SITE VISIT INFORMATION: SITE 1A

CHANNEL IMPROVEMENTS TO THE RIVER NENE, DUSTON MILL, NORTHAMPTON

(WEDNESDAY 1ST MAY 2013)

The River Nene is part of the Nene Valley Nature Improvement Area. We will visit a short section of the river that has been suffering from low discharges, to some extent due to partial diversion to a flood relief channel and also because of abstraction to a reservoir. As a consequence, the channel's cross-section is too large for the "normal" flows exhibited, a situation that is worsened by two weirs that make the river "pond back". All these factors contribute to siltation on the riverbed and deterioration in ecological quality.

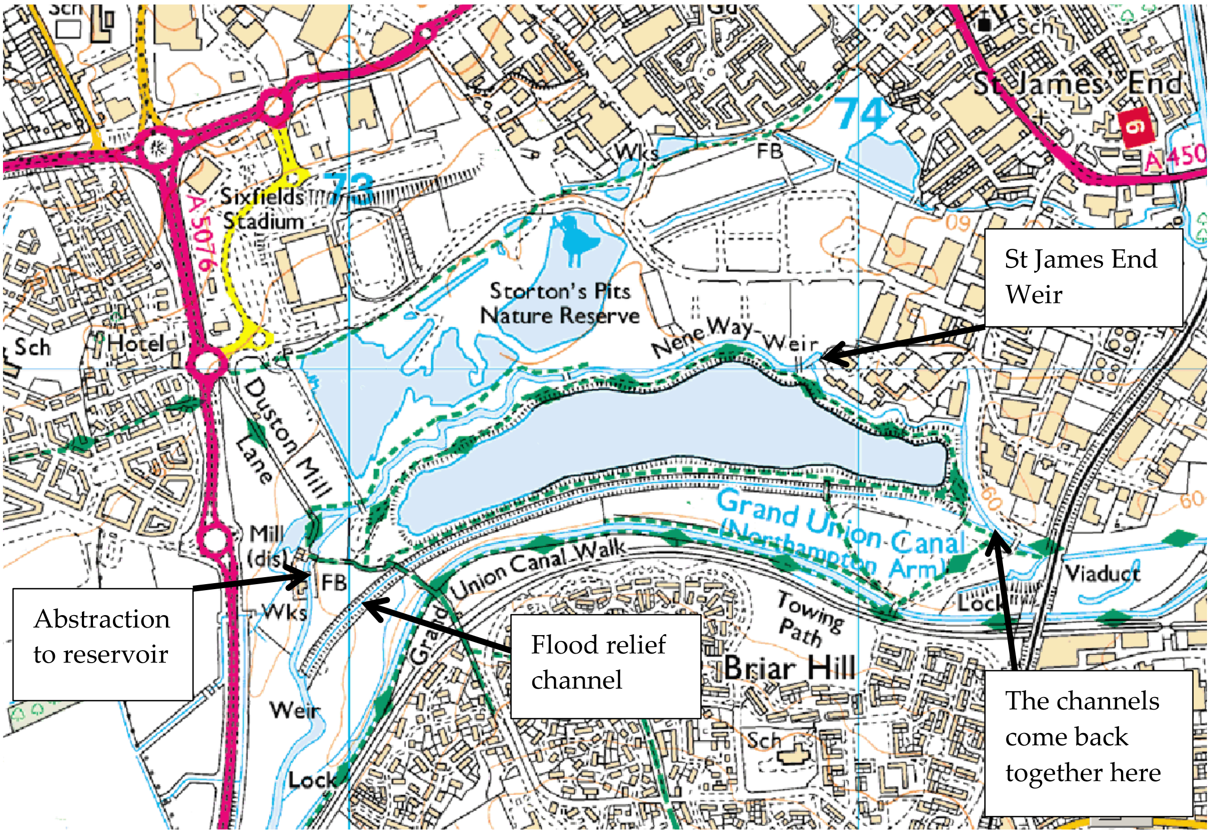


Figure 1: Duston Mill site map (Map copyright of Ordnance Survey)

One weir cannot be removed as it provides the head for water abstraction, but there is a proposal to either remove, lower, bypass or put a notch in the downstream weir, at St James End. This will bring about a faster flowing habitat to the 1.2km of river immediately upstream of the weir. It is estimated that approximately 2000m^3 of silt lies on the riverbed in that stretch. This silt will have to be managed in some way before any works take place on the weir: the silt could be mechanically removed and either taken to a tip as waste or, once water levels in the river have been lowered, be used to create habitat features within the channel. Alternatively, however, the silt could be left alone and simply allowed to be transported downstream through normal river processes. As the weir currently impounds a large volume of water, any works to reduce or remove its impact will have an additional benefit to flood risk, as channel conveyance and capacity will be increased.

If St James End Weir cannot be removed or lowered, an alternative option for habitat improvement will be adopted. The impounded channel will be narrowed by between a third and a half, by excavating much of the right bank down to just above the water level and placing the spoil into the river. Hazel spiling with a geotextile lining will be used to retain the spoil and, as the features will lie just below the water level, they will form wetland berms, therefore further diversifying the habitats on site. On occasion, the berms will lie in sequence on alternate sides of the river, adding sinuosity to the channel. The underwater berms will not reduce channel capacity as the spaces they will occupy are where the water is currently effectively static. However, the excavated banks will increase flood storage and protection for the urban areas downstream.

Figure 2: St James End Weir on the River Nene © R S Brayshaw Ecological Consultancy

Unusually, even during "normal" flows the flood relief channel takes more water than the main river. Whichever of the above improvement options is taken, it is also hoped that the weir that controls the apportionment of flows will be altered to allow more to remain in the river, although that could have implications for the effectiveness of a third (normally dry) channel that takes flood flows to a retention lake.

Participants will have the opportunity to give their views and opinions on the enhancement options to remove the weir to reinstate normal river processes or to narrow the watercourse and introduce more morphological diversity.

SITE VISIT INFORMATION: SITE 1B

SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS)

UPTON MEADOWS

(WEDNESDAY 1ST MAY 2013)

Phase I of Upton Sustainable Urban Extension commenced 2003 and when completed it will contain over 1,600 homes, a primary school and an area for new business along the A4500 (Figure 1). Upton Meadows was one of the first developments in the UK to masterplan an integrated 'roof to river' surface water management strategy. A variety of measures were installed including green roofs, porous paving, rainwater harvesting, swales and a series of retention ponds. Dr Janet Jackson at the University of Northampton has been monitoring and collaboratively researching the development since 2003. Both Undergraduate and Postgraduate students use the site for their projects and dissertation. Current research projects include:

- biodiversity values, ecosystem health and ecosystem services of SUDS
- SUDS performance - sediment transport - heavy metals
- SUDS Management
- Bio/phytoremediation and entrapment/phytofiltration
- Community Health and Well Being
- Community education and enterprise

Partners include: Homes and Communities Agency, The Prince's Foundation for Building Communities, Halcrow, Aviva Insurance, Sustainable Construction INet, Universities of Nottingham, Loughborough and Leicester, Zedfactory, Microdrainage and Pell Frischmann.

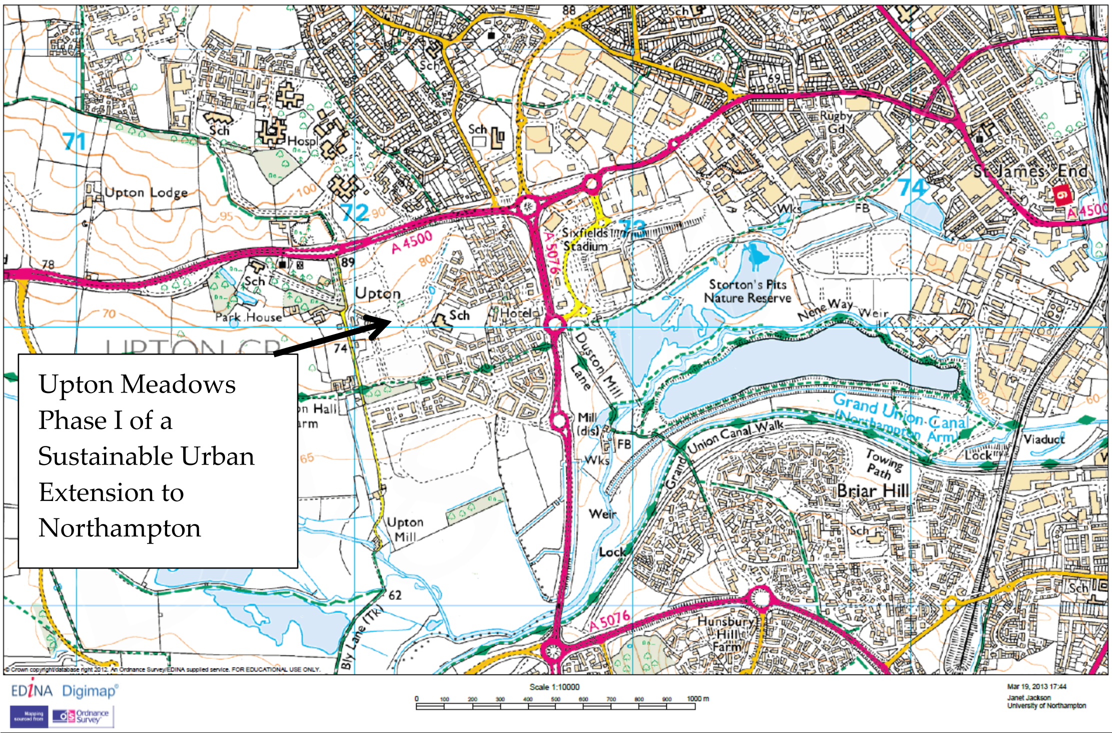


Figure 1: Upton Meadows site map (Crown Copyright Ordnance Survey; supplied by Edina 2013)

The development contains two hydrological catchment units. SUDSA drains to the River Nene towards the south-east of the site and SUDSB drains down toward Upton Mill to the south of the site (Figure 2).

