River Tawe Ground Investigation Water Framework Directive Assessment

Final Report

September 2022

www.jbaconsulting.com

JBA Project Manager

Jonathan Harrison
JBA Consulting
Kings Chambers
8 High Street
Newport
NP20 1FQ

Revision History

Revision Ref/Date	Amendments	Issued to
Final Report v1.0/ September 2022	-	Amey PLC.

Contract

This report describes work commissioned by Amey PLC. Susannah Reid, Catherine Rodd and Adam Church of JBA Consulting carried out this work.

Prepared by ..... Susannah Reid BSc

Assistant Ecologist

..... Catherine Rodd BSc MRes MCIEEM

Senior Ecologist

Reviewed by ..... Rachael Brady BSc MSc PGCert CEcol MCIEEM

Principal Ecologist

Purpose

This document has been prepared as a Final Report for Amey PLC. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to Amey PLC.

Copyright

Carbon Footprint

JBA is aiming to reduce its per capita carbon emissions.

Contents

List of Figures

List of Tables

Abbreviations

CP+RC	Combined percussive / rotary boreholes
DrWPA	Drinking Water Protected Areas
IP	Inspection pits
NRW	Natural Resources Wales
NVZ	Nitrate Vulnerable Zones
PEA	Preliminary Ecological Appraisal
PPE	Personal Protective Equipment
RBD	River Basin District
RBMP	River Basin Management Plan
SgZ	Drinking Water Groundwater Safeguard Zones
TP	Trial pits
WFD	Water Framework Directive
WS	Window sample holes

1 Introduction

1.1 WFD Overview

The Water Framework Directive (WFD) came into force in 2000 and is the most substantial piece of EU water legislation to date. The Directive imposes legal requirements to protect and improve the water environment. All activities in the water environment need to take the Directive into account. The EU Water Framework Directive was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The 2003 regulations were consolidated and replaced with the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 ensure that floods and water legislation continues to be operable in the United Kingdom following withdrawal from the EU in January 2021. The instrument addresses deficiencies in retained EU law arising from the UK's withdrawal from the EU. The purpose of the instrument is to preserve and protect the existing policy regime rather than to introduce new policy. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, as amended by the Floods and Water (Amendment etc.) (EU exit) Regulations 2019, are hereafter referred to as the WFD Regulations in this report.

1.1.1 Scope of the WFD Assessment

The WFD Regulations require that Environmental Objectives be set for all surface and ground waters in England and Wales to enable them to achieve Good Status (or Good Ecological Potential for Heavily Modified and Artificial Water Bodies) by a defined date. These Environmental Objectives are listed below:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters.
- Aim to achieve at least good status/potential for all water bodies by 2021. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status/potential by 2027.
- Meet the requirements of Water Framework Directive Protected Areas.
- Promote sustainable use of water as a natural resource.
- Conserve habitats and species that depend directly on water.
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment.
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.
- Contribute to mitigating the effects of floods and droughts.

1.1.2 Preventing Deterioration in Status

Any activity which has the potential to have an impact on the ecology of a water body will need consideration in terms of whether it could cause deterioration in its Ecological Status or Potential[1].

For each water body, three different status objectives are identified within the RBMP. These are the overall status objective, the ecological status or potential objective and the chemical status objective. A default objective for all water bodies is to prevent the deterioration in the Ecological Status (or Ecological Potential for Heavily Modified and

1 Environment Agency (2010) Assessing new modifications for compliance with WFD: detailed supplementary guidance: 488_10_SD01

Artificial Water Bodies) of the water body. Note, the Ecological Status applies only to surface water bodies, and not ground water bodies. A separate assessment may be required to assess the impacts on the chemical and quantitative status of a ground water body, if the proposed activity is likely to cause impact.

The Ecological Status of a water body is determined through analysis of its constituent Biological Quality Elements. These elements are in turn supported by a series of Physico-Chemical and Hydromorphological Quality Elements. These Quality Elements are taken from Annex V of the WFD Regulations and are listed below. The overall Ecological Status is determined by the lowest element status.

The Biological Quality Elements assessed in the WFD include:

- Fish
- Invertebrates
- Macrophytes
- Phytobenthos

The WFD defines the flow, shape and physical characteristics of a watercourse as its 'hydromorphology'. Any in-channel works can impact upon the shape of a watercourse and the natural processes that occur within it, including:

- Flow patterns
- Width and depth of a channel
- Features such as pools, riffles, bars and bank slopes
- Sediment availability/ transport
- Interaction between a channel and its floodplain
- Ecology and biology (i.e. habitats which support plants and animals)

The WFD considers the chemistry of a watercourse through general water quality (physico-chemical measurements) and chemical pollutants. All three environmental components; morphology, hydrology and chemistry, support the Biology of a water body.

Any activity that has the potential to have an impact upon any of the Quality Elements will need consideration in terms of whether it could cause a deterioration in the status of a water body. The activity will also need to be considered in terms of whether it will compromise the ability of the water body to reach Good Ecological Status or Good Ecological Potential by the date specified in the Water Watch Wales, a web-based application provided by Natural Resources Wales (NRW).

Any adverse impacts can cause a water body's ecology to deteriorate and prevent environmental improvements from being undertaken. Nevertheless, in-channel works can also be beneficial if they can be designed to help achieve environmental improvements included in the River Basin Management Plan (RBMP), thus enhancing the water environment for plants and animals.

