Haweswater Aqueduct Resilience Programme – Proposed Marl Hill Section

Volume 6

Proposed Ribble Crossing

Appendix 7.3: Water Quality

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1. Introduction

1) This Appendix provides a detailed description of the baseline conditions of the catchment referred to in Chapter 7 of the Proposed Ribble Crossing Environmental Impact Assessment Report.

2) The following data sources have been consulted in collating this baseline information:

- The Water Framework Directive information has been obtained from The Environment Agency's (EA) Data Catchment Explorer (EA 2021), utilising the most recent classification data available (2019)
- Information on Atlantic Salmon has been obtained from the National Biodiversity Network (NBN) Atlas online tool (NBN 2021)
- Data on Geological strata both lithological and superficial were obtained from The British Geological Survey online tool (BGS 2021)
- Protected status areas (as defined by Natural England 2020) and water quality issue areas were identified using the online Department for Environment Food and Rural Affairs mapping tool (DEFRA). For definitions of each designation please refer to the Glossary of terms at the end of this Appendix
- Ordinance Survey (OS) Mapping.

2. Water Quality Baseline Conditions

3) Table 1 provides an overview of the baseline conditions discussed within Chapter 7.

Table 1: Water Quality Baseline Conditions

Catchment	Description	Project Interaction	Attribute	Description
Watercourse (WFD ID): The River Ribble (downstream Stock Beck - GB112071065612) Catchment length: 50.2 km Catchment area: 61.9 km^2	Land use: Land use within the catchment is approximately 80 % rural. Non rural areas include the towns of Clitheroe, Sawley Great Mitton and the outskirts of Whalley which are linked by a major and minor road network including the A59. More rural areas within the catchment consist of isolated residential holdings, farmsteads, fields and areas of wooded plantations interlinked by minor B roads. The catchment also contains designated recreation areas including parks and areas of managed woodland. Where woodland is not officially managed, it occurs in sporadic patches separated by open fields across the catchment and as riparian zones along the banks of watercourses. Catchment geology: The bedrock geology within the catchment is dominated by the Clitheroe Limestone Formation interbedded with the Hodder Mudstone Formation. The Clitheroe limestone is a carbonate rich sedimentary bedrock. The Hodder Mudstone in this area is a carbonate rich Mudstone. The differentiation between Mudstone and Limestone is likely to reflect changing sea levels over the period in which the strata was deposited. Both these	Proposed Ribble Crossing comprising, compound laydown areas, access haul routes, watercourse crossings and bridge foundations.	Water quality/supply	Overall Classification: Moderate Overall Ecological Classification: Moderate Biological quality elements: Good Physico-chemical quality elements: Moderate Hydromorphological Supporting Elements: Supports Good Overall Chemical Classification: Fail Potential additional pollutant sources: diffuse rural sources, road drainage, pollution from towns, cities and transport. One surface water abstraction has been identified within the assessment area associated with the Proposed Ribble Crossing. The abstraction is centered on (National Grid Reference (NGR)) SD 74899 44200. The abstraction is taken directly from the River Ribble and is owned and operated by Castle Cement Limited The abstraction is noted as being used for industrial purposes.
			Protected status areas	Site of Special Scientific Interest (SSSI) – None.
				Special Protection Area (SPA) - None.
				Area of Outstanding Natural Beauty (AONB) – the assessment area is not located within an AONB.
				Local Nature Reserve (LNR) – One LNR lies within the assessment area associated with the Proposed Ribble Crossing. The LNR is centered on (NGR) SD 747 436 and consists of an abandoned quarry which has since been restored to include a variety of plant species and associated habitats including, grasslands, bluebells and

Catchment	Description	Project Interaction	Attribute	Description
	formations were formed approximately 359 million years ago during the Carboniferous period in warm, shallow pelagic seas. In this environment small variations in sea level can change the nature of the strata deposited. Within the southern part of the catchment north of Mitton, the River Ribble flows over undifferentiated Permian and Triassic sandstone and mudstone rocks which are faulted against Clitheroe limestone Catchment geology is known to influence water chemistry which can significantly affect water quality. All rocks are broken down and dissolved in water. Mudstones contain quartz and feldspars, which are resistant to weathering and dissolution, but can often contain carbonate cements. Carbonate formations, including limestone, are more easily dissolved. If bedrock geology in the north of the catchment is a major control on water quality, it is likely to contain less total dissolved solids and a more neutral pH. Where limestone formations dominate, baseline water quality is likely to have higher pH and total dissolved solids. Superficial geology on higher slopes is dominated by glacial till composed of diamicton. On lower slopes towards the River Ribble, superficial geology tends to be composed of numerous (up to three) river			wild thyme. Animal species include Small Skipper, Willow Warbler and Sand Martins among others.
			Biodiversity	Atlantic Salmon - The National Biodiversity Network Atlas (NBN 2021) displays numerous sightings of Atlantic salmon spawning and migrating the full length of this reach of the River Ribble and associated tributaries within the catchment.
			Water quality issue areas	Faecal Indicator Organisms Issue Area –High priority Phosphates Issue Area – High priority

