

Improve channel geomorphology to create habitat

Project Summary

Title: River Quaggy enhancement scheme at Chinbrook Meadows

Location: River Quaggy, London Borough of Lewisham, England

Technique: Structure removal, channel realignment and natural enhancement

Cost of technique: ££££

Overall cost of scheme: £££££

Benefits: ££

Dates: 2002

Mitigation Measure(s)

Use of green engineering techniques instead of hard bank protection

Improve channel geomorphology to create habitat

How it was delivered

Delivered by: Environment Agency

Partners: Quaggy Waterways

Action Group; Lewisham Council



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New, restored channel



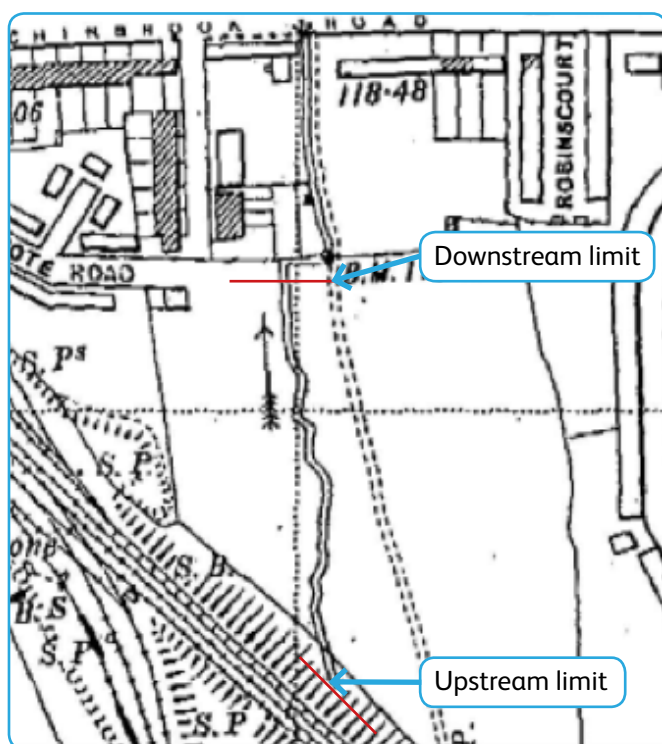
Background and issues

The River Quaggy is a tributary of the River Ravensbourne, and is located in Bromley and Lewisham in south east London. The river rises in Sundridge Park, from where it flows in a northerly direction. When the river reaches Sutcliffe Park, it flows in a westerly direction until it enters the River Ravensbourne to the north of Lewisham town centre. The Chinbrook Meadows restoration site is located in Grove Park, in the south of the London Borough of Lewisham.

The river has been extensively modified in the past, with large sections straightened, channelised or culverted as part of flood defence schemes during the 1950s and 1960s. After the 1960s the river flowed for 300 m

through Chinbrook Meadows in a straight, uniform concrete-lined channel. The upstream (southern) end of Chinbrook Meadows is bounded by a railway embankment carrying the railway between Grove Park and Elmstead. The river passed beneath the railway embankment in a culvert and then through the meadows in a concrete channel. Downstream of Chinbrook Meadows the channel passes through a gauging station and down a concrete flume.

In 2002, river enhancement works including removal of the concrete-lining and re-meandering of the river in the park to create a more natural planform were undertaken in the Chinbrook Meadows reach.



Overview of the River Quaggy restoration site in Chinbrook Meadows

Step-by-step

The river enhancement scheme in Chinbrook Meadows involved the following key elements:

- Breaking out the majority of the original concrete channel.
- Realignment of approximately 300 m of the river by the excavation of a meandering, naturalistic channel with increased morphological diversity.
- Creation of offline flood storage ponds.
- Removal of hedges and fencing adjacent to the concrete channel.
- Diversion of storm water drains that previously discharged into the original channel.
- Boardwalk, pond dipping and educational area constructed at the upstream end.
- Construction of a gauging station and measuring facilities in part of the concrete channel, which was retained at the downstream end of the site.

The constraints of the site (e.g. upstream and downstream levels and the invert levels of existing concrete bridges) meant that the top half of the scheme required a very shallow gradient of approximately 1:1000. To align the channel back into the downstream connection, the gradient of the second part of the channel was far steeper at around 1:150. The top half was designed as a meandering channel and the bottom half provided a gravel riffle and pool system.



(1) Previous toe-boarding of straight channel and (2) concrete bridge from 1950 / 1960s channelisation;



(3) Current soft-engineered channel, with new sinuosity resulting in (4) increased morphological diversity and natural erosion and deposition patterns

Benefits

- Removal of the concrete bed and banks and the creation of a sinuous planform with unprotected banks have increased flow and geomorphological diversity, and allowed natural processes to operate. This has resulted in bank toe scour and the formation of depositional features, particularly in the lee of meanders.
- Increased flow diversity resulting from structure removal has resulted in the formation of erosional and depositional features throughout the reach, with several gravel bars forming within the channel. These depositional features are creating a naturally occurring sinuous low flow course within the main channel and pool and riffle sequences have or are starting to form.
- The naturalised channel cross section that has been created has increased channel-floodplain connectivity. In high flows the park is regularly inundated, supplying water to the scrapes and ephemeral ponds that were created as part of the scheme, and helping to maintain wetland habitats.
- The enhanced, meandering channel provides landscape and amenity benefits and provides an area that is used by local residents for walking,

exercising their dogs and by children playing. The trees planted as part of the scheme provide additional landscape features within the park.



(1) Typical section of restored channel; (2) meandering channel

Lessons Learnt

- Minimising the use of artificial bank protection has allowed natural processes to operate in the restored channel. This means that the river has been able to adapt to the prevailing flow and sediment regime, creating a diverse range of in-channel morphological features which support varied habitats for plants and aquatic organisms.
- Channel incision created by increased sinuosity has lowered the bed level of the channel below the level of the offtake for the flood storage ponds and therefore natural flow to the ponds is limited during periods of moderate flows (although the features fill up during periods of higher flow). This connectivity could be improved through deepening the existing offtake or creating a new offtake. The lesson learnt is that although geomorphological change was considered in the scheme design, not all changes are easily predictable and that it may be necessary to undertake minor works to rectify this.
- The scheme may require some vegetation management in the long term, but is otherwise viewed as being sustainable.

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