

Lower Crane Re-Naturalisation and Enhancement: A New Vision



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Acknowledgements

This document was funded by the Smarter Water Catchments Programme on the Crane and has been prepared by the Zoological Society London (ZSL) on behalf of the London Borough of Richmond upon Thames and the Crane Valley Partnership.

This document was produced in consultation with CVP partners (Friends of the River Crane Environment, the Environment Agency and Thames Water).





Lower Crane Re-Naturalisation and Enhancement

The aims of the Lower Crane re-naturalisation and enhancement plan are to:

- Create and modify habitat in the Lower Crane so that it supports more wildlife.
- Modify in-channel structures that block the migration of fish to restore the ecological connection between the Crane and the wider Tidal Thames.
- Make space for water and modify the channel to reduce the threat of flooding and make the river more resilient to low flows.
- Make the Lower Crane river reach an asset for local people to enjoy.

Ecological Goals

- Create a mosaic of in-stream habitats and linked wetlands to increase connectivity and support multiple species.
- Link the Lower Crane with the wider tidal Thames by modifying barriers to allow fish migration into the through the reach.

Purpose and Intended Audience

The purpose of this document is to re-imagine the '**Lower Crane Vision**' to encompass new ways of catchment-scale thinking.

This plan sets out our ambitions for enhancing and re-naturalising the Lower Crane between Kneller Gardens and Cole Park Allotments. It will be shared with key decision makers and the wider public for information and comment with a view to implement recommendations over the next five years.

Key Definitions

- *Catchment*: A water catchment is an area of land through which water from any form of precipitation (such as rain, melting snow or ice) drains into a body of water, such as a river, lake or reservoir, or even into underground water supplies (Ofwat, 2015).
- *Longitudinal connectivity*: Within a river system, longitudinal connectivity refers to the pathways along the entire length of river for the movement of water and species as well as the occurrence of habitats.

The Lower Crane

The Crane Valley spans roughly **125 km** and is home to over **650,000 people**. The Crane Catchment extends across **five west London Boroughs**. The Crane headwaters start in Harrow as the Yeading Brook. The river flows down through Yeading Brook Meadows and becomes the River Crane in the stretch of channel between Minet Country Park and Cranford Country Park. At Mereway Weir in Twickenham, the river splits into two channels, the artificial Lower Duke of Northumberland's River and the Lower River Crane, joining the tidal Thames in Isleworth.

The Lower Crane Valley is made up of a **variety of habitats** including **river and marginal wetland, open grassland** and **heath, woodland** and **scrub** which support a range of species including **seven species of bat, water voles, kingfishers, european eels, tawny owls** and many more key native plants and animals.

Significant lengths of the river were modified as a result of industrial use over hundreds of years and suburban development in the 20th Century. The 3km of the Lower Crane of specific interest to this report now flow along an artificially straightened, widened and concrete lined course. As a result, these **modifications have prevented natural river function** and **significantly degraded the ecological and geomorphological function of the watercourse**.

