



Inspiring & Leading Action for Healthy Rivers

Lewes Winterbourne

Action Plan for Enhancement
2024 - 2030



The Lewes Winterbourne

Despite its designation as a chalk stream priority habitat, the Lewes Winterbourne watercourse has suffered progressive deterioration with extensive modifications of its channel. It is heavily uniform, and its course has historically been straightened, culverted, embanked and in sections over-deepened or otherwise disconnected from its floodplain and riparian margins. These historical modifications have been undertaken to reduce groundwater-related flood risk to the town of Lewes as well as for housing, development, road building and agriculture.

Many of the issues facing the stream can be attributed to these modifications, alongside contemporary management practices that continue to degrade the natural processes that are typical in healthy chalk streams. The stream is impacted by road run-off, abstraction, siltation, over-shading, algal growth, the spread of invasive non-native species (INNS), agricultural run-off, and barriers to migratory fish which all exert a negative influence.

In 2023 the Ouse and Adur Rivers Trust undertook a detailed study of the Winterbourne resulting in an Action Plan for its restoration which draws on existing resources and local knowledge along with the collection of up-to-date information on the current condition of the river.

Here we present the Action Plan as a strategic approach to the restoration of this vital stream, some of these actions have begun and are considered to be quick wins for the local environment and community whilst some will take longer to achieve and the cooperation of multiple partners. We therefore believe that a ten-year focus on the restoration of the Lewes Winterbourne will enable sustainable, supported and effective action to be implemented for the long-term future of this waterbody.



Modifications

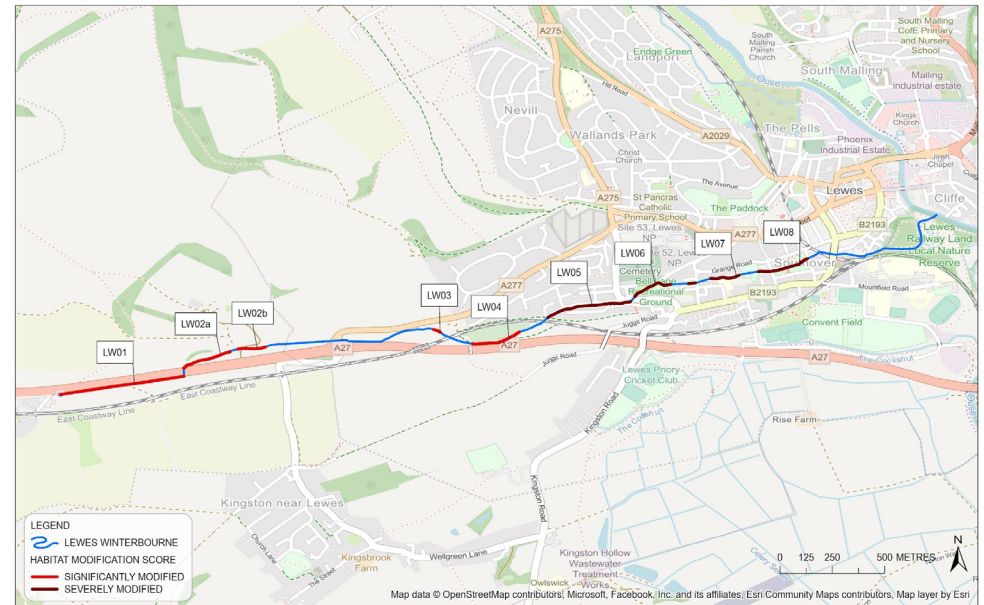
The Lewes Winterbourne is heavily impacted by human modification through both the urban and rural sections of the stream. Several sections have been culverted, there are both operational and remnant weir structures, and the bed and banks modified with concrete or other hard engineering materials. These modifications form a legacy of a disconnected channel which lacks any form of natural processes and is susceptible to both high and low flows.

