

OVQ-JBA-XX-XX-RP-PL-0002-S3-P03-Green_Infrastructure_Statement

Green Infrastructure Statement – Kenson River Restoration and Remeandering

1.0 Introduction

This document demonstrates the positive multi-functional outcomes that are being delivered as part of this project. The stepwise approach to avoid, minimise and mitigate impacts to the environment has been applied from the outset, and at all stages of project development. In this context the environment is considered in its widest sense, but the statement will also draw out specifically the net benefit for biodiversity and ecosystem resilience delivered as part of the project.

This document has been prepared to support a planning application for a 2.2km long proposed river restoration at the River Kenson, located to the west of Penmark and south of Llancadle. The proposed river restoration works have been commissioned by Natural Resources Wales (NRW) to improve biodiversity and habitat resilience and to improve the Water Framework Directive (WFD) status of the watercourse. The works consist of remeandering the river channel to establish a sinuous river planform and restore in-channel habitats. The works will consist of reconnecting palaeo channels, bank regrading, creating backwater areas and installing in-channel features, such as woody material.

2.0 Baseline

2.1 Green Infrastructure assessment & strategic context

Planning Policy Wales (PPW) defines green infrastructure as “the network of natural and semi-natural features, green spaces, rivers and lakes that intersperse connected spaces.” (PPW 12, paragraph 6.2.1).

The Vale of Glamorgan Council does not have a Green Infrastructure Assessment. However, it is currently developing a Green Infrastructure Strategy. In the meantime, the Council recommends following PPW.

PPW 6.2.14 recommends the use of the Building with Nature (BwN) Standards “as a prompt for developers to...demonstrate the sustainable management of natural resources”. The twelve core standards outlined in the BwN document, and how they relate to the project and the project location, are below:

1. Optimises Multifunctionality and Connectivity

The project site contains a 2.2km stretch of river within a wider riparian system. The project contributes to the status objective for the Kenson River as a whole to improve the WFD status from ‘Moderate’ to ‘Good’ by 2027 (significant water management issues currently impeding Good status include pressures from agriculture and rural land management, and sewage discharge from the water industry). The site is adjacent to semi-natural ancient woodland. Further south, the East Aberthaw Coast Site of Special Scientific Interest (SSSI) is acknowledged, but considered not to be impacted by the scheme due to the distance between the sites. The scheme sits within and contributes to a network of mosaic habitats on the landscape scale, being surrounded by a mixture of agricultural land and woodland, and within and alongside three Sites of Importance for Nature Conservation (SINCs) (numbers 314, 315 and 320). The scheme will include the establishment of a native and functioning riparian corridor providing multiple benefits (including erosion control, sediment capture, shading) and improving habitat connectivity.

2. Positively Responds to the Climate Emergency

The project is inherently a response to the climate emergency, providing biodiversity and habitat resilience, and creating rare habitat types such as saltmarsh. Furthermore, low carbon behaviours are promoted with the use of the EA’s Eric Carbon Calculator which will assess the impact of the final detailed design.

3. Maximises Environmental Net Gains

The development will not have any unavoidable harmful environmental impacts of development on soil and air quality, and when operational, will not have any light or noise pollution. On the contrary, the development will deliver significant environmental net gains as the 2.2km stretch of the River Kenson is restored, providing space for both wildlife and people while aiming to improve the Water Framework Directive status of the river.

4. Champions a Context Driven Approach

The scheme design is intimately connected to the micro-environments of the site, making the most of all opportunities afforded by pre-existing paleochannels (to re-meander the straightened river), local topography (to determine location for backwater features), and existing trees (to form woody debris).

5. Creates Distinctive Places

The green infrastructure is integral to the project in that it contributes to the driving force of the project. The enhancements that the interventions will bring will generate interest and diversity to the site, building a strong sense of place and enhancing the site setting with a dynamic landscape of greater interest than existing.

6. Secures Effective Place-keeping

The interventions chosen for the scheme have been designed to replicate and encourage natural processes, effectively eliminating ongoing management and

maintenance in preference for a more passive nature-based approach.

7. Brings Nature Closer to People

The site has two Public Rights of Way (PRoWs) passing through it from the nearby village, allowing the public to immerse themselves in a distinctive and nature-filled environment that will have seasonal interest.

