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Restoring Meanders to Straightened Rivers

1.11 Returning a woodland stream to its former sinuous course

HIGHLAND WATER AT WARWICKSLADE CUTTING

LOCATION - NEW FOREST, 3KM SOUTH WEST OF LYNDHURST, SU273055

DATE OF CONSTRUCTION - AUGUST-NOVEMBER 2009

LENGTH – 2000m

COST – £214,500

Highland Water	Medium energy, gravel
WFD Mitigation measure	**Click Here** to view details
Waterbody ID	GB107042016720
Designation	SSSI, SAC, SPA, Ramsar, National Park
Project specific monitoring	Geomorphological surveys, cross and long sections, flow measurements, SSSI condition assessment

Description

Many rivers in the New Forest National Park were improved for grazing by cutting straight drainage channels during the 1850s, resulting in the abandonment of a network of historic woodland streams. These new channels had steeper gradients leading to down cutting and erosion of the underlying sands, gravels and clays.

One example of this degradation is on Highland Water, a small headwater sub-catchment (4.9km^2) of the Lymington River. Prior to restoration the channel was up to 1.2m deep and 4m wide restricting the natural seasonal flooding of the surrounding forest. The previously wet woodland and mire habitat had dried out and the increased channel size presented a barrier to the freely roaming forest animals.

The aim of this EU-Life Nature project was to stop the excessive vertical and lateral erosion and to restore the connection between the river and its floodplain. This would be achieved by reinstating the river's natural form and processes. The dual outcomes were to achieve favourable SSSI condition for wet woodland as well as an improvement in WFD status.

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The degraded channel was restricting both natural river processes an easy access across the forest for roaming animals – 2009

Restoring Meanders to Straightened Rivers

1

Design

Historical maps were used to identify old or "lost" watercourses to guide the overall restoration design (*See Figure 1.11.1*). Where they could not be identified, the design was based on expert opinion through field assessment.

The work was was carried out in the following stages (*See Figure 1.11.2*):

Firstly, selected bankside trees on the existing channel were felled in order to create access for machinery. This also had benefits for landscape, aesthetics and ecology, as retaining a straight line of trees would have looked out of place in the forest environment.

Accumulated leaf litter and wood from the existing drainage course was then carefully removed and retained for reuse on site. In places a new channel was dug using an excavator, but only where no obvious channel could be found. The creation of idealised features was avoided, but some areas were more extensively cleared to create deeper pools to maximise gains for fish.

Gravels were transferred from the existing to the restored channel.

Flow was diverted from the existing to the restored channel, section by section (*See Figure 1.11.2*) from one crossing point to the next moving down the reach. Adopting this phased approach enabled a controlled diversion of the flow into the new channel, reducing the risk of initial channel instability occurring.

The existing drainage course was then in-filled using a mix of 8,000 tonnes of hoggin (as dug sand and gravel mix) and 800 tonnes of firm clay by-product, both sourced locally.

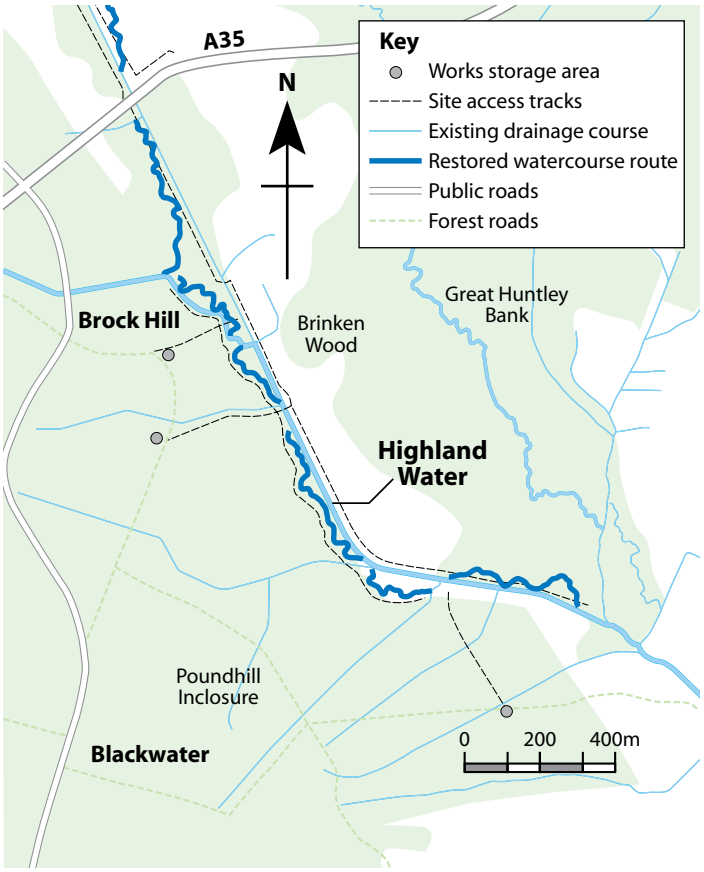
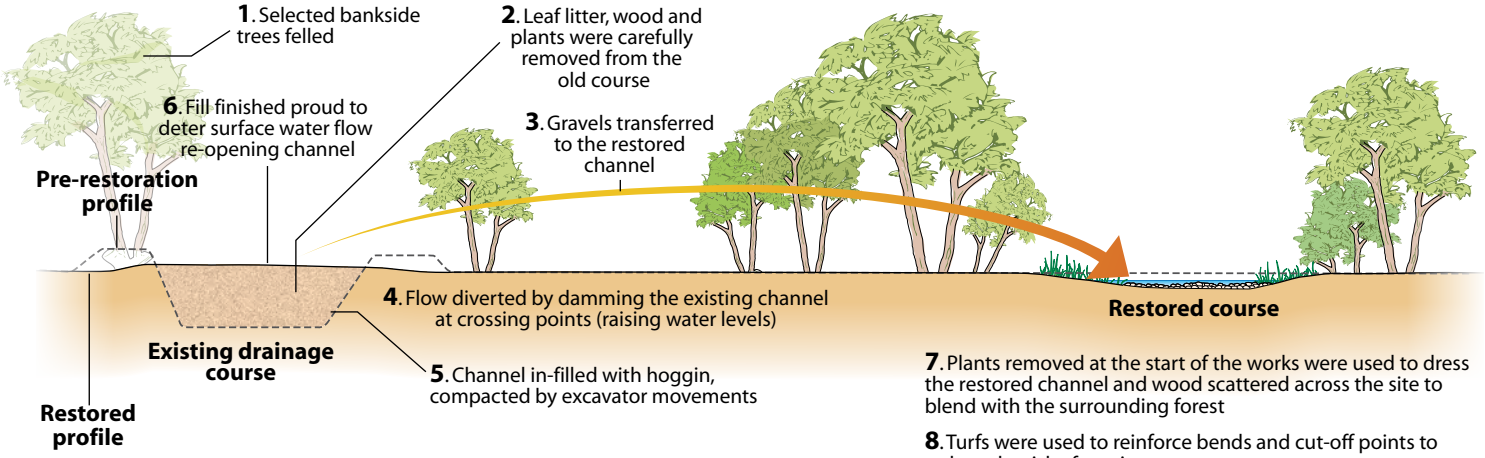