Research thus far has revealed a biodiversity gain through development on this ex-arable site.

Man-made SUDS have been colonised naturally and rapidly. The ecology of SUDS is dynamic and natural succession does occur.

From a recent survey in December 2012 we found that 89% residents felt that SUDS added value; improved their Quality of Life and made the development a healthier place to be. 91% used the green space regularly with 57% using it every day or every week.

During the tour we will have opportunities to discuss and debate the use new urban habitats to control of surface water run off, pollutants and urban sediment.

Figure 2: Map of the Upton Meadow SUDS schemes A & B

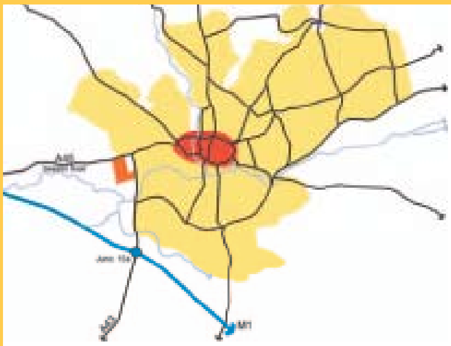
For further information please contact:
Dr. Janet Jackson
University of Northampton
School of Science and Technology
Newton
Northampton, NN2 6DJ

Upton
Northampton
Site A

Sustainable urban drainage system (SUDS) is integrated with the street system.

Basics

- English Partnerships (the landowner) is leading the development of the site in partnership with Northampton Borough Council (the planning authority and highway authority) and Northamptonshire County Council (the highway authority when code was produced).
- Site A, comprising 220 units on 3.7 hectares, is the first completed phase of Upton, a 1220-dwelling, south-western extension of Northampton.
- Construction of Site A began in 2003 and completed in 2007. The developer is Paul Newman Homes.
- Tenure mix – 22 per cent per cent affordable units are pepper-potted throughout the scheme.
- Gross density – 58 dwellings per hectare including sustainable urban drainage system (SUDS) and landscaped areas.



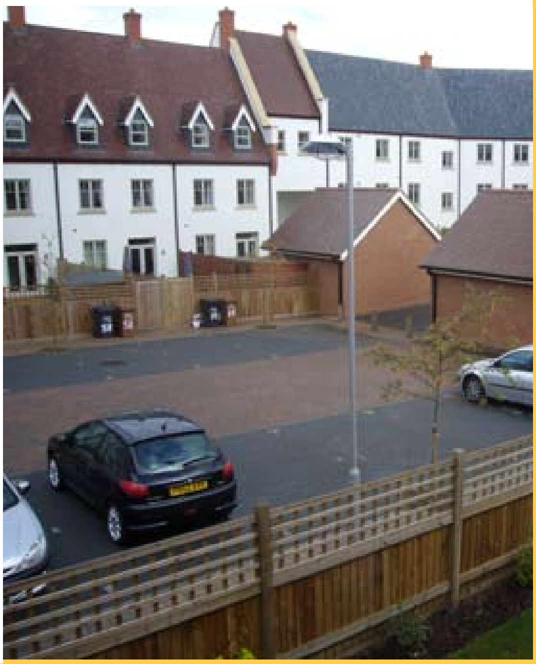
Northampton town centre
Northampton built up area
Upton site

Above: Site location in relation to Northampton.
Below: Central courtyard – semi public space entered from public streets or lanes.

Objectives and guiding principles of the scheme

Key aims included the integration of all movement systems in a connected network across the site; the provision of a variety of housing types and tenures at higher than usual densities for this type of location; SUDS to be integrated with the street system; and a hierarchy of street types which are the basis of a character area framework which achieves a legible environment in which all public and semi-public spaces are highly visible. For each of a number of defined street types, the code defines carriageway dimensions, sightlines, and the type of boundary arrangements with adjoining dwellings.

Car parking has been provided at an overall ratio of 1.5 vehicles per dwelling - some dwellings, such as sheltered housing, will have a lower ratio; larger dwellings will have a higher allocation. The single allocated space is provided in the rear courtyards or in garages, the unallocated spaces on the streets, lanes or mews.



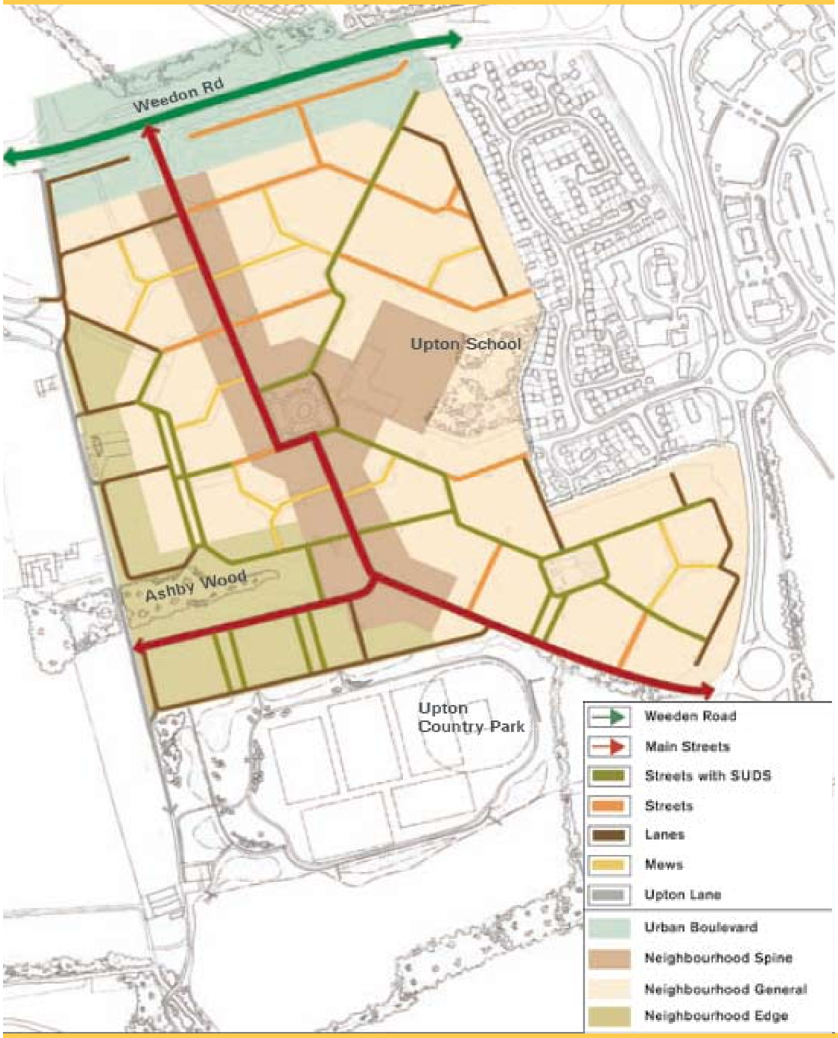
Particular features of the development

The project demonstrates how a high-quality public realm design can be achieved by volume housebuilders through adherence to the principles of a code and careful monitoring of the implementation. Furthermore, a high environmental performance can be achieved by 'normal-looking' houses. This scheme of apartments and houses was designed according to a design code produced by a partnership of landowner and local authority interests, who also provided advanced site infrastructure. The code lays down the details of the public spaces but is much less prescriptive of the architecture, so later stages will have a different appearance. Where site A, the 'Upton One' development by Paul Newman Homes, is in a traditional 'Georgian' style, site C (by David Wilson Homes and HTA Architects) will be more modern. Site B (Cornhill Estates and Fairclough Homes) manages the transition between the two.

Flood attenuation measures are a strong landscape component. Car parking courtyards and many of the adoptable lanes and mews have permeable blockwork paving to store run-off. Rainwater then passes to a piped drainage and swale system close to the housing.

Above and overleaf: Car parking has been provided with an overall ratio of 1.5 vehicles per dwelling, with unallocated spaces on the streets, lanes or mews.

Masterplan showing street types.



Process

The first planning application was made in 1997 for a scheme based on cul de sacs off distributor roads and local services at its centre. In 2001 English Partnerships, the landowner, together with the Prince's Foundation and Northampton Borough Council, which constitute the members of the Upton Partnership, conducted an enquiry by design exercise, which resulted in a radically different proposal which formed the basis of the urban framework plan (UFP) on which the code is based.

The UFP differs from the earlier plan because of its connected network of streets and the shifting of local facilities - except the primary school - from to the edge of the new development, where it will create a link with adjoining neighbourhoods and integrate with the rest of Northampton.

The code is realised through a bi-monthly steering group, made up of representatives from Northampton borough council officers and members, English Partnerships, the Prince's Foundation, Upton Parish Council and residents. Consultants are retained as advisors, while a working group assesses developments against the code every week or fortnight.

For any application, there is a two-stage tender process: schemes are evaluated against the design code and the brief before shortlisting, detailed design submissions and land value bids. Selection is made on the basis of 70 per cent per cent for design quality and 30 per cent per cent for land value. Each phase has achieved planning permission within eight weeks, thanks to the design code.