8. Supports Equitable and Inclusive Places

PRoWs are legally recognised paths that allow the public to travel freely, so even though the development is on private land, anyone will be able to enjoy the benefits of the restored stretch of river all year round.

9. Delivers Climate Resilient Water Management

Water management is an integral element of the scheme, intending to improve the physical quality of the watercourse and connect laterally with its floodplain. The restored channel and floodplain will be more resilient to climate change challenges including drought and flooding.

10. Brings Water Closer to People

The blue infrastructure features of the schemes will bring multifunctional benefits with a diverse range of nature-based solutions managing water quality, water flow, and riparian habitats for wildlife and people to enjoy.

11. Delivers Wildlife Enhancement

The green infrastructure to be developed by the scheme optimises long-term and climate resilient net benefits for nature, by retaining and enhancing existing ecological assets and creating locally relevant new habitats within the boundary of the project including with riparian planting. Specifically, the scheme will improve habitat for Otter, Water Vole, freshwater and marine fish species, aquatic invertebrates, and riverine and wetland flora.

12. Underpins Nature's Recovery

As a river restoration scheme, underpinning nature's recovery is an intrinsic characteristic of the development. Existing and planned for key habitat areas within and on the boundary of the site have been identified and enhanced including with riparian planting for the benefit of priority species such as water voles and otters. Furthermore, construction methods will include management of Invasive Non-Native Species (INNS) which will contribute to nature's recovery.

The Greenspace Toolkit by NRW is another strategic document that contributes to the understanding of green infrastructure in and around built-up areas. The project site is accessible by PRoWs from Llancadle, and provides an example of low-level management natural greenspace according to this document.

2.2 Project baseline

The site is a main river (opportunities for Standards 9 and 10), located within the Fonmon Estate to the south of Llancadle. It is set within land used for agriculture, predominantly cattle grazing, and recreation (opportunities for Standards 7 and 8). The river has been historically straightened and dredged. This has led to a degraded and artificially incised river with very tall, unstable banks. There is a degraded riparian zone mainly comprised of improved grassland. There is evidence of palaeo channels on site.

The surrounding land is a mixture of agricultural land and woodland. The low-lying U-shaped valley is bounded on its southern slope by ancient woodland (opportunities for Standards 1 and 4). A number of SINCs are on and around the site (numbers 314, 315 and 320).

The channel throughout the reach is very homogenous in terms of hydromorphological forms and processes, characterised by an incised deep channel with very steep banks in places. The channel is embanked in places which is likely the result of historic dredging activities (opportunities for Standard 5). This, combined with the shortening of the river's length, has led to the channel being over deep. As a result, there is evidence of bank slumping throughout the reach, indicating that the banks are too steep and the channel is trying to reach an equilibrium in terms of channel gradient and cross-sectional area. Some of these areas of mass movement has fallen into the channel and have been eroded forming some in-channel berm features, comprised of very fine material.

There is a lack of flow diversity throughout the reach, with the channel dominated by glide and run flows. Some in-channel features, such as slumped material, some trees and one riffle feature showed some localised areas of flow diversity. The majority of the reach is featureless, with few in-channel features. This is potentially due to high energy at times of high flow or a lack of sediment input into the system from upstream. (Opportunities for Standards 4, 5, 9 and 10). There is very little connectivity between the river and floodplain. Furthermore, the current WFD status of the river is 'Moderate', with significant water management issues impeding Good status including pressures from agriculture and rural land management, and sewage discharge from the water industry (opportunities for Standards 1, 4, 10 and 11).

Throughout the study area the riparian zone is degraded, comprising mainly of longer grass, some small shrubs and some relatively young trees. There is a distinct lack of any significant buffer strip between the managed grassland and the river in the upper and middle catchment (opportunities for Standards 11 and 12). The lower reach of the river is more tidally influenced with more fine sediment deposition and bare bank faces (opportunities for Standards 2, 4 and 5). Some wildlife ponds have been created separately in this area of floodplain by Fonmon Estate.

A Preliminary Ecological Assessment (PEA) was undertaken in January 2025 by JBA Consulting. There are no habitats of principal importance on the site. Some riparian trees will be lost due to bank regrading, which is unavoidable. These will be replaced as part of native riparian planting, which will help to achieve more biodiversity benefit. The removed trees, if suitable, will also be used in the woody material placement, which will avoid importing trees.

