Kenson River Restoration

WFD Scoping Assessment

Final Report

January 2026

Prepared for:

Natural Resources Wales

www.jbaconsulting.com

Document Status

Issue date	15/01/2026
Issued to	Natural Resources Wales
BIM reference	OVQ-JBA-XX-XX-RP-EN-0004-S3-P02-WFD_Scoping_Assessment
Revision	P02
Prepared by	James Nixon BSc MSc Assistant Geomorphologist Hannah Webster BSc MSc Ecologist
Reviewed by	Natasha Todd-Burley BSc PhD FRGS CGeog (Geomorph) Principal Geomorphologist
Authorised by	Rachel Drabble BSc (Hons) CEnv MISEP Project Manager

Carbon Footprint

The format of this report is optimised for reading digitally in pdf format. Paper consumption produces substantial carbon emissions and other environmental impacts through the extraction, production and transportation of paper. Printing also generates emissions and impacts from the manufacture of printers and inks and from the energy used to power a printer. Please consider the environment before printing.

Contract

JBA Project Manager	Rachel Drabble
Address	Kings Chambers, 8 High St, Newport NP20 1FQ
JBA Project Code	2025s0023

This report describes work commissioned by Natural Resources Wales. James Nixon and Hannah Webster of JBA Consulting carried out this work.

Purpose and Disclaimer

Jeremy Benn Associates Limited ("JBA") has prepared this Report for the sole use of Natural Resources Wales and its appointed agents in accordance with the Agreement under which our services were performed.

JBA has no liability for any use that is made of this Report except to Natural Resources Wales for the purposes for which it was originally commissioned and prepared.

No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by JBA. This Report cannot be relied upon by any other party without the prior and express written agreement of JBA.

The conclusions and recommendations contained in this Report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by JBA has not been independently verified by JBA, unless otherwise stated in the Report.

The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between July and August 2025 and January 2026 and is based on the conditions encountered and the information available during the said period. The scope of this Report and the services are accordingly factually limited by these circumstances.

JBA disclaims any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to JBA's attention after the date of the Report.

Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. JBA specifically does not guarantee or warrant any estimates or projections contained in this Report.

Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in issuing this Report.

Contents

List of Figures

List of Tables

Abbreviations

DrWPA……Drinking Water Protected Areas
ID .....Identifier
NRW.....Natural Resources for Wales
NVZ.....Nitrate Vulnerable Zones
PEA.....Preliminary Ecological Appraisal
pH .....Power of Hydrogen
RBD.....River Basin District
RBMP.....River Basin Management Plan
SAC.....Special Area of Conservation
SgZ……..Safeguard Zones
SPA.....Special Protection Area
WFD.....Water Framework Directive

Executive Summary

JBA Consulting was commissioned by Natural Resources Wales (NRW) to undertake a Water Framework Directive (WFD) scoping assessment to support a planning application for a proposed river restoration design on the lower reaches of the Kenson River, located near Fonmon Castle in the Vale of Glamorgan, Wales, UK. The proposed restoration options include:

- Creating backwater areas in the current channel
- Bed raising
- Re-profiling and re-grading sections of riverbank
- Installing in-channel features, such as woody material and in-channel berms
- Reconnecting palaeo channels and channel infilling
- Floodplain lowering
- Improving riparian corridor

The restoration reach is located within the Kenson - conf with Waycock to conf with Thaw Water Body and located on top of the Thaw & Cadoxton Jurassic Lias (Groundwater body) water body. The proposed works will have localised temporary impacts upon the River Kenson; however, proposed mitigation measures ensure potential negative impacts are minimised. The proposed mitigation measures include:

- Implementing industry standard silt management techniques to reduce the release of fine sediment during temporary works.
- Undertaking riparian planting and improvements post ground works to mitigate the potential temporary and permeant impacts upon the structure of the riparian zone.

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 the 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 any element of its classification, including Ecological Status or Potential[1].

For each water body, three different status objectives are identified within the River Basin Management Plan (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 any element of its classification, including the Ecological Status (or Ecological Potential for Heavily Modified and Artificial Water Bodies) of the water body. Note, the Ecological Status applies only to surface water bodies and not ground water bodies.

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.

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

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 Catchment Data Explorer. Additionally, invasive non-native species (INNS) could affect the status of a waterbody through its introduction or spread into the waterbody.

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 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 NRW to undertake a WFD assessment for the Kenson Restoration project near Fonmon Castle.

This WFD assessment aims to determine the effects of the proposed (scheme/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 Kenson - conf with Waycock to conf water body and falls within the Western Wales River Basin District (RBD). The Environmental Objectives, together with the specific actions (mitigation measures) necessary to enable the water body to meet these objectives, are set out in the Western Wales River Basin district river basin management plan (RBMP) Water Watch Wales (WWW, 2021).

2 Assessment Methodology

2.1 Overview

The following chart summarises the WFD Assessment process.

