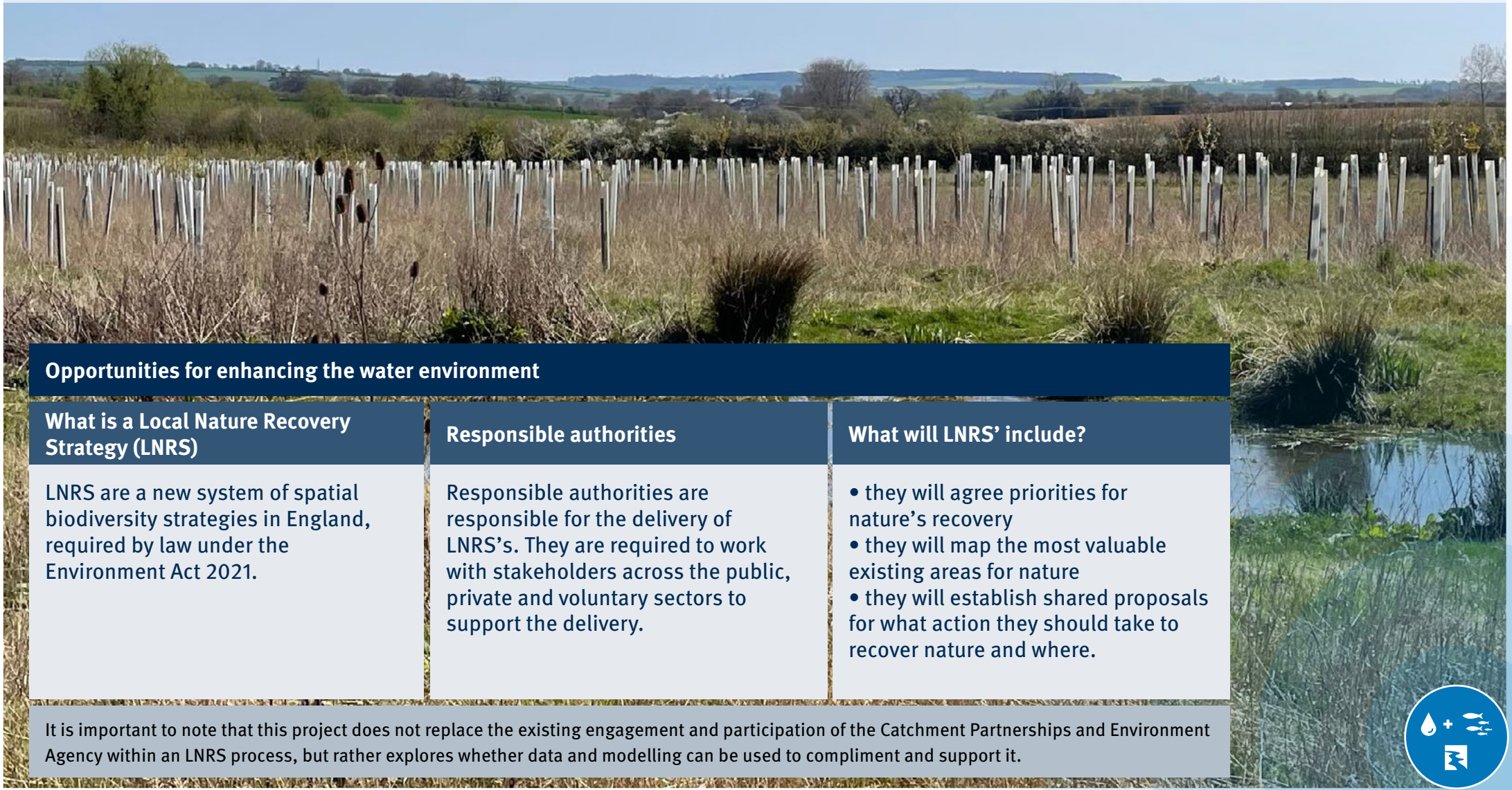
Oxford to Cambridge
Integrated Water Management Framework

Bedfordshire Local Nature Recovery Strategy through a blue lens

Environment Agency



Opportunities for enhancing the water environment

What is a Local Nature Recovery Strategy (LNRS)

LNRS are a new system of spatial biodiversity strategies in England, required by law under the Environment Act 2021.