A water vole and otter walkover survey was undertaken in January 2025 and April 2025. Dense vegetation made it difficult to observe signs of water vole or otter. However, there are records of otter along the reach. It is likely that otter use the River Kenson for commuting or foraging (opportunities for Standards 11 and 12). The lower River Thaw is part of the Wildlife Trust for South and West Wales' strategy to bring back the Water Vole, and this has extended into the Fonmon Estate with the construction of wildlife ponds on the floodplain in 2024.

3.0 Implementation of the Stepwise Approach

In 2021, APEM produced a scoping report for the Kenson River that developed a long list of river restoration options to reduce the velocity of the river, improve biodiversity and create a wildlife environment accessible to visitors.

JBA Consulting completed a feasibility study in March 2023 which recommended river restoration to include some, if not all, elements below:

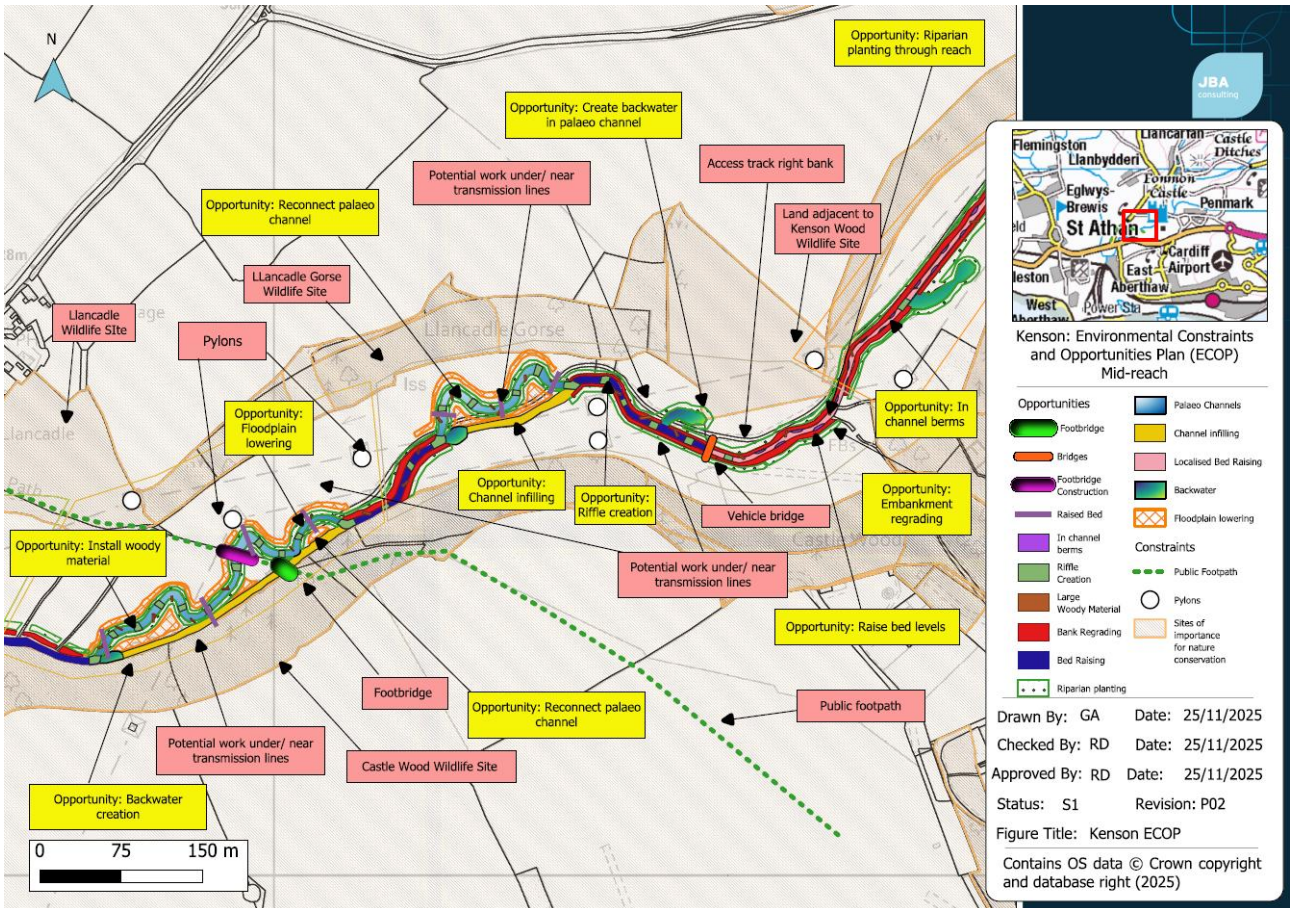
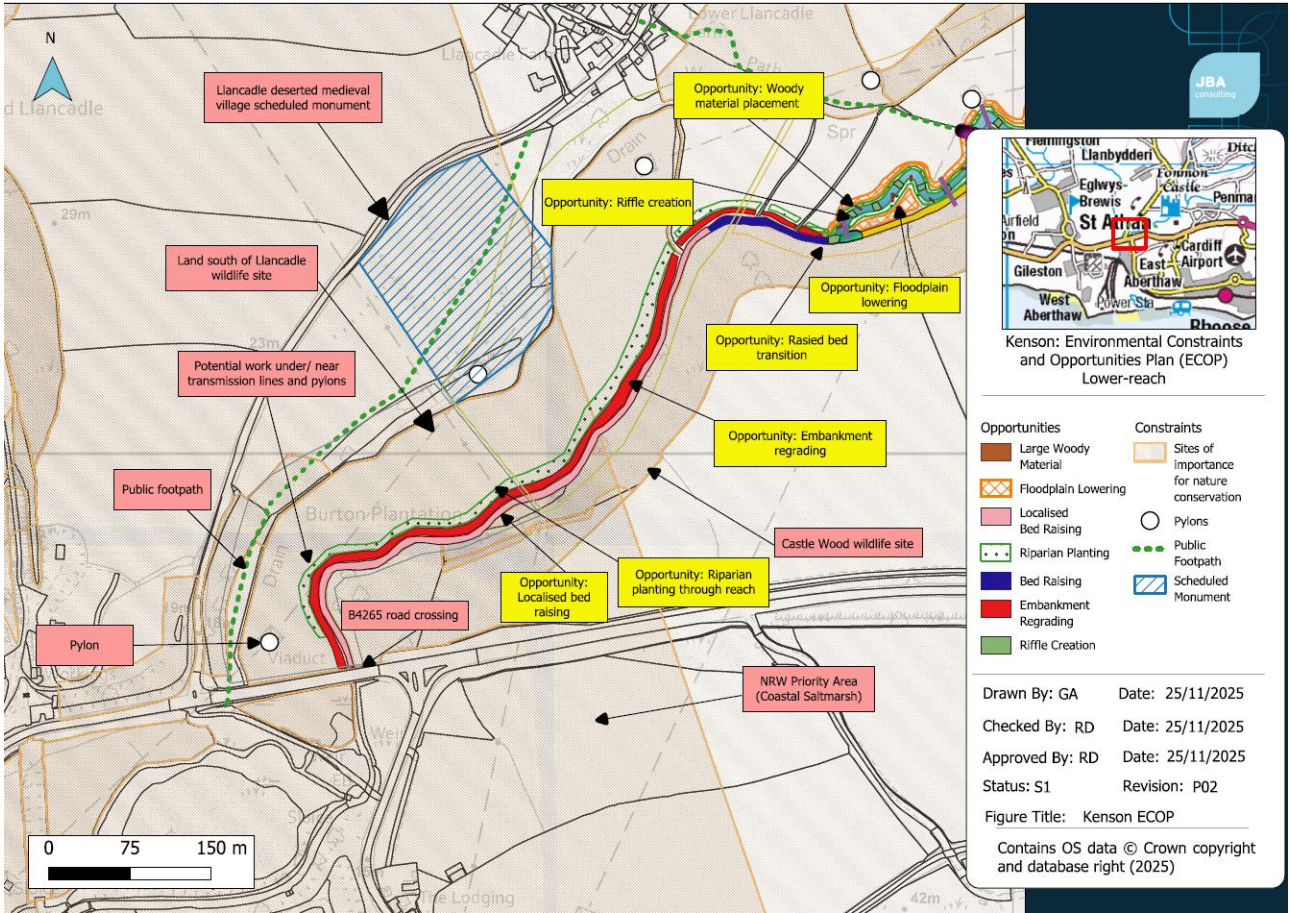
- Palaeochannel reconnection
- Channel narrowing with berms to create sinuosity
- Creation of features to divert flow into reconnected channels
- Creation of wetland areas and backwater features, some may re-use sections of the existing channel
- Reseeding the channel bed with natural gravels
- Reseeding riparian zone banks with natural vegetation
- Removal or modification of the culvert at the downstream extent of the site to improve fish passage

