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# SITE VISIT INFORMATION

(FRIDAY 15<sup>TH</sup> APRIL)

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[Photos from the Friday site visits on the Rivers Tame and Sence](#)

## Croxall Lakes

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A very large proportion, if not most, rivers in lowland England have been re-sectioned to a trapezoidal profile with very steep banks with an angle of 1:3-4. This cross section can be self maintaining where the channels were specifically designed to be “self-cleansing” i.e. not to allow deposition of gravel and silt. These channels were based on keeping the narrowest existing river cross section and making the whole river to that width. It has therefore become clear that the only way to create self sustaining in-stream habitat is to widen channels in such places. This re-establishes a more natural variation in channel width. This is most easily done on the inside of bends where it is possible to mimic a natural tick shaped channel profile by pulling back the bank. It became clear that the key factor in this was to increase the channel cross sectional area very considerably to allow slowing of flow, deposition of gravels, resulting in raising of bed levels creating riffles and thus kick starting the process of self restoration. This is of course in addition to the directly created habitats.

### Earlier work at the site

#### Stage 1 (1997)

Along 400m of the Tame an underwater shelf about 4m wide was excavated to just below water level and the bank sloped back to an angle of 1:20 to a maximum of 30m at the point of the bend. The river in this reach had a very even width of about 25m before the works.

#### Stage 2 (2002)

It became clear that a larger increase in cross section at high flows would have been desirable. In 2002, the 400m of land between the river and the lake (an area of about 2.7ha) was lowered by 750mm. The highest point was lowered from 1.6 to about 0.85m above normal water level. The river height at bank full level was thus similarly lowered thus reducing velocity and thus increasing deposition on the bend. The soil was again put into the lake to create shallows.

#### Stage 3 (2008)

There was a 300mm pipe linking the pool at Croxall to the river. This was put in when gravel working on the site ceased. It allowed river water to enter and drain from the lake quite slowly, kept the lake level generally higher than the river and did not allow fish to move between the lake and the river. The poor in-channel habitat on the River Tame, combined with intermittent poor water quality events have retarded the development of sustainable fish stocks. To counter that the EA has created a series of “fish refuges/spawning areas” by linking pools to the river. In 2002 the pipe was replaced by a lower level open channel about 6m wide at bank top. This allows fish to enter and leave the pool and also lowered the lake level thus creating better shallows for waders.

### Lessons Learnt

It became clear that the restoration works could have been even bolder by lowering the whole of the bend down to lake/river level. This experimental work on the Tame at Croxall gave confidence that widening, combined with allowing river processes to work was an answer to the problems of poor channel structure in gravel rivers. This confidence was part of the background to the much larger scheme carried out by the Wildlife Trust on the Tame/Trent at Croxall.

## Latest Phase of Works at Croxall

The work was carried out by Nick Mott of Staffordshire Wildlife Trust in partnership with Lafarge Aggregates, Landfill Communities Fund, Natural England, The National Forest Company, the Environment Agency, Network Rail and May Gurney.

### Aims

The main aim was to recreate some of the habitats which were once common features along our main rivers prior to their modification in the 19<sup>th</sup> and 20<sup>th</sup> centuries. The river has been heavily engineered in the past and was once much shallower and wider. The project aims at allowing natural river processes to occur by widening the channel (to over 90m in some places) encouraging it to become active in terms of deposition and bed-scouring.

**Table 1 Scheme Summary**

<b>Works</b>	<b>Driver</b>
540 metres of river re-habilitation	(UK & LBAP Target for Rivers)
1.85 ha area of river widening	(UK & LBAP targets for creation of new wetlands)
1.2 ha of shallows created for new reedbed planting	
Approximately 40,000 cubic metres (80,000 tonnes) of soil was removed from the riparian zone and transported to the lake deposition areas.	Baseline surveys carried out for UK & LBAP (& other indicator) species
Baseline geomorphological survey carried out including a 1D Hydraulic model	