Responsible authorities

Responsible authorities are responsible for the delivery of LNRS's. They are required to work with stakeholders across the public, private and voluntary sectors to support the delivery.

What will LNRS' include?

- they will agree priorities for nature's recovery
- they will map the most valuable existing areas for nature
- they will establish shared proposals for what action they should take to recover nature and where.

It is important to note that this project does not replace the existing engagement and participation of the Catchment Partnerships and Environment Agency within an LNRS process, but rather explores whether data and modelling can be used to compliment and support it.

Project aims

Objective

The aim of the project was to support the Bedfordshire LNRS's priority setting and opportunity identification requirements by mapping intervention opportunities.

The core LNRS process's methodology was based on two mechanisms for identifying needs and opportunities.

- expert judgment and stakeholder input
- data driven mapping using terrestrially focused natural capital and ecosystem services maps.

The purpose of this project was to trial supplement these two mechanisms with a third:

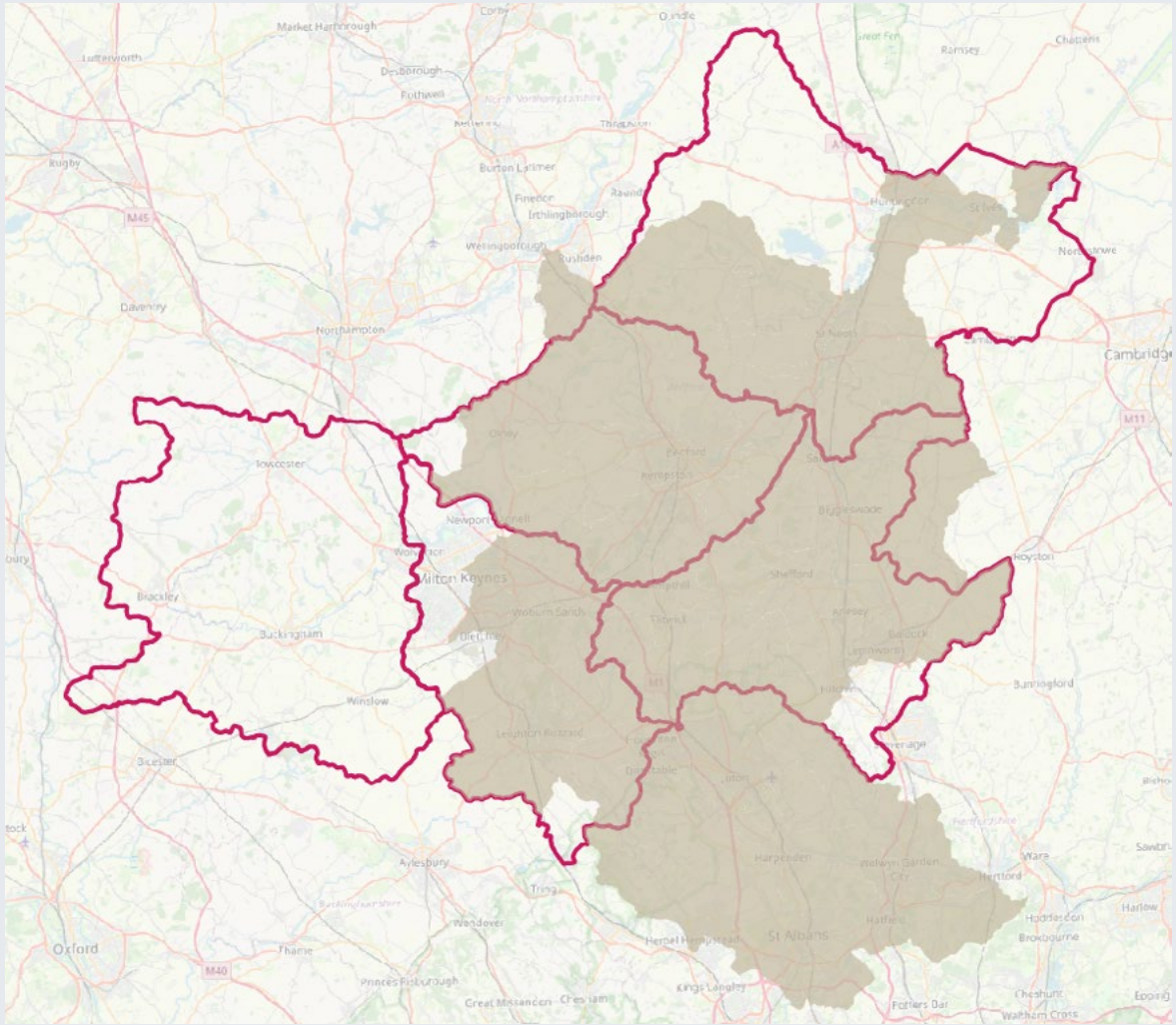
- data driven mapping with a water focus.