1.1.3 Artificial or Heavily Modified Water Bodies

Whilst good ecological status is defined as a slight variation from undisturbed natural conditions in natural water bodies, artificial and heavily modified water bodies are unable to achieve natural conditions. Instead, artificial and heavily modified water bodies have a target to achieve Good Ecological Potential, which recognises their important uses, whilst making sure ecology is protected as far as possible. Ecological potential is also measured on the scale high, good, moderate, poor and bad. The chemical status of these water bodies is measured in the same way as for natural water bodies.

Specific mitigation measures have been identified for each Artificial and Heavily Modified Water body and are listed in the RBMP. These mitigation measures are necessary to reduce

the existing hydromorphological impacts on the water body and all measures need to be in place in order for the water body to achieve Good Ecological Status or Potential.

1.2 Purpose of this WFD Assessment

JBA Consulting was commissioned by Amey PLC. to undertake a WFD assessment to inform the development and design of proposed ground investigations along the riverside of the River Tawe in Swansea, South Wales.

This WFD assessment aims to determine the effects of the proposed ground investigation works on ecological, hydromorphological and chemical quality and identify any potential impacts that could cause deterioration in the current status of the water body or could hinder the water body from meeting its WFD objectives in the future.

The site of works is located on and adjacent to the Tawe – Beaufort Weir Barrage transitional water body and falls within the Western Wales River Basin District (RBD). The Environmental Objectives, together with any specific actions (mitigation measures) necessary to enable the water body to meet these objectives, are set out in the Western Wales river basin district RBMP and the Natural Resources Wales' Water Watch Wales website.

2 Assessment Methodology

2.1 Overview

The following flow chart summarises the WFD Assessment process.

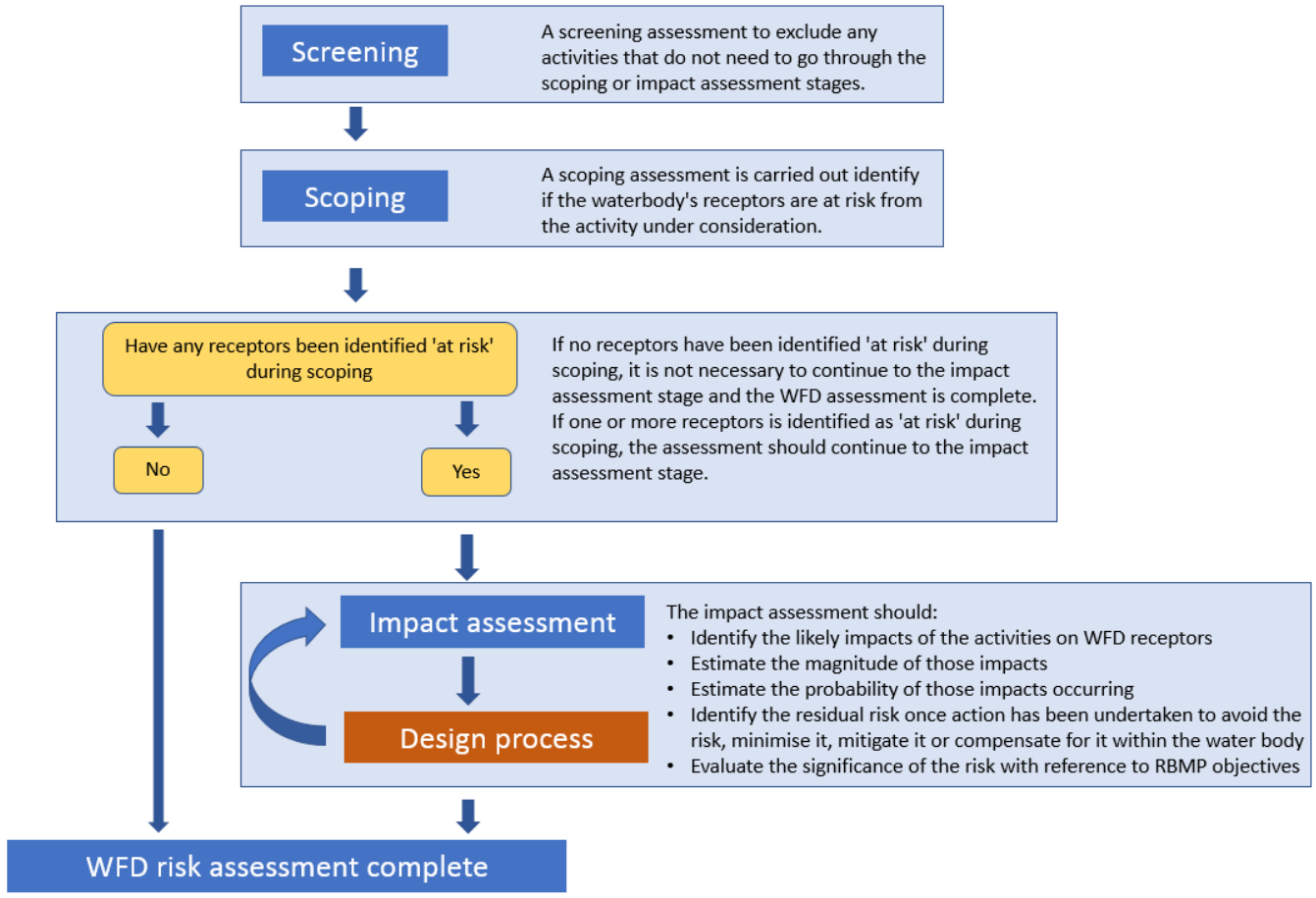

Figure 2-1: WFD assessment process flow chart

2.2 Screening Assessment

The Screening Assessment aims to exclude any activities that do not need to go through the scoping or impact assessment stages.