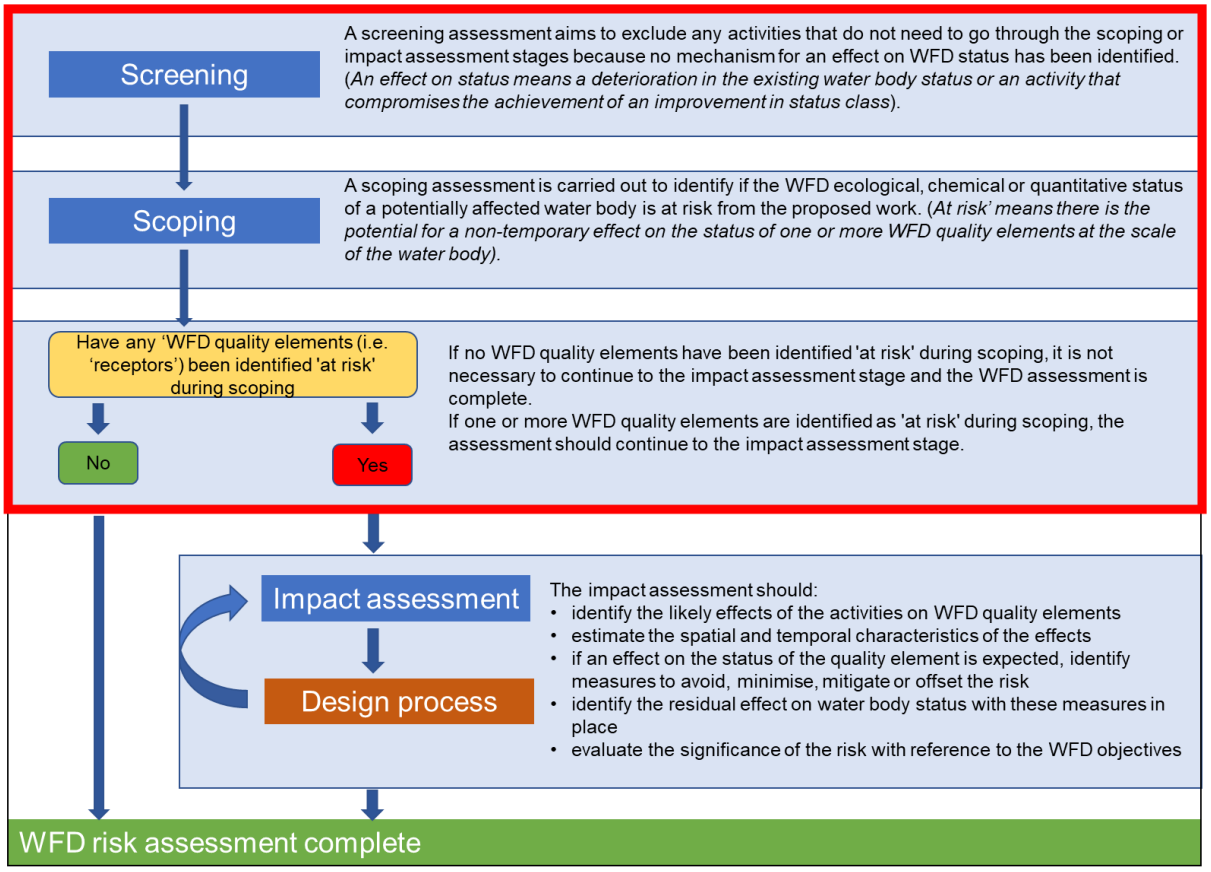


Figure 2-1: WFD assessment process flow chart

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 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 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 1.1.2).

- 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 the NRW 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 was commissioned by NRW in 2025 to undertake an outline design for river restoration proposals on the Kenson River, near Fonmon Castle in the Vale of Glamorgan, Wales, UK (Figure 3-1). The Kenson River restoration project aims to improve biodiversity, increase habitat resilience and to minimise further deterioration of the WFD status. Ultimately, the river restoration scheme looks to address physical modifications by removing legacy workings alongside reinstating part of the existing channel course, where possible, and using nature-based solutions to replicate and reinstate natural channel dynamics and increase habitat diversity. Restoration will improve the resilience of habitats and increase biodiversity, as well as build and contribute to wider environmental resilience.

