River Wandle Improvements Proposal for Ravensbury Park

Report 2

The Wandle Trust

On behalf of the Living Wandle Project

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September 2012

1. Background

This plan builds on the previous scoping plan: *River Wandle Improvements Proposal for Ravensbury Park* produced by the Wandle Trust in June 2012. A detailed background to the project is described in that document.

A discussion was held on the bank on 14/08/12 with London Borough of Merton; Friends of Ravensbury Park; Landscape Partnership Scheme; Environment Agency Operations team; and the Wandle Trust. Subsequent to this the Wandle Trust held discussions on site with Cain Bioengineering on 31/08/12, Land and Water by phone and e mail and the Environment Agency on site on 14/09/12.

2. Proposed Project Location

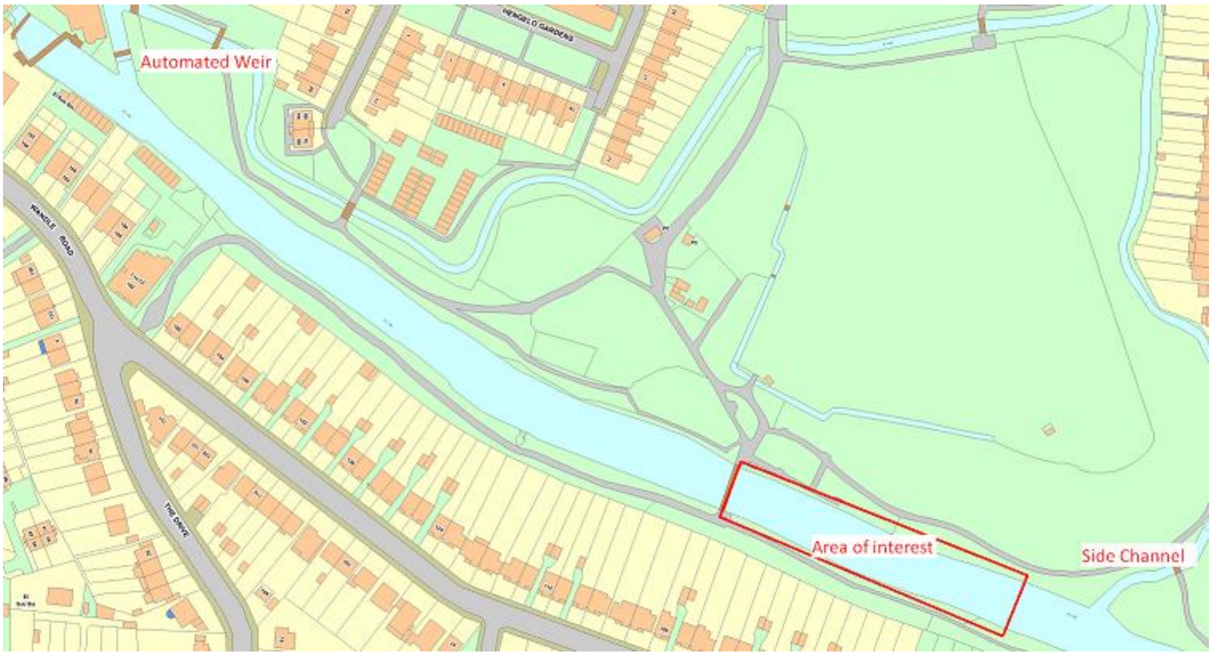

Figure 1: Location of the proposed project site.

The original scoping plan looked at the length of the river from the tilting weir at the bottom end of the park to a point near the side channel off take some 400m upstream.

From Discussions with Stephen Crabtree there is an assumption that £75K will be available for this project from the HLF funding.

It was agreed at the meeting on 14/08/12 that the area to look at in the first instance would be from upstream of the middle bridge over the main river to a point downstream of the side channel off take (Figure 1), a distance of 80-100m.

3. River Restoration Options

3.1. General Proposal

As described in the previous document the weir at the downstream end of the park creates an impounded, over widened river that is subject to sedimentation of the bed substrate with sub optimal flows. The river has been straightened and has concrete banks on the northern bank of the proposed project area.