Figure 1.11.1
MAP SHOWING PLAN OF RESTORATION WORKS AT WARWICKSLADE



7. Plants removed at the start of the works were used to dress the restored channel and wood scattered across the site to blend with the surrounding forest

8. Turfs were used to reinforce bends and cut-off points to reduce the risk of erosion

Figure 1.11.2
STAGES OF TECHNIQUE IMPLEMENTATION

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Restoring Meanders to Straightened Rivers

The clay was packed tightly at 10m intervals and at construction crossing points to prevent seepage. The rest of the channel length was then in-filled, with excavator movements helping to compact the fill as they moved across the site.

Fill levels were finished slightly above the surrounding ground level to deter any surface water channelling along the fill, which had yet to settle. This could have led to re-opening of the filled channel.

Dead wood was scattered across the site to aid the rapid recovery of the landscape and stop the route becoming a straight path for humans or grazing animals. Turfs removed from the existing course were used to reinforce bends and cut-off points to reduce the risk of erosion immediately post-construction.

Finally the soils, ferns and small plants which had to be removed from the banks during construction were re-used to 'dress' the finished work across the project area.

Sketch design diagrams were developed to provide an overview of the works. However, in this fragile habitat it was essential that that the contractor was sensitive to the local conditions, therefore most of the detailed project works decisions were made using on-site expert judgement.

Clay infill was tightly packed at crossing points at 10 metre intervals along the channel to prevent seepage – October 2009

Innovative tramway designed to reduce the impact of works on the sensitive forest habitats, especially during wet site conditions – 2009

Restoring Meanders to Straightened Rivers

1

The reduced in-channel capacity of the restored course raised concerns about flooding onto the A35. A pool close to the road was widened to reduce the flood risk in this location, which would have caused major disruption.

An innovative tramway system was devised to enable materials to be moved along the line of the channel, even during poor weather, with no appreciable impact on the heavily designated forest habitat.

Project costs comprised plant hire and labour (£106,500), and infill materials (£108,000).

Critical to the success of this project was the preliminary consultation that took place with stakeholders, in particular the Verderers and Commoners. Initially, fears were raised about the time it would take for the scar of the works to heal, but speed of visual recovery due to the relocation of plants during construction has, as predicted, been rapid.

The work has been well received by the local communities with excellent media coverage. The success of the scheme has facilitated negotiations for future works at other locations across the New Forest.

Subsequent performance

The newly restored channel has been left to develop naturally and no post-construction adaptation has been necessary. A variety of morphological features and in stream habitats have been re-established and floodplain connection has been restored through more regular bank overtopping. This has helped to re-wet the surrounding woodland habitats. These enhancements have been quantified by a recorded improvement in SSSI condition scores for the area.

The use of high quality infill material was crucial to the success of the scheme. At other locations where a similar technique had been used the redundant channels had been in-filled with poor quality material, which left them vulnerable to erosion and re-opening.

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Well-placed shrubs and deadwood blend the old channel into the landscape within days – 2009

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Immediately post-construction flow begins to grade materials. Pools and riffles are developing – 2009

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The restored course includes both narrow and wide sections – 2009

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