Outcomes

The connections within the scheme work well already. Even though the adjacent phases are not finished, the block structure offers alternative walking and cycling routes to the recently opened primary school. The connections to the adjoining existing housing work less well. There are pedestrian and cycle links but no vehicle connections – space has been left for these once hostility from the existing inhabitants has subsided. It has been reported that satellite navigation systems direct vehicles to Upton through the cul de sac scheme and they then have to reverse and find their way out. Therefore, paradoxically, this lack of connection might be more of a nuisance to the existing house owners than a proper vehicle connection. There are no pedestrian connections across the A45 Upton Way which runs along the eastern edge of the site, and the exit from this side does not enjoy the same degree of surveillance as the rest of the scheme.

Surface water from adopted streets (responsibility of Northampton Borough Council) and from buildings (responsibility of Anglian Water) is discharged into the SUDS. These performed well in the floods of summer 2007.

Lessons for elsewhere

While codes tend to be regarded as an automatic route to the production of a quality environment, Upton demonstrates that there are other important factors to be considered:

- The continuing involvement of the landowner in the marketing, design and building of each phase of the project
- implementation through a housebuilder selection process, which puts a high priority on the quality of the design
- a monitoring system for the implementation of the project
- a reduction in the number of traffic signs and street markings tighter horizontal road geometry.

On the negative side, parking provision will probably be inadequate once all the dwellings in the first phase are occupied – this has been acknowledged by a higher provision being required in future phases.

Review by: Phil Jones Associates.
For inspiration visit:
www.cabe.org.uk/streets

Images: Ivor Samuels

Additional Notes – Site Visit 1

The delegates could appreciate the complex nature of the watercourses in this area, and the role each plays in reducing the flood-risk to Northampton. Work in any one channel will have a direct effect on the conveyance of water in the others.

At Duston Mill, the general consensus of the conference delegates was that the preferred option was to remove the weir (photo below), as this would enable fish passage, restore natural processes and reduce flood-risk. Several delegates stated that they had carried out weir removals in rivers of very similar discharge and gradient, and no major problems such as lateral migration had occurred.

It was also suggested by several people that the tilting-weir controlling the flow of water down the flood relief channel ought to be adjusted, so that more flow remains in the natural course of the river. However, flow-gauging takes place just upstream of the weir, and any alteration of the structure will interfere with long-term flow-gauging records, making the prediction of flood-risk less certain. Data could be re-calibrated to take account of the newly-raised water level, but the EA Hydrometry team would have to be convinced of the overall benefit.

Since the site visit, funding constraints have meant that a reduced version of the channel narrowing option is being pursued. The aim of the habitat improvement project is now to create two each of the bank excavation areas, channel in-fill (wetland berm creation) and riffle / glide areas.

Site visit delegates also visited Upton Meadows, a sustainable urban extension scheme which started in 2003. The photograph below shows Dr Janet Jackson (University of Northampton), describing the multiple faceted project to conference delegates.

Site Visit Information: Site 2

River Bure Diversion

Bicester Town Centre

(Wednesday 1st May 2013)

The River Bure, or Bure Brook as it is otherwise known, is classified as an Environment Agency Main River and flows through Bicester town centre. In the 1970s the river was diverted and canalised at this location as part of the Manorsfield Road construction. In 2004 Cherwell District Council formed a partnership with Stockdale Land and Sainsbury's to regenerate a 3.9 hectare car park site in the centre of Bicester. In order to enable this development at Bure Place, it was originally proposed to culvert a concrete section of the main river. However, concerns were raised that this would increase flood risk and the maintenance requirements at the site, as well as inhibit biodiversity. As such the development partnership sought a solution which allowed them to maximise the land available for development whilst offering flood risk benefits and significant environmental improvements.

The decision was taken to realign a section of the river as illustrated in Figure 1.

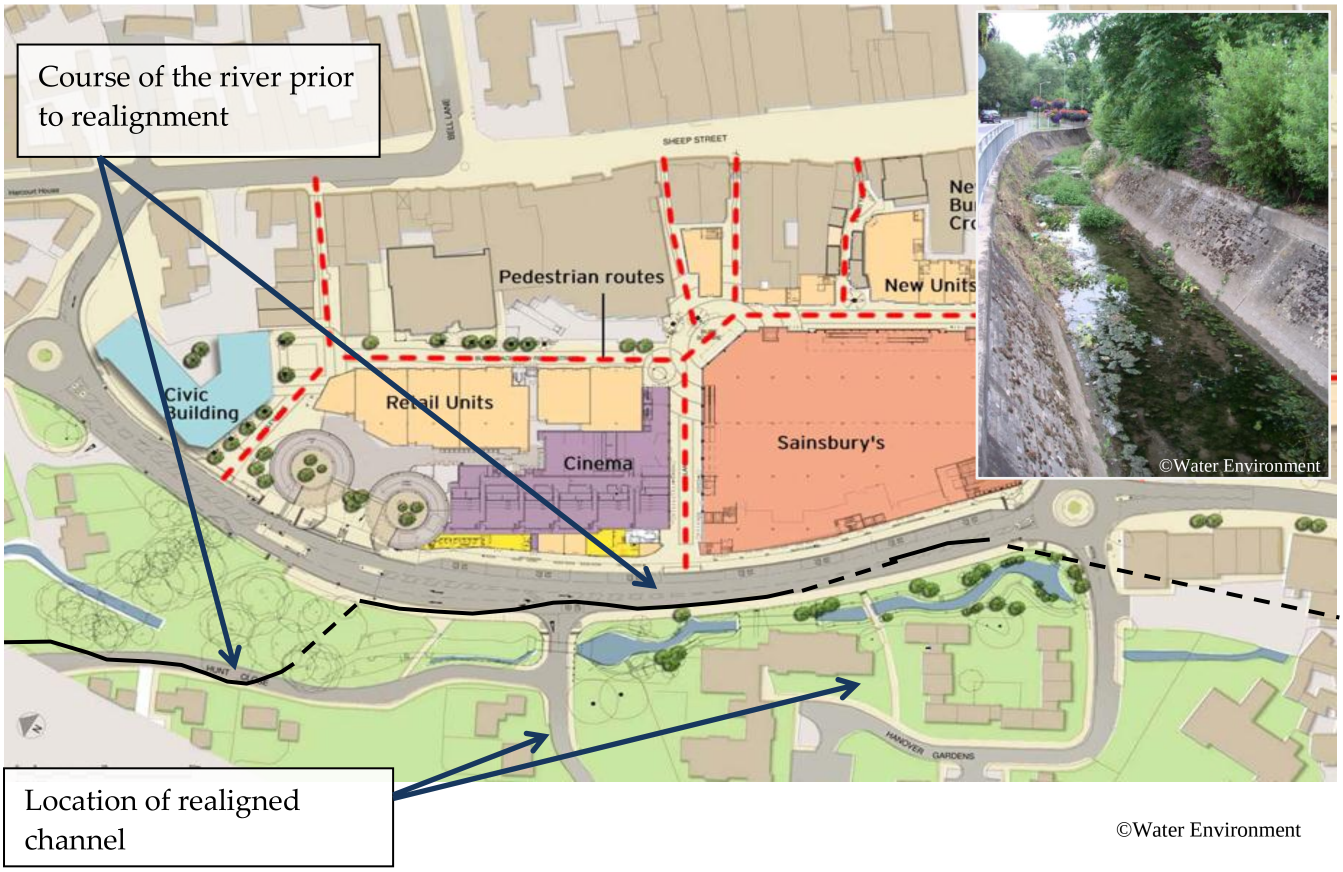


Figure 1: Outline of the proposed development at Bure Place, including location of the realigned channel. Inset: Pre works, canalised channel.

Following the initial concept of the diversion, two years were spent planning and developing the scheme and undertaking feasibility investigations. A Flood Risk Assessment (FRA) was carried out, including a ground investigation and hydraulic analysis. A hydraulic model was created to test the impact of the proposals and the new channel alignment was designed based on the outcome of this modelling. The channel design aimed to create a pseudo-natural environment, creating new habitats whilst working within the tight physical constraints of the site area. Following consent, the designs were developed further and construction started in 2010. The project was completed in April 2011.

Figure 2: The channel diversion during construction (top) and 2 years on.

Key features of the channel design will be discussed during this visit including; the combination of reinforced banks used, the removal and creation of outfalls, the diversion and construction of the new channel and culverts and the creation of in-channel features to create new habitat and varied flow regimes.