This plan aims to create a narrower more sinuous river with improved flows, marginal vegetation and a clean gravel bed colonised with chalk stream species such as callitriche and rannunculus. Such a system allows a balanced natural ecosystem with features that will create habitat for all life stages of invertebrates, spawning areas for fish, habitat for native chalk stream aquatic and marginal plant species as well as being aesthetically pleasing.

3.2. Automated weir

It was recommended by Cain Bioengineering that gradient needs to be recovered for the river to achieve successful restoration of the river namely by removing or lowering the automated weir. Although removal is ideal this solution is not likely to be an option in the short to medium term but could be seen as a long term goal that can be discussed further with the Environment Agency.

A more feasible solution in the short to medium term would be the partial lowering of the weir to decrease the impounded reach upstream and improve river flows in the proposed reach. Lowering the weir could be discussed with the Environment Agency The Wandle Trust is already having discussions regarding lowering other similarly operated weirs on the Wandle. Some modelling may be required to prove that this will not constitute a flood risk.

For the purposes of this design proposal it has been assumed that the weir levels will stay the same. The design has been created such that it will only be enhanced by any future modifications to the weirs operation.

3.3. Proposed design

Visual assessment by Cain Bioengineering suggested that the river should be narrowed from the current 19m to ~7-10m in width to provide a self cleansing channel with clean gravels and flows capable of supporting callitriche or even rannunculus.

To achieve this it is proposed that the river is narrowed to form a sinuous channel by creating a new in channel bank edge with planted berms either side. The sinuous channel will have a wavelength of ~1:5 channel widths. The sinuosity will re-energise the river and allow pools and riffles to form through natural processes and provide a variety of river bed habitats.