Outputs

The outputs from this project were designed to be used in two ways:

Feeding into the developing Bedfordshire LNRS - in 'real time'

Demonstrate 'added value' of approach (If determined) to feed into future LNRS guidance



Project geography

Cross-boundary working

The project considered multiple geographical boundaries when defining the geography that we were working to. This included considerations around political and operational water management areas.

To successfully work across these boundaries the project team needed to talk to and work with numerous stakeholder groups and neighboring local authorities.

We also created a buffer around the Bedfordshire political boundary because what happens on that land, affect the Bedfordshire waterways.

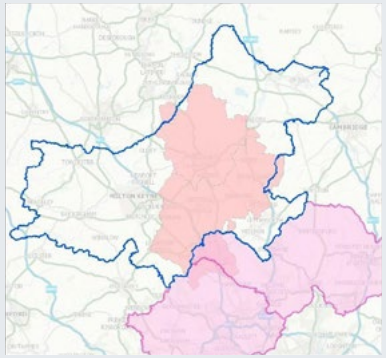
Bedfordshire LNRS

The Bedfordshire LNRS covers the ceremonial county of Bedfordshire.

Made up of the Unitary Authorities:

- Bedford
- Central Bedfordshire; and
- Luton

The major water management catchment covering Bedfordshire is the Upper and Bedford Ouse



The Lea and Colne management catchments were also to considered ensuring coverage of all of the rivers in Bedfordshire.

Water environment needs and types of intervention

Long lists

The long list of needs and measures were created by the project team – these needs and measures are generically applicable across the country.

A workshop was then run with the Bedfordshire LNRS stakeholder group to shorten them down to a priority list that better reflects the geography and would be taken forward into the project.

Long list of water environment needs

Ammonia Reduction	**Phosphate Reduction**	Eutrophication
Nitrate reduction	Control of water temperature	Reduce chemical pollutants
Improve geomorphology	Microion plastic reduction	Sediment management
Aquifer recharge	Habitat creation i.e. for fish	**In channel barrier removal**
Management/reduction of surface water pooling/ flooding	**Better protect the environment at low flow**	**Management of high in river flows**
Management of non-native invasive species	**Reversing wetland and peat degradation and loss**	