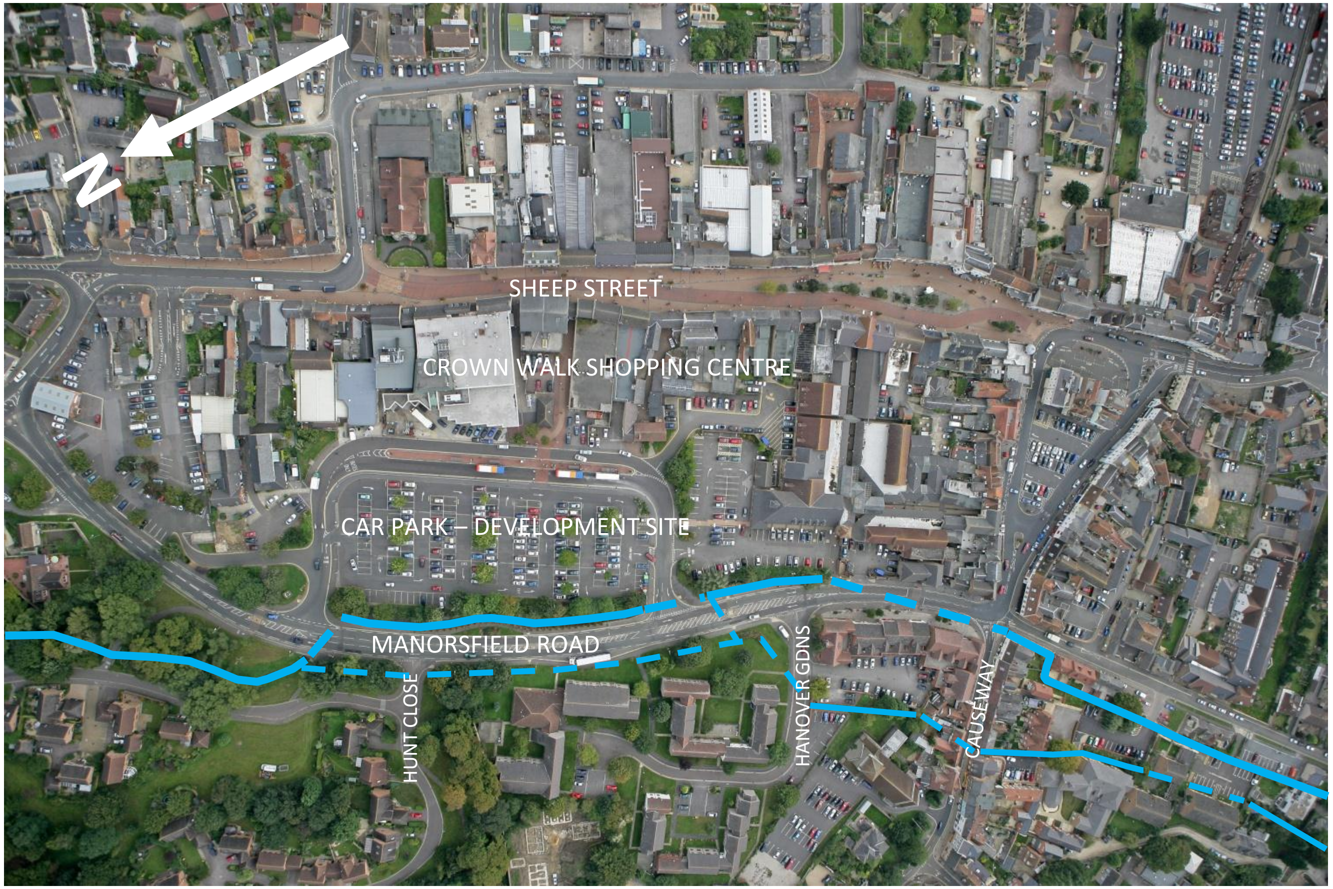
River Bure (Bure Brook) Diversion
Bicester Town Centre

Guy Laister
MSc Eng BSc Eng (Civil)
Specialist river diversion consultant

WATER | ENVIRONMENT

Project location

Bicester, Oxfordshire



WATER | ENVIRONMENT

Project Timeline

2004 : Cherwell District Council – tender for regeneration partner

2004 – 2006 : Concept development, Flood Risk Assessment

2006 : Environment Agency approval in principle

2007 : Planning Permission granted

2007 : Detailed design

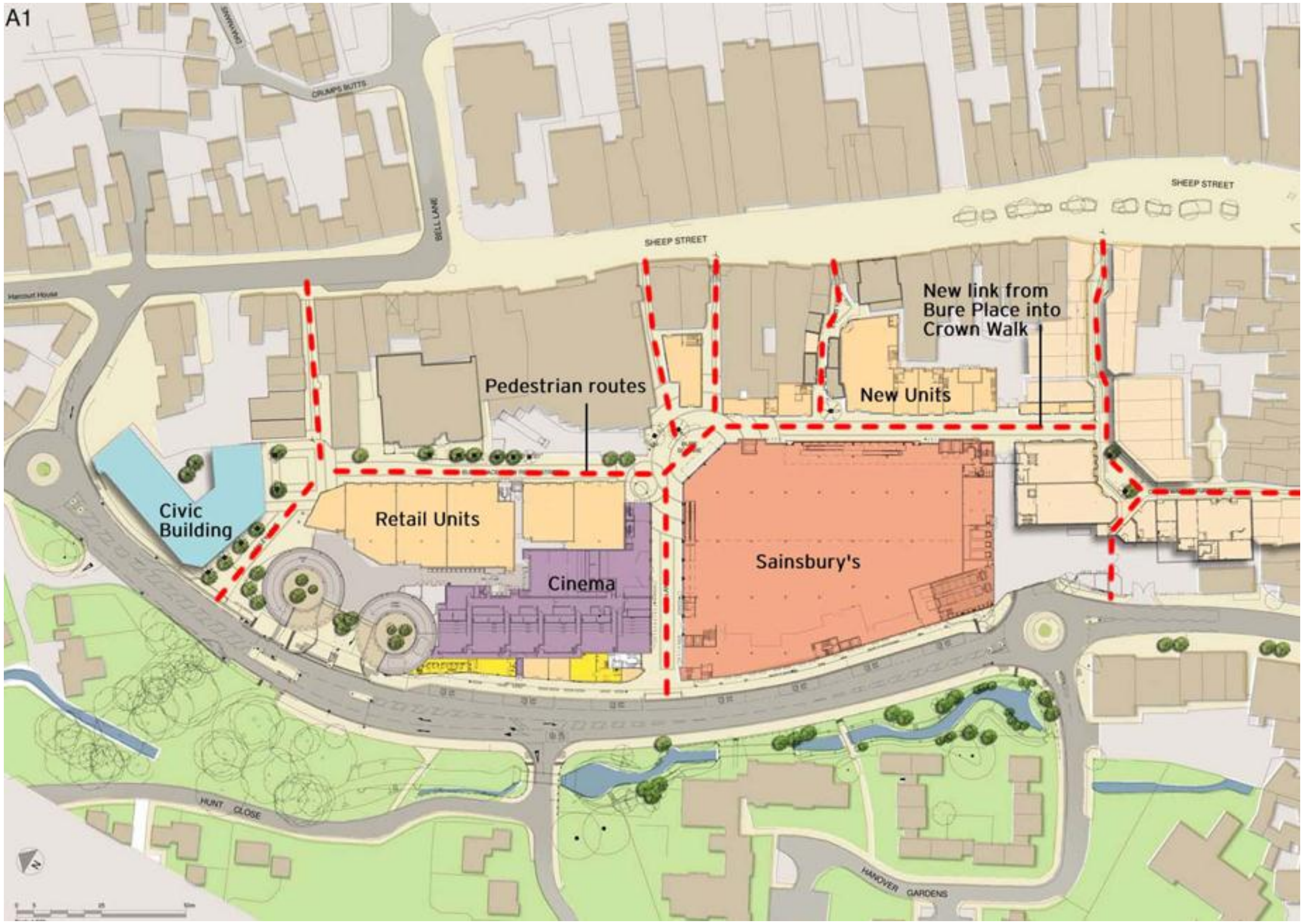
2007 : Environment Agency Flood Defence Consent

2010 : Contractor appointed and construction commenced (August)

2011 : Practical completion (April)