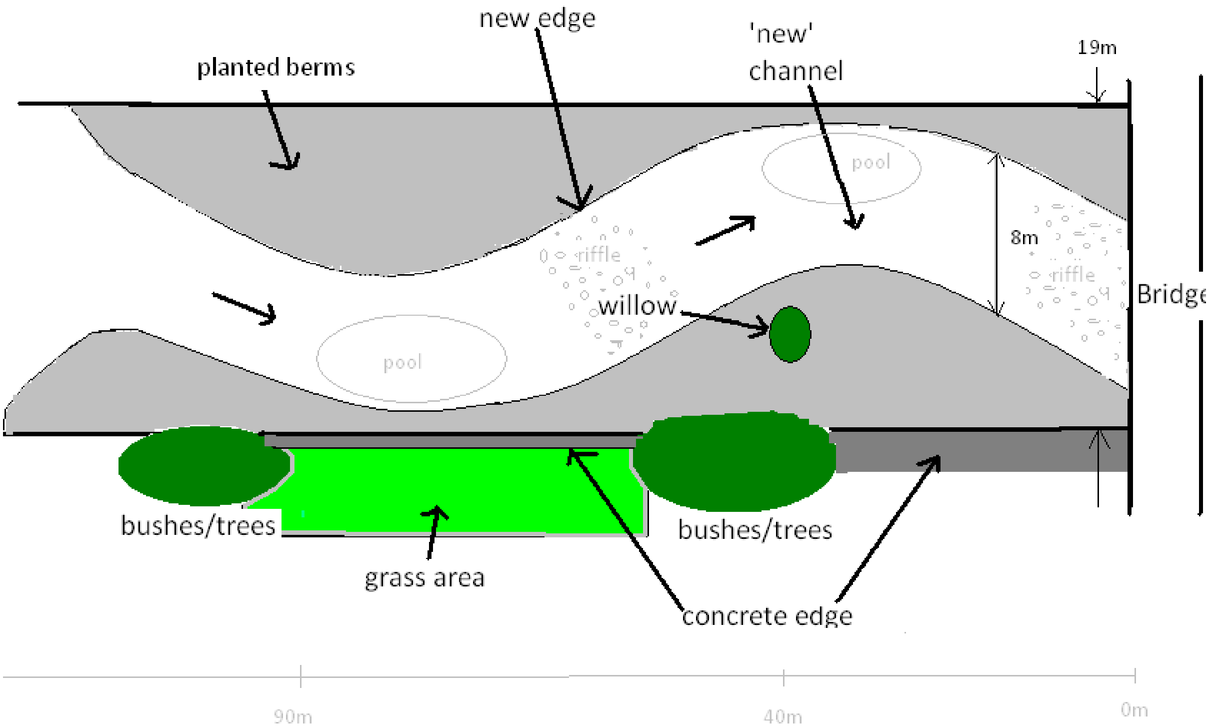

Figure 2: Impression of the finished design for the area immediately upstream of the middle bridge. Sinuosity introduced ratio of c1:5 channel widths. Channel width varies between 7-10m (Sketch not to scale).

3.4. Bank line formation Options

There are 3 main options;

1. Bund from river gravel winnings,
2. Bund from gravel importation
3. Bank line from faggot bundles and posts.

3.4.1. Bund from gravel winnings

A new in-channel bank line would be created using site-won gravel graded up from the bed to form a lagoon contained by a low-level emergent bank. Gravel would be placed in a new sinuous bank line to define the new bank margins.

The gravel would be emergent above the existing water levels by 100mm to allow for settlement (Figure 3). Because the finished height is so close to water level the emergent banks will quickly drown out if flood water levels rise rapidly so flood-carrying capacity will not be compromised.

This option will depend on an assessment of how deep the gravels are but has the benefit that no materials would need to be imported into the river and may be more attractive from a flood consent perspective. This was the preferred option of Cain Bioengineering from both a strategic and cost perspective

The emergent gravel bank should be planted up immediately on project completion (Figure 4). Seed will naturally spread into the sedimented lagoon as it fills up.