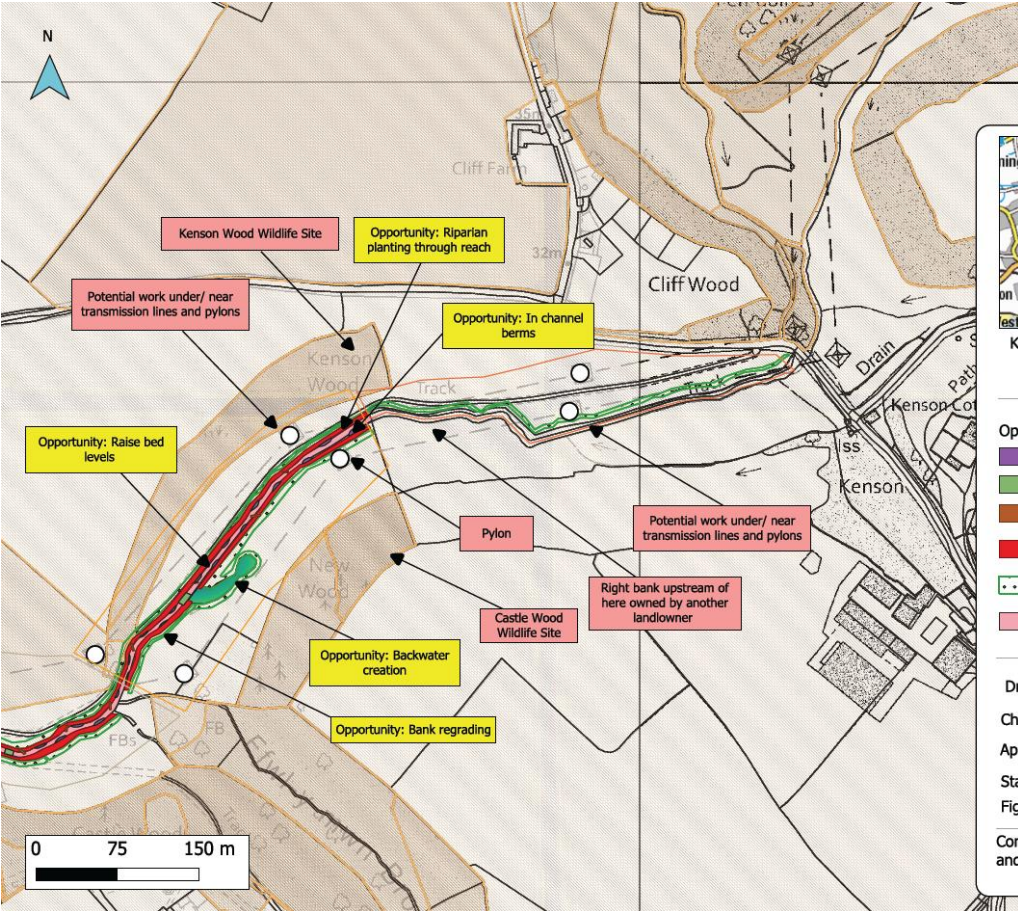
The above was further refined during outline design stage in Spring 2025, with the following options recommended for the reach:

- Bank regrading
- Riparian improvement/planting
- Reprofile banks
- Install woody material/large wood
- Riffle creation/bed raising
- Palaeochannel reconnection
- Backwater creation

The environmental assessments of the site have influenced the design process not only to avoid and minimise impacts on biodiversity and green infrastructure, but to actively nurture and create opportunities for wildlife to flourish on this specific site, pursuing Building with Nature Standards 3, 4, 5, 7, 9, 10, 11 and 12. The ultimate aim is to evolve the watercourse into a more connected and resilient re-naturalised system that requires minimal future management, aligning with Standards 1, 2, and 6. Further information about how the design interventions above have developed over the project can be found in the Design and Access Statement.

The Environmental Constraints and Opportunities Plans for the scheme are below to illustrate the results of the environmental assessments of the site.