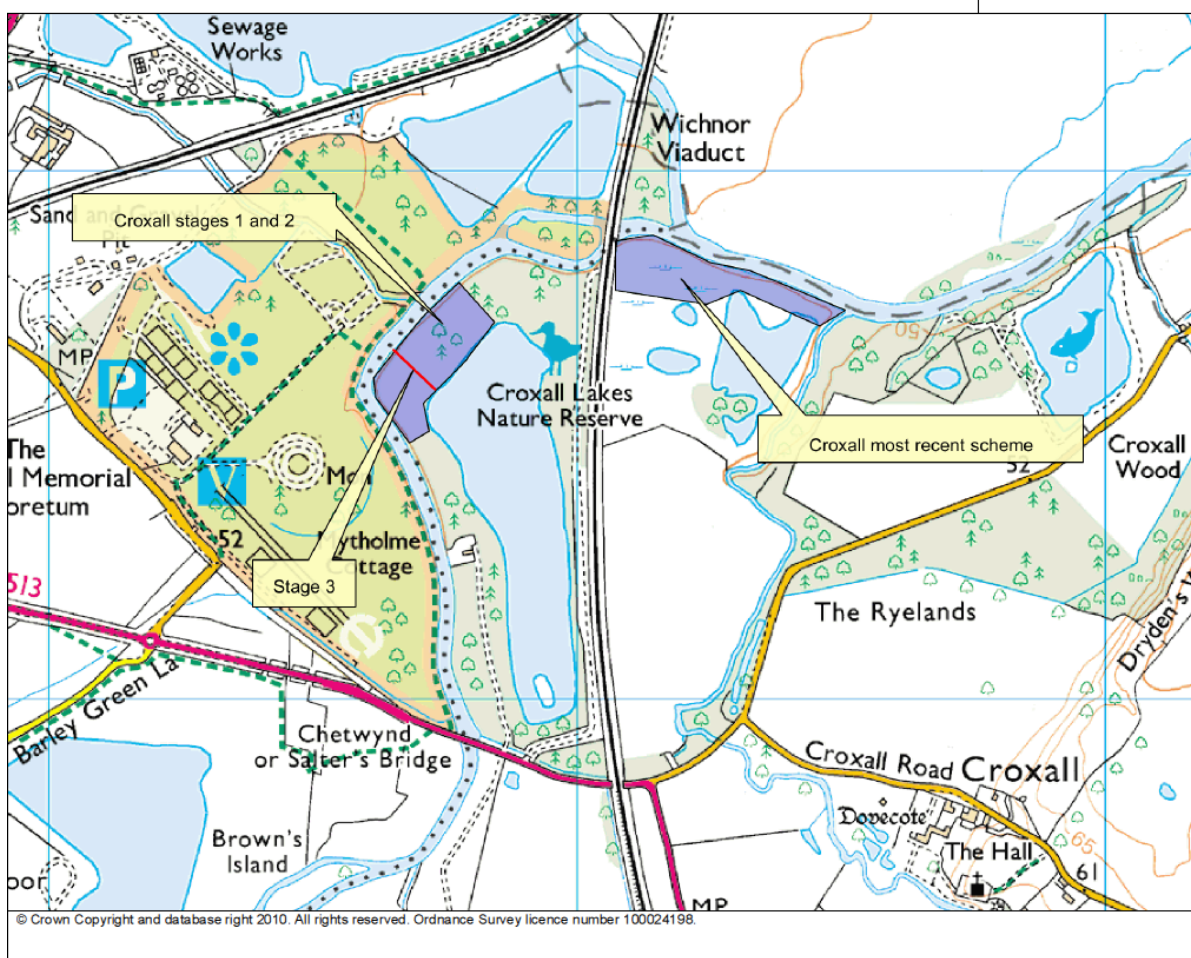
The scheme cost £161,000 of which £144,000 was capital works.

### Wildlife

Baselines survey information has been collated for a number of invertebrate, bird, amphibian, fish, mammal and plant species at Croxall. UK and Staffordshire BAP wetland species recorded within two kilometres and within the last ten years include: white-clawed crayfish, harvest mouse, otter, water vole, common toad, eel, barn owl, snipe, lapwing, reed bunting and native black poplar.