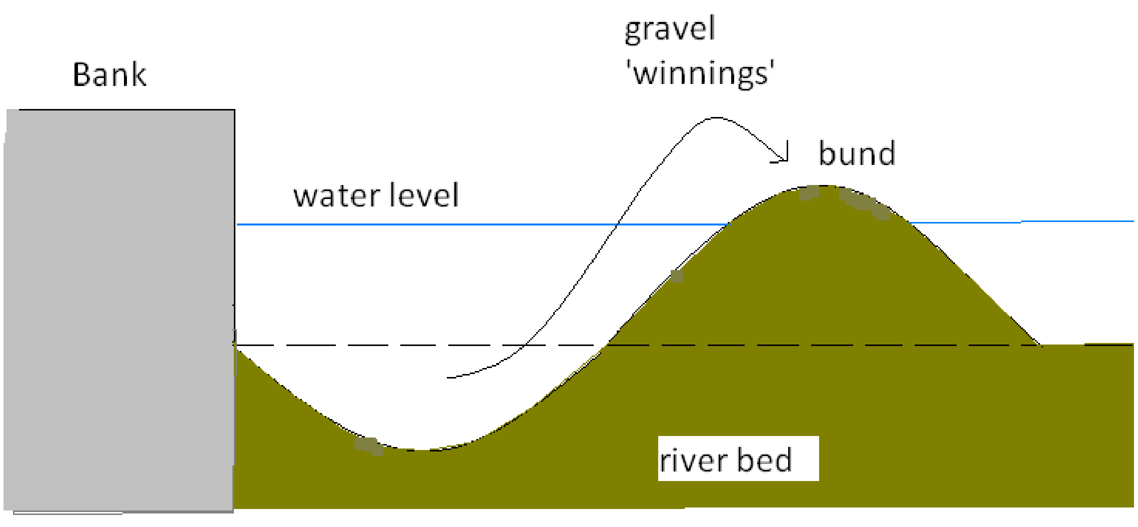

Figure 3: schematic of the gravel bank line formation

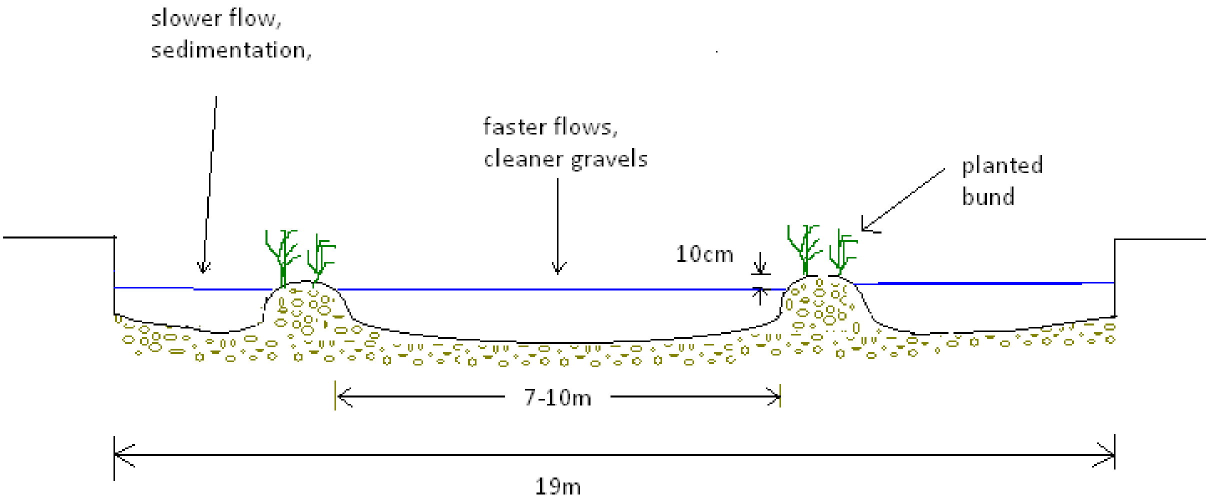

Figure 4: Cross section of proposed narrowed river immediately after work.

3.4.2. Imported Gravel bund formation

Similar to option one but would import new gravels to the river to be placed into the river along a staked line. This option could be used if there was not enough gravel available but requires importation of material into the river. This would be significantly more costly and would involve importing materials into the flood plain. This may make EA consent harder to achieve and lead to additional hydraulic modelling costs.

3.4.3. Posts/faggots/coir bank line formation

An alternative to the use of gravels and bed material is to use a traditional post and faggot approach. Faggot bundles made from, for example, chestnut or hazel branches would be staked into the river to create an edge. Behind this a coir geotextile sheet would be placed in order to catch silt behind the structure. This has the disadvantage of not being as natural a solution as using site won gravels.

3.5. Berm formation detail

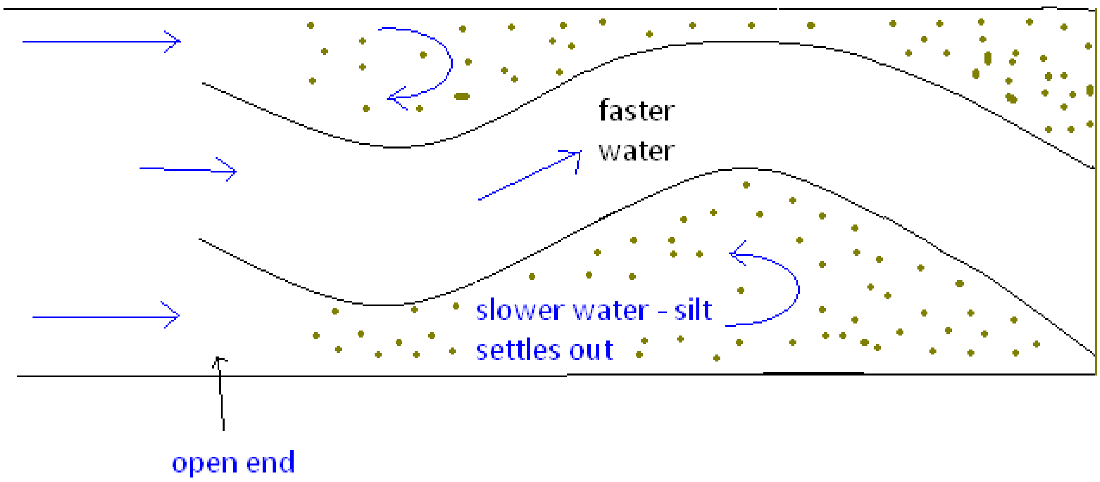

Figure 5: The effect of having a gravel bunded lagoon; silt settles in the bunded areas and faster flows are achieved in the new channel with clean gravels.