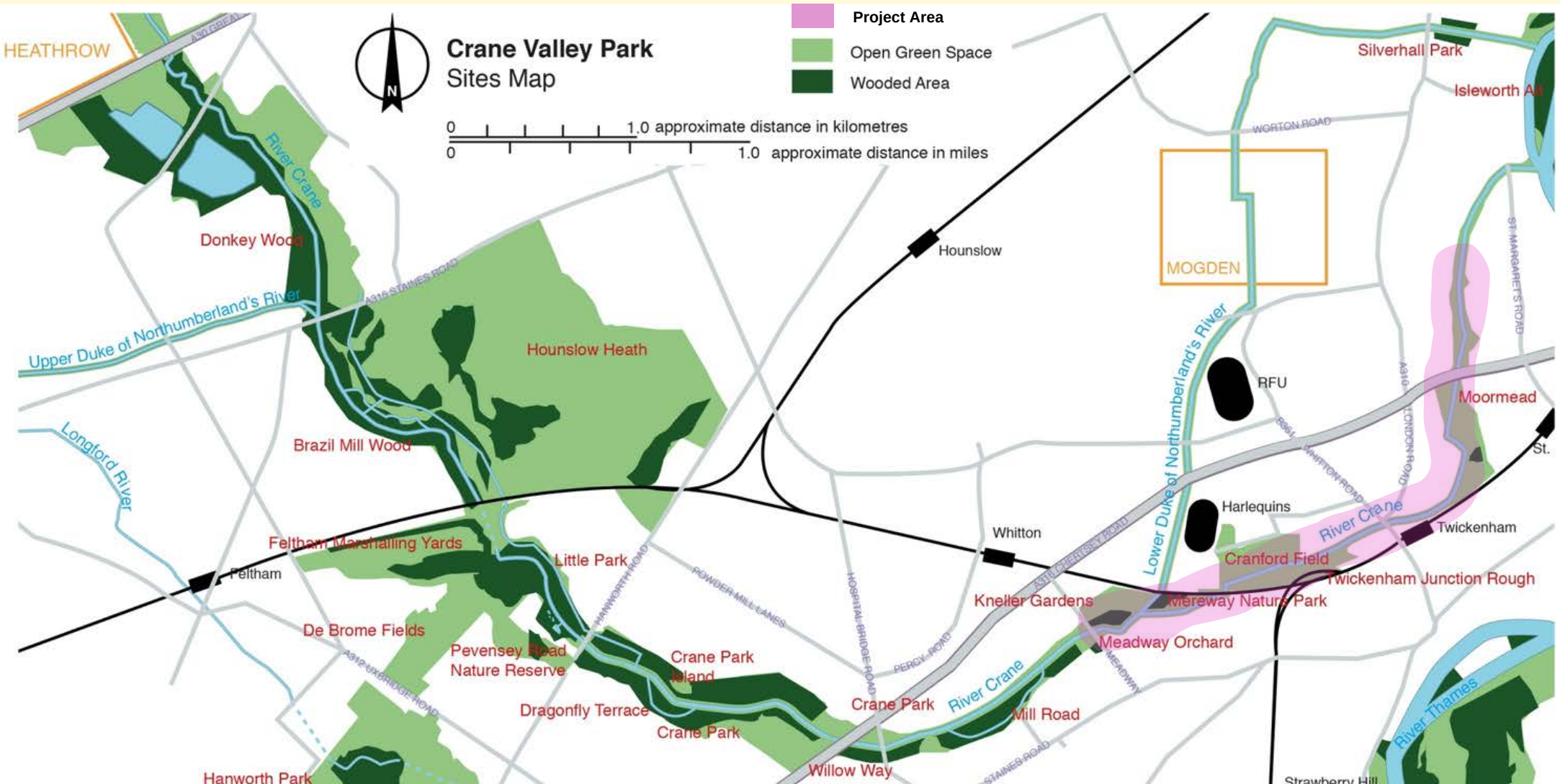
Enhancement works in the historic River Crane corridor have been ongoing for many years, with improved public access, water quality, hydromorphology, habitats and biodiversity helping to build community awareness and stewardship of the Crane catchment rivers and their ecology. These improvements have principally been focused in Harrow, down through Yeading Brook Meadows, Crane Bank and Crane Park, along the Lower Duke of Northumberland's River and on the tidal Crane.

However, the Lower River Crane reach, downstream of Mereway Weir remains largely untouched by improvements and is a 3km section of the River Crane that runs in a straight, wide, concrete channel interrupted by numerous weirs, with fragmented public access and generally poor physical and ecological function.



Project Area

The map below shows the River Crane (as well as the Lower Duke of Northumberland's River) from Heathrow Airport to its confluence with the River Thames in Isleworth. The project area that this renaturalisation and enhancement plan is focused on is highlighted. The project area spans from the newly constructed fish pass next to the recently refurbished Mereway Weir (in Mereway Nature Reserve) to Cole Park Island and allotments. Downstream of this, much of the natural river bed and banks still survive before the Lower Crane River enters the River Thames at Isleworth. Here the River Crane is tidal and is designated as a 'Site of Metropolitan Importance for Nature Conservation', supporting a very rare and diverse ecological environment within a dense urban setting. This tidal section is now being further enhanced with an ongoing project for the establishment of Northcote Nature Reserve, along the banks of the river at Northcote Recreation Ground (historically known as Pit Park).



