Haweswater Aqueduct Resilience Programme - Proposed Marl Hill Section

Volume 6

Proposed Ribble Crossing

Appendix 7.1: Preliminary Water Environmental Regulations Compliance Assessment

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Jacobs

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1. Introduction

1.1 Purpose of the Report

1) This Preliminary Water Environment Regulations (WER) compliance assessment report has been prepared for the Proposed Ribble Crossing associated with the Haweswater Aqueduct Resilience Programme (HARP).

2) Compliance with the provisions of the legislation needs to be taken into account in the planning of all new activities in the water environment. The Environment Agency, as competent authority in England and Wales, is responsible for their delivery through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WER).

1.1 Background

3) WER requires that measures should be (a) put in place to prevent deterioration of the surface water status or groundwater status of a body of water (subject to the application of Regulations 18 and 19), and (b) otherwise to support the achievement of the environmental objectives set for a body of water (subject to the application of Regulations 16 to 19).

1.1.1 Preventing deterioration in Ecological Status or Potential

4) All water bodies should meet good ecological status (GES) (or good ecological potential (GEP) of an artificial or heavily modified water body) by a set timeframe. Overall ecological status (or potential) is made up of a number of biological, hydromorphological and chemical quality characteristics called elements. The overall status is determined by the lowest element status.

5) Any activity which has the potential to have an impact on ecology would need consideration in terms of whether it could cause deterioration in the ecological status or potential of a water body. It is, therefore, necessary to consider the possible changes associated with the Proposed Ribble Crossing.

6) Where there are sites protected under transposed and adopted regulations, WER aims for compliance with any relevant standards or objectives for these sites. including Conservation of Habitats and Species Regulations (2017).

7) For those water bodies that are not already in 'good' condition, specific mitigation measures have been set for each River Basin District (RBD) to achieve the environmental objectives. These measures are to mitigate impacts that have been or are being caused by human activity and to enhance and restore the quality of the existing environment. These mitigation measures would be delivered through the River Basin Management Plan (RBMP) which also identifies the different organisations responsible for their delivery.

2. Outline of Proposed Ribble Crossing

8) The construction traffic route for the Proposed Ribble Crossing would be a two lane carriageway 7.7 m wide and 1450 m in length. The construction traffic route would be temporary and would be in place for the duration of the construction of the Proposed Marl Hill Section, which would likely finish in 2029. The construction traffic route would be fully removed, and the land reinstated once construction of the Proposed Marl Hill Section has been completed. During the works the construction traffic route would be reserved for the use of all construction traffic. Public access to the construction traffic route would be prohibited through the provision of vehicle barriers at either end of the construction traffic route.

9) The construction traffic route would be suitable for heavy duty use and would be surfaced with a tarmac construction based on a stone aggregate foundation.

10) A temporary bridge crossing of the River Ribble would be incorporated in the construction traffic route. The bridge would be a Bailey bridge type clear span construction supported on columns either side of the river, of approximately 70 m in length. The bridge would extend over the adjacent flood plain with additional bridge sections either side of the river bridge. Overall, the bridge would be approximately 175 m in length. Earthwork abutments would be required either side of the bridge.

11) With the exception of the bridge, the construction traffic route would be constructed to suit the existing topography. Cuttings and embankments would be kept to a minimum and would only be made to create a suitable profile for the construction traffic route,

12) Drainage would be provided to keep the construction traffic route surface and foundations free from water. A drainage system would be put in place that would attenuate and treat the water prior to discharge into the River Ribble at a rate not exceeding greenfield run off.

13) The construction traffic route has been selected to keep to the periphery of field boundaries where possible. Gated crossing points would be provided for landowners and tenants to enable access to land that the construction traffic route crosses.

14) The construction traffic route crosses a numbers of Public Rights of Way (PROWs) including the Ribble Way. The temporary bridge would cross over the Ribble Way with sufficient clearance to avoid any disruption to access apart from during the bridge construction, which may require a temporary diversion. Gated crossing points would be provided to ensure continuity of access for any other affected public rights of way.

