

# Blackburn's Rivers Important to Lancashire's Landscape Investment and Natural Capital Economy (BRILLIaNCE) - Summative Assessment Final Report



**European Union**  
European Regional  
Development Fund



**Ribble Life**  
Together

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## Executive Summary

Blackburn's Rivers Important to Lancashire's Landscape Investment and Natural Capital Economy (BRILLIANCE) aimed to increase the value of Blackburn's Natural Capital through delivery of improvements to Blackburn community's quality of place, value of the natural environment, and ecosystem service provision. Focused in an urban environment that through improvements will attract and support sustainable development, inward business investment to support job creation, and improve community and environmental resilience. This would be achieved through creation of new and enhanced blue infrastructure by connecting fragmented habitats, increasing habitat quality, improvements to water quality and reductions in extreme flows that will help to reverse the decline in biodiversity particularly of endangered aquatic species.

The projects SMART objectives were:

- 1) Improvement of habitat connectivity to 19 hectares of the River Darwen and its tributaries by October 2018 through the construction of 3 fish easements, one upstream of the close to nature channel on the River Roddlesworth, and one each at Hoghton Bottoms and Lower Darwen.
- 2) The construction of a new close to nature river channel on the River Roddlesworth delivering natural flood risk management by October 2017.

Table 2. Spend and Output Performance Table

Key		less than 85%				
		between 85% and 95%				
		Greater than 95%				
Indicators / Expenditure	Original Funding Agreement	Amount in most recent Funding Agreement Variation	Total achieved at time of evaluation	% of target	Projected to be achieved at Project Closure	% of target
<b>Expenditure</b>						
ERDF Capital Expenditure (£m)	£751,927.00	£172,771.00	£172,771.0	100%	£171,503.7	99%
ERDF Revenue Expenditure (£m)	£180,574.00	£131,051.33	£130,259.81	99%	£130,259.81	99%
<b>Indicators</b>						
(C23) Surface area of habitats supported in order to attain better conservation status	19 ha	21.1 ha	21.1 ha	100%	21.1 ha	100%

The projects contract value was £932,500 and ran for 2 years and 9 months from November 2016 to July 2019. ERDF grant value was £559,500 to £373,000 of private sector match funding. Change requests during the project meant the project reduced in scale with the total value of the project at evaluation being £303,030 with ERDF contributing £181,057 and £121,973 coming from private sector match.

The project delivered 2 fish easements of the 3 planned and did not deliver the planned close to nature river channel as those two items were withdrawn from the project in 2019. 21.1 ha of surface water with improved conservation status was achieved as an output of the project compared to the 19 ha planned.



Figure 1. Photo Hoghton Bottoms complete with fish easement.



Figure 2. Lower Darwen weir complete with fish easement in 2018.

There were a number of change requests submitted and accepted in the course of the project, the majority were minor in nature, owing to above threshold, but low changes to expenditure profile. However, there were three significant change requests, all relating to the Close to nature River Channel. The final change came in July 2019, following the inability to secure certainty of delivery of the close to nature river channel and upstream rock ramp in 2019, and a change request submitted where they were retracted from the project, without commencement or completion due to ongoing risk of delays to the delivery of the works.

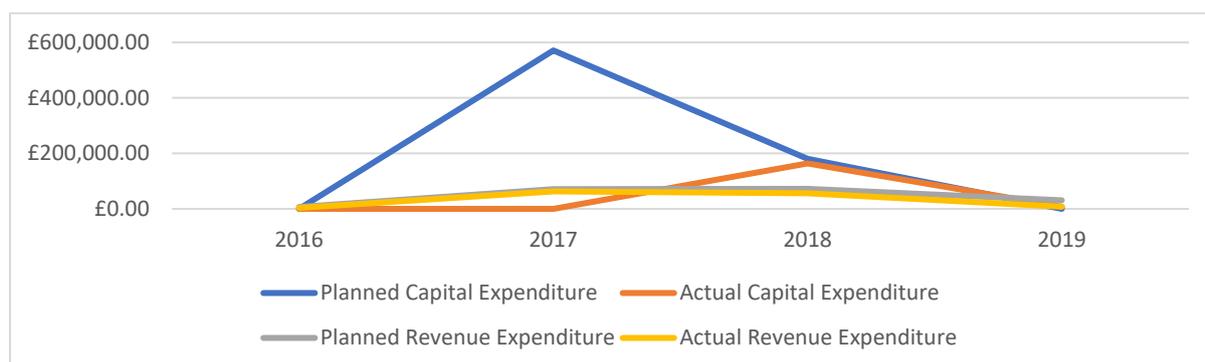


Figure 3. Planned and Actual Capital and Revenue Expenditure.

Post-project interviews have been carried out with staff to gauge their responses to how the project was delivered and managed, focusing on reflective assessment of the procurement, selection procedures, delivery performance, governance and management aspects.

Overall it was felt that the procurement process and selection procedures were effective and appropriate for the project design. The delivery partner experienced some delays in relation to

procuring highly specialised evaluation equipment which was a learning. Despite this the process has been considered valuable and integrated into their tender procurements over £50,000.

In terms of delivery performance, what was completed was delivered to budget, deadline and effectively. The largest challenges were principally the fact that this was the first ERDF funded project that the delivery partner had received funding through, which led to hesitation and caution, which ultimately resulted in good audit findings, but at time presented challenges to the project team. The single largest issue was the design of the close to nature river channel occurring without significant input from the delivery, or lead partner. This combined with wider site activity of the co-finance provider resulted in what often presented a sense of lack of control on delivery of an aspect of the project, that fundamentally changed the overall delivery. In future the project team, felt greater control over the design process, was critical to the successful delivery of activities.

The review of the management and governance considered systems worked well but identified one particular area for improvement, with all physical delivery of the whole project being undertaken by one partner, could result in the lead partner becoming disconnected from short term issues that needed quick resolutions.

Project Output was confirmed to be achieved through GIS analysis identifying the 21.1 ha improved due to the project, alongside the fish telemetry studies that determined both Hoghton Bottoms and Lower Darwen had improved fish passage with 19% and 80% passing after fish pass construction compared to 0% and 31% before respectively. Fish populations were not observed to increase, but this assessment identified it would have been difficult to achieve this in 2018 given a catchment wide recruitment crash in juvenile brown trout due to adverse environmental conditions.

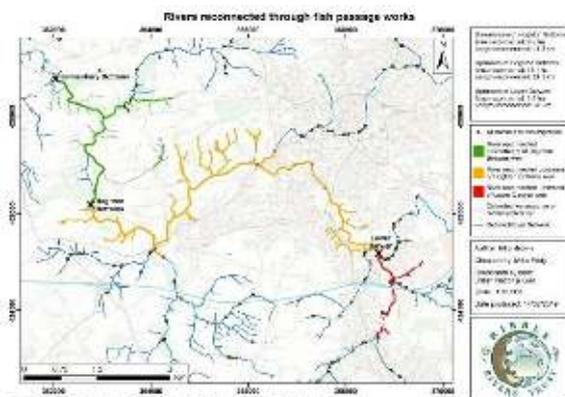


Figure 4. Map showing recalculated output area to be reconnected through fish easements, total 21.1 ha.

A measurable increase in recreation through angling visits has not been achieved by this point due to the project, however an increasing interest in recreation has been achieved through a large angling club inquiring about the potential to take on fishing on the river, which may leave a legacy in to the future leading to future investment.

Through the project an increased awareness of the biodiversity of the River Darwen has been achieved through project publicity and engagement. This increased awareness is already leading to new opportunities to improve the River Darwen's conservation status through the delivery partner being approached regarding new projects by landowners.

Using the Environment Agency's Benefit Cost Ratio, a net additional GVA was calculated using £1.56 for every £1 spent (Appendix B). The Employment impact indicator has been calculated with margins. Where considering revenue alone, the employment indicator would suggest 8.7 FTE as the lowest Gross impact on employment. Which if removing the FTE equivalent identified through Leakage gives a lowest net additional employment unity of 6.9. However, the capital elements also contain a significant degree of employment, and where these are included the upper limit could be 20.2. Which if removing the leakage, gives an Employment Unit of 18.4.

*Table 1. Gross and Net Additional Impact for Employment and GVA (time period).*

		<b>Impact Area 1:</b>	
		Lancashire	
		<b>Measure</b>	<b>Adjustment</b>
<b>Impact Indicator: Employment Unit = FTEs</b>	<b>Gross Impact</b>	8.7 – 20.2	
	<b>Deadweight / reference case</b>	0	0
	<b>Displacement / substitution</b>	0	0
	<b>Leakage</b>	1.8	0
	<b>Net Additional</b>	6.9 – 18.4	
<b>Impact Indicator: GVA Unit = £ms</b>	<b>Gross Impact</b>	0.303	
	<b>Deadweight / reference case</b>	0	0
	<b>Displacement / substitution</b>	0	0
	<b>Leakage</b>	0.027	0
	<b>Net Additional</b>	0.142	

## Introduction

This document forms part of the Summative Assessment process for the Blackburn's Rivers Important to Lancashire's Landscape Investment and Natural Capital (BRILLIANCE) project delivered by the Ribble Rivers Trust and The Rivers Trust, with funding from the European Regional Development Fund. The purpose of this Summative Assessment is to act as an end of project evaluation of the success of the project, identifying and ratifying the delivery of its aims and objectives, how they have impacted the economy, society and the environment, and the value for money achieved in doing so.

In accordance with Summative Assessment guidance (ERDF 2019a, 2019b), this final report is split in to six sections as below:

Section 1: Project context

Section 2: Project progress

Section 3: Project delivery and management

Section 4: Project outcomes and impact

Section 5: Project value for money

Section 6: Conclusions and lessons learnt

## Section 1: Project Context

Section 1 will aim to detail what the BRILLIANCE project aimed to achieve in the context of identified market failures and the economic and policy context at the time of project design. Alongside this detail, a critical analysis will be given of how suitably the project was designed to achieve its aims, while considering how contextual changes may have impacted how the project was delivered and if the projects' outputs and outcomes hold the same value as when it was designed.