BOLD = Taken forward

Long list of measures/intervention types

Catchment woodland	**Bund**	**Floodplain reconnection**
1p farming	**Buffer strip**	Lowland marshland
Low/targeted pesticide use	**Contour swale**	**Lowland wetland**
Alternative pesticides	Scrape	Oxbow lake
Contour cultivation	Pond	Fencing
Peatland restoration	No or low till	Sediment trap
Cover crop	Grip blocking	**Leaky barrier**
Short rotation window	Crop rotation	Flood storage online
Livestock integration	Flood storage offline	SuDS
Banked hedge	**Riparian buffer strip**	Reedbed system
Infield buffer strip	Beaver dams	**Floodplain woodland**
Riparian woodland	Riverbank stabilisation	River re-meandering

BOLD = Taken forward

How we mapped opportunities for measures and interventions

Example method 1

The need

Improved geomorphology, in channel habitat & connectivity.

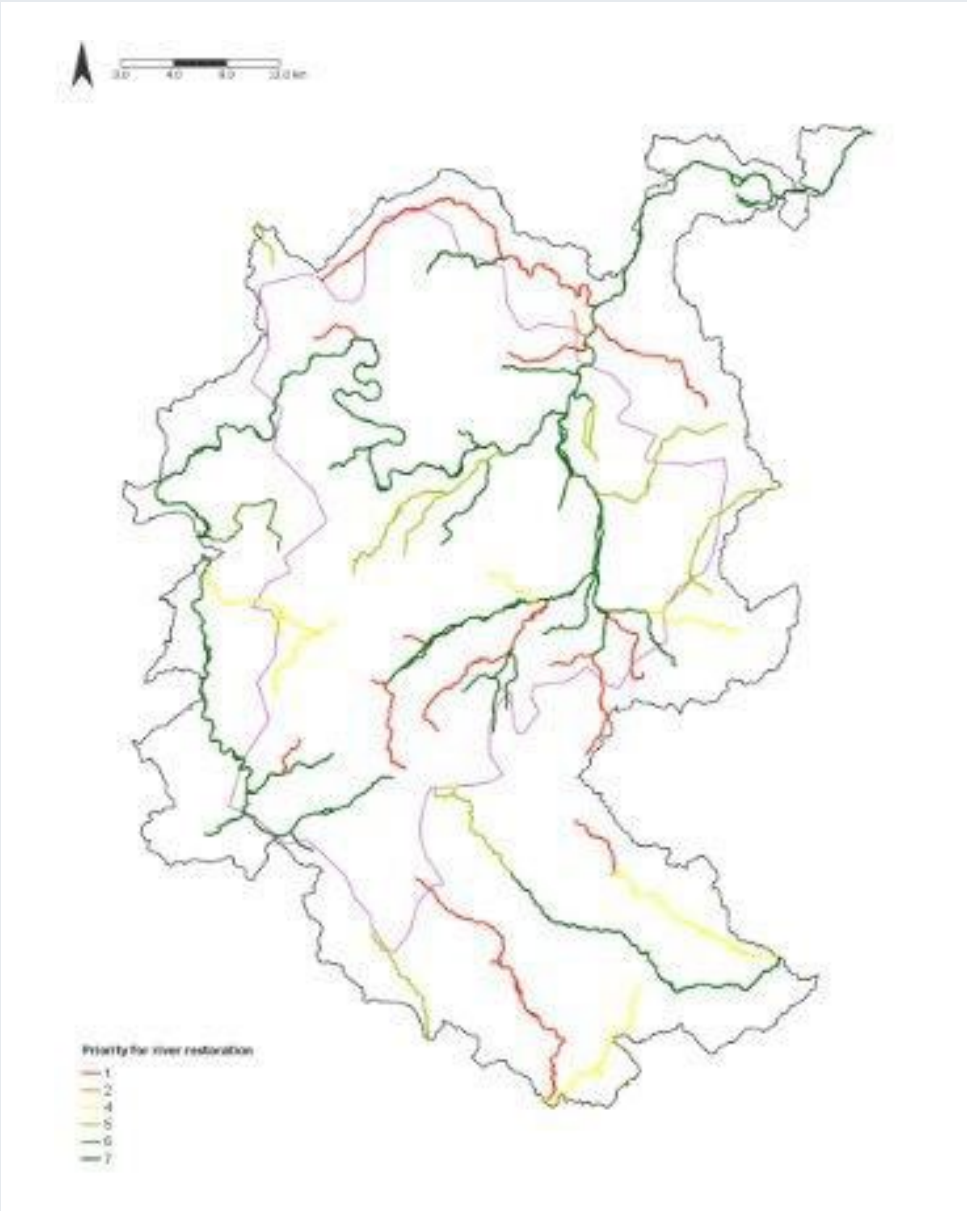
The process