Larger-Scale Improvement Sites

- 1 Mereway Nature Reserve
- 2 Twickenham Rifle Club Phase 2
- 3 Twickenham Rough
- 4 London Road
- 5 Moormead and Bandy Recreation Ground

Priorities for Fish Passage

- Zone 1
- Zone 2
- Zone 3



Larger-Scale Improvement Sites

1 Mereway Nature Reserve

- Break-out sections of the concrete channel wall to create new wetland habitat.
- Installation of an in-channel vegetated berm on the southern riverbank and creation of more natural in-stream features.
- Creation of an 80m dual-flow (two-stage) channel from the eastern end of the old Mereway Centre site downstream to the western end of the Greggs bakery site.

2 Twickenham Rifle Club (Phase 2)

- Potential remeandering of the river channel (creation of an oxbow shape)
- Extension of the newly installed vegetation berm to the weir downstream.
- Reinstatement of previously washed out gravels which will be retained using deflectors.

3 Twickenham Rough

- Potential opportunity to re-profile northern bank (college-owned land), breaking-out a section of the concrete channel wall .
- Addition of a vegetation berm similar to Rifle Club site.

4 London Road

- Improve a section of the channel just upstream of the bridge by adding an in-channel vegetation berm.

5 Moormead and Bandy Recreation Ground

Phased approach to improvements at this site.

- Phase 1: Visual engagement/signage, tree works, daylighting of the overshadowed channel and addition of vegetated berms.
- Phase 2: If initial improvements are successful, there is potential to break-out and reshape a section of the channel to better engage with the park. River reshaping would be designed to minimise encroachment on playing fields and park facilities.

Additional Improvements Across the Lower Crane

In conjunction with the larger scale improvement plans at the five sites identified within this plan, the following river improvement works will be carried out in suitable locations along the Lower Crane River.

- Managing vegetation to reduce overshadowing,
- Installation of vegetation berms/coir mats along river margins,
- Gravel/cobble additions into the channel.

Ideally these improvements will be in locations that are visible to the public so as to improve local engagement with the river and its banks.

Improvement Options

Marginal Planting

- Wild plants are very important along river banks as their **roots provide bank stability** and **prevent soil washing away**, especially during flood events.
- Established marginal plants **provide food and habitat for wildlife**, including fish, insects such as damselflies and water beetles, and threatened mammals including otter and water vole.
- Marginal plants often form locally distinctive plant communities of wild flowers, sedges, rushes and grasses.



Gravel Additions

- The addition of mixed gravel substrates to urban rivers can help to **raise the level of riverbeds, narrow, over-widened channels and restore natural river function**.
- Adding gravels can improve riverbeds by **creating varied flows** and features such as riffles and pools. In turn, this builds a **range of habitats** for species such as fish and invertebrates, providing **refuge, spawning and feeding areas**.
- Gravel sizes and retention techniques can be experimented with to establish the best mix to reduce substrates being washed out while providing maximum benefits for flow regimes and biodiversity.

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Managing Over-Shading

- Riparian/bankside vegetation provides a number of benefits to rivers. However, **excessive over-shading can also be detrimental to the quality of the river habitats** as it can limit the amount of light entering the channel. This can destabilise banks and inhibit aquatic and marginal vegetation, which is vital for biodiversity.
- Selected rotational coppicing, pollarding and crown raising of marginal trees and saplings allows for **increased light penetration** and thereby **promotes the growth of marginal vegetation, improving biodiversity and creating valuable habitats**.



Improvement Options

Coir & Rock Rolls

- Rock rolls/coir rolls can be added into a river channel to reduce erosion and help establish marginal vegetation.
- Rock rolls have been used at the Twickenham Rifle Club pilot site to create a robust marginal berm that has been covered in coir mats and planted with reeds and marginal plants to provide habitat for fish, invertebrates and other vulnerable species.



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Break-out concrete

Concrete channel walls and beds prevent rivers from functioning naturally, significantly reduce connectivity while also **constraining the applicability of several in-stream improvement techniques**.

Breaking sections of river out of concrete constraints can restore more natural flow regimes, connectivity to the floodplain and improved ecological function.

Removal of artificial banks and channel beds also **allows for the restoration of meanders**, the **creation of backwaters** and more ecologically diverse sections of river.

Improvement Options

Before



After



Re-meandering

- Re-meandering is the restoration of natural curves to river channels which have previously been modified and/or straightened. More varied flows created by re-meandering **provide a greater range of habitats** for fish and other aquatic wildlife and **can promote the growth of more diverse plant assemblages**.
- Re-meandering increases the length of the river and slows flows, allowing more water to be stored in-channel, **helping to reduce the risk of flooding downstream**.