Our survey identified that modifications are present along the entire length of the stream with a total of 11 modification types which included:

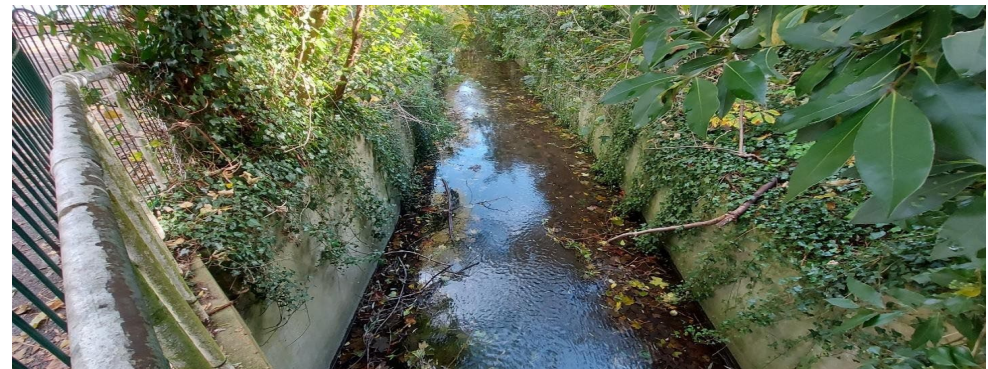
- Intermediate bridges (10–25m abutments) x 3
- Minor bridges (<10m abutments) x 8
- Culverts x 15
- Deflectors (fencing protruding into channel) x 2
- Reinforced banks (x 7 subreaches)
- Reinforced bed (x 5 subreaches)
- Obviously resectioned banks (x 3 subreaches)
- Weir x 1
- Outfall pipes (including road drains, garden drainage and treatment works outfall) x 37
- Ford x 1
- Trash screens (excluding those present on culverts) x 3

Restoring the Lewes Winterbourne requires works to mitigate these modifications and we propose to find acceptable solutions to remove or alter these wherever feasible to do so. However, not all can be changed or removed as they play a critical infrastructure role in monitoring and managing the stream. The most notable of these modifications are in the areas of Bell Lane and through Grange Gardens where the channel no longer has any natural form. These changes will require us work in partnership with stakeholders and the local community to find acceptable and sustainable solutions.

In the following section we outline plans for re-naturalizing the Lewes Winterbourne through removal or alteration to the existing hard engineering in place along much of its length. We also highlight examples and case studies of approaches undertaken on other winterbourne streams with similar constraints.



Map showing the degree of modification along the Lewes Winterbourne



Bell Lane

The stream emerges from a culvert under Bell Lane Road, immediately enters a culvert at Winterbourne Mews before running along the outside of the boundary wall of Bell Lane Recreation Ground for c.200 metres. A well-used public towpath runs along much of the length of the left bank. The channel here has been heavily modified and engineered with two stage reinforced banks integrating the towpath and circa 1m high wall made of brick, stone, and concrete, the bed is reinforced with concrete although some natural cobbles and gravel are present at the upstream extent. From this point the entire bed of the Winterbourne Stream is concrete lined and despite in-depth research there appears no specific reason why this has been done.



Objectives

- Remove or alter the concrete bed of the channel
- Install features which increase temporary water storage
- Provide increased value to the community, raising the profile of the stream.

Action Plan

In the 2010 Sussex Watercourse Report, Dr. Nigel Holmes identified this stretch of the Winterbourne as being an ideal place for small pool, riffle and side bar habitat enhancements which could be easily created using a small excavator. We propose the following approach throughout this section of Bell Lane.

1. Remove the concrete bed of the channel and install features to form a meandering riffle and low flow channel.
2. If bed cannot be entirely removed, cut a low flow channel in the concrete bed (there are no services in this area) and install channel features.
3. Re-distribute natural gravels and cobbles, and/or augment further gravel substrate to form a long meandering riffle with sinuous low flow channel.
4. Form low-level side bars or berms to increase sinuosity and encourage marginal vegetation growth.
5. Create greater connectivity between the stream and Bell Lane Rec through the creation of areas of marginal bankside habitat.