### 1.1 Project Key Facts

Table 2. Key facts of the BRILLIANCE Project.

Project Name:	Blackburn's Rivers Important to Lancashire's Landscape Investment and Natural Capital Economy (BRILLIANCE)			Project Ref:	19R16P01276
Lead LEP Area:	Lancashire			Priority Axis:	6
Grant Recipient:	The Rivers Trust				
Original Project Total (£)	£932,500	Original ERDF value (£)	£559,500	Intervention Rate	60%
Current Project Total (£)	£303,030	Current ERDF Total (£)	£181,057	Intervention Rate	60%
Start date	1st November 2016	Financial Completion Date	31 <sup>st</sup> July 2019	Practical Completion Date	31 <sup>st</sup> July 2019

### 1.2 Project Aims & Objectives

BRILLIANCE aimed to increase the value of Blackburn's Natural Capital through delivery of improvements to Blackburn community's quality of place, value of the natural environment, and ecosystem service provision. Focused in an urban environment that through improvements will attract and support sustainable development, inward business investment to support job creation, and improve community and environmental resilience. This would be achieved through creation of new and enhanced blue infrastructure by connecting fragmented habitats, increasing habitat quality, improvements to water quality and reductions in extreme flows that will help to reverse the decline in biodiversity particularly of endangered aquatic species.

The projects SMART objectives were:

- 1) Improvement of habitat connectivity to 19 hectares of the River Darwen and its tributaries by October 2018 through the construction of 3 fish easements, one upstream of the close to nature channel on the River Roddlesworth, and one each at Hoghton Bottoms and Lower Darwen.
- 2) The construction of a new close to nature river channel on the River Roddlesworth delivering natural flood risk management by October 2017.

### 1.3 Market Failures

This project was specifically targeting the degraded biodiversity of the River Darwen, a natural capital asset that could provide significant ecosystem services. This degradation, brought about through modification in the industrial revolution when weirs and culverts were constructed to power mills, comes about due to fragmentation and loss of habitats. It was considered that Public Sector intervention was pivotal to addressing this issue and improving the quality and biodiversity of blue/green space in Blackburn-with-Darwen, which would spur improved recreation and investment.

### 1.4 Project Rationale

The project sought to connect and create new river habitats, that would contribute to number of hectares of habitat with conservation status improved. Habitat connectivity is widely recognised as one of the most important elements on ensuring good or improved habitat conservation status. No more so than for Rivers, and fish populations, which had been identified as in “poor ecological status”.

The actions identified for delivery through the project are seen as crucial in improving the ecological, or conservation, status of rivers. For the River Darwen physical modification and barriers to fish migration are a recognised reason for the River failing to reach good ecological status. Removal of barriers and mitigation of physical modifications is seen as the means of improving the conservation status of the River Darwen. As such the project would deliver output indicator C23 “Surface area of habitats supported in order to attain a better conservation status”. The surface area of water that will be better connected and habitat improved was been measured using satellite imagery and Geographical Information System and equates to 19 Hectares.

### 1.5 Economic and policy context at the time that the project was designed

The economic and policy context for Lancashire at the time the project was designed was set out in the Lancashire Economic Partnership ESIF Strategy. It clearly identified that Lancashire’s environmental quality and diversity “sets it apart from other areas”, and this is crucial in attracting investment. By improving and enhancing some of the worst environments in Lancashire this project will enable sustainable development creating economic opportunities, but also aid in attracting inward investment in areas that need it most. It will also provide environmental resilience, but also business and community resilience to flooding through Natural Flood Risk Management and adaptation to the expected impacts of Climate Change.

This maps directly onto 3 of the Lancashire ESIF strategy priorities:

- Investing in Strategic infrastructure, development and environmental resilience.
- Encouraging inward investment and marketing
- Creating opportunities for disadvantaged communities/groups

But particularly Theme 1 - Investing in Strategic infrastructure, development and environmental resilience through Support and investment in Green/Blue Infrastructure to support and sustain business growth and enhance Environmental Resilience.

The local ESIF strategy has clearly identified the value of Lancashire’s Natural Heritage, and its links to economic growth sectors, particularly that Natural Heritage adds to the quality/sense of place offer of Lancashire that attracts inward investment and attracts higher skilled residents.

The project by offering higher quality green and blue spaces, contributes to attracting and retaining higher skilled residents in Blackburn with Darwen that supports the LEP ESIF strategy on

Employment and Skills. The proximity of the project to the Local Enterprise Zone, means that the project has the potential to support the Local Enterprise Zone by providing suitable places to live, with short commuting distances. Additionally, the project supports the sustainable development of a Brownfield site that includes a commercial/employment hub, that contributes to increasing opportunities for encouraging entrepreneurship and enterprise in Blackburn-with-Darwen. Blackburn-with-Darwen falls within the 10% most deprived areas in the country, health and poor quality environment has been identified as one of several factors affecting these most deprived communities.

The project also contributed to national policy and drivers on water environment improvements, particularly through the Water framework Directive, by addressing key “reasons for failure” identified by the Environment Agency as causing the rivers not to be in “Good Ecological Status”. By focusing on the greenspace aspects of the project it also delivered on national drivers on community engagement on the water environment, as set out in the DEFRA policy on the Catchment Based Approach.

### 1.6 Project design and delivery model

In terms of outputs the project was appropriately designed to achieve its objectives. The project structure took designs developed by both the Ribble Rivers Trust and Blackburn Waterside Regeneration Ltd (co-financers), forward for delivery. At the point of application this seemed appropriate for the delivery model. However, as the project progressed, technical issues with site conditions relating to BWR’s design caused significant delay, and ultimately caused the failure in achievement in one of the objectives. This was identified as a risk in the risk register and the risk management strategy employed. However, ultimately site conditions did not permit construction. As such the use of a third parties design in the development of the delivery model without sufficient involvement of the key delivery partner in its development has been identified as a potential weakness in the delivery model. This has been learnt from and incorporated in RRTs project development process going forward.

### 1.7 Reflection on project targets and context

Project targets are considered to have been realistic and achievable, however, it became apparent that factors initially considered outside of the delivery model, the wider site ground conditions, became a factor in the delivery model, which with the wider site aspiration caused an issue with certainty of project delivery.

There was no significant policy or economic context change during the project, and as such there were no particular pressures on project delivery relating to investment in, or commitment to the delivery of the project. There is no change to the ERDF/ESIF LEP strategy, further calls were made under the priority axis 6 d.

The identified weakness in the delivery model only applied to one of the 3 sites involved. As such the performance achieved verses the targets could be considered a good performance. However, the learnings from the 3<sup>rd</sup> project site, have identified a change in the way the delivery partner approaches project development and subsequent delivery.

## Section 2: Project Progress

This section will track the progress of the project in relation to the expenditure, activity and output targets, detailing any changes to these targets via accepted change requests to the managing authority, and explaining and evidencing any deviation from these targets. This progress evaluation will be split in to both annual and lifetime performance.

### 2.1 Expenditure

The year on year expenditure profile (Figure 1) details the original planned expenditure at the start of the project and what the actual expenditure was up to end of December 2019. The largest disparity between planned and actual figures was in 2017 where > £500K was due to be spent on the close to nature river channel and upstream rock ramp which were at first delayed and then later withdrawn from the project in 2019. Delays were caused due to weather, a landslip, and securing of a supplier for specialist evaluation equipment. The second year of majority capital expenditure in 2018 was similar to planned expenditure with fish easements coming in under planned budget.

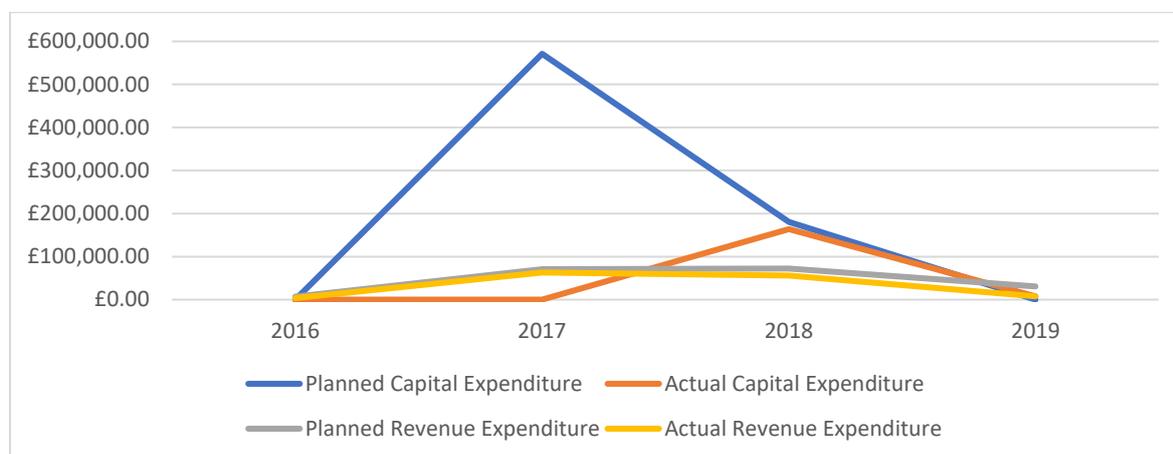


Figure 5. Planned and Actual Capital and Revenue Expenditure.

Over the lifetime of the project 23% of the original planned capital expenditure was spent and 72% of planned revenue expenditure was spent. However, the proportion of expenditure relative to the most recent budgets approved by change request (Table 2) show 100% and 99% of both capital and revenue being achieved to end of December 2019 respectively.

Table 3. Spent and output performance table.

