

REALIGNING THE RIVER CHERWELL A PRACTICAL PERSPECTIVE

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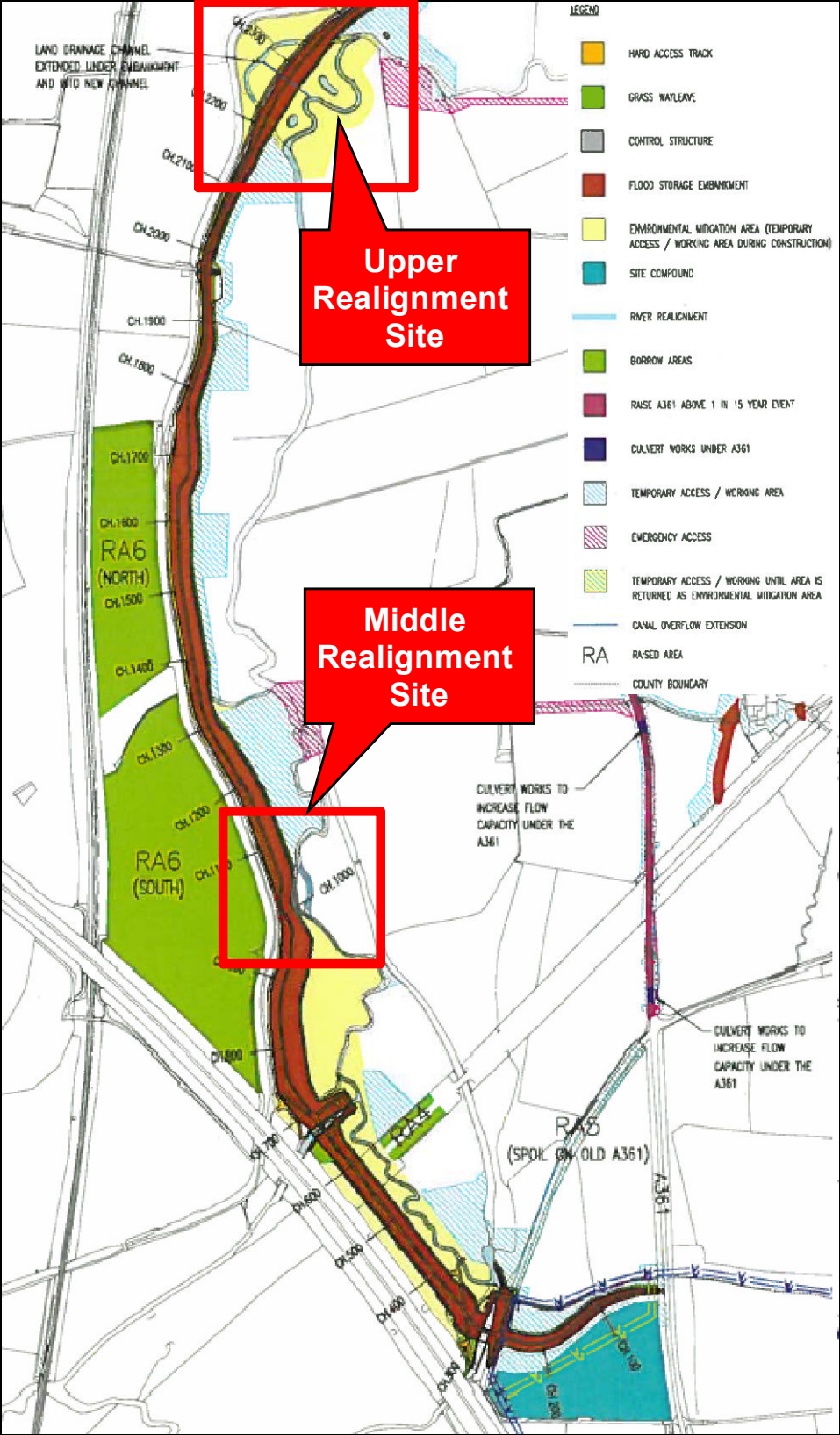


ABSTRACT

As part of the Banbury Flood Alleviation Scheme, sections of the River Cherwell, located near Banbury, Oxfordshire, were realigned to make room for the construction of a new flood embankment. This included two sections of the River Cherwell, referred to as the upper and middle realignments. Black & Veatch were responsible for developing the detailed design of the new realigned channel and taking them through to construction. Key objectives for the design included increasing the connectivity between the river and the floodplain; and provision of changes to the channel form that would be in line with high status morphological objectives under the Water Framework Directive.