Case Study - East Meon

A forty-metre section of the river that passes through the centre of East Meon village was enhanced in 2014. The work involved bonding over 400 stones to the concrete bed with short steel pegs drilled into the stones and the concrete to form the low flow channel. Large oak trunks were later pinned to the concrete bed. The berms created by the stones and wood were then filled with 18 tonnes of river gravels and planted up with a range of local chalk stream plant species.

The work was designed to create a semi-natural meandering channel within the confines of the existing concrete bed. It has created an environment that enables chalk stream invertebrates and plants to thrive and provide a more favourable environment for fish such as juvenile brown trout and bullheads, which have since been recorded using these features.



Grange Gardens

As the Winterbourne emerges from the road culvert under Southover High Street it then runs for 180 metres through the centre of Southover Grange Gardens, a popular public park in the heart of Lewes town. Despite attempts to soften the marginal areas with ornamental planting, the channel's course runs straight and is heavily modified and reinforced with a concrete bed and metal fences lining both banks for almost the entire length. Through its upstream half, the stream profile is made up of two-stage concrete and brick berms on both bank faces planted with non-native pampas grass. The downstream half of the channel remains reinforced to both banks but is narrower and deeper, with a single-stage square sided course that flows through an open parkland setting.



Objectives

- Remove or alter the concrete bed and banks of the channel
- Re-naturalise the channel profile and morphology
- Introduce channel features such as side bars and pools
- Create a community asset which is used for education and recreation.

Action Plan

We propose the following approach throughout this section of Bell Lane.

1. Investigate the archaeological heritage of the site to inform on constraints to river improvement.
2. Undertake community consultation to discuss the options and gather feedback from park users as to the level of support for change, ensuring co-development of ideas throughout the process.
3. Subject to lack of constraints from above, remove the concrete reinforcements and re-profile the banks. Re-erect fence 3m from bank top to enable formation of buffer strip.
4. Re-distribute natural gravels and cobbles, and/or augment further gravel substrate to form in channel features (riffles, side bars) and enable natural processes to create pools.

Southover Grange Gardens

The gardens are owned and managed by Lewes District Council and are very popular with local residents and visitors. The area was originally the private garden of The Grange, built in 1542 by William Newton and briefly the home of John Evelyn, the diarist. They are steeped in history and are now a popular destination for wedding photographs and those seeking the peace and tranquility they offer.

Due to this history, it is considered likely that there is archaeological interest in the site which will need to be thoroughly investigated prior to any works commencing. It is also important that the community of Lewes is engaged from the start of any project ideas at the site, this will enable a co-designed and delivered project supported by the community to enhance the Winterbourne Stream whilst maintaining the surrounding beauty of the gardens.

The benefits from river restoration at this site are considered to be of high value to the overall health of the Winterbourne but any work here will take some time to develop and engage before implementation can be taken forward.

Structures

Whilst some modifications cannot be interfered with as they provide a function to local infrastructure (e.g. concrete wingwalls for bridge crossings) not all those recorded on the Lewes Winterbourne appear to be serving a purpose. We therefore propose to investigate and engage with relevant stakeholders on the removal of those structures (concrete banks, beds, artificial deflectors, re-sectioned banks, weirs and fords) throughout the timeframe of the project.

Objectives

- Understand the purpose of all structures and modifications across the Winterbourne Stream.
- Remove/alter all appropriate structures, enabling diverse flow patterns to establish,
- Re-naturalise the morphology and hydrology of the stream through river restoration around structures.

Action Plan

We propose the following approach:

1. Work with stakeholders and asset owners to identify redundant structures.
2. Seek to remove those which are no longer serving a function whilst altering those where appropriate (e.g. remove culverted farm crossings and replace with freestanding bridge)
3. Monitor the impact of structure removal through upstream habitat mapping and Riverfly monitoring to establish derived benefits.



