

## **KEY POINTS IN PLANNING A RIVER RESTORATION PROJECT.**

**This is a companion report to that on the river restoration project carried out on a stretch of the River Glaven upstream of Letheringsett Ford. This was the first practical river restoration project to be carried out by the River Glaven Conservation Group (RGCG), a voluntary body with a local membership. The project involved several different types of remedial measures, not all of which are as yet commonly done. Based on this experience, we set out a number of factors that were important to take into account when planning and implementing the programme of works. We hope that others embarking on a similar chalkstream project might find this report useful.**

### **TIME OF YEAR.**

Ideally the in-river work should take place in August and September for a number of reasons, but with some luck with the weather it can slip to September and October. There are a number of reasons for this. The meadows are likely to be at their driest and best withstand the working with heavy plant; this is the window of opportunity best suited for wildlife interests in general, and species such as the water vole and brown trout in particular; the river is likely to be at its shallowest and easiest to work in; transport of heavy materials is likely to be easiest in reaching the site general "holding area"; if part of an arable field is used as a base for this it can be after a cereal cropping (and in our case also for soil disposal).

### **TERRAIN AND LOGISTICS.**

One advantage of the site we selected was the use of local knowledge to ascertain how materials might be brought in and deployed to where they will be needed on site, in particular where heavy plant is to be used. Also in our case how heavy material (spoil) may be taken off site and where it can be disposed. For delivery of materials and other contacts it is a useful bonus if a team member lives close to the site.

### **THE LICENCE OF CONSENT.**

No work can start on the river itself until the application for consent is approved by the Environment Agency. Given the complexity of our programme and other special reasons our six week clearance time was unusually fast. It may be necessary to think in months rather than weeks. The preparation of the document itself for the Agency requires some specialist skills and time. Prior to this a pre-application site visit is likely to be very helpful and reduce rather than increase timescales.

### **OVERALL TIMESCALES.**

Build in the necessary time for obtaining the licence of consent and other necessary steps required before practical work can start, and then work backwards from August-September to give the overall timescale for the project in planning terms. It would be advisable to build in some allowance for slippage for the main steps so that the start of practical work is not delayed. In our case we were on a tight timescale from the start due to funding availability; the use of e-mail then becomes an absolute necessity.

### **PREPARATION WORK.**

Note that application processing time can be well spent on careful planning of the work, and taking this through to some preparation as regards the provision of materials to be used. The latter applies in particular to tree and woody materials as a source of large woody debris deflectors and coppiced hazel for the faggots, stakes, batons, pegs and brash that will be required. It is important to carry out studies on any protected species that might otherwise suffer inadvertently from the proposed works, such as water vole, otter and white-clawed crayfish. Water levels at selected points should be measured at least before work is started on a specific measure. When the measures are to be implemented, the works will proceed from downstream to upstream on the length of river selected.

## **SPECIALIST HELP**

The RGCG had the benefit of a specialist advisory visit in thinking through the concept in principle of “what might be done where” on the stretch of river selected. Given our (lack of) experience, and the unavoidably tight timescale, it was essential to enlist the aide of a specialist consultant in translating the concept into the practical work proposals and preparing the documentation for the Environment Agency. Also in our case, we needed the direction for the execution of the main practical work to be carried out.

## **INTERESTED PARTIES.**

It is imperative to ensure that all interested parties have been consulted and are supportive of the work planned: landowners or their representative, farmers, tenant farmers and land agents. This is best done between the advisory visit and the working out of the detailed plan of work to be presented to the Environment Agency. Notices should be displayed at site entrances to inform the public of the work before it starts.

## **NATURE OF THE WORK.**

River restoration work tends to fall into two broad categories; whether heavy plant and a consultant are required as well as the volunteers, or work that can largely be carried out by volunteers, working “in their own time”. Riffle and large woody debris (LWD) work are the most dependent on the “expensive” deployment of heavy plant and a consultant, and as the saying goes, “time means money”. The timing to bring together these, and making ready the materials required and perhaps also the hire of other equipment, has to be carefully co-ordinated to make best use of the resource.

The RGCG in making the riffles required the consultant who also played a very active part in the construction work, a tracked digger with operator, the hire of a dumper truck driven by the consultant, and the in-time delivery of the stone and gravel to the holding delivery area.

LWD also falls into the “heavy” plant and consultant category, but is simpler than the riffle work in that the trees can be cut and trimmed and kept out of the way but on site well before the time they are required. No dumper truck will be required, but a set of lifting chains are required. It is very useful, as in our case, if the digger driver also has a chain saw licence and can do felling, cutting and trimming of the trees, as well as moving them.

