

# Project completion report:

## RIVER RESTORATION STRATEGY RIVER GOWAN EMBANKMENT REMOVAL



A project delivered in partnership with Natural England and The Environment Agency

NATURAL  
ENGLAND



ENVIRONMENT  
AGENCY



## Contractor

This document was produced by the South Cumbria Rivers Trust  
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## Project Funders

This project was funded by Natural England and the Environment Agency

## Disclaimer

Whilst this document is considered to represent the best available scientific information and expert opinion available at the stage of completion of the report, it does not necessarily represent the final or policy positions of the project funders or contractors.

## Dissemination status

Unrestricted

## SCRT Project Manager

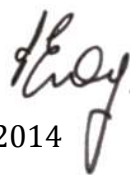
SCRT's project manager for this contract was:  
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## Report completed and signed off

Name: Pete Evoy

Position: Trust Manager

Signature:



Date: 2/12/2014

## SCRT Project Code

SCRT SAGE Code 10-006

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## Introduction and rationale

### The River Restoration Strategy

The aim of the RRS project is to enhance rivers' natural processes which will also enhance them as a habitat for valuable wildlife and help landscape to adapt to the demands of our changing climate. This approach to river management may also have benefits in managing flood risk on farmland and to nearby towns. The RRS is a Cumbria initiative involving the Derwent, Eden and Kent river catchments. All of these riverine "Site of Special Scientific Interest" (SSSI) are also "Special Areas of Conservation" (SAC) classified as "protected areas" under the Water Framework Directive. Restoration remedies on these rivers are identified as "measures" in the River Basin Management plan. The Directive requires that protected areas meet their conservation objectives (i.e. in favourable condition)

### RIVER KENT & TRIBUTARIES SSSI/SAC

#### RIVER GOWAN EMBANKMENT REMOVAL-Site Location Fairbanks Farm, Staveley, Cumbria. NGR SD 4540598542

The River Gowan in SSSI unit 104 is in unfavourable condition due to historic river engineering works affecting its natural geomorphology. The site was identified in the Environment Agency/Natural England commissioned "SSSI Restoration (River Kent)" walk over survey, conducted by Jacobs Consultancy, as an area requiring assisted natural recovery.

Within the section surveyed is approx. a 300 metre length of river that has been artificially straightened with the adjoining right hand bank raised along its length, presumably the spoil from these works.

South Cumbria Rivers Trust, initially working with the Natural England HLS advisor, negotiated a River Restoration Strategy scheme with the landowner and reached agreement for the Phase 1 (Feb/March 2013) removal of approx. 70 metres of this embankment to reconnect the river



to its floodplain. During Phase 2 (April/May 2014) a further 200 plus metres were removed.

A collaborative approach to this project was achieved and the Environment Agency Operations Delivery team based at Bridge end depot, Levens conducted the physical removal of the embankment and other associated ground works.

The Phase 1, 70 metre section of embankment was selected via topographic survey as the most beneficial section to allow maximum river/flood plain re connection. Also, the availability of Ops Delivery resources and their existing works programme commitments factored into the decision to concentrate on this initial section. Phase 2 in the subsequent year adopted the same approach and enabled removal of the remaining embankment.

Apart from the RRS benefits in terms of re naturalising this river section there are also important and positive flood alleviation benefits from such a scheme. Although small in scale, these works help to demonstrate flood storage benefits to farmers/landowners and communities concerned and affected by recent and increasing flooding events. Staveley village and Kendal town downstream of the project site are cases in point.

Additionally, this project site is a low risk site. There is one landowner who is supportive of the project and its aims and the floodplain itself is constrained by a large glacial drumlin.

The project location on the River Gowan, a tributary of the River Kent, is in a section where past river engineering works formed a 300m long unnaturally straightened and constrained river channel through which the river has since been prevented from behaving in a normal manner. Meandering rivers and their ability to be able to over top their banks in high flows can bring benefits for both wildlife and for the human population.