Case Study - Concrete Ford

Fords provide vehicle crossing points through rivers and streams; however, they also have a detrimental impact through impounding water, creating artificial sediment drop-out, and altering natural flow regimes.

Where these are no longer used they can be easily removed by a variety of methods, enabling a more naturalised channel to form, stabilising the performance of the channel during periods of low flow.

Below is the disused ford on the Lewes Winterbourne with visible gravel substrate to the edge and upstream, this would spread with the removal of the ford forming a larger riffle and pool sequence through this area of the stream.



INNS Control

Fresh and transitional waterbodies are particularly vulnerable to Invasive Non-Native Species (INNS) as they serve as natural wildlife and dispersion corridors. This coupled with the fact that many rivers and streams are becoming unfavourable for our native species means that there is more chance that INNS will colonise and thrive along our watercourses. This threatens the natural heritage of our river catchments through modification of the physical environment (e.g. river bank erosion) and the out-competing of native species.

A total of seven non-native (invasive) species were recorded across the surveyed subreaches and included:

- *Cotoneaster* spp
- Layland Cypress (*Cupressus x laylandii*)
- Cherry Laurel (*Prunus laurocerasus*)
- Bamboo
- Pampas grass (*Cortaderia selloana*)
- Buddleia (*Buddleia davidii*)
- Montbretia (*Crocsmia x crocosmiiflora*)

Two species (*Cotoneaster* and *Montbretia*) are listed under the Wildlife and Countryside Act (Schedule 9), four species (*Cherry Laurel*, *Buddleia*, *bamboo* and *Pampas grass*) are listed on the Global Invasive Species Database and *Leylandii* is not known to be invasive but can cast dense shade along riverbanks leaving exposed soils that are susceptible to erosion.

As species identified on the Lewes Winterbourne are associated with gardens and urban planting an important part of their control is engagement with communities, and individuals, focused on raising awareness of not only the detriment of species but the importance of biosecurity through following existing initiatives such as the Check, Clean, Dry campaign and considerate disposal of garden waste.

Action Plan

1. Remove existing INNS from the length of the Lewes Winterbourne (two-year programme)
2. Subsequently implement a five-year monitoring and control programme to prevent re-colonization
3. Run a community awareness campaign to highlight the importance of considerate garden waste disposal, and the importance of general biosecurity measures.
4. Monitor the Lewes Winterbourne for garden waste and remove.



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Wetlands & Wildlife

There are several opportunities to enhance the Winterbourne through the creation of wetland features along its course, creating in-channel habitat, and planting of trees. Along its length there are also opportunities to enhance the stream through the thinning of trees particularly removing those affected by Ash Dieback.

Wetland Features

In the upper, rural, areas of the Winterbourne there are opportunities to create wetland features such as scrapes, swales, and pools to slow and store water flowing through the landscape. There are various springs which create secondary, fast moving, channels joining the Winterbourne outside of Lewes, slowing and storing water from the secondary channels will provide flood benefits to Lewes Town whilst creating habitat complimenting that at Lewes Railway Lands and the Cockshut Wetlands.

Within Lewes Town there are opportunities at Bell Lane Recreation Ground to create a water holding area next to the stream which has been identified as a surface water pathway and one which transports high levels of nutrients to the stream. Formalising the current depression at this location to a formal water storage area, either as a connected backwater or offline pond, will both slow the flow, provide habitat and filter pollutants from entering the stream.



Trees

Towards the upstream extent of the Winterbourne there are opportunities to plant in-channel or bankside trees, helping to naturalise the river through facilitating the formation of pools, scouring the bed, and exposing underlying gravels which are evident 250m downstream.

Three locations along the Winterbourne would benefit from some tree thinning, the most prevalent of these being the removal of ash trees within Bell Lane Recreation Ground. Opening the canopy will enable better growth of macrophytes which are essential to chalk stream health.