The prioritisation of the Bedfordshire rivers by their need for restoration

Using the Hydromorphological Pressure and Condition (HPC) index:

- level of river modification
- flow regime
- erosion and deposition features, riffles and pools
- habitat quality channel substrate
- channel vegetation structure
- number of occurrences of bank and channel modification

Need to be aware that these locations have not been technically assessed. This is a desk-based method to provide direction for further investigation.



How we mapped opportunities for measures and interventions

Example method 2

The need

Flow regulation (high and low flows)

The measure

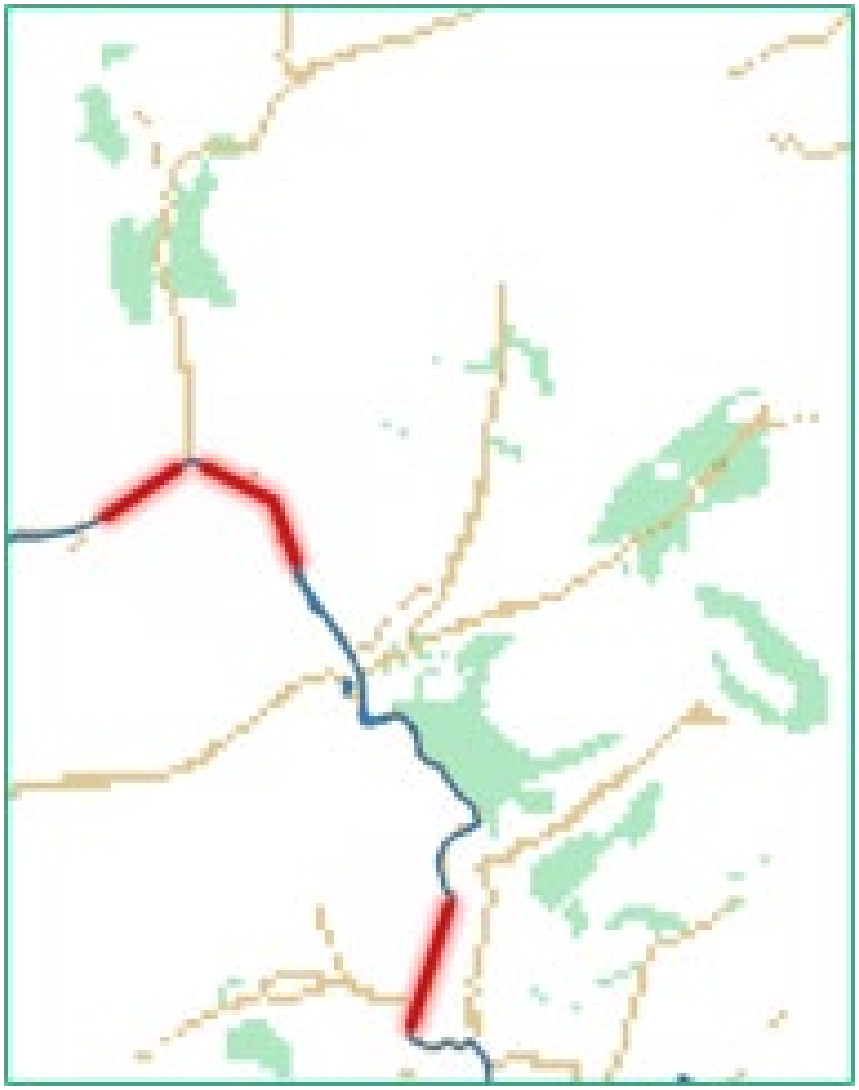
Leaky dams

The process

GIS analysis:

- relatively straight stretches of rivers
- rivers < 5m wide
- dams also placed at least three in a row
- the distance between the dams being at least 7 times the width of the river.