A number of challenges were faced during the development of the design and during construction. The presence of an impounding structure downstream of the upper realignment posed a challenge for the design team, particularly in regards to the potential for the future removal of this structure, as a result a number of modifications to the cross-sectional planform of the upper realignment were made during construction. Buildability was another issue faced, particularly in regards to contractors experience and managing their perception of what was required during the construction of the new river channel.

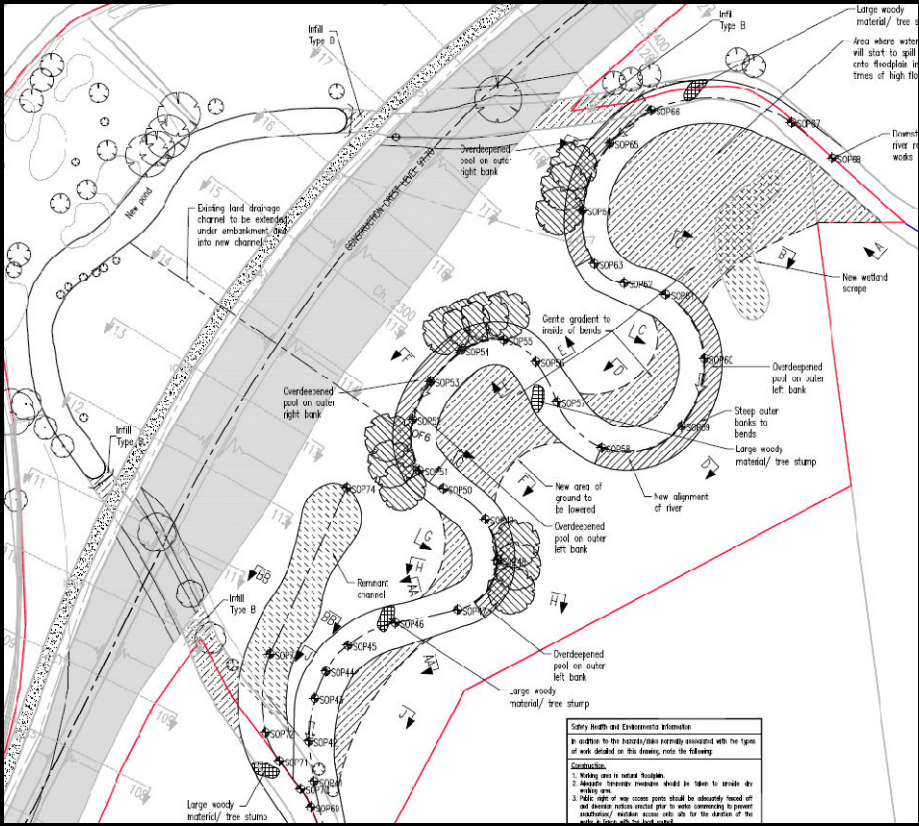
Further enhancements to the biodiversity and hydromorphology of the channel design were carried out during construction. Works on site included, 'roughening' the channel planform, localised channel narrowing and bed raising, and the translocation of aquatic vegetation. On site, supervision of enhancement works ensured that local resources were fully utilized, for instance, coarse woody debris (CWD) was identified and retained on site and reused within the channel to provide a more variable flow regime and to speed up the establishment of riparian habitat.



(1) Location of the River Cherwell realignment sites. Part of the wider Banbury Flood Alleviation Scheme.

UPPER REALIGNMENT

DETAILED DESIGN



(2) Detailed design of the upper realignment channel. The outline design of the upper realignment channel was undertaken by Kevin Skinner (Atkins), following previous work undertaken at Jacobs. The outline design was developed through to detail design by Black & Veatch. Previous studies including a fluvial audit of the River Cherwell were used to to inform the development of the design.