Indicators / Expenditure	Original Funding Agreement	Amount in most recent Funding Agreement Variation	Total achieved at time of evaluation	% of target	Projected to be achieved at Project Closure	% of target
<b>Expenditure</b>						
ERDF Capital Expenditure (£m)	£751,927.00	£172,771.00	£172,771.0	100%	£172,771.0	100%
ERDF Revenue Expenditure (£m)	£180,574.00	£131,051.33	£130,259.81	99%	£130,259.81	99%
<b>Indicators</b>						
(C23) Surface area of habitats supported in order to attain better conservation status	19 ha	21.1 ha	21.1 ha	100%	21.1 ha	100%

## 2.2 Activity

Activity delivery is heavily linked to expenditure performance with no capital works being delivered in 2017, but with two rock ramp fish easements being delivered as planned in 2018 (Table 3). Overall 2 rock ramp fish easements were delivered during the project, while 3 fish easements and a close to nature river channel were planned.

*Table 4. Planned and actual activity delivery.*

Activity Delivery			
Planned	2017	2018	2019
Rock Ramp Construction	1	2	0
Close to Nature River Channel	1	0	0
Actual			
Rock Ramp Construction	0	2	0
Close to Nature River Channel	0	0	0

## 2.3 Outputs

The delivery of a close to nature river channel and a fish easement in 2017 was due to deliver 1 ha of improved habitat surface area in 2017, with 18 ha being delivered in 2018 as part of the two other fish easements being constructed. With the close to nature river channel and rock ramp being withdrawn, the planned 1 ha was not delivered in 2017. However, an improvement to the calculation and updated data for determining surface area with improved conservation status identified that 21.1 ha was improved through the delivery of two fish easements in 2018 (Table 4).

*Table 5. Planned and actual outputs.*

Outputs			
Planned	2017	2018	2019
Surface area of habitats supported in order to attain better conservation status (ha)	1	18	
Actual			
Surface area of habitats supported in order to attain better conservation status (ha)		21.1	

## 2.4 Changes to the Project

There were a number of change requests submitted and accepted in the course of the project, the majority were minor in nature, owing to above threshold, but low changes to expenditure profile. However, there were three significant change requests, all relating to the Close to nature River Channel. The first key occurrence in this project, which was accepted by the managing authority via a change request in April 2017, was the delay to the constructions of the close to nature by-pass channel and the associated upstream fish easement on the River Roddlesworth. This was approved, however, a further issue was experienced and in April 2018, a further delay requested and approved. The final change came in July 2019, following the inability to secure certainty of delivery in 2019, and a change request submitted where the close to nature river channel and upstream rock ramp were retracted from the project, without commencement or completion due to ongoing risk of delays to the delivery of the works, and agreed variation to the works specification, which created an associated financial risk on both parties that was not acceptable or sustainable (clause 10. (e) of the

legal agreement between Ribble Catchment Conservation Trust and Blackburn Waterside Regeneration Ltd.). In terms of outputs of the project, this change would reduce the area to benefit from improved connectivity by 1 ha, and the amount of direct habitat improved through the creation of the close to nature channel by 0.2 ha.

A further change request was submitted in October 2019, to reflect an increase in project outputs, relating to validation and evaluation of outputs, using more up to date data reflecting an increase in habitat area connected and thus conservation status improved.

## Section 3: Project delivery and management

Post-project interviews have been carried out with staff to gauge their responses to how the project was delivered and managed, focusing on reflective assessment of the procurement, selection procedures, delivery performance, governance and management aspects. Below the feedback received on each of these topics is detailed, with this exercise being a key input for Section 6: Conclusions and lessons learnt.

### 3.1 Procurement

Prior to BRILLIANCE Ribble Rivers Trust had undertaken significant amounts of procurement relating to public funds, however, none as stringent as the requirements associated to ESIF and ERDF. The original procurement plan was drafted with the support of Public Procurement specialist solicitors, and a compliant process set up, to ensure that the project delivered value for money, in an open, fair and transparent manner, that was compliant with the regulations. During the initial stages of the procurement, timescales identified that using close tender procedures took significantly longer. A review with the project team identified, that the specialist nature of the project, had led to a desire to ensure that only appropriate contractors submitted tenders. The review concluded that through an open process, with suitable selection and award criteria, this could be achieved without compromising the integrity of the procurement process. This led to 3 successful open tender processes, with a good number and quality of submissions. Although the process seemed laborious at the time being undertaken, the project team feel with hindsight it ensured a good outcome. To the extent that the delivery partner now employs many of the processes (particularly the selection and award criteria assessments) in all tenders over £50,000.

There were also particular challenges around the procurement of highly specialised evaluation equipment, that through the stringent procurement policies of ERDF, meant delays in project evaluation and expenditure.

Overall it was felt that the procurement process was effective and appropriate for the project design.

### 3.2 Selection Procedures

The process of setting appropriate and consistent selection procedures for this projects' open tenders was an area in which learning was taken, particularly having reviewed with a panel of 3 assessors the largest tender, and a review of the assessors' findings for 2 tenders. The specific area for improvement, was ensuring good enough guidance was provided to the contractors with the invitation to tender documentation, relating to what standard of documents submitted would achieve what score, on the 0 – 5 scale.

### 3.3 Delivery performance

Within project, what was completed was delivered to budget, deadline and effectively. The largest challenges were principally the fact that this was the first ERDF funded project that the delivery partner had received funding through, which led to hesitation and caution, which ultimately resulted in good audit findings, but at time presented challenges to the project team. These challenges were regarding usual pace of delivery for such work, and potentially over complicating certain administrative aspects to ensure compliance.

The single largest issue was the design of the close to nature river channel occurring without significant input from the delivery, or lead partner. This combined with wider site activity of the co-finance provider resulted in what often presented a sense of lack of control on delivery of an aspect

of the project, that fundamentally changed the overall delivery. In future the project team, felt greater control over the design process, was critical to the successful delivery of activities.

The validation and evaluation of the outputs of the project, reassured the lead and delivery partner that the works completed, had been done to a high standard, in line with the outline project design, and the site specific design. For example, the fish passage efficiency at Lower Darwen was above the expected design performance for such a rock ramp and reflects excellent outputs.

The activities at the two delivery sites completed, were utilised by other Ribble Rivers Trust projects, to promote the River Darwen, including education and engagement with schools and the community, throughout the local area. The success of this project and the complementary activities highlighted the need for in project resource to deliver these types of activities, which would enable the identification and quantification of direct beneficiaries, and would expect a great number of indirect beneficiaries.

The project team commented, on the positive feedback from the complementary activities, but also from the passers-by, when visiting sites during the works, and have found that a number of individuals have come forward to instigate further river improvement activity, such as the Witton Park litter trap, river clean ups, from the residents of Hoghton Bottoms, further fish pass projects, at Arley Brook (near Hoghton Bottoms), as well as Holland Wood at the bottom of the Darwen, and feasibility studies at Roach Bridge, and Sablesbury Bottoms (large weirs downstream of Hoghton Bottoms). This the team surmised is a significant indication of the project, activities, and the overall aim of improving the River Darwen being “extremely well received”.

### 3.4 Governance & Management

The project organogram set out the structure, management and governance for the project. This was largely successful, the steering group, acting as “critical friends” to ensure key aspects were appropriately considered and managed. The Director of Operations controlled the overall project activity, ensuring that all other team members were functioning effectively. Having a compliance manager/officer in both the lead partner and delivery partner offices aided in ensuring compliance of the project, overall and within the respective offices. The Project Manager ensured works on the ground were undertaken compliantly and that the evaluation officer was kept informed of all appropriate project developments and changes. The administrative support to the Compliance officer for the delivery partner ensured that publicity activities were undertaken and recorded, providing key support through the procurement processes.

The review of the management and governance identified one particular area for improvement, with all physical delivery of the whole project being undertaken by one partner, could result in the lead partner becoming disconnected from short term issues that needed quick resolutions. Although this didn't affect overall performance, it was identified that for future projects with similar governance and management arrangements, additional support is required within the lead partner to liaise and oversee on the ground works. This has been reflected a subsequent ERDF funded project with the two partners (Primrose Lodge Blue and Greenway project: 19R18P02472).

A positive, was that ensuring the authors of the outline and full application for the project funding continued to work on the project throughout project life, ensuring continuity and understanding of project design, management and performance were maintained from application to completion.

The project design included the use of the respective partners equality and non-discriminatory policies, and although there were no specific targets, the project team felt they were complied with throughout the project, by applying the principles and ensuring activities did not discriminate. The

sustainable development policy was included within the individual site designs, for the chosen fish passage solution, as well as the method of construction, and contractors submitting tenders had to demonstrate an appropriate environmental management policy/plan, that ensured through the delivery of the project, disturbance and damage to communities and the environment was minimal, and wherever possible removed.

## Section 4: Project outcomes and impact

This section will evaluate the performance of the project in relation its impact and outcomes which were outlined in the Logic Model. This evaluation will aim to identify how the impact and outcomes weigh up to what was aimed for by the project, and to what extent the project is directly responsible for any identified economic, social, and environmental benefits. Once this performance has been detailed, the projects contributions to the ERDF programme result indicators and which aspects of the project have given greatest Strategic Added Value will be surmised.

### 4.1 Output 1: ER/C/O/23 Surface area of habitats supported in order to attain better conservation status for 19 hectares

The projects main output as per the Logic Model was to improve the connectivity of 19 ha of surface water habitat. As validated in the Outcome 1 assessment below, the fish passes that were constructed at Lower Darwen and Hoghton Bottoms successfully improved the connectivity of these sections of river.

This output was completed when both fish easements were completed in Summer 2018. The project initially stated in its application that 19 ha of habitat surface area would be improved due to the reconnection of these fish easements. A recalculation in 2019 brought to light this original figure was an underestimate, with the recalculated area improved being 21.1 ha. The disparity between the calculations is due to an improvement in the GIS analysis technique used, which allowed for the estimate of areas of connectivity of smaller streams that were not included in the original calculation. This difference can be observed through comparing Figure 2 and Figure 3, which show that there was 1 ha of habitat connectivity lost due to the retraction of the close to nature by-pass and associated upstream fish pass from the project. Ergo 18 ha of habitat has still been improved by the original method of calculation.