15) Temporary laydown areas would be established for the construction and removal of the construction traffic route, but these shall not be present when the construction traffic route is in use.

16) The construction of the construction traffic route would require removal of topsoil and sub-surface material where required. These materials would be stockpiled adjacent to the construction traffic route at intervals and they would be re-used to reinstate the land once the construction traffic route is removed.

17) This WER assessment will assess the following activities:

- Construction traffic route (including bailey bridges across tributaries)
- Bailey Bridge crossing the River Ribble
- Construction compound sites
- Discharges of routine construction drainage
- Discharges of routine construction traffic route runoff
- New outfall structures.

3. Assessment Stages

3.1 Data Collection

18) A desk-based study has been carried out to inform this assessment, reviewing existing information for the Proposed Ribble Crossing and assessment area to develop an initial baseline for the WER water bodies. The main source of data has been Environment Agency Catchment Data Explorer (CDE) (Environment Agency, 2021)[1].

3.2 Waterbodies in the Assessment Area

19) There is one WER surface water body catchment and one ground water body. Table 1 and Table 2 provide a summary of the baseline conditions present in each assessed water body:

- River Ribble Downstream of Stock Beck (GB112071065612) which is the water body in which the Proposed Ribble Crossing is located; and
- Ribble Carboniferous Aquifers (GB41202G103000) which is the groundwater body.

Table 1: Baseline information of WER surface water body, Ribble DS Stock Beck

Water Body ID	Ribble Downstream Stock Beck
Water body name	GB112071065612
NGR	SD7248140135
Length (km)	50.192
Catchment area (km^2)	61.939
Hydromorphological designation	Not designated artificial or heavily modified
Current overall potential (2019 data)	Moderate
Status objective (overall)	Moderate (target of 2015)
Reasons for not achieving good status	Point source pollution (Mercury and its compounds)
Protected area designation	River Ribble (UKENRI4) Urban Waste Water Treatment (England and Wales) Regulations 1994 sensitive area
Hydromorphological supporting elements	Supports Good
Current ecological status (and status objective)	Moderate
Biological quality elements	Good
Physico-chemical	Moderate
Specific Pollutants	High
Chemical	Fail

[1] Environment Agency (2021). Catchment Data Explorer [online]. Available at: https://environment.data.gov.uk/catchment-planning/ {Accessed March 2021}

Table 2: Baseline information of WER groundwater body, Ribble Carboniferous Aquifers (source: Catchment Data Explorer, Environment Agency)

Water Body ID	Ribble Carboniferous Aquifers
Water body name	GB41202G103000
NGR	SD7464257389
Surface area (km^2)	828.547
Current overall potential (2019 data)	Poor
Status objective (overall)	Good (target of 2015)
Reasons for not achieving good status	No data to show
Protected area designation	Ribble Carboniferous Aquifers (UKGB41202G103000) Drinking Water Protected Area
Quantitative status element	Good
Chemical Status element	Poor

3.3 Upstream and Downstream Waterbodies

20) Ribble Downstream Stock Beck WER surface water body is fed by seven upstream surface water bodies, which are listed below:

- Swanside Beck (GB112071065530)
- Mearley Brook (GB112071065510)
- Stock Beck (GB112071065540)
- River Hodder – confluence Easington Bk to confluence Ribble (GB112071065560)
- Skirden Beck (GB112071065570)
- Bashall Brook (GB112071065520)
- River Ribble (Long Preston to Stock Beck) (GB112071065613).

21) The distances between the confluences of each of the above are over 1 km of the Proposed Ribble Crossing, therefore all the above have been scoped out of the assessment.

22) Additionally, Ribble – confluence Calder to tidal (GB112071065500) is the downstream water body. This is approximately 9 km downstream of the Proposed Ribble Crossing. Therefore, it has also been scoped out of further assessment.

4. Screening of Scheme Components

23) The following list summarises construction and operation activities which will be carried forward into the impact assessment.

24) The following list identifies those construction activities screened in for further assessment:

- Bailey bridge across the River Ribble
- Construction traffic route
- Construction compound sites (including access tracks and drainage)
- New outfall structures
- Discharge of routine construction drainage.