The sinuous form of a natural meandering river creates a variety of flows and habitats by producing a succession of deep and shallow areas. Deeper water areas, including pools, are created by localised bed scour on the outside of river bends with shallow areas forming on the inside as sediments and gravels are deposited. Deep water habitat acts as a refuge for a number of species and is particularly important for adult fish to allow them to feed in relative safety, rest during migration and evade predation. Sediment and gravel deposition that form the shallow areas also provide a variety of valuable habitat for species like lamprey, the endangered eel and the aquatic invertebrates which are a key component of the aquatic food-web. This variability in the river bed profile allows the river to absorb more oxygen as its flow is hastened and becomes more turbulent over the shallow, gravel areas. Clean and well oxygenated gravels are vital for successful salmon and trout spawning and the production of their juveniles.

The variability of habitat provided by a naturally functioning river also offers greater opportunity for more diverse forms of plant life both in and out of the water which in turn offer their own opportunities for many more aquatic and terrestrial species.



## Project funding

This project was funded by the Environment Agency and Natural England

FUNDING TOTAL: £20,000

In-kind contributions were received in the form of approximately 1,000 metres of stock fencing kindly provided via Cumbria Woodlands through the Catchment Restoration Fund "Source to Sea" - Value £6,000

In-kind contributions were also received in the form of technical advice and support from the River Restoration Strategy Project Board comprised of Environment Agency and Natural England staff.- Value £5,000

IN-KIND TOTAL: £11,000

### **PROJECT TOTAL BUDGET: £ 31,000**

The Environment Agency, Operations Delivery team met most of the costs of the physical interventions of this project including manpower, equipment and fuel. This was possible due to;

- Timings of these works i.e. outside of the in-river working period allowing time in the team work programme
- Water Framework Directive objectives and the opportunity to make a positive contribution to team targets





- Nature of these works- employing skills and techniques appropriate to maintaining the team's abilities and competencies during a quiet time of year.



**Figure 1 EA Operations team prepare access to site**



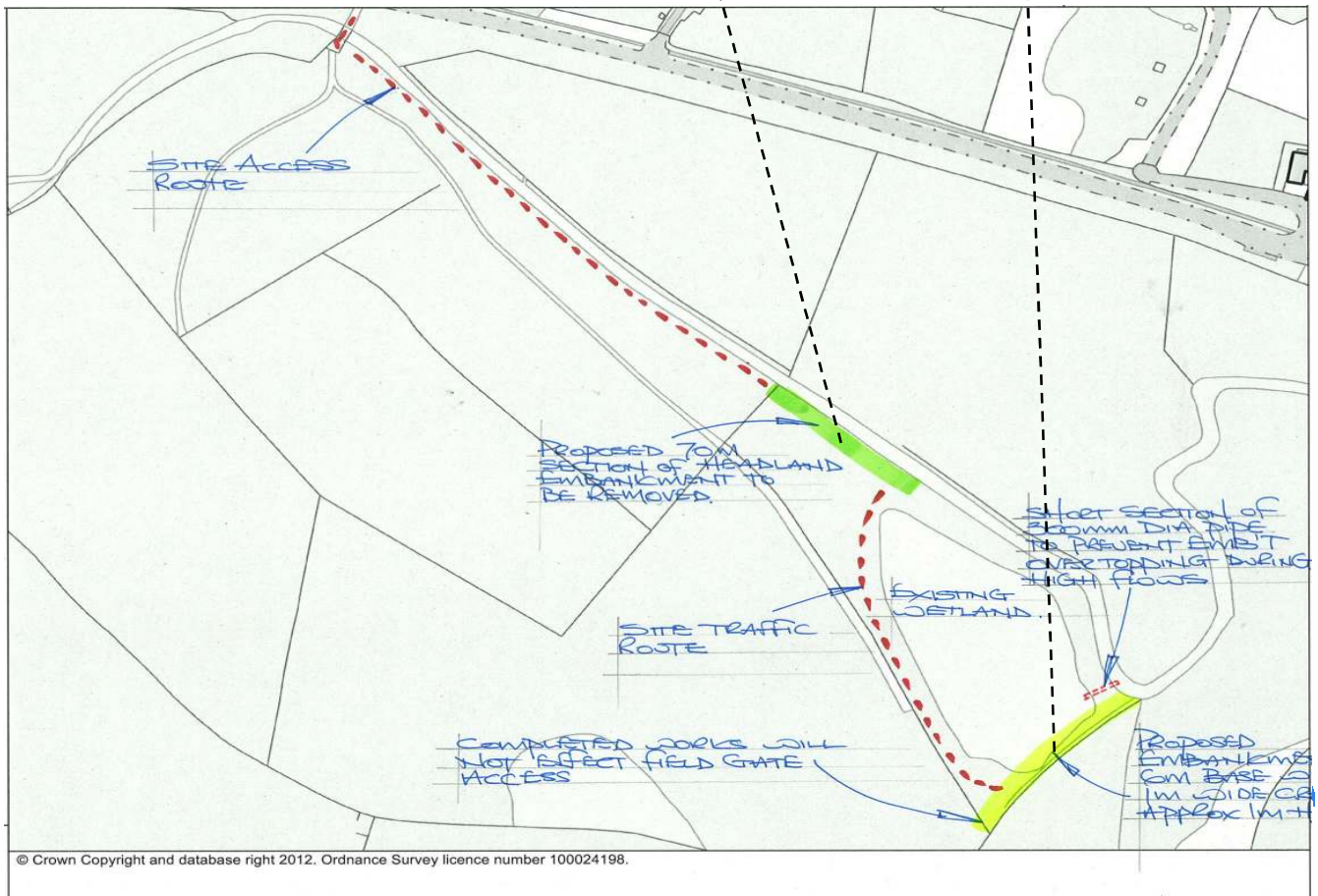
**Figure 2 SCRT site display board informs the public**