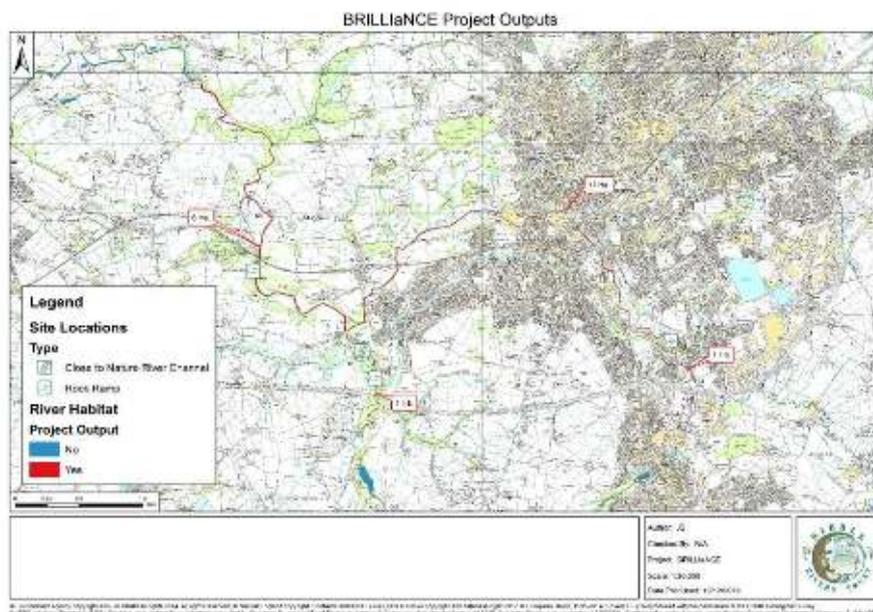


Figure 6. Map showing original output area to be reconnected through fish easements, total 19 ha.

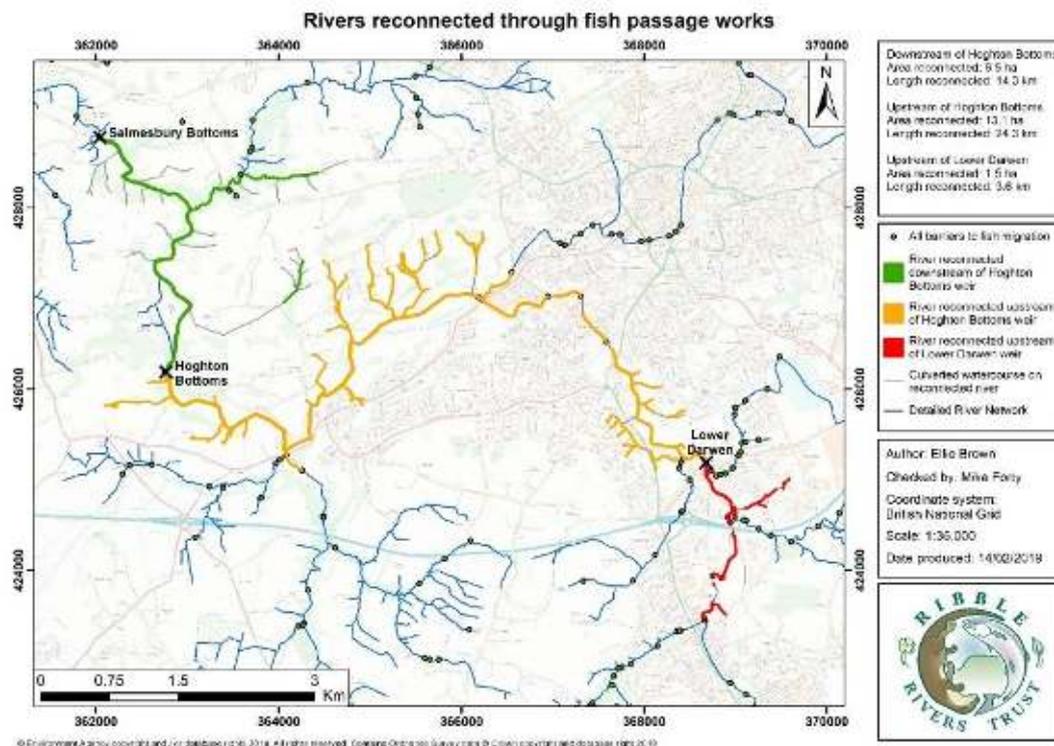


Figure 7. Map showing recalculated output area to be reconnected through fish easements, total 21.1 ha.

## 4.2 Outcome 1: Increase River Ecosystem Resilience

An important aspect of determining whether this project has successfully achieved its main intended output of improved connectivity of 19 ha of surface water habitats, is determining how effective the fish easements are that have been installed in allowing for this connectivity. To give greater context as to how effective the easements were in relation to pre-existing conditions the Ribble Rivers Trust assessed Houghton Bottoms and Lower Darwen weirs to identify the impact they were having on connectivity.

### 4.2.1 Baseline Assessment

In some circumstances, a physical structure can be determined to be a complete barrier to fish migration through a visual inspection of its physical characteristics, putting them in to context with the known swimming or leaping ability of target fish species to identify whether fish could successfully navigate past the structure. At other structures, size of structure or flow patterns make it more difficult to determine how much of a migration barrier a structure poses, in these cases tagging and telemetry studies can be used to shed light.

For Houghton Bottoms, a visual assessment was considered sufficient by the Fisheries Scientists at the Ribble Rivers Trust to determine that brown trout (or any other species present in the river) would be unable to migrate upstream with the weir posing a complete migration barrier. The size of the vertical step of the weir would be the major limiting factor in fish not being able to migrate past the weir, with fish being observed to attempt to do so but attempts falling far short of the weir crest (Figure 4).



*Figure 8. Photo showing adult brown trout leaping and failing to achieve passage at Hoghton Bottoms pre fish easement (left), and Hoghton Bottoms complete with fish easement (right).*

Lower Darwen weir (Figure 5) was a more complex structure in terms of fish passage with passage for brown trout being possible in certain flows if a depth of water was maintained over the weir. As such a telemetry study was undertaken by the RRT in 2015 that identified 31% of tagged fish being able to pass the weir in elevated flows.



*Figure 9. Lower Darwen weir complete with fish easement in 2018.*

#### 4.2.2 Post-construction Assessment

Both Lower Darwen and Hoghton Bottoms were assessed post-construction using radio telemetry studies to track fish movement. Brown trout (Figure 6) were used as the study species as their life history means that they would benefit the most from the fish passes given their propensity to migrate upstream to suitable spawning grounds. Fish were captured upstream of structures and then individuals of 1+ age or older were tagged and then displaced downstream of the structure as this is known to instigate migration attempts upstream through a homing instinct (e.g. Forty et al., 2016). Fish were then manually tracked daily initially (every 2-3 days later) through walking along the

bank with a radio receiver and antenna. This allowed fish to be regularly located giving a high probability that successful passage would be recorded.



Figure 10. Brown trout tagged at Hoghton Bottoms.

At Hoghton Bottoms brown trout were in low numbers in the vicinity of the weir so a sample of only 16 fish was achieved. Of these 16 fish, 3 successfully moved upstream during the study giving a passage efficiency of 19% assuming all fish attempted to move upstream. Successful fish (mean = 200mm, 122g) were observed to be smaller in length and weight than unsuccessful fish (mean = 271 mm, 287g).

In comparison with pre-fish pass conditions, there has been a stark change in the ability of brown trout to move upstream at Hoghton Bottoms weir. Brown trout have been shown to be able to move upstream through the fish pass, meaning that for the first time since the weir's construction the habitat upstream and downstream is again connected. While the percentage of fish that achieved passage was low at 19%, this is considered to be a minimum value given the limited tag battery life and that other fish may have moved upstream after batteries had died. The study was also limited by the low densities of brown trout above the weir which limited the number of fish that could be tagged. Results from the study indicated that there may be a bias in the function of the fish pass towards smaller adult fish, however the limited sample size means that this cannot be definitively concluded.

Of the 20 tagged brown trout at Lower Darwen weir, 16 were observed to move upstream during the study. Successful fish had a mean fork-length of 247 mm (range= 176 – 360 mm, SD = 14.49) and a mean weight of 203 g (range = 74 – 515 g, SD = 34.82). Unsuccessful fish (n=4) had a mean fork-length of 212 mm (range = 190-245 mm, SD = 12.73) and a mean weight of 108 g (range = 82-158 g, SD = 17.83). The proportion of displaced fish achieving passage was 80% during the study.

The construction of this fish pass has greatly improved the ability of brown trout to migrate upstream at this structure. In comparison with the 31% of fish being able to pass the weir before the fish pass, 80% observed in this study was a vast improvement. Additionally, in this study, fish were observed to move both upstream and downstream with multiple passes through the new fish pass

showing positive signs of efficient two-way movement. It can be concluded from this study that the habitats upstream and downstream of Lower Darwen weir have successfully been reconnected.

In summary, the two fish easements have succeeded in improving the connectivity of the River Darwen, though the Lower Darwen easement has been much more successful in doing so. A number of contributing factors are likely to have led to this greater success including: 1) Lower Darwen easement being built at a lower gradient than Hoghton Bottoms due to more amenable site constraints; 2) attraction of fish to find the easement entrance would be easier to achieve at Lower Darwen as river flow is less, meaning less main river flow to compete with.

### 4.3 Outcome 2: Increased Fish Populations

Associated with an improved connectivity of these sections of the River Darwen, it is expected that there will be an increase in fish populations as a result given fish will be able to migrate for spawning and hunt for resources more easily. To evaluate this the RRT applied a standard methodology for evaluating spawning success of fish: electric fishing of spawning habitat. A 5-minute timed survey is undertaken of spawning riffles and the number of young of year fish are counted, giving a density of fish per 5-minutes and per 100m<sup>2</sup> that can be compared with the National Fisheries Classification Scheme to give an estimate Grade score of A (high density) to F (no fish present). Sites upstream and downstream of the weirs were fished once a year at a minimum of one survey before and after construction (Figure 7).