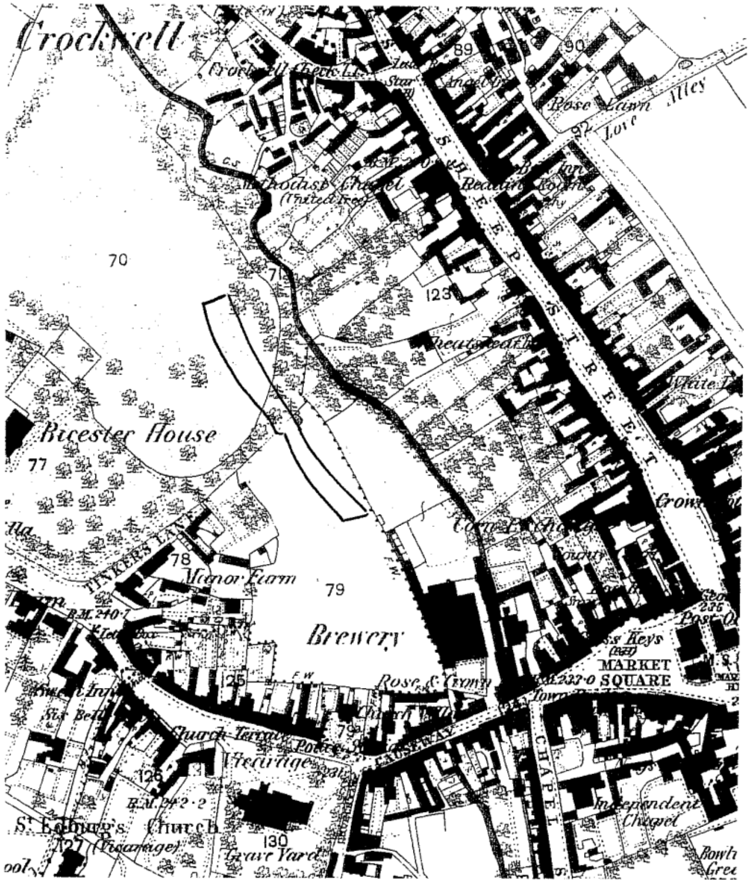
WATER | ENVIRONMENT

Proposed development

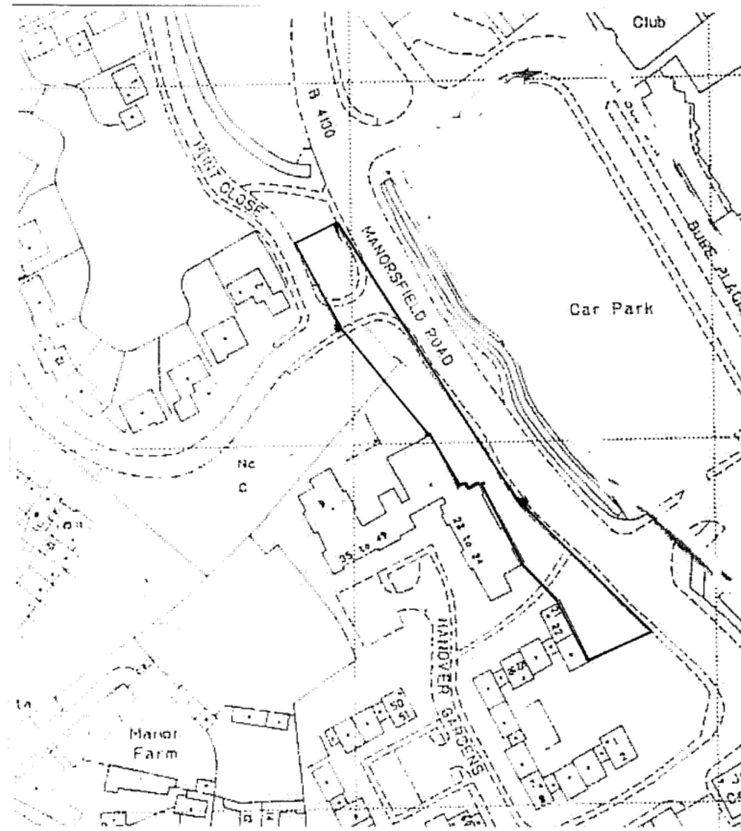


WATER | ENVIRONMENT

Historical records



1881



1995

WATER | ENVIRONMENT

Original layout

2004

WATER | ENVIRONMENT

Concept

Initial regeneration plans included culverting the watercourse

Revise regeneration plans, change in layout?

Alternatively :Divert River Bure – remove development constraint and fund channel improvements for better environmental solution