## Project activities



Figure 3 River Gowan pre-works Feb 2013



Phase 1- During the first phase of this operation the Environment Agency Operations Delivery team, working in coordination with South Cumbria Rivers Trust, removed 70 metres of unnatural embankment.



**Figure 4 Embankment profile and turf replacement Feb 2013**

The main principal was to reduce the unnatural bank height and re-establish the natural slope, form and level of the river bank. In the first instance, a landscape contractor, hired by the EA, was employed to mechanically remove the turf in advance of the excavation. This proved difficult due to the rough and irregular nature of the embankment and subsequently, the EA digger drivers skilfully removed the turf with their buckets to expose the underlying material. The turf was then placed to one side for relaying later. During the initial excavations that followed it was immediately apparent that the embankment material, mostly gravel with clay and soil, formed a distinct substrate and colour horizon in comparison to the underlying natural bank material. This “horizon” was



followed throughout the embankment removal to re-create the natural bank level.

As the embankment material was removed it was loaded into a dumper truck and moved downstream. At this downstream site, the excavated material was employed to create an 80 metre long by 10 metre wide bund; the purpose of which to allow the containment of flood waters following the lowering of the river embankment and therefore the reconnection of the river to its natural flood plain. Additionally and very helpfully, the use of this “waste” material on site circumvented the triggering of complicated and expensive waste regulation requirements.



**Figure 5 Bund construction from embankment spoil Feb/March 2013**

As the embankment removal proceeded and the correct level was reached, turf was re-laid onto the exposed soil and netted and pegged; as a soil/sediment input protection measure to the river.



**Figure 6 Turf re-laid, netted and pegged following embankment removal March 2013**



During the course of the embankment removal, two time lapse cameras captured progress.