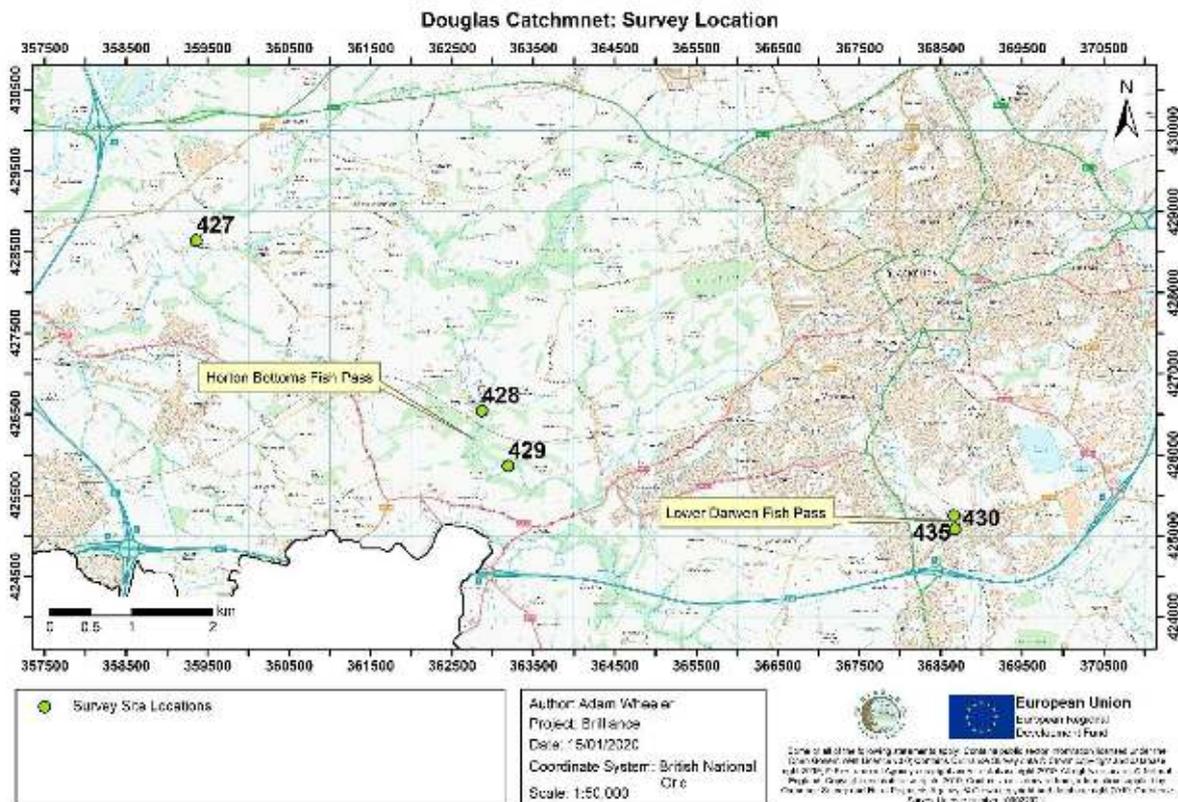


Figure 11. Site locations for electric fishing surveys undertaken on the River Darwen

Table 6. National Fisheries Classification Scheme Grade Scores for sites on the River Darwen.

Site Number	Catchment	NGR	Trout 2017	Trout 2018	Trout 2019
427	Darwen	SD 59360 28645	D	E	F
428	Darwen	SD 62867 26542	F	E	F
429	Darwen	SD 63189 25861	F	F	F
430	Darwen	SD 68676 25079	E	C	E
435	Darwen	SD 68660 25251	-	E	F

The survey results from pre-construction set a baseline of moderate to poor grade densities on the Darwen, ranging from C to F (Table 5). Given the easements were constructed in summer 2018, this means that summer 2019 was the only occasion possible to evaluate if there had been an improvement to spawning success. Unfortunately for trout populations, the entire Ribble catchment suffered from very poor brown trout recruitment in 2019 which has been attributed to 3 large storm events during the emergence of trout from eggs, which is a time they are very vulnerable. Figure 8 shows the population crash that occurred for brown trout across all three major catchments of the Ribble. The sites on the River Darwen all recorded no trout spawning success except the site downstream of Lower Darwen which had poor densities. In order for the degraded fish populations of the River Darwen to be allowed to recover, a year where environmental conditions are more conducive to survival of the young-of-year would likely be required. Ribble Rivers Trust will be continuing surveying in the vicinity of the weirs to identify if there is a recovery of populations in the years to come.

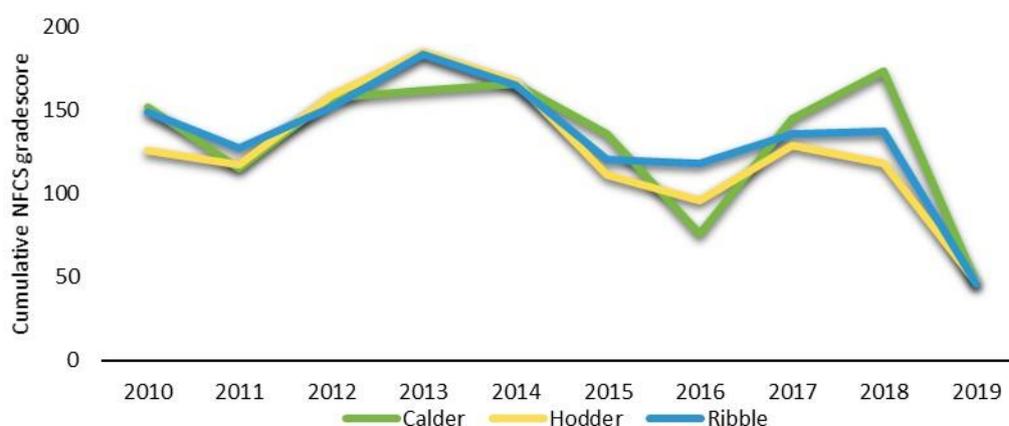


Figure 12. Population trend of brown trout on the Ribble catchment from RRT surveys.

#### 4.4 Outcome 3: Increased Recreation

It was considered as part of the project that the main measurable output in terms of increased recreation would be an increase in the number of angling visits to the River Darwen, associated with the improving fish populations and the increased awareness of the biodiversity of the River brought about via the project.

Previous to the project, upstream of Hoghton Bottoms weir there were no registered angling clubs holding fishing rights on the River Darwen. This is potentially reflective of the low value (or perceived low value) of the natural capital of the blue space, within the project area. During the project's life and as a result of the publicity and greater knowledge of the river brought about by the project,

Prince Albert Angling Society, one of the largest angling clubs in the country, approached the riparian land-owner regarding taking on the fishing rights upstream of Hoghton Bottoms. In spite of this new interest, the angling club did not decide to take on the fishing rights in this instance due to other infrastructure restrictions relating to car parking and access that would need to be addressed.

So, while a measurable increase in angling visits has not been achieved by this point due to the project, an increasing interest in recreation has been achieved which may leave a legacy in to the future leading to future investment.

#### 4.5 Outcome 4: Increased Habitat Quality

With this outcome directly linked to the delivery of the close to nature by-pass channel, which was not delivered, this outcome is not to be assessed.

#### 4.6 Outcome 5: Increased awareness of biodiversity of River Darwen

During the project the RRT has kept up a publicity and engagement programme to promote the River Darwen and the BRILLIANCE projects' role in improving it.

RRT have held a project page on their website which has acted as an information hub for anyone interested in the project. A total of 873 unique visitors viewed the webpage 981 times during the project (Table 6). Further to this, the RRT have published two blog posts about the River Darwen and improving connectivity in May 2018 and June 2018 which had a total of 776 views in total.

*Table 7. Webpage views for BRILLIANCE project page on <https://ribbletrust.org.uk/brilliance/>*

Year	Quarter	Period	Unique Webpage Visitors
1	Q3	Oct-Dec 2016	N/A
1	Q4	Jan-Mar 2017	69
1	Q1	Apr-Jun 2017	72
1	Q2	Jul-Sept 2017	63
2	Q3	Oct-Dec 2017	61
2	Q4	Jan-Mar 2018	60
2	Q1	Apr-Jun 2018	83
2	Q2	Jul-Sept 2018	82
3	Q3	Oct-Dec 2018	61
3	Q4	Jan-Mar 2019	116
3	Q1	Apr-Jun 2019	106
3	Q2	Jul-Sept 2019	63
4	Q3	Oct-Dec 2019	37
Total			873

Outside of publication through RRT media, the project has also been reported on by two major local news outlets, Lancashire Telegraph (16/08/2018) and THIS IS Lancashire (16/08/2019) following an RRT press release (Appendix A).

Table 7 details the engagement events and activities that have been delivered alongside the BRILLIANCE project in Blackburn-with-Darwen. These activities include open public engagement in parks over river wildlife such as invertebrates as well as specific education events with community groups and schools. Particularly successful is the RRTs Trout in the Classroom project where primary

school children raise baby trout from eggs and then release them into their local river, while learning about the fish's life cycle as well as the ecology and biodiversity of their local rivers, and water safety.

*Table 8. Engagement events held alongside BRILLIANCE project in Blackburn-with-Darwen*

Date	Event	Number directly engaged
Aug-18	Family invertebrate event in Witton Park	138
Spring 2019	Trout in the Classroom Programme - Longshaw Infants - Trout released at Lower Darwen	73
Spring 2019	Trout in the Classroom Programme - St Peter's School - Trout released in Witton Park	60
Jun-19	Witton Park Academy - Invertebrate day with GCSE Geography Students	82
Aug-19	River Explorers Trail in Witton Park	22
Sep-19	St Francis Cubs - Invertebrate study and art project	Not Recorded



*Figure 13. Photos of family invertebrate event in Witton Park (left), and a trout in the classroom release (right).*

Through the project's publicity a landowner of several weirs on a tributary of the River Darwen (Arley Brook) has approached the RRT regarding fish easements/weir removal to improve the biodiversity of the river. The RRT is currently working with this landowner on feasibility studies for such a project.