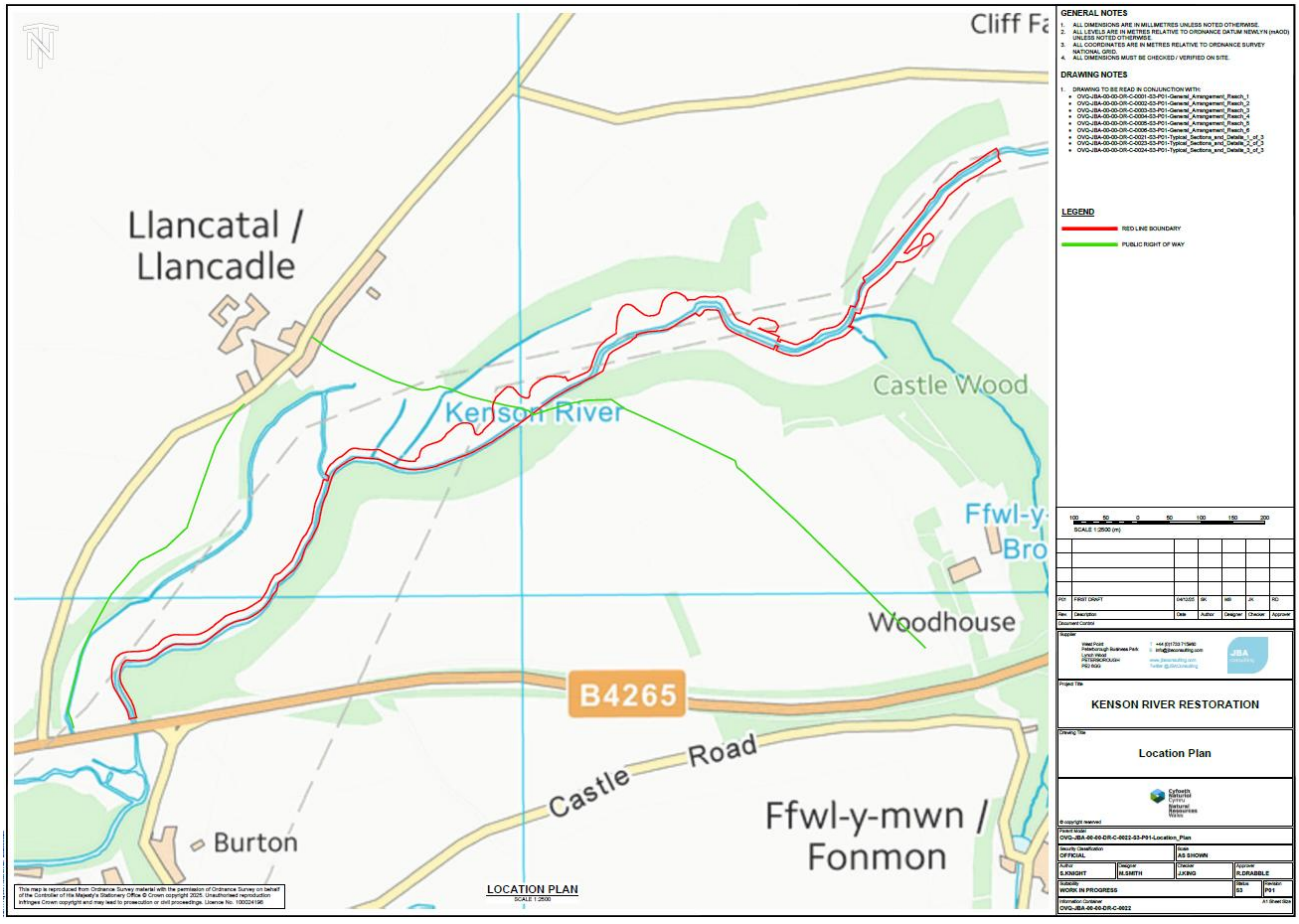


Figure 3-1: Site location

3.2 Proposed Works

The proposed works consist of an extensive river restoration design on a 2.2km section of the Kenson River, near Fonmon Castle in the Vale of Glamorgan, Wales. The Kenson River restoration project aims to improve biodiversity, increase habitat resilience and to minimise further deterioration of the WFD status. To do this the project is proposing to take eleven restoration opportunities forward:

- Creating backwater areas in the current channel
- Bed raising
- Re-profiling and re-grading sections of riverbank
- Installing in-channel features, such as woody material and in-channel berms
- Reconnecting palaeo channels and channel infilling
- Floodplain lowering
- Improving riparian corridor

4 WFD Screening Assessment

The full screening assessment was completed as a separate document (OVQ-JBA-XX-XX-TN-EN-0001-S3-P01-WFD_Screening_Assessment) and has been summarised below.

4.1 WFD Water Bodies

The site is located within the Kenson – conf with Waycock to conf with Thaw Catchment, within the Tawe to Cadoxton management catchment area. The following water bodies were considered:

- Waycock - headwaters to confluence with Kenson (GB110058026400)
- Llancarfan (GB110058026410)
- Kenson - conf with Waycock to conf with Thaw (GB110058021000)
- Thaw (GB110058026430)
- Thaw & Cadoxton Jurassic Lias (Groundwater body) (GB41002G201400)

4.2 Screening Outcome: Water Bodies

The following water bodies and their associated quality elements were screened in for further consideration in the next phase of the WFD Assessment process (scoping assessment):

Kenson - conf with Waycock to conf with Thaw (GB110058021000)

- Biological Elements
- Hydromophological Elements
- Physico-chemical elements
- Chemical elements

The Kenson-conf with Waycock to conf with Thaw was screened in as the proposed restoration works will be taking place within this water body and therefore there is potential for the project to have an impact upon WFD quality elements of the watercourse.

Thaw & Cadoxton Jurassic Lias (Groundwater body) (GB41002G201400)

- Quantitative Elements
- Chemical Elements

The Thaw & Cadoxton Jurassic Lias lies beneath the proposed restoration works and the downstream section of the site has naturally high groundwater, meaning there is potential for the project to have an impact on the groundwater water body and therefore this waterbody has been screened in.

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 Section 3. This assessment is supported by the evidence collected in the previous Kenson Restoration Feasibility study (JTK-JBAU-XX-XX-RP-EN-0005-S3-P02-Kenson_River_Restoration_Feasbility_Study) and the Kenson Restoration Baseline and design report (OVQ-JBA-XX-XX-RP-EN-0001-S3-P01-Kenson_River_Baseline_and_Design_Report). The proposed development 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 section (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 Kenson - conf with Waycock to conf with Thaw Water Body (GB110058021000)

5.2.1.1 Biological Quality Assessment

Table 5-1 presents an assessment of the proposed works against the biological quality elements of the Kenson - conf with Waycock to conf with Thaw Water Body. While there is an interim 2024 status available, the information is limited, and therefore 2021 has been used below.