The Western Wales RBMP and the Natural Resources Wales' Water Watch Wales website were used to determine which water bodies could be potentially affected by the proposed works. The names, ID numbers, designation, status classification and objectives for all relevant water bodies were obtained and downloaded from the Natural Resources Wales' Water Watch Wales website.

The initial stage of the assessment screens the proposed works against the Ecological and Chemical Status objectives for the water bodies potentially affected by the works, together with their Quality Elements. The aim of this process is to determine whether the works could have an impact upon any of these criteria. Those criteria for which no potential adverse effects are identified are not considered further in the assessment. Any potential adverse effects are screened into the assessment and are carried forward to a detailed assessment.

2.3 Scoping Assessment

A detailed assessment is then undertaken to determine the effects that the proposed works could have upon those Quality Elements screened into the assessment. Any impacts identified are then considered in relation to the Ecological Status of the water body, which comprises biology, hydrology, hydromorphology and water chemistry, and the water body objectives.

The following assessment objectives are then used to determine whether the proposed works comply with the overarching objectives of the WFD. These objectives were therefore derived from the Environmental Objectives of the Directive (as listed in section 1.2).

- Objective 1: The proposed scheme does not cause deterioration in the Status of the Ecological Elements of the water body.
- Objective 2: The proposed scheme does not compromise the ability of the water body to achieve its WFD status objectives.
- Objective 3: The proposed scheme does not cause a permanent exclusion or compromised achievement of the WFD objectives in other bodies of water within the same RBD.
- Objective 4: The proposed scheme contributes to the delivery of the WFD objectives.

In order to establish whether the strategy complies with the WFD it is necessary to ascertain whether the preferred options have the potential to result in:

- Failure of a water body to achieve Good Ecological Status or Potential; or
- Failure to prevent a deterioration in the Ecological Status or Potential of a water body

If the answer to these questions is 'no' the strategy can be considered WFD compliant. If either of these failures is identified and if any receptors are identified as 'at risk', further assessment may be required to identify if the strategy meets all of the conditions set out by the WFD Legislation.

2.4 Impact Assessment

The third stage of the WFD Assessment, if determined as necessary from the Screening and Scoping Assessments, is to undertake an Impact Assessment to consider the impacts of the proposed scheme in more detail and recommend necessary mitigation measures. An impact assessment must be carried out for each receptor identified during scoping as being at risk from your activity.

The Impact Assessment describes how any identified impacts from the proposed scheme will be mitigated, to either avoid or minimise the impacts. The assessment shows how any impact on WFD receptor caused by the proposed activity fits with the objectives of any affected WFD water bodies. After the works have been amended to try and avoid, minimise, mitigate or compensate for the risks to WFD receptors the following questions will need to be answered:

- Could the activity still cause a water body to deteriorate from one WFD status class to another or cause significant localised impacts that could contribute to this happening?
- Could the activity prevent or undermine action to get water bodies to good status?

When these questions are answered, the following should be borne in mind:

- A water body deteriorates in status when one WFD receptor (an "element") is affected such that it drops from one WFD status class to another.

- A significant localised impact on an element is one that is either long-lasting; causes severe harm; or affects a wide area within a water body. These are likely to contribute to a water body dropping from one status to another and highly likely to prevent action to get water bodies to good status.
- Elements at high status are very sensitive. The assessment will need to demonstrate that there will be a negligible impact on those aspects of the water environment
- Elements at bad status must not be made worse.

If it cannot be demonstrated with a high level of confidence that the activity supports RBMP objectives, then in order for Natural Resources Wales to permit the activity it must be shown that the activity meets the criteria set out in Article 4(7) of the WFD. Article 4(7) sets out stringent environmental and socio-economic tests to assess if a scheme meets struct environmental and sustainability criteria.

3 Project Description

3.1 Project Overview

JBA Consulting has been commissioned to carry out a WFD assessment of ground investigation works that are required prior to inform the design of structures for the continuation of existing shared use path along the River Tawe. The proposed ground investigations are located along the riverside with boreholes within the riverbed and trial pits, inspection pits and window samples on the bank, located near urban industrial and residential areas along the river side.