Witton Park is a focal green space in Blackburn-with-Darwen through which the River Darwen runs. The publicity around this project led to RRT being approached by Blackburn-with-Darwen Council to be part of a collective group aiming to revive the functioning of a disused litter trap on the river through the park. This effort demonstrates an increased desire to improve and maintain the value of this natural capital asset by the local community, which has been inspired by the project.

As noted in Outcome 3, the biodiversity of the river was highlighted to Prince Albert Angling Society through the project who investigated the potential of taking on the fishing rights of a stretch of the project area.

#### 4.7 Employment Impact Assessment

Using the Environment Agency's Benefit Cost Ratio, a net additional GVA was calculated using £1.56 for every £1 spent (Appendix B). Where the public funded support was approximately £0.303m (Gross Impact; Table 8). There was assumed no deadweight, as no spend on the River Darwen would have occurred had there been no public funded support, and similarly no displacement/substitution identified as the investment was not to detriment or loss of another river/environmental asset. As the benefit was specific to Lancashire, there was some leakage as the Lead Partner was based outside Lancashire which equated to £27,000. The remainder of the investment was solely within Lancashire owing to the River and identified associated benefits, being wholly within Lancashire.

Table 9. Gross and Net Additional Impact for Employment and GVA (time period).

		Impact Area 1:	
		Lancashire	
		Measure	Adjustment
Impact Indicator: Employment Unit = FTEs	Gross Impact	8.7 – 20.2	
	Deadweight / reference case	0	0
	Displacement / substitution	0	0
	Leakage	1.8	0
	Net Additional	6.9 – 18.4	
Impact Indicator: GVA Unit = £ms	Gross Impact	0.303	
	Deadweight / reference case	0	0
	Displacement / substitution	0	0
	Leakage	0.027	0
	Net Additional	0.142	

The Employment impact indicator has been calculated with margins. This is using a figure of £23,400 per FTE, and that the project had distinct revenue elements. Where considering revenue alone, the employment indicator would suggest 8.7 FTE as the lowest Gross impact on employment. Which if removing the FTE equivalent identified through Leakage gives a lowest net additional employment unit of 6.9. However, the capital elements also contain a significant degree of employment, and where these are included the upper limit could be 20.2. Which if removing the leakage, gives an Employment Unit of 18.4.

## Section 5: Project value for money

Economic assessment of environmental improvement is a rapidly evolving area of work. Identifying benefits of rivers is a particularly challenging aspect of economic assessment of this paradigm, as there are a number of approaches, which are accepted and used by different governmental and non-governmental organisations. Given this, the project opted to use the Environment Agency Operational Catchment Economic Appraisal report (see Appendix B), and findings particularly the “Benefit cost ratio” to calculate the economic value of the project. The BCR, calculates that for every £1 spent in the Ribble (and tributaries) on water environment improvement work, £1.56 of benefit is derived. As such the project provided £450k of benefit, for an investment of £300k. A greater return would have been achieved if all things had been achieved, however, the ratio is linear, and as such even with the reduction in investment the project provided a valuable return for investment.

The project exceeded the outputs anticipate at the outset of the project, for a significantly lower investment, and reflects a significant increase in value for money based on target outputs per £1 compared to delivered outputs per £1. The tender process also saw delivery below budgeted amounts, which were based on independent Quantitative Surveyors estimates, offering greater value for money.

## Section 6: Conclusions and lessons learnt

### 6.1 Summary

BRILLIANCE aimed to increase the value of Blackburn's Natural Capital through delivery of improvements to Blackburn community's quality of place, value of the natural environment and ecosystem service provision. The project targeted works to improve the conservation status of surface water habitats through the construction of fish easements to improve habitat connectivity, and directly improving habitat quality through a replacement of a culvert with a close to nature river channel.

The projects contract value was £932,500 and ran for 2 years and 9 months from November 2016 to July 2019. ERDF grant value was £559,500 to £373,000 of private sector match funding. Change requests during the project meant the project reduced in scale with the total value of the project at evaluation being £303,030 with ERDF contributing £181,057 and £121,973 coming from private sector match.

The project delivered 2 fish easements of the 3 planned and did not deliver the planned close to nature river channel as those two items were withdrawn from the project in 2019. 21.1 ha of surface water with improved conservation status was achieved as an output of the project compared to the 19 ha planned.

### 6.2 Strengths of BRILLIANCE

#### **Overachieving project output**

BRILLIANCE managed to deliver 111% of the output to improve the conservation status of surface areas.

#### **Effective progress of delivered activity**

The activities that the project delivered were done so on time and effectively, coming in under planned budget and with Lower Darwen fish pass performing above expectations.

#### **Transparency and supportive working**

With this being the delivery partner's first ERDF funded project, a culture of transparency and supportive working was key between themselves, the lead partner and MHCLG in ensuring effective and compliant delivery of the project.

#### **Prioritised delivery targeting areas of high need with high impact interventions**

Pre-project the delivery partner undertook a prioritisation assessment of the River Darwen to highlight sites where restoring connectivity can have highest impact in habitat reconnection. This assessment formed the basis of delivering a large impact, in an improved conservation status, through a high value for money investment than could have been achieved elsewhere on the River. Prioritisation is key in the delivery partners approach for delivering greatest impact and greatest value for money.

#### **A legacy of an improving Natural Capital Asset**

BRILLIANCE has provided a springboard upon which the conservation status of the River Douglas will continue to improve. The project has conducted some of the first restoration works on this degraded river. Beginning the process of reconnecting habitats disconnected through a number of key large structures provides key momentum from which future investment can build with the result being a recovering river that improves the quality of place Blackburn's community, the ecosystem services provided and increasing investment and desirability of Blackburn-with-Darwen.

### 6.3 Lessons Learnt

Here, as recommended in the Summative Assessment guidance, we detail the lessons learnt through the project as tailored to key audiences.

#### 6.3.1 Grant Recipient/Delivery body & Others designing and implementing similar interventions

##### **Values of greater involvement of delivery partner in construction design**

With the delays and eventual retraction of the close to nature river channel from the project, there were a number of learnings that the delivery partner took with regards to this occurrence. As highlighted in Section 1.6, a greater involvement of the delivery partner in the designs was highlighted as a weakness in the delivery model and has been learnt from and incorporated in to project development moving forward.

##### **New funder challenges**

Learnings also took place with this being the first ESIF and ERDF funded project of the delivery partner. Caution due to this by the project team led to some challenges in usual delivery pace while potentially over complicating certain administrative aspects. This caution ultimately led to good audit findings; however, the delivery partner improved its effectiveness in delivering ERDF/ESIF projects through this project leading to a further project (Primrose Lodge Blue and Greenway project: 19R18P02472) being undertaken by the delivery partner.

##### **Further support for the Lead Partner to liaise and oversee capital works**

Where all on the ground delivery is being undertaken by the delivery partner, a potential issue when quick decisions need to be made in conjunction with the lead partner can lead to a disconnect and is an area where improved resource for oversight and liaising to keep all parties appropriately apprised and engaged would increase effectiveness of governance and management.

##### **Procurement delays and processes**

On reflection of this project the procurement process of the delivery partner has been improved based on improved invitation to tender documentation and applying many of the processes undertaken in this project in all tenders over £50,000. Timescale adjustments due to delays when procuring highly specialised equipment have also been integrated into future project timelines.

#### 6.3.2 Policy makers

##### **Duplication of effort in claims process**

During the project, the e-claims system was added to the reporting requirements as part of the claims process. However, the efforts of the delivery and lead partners were being duplicated from this point on as there was a requirement to continue to report under the previous reporting mechanism as well as e-claims. Streamlining this process to require one reporting mechanism will increase efficiency and remove the duplication of effort.

##### **Priority axis 6 subject to greater uncontrollable risks in delivery**

On reflection of the occurrences in this project, it is considered the Priority Axis 6 projects may be susceptible to an increased risk of slippage in delivery due to the nature of works. Specifically, this is related to uncontrollable factors such as weather which can have a large impact on ability to work in the environments, with this being particularly the case in river environments which are very changeable.

**Case studies and examples for each funding priority axis**

Alongside the guidance provided to applying for and undertaking the process of an ERDF funded project, it would be valuable for grant recipients and delivery bodies to have examples or case studies of projects previously delivered under that funding priority. These examples may demonstrate what is feasible to deliver under the project and how challenges associated with delivering under that priority may be overcome.

## References

ERDF, 2019a. Summative Assessment Guidance. ESIF-GN-1-033, April 2019.

ERDF, 2019b. European Regional Development Fund Summative Assessment Guidance – Appendices. ESIF-GN-1-034, April 2019.

Forty, M., Spees, J., Lucas, M. C., 2016. Not just for adults! Evaluating the performance of multiple fish passage designs at low-head barriers for the upstream movement of juvenile and adult trout *Salmo trutta*. *Ecological Engineering* 94, pp. 214-224.

## Appendix A – Lancashire Telegraph and THIS IS Lancashire news articles on the BRILLIANCE Project

LANCASHIRE  
**Telegraph**

### Weir work to boost fish and eels visiting Blackburn's waterways

16th August 2018

**A TRUST has just completed its first projects to restore Blackburn's rivers and open up more habitat for aquatic wildlife around the town.**



Bypass channels have been constructed alongside two large weirs near Hoghton Bottoms and Lower Darwen to allow fish like trout and eels to access 18 hectares of upstream river habitat for the first time in decades.