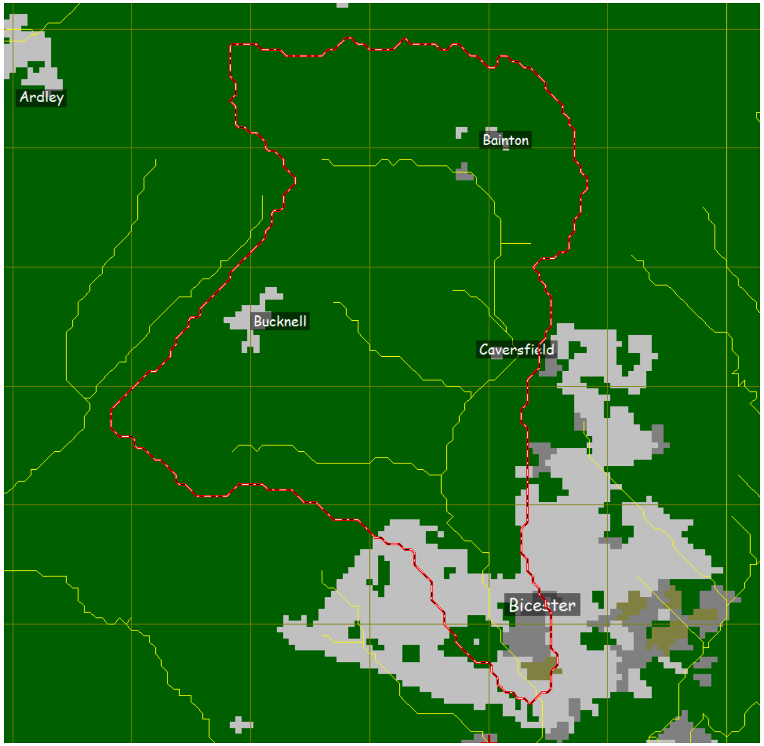
BEFORE

AFTER

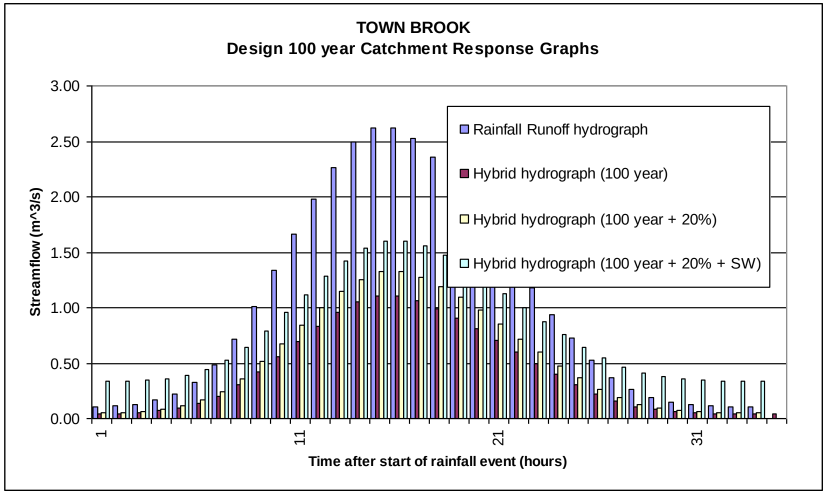
WATER | ENVIRONMENT

Hydrology

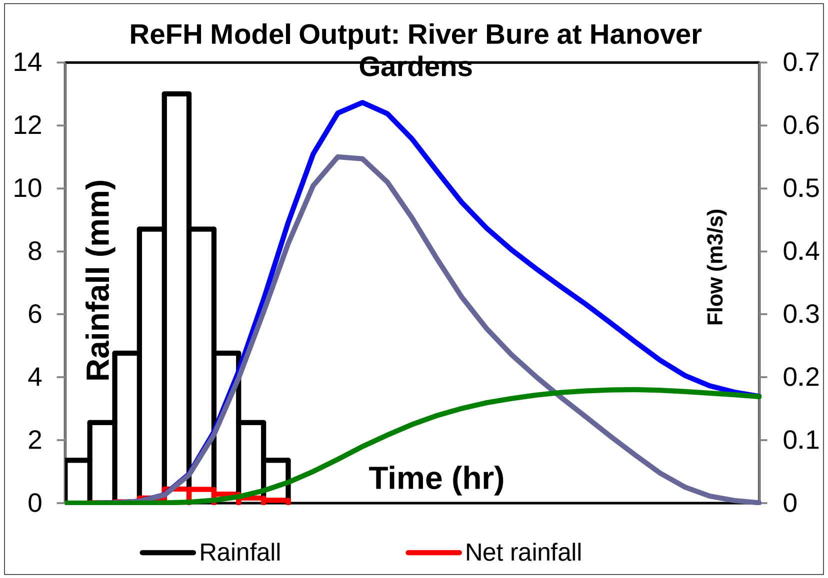
FEH



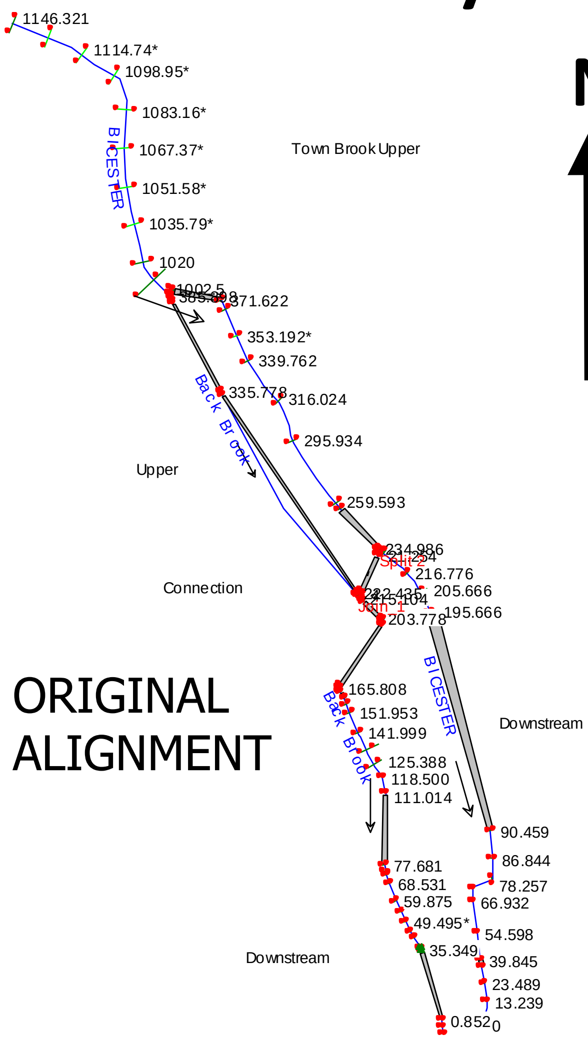
Rainfall-Runoff



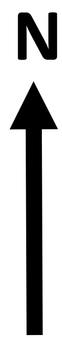
ReFH

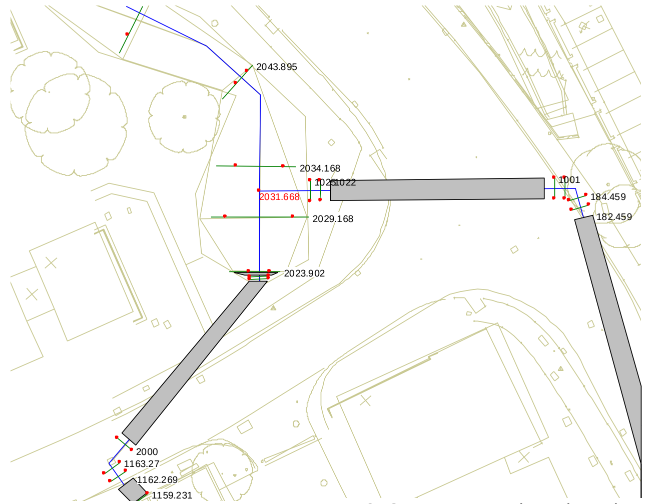


Hydraulic modelling

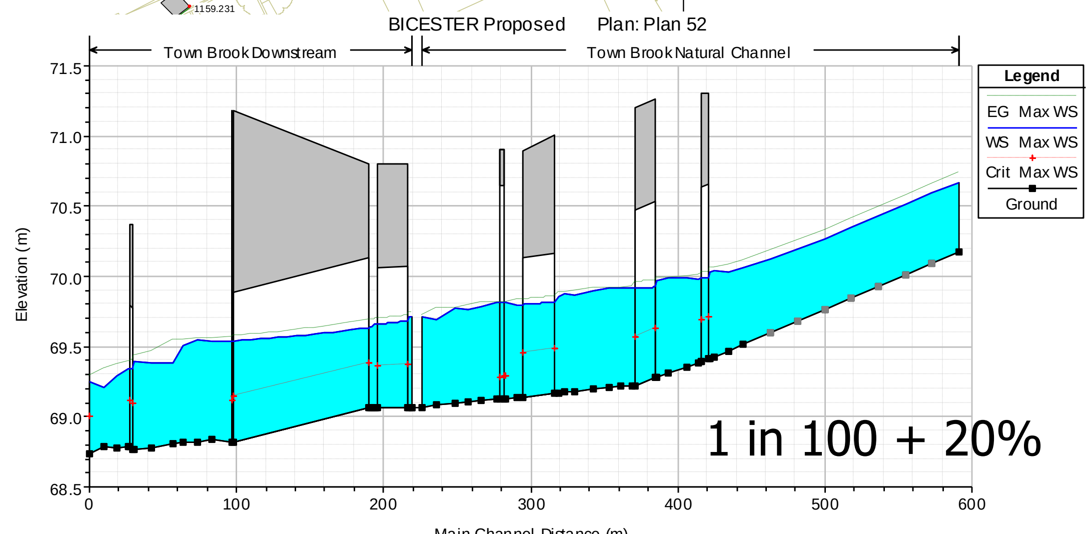


ORIGINAL ALIGNMENT



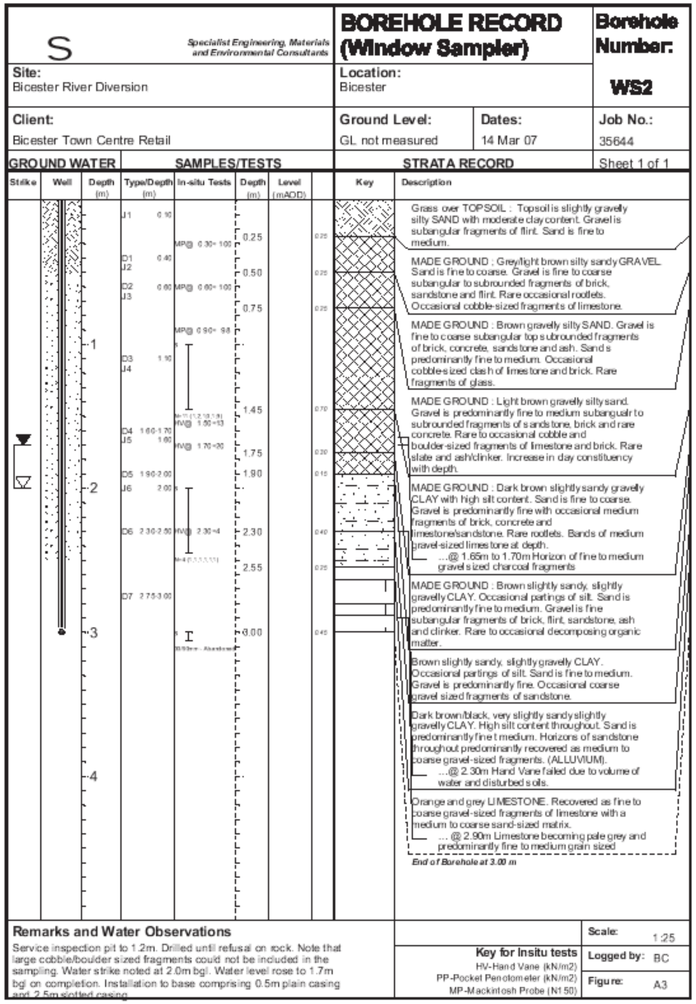


PROPOSED BIFURCATION



1 in 100 + 20%

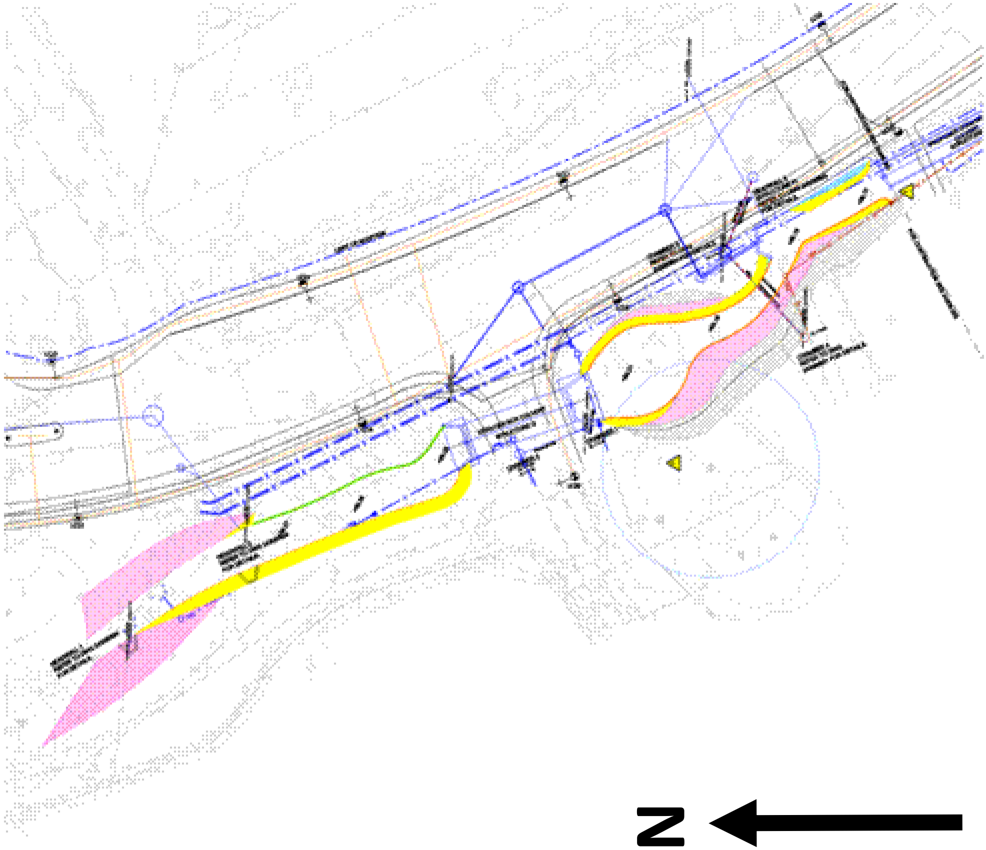
Ground conditions



- Topsoil
- 1.5m made ground
- 1m alluvium
- Cornbrash Formation (limestone)
- Water table at 2.0m bgl
- Hotspot contamination in the made ground and localised hydrocarbon in a single borehole
- Groundwater quality testing confirmed no impact

