Case study 6. Chelmer Valley Local Nature Reserve

Author: Trevor Bond

Main driver: Habitat improvement

Project stage: Completed spring 2016

Photo 1: River Chelmer, Chelmer Valley Local Nature Reserve (source: Chelmsford City Council)

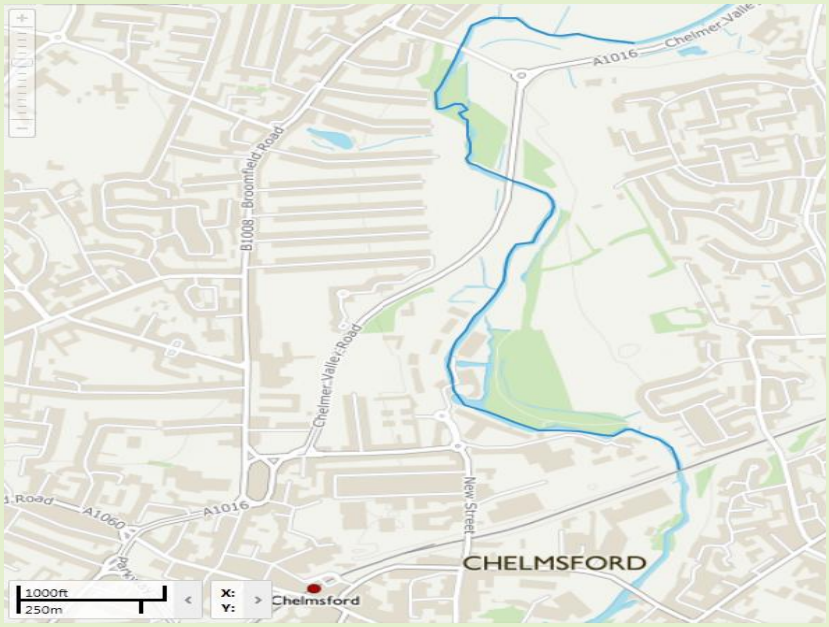
Project summary:

The Chelmer Valley Local Nature Reserve (LNR) is a much loved open space situated to the north of Chelmsford city centre (Map 1). Approximately 2.5km long, the Chelmer Valley LNR consists of parkland, green spaces, unimproved grassland, ponds, wet margins, riparian woodland and the River Chelmer itself (Photo 1).

As part of this project, informal embankments created through years of dredging were lowered and the won material was used within the river to construct earth berms. This improved floodplain connectivity, created marginal habitat for plants and restricted the width of the active river channel, encouraging geomorphic processes. In addition, flood risk modelling of the scheme has shown flood risk benefits emerging from the project during particular flood frequencies.

Key facts:

Flood risk modelling indicated that the scheme would lead to a small, net decrease in lateral flood extent during both 10% and 1% annual exceedance probability (AEP) events. Modelling also suggests reduced flood depths of up to 0.3m in some locations during a 10% AEP event and reduced flood depths of 0.15m in some locations during a 1% AEP. The reduced flood risk is believed to be due to the improved connectivity between the main river channel and the floodplain, which means water evacuates onto the floodplain earlier and the flood peak is marginally reduced.



Map 1: Chelmer Valley Local Nature Reserve. The blue line shows the extent of the project (source: Ordnance Survey)

1. Contact details

Contact details	
Name:	Trevor Bond
Lead organisation:	Essex Wildlife Trust
Partner:	Environment Agency
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2. Location and catchment description

Catchment summary	
National Grid Reference:	TL 70963 08053
Town, County, Country:	Chelmsford, Essex, England
Regional Flood and Coastal Committee (RFCC) region:	Boundary of Anglian Eastern and Thames
Catchment name(s) and size (km^2):	Chelmer, 988km^2
River name(s) and typology:	River Chelmer, Inactive single-thread channel
Water Framework Directive water body reference:	GB105037033950
Land use, soil type, geology, mean	Recreational

annual rainfall:	London Clay (clay, silt and sand) Average annual rainfall: 750mm

3. Background summary of the catchment

Socioeconomic/historic context

The River Chelmer is characterised by a number of historic (now inactive) mill structures and in-stream barriers dating back to the 18th and 19th centuries. In its lower reaches, it is also designated as a navigation, dating back to 1793. As a consequence, the River Chelmer has many artificially straight sections, is unnaturally wide and generally lacks coarse bed substrate in its middle reaches.

Flood risk problem(s)

The River Chelmer has no recent record of severe flooding. Generally the greatest risks are to properties in the responsive upper catchment and at the downstream end where the rivers Wid, Can and Chelmer converge. The most recent event that led to some road closures was in January 2009, while local people recall a small number of properties flooding in March 1947 and September 1958.