Table 5-1: Assessment of the Proposed Works against the Biological Quality Elements

WFD Biological Quality Element	Current Status (2021)	Potential Impact	Further Assessment and/or Mitigation Required?
Fish	Not assessed	The proposed works have the potential to impact fish via accidental pollution spillages from plant machinery operating within proximity to the water body as well as disturbance from construction activities. The proposed permanent works will likely result in a positive impact to fish, with proposed works resulting in varied flow biotopes, riparian tree roots and in-channel woody material which can provide places of shelter for fish and nursery sites for young fish as well as providing habitat for aquatic macroinvertebrates that are a potential prey source for fish species.	Yes - (Temporary works have the potential to cause disturbance and release chemical pollution from accidental spillages)
Invertebrates	Good	The proposed works have the potential to impact invertebrates via accidental pollution spillages from plant machinery operating within proximity to the water body as well as disturbance from construction activities. The proposed permanent works will likely result in a positive impact to invertebrates. Proposed in-channel works, such as the installation of woody material will create habitat for aquatic macroinvertebrates, whilst habitat creation on the floodplain will generate habitat for terrestrial invertebrates.	Yes- (Temporary works have the potential to cause disturbance and release chemical pollution from accidental spillages)
Macrophytes and Phytobenthos combined	Moderate	The proposed works have the potential to impact macrophytes via accidental pollution spillages from plant machinery operating	Yes - (Temporary works have the potential to cause disturbance and

WFD Biological Quality Element	Current Status (2021)	Potential Impact	Further Assessment and/or Mitigation Required?
Macrophytes sub element	Moderate	within proximity to the water body as well as disturbance from construction activities. The proposed permanent works will likely result in a positive impact to in-channel macrophytes and phytobenthos due to the proposed habitat creation.	release chemical pollution from accidental spillages)

5.2.1.2 Hydromorphological Quality Elements

Table 5-2 presents an assessment of the proposed works against the hydromorphological quality elements of Kenson - conf with Waycock to conf with Thaw Water Body Water Body.

Table 5-2: Assessment of the Proposed Works against the Hydromorphological Quality Elements

WFD Hydromorph. Quality Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
Hydrology: Quantity and Dynamics of flow	Not High	The temporary works may cause minor changes to the quantity and dynamics of flow within the channels being worked in. This is due to equipment and plant potentially operating within the channel, as well as the application of pollution control measures. The permanent works will have a positive impact upon the quantity and dynamics of flow within the channels by creating more localised variation, which is likely to encourage natural hydromorphological functioning within the channels. Large wood and brashy in-channel berms, for example, can initiate localised sediment erosion and deposition due to their influence on flow dynamics, helping to diversify the structure the	No

WFD Hydromorph. Quality Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
		river bed and encourage morphological diversity. Similarly, reconnecting the channel to the floodplain with bank regrading, back water creation and floodplain lowering, will help to dissipate flows and retain water within the wider landscape. This is likely to be beneficial, but it will also alter the quantity of flow within the channel to some extent and may create shallower flows under certain conditions. In addition, the reconnection of the palaeo channels is likely to improve dynamics of flow through the reconnected sections by reinstating sinuosity to the channel. This will aid in diversifying the types of flow, creating areas of slower and faster flow, providing the potential for improved habitats. The permanent works are likely to slow the conveyance of flow through the reach, by reinstating a more naturalised channel planform and processes. This is likely to be a positive for ecology and may act as a positive for flood risk. The permanent works will not cause a negative impact to the quantity and dynamics of water flow of the waterbody.	

WFD Hydromorph. Quality Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
Hydrology: Connection to ground water bodies	Not assessed	The proposed works are anticipated to have a positive impact upon the connection to ground water bodies, by encouraging retention of water within the channel and on the floodplain. The measures are also likely to increase interaction between river flow and ground water in the hyporheic zone within the main channel; the changes in erosion and deposition might help to clean the bed substrate of fine sediment. The reconnection of the palaeochannels to the main channel of the Kenson may create a change in connection to the Thaw & Cadoxton Jurassic Lias (Groundwater body) beneath the restoration site, by excavating the original course of the river. The current course of the river is not natural and historical dredging and large quantities of fine sediment will likely have damaged, removed and disconnected the exchange between the channel and the hyporheic zone. This means that reconnecting the original channel is likely to have more of a positive impact upon exchange with the ground water body.	No
River Continuity	Not assessed	The works are not anticipated to negatively impact upon river continuity of the River Kenson. The scheme is likely to have a positive impact on lateral river continuity by increasing the lateral connectivity of the watercourse with the floodplain. This will be achieved through regrading of the banks, back water creation, bed raising, in-channel berm creation, large woody material placement and	No

WFD Hydromorph. Quality Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
		palaeochannel reconnection with floodplain lowering. Through this scheme the channel is likely to be widened slightly with the regrading of the banks and reconnection of palaeo features, however this will provide hydromorphological and ecological benefits to the river by allowing the Kenson to interact more with its riparian zone, while encouraging floodplain reconnection at times of high flow. The placement of large wood and in-channel berms, along with the reconnection of palaeochannels in the main Kenson channel is likely to create a small impact on the longitudinal movement of sediment along the channel, as it may lead to increased areas of deposition and erosion, around the in-channel features. This is likely to be a positive within the channel though, creating more diversity in flow, habitats, planform and features within the channel.	