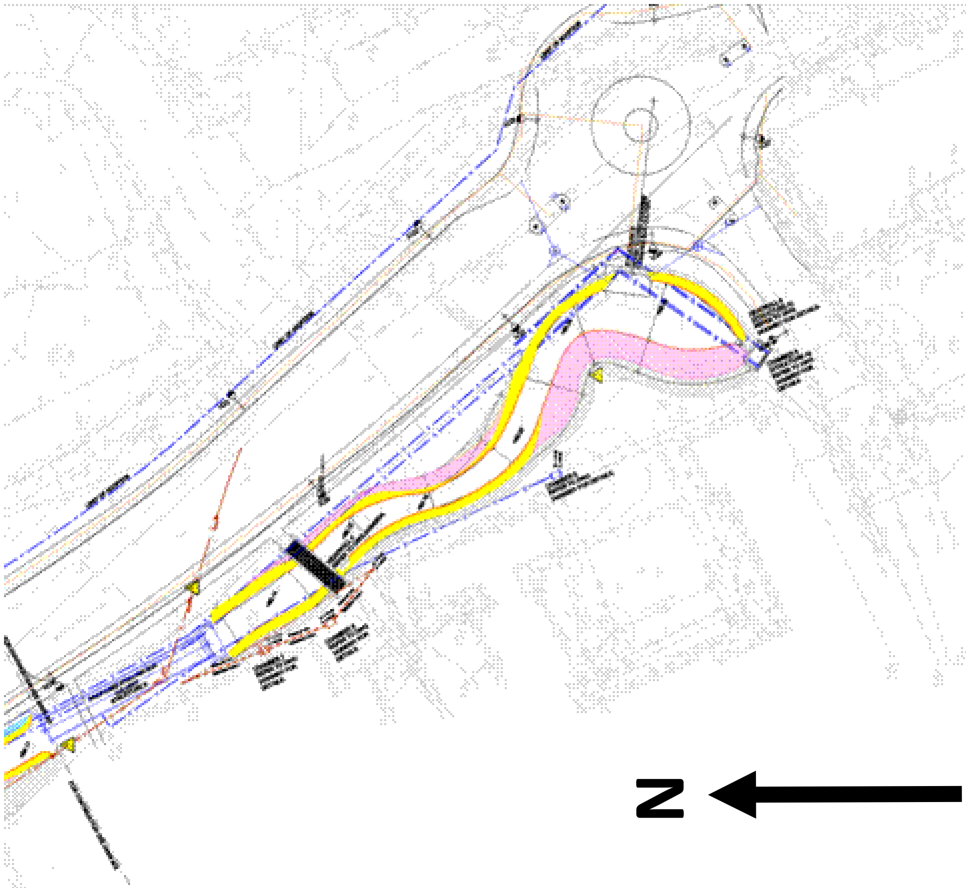
WATER | ENVIRONMENT

Detailed design - layout



WATER | ENVIRONMENT

Detailed design - layout

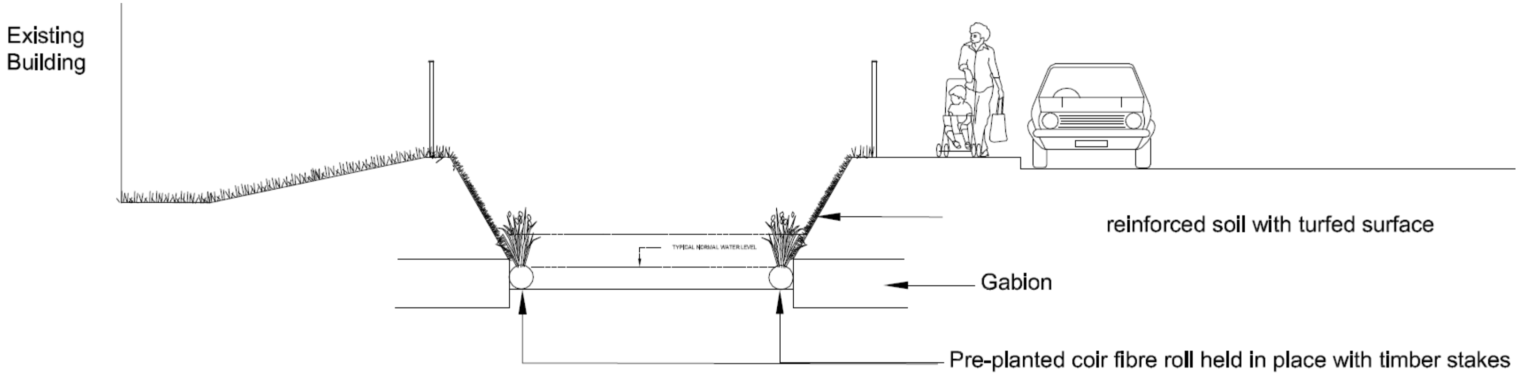


BEFORE

DURING

WATER | ENVIRONMENT

Detailed design – Sections and Landscaping



- Various bank profiles
- Impermeable liner
- Armoloc blocks
- Reinforced soil banks
- Coir Roll (pre-planted)
- Hydroseed banks

WATER | ENVIRONMENT

Detailed design - approvals

- Environment Agency Flood Defence Consent
- Approval in Principle (AIP) – Oxfordshire County Council (OCC)

Adopt all structures

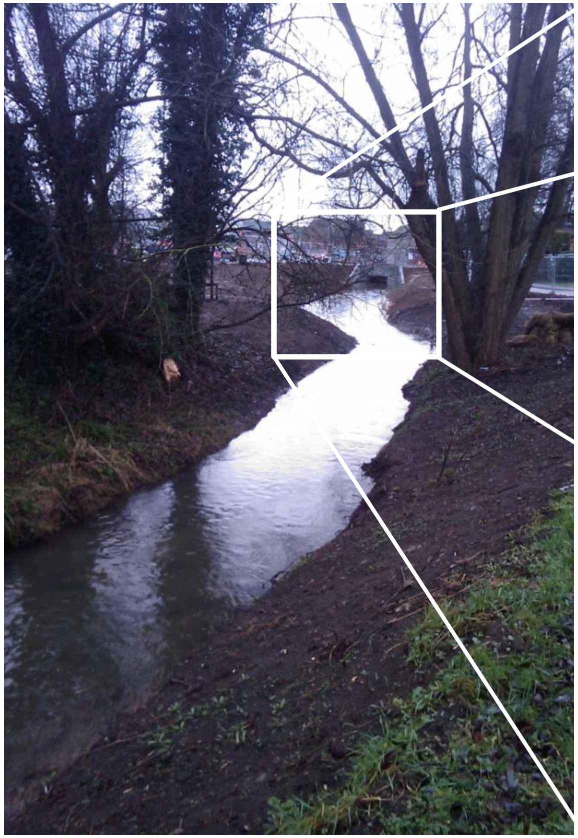
Design checked and amended to meet
- Highway standards
- Inspection and maintenance - Health & Safety
- Railings, grills and steps

Water Framework Directive
- Petrol Interceptors

WATER | ENVIRONMENT

Photos/Summary/Conclusions

View south at the upstream realignment, with previous channel alignment left, and the diverted channel in the middle and on the right (during and post construction)



WATER | ENVIRONMENT

Photos/Summary/Conclusions

WATER | ENVIRONMENT

www.WaterEnvironment.co.uk

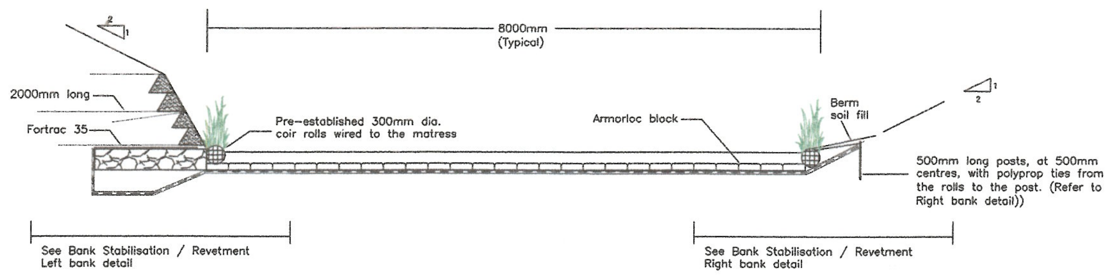
Water Environment Limited, Highland House,
165 The Broadway, Wimbledon, London SW19 1NE
Tel: 020 8544 8067, Fax: 020 8544 8068

Guy Laister

admin@waterenvironment.co.uk

WATER | ENVIRONMENT

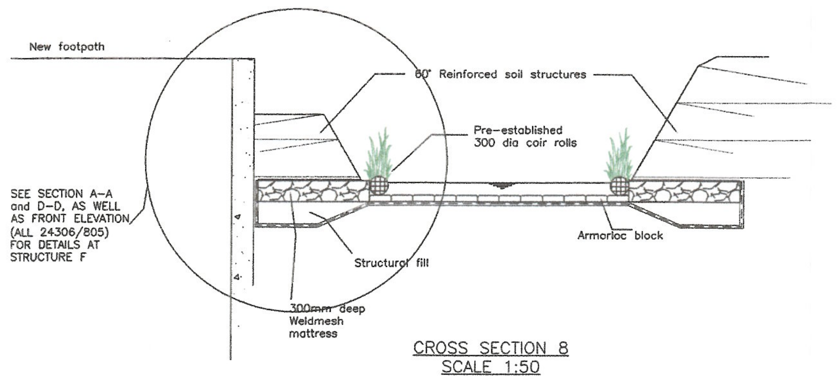
BICESTER TOWN CENTRE REDEVELOPMENT – CHANNEL CONSTRUCTION
BANK STABILISATION / REVETMENT



Note: To ensure viability of planted coir rolls, water level should be maintained by the bed level (Riffle) downstream of this section