Need to be aware that these locations have not been technically assessed. This is a desk-based method to provide direction for further investigation.



Combining opportunities

The need

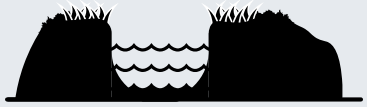
Flow regulation (high and low flows)

The measures

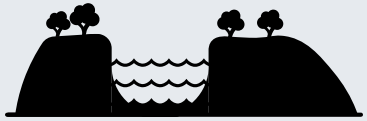
Leaky dams

Bunds and Swales

Wetlands



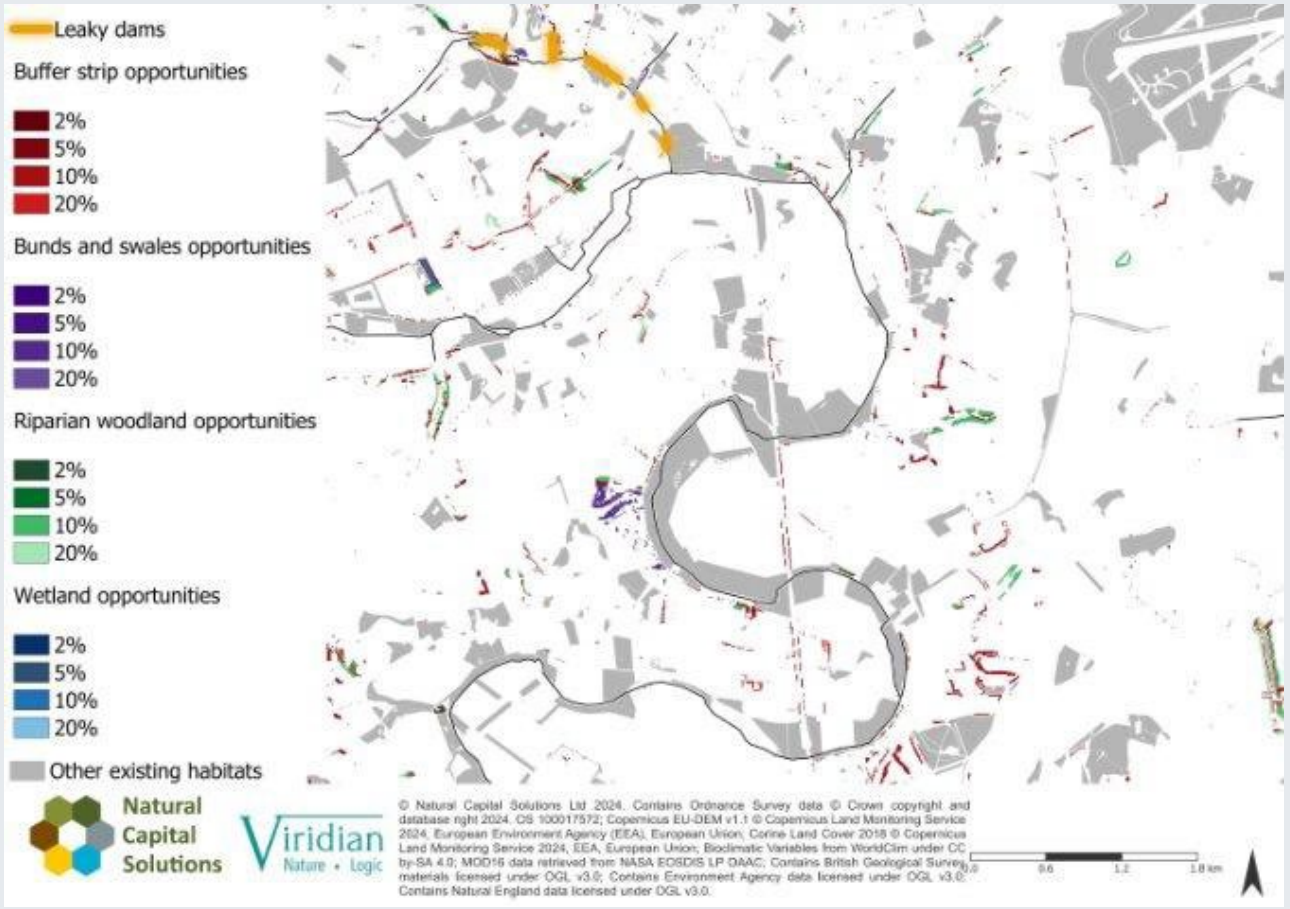
Buffer Strips



Riparian Woodland

The process

Once needs and measures were defined we added them to combined maps to look for multiple benefit opportunities or locations where there are multiple options for an intervention. The key on the left hand side of the map highlights the opportunities that were in the top percentage of opportunities.



Conclusions and recommendations

This project developed various approaches that demonstrated how a GIS/ data led approach to create a user-friendly evidence base that prioritises opportunities for nature-based solutions that will deliver on multiple objectives.

Key factors that make the approach used in this project particularly useful in the LNRS process are:

- the cost-effective integration of hydrology data and modelling to provide prioritised nature-based solutions for water
- complementary GIS-based approaches were used to produce an evidence base that allowed integration across needs and measures. This work suggested locations where interventions and measures can be best located, and that will deliver water benefits and biodiversity
- the approaches use freely available data sets (of varying resolution and quality)