WFD Hydromorph. Quality Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
Morphology: River width and depth	Not Assessed	The permanent works are likely to have an impact upon the river width and depth, due to the nature of the works. This includes regrading to reduce steep bank angles along the restoration reach and creation of backwater areas, where the width of the channel is likely to be increased. In addition, the creation of in-channel berms as part of the scheme will narrow the channel in the upper reaches of the restoration reach. Although the channel width is being altered, this is likely to have a positive impact upon the reach by creating increased variability in channel width at a reach scale, reducing the homogenous nature of the channel that currently exists. The river depth will be reduced in certain areas with sections of bed raising. This will act as a riffle type feature, with the aim of raising the water table and encouraging increased floodplain connection. This will increase variability in depth within the channel which is currently over deep and incised, providing a positive influence on the river by increasing habitats and morphological diversity.	No
Morphology: Structure and substrate of the river bed	Not Assessed	The temporary works may directly cause small changes to the structure and substrate of the riverbed. This could be caused by increased fine sediment mobilisation and deposition during construction activities. Some of the activities such as back water creation and palaeochannel reconnection have the potential to release significant amounts of fine	Yes - (Temporary works only - with the risk of fine sediment release)

WFD Hydromorph. Quality Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
		sediment. In addition, disturbance, compaction and breaking up of bed sediments could occur if heavy machinery or equipment enters the channel. Large wood and in-channel berms placed within the Cadoxton could initiate localised erosion and sediment deposition due to its influence on flow dynamics. This will help to diversify the structure and substrate of the riverbed by creating 'patchiness' leading to increased habitat diversity. The placement of large wood is also likely to lead to increased deposition of fines, within this reach and potential creation of silt 'benches'. This is likely to be a positive, reducing the impact of fine sediment downstream and creating localised habitats. The sections of bed raising will likely alter the structure and substrate of the riverbed in certain areas, with the addition of site won material and imported gravels. The raising of the bed level in places is expected to have a positive impact upon channel, helping to increase variability along a homogenous channel bed, that is dominated by fine sediments and limited clean gravels. This should help to improve floodplain connectivity, increase the variety of flow biotypes and provide improvements in habitat availability. Reconnecting the palaeochannels will also directly change the structure and substrate of the river bed through this section of the reach. However, the	

WFD Hydromorph. Quality Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
		existing Kenson channel bed through the restoration reach is rather degraded, lacking in gravels and dominated by fine sediments. It is hoped that excavation of the original channels with help to reveal floodplain sediments that can be incorporated into the new channel providing an improvement over the existing channel.	
Morphology: Structure of the riparian zone	Not Assessed	The temporary works may impact the riparian zone in certain areas where work is being undertaken, with the potential need for some vegetation clearance and damage. The permanent works also have the potential to impact the structure of the riparian zone, with the significant earth works that are proposed as part of the scheme. The main impact being with the regrading of the channel banks, that will require the removal of a signifcant length of riparian vegetation from the restoration reach. However, this will only be a temporary impact as the scheme includes riparian planting/ improvement that will help to re-establish and develop the riparian zone post works. The regrading will also create increased opportunities for the establishment of different species on the new banks and create increased quality of habitats.	Yes- (Potential for more permeant vegetation to be removed if mature trees are felled as part of the works)

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 Kenson - conf with Waycock to conf with Thaw Water Body.

Table 5-3: Assessment of the Proposed Works against the Physico-Chemical Quality Elements of the Kenson - conf with Waycock to conf with Thaw Water Body.

WFD Physico-Chemical Element	Current Status	Potential Impact	Further Assessment and/or Mitigation Required?
Ammonia (Phys-Chem)	High	Impacts to concentrations of phosphate and ammonia are not anticipated - the works are not expected to result in nutrient enrichment. Similarly, direct impacts to DO are not anticipated to occur from the works. There is the potential for indirect temporary impacts via accidental pollution spillages from plant machinery operating within proximity of the water body.	Yes
Dissolved Oxygen	High		
pH	High		
Phosphate	Moderate		
Temperature	High		

5.3 Thaw & Cadoxton Jurassic Lias (Groundwater body) (GB41002G201400)

5.3.1 Quantitative Status Elements Assessment

Table 5-4 presents an assessment of the proposed works against the groundwater status elements (both Quantitative and Chemical) of the Thaw & Cadoxton Jurassic Lias (Groundwater body) Water Body.

Table 5-4 Potential impact on groundwater status elements (both Quantitative and Chemical)

WFD Biological Quality Element	Current Status (2021)	Potential Impact	Further Assessment and/or Mitigation Required?
Saline or other intrusion Element (Quantitative	Good	The works are not expected to have any detrimental impact upon the ground water body. The works do not include any direct	No

WFD Biological Quality Element	Current Status (2021)	Potential Impact	Further Assessment and/or Mitigation Required?
and Chemical)		extraction or introduction of water to the ground water body. The works may increase floodplain storage and infiltration to groundwater. However, the impact upon the groundwater body is likely to be minimal and positive.	
Surface Water Element (Quantitative and Chemical)	Good	The works are not expected to negatively impact upon any surface water bodies associated with the Thaw & Cadoxton Jurassic Lias (Groundwater body) Water Body.	No
GWDTE Element (Quantitative and Chemical)	Good	The works are not expected to reduce the levels or quality of the ground water body. The works are seeking to improve floodplain habitats with the creation of new wetlands and scrapes that may be impacted and reliant on the high ground water table in the lower reaches of the restoration site.	No
Water Balance Element (Quantitative)	Good	No water is being extracted as part of the works and groundwater recharge is likely to be improved or not impacted by the works.	No
Drinking water protected areas (No deterioration in quality of waters for	Good	The works are not expected to have any detrimental impacts upon the ground water body. In addition, the site is not located within a drinking water protected area.	No