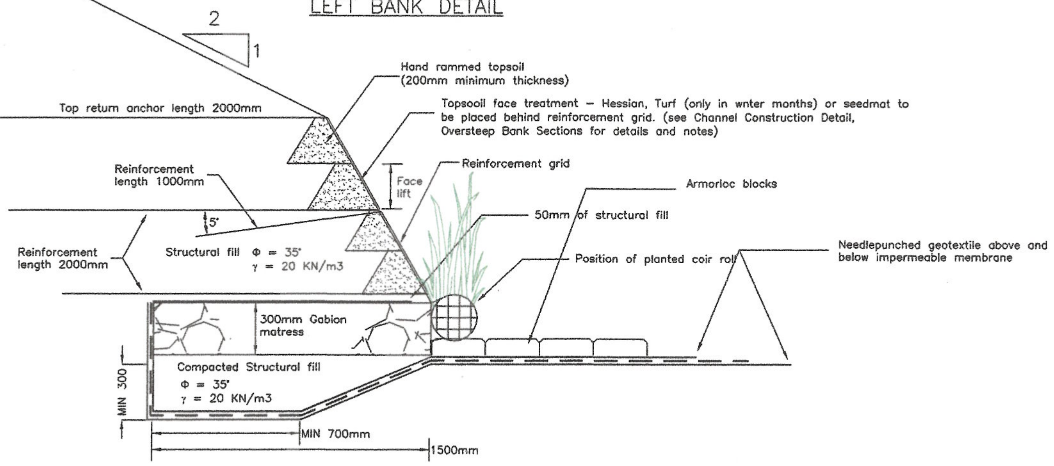
CROSS SECTION 5, 16
SCALE 1:50

BICESTER TOWN CENTRE REDEVELOPMENT – CHANNEL CONSTRUCTION
CONCEPT DETIAL FOR IMPERMEABLE MEMBRANE / PROTECTION



CROSS SECTION 8
SCALE 1:50

BANK STABILISATION / REVETMENT
LEFT BANK DETAIL



CROSS SECTION 5, 10, 11, 12, 13
SCALE 1:20

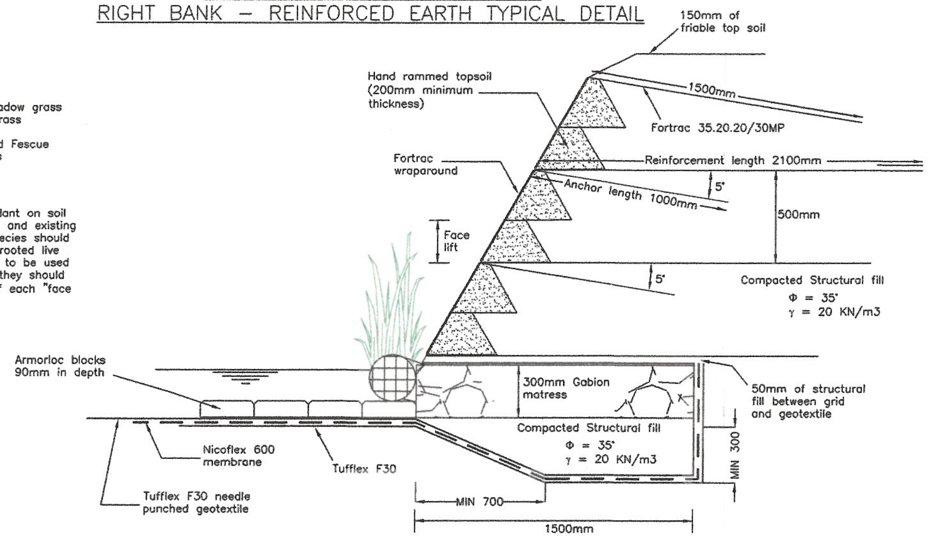
Seeds mixture:–
(Hydroseeding on hessian or within seed mat)

10% Perennial Ryegrass
10% Tall Fescue (RTF)
15% Smmoth stalked meadow grass
20% Flattened meadow grass
10% Hard Fescue
30% Slender creeping Red Fescue
5% Browntop Bent grass

100%

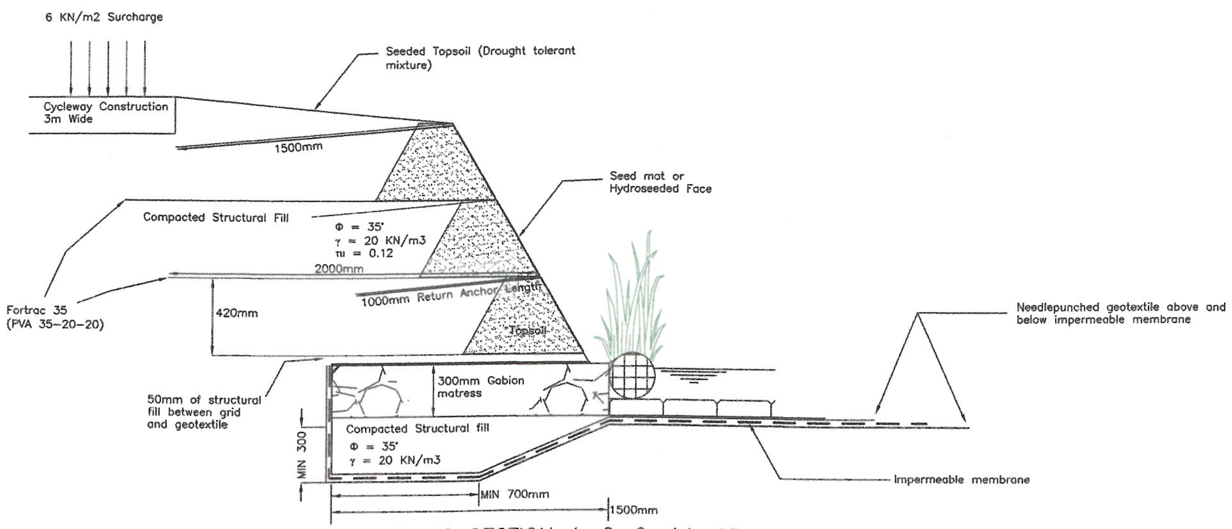
Seeds mixtures emplyed are dependant on soil type, aspect, proposed maintenance and existing indigenous species. The selected species should be able to withstand drought. If unrooted live cutting of various salix species are to be used within the reinforced soil structure they should be placed at the top termination of each "face lift".

CHANNEL CONSTRUCTION DETAIL
RIGHT BANK – REINFORCED EARTH TYPICAL DETAIL



CROSS SECTION 8 – 13
SCALE 1:20

CHANNEL CONSTRUCTION DETAIL
LEFT BANK REINFORCED EARTH TYPICAL DETAIL



CROSS SECTION 4, 6, 9, 14, 15, 16
SCALE 1:20

Armorlock blocks:–

The Armorloc interlocking reventment blocks are to be blinded with 5mm to 35mm angular gravel to achieve the required friction interlock.

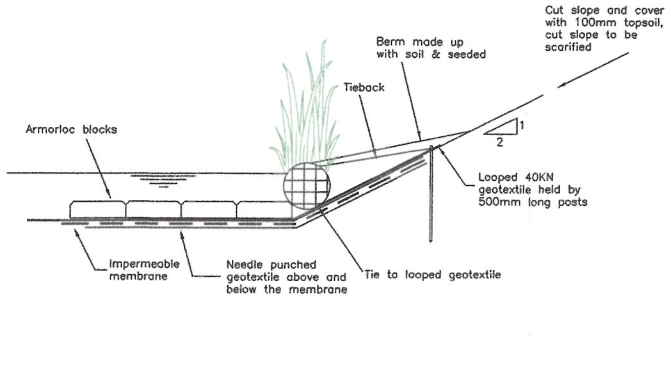
Coir rolls:–

To be wired top the Weldmesh gabions at 500mm

Reinforced soil:–

Compaction to be to Highway Specifications

BANK STABILISATION / REVETMENT
RIGHT BANK DETAIL



CROSS SECTION 5, 6, 7, 14, 15, 16
SCALE 1:20

CAD File Ref No

NOTES

1. Based on design by Riperian Revetments.
2. Do not scale drawings.
3. If soft clay is present at such a level that it is below the level of the underside of the gabion mattress it must be removed and replaced with a granular fill similar to that to be used in the reinforced soil construction.
4. For CDM Regulations 2007 Risk Assessment, see Drawing No.s 24306/301 and 24306/302
5. Watercourse to be constructed using bed invert levels as shown on 24306/301 and 24306/302
6. Construction to be in accordance with Technical Approval in Principle for the Design of Reinforced Slope at Manorsfield Road and Hunt Close.
- Base: Double twist woven gabion mattress with Class 6G slected stone fill on a geotextile separator. Galvanised Wire with HDPE coating.

Rev	Date	Amendments	Drawn	A'ppvd
G	07.04.11	AS-BUILT	GL	RGB
F	29.11.10	Notes amended to include reference to AIP documentation as requried by Design Check	GL	RGB
E	15.11.10	Overexcavated landscape ponds removed from scheme and note added regarding invert levels	GL	RGB
D	25.10.10	Detail for gabion mattress foundation amended as per John Grimes Partnership drawing 8641 SK1	GL	RGB
C	18.05.10	Risk Assessment notes amended	GL	RGB
B	07.04.10	Section references updated, additional detail added for left back Section 14/15	NM	GL
A	22.02.10	Risk Items added	GL	RGB

WATER | ENVIRONMENT

DESIGN DISCLAIMER
Drawing based on original design by Bettridge Turner & Partners.

Rev	Date	Amendments	Drawn By	Approved By

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Client
TOWN CENTRE RETAIL (BICESTER) LTD

Job Title
BICESTER TOWN CENTRE REDEVELOPMENT PROPOSALS

Drawing Title
CHANNEL REVETMENT DETAILS TYPICAL SECTIONS

Scale		DO NOT SCALE THIS DRAWING	Date
AS SHOWN			JUNE 2007

Drawn by	Date	Checked by	Date	Approved by	Date
DM	24.06.07	GL/CB	11.07.07	JS	16.07.07

Drawing No. 24306/808 — Rev. G

Site visit 2 – Additional notes

River Bure Diversion, Bicester Town Centre

- The catchment is predominantly rural upstream and Bicester does not have a significant flood history. As such flood risk management was not a key project driver. The restoration works did however increase capacity for the river, using a model to predict the potential impact of climate change in the technical design stage to accommodate for greater flow conveyance in future.
- The project team held monthly community consultation meetings with community liaison officers, representing local people. These were found to be very useful sessions as it allowed the project team to provide an update on construction of the restoration scheme and inform the public about forthcoming road closures/ disturbances.
- On the site visit, considerations that influenced the final restoration design were discussed. In particular it was suggested that the bank profile of the restored channel could have been re-graded shallower and the channel made more sinuous however the location of the road and utility services were constraints, limiting the area where restoration could take place.
- Maintenance was also mentioned given the accumulation of sediment and silt, particularly at the downstream end of the reach within Bicester. This is something that the local council and the Environment Agency are continuing to informally monitor, and discuss.

The restoration project has made significant improvements to the historic channel (above) in comparison to the photos on the pages that follow (all taken on the day of the site visit, May 2013).