- the mapped outputs can be overlaid with GIS layers created as part of the LNRS

The project outputs provide prioritised opportunities for a range of interventions to help meet the range of water needs in Bedfordshire, at the same time as supporting nature recovery.

A large number of potential opportunities have been identified, and these will need to be prioritised further during the LNRS process to short list the packages of interventions it will be possible to take forward on the ground,

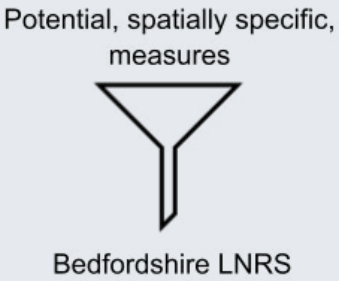
Further project work may be necessary to aid this process, for example, GIS layer use and interpretation, synthesis mapping with opportunities from different projects and initiatives and GIS-based land ownership assessment. To develop projects from this work, it will be necessary to engage with landowners, local communities and to carry out further ground-truthing.

The full project report can be found here PDF

Next steps

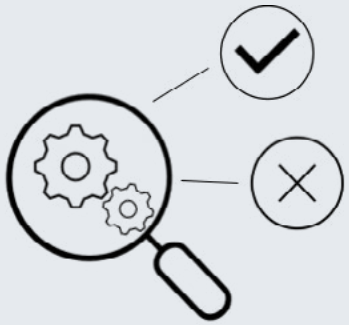
This mapping project has created a significant spatial evidence base for the Bedfordshire LNRS.

This will be utilised immediately and will feed into the Bedfordshire LNRS Opportunity mapping work.



Use in the Bedfordshire LNRS will provide an immediate test of the outputs.

We will develop an analysis / evaluation project in early 2025 to determine the success and learning from this test and trial.



Share any learning from this project with the central LNRS teams and other LNRS's across the country.

Ultimately this will inform the development of national LNRS guidance for future cycles.