WFD Biological Quality Element	Current Status (2021)	Potential Impact	Further Assessment and/or Mitigation Required?
human consumption) (Chemical)			
No significant impairment of human uses (Chemical)		The works are not expected to have any detrimental impacts upon the ground water body and therefore no impact upon human uses of the waterbody is expected.	No
No significant environmental risk from pollutants across a groundwater body (Chemical)		The works are not expected to have any detrimental impacts upon the ground water body, and therefore no impact upon the quality of the groundwater body as a whole is expected.	No

6 WFD Impact Assessment

6.1 Overview

The Scoping Assessment presented in Section 5 identified some receptors may potentially be at risk from the proposed works. An Impact Assessment is therefore required to describe how these identified impacts will be mitigated.

The Impact Assessment needs to consider if there is a pathway linking the pressure to the receptor. If there is no pathway there can be no impact on the receptor and there is no need for any further assessment of that receptor to be carried out. If there is a potential pathway the assessment should consider if the activity, and the pressure it creates, may cause deterioration of the receptor.

In order to effectively assess the potential impacts of the proposed works and decide upon suitable mitigation measures, a good understanding of the proposed scheme and design is required. Should any revisions be made to the proposed works that could impact any of the WFD Quality Elements, this section should be revised.

6.2 Impact Assessment

Table 6-1 below discusses each of the receptors identified as being potentially at risk in the scoping assessment. Mitigation measures are recommended to mitigate the effects of the proposed works. It should be noted that these mitigation measures differ to the Mitigation Measures identified for any Heavily Modified water body.

Table 6-1: Impacts and Mitigation Measures for the Kenson - conf with Waycock to conf with Thaw Water Body (GB110058021000)

WFD Quality Element	Pathway (Direct/Indirect)	Potential Impact / Mitigation Measures
Biological elements		
Fish	Direct and Indirect	**Potential Impacts:** The proposed works have the potential to impact fish via accidental pollution spillages from plant machinery operating within proximity to the water body as well as disturbance from construction activities. **Mitigation:** Where possible an open channel should be maintained at all times to allow for fish passage during the construction works. If works need to be undertaken in a dry environment, fish-friendly pumps should be used to dewater, thus ensuring no entrainment of fish. Dewatering works should also be supervised by appropriately experienced fisheries specialists, to undertake a licensed fish rescue if necessary. The design and installation of woody material should consider adequate spaces to allow fish passage. Consultation with the local fisheries officer at NRW should be undertaken, to ensure appropriate mitigation for fish is fully considered during the works, including appropriate timing of works. Standard construction industry practices and associated measures for the management of pollution prevention are required throughout the duration of the proposed works.
Invertebrates	Direct and Indirect	**Potential Impacts:** The proposed works have the potential to impact invertebrates via accidental pollution spillages from plant machinery operating within proximity to the water body as well as disturbance from construction activities. **Mitigation:** Any disturbance to invertebrates will be small in scale and temporary during the construction works. The permanent works will result in a positive impact to invertebrates through the creation of suitable aquatic and terrestrial habitat. Standard construction industry practices and associated measures for the management of

WFD Quality Element	Pathway (Direct/Indirect)	Potential Impact / Mitigation Measures
		pollution prevention are required throughout the duration of the proposed works.
Macrophytes and Phytobenthos combined Macrophytes sub element	Direct and Indirect	**Potential Impacts:** The proposed works have the potential to impact macrophytes via accidental pollution spillages from plant machinery operating within proximity to the water body as well as disturbance from construction activities. **Mitigation:** Any disturbance to macrophytes and phytobenthos will be small in scale and temporary during the construction works. The permanent works will result in a positive impact to in channel macrophytes and phytobenthos due to proposed habitat creation. Standard construction industry practices and associated measures for the management of pollution prevention are required throughout the duration of the proposed works.
Hydromorphological elements		
Morphology: Structure and substrate of the river bed	Direct and Indirect	**Temporary Impact:** The temporary works that will need to be undertaken during construction of the scheme have the potential to release fine sediment into the channel. **Mitigation:** Standard construction industry practices and associated measures for the management of pollution prevention are required throughout the duration of the proposed works. In-channel works will be undertaken with appropriate silt containment measures.