The Ribble Rivers Trust has been awarded grants from the European Regional Development Fund and the Heritage Lottery Fund (as part of its Ribble Life Together project), to deliver a programme of works to 're-naturalise' and improve parts of the River Darwen and the River Roddlesworth at Feniscowles.

The weirs were originally built to provide local mills with a water supply. The mills have since been demolished.

Restoration work is also planned for a section of the River Roddlesworth near Feniscowles next year.

Jack Spees, the trust's chief executive, said: "This work doesn't just benefit aquatic animals, it's good news for the people who live around Blackburn and Darwen too. We hope this will encourage more people to visit, enjoy and value the rivers of Blackburn".

<http://www.lancashiretelegraph.co.uk/news/16431299.weir-work-to-boost-fish-and-eels-visiting-blackburns-waterways/>

## THIS IS LANCASHIRE

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<https://www.thisislancashire.co.uk/news/16431299.weir-work-to-boost-fish-and-eels-visiting-blackburns-waterways/>

## Appendix B - Environment Agency Operational Catchment Economic Appraisal Report

### Operational Catchment Economic Appraisal - Final Appraisal Report and Audit Trail

#### 1. Final appraisal report

Overview	
Catchment	<p><b>Operational Catchment: Ribble</b>  <b>WFD Management Catchment: Ribble</b></p> <p>This assessment covers surface water bodies in the Ribble</p> <p><b>Map of the Ribble Catchment</b></p>  <p>The map illustrates the Ribble Catchment area, divided into five sub-catchments: Hodder, Upper Ribble, Lower Ribble, Calder, and Darwen. Major towns and cities are marked with black dots: Kirkham, Preston, Blackburn, Burnley, Clitheroe, and Settle. The rivers are shown in blue, with labels for River Hodder, River Ribble, River Calder, and River Darwen. The catchment boundary is outlined in black.</p>
Date economic appraisal started	October 2013

Overview				
Date economic appraisal completed	March 2014			
Name/s of assessor/s	Lead assessor: <b>Helen Nightingale</b> <b>Environment Planning Specialist</b>			
Objective and aim of economic appraisal  <i>WAG section 2.1</i>	<p><b>Objective</b> To identify a bundle of measures to improve water bodies in the operational catchment to good status/potential or as near to it as possible.</p> <p><b>Aim</b> To identify whether the bundle of measures is cost beneficial or not.</p>			
Number of bundles of measures assessed	Two bundles of measures have been assessed, including measures relating to diffuse agriculture, point source discharges and non mains drainage.			
Risk of failure % applied to recommended bundle of measures	<p>30%</p> <p>A rule of thumb of 30% has been used across the Douglas Catchment reflecting the level of risk associated with the proposed measures, particularly diffuse private sewage treatment plant pollution.</p>			
Results of Stage 1 (and Stage 1+ if applied) valuation for recommended bundle of measures  <i>Stage 1 valuation sheet – Key Outputs tab</i>	Net Present Value:	Benefit Cost Ratio:	Present Value Benefits:	Present Value Costs:
	£77.5 Million	1.4	£260 million	£182.5million
Results of Stage 1+ valuation (if applied)  <i>Stage 1 valuation sheet, 'GES-Rivers' and/or 'GES - Coastal, Lakes &amp;</i>	Biodiversity benefits from mitigation measures, saltmarsh and reed bed creation and agricultural schemes.			
	Number of farms affected: 544			
	Stage 1	Stage 1+ medium	Stage 1+ medium inc TRAC and	

Overview																																																																																																												
<i>Trans' tab and stage 1+ tab</i>				reservoir benefits																																																																																																								
	Net Present Value	£77.5 million	£97.2 million																																																																																																									
	Benefit Cost Ratio	1.4	1.53	2																																																																																																								
<p>Conclusions of Stage 1+ valuation for recommended bundle of measures</p> <p><i>Stage 1 valuation sheet and manual sensitivity testing for Stage 1+ as per guidance</i></p>	<table border="0"> <thead> <tr> <th>Split costs</th> <th>capex</th> <th>opex</th> <th>40yr opex</th> <th colspan="2"></th> </tr> </thead> <tbody> <tr> <td>Rivers</td> <td>148851</td> <td>2263.2</td> <td>90529</td> <td colspan="2"></td> </tr> <tr> <td>Lakes</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td colspan="2"></td> </tr> <tr> <td><b>Totals</b></td> <td><b>148851</b></td> <td><b>2263.2</b></td> <td><b>90529</b></td> <td colspan="2"></td> </tr> <tr> <td colspan="6"><b>Total costs</b></td> </tr> <tr> <td colspan="6"> </td> </tr> <tr> <th>Bens &amp; Costs</th> <th>PV bens</th> <th>PV costs</th> <th colspan="3"></th> </tr> <tr> <td>Rivers</td> <td>279.70</td> <td>182.50</td> <td colspan="3"></td> </tr> <tr> <td>Lakes</td> <td>5.60</td> <td>0.00</td> <td colspan="3"></td> </tr> <tr> <td></td> <td><b>285.30</b></td> <td><b>182.5</b></td> <td colspan="3"></td> </tr> <tr> <td colspan="6"> </td> </tr> <tr> <th>NPV</th> <td colspan="5"></td> </tr> <tr> <td>Rivers</td> <td>97.2</td> <td colspan="4"></td> </tr> <tr> <td>Lakes</td> <td>5.60</td> <td colspan="4"></td> </tr> <tr> <td></td> <td><b>102.8</b></td> <td colspan="4"></td> </tr> <tr> <td colspan="6"> </td> </tr> <tr> <th>BCR Ratio =</th> <td colspan="5"><b>1.56</b></td> </tr> </tbody> </table>					Split costs	capex	opex	40yr opex			Rivers	148851	2263.2	90529			Lakes	0.00	0.00	0.00			<b>Totals</b>	<b>148851</b>	<b>2263.2</b>	<b>90529</b>			<b>Total costs</b>						 						Bens & Costs	PV bens	PV costs				Rivers	279.70	182.50				Lakes	5.60	0.00					<b>285.30</b>	<b>182.5</b>				 						NPV						Rivers	97.2					Lakes	5.60						<b>102.8</b>					 						BCR Ratio =	<b>1.56</b>					<p>The addition of the stage 1+ values for agriculture benefits changes the BCR from 1.8 to 2</p> <p>Agriculture benefits are for 544 farms = £1,360,000/year.</p> <p>The medium biodiversity value has been used to reflect the potential benefit to the catchment that diffuse agriculture measures would bring.</p> <p>The sensitivity tests show that the result is robust.</p> <p>These results provide additional detail to support the recommendation below.</p>
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<p>Non-monetised benefits</p> <p><i>WAG section 3 and 5</i></p>	<p>Non monetised benefits have been identified in the AST for:</p> <ul style="list-style-type: none"> <li>Fresh Water</li> <li>Erosion</li> <li>Recreation and tourism</li> <li>Provision of habitat</li> </ul>																																																																																																											

**Overview**

Water regulation (timing and scale of run-off, flooding, etc.)

Non monetised costs have been identified in the AST for:  
Cultural Heritage

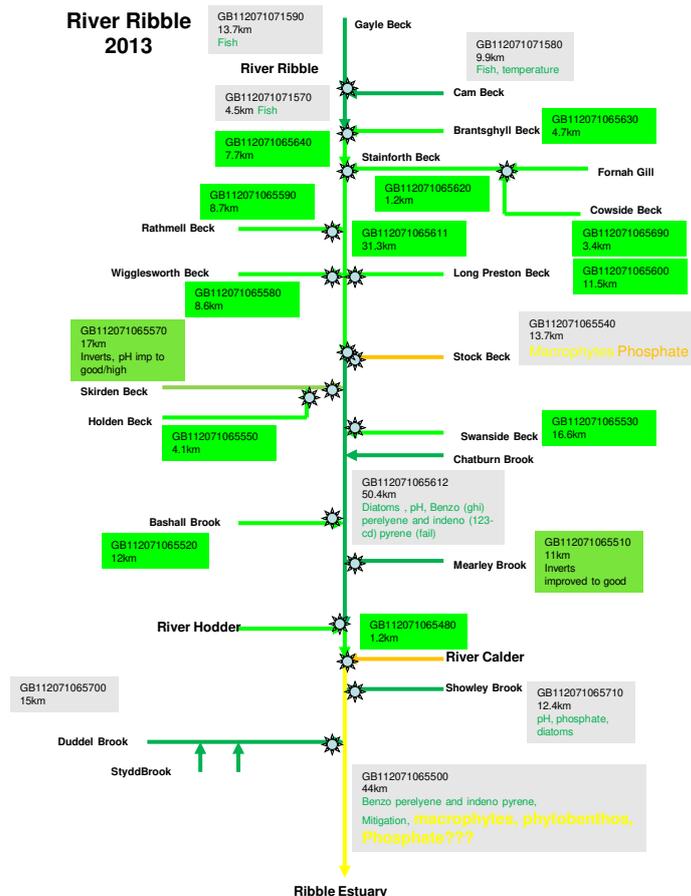
These are described in more detail within the AST

All water bodies within the operational catchment will achieve moderate status/potential by 2021. The limiting element is PHOSPHATE. United Utilities will be unable to introduce phosphate stripping to their sewage treatment works on the catchment until the process is technically feasible. It is hoped a solution will be developed by 2025. The remaining elements should achieve 'good' by 2021.

The bundle of measures is shown to be cost beneficial and subject to affordability could achieve GES by 2027.