Kenson: Environmental Constraints and Opportunities Plan (ECOP) Upper-reach

Opportunities		Constraints	
	In channel berms		Backwater
	Riffle Creation		Floodplain lowering
	Large Woody Material		Sites of Importance for nature conservation
	Bank Regrading		Pylons
	Riparian planting		
	Localised Bed Raising		

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 Figure Title: Kenson ECOP

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4.0 Net Benefit for Biodiversity & Wider Environmental Benefits

4.1 Net Benefit for Biodiversity

The scheme inherently delivers the concept of DECCA (Diversity, Extent, Connectivity and Condition) to make an Adaptive and resilient contribution to Green Infrastructure:

- **Diversity** – the combination of multiple interventions within the channel and across the floodplain will evolve the river from a homogenous stretch of watercourse to a site with diversity within/between species and within/between habitat (e.g. with the introduction of backwater channels, riparian planting, in-channel woody material and berms). This diversity in species and habitats is achieved by creating a diversity in flow conditions and sediment deposition, and introducing different food sources.
- **Extent** – the interventions planned across the 2.2km reach of river and across the floodplain enhances and increases the extent of the new habitats across the site. There are also benefits that extend beyond the boundaries of the site, for example improving fish habitat and migration routes upstream by improving the WFD status, and the connected floodplain acting as a sink for sediments and pollutants from upstream which will protect downstream reaches.
- **Condition** – the project will improve the condition of the site's ecosystems by introducing, restoring, and encouraging natural features and habitats, providing riparian planting, and promoting natural processes to occur.
- **Connectivity** –the project will increase lateral connectivity of the floodplain and the river, including by removing embankment sections, as well as planting riparian buffers (both vegetation and riparian trees).

4.2 Health and wellbeing of the local community (inc. Active Travel)

With two PRowWs that cross the site to link with the nearby village of Llancadle, there are significant public benefits beyond environmental climate resilience which is the focus of the scheme. In fact, in line with NRW's Greenspace Toolkit, Llancadle is less than 300m away from this accessible natural greenspace, with the designated PRowWs providing access through a large hectarage of green and blue infrastructure.

Members of the public will be able to move through the site and experience this improved biodiverse and multi-sensory new habitat, providing a significant segment of blue-green infrastructure to deliver multifunctional benefits in health, wellbeing, and active travel. The interventions will increase the naturalness of the site to provide significant landscape and amenity enhancement. It will establish a sense of place, a sense of tranquillity, and a visually attractive setting for the two PRowWs.

4.3 Climate change resilience

The river restoration will improve the resilience of habitats and increase biodiversity, as well as build and contribute to wider environmental resilience.

The diverse range of habitats will be able to respond to and cope better with the changing climate, and the interventions provide food, water and shelter/shade to wildlife when experiencing extreme weather such as periods of drought. The embankment removal will especially limit the impact of flood flows on the river channel by allowing water to dissipate across the floodplain rather than remaining within the channel.

4.4 Carbon storage

The design manages and minimises the whole life carbon footprint by restoring natural processes, therefore designing out onerous and carbon intensive maintenance requirements. Furthermore, opportunities exist such as using spoil from removed sections of embankment to fill the existing channel.

The EA's Eric Carbon Calculator will be used to assess the full impact of the final detailed design.

5.0 Long Term Management Plan

The site is entirely under private ownership. The site is currently grazed land with no mowing or other formal management regime. Some INNS management takes place, and the ditches are cast on one side one year, the other side the next year, and then left for five years, which opens up the watercourse and reduces sedimentation.

The primary aim of the design using the principle of nature-based solutions is to restore natural processes. Therefore, it is not anticipated that routine intervention or active management will be needed.

If necessary, Year 1 and 2 post construction minor maintenance will be carried out by NRW, and the site will be monitored for five years post construction. Otherwise, post development long term maintenance will be handed back to the landowner, who will fund this management and maintenance. Fonmon Estate will continue their INNS management as before.

Ultimately, Net Benefit for Biodiversity and improving WFD status are the drivers of this scheme and these benefits are expected to be achieved long into the future with very little additional intervention. The scheme improves habitat restoration, and resilience of the waterbody. We will be increasing channel length, creating new features within the channel and banks particularly benefiting invertebrates fish birds and mammals, reconnecting the river to the floodplain and improving habitat and diversity, managing INNS, creating suitable habitat for water voles, and managing the ditches to open them up for plant and animals. Reinstating natural processes within the river and floodplain will improve the resilience of the waterbody to the impacts of climate change.