Other environmental problems

The river experiences low dissolved oxygen levels in the summer months, owing to a lack of tree cover, an unnaturally shallow longitudinal gradient, in-stream structures and low summer rainfall. Generally the river contains excess nutrients, particularly phosphorus, which come from a combination of sewage treatments works, misconnections and agriculture.

4. Defining the problem(s) and developing the solution

What evidence is there to define the flood risk problem(s) and solution(s)

The potential flood risk benefits of this project were not realised until flood risk modelling was carried out. The objective was to demonstrate a zero or negligible change in flood risk, with the modelling suggesting there may be minor benefits.

What was the design rationale?

The original design was conceived to optimise the ecology of the river while not increasing flood risk. There was also a financial restraint that prevented extensive or costly works. The design focused on using the material available within the floodplain and thus not reducing the overall flood storage capacity of the valley. Soil won from informal embankments was used to:

- increase channel sinuosity
- create marginal habitat
- improve connectivity between the river channel and the floodplain
- reduce the river bank slope in some locations
- enhance the available habitat for the benefit of fish, plants and insects

Project summary	
Area of catchment (km^2) or length of river benefitting from the project:	Approximately 2km

Types of measures/interventions used (Working with Natural Processes and traditional):	Embankment lowering, berm creation
Numbers of measures/interventions used (Working with Natural Processes and traditional):	10
Standard of protection for project as a whole:	There has been no significant improvement in the standard of protection due to this project, but no detriment either.
Estimated number of properties protected:	Modelling was insufficiently detailed to determine the number of properties potentially protected by the works.

How effective has the project been?

The project was completed in March 2016 and has not been tested with respect to a flood event. It may be several years before the effectiveness of the project can be determined with respect to flood risk and ecological benefits.

5. Project construction

How were individual measures constructed?

Individual measures were constructed using a long-reach excavator. Features were designed to a specification that included parameters stating berms should not occupy more than half the channel width.

How long were measures designed to last?

The berms are intended to become the new bank of the river. As such, they are designed to remain in place indefinitely, or until such time that the river has sufficient energy to move them.

Where there any land owner or legal requirements which needed consideration?

It was necessary to secure planning permission of this work, as well as an environmental permit (flood defence consent). The land is owned by the local council.

6. Funding

Funding summary for Working with Natural Processes (WWMP)/Natural Flood Management (NFM) measures	
Year project was undertaken/completed:	Completed March 2016
How was the project funded:	The project was funded by the Catchment Partnership Action (CAP) fund.
Total cash cost of project (£):	£25,000
Overall cost and cost breakdown for WWNP/NFM measures (£):	There was no cost for design or modelling, which were performed by the Environment Agency on behalf of Essex Wildlife Trust. The principal cost was for implementation, including vehicle hire and labour.

WWNP/NFM costs as a % of overall project costs:	Not applicable
Unit breakdown of costs for WWNP/NFM measures:	It is not yet possible to specify the exact flood risk benefits emerging from this project but the overall cost was £12,000 per km, or £2,000 per feature.
Cost–benefit ratio (and timescale in years over which it has been estimated):	Not applicable

7. Wider benefits

What wider benefits has the project achieved?

Although it is too early to see any direct benefits of the work, it is hoped that the recent changes to the river will encourage local people to engage further with the watercourse directly. It is also hoped that this project can act as a case study to encourage more work on the River Chelmer, particularly upstream.

How much habitat has been created, improved or restored?

The total length of watercourse improved is approximately 2km. The watercourse is currently failing to meet its Water Framework Directive objectives (currently at poor potential); although this project in isolation will not change the water body's status, it could move the River Chelmer along the pathway to good.

8. Maintenance, monitoring and adaptive management

Are maintenance activities planned?

No additional maintenance is planned beyond the annual check to determine whether weed cutting is necessary.

Is the project being monitored?

The project is being monitored informally by Essex Wildlife Trust staff. There is no formal asset management or ecological monitoring planned as part of the work.

Has adaptive management been needed?

Not as yet – all features have remained in place, although the stretch has yet to experience a substantial flow.

9. Lessons learnt

What was learnt and how could it be applied elsewhere?

This project has highlighted the value of thinking about flood risk benefits while developing environmentally focused projects. Greater alignment between flood risk and environmental objectives could have been achieved through this project if flood risk considerations had been taken into account during project development. Anyone planning habitat enhancement work should consider how they could reduce flood risk to people and properties while still improving the environment for wildlife.

10. Bibliography

Not applicable

Project background

This case study relates to project SC150005 'Working with Natural Flood Management: Evidence Directory'. It was commissioned by Defra and the Environment Agency's Joint Flood and Coastal Erosion Risk Management Research and Development Programme.