25) The following list identifies those operation activities screened in for further assessment:

- Bailey bridge across the River Ribble
- Construction traffic route
- New outfall structures
- Discharge of routine construction traffic route runoff.

26) Construction compounds will be screened out of the operation impact assessment as it is anticipated that they would only be present during the construction phase. Conversely, the discharge of routine runoff would solely be assessed for operation impacts.

5. Scoping of Water Body Elements

27) Table 3 scopes the water body elements that are taken forward into the impact assessment for the fluvial water bodies.

Table 3: WER surface water body elements for further consideration

Element	Description	Scoped in or out (construction)	Scoped in or out (operation)
Biological Status Quality Elements			
Fish	Composition, abundance and age of structure of fish fauna, presence of sensitive species	In	In (Bailey Bridge, Discharge of Routine runoff, New Outfall Structure).
Invertebrates	Composition and abundance of benthic invertebrate fauna	In	In (Bailey Bridge, Discharge of Routine runoff, New Outfall Structure).
Freshwater aquatic plants (macrophytes) and diatoms (phytobenthos)	Composition and abundance of aquatic flora	In	In (Bailey Bridge, Discharge of Routine runoff, New Outfall Structure).
Hydromorphological Status Supporting elements			
Hydrological Regime	Quantity and dynamics of water flow	In	In
	Connection to groundwater bodies	In	In
Morphological conditions	River continuity	In	In
	River width and depth variation	In	In
	Structure and substrate of the riverbed	In	In
	Structure of the riparian zone	In	In
Water quality			
Physico-chemical Status quality elements	Acid Neutralising Capacity	Out. No likely change to erosive capacity of mineral bearing rock as a result of Proposed Ribble Crossing.	Out. No likely change to erosive capacity of mineral bearing rock as a result of Proposed Ribble Crossing.
	Ammonia	Out. No likely change to discharged organic waste as a result of Proposed Ribble Crossing.	Out. No likely change to discharged organic waste as a result of Proposed Ribble Crossing.
	Biochemical Oxygen Demand	No change in BOD or organic matter as a result of Proposed Ribble Crossing.	No change in BOD or organic matter as a result of Proposed Ribble Crossing.
	Dissolved Oxygen (DO)	In	In (discharges of routine runoff).
	pH	In	In (discharges of routine runoff).
	Phosphate	In	In (discharges of routine runoff).

Element	Description	Scoped in or out (construction)	Scoped in or out (operation)
	Temperature	In	In (discharges of routine runoff).
Specific Pollutants	Triclosan, Manganese, Arsenic, Copper, Iron, Permethrin, Zinc	Out. Lack of significant excavations.	Out. No likely impact as a result of Proposed Ribble Crossing.
Chemical Status Supporting Elements	Pollution including: ▪ All priority substances identified as being discharged into the water body. ▪ •Other substances identified as being discharged in significant quantities into the water body.	Out. Lack of significant excavations.	Out. No likely impact as a result of Proposed Ribble Crossing.

28) It should be noted that Physico-chemical status quality elements have been scoped out of the operation activities, Bailey bridge crossing the River Ribble and construction traffic route. Furthermore, biological status quality elements have also been scoped out of further assessment for the operation activity, construction traffic route.

29) Due to a lack of significant excavations in the assessment area, impacts to groundwater bodies can be scoped out of impact assessment.

6. Impact Assessment

30) Table 4 and Table 5 summarise the impacts associated with the Proposed Ribble Crossing and its components to the Ribble water body.