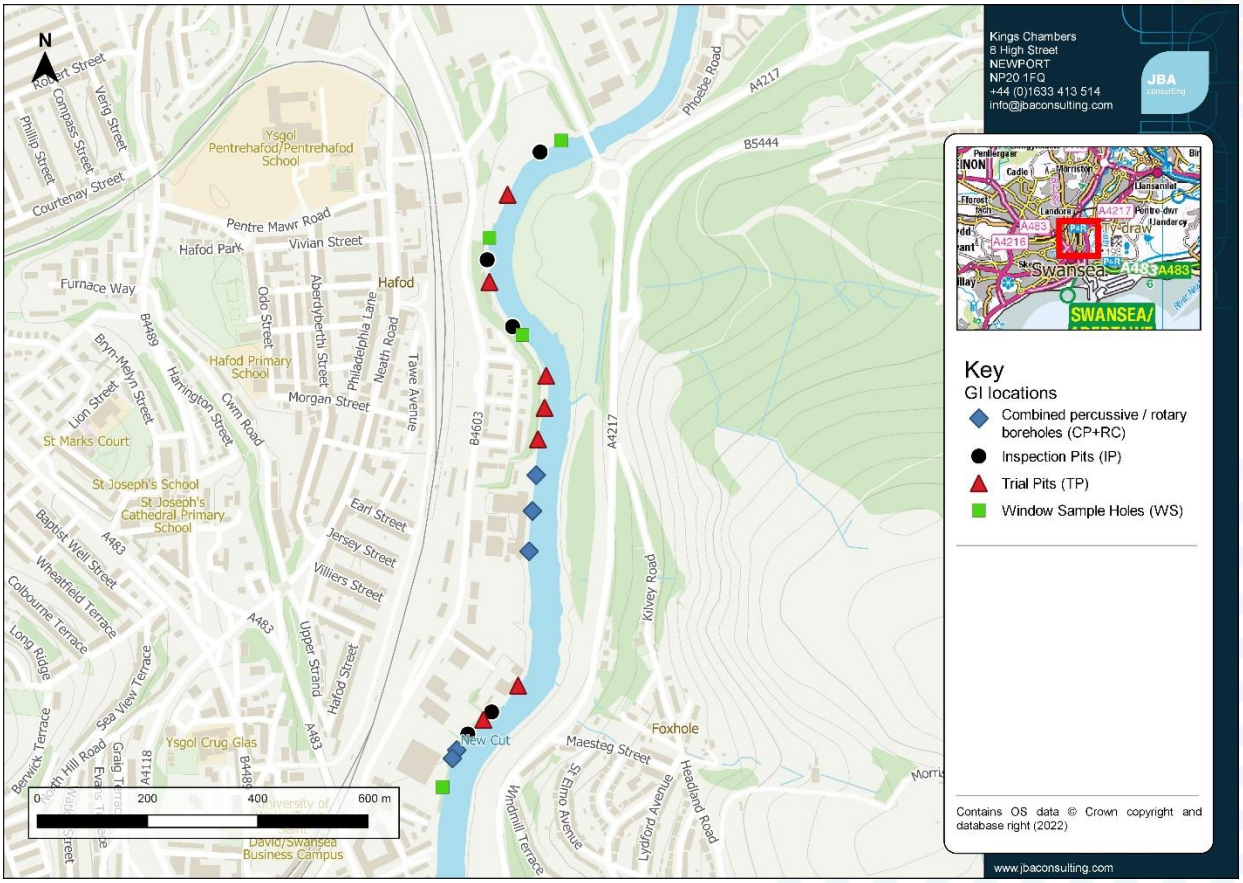

Figure 3-1: GI Locations

3.2 Proposed Works

The proposed works are to carry out ground investigations. Four methods will be used to carry out the works, these will include:

- Hand dug trial pits (TP) to 1.2m for geotechnical observation and sampling. Where appropriate these are also being used for structural observations
- Hand dug inspection pits (IP) to 1.2m for structural observations
- Window sample holes (WS) to 5m for geotechnical observation and sampling. Done with a mini excavator
- Combined percussive / rotary boreholes (BH CP+RC) to 25m or more for geotechnical observation and sampling backfilled with bentonite.

All boreholes are located near to the toe of the bank. Trial pits, inspection pits and window samples will be on the bank. The works to carry out the boreholes at the toe of the bank will be carried out from a floating pontoon which will be anchored on spud legs. ~~All the works will be onto a dry bank, no in water works will occur.~~

3.3 Assumptions of proposed construction works

The following assumptions have been made in regard to the construction phase of the project for the purpose of this WFD assessment. Should the scope of the proposed works change, the project should be reassessed to ensure that it is still compliant or whether any further mitigation or impact assessment is required.

There will be no dewatering carried out as part of the works process, if dewatering becomes necessary this assessment should be reviewed to assess any potential impacts. In addition, all works will occur onto dry banks, there will be no in water works carried out.

A piling risk assessment will be carried out prior to any works occurring to ensure there will be no impact upon groundwater bodies connected to the works area.

It is assumed that 'soft start' procedures will be followed for use of machinery to provide species with an opportunity to move away from the works area.

No ecology or geomorphology survey has been carried out by JBA Consulting, therefore this assessment has been completed based upon provided information from the client. It is assumed that an ecology survey has been carried out of the site and no Invasive Non-Native Species (INNS) identified. If INNS are present within the works area or surrounding area an INNS management plan will need to be written and implemented on site to ensure no inadvertent spread of these species.

It is assumed strict biosecurity protocols for all personnel and equipment will be followed, this is of especially high importance due to working in close proximity to water.

All banks will be reinstated following the works, so there will be no alteration in the structure of the watercourse.

No geomorphology desk based assessment has been carried out, however, this is considered not likely to have an impact upon the conclusions of this report.