River narrowing, island creation and bank protection can all be done by hand labour. Preferably this is aided by some chain saw work for the coppicing of hazel (best), and the sectioning into stakes, batons and pegs, and for making up into faggots, while using the remaining brash as soft filling. The work can be carried out by one or more people, with some spread of timescale. It can be picked up and stopped again without undue detriment to the program of works, and can be fitted around more time and cost critical activities.

It is very useful to have a 4WD and trailer to take bulky and quite heavy woody materials to the positions where they are needed.

## **PLAN COMPLEXITY.**

Delays can be experienced, such as by a spell of wet weather, and in specific activities. The more complex the programme, and the level of interaction between activities, then the greater is the vulnerability to these and the chances of delays and the potential for something going wrong.

In our case we had planned two separate and parallel operations involving heavy plant work. The first was the RGCG work on riffles and LWD placements; the second the spoil bank removal being carried out by the Environment Agency team using a tracked digger and two dumper trucks. These could have operated quite separately, and any delay in one would not have affected the other.

However in this case we had embarked on a plan to recover stone and gravel from the spoil, and use this in the riffle work. This of course then linked the two operations through the production and supply of the stone and gravel.

Further the recovery of the stone and gravel introduced a third component into the equation; a riddler/grader machine, a digger to feed the spoil to this, and an operator to work both machines. To weigh against the value of the covered material was the cost at £500 a day to do this, and the uncertainty whether it would take 1 or 2 days depending on the weather and the dryness or otherwise of spoil in the separation process, and what the level and yield of stone and gravel in the spoil might be.

There was in fact a 2-3 week slippage on starting the spoil bank removal in mid September, with the approval of the licence expected (and obtained) then. This happened through two factors; the time to obtain the waste disposal exemption licence, and additional discussion with interested parties on the spoil bank removal. So the decision was taken that the project would have to start with "imported" stone and gravel to the site, and cleared with the Agency in this respect, rather than any import coming in the later stages in the programme to balance up the requirements.

In the final event, at the end of the first day of the Agency starting work by stripping off much of the bank vegetation and spoil surface, it was clear that the yield of stone and gravel would be low in relation to the need, and the riddling approach was abandoned; and the two main exercises unhooked. Following this some 80-90% of the larger stone was pulled out by hand as described in the "Construction" section above.

The idea of recovery by riddling was good in principle, but even if the yield had lived up to expectation, in a tight timescale there was little room for any delay. The moral of this story is to look hard at dependent interactions in a plan. Here they carried with them both a degree of uncertainty (on yield of stone and gravel and the cost effectiveness), and a timing interaction (provision of material for other planned work). And perhaps there are much simpler ways in getting some of the benefits sought, in this case the picking up of larger flints material by hand from the spoil and barrowing it to where required.

## **PLAN B.**

It is useful when planning the days work with "expensive" resource, such as with a consultant and heavy plant, to have a collective plan B on what else might be usefully done in the light of a delay in the expected delivery of material or equipment, or bad weather. We were fortunate that we did not experience any of these.

## **POSITION OF MEASURES TO BE CARRIED OUT.**

The more detail on the position of all works to be carried out makes it easier in making use of "before and after" photographs, and also the measurement of any changes in water levels in this respect. It has in addition other advantages, see below.

## **MATERIALS REQUIREMENTS AND COST CONTROL.**

In the case of riffle creation, the measurement of the river depth, width and the length of bank at the chosen location can give an indication of the tonnage of reject flint required for the specified item of work. The gravel requirement is largely independent of the depth. In our case, riffles 1-3 were set in water about 1 metre deep. Riffle 4 and 5 were placed in the river where it was about half a metre deep.

This knowledge is useful as regards pre-ordering, but perhaps more importantly as regards aiding project cost control. Stone and gravel are a large component in total costs, along with those for heavy plant and consultant charges. The length and of the riffles installed can provide some flexibility and a degree of contingency in delivering the main project aims within budgetary constraints, as it did in this case. Further it still leaves the possibility of extending a riffle at some stage in the future, either through further finance, or free flint and gravel and a wheel barrow and voluntary labour.

In our case we were fortunate (see the Costs table in the project report) in being able to purchase 60t of reject flint and 40t of gravel at half price from Cemex, and obtain a total of a further 55t of reject flint at no cost for the material itself. Gleaning with rake, shovel and wheelbarrow for gravel spill where heavy plant has worked on a riffle is a worthwhile recovery exercise as well as being part of the clearing up tasks.

RGCG, December 2006.