CASE STUDY

Remove culverts

Project Summary

Title: River Ravensbourne at Norman Park
Location: Norman Park, Bromley, England
Technique: Restore previously culverted river
Cost of technique: ~~£~~£~~£~~£
Overall cost of scheme: ~~£~~£~~£~~£
Benefits: ~~£~~£~~£~~£~~£~~
Dates: March – June 2000

Mitigation Measure(s)

Remove culverts
Increase of in-channel morphological diversity
Improve floodplain connectivity

How it was delivered

Delivered by: Environment Agency
Partners: London Borough of Bromley

Aerial view of the Ravensbourne at Norman Park
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Background / Issues

As part of an historic flood defence scheme for Hayes and Bromley Common, the River Ravensbourne was diverted into a concrete culvert, 1 m wide and 330 m long. This buried culvert ran the entire length of Norman Park before finally re-emerging at ground level in a field downstream of the park. This turned the park into one large, uniform recreational area with little visual or habitat diversity. The park was consequently deprived of all the social and environmental benefits that a river can provide for a local area and its people.

A project to deculvert the Ravensbourne was proposed with the aim of reducing the high costs associated with culvert maintenance, removing a trash screen and associated health and safety risk, and increasing flood storage. In addition, this project also aimed to restore the river corridor by recreating an open channel (in replacement of the culverted section) with diverse in-channel and bankside habitats linking to Scrogginhall Woods upstream of the park.

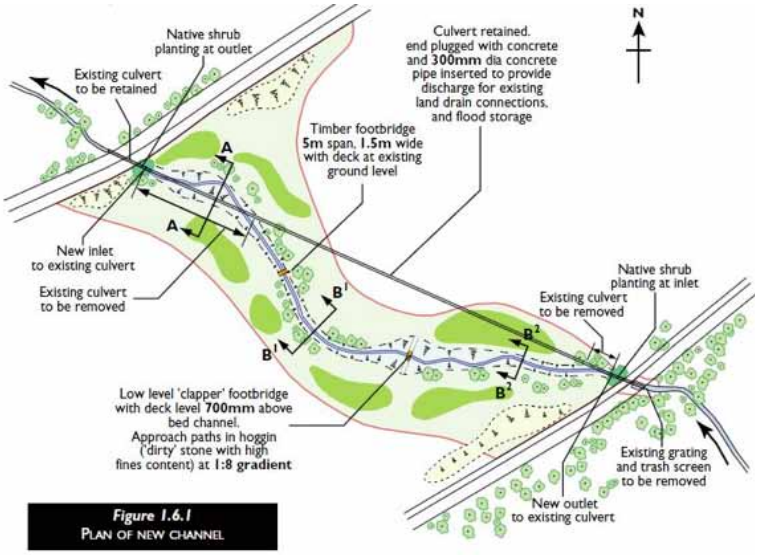

Figure 1.6.1
PLAN OF NEW CHANNEL

Scheme overview at Norman Park
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CASE STUDY

Step-by-step

The design of the project was based on the historic alignment of the channel, the geomorphology of less modified sections of the river, flooding considerations and present day use of the park. Works involved:

- The removal of 70 m of the 300 m culvert.
- The closing off of the remaining sections of the culvert (removal of culvert, backfilling and reshaping of a straight culvert is more expensive and, if other options are available, a less desirable option).
- The design and excavation of a new meandering, two-stage channel. The new channel is sinuous, 12.5 % longer than the culvert and possesses varying top-of-bank widths.
- Promotion of access to channel through the creation of a shallow (1:8 slope) 'berm, and new meanders (1:5 slope).
- Creation of a sediment trap at the end of the downstream limit of the new channel through the widening of the channel to lower flow velocities so that sediment will drop out of the flow and accrete.
- Seeding the new channel with gravel, thus allowing the stream to naturally shape its new bed, rather than attempting to construct pools, riffles, and other bedforms.
- On-site use of spoil from excavation to create mounds as part of the park landscaping.
- Planting of native vegetation along the riparian zone.

Excavation of new sinuous channel © Environment Agency copyright and database rights 2013

Benefits

- Improvements to in-channel, marginal, wetland and floodplain habitats.
- An improved physical habitat with has the potential to support improved ecology.
- Naturalised geomorphology.
- Increased flood storage capacity.
- Creation of a more attractive, diverse and accessible public open space.
- Educational opportunities for local schools and the community.

Marginal planting © Environment Agency copyright and database rights 2013

Lessons Learnt

- Post-project ecological monitoring has revealed low biologic score and reduced biological quality at Norman Park. This has been attributed to a "washing out" element, lack of in-channel refuge and community disturbance. Fencing to create buffer areas and in-stream planting have been identified as potential solutions.
- Marginal planting may suffer disturbance from early use and may take longer than expected to establish.
- Allowing the river to find a natural equilibrium with respect to the gravel placement has meant that significant cost savings have been made that could have been allocated to bed and bank re-profiling.

Project contact: Flood & Coastal Risk Management, South Thames Area, South East Region, Environment Agency