4 WFD Screening Assessment

4.1 Overview

This screening assessment aims to screen in any works that require WFD Assessment and to identify which WFD water bodies are within and near to the proposed works.

The results of the screening assessment are presented below. The baseline status of the Quality Elements within the water bodies screened into the assessment are discussed in this chapter. As discussed in the Introduction and Methodology, if this section finds there is potential for the proposed works to cause deterioration in the status of a water body, or prevent it from achieving its status objectives, the relevant water body and its Quality Elements should be taken forward and consider further in the Scoping Assessment chapter.

4.2 WFD water bodies

The site is located within Tawe – Beaufort Weir to Barrage transitional waterbody, which is located within the Tawe to Cadoxton TraC Management Catchment. The following water bodies are considered:

- GB541005900901 - Tawe - Beaufort Weir to Barrage (Transitional waterbody on site)
- GB110059032180 - Tawe -confluence with Twrch to tidal limit (Surface waterbody upstream)
- GB110059025710 - Nant y Fendrod - headwaters to conf with Tawe (Surface waterbody upstream)
- GB541005900900 - Tawe Estuary below Barrage incl docks (Transitional waterbody downstream)
- GB641008260000- Swansea Bay (Coastal waterbody downstream)
- GB41002G201000 - Swansea Carboniferous Coal Measures (Groundwater waterbody on site)

4.2.1 Current status

Details of the latest classification, status and objectives, as described by NRW's Water Watch Wales website, are summarised in Table 4-1 below.

Table 4-1: Current WFD status

Water body ID	Name of water body	Hydromorphological designation	Current Overall Status/ Potential	Current Ecological Status/ Potential	Overall Status Objective
GB541005900901	Tawe - Beaufort Weir to Barrage	Heavily modified	Moderate	Moderate	Good by 2027
GB110059032180	Tawe - confluence with Twrch to tidal limit	Natural	Moderate	Good	Good by 2027
GB110059025710	Nant y Fendrod - headwaters to conf with Tawe	Heavily modified	Moderate	Moderate	Good by 2027

GB541005900900	Tawe Estuary below Barrage incl docks	Heavily modified	Moderate	Moderate	Moderate by 2027
GB641008260000	Swansea Bay	Heavily modified	Moderate	Moderate	Good by 2033
GB41002G201000	Swansea Carboniferous Coal Measures	Natural	Poor	N/A	

4.3 Screening Outcome: water bodies

The following table details which water bodies have been screened in or out of the assessment and the reasons for this decision.

Table 4-2: Water body Screening Assessment

Water body	Reason	Screening outcome
Tawe - Beaufort Weir to Barrage (GB541005900901)	The proposed works are located within the waterbody, and therefore, direct impact on this waterbody is possible.	Screened In
Tawe -confluence with Twrch to tidal limit (GB110059032180)	The waterbody is located 2.8km upstream of the proposed works. Due to the distance between the area of the proposed works and this waterbody, it is unlikely there will be an impact on this waterbody.	Screened Out
Nant y Fendrod - headwaters to conf with Tawe (GB110059025710)	The waterbody is located 2.0km upstream of the proposed works. Due to the distance between the area of the proposed works and this waterbody, it is unlikely there will be an impact on this waterbody.	Screened Out
Tawe Estuary below Barrage incl docks (GB541005900900)	The waterbody is located 1.0km downstream of the proposed works. Due to the distance and small-scale temporary nature of the works it is considered that this waterbody will not be impacted by the proposed works.	Screened Out
Swansea Bay (GB641008260000)	The waterbody is located 1.2km downstream of the proposed works. Due to the distance and small-scale temporary nature of the works it is considered that this waterbody will not be impacted by the proposed works.	Screened Out
Swansea Carboniferous Coal Measures (GB41002G201000)	This waterbody is overlaps with the area of works, however a piling risk assessment will be caried out prior to any works to ensure that there will be no impact upon this groundwater body as a result of the GI works.	Screened Out

4.4 Baseline status of screened-in water bodies

For each water body screened into the assessment, details on the status of each element, as described by NRW's Water Watch Wales, are given below.

4.4.1 Tawe - Beaufort Weir to Barrage (GB541005900901)

The three tables below describe the current status of the Ecological Elements according to the most recent WFD cycle. The ecological elements have not been assessed in the current 2021 cycle (Water Watch Wales, 2021), therefore statuses from surrounding waterbodies were used to inform this assessment.

Biological Quality Element	Current Status (2021)
Benthic Invertebrates	Not assessed
Fish	Not assessed
Phytoplankton	Not assessed
Macroalgae	Not assessed
Angiosperms	Not assessed

Hydromorphological Quality Element	Current Status
Depth variations	Not assessed
Quantity, structure and substrate of the bed	Not assessed
Structure of the inter-tidal zone	Not assessed
Freshwater flow	Not assessed (Pass in 2015)
Wave exposure	Not assessed

Chemical and Physico-Chemical Quality Element	Current Status
Transparency	Not assessed
Thermal Conditions	Not assessed
Oxygenation conditions	Not assessed
Nutrient conditions	Not assessed

4.5 Protected Areas

The WFD specifies that areas requiring special protection under other retained EC Directive and waters used for the abstraction of drinking water are identified as protected areas. These areas have their own objectives and standards.