If the upstream edge of the new bank line is left open so water can flow into the back end of the structure (Figure 5) this will create a backwater that will catch silt and aid in creating a marginal habitat suitable for planting.

Cain Bioengineering suggested that the berm could be left to silt up over a period of 6 months. The upstream edge of the bank would then be sealed to form a new edge.

Brashings from the trees in the park could be added behind the bund/edge to provide fill and aid in silt trapping. This would be an ideal opportunity to involve volunteers in the work and would also aid in the removal of brash material from any tree work carried out by LBM. Brashings would be secured by wires attached to strategically placed stakes.

3.6. Silt importation option

An alternative proposal worth considering would be to import silt from the Mill Pool at the downstream end of the site. There are plans as part of the HLF bid to renovate the Mill wheels and the silt in the Mill Pool is likely to require removing before the wheels are able to operate.

This proposal would allow a short circuiting of the time required to silt up the berms ready for planting and could be a useful synergy between the two projects with possible benefits for both. In this case the process of siltation would be quicker but with the added cost of silt transporation.

3.7. Concrete edge.

The concrete edge found along the river at this point could either be removed or retained. From a cost point of view leaving the concrete in place will be cheaper. Strategically it may be worth leaving the concrete in place as this could cause less issue for consenting. Leaving the concrete in place, especially at the grass section downstream of the bridge would retain the full extent of this area for public amenity.

Removal of the concrete edge would create a more aesthetically pleasing bank and could be achieved by breaking the concrete in situ and using as back fill in the berm sections. Enquiries with the EA.into the classification of the concrete edge from a flood management asset perspective should be carried out to determine if the concrete can be removed. Services and utilities would need to be checked to determine if any services are likely to be disturbed by removal.

Cain Bioengineering suggested that the concrete edge near the bridge could be blinded with gravel and silt, graded down to river level using a coirnet retaining bank. The bank would then be planted up.

How effective this would be would remain to be seen due to the limited depth of sediment that could be added at this point. Another option would be to remove the bulk of the concrete ledge but retain the outer lip nearest to the footpath next to the bridge.

The concrete retaining bank u/s of in stream willow could be left in place but the height reduced to provide a sloping emergent planted bank. Some thought as to what end result is required for public access will inform what should be done.

3.8. Planting

Planting of the bund would be carried out immediately after the bunds have been formed. This can be done with volunteers.

After the areas behind the bund have silted up sufficiently to allow planting to take place planting would be carried out with volunteers. A significant number of plants would be required and would allow a number of volunteer events staged over a number of weeks or months.

A minimum of 9cm plug plants would be used. These have a better root system than smaller plugs giving them the best opportunity to establish. Plants would be selected that give the best chance against wildfowl predation by comparing other similar sites that have a high resident wildfowl population. Fencing would be required during the first growing season to reduce grazing until the plants are established.

4. Case Studies

The following schematic (Figure 6) shows examples of features from previously completed projects undertaken by Cain Bioengineering that relate to the Ravensbury Park proposal. Note the deep sediment that formed in the lagoon areas behind the bunds within 6 months of bund formation.

A second case study (Figure 7) shows examples of a project immediately after bund formation and then the same site 3 years later. This uses an identical method to the one proposed for Ravensbury Park.