Table 4: Impact Assessment of the construction phase of the Proposed Ribble Crossing against supporting and quality elements in the Ribble DS Stock Beck WER surface water body

Key	
Positive change	
Negative change	
Negligible change	
No change	

WER element likely to be impacted (and description of impact)	Possible ways to control negative effects (mitigation suggestions)	Risk to WER status?
Construction traffic route (including bailey bridges across tributaries)		
Biological quality elements: Generally, the accidental release of fine sediment would be conveyed via surface water runoff and the non-WER watercourses which discharge into the River Ribble at confluences. Any fine sediment would likely remain localised to these. Likely effects from release of fines include localised smothering of invertebrate and fish (spawning) habitats. Dry swales and check dams incorporated as part of the construction traffic route are likely reduce the volume of fine sediment from entering the River Ribble by interrupting the pathway. Impacts would likely be localised and temporary.	Adherence to Code of Construction Practice (CCoP) and Environmental Management Plan (EMP).	No.
Hydromorphological supporting elements: The creation of new surface water pathways and mobilisation of fine sediment would generally alter local flow dynamics and smother bed substrate local to entry points and tributary confluences. Impacts would likely be localised and temporary.	Adherence to CCoP and EMP.	No.

WER element likely to be impacted (and description of impact)	Possible ways to control negative effects (mitigation suggestions)	Risk to WER status?
Physico-chemical quality elements Accidental release of fine sediment and pollutants could alter pH and DO levels. Impacts would largely be secondary, conveyed via silt-laden runoff and non-WER watercourses, which drain into the River Ribble.	Adherence to CCoP and EMP.	No.
Bailey Bridge across the River Ribble		
Biological quality elements Accidental release of fine sediment and pollutants during the construction of embankments, abutments and floodplain piers could displace invertebrate species under footprint and create suspended sediment plumes during disturbance of substrate. This could smother macrophytes and lead to the displacement or loss of invertebrate and fish species. Furthermore, fine sediment could lead to the smothering of salmon redds, if present. Noise could disturb fish. This would however be localised to the bridge and temporary, with communities likely returning to prior conditions once the bridge is constructed.	Adherence to CCoP and EMP.	No.
Hydromorphological supporting elements: Construction would lead to temporary loss of footprint on floodplain where piers and abutments are placed. This is a localised impact.	Adherence to CCoP and EMP.	No.
Physico – chemical quality elements: Accidental release of fine sediment and pollutants could alter pH and DO levels. Impacts would largely be secondary, conveyed via silt-laden runoff and non-WER watercourses, which drain into the River Ribble.	Adherence to CCoP and EMP.	No.
Construction compound sites		
Biological quality elements: The presence of hard standing areas, topsoil stripping, vegetation clearance and stockpiles could lead to the accidental release of fine sediment and pollution, which could contribute to plumes and accretion of fines downstream, potentially smothering invertebrates and suffocating fish/fish redds.	Adherence to CCoP and EMP.	No.
Hydromorphological quality elements: Potential for accidental release of fine sediment from the stockpiles, vegetation clearance and topsoil stripping could smother localised bed substrate material and depositional features upon entry to the channel. However, the presence of a dry swale consisting of check dams and coarse sediment for filtration would reduce the quantity of fine sediment entering the channel. Such mitigation would also capture any changes in surface run off, conveying it to individual outfalls. Impacts would likely be localised and temporary.	Adherence to CCoP and EMP.	No.