The water body is linked to a number of protected areas, those within 2km of the works or which were considered to have the potential to be impacted are listed below:

Table 4-3: Protected Areas in Vicinity of Proposed Works

Protected Area Name	ID	Designation	Proximity to works	Screening Outcome
Swansea Carboniferous Coal Measures	GB41002G201000	Groundwater Drinking Water Protected Area	On site	In – located within site boundary
Swansea Bay (West)	N/A	Shellfish Water Protected Area	1.4km downstream	Out – located a significant distance from site

				boundary
Swansea Bay (East)	N/A	Shellfish Water Protected Area	2.0km downstream	Out - located a significant distance from site boundary
Swansea Bay	36900	Bathing Water	3.7km downstream	Out - located a significant distance from site boundary

4.5.1 Nitrate Vulnerable Zones (NVZs)

The retained European Commission Nitrates Directive requires areas of land that drain into waters polluted by nitrates to be designated as Nitrate Vulnerable Zones (NVZs). There are no NVZs within the site boundary.

4.5.2 Drinking Water Groundwater Safeguard Zones (SgZ)

Drinking Water Protected Areas (DrWPA) are designated under the Water Framework Directive, with the aim of avoiding deterioration in their quality in order to reduce the level of purification treatment required in the production of drinking water. SgZs are areas where actions will be targeted to address the causes of DrWPA objective failure/risk of failure.

Swansea Carboniferous Coal Measures Groundwater Drinking Water Protected Area is located within the site boundary.

4.6 Summary

To conclude the Screening Assessment, the following quality elements need to be considered further within the Scoping Assessment:

- Tawe - Beaufort Weir to Barrage water body
  - Biological Elements
  - Hydromorphological Elements
  - Physico-chemical Elements
- Protected areas:
  - Swansea Bay (West) Shellfish Water Protected Area
  - Swansea Bay (East) Shellfish Water Protected Area
  - Swansea Carboniferous Coal Measures Groundwater Drinking Water Protected Area

5 WFD Scoping Assessment

5.1 Overview

This scoping assessment identifies whether the water body's receptors, identified during the screening assessment, are at risk from the proposed works discussed in Chapter 3. The proposed ground investigation works are being appraised in terms of their impact on WFD status and objectives. If any Quality Elements are found to be at risk of detrimental impact, further assessment and/ or mitigation may be required in the next chapter (as demonstrated by the final column).

Some WFD Quality Elements have not been formally assessed as part of the classification for this water body. However, due to the scale and nature of the proposed works, all WFD Quality Elements have been included in the previous screening and any identified impacts have been considered in relation to the ecological status of the water body and the status objectives.

Article 4.7 of the Directive defends deterioration in status or failure to meet WFD objectives resulting from new modifications or sustainable human development activities (if all conditions set out under this Article are met). If the assessment procedure predicts that an activity will cause deterioration in water body status or prevent a water body from meeting its ecological objectives, then an assessment is also required against the conditions listed in Article 4.7 of the WFD. If all the assessment conditions are met, there will not be a breach of the WFD and compliance will be attained.

5.2 Scoping Assessment

5.2.1 Tawe - Beaufort Weir to Barrage transitional water body

5.2.1.1 Biological Quality Assessment

Table 5-1 presents an assessment of the proposed works against the biological quality elements of the Tawe - Beaufort Weir to Barrage transitional water body. This assessment is based upon available desk-based information based upon the assumptions outlined in Section 3.3 above. Any alterations to these assumptions or the proposed works, may alter the below assessment.

Table 5-1: Assessment of works against the biological elements

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
Benthic Invertebrates	Not assessed	The majority of the works will occur on terrestrial ground. There will be small areas impacted at the toe of the bank, however the limited size of these areas means there will be no significant effect upon benthic invertebrates in the wider habitat. Industry standard pollution prevention	No

		measures will be implemented throughout the works to prevent any pollution events occurring as a result of the works.	
Fish	Not assessed	There will be no dewatering or barriers to fish movement during the ground investigation works. Vibration impacts from machinery may cause localised disturbance, however, a 'soft start' for the works will be implemented to allow local populations of fish to move away from the area of works. Therefore, there will be no significant or permanent impact upon fish populations in the River Tawe. There will be no impact upon fish in the water body as long as industry standard pollution prevention measures are implemented.	No
Phytoplankton	Not assessed	The works are small scale and no impact upon phytoplankton within the Tawe - Beaufort Weir to Barrage water body is anticipated. Appropriate pollution prevention measures will be implemented throughout the works.	No
Macroalgae	Not assessed	The majority of the works will occur within terrestrial environment of manmade structures, a small proportion of the works will occur at the toe of the bank.	No

		The small scale, temporary nature of the works means no impact upon macroalgae is anticipated. Pollution prevention measures will be included as part of the works to ensure no pollution events occur.	
Angiosperms	Not assessed	The majority of the works will occur within a terrestrial environment, a small proportion of the works will occur at the toe of the bank. The small scale, temporary nature of the works means no impact upon angiosperms is anticipated.	No

5.2.1.2 Hydromorphological Quality Elements

Table 5-2 presents an assessment of the proposed works against the hydromorphological quality elements of the Tawe - Beaufort Weir to Barrage water body. This assessment is based upon available desk-based information based upon the assumptions outlined in Section 3.3 above. Any alterations to these assumptions or the proposed works, may alter the below assessment.