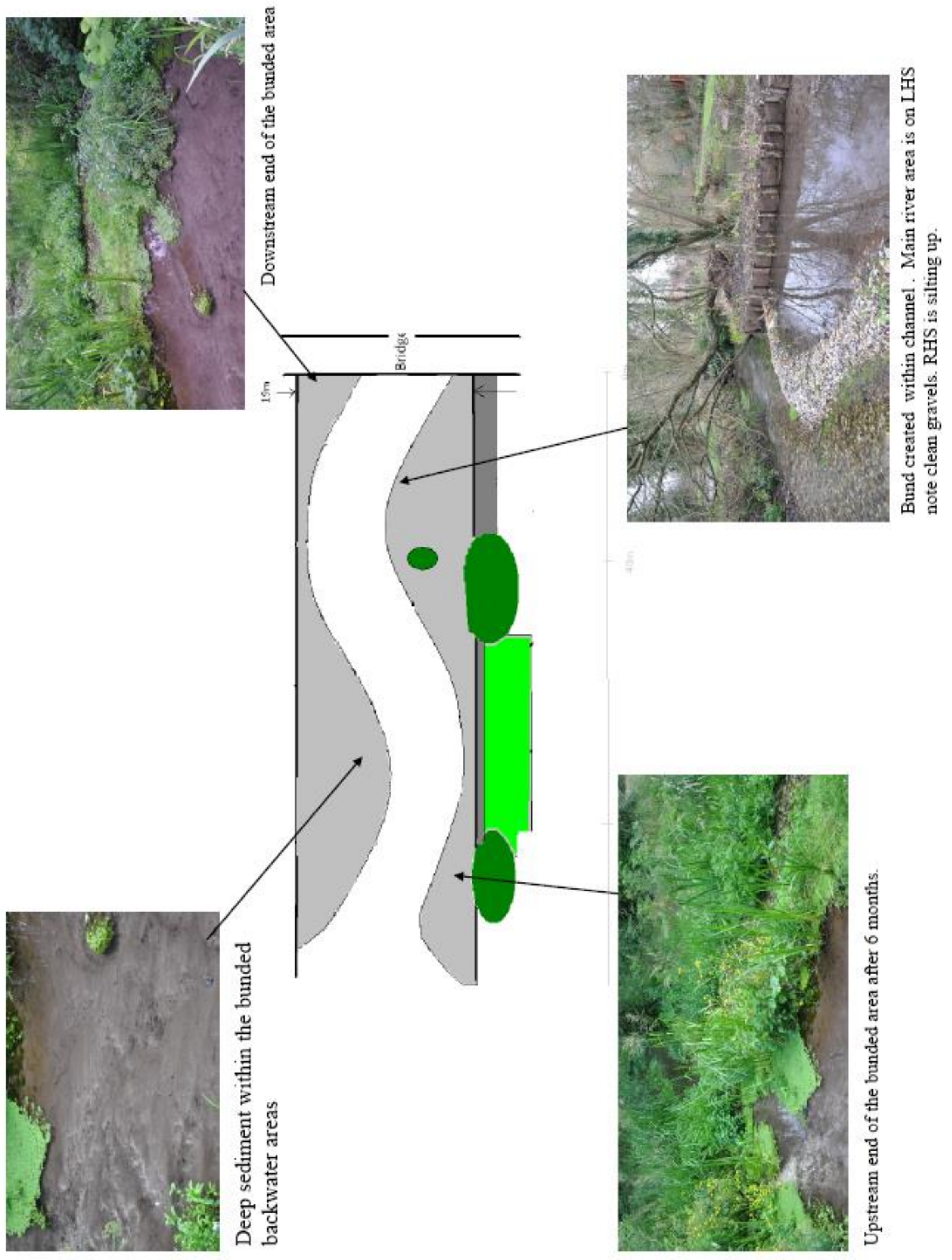

Figure 6: Schematic of the Ravensbury Park stretch with examples of the type of features to expect from a previously completed project by Cain Bioengineering.

Cain Bio-Engineering Ltd.

Meadow Barn, Lower Woodford, Salisbury, Wiltshire SP46NQ

Case study: **Technical detail 6 – Channel Narrowing (Gravel) River Kennet at Avington**

Above: Site-won gravel water vole habitat lagoon and channel narrowing to re-energise an over-wide channel.
Below: The same bank after 3 years growth. The gravel used was 'as dug' from the rear of the lagoon

Cain Bio-Engineering Ltd.

