removal of the silt curtain but any decrease in water clarity would be expected to clear within a short period of time through river flow and tidal movements.</p>
<p>Could cause entrainment or impingement of fish</p>		<p>Impact assessment not required</p>	<p>There is no potential for impingement or entrainment of fish during the works.</p>

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)
<p>Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)</p>	<p>Requires impact assessment</p>		<p>Given the small-scale and temporary nature of the works, it is considered that there will not be any long-term changes to these parameters. There is the potential for a decrease in water clarity and dissolved oxygen within the area surrounded by the silt curtain for the duration of the concrete works and across a wider area when the silt curtain is removed.</p> <p>Over-pumping from behind the culvert collapse to create a dry working area may temporarily reduce local water clarity but is only scheduled to take 0.5 days.</p> <p>The culvert discharge diversion will occur for the duration of the works and may result in scour of the riverbank, leading to an increase in suspended solids in the river. However, embedded mitigation through the use of sedimats and rock mattress scour protection will ensure</p>

			<p>the riverbank is not subject to scour and erosion during the works.</p> <p>Due to potential for short term effects on effects on water clarity and DO, they have been scoped into further assessment.</p>
Is in a water body with a phytoplankton status of moderate, poor or bad		Impact assessment not required	Phytoplankton status has not been assessed for this water body.
Is in a water body with a history of harmful algae		Impact assessment not required	This has not been assessed.

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		The proposed works do not include the use or release of chemicals during the works. Chemicals could potentially be released accidentally, for example through accidental fuel spillages. Concrete will be used during the works and there is a potential pathway for this to be washed into the water body. As such, this has been scoped into further assessment.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
It disturbs sediment with contaminants above Cefas Action Level 1		Impact assessment not required	Works will not substantially disturb surrounding 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	There will be no chemical release associated with the works. The maintenance works of the culvert are not associated with the mixing zone of the operational discharge.

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 2 km of any WFD protected area ⁶	Requires impact assessment		The Tawe Estuary, where the works will take place, is a nutrient sensitive area (eutrophic river).

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	No plant will be required in the water body. Equipment for the dam and silt curtain will be washed down with clean fresh water prior to and after use and will have been kept in the dry for extended periods prior to deployment. As such, the introduction of INNS is considered unlikely.

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	Given that the works are restorative works to an existing culvert and the works are expected to not adversely impact the flow of the river, it is unlikely that they will pose as a risk to the hydromorphological regime of the waterbody.
Biology: habitats	No	The works footprint is relatively small compared to the size of the overall waterbody (<1%) and the habitats within it. The site of the proposed works is not within 500m of any higher or lower sensitivity WFD protected habitats.
Biology: fish	No	Given the ephemeral and restorative nature of the works, it is unlikely that there will be a barrier to the movement or migration of fish through the River Tawe.
Water quality	Yes	The proposed works will not involve the release or use of chemicals and the works are temporary in their nature. There is a potential risk of impact on dissolved oxygen and phosphate during works due to increased suspended sediment. There is also potential for the release of chemicals listed on the EQSD list in the form of accidental spillages of fuel from works plant.
Protected areas	Yes	The River Tawe is a nutrient sensitive area (Eutrophic), which is a WFD protected area. There are no other WFD protected areas in the vicinity of the proposed works.
Invasive non-native species	No	Contact with the water body by plant/equipment will be relatively minimal and so there is not expected to be any risk of introducing or spreading INNS.