Table 5-2: Assessment of works against the hydromorphological quality elements

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
Depth variations	No status available	The proposed works will not change the depth of the river at this location.	No
Quantity, structure and substrate of the bed	No status available	The proposed works will not lead to a change in the quantity, structure or substrate or bed of the bed in the Tawe - Beaufort Weir to Barrage water body.	No
Structure of the inter-tidal zone	No status available	The proposed works will not lead to a change in the structure of the intertidal zone within	No

		the Tawe - Beaufort Weir to Barrage water body.	
Freshwater flow	No status available	The proposed works will not alter the freshwater flow that is received by the Tawe - Beaufort Weir to Barrage water body.	No
Wave exposure	No status available	The proposed works will not lead to a change in wave exposure on Tawe - Beaufort Weir to Barrage water body.	No

5.2.1.3 Physico-Chemical Quality Assessment

Table 5-3 presents an assessment of the proposed works against the physico-chemical quality elements of the Tawe - Beaufort Weir to Barrage water body. This assessment is based upon available desk-based information based upon the assumptions outlined in Section 3.3 above. Any alterations to these assumptions or the proposed works, may alter the below assessment.

Table 5-3: Assessment of works against the physico-chemical quality elements

WFD Quality Element	Current Status	Potential Impact	Further assessment and/or mitigation required?
Transparency	Not assessed	Due to the small scale nature of the works, no alteration of transparency in the watercourse is anticipated.	No
Thermal Conditions	Not assessed	There will be no significant alteration in the watercourse as a result of the works, therefore there will be no change in the thermal conditions of the Tawe - Beaufort Weir to Barrage water body.	No
Oxygenation conditions	Not assessed	The works will all occur within a terrestrial environment or at the toe of the bank for any in channel works. No significant mobilisation of sediments is	No

		anticipated as a result of the works. Therefore, there will be no temporary or permanent impacts upon oxygenation conditions of the Tawe - Beaufort Weir to Barrage water body.	
Nutrient conditions	Not assessed	There will be no impact upon nutrient levels within the waterbody as there will be no release of nutrients as a result of the works.	No

5.3 Impacts of works on protected sites

Table 5-4 presents an assessment of the proposed works against any protected sites identified as relevant to the Tawe - Beaufort Weir to Barrage water body.

Table 5-4: Assessment of works on protected sites

Name	Current status	Potential Impact	Further assessment and/or mitigation required?
Swansea Bay (West) Shellfish Water Protected Area	Not applicable	The proposed works are not expected to result in a change to the present water quality and therefore will not cause any permanent deterioration of Swansea Bay (West) Shellfish waters. However, there is the potential for temporary impacts during the works, but these would be addressed through implementation of appropriate pollution prevention measures.	No
Swansea Bay (East) Shellfish Water Protected Area	Not applicable	The proposed works are not expected to result in a change to the present water quality and therefore will not cause any permanent deterioration of Swansea Bay (West) Shellfish waters. However, there is the potential for temporary impacts during the works, but these would be addressed through implementation of appropriate pollution prevention measures.	No
Swansea Carboniferous Coal	Not at risk	A piling assessment will be carried out prior to the works to ensure there will be no impact upon	No

Measures Groundwater Drinking Water Protected Area		groundwater. Therefore, the Swansea Carboniferous Coal Measures Groundwater Drinking Water Protected Area will not be impacted by the works.	

6 WFD Assessment Summary

6.1 Overview

The Scoping Assessment presented in Chapter 5 concluded that the receptors will not be at risk from the proposed works, providing the appropriate industry standard mitigation measures are implemented throughout the proposed works.

Should any revisions be made to the proposed works that could impact any of the WFD Quality Elements, this section should be revised, and a full impact assessment may be required.

6.2 Water body Mitigation Measures

There are 14 mitigation measures contributing to better ecological potential for the water body identified in the Natural Resources Wales' Water Watch Wales website. The ability of the proposed works to deliver these mitigation measures, or the risk that the works could prevent their implementation, is considered further in the table below.

Table 6-1: Assessment of proposed works against the water body's mitigation measures

Mitigation Measure	Mitigation Measure	Current Status	Will the proposed works contribute towards the implementation of the mitigation measure	Will the proposed works prevent the mitigation measure from being implemented
Navigation	49. Modify vessel design	Not applicable.	No. The works will not impact vessels.	No. The works will not impact vessels.
	50. Vessel Management		No. The works will not impact vessels.	No. The works will not impact vessels.
Operations and maintenance	21. Avoid the need to dredge		No. The works will not impact dredging.	No. The works will not impact dredging.
	22. Dredging disposal strategy		No. The works will not impact dredging.	No. The works will not impact dredging.
	23. Reduce impact of dredging		No. The works will not impact dredging.	No. The works will not impact dredging.
	24. Reduce sediment resuspension		No. The works will not reduce sediment resuspensions	No. The works will not reduce sediment resuspensions
	25. Retime dredging or disposal		No. The works will not impact dredging.	No. The works will not impact dredging.
	26. Sediment management		No. The works will not alter sediment management.	No. The works will not alter sediment management.