WER element likely to be impacted (and description of impact)	Possible ways to control negative effects (mitigation suggestions)	Risk to WER status?
Physico-chemical quality elements: The presence of hard standing areas, topsoil stripping, vegetation clearance and stockpiles could lead to the accidental release of fine sediment and pollution. Impacts would likely be localised and temporary.	Adherence to CCoP and EMP.	No.
New outfall structures		
Biological quality elements: Loss of footprint on banks and bed could displace invertebrates and macrophytes. Noise from construction could disturb fish. Release of fines and pollutants could affect water quality, and therefore fish/invertebrates. Noise from construction could disturb or displace species locally and temporarily.	Consider pumping water from construction area, a 'siltbuster' would likely reduce the risk of increased fine sediment input. Adherence to CCoP and EMP.	No.
Hydromorphological supporting elements: Potential removal of bank material for installing the structure could destabilise bed and bank sediment adjacent to the outfall, potentially accumulating on coarser sediment, and therefore smothering of local depositional features (i.e., riffles). Impacts would likely be localised and temporary		No.
Physico-chemical quality elements: Excavations and construction of the concrete outfall structure could lead to the accidental release of fine sediment and pollutants. This could lead to the increased fine sediment loads and alter nutrient conditions along the channel. Impacts would likely be localised and temporary.		No.
Discharges of routine construction drainage		
Biological quality elements: Changes in water quality and dynamics has the potential to alter biological community composition and function. This could be a result of construction traffic route runoff conveying pollutants and fine sediment to the River Ribble, leading to the displacement and/or loss of macrophyte, invertebrate and fish species. The presence of a proposed dry swale would however filter fine sediment and pollutants reducing the quantities of such from entering the River Ribble. Therefore, any impacts would be localised and dependant on rain-fall events.	Safeguards to be put in place to reduce the likelihood of spillages and clean-up systems. All works should be carried out in accordance with pollution prevention measures and best practice.	No.
Hydromorphological quality elements: Depending on discharge, drainage would increase local peak discharges and cause changes to flow dynamics as a result of the input of additional flow. Some of the outfalls could lead to the direct discharge of runoff onto depositional features such as mid-channel bars and islands. This could reduce the size and integrity of the depositional features as a result of erosion. Furthermore, where two outfalls are present at the bridge, the cumulative discharges could lead to localised bed scour.	Align the outfalls to point downstream at a 45 degree angle and away from depositional features.	No.
Physico-chemical quality elements: Changes in water nutrient conditions, sediment loading, pH and water temperature could result from the discharge of runoff which has been proposed to have a maximum runoff rate of 5 l/s, 3. 5 l/s more	Safeguards to be put in place to reduce the likelihood of spillages and clean-up systems.	No.

WER element likely to be impacted (and description of impact)	Possible ways to control negative effects (mitigation suggestions)	Risk to WER status?
than the existing greenfield runoff rate. This runoff however would not be continuous and would depend on rainfall events. Furthermore, the dry swale which forms the drainage network would consist of check dams and coarse sediment for filtration. These would reduce the quantities of such entering the River Ribble.	All works should be carried out in accordance with pollution prevention measures and best practice.	
All Proposed Activities		
Invasive Non-native species (INNS): Himalayan Balsam has been observed along the River Ribble, particularly upstream of the proposed works. Construction activities could lead to accidental spread of the invasive plant species.	INNS are reportable, and control measures should be put in place to prevent spread. This needs to be included in the Construction Environmental Management Plan (CEMP).	No.
Connection to designations: No likely change to protected areas during construction.	N/A.	No.

Table 5: Impact Assessment of the operation phase of the Proposed Ribble Crossing against supporting and quality elements in the Ribble DS Stock Beck WER surface water body

Key	
Positive change	
Negative change	
Negligible change	
No change	

WER element likely to be impacted (and description of impact)	Possible ways to control negative effects (mitigation suggestions)	Risk to WER status?
Bailey bridge crossing River Ribble		
Biological quality elements: Traffic noise and vibration from the bridge as it is being used could also displace invertebrate and fish populations, however this would be intermittent during working hours.	No mitigation required.	No.
Hydromorphological supporting elements: Bridge would be clear span and unlikely to impacts the channel. Piers present on the floodplain could lead to changes in local flow dynamics of flood flows and lead to deposition immediately	No mitigation required.	No.