WFD Quality Element	Pathway (Direct/Indirect)	Potential Impact / Mitigation Measures
Morphology: Structure of the riparian zone	Direct	**Temporary Impact:** The temporary works may impact the riparian zone in certain areas where work is being undertaken, with the potential need for some vegetation clearance and damage. This is likely to cause temporary loss of habitat until riparian vegetation reestablishes. **Permanent impact:** The groundworks on site including regrading works, backwater creation and palaeo channel reconnection**,** has the potential to damage and permanently remove established riparian vegetation such as trees**.** **Mitigation:** Part of the proposed restoration scheme includes riparian corridor improvements and planting. This will include a range of suitable species that are native, ideally locally sourced, and should include species that reflect the flora across the local area.
Physio-Chemical Elements		
Ammonia (Phys-Chem)	Indirect	**Potential Impacts:** There is the potential for indirect temporary impacts via accidental pollution spillages from plant machinery operating within proximity of the water body. **Mitigation:** Standard construction industry practices and associated measures for the management of pollution prevention are required throughout the duration of the proposed works.
Dissolved Oxygen		
pH		
Phosphate		
Temperature		

INNS are present along the river channel. Additional survey during the summer months is recommended to ascertain the presence of INNS plants. Production of an invasive species management plan may be required for the construction works, to ensure that measures are put in place to ensure INNS are not spread within or beyond the site. The presence of workers and machinery on site could introduce species and therefore industry-standard biosecurity measures should be implemented on site. The Check-Clean-Dry approach should be followed, ensuring that all Personal Protective Equipment (PPE) and equipment is cleaned before leaving site. For more information go to: www.nonnativespecies.org/checkcleandry.

6.3 WFD Assessment Objectives

Following consideration of the potential impacts and recommended mitigation measures, Table 6-2 assesses whether the proposed works comply with the overarching objectives of the WFD.

Table 6-2: Assessment of the Proposed Works against the WFD Objectives

WFD Assessment Objective	Assessment of the Proposed Works
Objective 1: The proposed works do not cause deterioration in the Status of the Ecological Elements of the water body	The proposed works will not cause the deterioration of the status of the ecological elements in the waterbody, providing the appropriate mitigation outlined in this report is undertaken in relation to the construction works.
Objective 2: The proposed works do not compromise the ability of the water body to achieve its WFD status objectives	The proposed works do not compromise the ability of the water body to achieve good Ecological and overall potential by 2027.
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 proposed works do not cause negative impacts or deterioration in WFD objectives or status of any of the other waterbodies assessed within the same RBD.
Objective 4: The proposed works contribute to the delivery of the WFD objectives	The proposed works will contribute to the delivery of the WFD objectives by ensuring no detrimental impact to the water body at the water body scale. As well as helping to restore natural processes and improve biodiversity.

7 Discussion and Conclusions

7.1 Assessment Summary

The proposed works on the lower reaches of the Kenson River have been assessed for compliance with the WFD Objectives of the Kenson - conf with Waycock to conf with Thaw Water Body and Thaw & Cadoxton Jurassic Lias (Groundwater body) Water Bodies. This assessment has been undertaken with the current site plans provided. Should the design or scope of the work alter significantly, this report would need to be revised to ensure the mitigation measures and recommendations outlined in this report have been considered and to determine whether the final scheme is WFD-compliant.

7.1.1 Biological Assessment

The proposed works are not anticipated to pose a significant threat to the biological quality elements of the impacted water bodies providing recommended mitigation measures are followed. These include the following:

- Where possible an open channel should be maintained at all times to allow for fish passage during the construction works. The design and installation of woody material should also consider adequate spaces to allow fish passage.
- If works need to be undertaken in a dry environment, fish-friendly pumps should be used to dewater, thus ensuring no entrainment of fish. Dewatering works should also be supervised by appropriately experienced fisheries specialists, to undertake a licensed fish rescue if necessary.
- Consultation with the local fisheries officer at NRW should be undertaken, to ensure appropriate mitigation for fish is fully considered during the works, including appropriate timing of works.
- Standard construction industry practices and associated measures for the management of pollution prevention are required throughout the duration of the proposed works. Pollution prevention measures could include, but are not limited to:
    - Abiding by industry standard pollution prevention guidelines, such as those given in CIRIA Guidance: Control of water pollution from construction sites. Guidance for consultants and contractors (C532D).
    - Any chemical, fuel and oil stores should be located on impervious bases within a secured bund with a storage capacity 110% of the stored volume.
    - Biodegradable oils and fuels should be used where possible.
    - Drip trays should be placed underneath and standing machinery to prevent pollution by oil/fuel leaks. Where practicable, refuelling of vehicles and machinery should carried out on an impermeable surface in one

designated area well away from any watercourse or drainage (at least 10m).
    - Emergency spill kits should be available on site and staff trained in their use.
    - Operators should check their vehicles daily before starting work to confirm the absence of leakages. Any leakages should be reported immediately.
    - Daily checks should be carried out and records kept on a weekly basis and any items that have been repaired/replaced/rejected noted and recorded. Any items of plant machinery found to have been defective should be removed from site immediately or positioned in a place safely until such time that it can be removed.
    - Silt run off should be prevented by incorporating the following actions:
        - Silt curtains, or other appropriate method of silt containment, should be used to prevent silt from the construction works entering the watercourse.
- An additional survey prior to the commencement of the works is recommended to ascertain the presence of further invasive non-native species within the works area. Production of an invasive species management plan will be required before any construction works, to ensure that measures are put in place to ensure INNS are not spread within or beyond the site.

7.1.2 Hydromorphological Assessment

The proposed works are not anticipated to significantly negatively impact upon the hydromorphological quality elements of the impacted water bodies and are likely to provide improvements with a range restoration measures being implemented.

There is potential for a temporary impact upon the structure of the riparian zone of the Kenson River, with temporary works likely to damage and remove vegetation and permanent works having the potential to remove established trees. Provided the mitigation measures outlined above are followed, the works will not have a significant detrimental impact upon the overall hydromorphology quality elements of the Kenson River.