	27. Dredge disposal site selection		No. The works will not impact dredging.	No. The works will not impact dredging.
	28. Manage disturbance		No. The works will not alter disturbance levels.	No. The works will not alter disturbance levels.
Structural modification	14. Modify structure		No. The works will not modify the structure of the watercourse.	No. The works will not modify the structure of the watercourse.
	15. Flow manipulation		No. The works will not alter the flow in the watercourse.	No. The works will not alter the flow in the watercourse.
Working with physical form and function	1. Modify channel		No. The works will not modify the channel.	No. The works will not modify the channel.
	2. Remove obsolete structure		No. The works will not remove any structures.	No. The works will not remove any structures.

6.3 WFD Assessment Objectives

Following consideration of the potential impacts and recommended mitigation measures, as well as the appraised Mitigation Measures for the water body, Table 6-2 assesses whether the proposed works comply with the overarching objectives of the WFD.

Table 6-2: Assessment of proposed works against WFD objectives

WFD Assessment Objectives	Assessment of works
Objective 1: The proposed works do not cause deterioration in the Status of the Ecological Elements of the water body	The works should not deteriorate the current status of the waterbody as long as appropriate measures identified in the previous sections are implemented. With the implementation of appropriate mitigation measures, the current classification of the ecological elements, with the consideration of the proposed works in the context of the waterbody, the effects are not likely to be significant.
Objective 2: The proposed works do not compromise the ability of the water body to achieve its WFD status objectives	The works will not prevent the water body from achieving its WFD status objective as the impacts are expected to be extremely localised if suitable mitigation measures are implemented throughout the proposed works.
Objective 3: The proposed works do not cause a permanent exclusion or compromised achievement of the WFD objectives in other bodies of water within the same RBD	The impact of the ground investigation works will be direct and local to the site. The works will not impact on adjacent linked waterbodies as all adjacent waterbodies have been screened out in this WFD assessment.
Objective 4: The proposed works contribute to the delivery of the WFD objectives	There is limited potential for the works to contribute towards achieving better ecological potential for the waterbody.

7 Discussion and Conclusions

7.1 Assessment Summary

7.1.1 Biological Assessment

The ground investigation works will take place within a terrestrial environment or from a floating pontoon to near the toe of the bank. Therefore, there will be no impact upon any natural habitats as a result of the works. Therefore, the impact to the habitats surrounding the site is expected to be negligible and it was determined that the proposed works are unlikely to result in the deterioration in the biological status of the water body or hinder the water body meeting its WFD objectives in the future, providing the measures detailed in Section 7.2 are applied.

7.1.2 Hydromorphological Assessment

The current hydromorphological supporting elements of the Tawe - Beaufort Weir to Barrage water body have not been assessed in the 2021 cycle or previous cycles. However, the scoping assessment within this report found that the proposed works will have no detrimental impact on the hydromorphology of this waterbody.

7.2 Scheme Recommendations/Key Considerations

Any mitigation measures that need to be considered to make the works compliant with the WFD are presented below:

7.2.1 Pollution prevention measures

Appropriate mitigation measures should be implemented to ensure that habitats proximity to the works are not degraded as a result of pollution events during the construction phase. This mitigation should include:

- Following relevant guidance e.g. CIRIA Guidance: Control of water pollution from construction sites. Guidance for consultants and contractors (C532D) (Masters-Williams, 2001), including the implementation of toolbox talks.

7.2.2 'Soft start' Procedures

To reduce the impacts of underwater noise for species within the watercourse 'soft start' procedures should be followed to gradually increase the sound intensity over a period of time. By following these methods, it provides fish in the watercourse the opportunity to move away from the works, reducing the potential for impact and disturbance.

7.2.3 Biosecurity

Appropriate biosecurity measures should be implemented throughout the works, including:

- Ensure all Personal Protective Equipment (PPE) and equipment is clean prior to entering and leaving site.
- Ensure vehicles are kept clean and do not let mud and debris accumulate on wheels or under wheel arches. Keep vehicular access to a minimum.
- Follow Check-Clean-Dry approach (NNSS, 2019).

7.3 Conclusions

The proposed ground investigation works are considered to be compliant with WFD objectives if the appropriate outlined mitigation measures are adhered to, to ensure protection of the WFD quality elements.

References

European Communities (2000). *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy.* Official journal of the European Communities L327(43), 1–72.

Masters-Williams, H., Heap, A., Kitts, H., Greenshaw, L., Davis, S., Fisher, P., Hendrie, M., Ownes, D. (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532D).* London, CIRIA.

NNSS (2019) *Clean, Check, Dry* [Online] Available at: https://www.nonnativespecies.org/what-can-i-do/check-clean-dry/ [Accessed: September 2022].

Water Watch Wales (2021) *Water Watch Wales Map Gallery* [Online] Available at: https://waterwatchwales.naturalresourceswales.gov.uk/en/ [Accessed September 2022].

JBA consulting

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
Follow us:

Jeremy Benn Associates Limited

Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007

New Civil Engineer TechFest Awards WINNER

New Civil Engineer 100 COMPANIES OF THE YEAR 2016 WINNER

New Civil Engineer 100 COMPANIES OF THE YEAR 2017 RANKED COMPANY

CHAS Accredited Contractor CHAS.co.uk