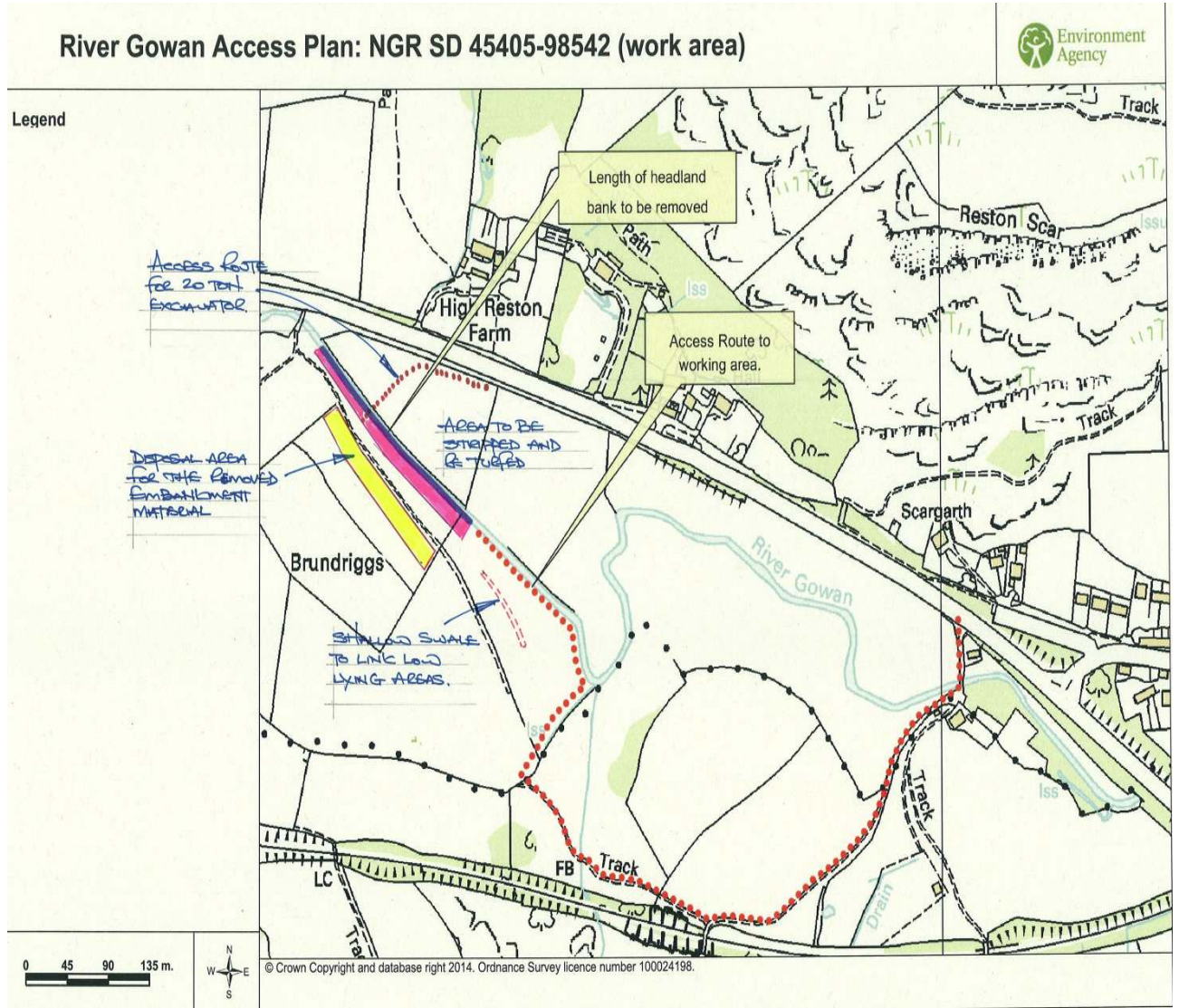


**Figure 7 Riverside time lapse camera Feb 2013**

Please go to the following link to view the movie.

<https://www.youtube.com/watch?v=ji8ejbz-kAE>

## River Gowan embankment removal Phase 2





Phase 2- During April and May 2014, the methods and principals adopted in phase 1 were again used to remove a further 220 metres of embankment from the River Gowan; this section immediately adjoins upstream of the 70 metre section previously removed in 2013.



**Figure 8 Phase 2- embankment profile April 2014**

In this phase, LIDAR data obtained from the Environment Agency added to the topographic survey data already acquired and informed precisely the correct positioning of the waste material taken from the embankment to prevent interference with the opening up of this floodplain. Agreement was reached to place this material at the foot of the drumlin (Brundriggs) adjacent to the works; this was formed into a raised access track for use by the farmer.