During the construction phase, there is also a risk of fine sediment release. To minimise impacts on hydromorphic conditions, as per construction methodologies, silt management measures e.g. silt curtains/ dry working areas, need to be adopted to ensure there is minimal impact from the temporary works.

7.1.3 Physico-Chemical Assessment

The proposed works are not anticipated to significantly impact upon the physico-chemical elements of the screened in waterbodies provided standard construction industry practices and associated measures for the management of pollution prevention, such as those outlined above, are adhered to throughout the duration of the proposed works.

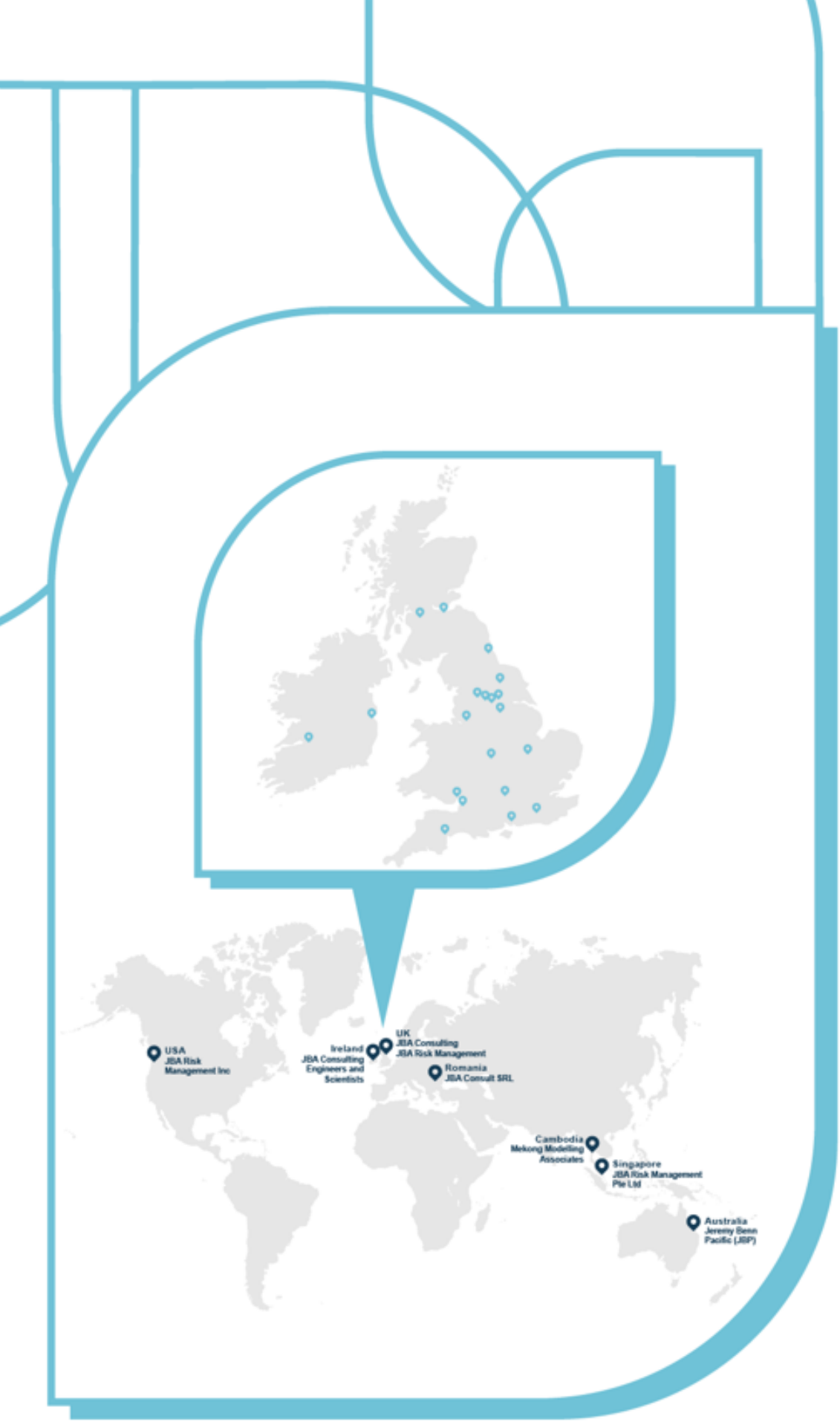
7.2 Scheme Recommendations/ Key Considerations

The impact assessment determines whether the proposed works have the potential to significantly impact any of the quality elements screened into the assessment. Any mitigation measures that need to be considered to make the works compliant with the WFD are presented in Table 6-1; however, the critical ones are listed below:

- Implementing industry standard silt management techniques to reduce the release of fine sediment during temporary works.
- Undertake riparian planting and improvements post ground works to mitigate the potential temporary and permeant impacts upon the structure of the riparian zone.

7.3 Conclusions

The proposed works will be compliant with WFD objectives if the appropriate mitigation measures described in relation to each potential impact are incorporated into the temporary works design.



Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
Warrington

Registered Office
1 Broughton Park
Old Lane North
Broughton
SKIPTON
North Yorkshire
BD23 3FD
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
ISO 27001:2013
ISO 45001:2018