Catchment	Description	Project Interaction	Attribute	Description
	terrace deposits made up of sands and gravels. On flatter ground within the River Ribble floodplain and the floodplain of the larger tributaries of the River Ribble, superficial geology is generally alluvium, consisting of clay, silt, sand and gravel deposits. Superficial deposits are less resistant than bedrock to weathering and disruption. Poorly consolidated superficial deposits, if disrupted, could lead to large volumes of sediment entering surface waters and degrading water quality.			

3. References

The British Geological Survey (BGS) online tool (2021). Available at: https://mapapps.bgs.ac.uk/geologyofbritain/home.html

The Environment Agency's (EA) Data Catchment Explorer (2021) Available at: https://environment.data.gov.uk/catchment-planning/

Department for Environment Food and Rural Affairs (DEFRA) mapping tool Magic Map Application (2021). Available at: https://magic.defra.gov.uk/MagicMap.aspx

National Biodiversity Network (NBN) Atlas online tool (NBN 2021). Available at: https://nbnatlas.org/

Natural England, UK Government website (2021). Available at: https://www.gov.uk/government/organisations/natural-england

Appendix A. Glossary of Terms

Term	Definition
Area of Outstanding Natural Beauty (AONB)	An Area of Outstanding Natural Beauty (AONB) is an area of countryside in England, Wales or Northern Ireland which has been designated for conservation due to its significant landscape value. Areas are designated in recognition of their national importance.
Faecal Indicator Organisms Issue Area – High priority	Water quality priority areas where Countryside Stewardship Agreements, under the England Rural Development Programme, could help improve Water Quality in areas identified. Incentives are offered to farmers to adopt agricultural practices which will safeguard areas and meet Water Framework Directive targets.
Local Nature Reserve – LNR	Local Nature Reserves (LNRs) are a statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949 by principal local authorities. Parish and Town Councils can also declare LNRs but they must have the powers to do so delegated to them by a principal local authority. LNRs are for people and wildlife. They are places with wildlife or geological features that are of special interest locally. They offer people opportunities to study or learn about nature or simply to enjoy it.
Phosphates issue area – High priority	Water quality priority areas where Countryside Stewardship Agreements, under the England Rural Development Program, could help improve Water Quality in areas identified. Incentives are offered to farmers to adopt agricultural practices which will safeguard areas and meet Water Framework Directive targets.
Sediment Issues Area – High priority	
Surface water nitrate issue area – High priority	
Surface water pesticide issue area – High priority	
Special Area of Conservation (SAC)	A Special Area of Conservation (SAC) is defined in the European Union's Habitats Directive (92/43/EEC). SACs are granted to protect the 220 habitats and approximately 1000 species listed in annex I and II of 92/43/EEC which are considered to be of European interest following criteria given in the directive. They must be chosen from the Sites of Community Importance by the State Members and designated SAC by an act assuring the conservation measures of the natural habitat
Site of Special Scientific Interest (SSSI)	Conservation designation denoting a protected area in the United Kingdom. Sites may be designated SSSI's based on ecological, biological and/or geological areas of interest.
Special Protection Area (SPA)	Special Protection Areas (SPAs) are protected areas for birds in the UK classified under: the Wildlife & Countryside Act 1981 (as amended) and the Conservation (Natural Habitats, & c.) Regulations 2010 (as amended) in England, Scotland and Wales, The Conservation of Offshore Marine Habitats and Species Regulations 2017 in the UK offshore area, and other legislation related to the uses of land and sea. SPAs are classified in accordance with European Council Directive 2009/147/EC on the conservation of wild birds, known as the Birds Directive. SPAs protect rare and vulnerable birds (as listed on Annex I of the Birds Directive), and regularly occurring migratory species.