**Figure 9 Embankment spoil formed into a track at the foot of Brundriggs drumlin April 2014**

Following completion of the embankment removal and the creation of the track, a shallow swale was cut into a ridge on the floodplain to link low lying areas either side of phase 1 and 2.

Once again, the works were captured with time lapse photography.

Please click the following link to view the movie

<https://www.youtube.com/watch?v=FVUBot8UAVc>





**Figure 10 Embankment removed and track nearing completion April 2014**

## Lessons learned

This project was very much helped by the adoption of a collaborative approach, particularly demonstrated by the EA Operations Delivery Team, based at Bridge End depot, Levens. In addition to the practical and mechanical expertise of the team there was added benefit in being able to use EA exemptions for Lake District National Park planning regulations in regard to projects demonstrating an ecological benefit. This circumvented time consuming and time costly preparations for applications.

The lessons learned from this project and others conducted by Eden Rivers Trust and West Cumbria Rivers Trust are being shared between ourselves and on a much wider scale. The Cumbria River Restoration Strategy (RRS) and the experiences of the projects managed within it have attracted interest from other enthusiasts, partners and organisations throughout the UK and Europe. For example, the Cumbria RRS is a lead member of the European Rivers Restoration Community of Practice

One of the main aims of the work being delivered in Cumbria is to demonstrate that river restoration projects deliver multiple benefits for society and our natural heritage. By sharing experiences and learning the best approach to new opportunities, often involving innovative techniques, we hope to deliver many more river restoration projects into the future.



## Ongoing maintenance

Prior to the physical interventions described earlier (see “Project Activities”) a river habitat type survey and monitoring of the site ecology was conducted under contract by the Freshwater Biological Association, Ferry House, Windermere. This pre-restoration monitoring is documented in South Cumbria Rivers Trust files.

This baseline monitoring of river features, invertebrates, crayfish, macrophytes including terrestrial plant species is therefore available for use in comparison with follow up surveys in the future.

It is recommended that post restoration monitoring is conducted within five years of the completion of the physical interventions.

In September 2014, SCRT returned to site to carry out a small section of soft engineering bank stabilisation work. This work was negotiated by the landowner as part of the initial agreement to conduct the wider RRS work including both phases of the embankment removal





**Figure 11 Bank erosion point pre stabilisation work April 2013**

This left bank erosion point was protected by the staking of felled Alder boles into the bank toe. Inert hazel fascines and the Alder brush were fixed in place behind the toe protection with a combination of chestnut stakes and heavy duty sisal ties. A new fence installed concurrently on the entire left bank allowed a buffer of this bank to encourage stabilisation. The cost of fencing was met through the “Source to Sea” Catchment Restoration Fund-this was handled under contract through Cumbria Woodlands (Rebecca Oakes)





**Figure 12 Soft engineering installation in progress September 2014**



**Figure 13 Soft engineering completed September 2014**





**Figure 14 Soft engineering and new fence following autumn floods  
December 2014**

Once more, this work was captured on time lapse camera and can be viewed via the following link

<https://www.youtube.com/watch?v=ef30-vdf-1>

Additionally, at the time of writing (Dec 2014), agreement has just been reached with the landowner to fence the entire right bank reach to exclude stock from the river. A compromise to allow limited access via two watering bays was necessary although plans are in hand to supplement these with an alternative watering supply. Following completion of this work, this report will be updated to include full details of the additional work

## Acknowledgements

The River Restoration Project Board-comprised of Environment Agency and Natural England technical staff, specialists and managers plus South Cumbria Rivers Trust, Eden Rivers Trust and West Cumbria Rivers Trust project officers.

Sue Evans- Natural England River Kent Lead Advisor

Daniel Rayson- Fairbank Farm, Staveley-Landowner and farmer

Howard Lawton and the Environment Agency Operations Team at Bridge End Depot, Levens

Catchment Restoration Fund-“Source to Sea” and Cumbria Woodlands-  
Rebecca Oakes







**South Cumbria Rivers Trust** is registered in England and Wales as a company limited by guarantee (Company Registration No: 5763380) and a charity (Charity No: 1114682). We established in 2000 with the aim to protect, conserve and rehabilitate the aquatic environments of South Cumbria.

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