© Matilda Biddulph, Turkey Brook at Albany Park

Two-stage channel creation

The creation of a two-stage channel system is an in-channel practice that is used to **improve or restore uniform trapezoidal channels to a more natural form**. The design of a smaller main channel/ditch acts as a low-flow channel and vegetated benches on one/both sides are created to flood during higher flows.

These are difficult to create in concrete, impounded channels if breaking out is not an option. However, through using some of the techniques highlighted in this document such as the addition of vegetated berms, coir/rocks rolls and gravel additions, a more natural river form can be created.

Benefits of restoring a more natural channel form include improved filtration of run-off, reduced sediments, more natural flows and enhanced the ecological function.

Before



After



© River Restoration Centre, Medina River Enhancement Project

Priorities for Fish Passage in the Lower Crane

Fish populations within the catchment have been significantly affected by **pollution** in the last decade with two major pollution events having taken place in the Crane Catchment, in 2011 and 2013 which caused **significant fish kills and devastated aquatic life**. In addition to the impacts of pollution, fish population data from the Crane is indicative of a **lack of natural flow regimes, poor longitudinal connectivity and the lack of functional habitat for species to complete their lifecycles**.






Environment Agency data show a total of **16 fish species** to have been recorded in the Crane since 2000 including **barbel, roach, dace** and the **critically endangered european eel**. Data from a report of fish in the Tidal Crane, commissioned by the Friends of the River Crane Environment Community Group (FORCE), shows presence of an additional 10 species not found during Environment Agency sampling. If habitat, water quality and connectivity were to be improved we might be able to **encourage their migration further up into the non-tidal Crane**.

Fish movement within many sections of the River Crane is **obstructed by operational and redundant structures such as culverts, weirs and mill races**. The majority of structures within this section of the Lower Crane are weirs that were built with the purpose of water level management and/or tide control.

In May 2023 ZSL staff and the Environment Agency assessed these structures following the improved flows through the channel created by re-setting the flow controls on Mereway Weir. The assessment showed that the channel has been consistently **over-widened, concrete lined** and largely **lacks water depths, flows and habitat to support diverse fish communities**. As a result three key zones for improvements have been highlighted.

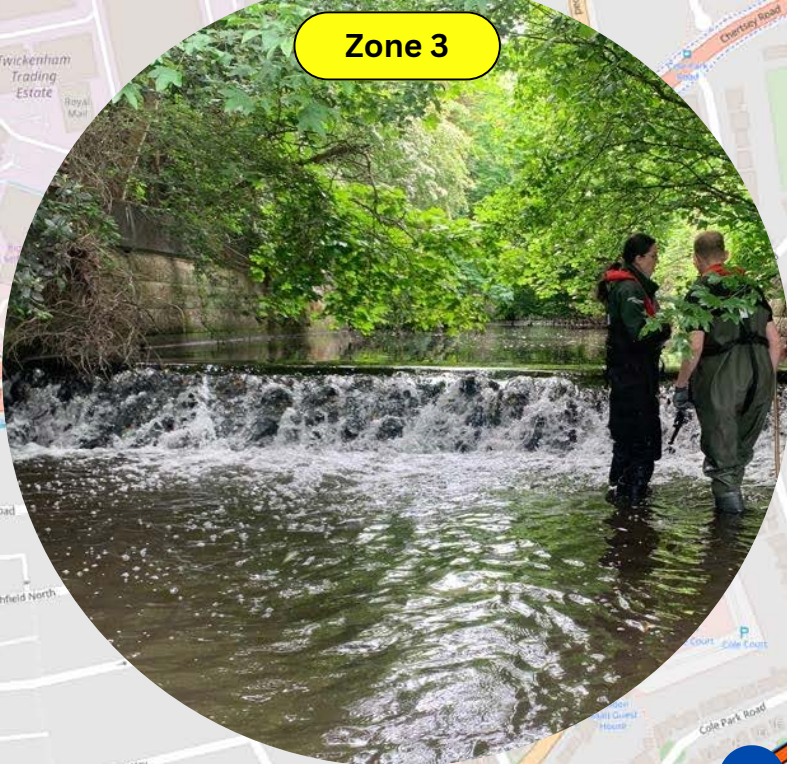


Priority Zones for Fish Passage

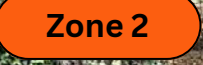
-  Zone 1
-  Zone 2
-  Zone 3

 Water level control structures

 Zone 1



 Zone 3

 Zone 2



Improvement Zones

Zone 1

At present, this section of the Lower Crane has very low flows, a lack of suitable fish habitat, small step weirs and little to no in-stream vegetation. The shallow water depths for much of the year will limit fish diversity and exclude adult life stages of bigger fish species in this zone.