(3) Section of the River Cherwell channel prior to realignment (Source: River Cherwell Geomorphological Assessment and Design Advice. Feb 2011. Atkins).

CONSTRUCTION (JULY 2011)

(4) The contractors took the design rather too literally by regrading the banks to a perfect 1in5 slope with very smooth channel banks.



(5) Onsite supervision by a geomorphologist ensured the design was 'roughed up' a bit.

(6) A sediment bund was used to prevent any silt entering the original watercourse during construction.



POST-CONSTRUCTION (2011/2012)



(7) Aquatic vegetation was transplanted from the original River Chervell channel into the new realigned channel. The reedbeds in particular have established well.

(8) A backwater channel was constructed along the original River Cherwell channel.



(9) Course Woody Debris (CWD) was retained onsite and used to try and vary the flow within what is largely an impounded reach due to a downstream structure.

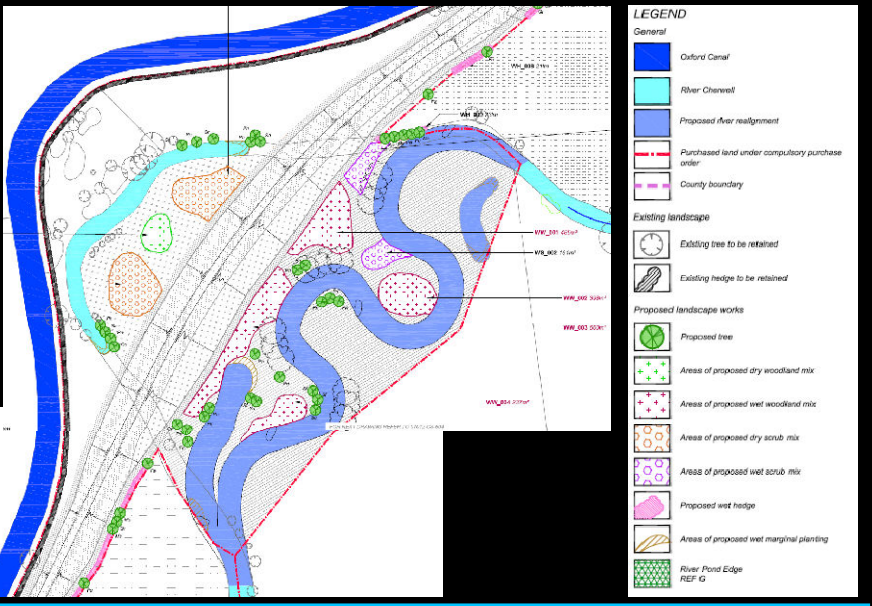


(10) More recent works have included the creation of wetland scrapes within the floodplain.