Figure 7: Case study on the River Kennet of a similar approach to the one proposed at Ravensbury Park

5. Pricing

5.1. Cain Bioengineering Quote

In summary, the quote allows for the contractors creating the bunded areas using site won gravels, supplying plants (but not planting) and removal of metal fencing upstream of the middle bridge. It doesn't include any modification or removal of the concrete. Planting and addition of brash or any further instream woody debris would be done by volunteers.

Cost = £35-40K +VAT (£42-48K with VAT).

The work achieved by this cost would exceed the initial ~100m of sinuous channel planned in the sketches and would improve 190m of the left bank upstream of the bridge and 160m of the right bank up to the side stream off take.

Cain Bioengineering suggest the surplus budget could be spent improving an additional 100-150m of channel up or downstream of the planned works.

Plants have been costed into the design but only for planting the bund itself. Further planting after 6 months would require more plants to be bought from the budget.

Clarifications and assumptions:

- The works assume the same compound and access point will be used as the side channel works.
- Compound area to be setup within confines of Ravensbury Park and consist of a welfare unit and secure box for material storage.
- Heras fencing will be setup around compound area and works area to prevent members of the public from accessing works.
- No track matting has been included within the costs to protect grass from machine damage. It is expected that at the end of the project, the excavator will machine finish any rutted areas and they will be raked and seeded.
- Sedimats to be installed downstream of works to prevent heavy sediment release during construction (20 units).
- Costs assume that an 8tonne excavator can work from within the channel to excavate and create gravel berms.
- Access to the river will be gained by creating a ramp next to the concrete wall using gravel.

- No costs have been included to change the concrete wall next to the channel.
- 50m of metal fencing upstream of the bridge to be removed by hand and taken off site for safe disposal by licensed waste carrier.
- No additional gravel material has been included within costing. All gravel materials to be won on-site from bed excavation works.
- 2 days of tree works to be undertaken to remove overhanging trees and pin them to the river bed in specific locations.
- Supply of plants (9cm) has been included within the costs but labour costs for planting have not been included.

5.2. Silt Importation from the mill pool

Land and Water were consulted over the costs to remove silt from the Mill Pool downstream and to transport and place it behind the bunded areas.

Mobilisation / de-mobilisation of plant & equipment	£15,000.00
Excavation of silt	£12.50 per M3
Transportation of materials to tip site	£5.00 per M3
Spreading of material at tip site	£3.00 per M3

Estimation that there is 695 cubic metres of silt in the mill pool area.

Cost would therefore be up to a total of £34,800 for removal of all of the silt.

6. Environment Agency Consultation

A site visit was carried out with Paul Stewart (EA FCRM officer) on 14/09/12. Sketch maps and proposed profiles have been sent through as a pre-application at his request. Paul will now gather feedback from the various interested EA departments and feed back to the Wandle Trust.

7. Discussion

- Utilisation of the bund formation technique with on site won gravels is a cost effective method. A budget of £75K will improve more river than was first thought. As a result the length of river restored could be increased both upstream and downstream. Note that the effectiveness of the technique will decrease as we approach the weir due to the increase in depth and decrease in flow. Lowering the weir would improve the effectiveness of this approach downstream.
- Discussions could be opened with the EA to see if lowering the weir is a feasible option. Modelling to provide evidence of any change in flood risk may be required and a portion of the money could be used to obtain this. Lowering the weir would provide a significant benefit in terms of river restoration and improve the chalk stream nature of the river through the park. The Wandle Trust has a number of contacts that could be approached to undertake this work.
- Silt importation to short circuit the sedimentation of the berms is a possibility. This is only worthwhile if the weir is lowered and/or the mill wheels are being restored to working order.
- If the weir is lowered silt may be exposed in the mill pool area and could be pulled back to form berms and planted up creating more habitat and an aesthetically pleasing area.
- There is sufficient budget to remove the concrete if desired but thought is needed as to what exactly is desired by the FORP and LBM regarding public access, amenity and aesthetics.