Recommendations:

- Trial a two-stage channel to create enough water depth for fish.
- Improve habitats for small species and juvenile fish through planting vegetation on marginal berms and rolls with the addition of gravels and cobbles.



Zone 2

This section of the river contains five small weirs, installed as flow control mechanisms. The majority of these structures present a significant barrier to fish passage but they can not be removed as they maintain some water depth in channel.

Recommendations:

Add baffles downstream of each weir as pre-barrages. The baffles reduce head drop and slow flows to improve fish passage. The weir and baffles will have off-centre notches to create gaps for fish passage.

Zone 3

The impounding effect of the large weir at the downstream end of Moormead Recreation Ground causes deeper water levels through this section of the Lower Crane. The large weir is a barrier to all fish species and blocks migration up from the wider Tidal Thames.

Recommendations:

- Construction of a rock ramp fish pass should be considered at this site (at which a concrete base already exists). It is likely that this structure would not need to span the whole width of the river and given the low flows in summer would benefit from being sited at a notch in the weir. This would create mixed flows and benefit the migration of multiple species.
- Increasing light penetration to the channel followed by the creation of marginal habitat should also be considered. Marginal habitat could be created using floating structures such as BioHaven® Floating Wetlands (Frog Environmental).

Weir at the downstream end of Moormead Recreation Ground



Example of a rock ramp fish pass



Aims: Improve the artificially straightened channel by enhancing habitats for biodiversity to support the return of water vole populations.

Techniques:

- Installation of wooden deflectors by hinging trees and fixing wooden logs into the channel.
- Re-connection of ditches to main channel.
- Vegetation management.

Benefits:

- Increased flow sinuosity and creation of areas of faster and slower water flows to encourage the formation of more natural river features such as meanders, riffles, pools and sediment bars.
- Improved habitats for fish spawning and water voles.
- Increased connectivity between the channel, banks and ditches encourages wet woodland formation and additional flood storage.
- When wet, the ditches will provide offline refuges for biodiversity.
- Removal of vegetation in specific areas has reduced over-shading which has improved light penetration to the woodland and river, promoting greater diversity of plants and insects.
- Ongoing engagement with local community and volunteers.



Twickenham Rifle Club (Phase 1)

Aims: The project aimed to increase flood storage, give the channel a more natural form and improve habitat to increase biodiversity.

Techniques:

- Removal of concrete bank to create backwater habitat.
- Installation of vegetation berm and addition of gravels downstream of berm and backwater.

Benefits:

- Increased the diversity of macroinvertebrates present within the channel and the backwater.
- Increase in the River Condition Assessment score from 'Poor' in the downstream reach to 'Fairly Poor' in the restored reach.
- The majority of feedback from a public perception survey was very positive with people saying that following river improvements they are more likely to visit the area and would like to see more restoration works carried out across the Lower Crane.



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Next Steps

Design and delivery of the next enhancement scheme

This is currently envisaged as a river embayment on the Mereway Nature Reserve site (similar in scale and design to the Rifle Club Phase 1 scheme) combined with marginal berms and gravel/cobble river beds installed here and at the London Road bridge. *Construction planned for 2024.* Completion of the Rifle Club Phase 1 scheme through the lowering of fences and installation of a public information board. *Completion planned for 2024.*

Consideration of further schemes

Other improvement projects outlined in this document as well as further installation of marginal berms to banks and river beds at high visibility sites alongside fish passes are *planned to commence in 2025.*

Feedback

If you would like to share your thoughts on this document then please scan the QR code and fill out the feedback form provided by 01/11/2024. We will be reviewing responses to help inform next steps and potential future enhancements in the Lower Crane Catchment and we value your opinion!

Alternatively - please visit: <https://forms.gle/YV6QyWiEny4funbJ8>