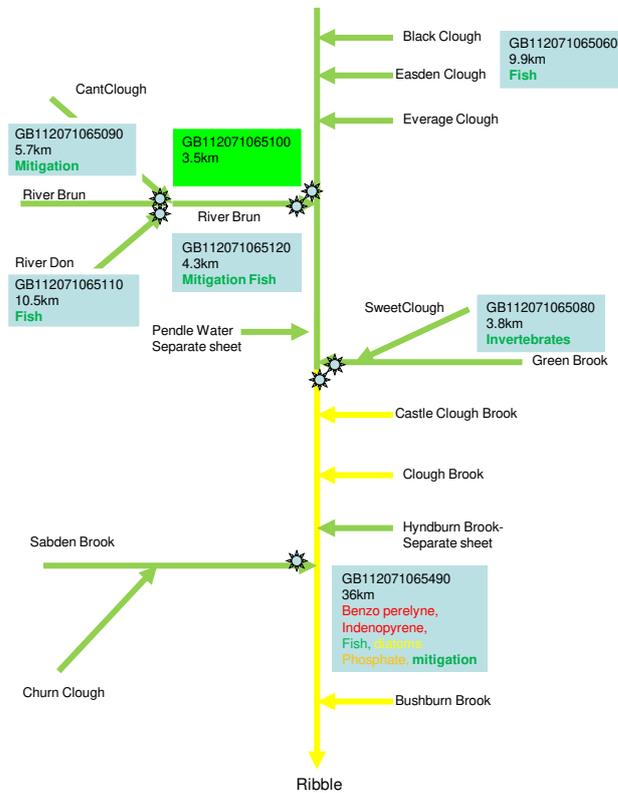
However, this is subject to the required take up of agriculture measures, the feasibility of phosphate stripping and the environmental response time.

WFD status achievable

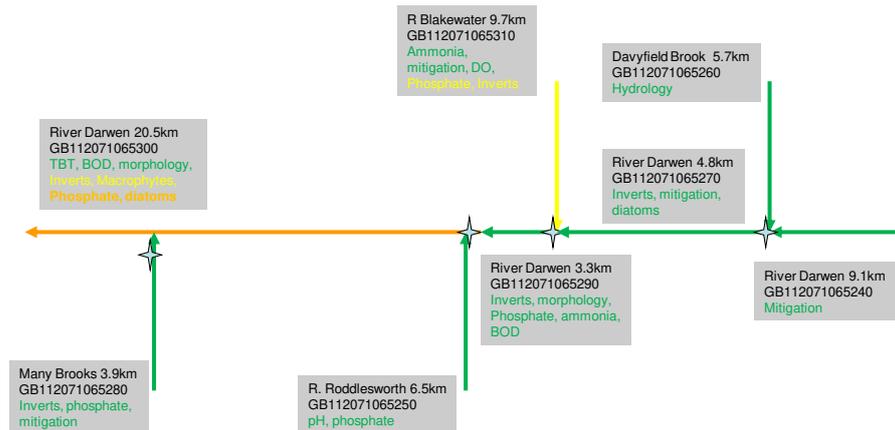


Overview

**River Calder  
2013**



**River Darwen  
2021 Objectives?**



All macrophyte and phytobenthos at less than good where sampled

Only schematics of waterbodies with alternative objectives are shown.

Overview	
Sensitivity testing <i>WAG section 7</i>	Sensitivity testing has shown all criteria to be green .
Recommendation of assessor	<b>The second bundle of measures is cost beneficial and no adverse environmental effects are anticipated, and should be included in the draft River Basin Management Plan for consultation.</b>
QA undertaken	No

**Detail****Bundle/s of measures** WAG section 2.3

In the NW Region, to identify and develop the relevant actions that would be needed to get all water bodies to good (*pathway to good*) and to undertake the initial Cost Benefit Assessment (CBA), the following approach has been followed;

The waterbodies in each Operational Catchment were identified. For each failing element, Reasons for Failure (RFF) were identified (investigations, workshops, external engagement). For each of these RFF, the relevant Tier 1-3 measures were assigned (from the Nationally agreed list).

Based on technical knowledge, high level Tier 4 measures were assigned to each RFF. These high level Tier 4 measures could then be used as a prompt with area teams, technical teams/partners, to build up the detail needed for each waterbody and each measure. The high level Tier 4 measures have been agreed by the NW Land and Water Business Group, the River Basin Programme Manager, the Virtual Planning Group and the network of Regional Pressure Leads.

All capex costs are assumed to occur in 2015/16 financial year unless specific information has been provided for alternative dates. 2009 is the baseline year for measure identification unless more recent evidence exists. NWEBS baselines were generated using the NWEBS descriptions for a rural river and informed by the WFD status. This was approved by the technical group.

Benefit length double counting was avoided as benefits were only assigned to an individual waterbody.

Willingness to pay – Central default value assumed unless alternative evidence available, such as protected areas including SACs/SPAs and within high value landscapes such as the Lake District National Park.

In order to estimate the length/area of water body to be improved and the number of measures required to get to good expert judgement was used and in-depth knowledge of the water bodies. Assumptions were agreed by the technical group.

All water bodies identified as failing with confirmed RFF should be improved in WFD status by the proposed measures. It is inevitable that a part of the measures will in some case help guard against deterioration and specific measures to prevent deterioration will be assessed in due course.

It is recognised that there are gaps in evidence eg related to failures identified by new/recent monitoring where investigation is required and/or confirmation of a reason for failure and associated measure.

Extensive engagement on classification, reasons for failure and associated measures is routinely undertaken with Ribble Rivers Trust– Catchment Hosts for the Ribble Catchment.

The main types of measures included in the bundle are diffuse agricultural pollution, non mains drainage, point source (sewage treatment works), habitat restoration

Measures which address no deterioration and protected area compliance were removed from the cost benefit analysis of the bundle of measures (as per guidance) before economic appraisal was

<b>Detail</b>	
<p>carried out. These, and their costs, are recorded in the Measures, Bundles and Costs sheet. The benefits and effects on the wider environment are recorded in the Appraisal Summary Table.</p> <p>Measures have been chosen primarily to address the impacts of significant water management issues causing failures under the Water Framework Directive. Where possible, climate resilient measures have been chosen. However it is considered unlikely that the measures will be sufficient to address all impacts of climate change and we will be assessing the likely gaps before the publication of the final River Basin Management Plans.</p> <p>Reference: Measures, Bundles and Costs sheet (see below)</p>	
<b>Costs</b>	
<p>National cost data has been used eg the Agriculture CAM tool. Where possible these costs have been amended, to make them more relevant for the Region, based on local knowledge and information e.g. expert judgement, previous projects, technical reports etc. This is identified where relevant. Mitigation measure costs have been taken from Mitigation measures studies.</p> <p>Farm numbers for the CAM Tool are based on the number of farms greater than 20ha, and the percentage which are livestock farms.</p> <p>Risk factor applied in the CBA: this has been based on expert judgement. For some of the measures, there is a higher confidence that they will be implemented and also on the success of the measure once implemented, eg water company improvements where there is clear funding through the AMP process. The specific limits that need to be met to enable compliance with WFD standards are also clearly set out, and so the schemes are modelled and designed to achieve this.</p> <p>For other types of measures that rely on advice and guidance, or are voluntary, then there is greater risk that the measures will not deliver the desired environmental outcome.</p>	
<b>Willingness to pay</b> <i>WAG section 4.5 (not applicable for groundwater only appraisals)</i>	
<b>Value used</b>	Central (Although this could be High as there are parts of the catchment in SPA and SSSIs)
<b>NWEBS baseline</b> <i>WFD element status and NWEBS category status correlation spreadsheet (not applicable for groundwater only appraisals)</i>	
The NWEBS baseline was determined using the agreed comparative WFD status approach.	
<b>Km /km<sup>2</sup>or m<sup>3</sup> of benefits</b>	
The waterbody length has been used for benefit calculations to reflect the catchment wide nature of measures relating to agriculture. For point source specific measures the downstream river length has been used. For fish barriers, the length of river accessible to fish has been used.	

<b>Detail</b>
<b>Sensitivity testing</b> <i>WAG section 7</i>
Sensitivity testing has shown all criteria to be green.
<b>Appraisal Summary Table</b> <i>WAG section 3 and 5</i>
Significant non monetised benefits have been identified for:  Fresh Water Erosion Recreation and tourism Provision of habitat Water regulation (timing and scale of run-off, flooding, etc.)  Non monetised costs have been identified in the AST for: Cultural Heritage  These are described in more detail within the AST  Reference: Appraisal Summary Table (see below)
<b>Engagement</b> operational instruction (450_13) section 2
<b>Internal</b>
Internal multifunctional workshops have been held to discuss reasons for failure and identify measures. Further events will be held as part of ongoing development of measures via virtual catchment teams
<b>External</b>
Significant external engagement has been achieved through working closely with Ribble Rivers Trust
<b>Any other supporting information such as key uncertainties, other rules of thumb used and key assumptions made</b>
Key assumptions  It is assumed that the required degree of take up can be achieved in order to realise the degree of improvement required from the agriculture sector. This is an area for further discussion with catchment partners.

## 2. Audit trail

*The documents in red text are required. Remove or add other documents in/to this table as appropriate.*

<b>Reference/relevant documents</b>	
<b>National templates:</b>	
<b>Measures, Bundles and Costs sheet</b>	Hyperlink

<b>Reference/relevant documents</b>	
(or similar as appropriate – must include the same information as the National template as a minimum for common cost/measure reporting/ calculations)	
<b>Appraisal Summary Table</b>	Hyperlink
<b>Stage 1 valuation sheet</b>	Hyperlink
<b>Final Appraisal Report and Audit Trail</b> (this document or similar as appropriate – must align with guidance for final appraisal reporting in section 8 of the WAG)	Hyperlink
<b>QA information and summary</b>	
<b>QA information and summary</b> (this may be a number of documents and will be held on the O drive)	Hyperlink
<b>Local supporting information</b>	
<i>i.e. water body summary sheets or action plans, km improved maps, correspondence from external partners, catchment group meeting notes, QA notes/report, communication/engagement log etc</i>	
	Hyperlink or details of how to find out more
<b>Regional information</b>	
<i>i.e. Regional centralised operational catchment statistic data, CPS download of stage 3 investigation outcomes, cost references etc</i>	
	Hyperlink or details of how to find out more



*“Improving the Ribble Catchment for wildlife and people”*

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