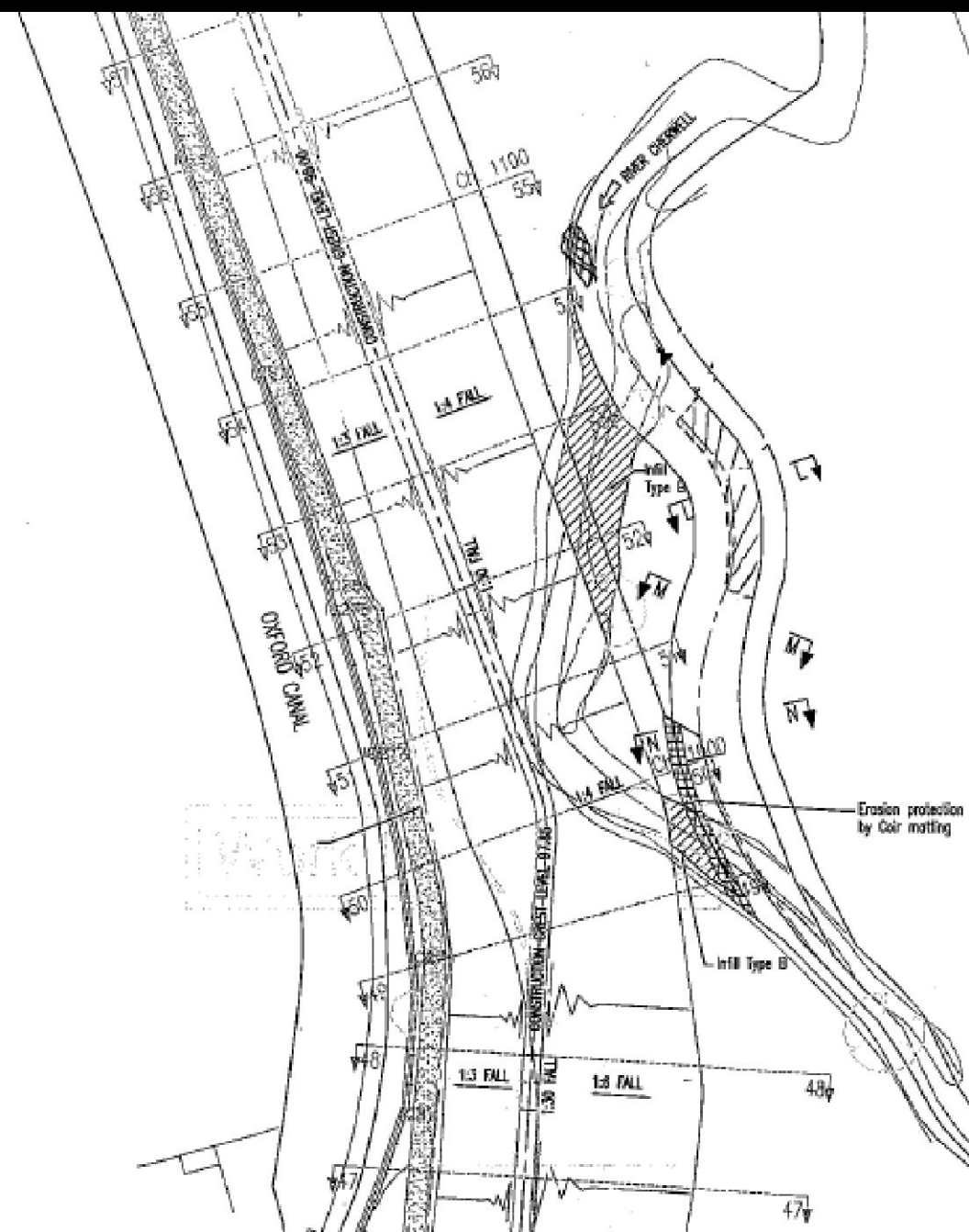
NEXT PHASE - 2012/2013

Tree planting and further landscaping will take place over the winter 2012/2013.



MIDDLE REALIGNMENT

DETAILED DESIGN



(11) Detailed design of the middle realignment channel.

The middle realignment was instigated to remove the need for a retaining wall on the downstream slope of the new flood embankment, due to the limited space available. This would have also meant that the river bank would have needed to be protected from erosion as it was close to the toe of the upstream face of the embankment.

CONSTRUCTION (JULY 2011)



(12a) Live CWD was identified and reused onsite.



(12b) First the branch was placed in the channel by the excavator.



(12c) A notch was cut from the reprofiled bank in which to place the CWD.



(12d) The skillful excavator driver was able to re-orientate the branch to ensure the live willow shoots were sitting above the water line.



(12e) CWD in place.



(12f) Aquatic vegetation was infilled behind the CWD to further narrow the channel.



(13) The channel was narrowed using sediment from the original channel and vegetation was transplanted onto the shallow berm. The channel was also locally raised using gravel sourced on site. The work has helped to vary the flow creating a nice riffle and pool sequence within the channel.

POST-CONSTRUCTION (2011/2012)



(14) Vegetation is starting to establish and grow on the new channel banks.



(15) View upstream along the newly aligned River Cherwell with the new flood embankment along the right bank. The realignment work prevented the need for any widescale revetment along the new flood embankment. Further tree planting is planned at the end of 2012/2013 will further enhance the new channel.

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