WER element likely to be impacted (and description of impact)	Possible ways to control negative effects (mitigation suggestions)	Risk to WER status?
downstream of the piers. However, these impacts would be limited to periods of significant flood flows and would be localised to the piers.		
Discharges of routine construction traffic route runoff		
Biological quality elements: Changes in water quality and dynamics have the potential to alter biological community composition and function. This could be a result of construction traffic route runoff conveying pollutants and fine sediment to the River Ribble, leading to the displacement and/or loss of macrophyte, invertebrate and fish species. The presence of a proposed dry swale would however filter fine sediment and pollutants reducing volumes entering the River Ribble. Therefore, any impacts would be localised and contingent on rainfall events.	Safeguards to be put in place to reduce the likelihood of spillages and clean-up systems. All works should be carried out in accordance with pollution prevention measures and best practice.	No.
Hydromorphological quality elements – Flow Dynamics and regime, variations in river width and depth, structure and substrate of river bed: Check dams and coarse sediment present along the proposed dry swale would help to attenuate flows to match greenfield runoff rates. Discharges from outfalls would range from 0.65 l/s to 3.77 l/s. Therefore, depending on rainfall events and runoff, localised increases in peak discharge could result from the new drainage network. The input of flow could also lead to localised erosion of the bed, again depending on the rate of discharge at the time. Some of the outfalls would lead to the direct discharge of runoff onto depositional features such as mid-channel bars and islands, which could see localised erosion. However, as discharges are not continuous, impacts would be insignificant.	Align the outfalls to point downstream at a 45 degree angle and away from depositional features. Consider scour protection.	No.
Physico-chemical quality elements: Changes in water nutrient conditions, sediment loading, pH and water temperature could result from the discharge of runoff which would be attenuated to match greenfield runoff rates. This runoff however would not be continuous and would depend on rain-fall events. Furthermore, the dry swale which forms the drainage network would consist of check dams and coarse sediment for filtration. These would reduce the quantities of such entering the River Ribble.	Safeguards to be put in place to reduce the likelihood of spillages and clean-up systems. All works should be carried out in accordance with pollution prevention measures and best practice.	No.
New outfall structures		
Biological quality elements: Potential displacement of species adjacent to, or within the footprint of the outfall structures. Potential loss of habitat as a result of structure, and potential localised erosion.	Apply bank protection adjacent to each outfall to mitigate outflanking.	No.
Hydromorphological quality elements: The presence of a concrete structure could lead to changes in flow dynamics immediately adjacent to the outfall structures, potentially leading to some scour or outflanking. This could lead to some localised smothering of bed substrate material by the release of fine sediment. All impacts would likely remain localised. Outfalls would also lead to loss of channel bank at its footprint, and small-scale loss of riparian vegetation.	Apply bank protection adjacent to each outfall to mitigate outflanking.	No.

WER element likely to be impacted (and description of impact)	Possible ways to control negative effects (mitigation suggestions)	Risk to WER status?
Physico chemical quality elements: Some increases in sediment loading and changes in DO, and pH adjacent to the outfall structure.	Apply bank protection adjacent to each outfall to mitigate outflanking.	No.
Construction traffic route		
Hydromorphological supporting elements – Flow regime and dynamics, structure and substrate of river bed: The presence of a new concrete surface adjacent to the water body catchment could alter existing surface water flow paths, whilst also creating new ones. These impacts would however be captured and attenuated by the dry swale. The bailey bridges crossing small non-WER waterbodies which feed the River Ribble, could lead to localised bank erosion. However, any fine sediment that reaches the watercourses would likely remain localised to tributary confluences and be insignificant in terms of quantity.	Apply bank protection adjacent to each outfall to mitigate outflanking.	No.
All Proposed Ribble Crossing components		
Invasive Non-native species (INNS): Himalayan Balsam has been observed along the River Ribble, particularly upstream of the proposed works. Construction activities could lead to accidental spread of the invasive plant species.	INNS are reportable, and control measures should be put in place to prevent spread. This needs to be included in the Construction Environmental Management Plan (CEMP).	No..
Connection to designations: No likely change to protected areas during operation.	N/A	No.

7. Conclusion

31) The impact assessment presented in Table 4 and Table 5 has demonstrated that overall there are no identified impacts capable of causing deterioration in the water quality elements measured under the WER assessment for the River Ribble Downstream of Stock Beck, which is the water body within which the Proposed Ribble Crossing is located.

32) The impact assessment also demonstrates that no activity (during construction and/or operation) is likely to cause deterioration to WER status elements, and therefore, the water body status. A separate Habitats Regulations Assessment (HRA) has been undertaken for the Proposed Ribble Crossing. Subject to the conclusions of this, the WER assessment is compliant.

33) Due to the conclusion of no deterioration, and the nature of the activities, no detailed assessment is required.