In-Channel Features

Across the sub-catchment the river channel would benefit from installation of features through hinging trees and redistributing gravel and bed materials. The majority of the stream through the urban area would benefit from redistribution of bed material to create deeper pools, glides and riffles particularly beneficial during low flow conditions. Given the availability of gravels, the creation of a winding low flow channel along the length of the Winterbourne would create and connect new pools, riffles and other natural features. Any gravel spoils arising from this work could then be moved to the edges of the channel to create side bars, naturalizing the stream profile and create diverse flows.

Water Quality

Water quality on the Lewes Winterbourne is complex to monitor, there are no wastewater treatment works and it is suspected that the issues of water quality are focused on significant road run off entering the stream, transporting heavy metals, rubber, petro-chemicals and other pollutants directly into the watercourse. In all there were 37 outfall pipes recorded across 3.5 km of stream (1 every 100m), the majority of which were associated with roads along with garden drainage.

Improving water quality must underpin all river restoration or enhancement and there are several opportunities along the Lewes Winterbourne to achieve this. We highlight that measures to re-naturalise the stream will enable better sediment management within the watercourse, but these should be complimented by target action to reduce and/or filter run off.

Action Plan

1. Laying and infilling of existing hedgerows along A27 boundary to increase infiltration and filter run off from the main road.
2. Engagement with Lewes District Council and Highways Department to develop plans to mitigate A27 run off near the source of the stream, through woodland areas west of Lewes and within the urban areas such as eroding banks in Winterbourne Hollow and drains along Bell Lane and Winterbourne Lane.
3. Creation of buffer strips and cross slope hedgerows to slow and filter run off across the sub-catchment, particularly from gardens and horse fields.
4. Use of brushwood bundles and coir matting to stabilize areas of bank erosion and increase filtration within surface water pathways.
5. Engage with Southern Water regarding over spills from manhole cover in Bell Lane Recreation Ground

Empowering Communities

The local community are an important part of water quality improvements on the Lewes Winterbourne, several areas suffer from fly-tipping, litter, garden waste disposal and urban debris. We will provide training, opportunity and awareness raising activities to empower the community to play their part in the health of the stream, providing a sense of ownership and pride as it is restored to its full potential.

Activities will include

- River Clean Ups
- Riverfly Sampling
- Riparian Responsibilities



Run off from the road network entering the stream through a brick outfall

Southover School

The school has a number of large roofs and areas of hard standing that contribute to surface water run-off into the stream. As part of developing the Action Plan, we have discussed the introduction of rainbox planters, rain gardens, and other rainwater harvesting interventions within the school grounds, and they are keen to move forward with these options. This would reduce the impact of roof run-off and slow stormwater reaching the stream, reducing peak flows. When planted up with drought and flood tolerant plants these measures would also benefit local pollinators, wider biodiversity and pupil engagement.

A more ambitious project here would be to de-culvert or 'daylight' the circa 100 metres of the Winterbourne that currently runs underneath the southern side of the school playing fields. This has the potential to deliver a naturalised meandering section of the urban Winterbourne, with riffles, vegetated side bars, backwaters and marginal wetland that could also serve as an excellent resource and teaching tool for the school.

There are many case studies of successful urban daylighting of buried sections of streams with multiple positive outcomes for flood alleviation, climate resilience, biodiversity, and wellbeing.



Rainbox planters installed in Ringmer School to slow surface water and engage pupils

Action Plan

1. Investigate feasibility of daylighting stream through the school grounds
2. Work with the school to design low-cost interventions to manage surface water runoff
3. Work with pupils and parents to construct and install rainbox planters on school downpipes.
4. Provide curriculum relevant learning on the water environment, pollution and surface water management.



Stream entering Southover School through a trash screen and culvert, potential to daylight this section of the Lewes Winterbourne