The UK BAP species, depressed (or compressed) river mussel has been recorded within three kilometres of the site. This is a species which is being targeted for specific survey work at Croxall to ascertain whether the habitats created during the scheme prove suitable for colonisation.

Now the works have been completed Staffordshire Wildlife Trust will be carrying out repeat surveys for BAP and other indicator species at the site. It should be noted that significant numbers of waders were recorded during and shortly after completing- the scheme. Snipe, lapwing, green sandpiper, common sandpiper and redshank were all frequent visitors to the new wetland area. Links with universities are in place to ensure that ongoing research and monitoring is carried out.



**Figure 1 Croxall Lakes site map**



**Annotated aerial photo showing the scope of the works at Croxall Lakes. © The Environment Agency.**

**Figure 2 Aerial Photograph annotated with proposed works at Croxall Lakes**





**Figure 3 Widened channel with bars and islands at the Tame – Trent confluence**



**Figure 4 Islands being created**

## **Tuckers Holt Farm**

The River Sence at Tuckers Holt Farm has been extensively straightened due to mineral extraction and agricultural land gain. The land is owned by the Crown, but leased for farming and to Hansons Aggregates for clay extraction. Fishing rights along the river are also let out separately. There are no flooding issues, in terms of impacts on buildings or infrastructure.

Permission was gained from all the landowners and tenants and from the Environment Agency (Land drainage consent), to introduce randomly placed large woody debris. The wood was sourced from the Forestry Commission at Cannock and was placed in the channel to act as blockages/deflectors which would encourage more scour and deposition of bed and banks (see Figure 5). This was supplemented with 80 tonnes of river gravels to raise the river bed and create/ improve the habitat for white clawed crayfish, brown trout and grayling that are found further downstream.

The project was mostly funded by the Environment Agency Fisheries, but was carried out by the Wild Trout Trust. The £10k project was carried out in the spring of 2010 and will be further enhanced by a new weir bypass channel (see weir in Figure 6) at the same site. The bypass channel will enable the white clawed crayfish, trout and grayling to migrate upstream to other improving habitat which has been enhanced by further introductions of large woody debris. This Environment Agency £13k Biodiversity project is being carried out at the end of March 2011.



**Figure 5 Large woody debris placed along river banks**



**Figure 6 Weir soon to be bypassed**

## Sence Valley Forest Park

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This area of Sence Valley Park formed part of a large opencast mining area covering around 460 acres. Once coal extraction had finished in 1996, the soil was compacted and cultivated and a drainage system was installed. Leicester County Council were given 150 acres to create a forest park, and the park was opened as part of the National Forest in 1998 after being planted with more than 98,000 trees.

As part of the restoration work the River Sence, which had been diverted around the mine, was reinstated to its original position. The Coal Board had planned to reinstate the river in a trapezoidal channel, but the Environment Agency insisted on a more natural restoration.

The reinstated channel is largely constructed without bank reinforcement, although there are a few small sections where stones have been used for support. This has been successful, and there have been no major problems with erosion or collapse. The channel has naturally moved since its creation, with areas of erosion and deposition and the formation of berms and meanders.

The new channel was dug quite deep for flood risk reasons, and it is subsequently felt that a shallower channel with a higher bed level would be preferable. It is also recognised that fencing off the river bank to create a buffer strip between the farmland and the river would help to improve the water quality.

More recently further work has been carried out on the River Sence through Sence Valley Park. Working with the Forestry Commission and Sence Valley Volunteer Group, the Environment Agency have carried a project to enhance 600m of the artificial river channel that was formed 15 years ago as a narrow incised channel after extensive opencast coal extraction.

The £20k project was funded out of the FCRM Biodiversity project pot and resulted in WFD improvements through re-grading and widening of bends, adding large woody debris as flow deflectors and habitat diversity, cutting 2 new meanders (see Figures 7 to 9), and removal of an artificial rock chute weir that was impounding water and disrupting natural flows.

After discussions with Lafarge aggregates, they also agreed to be a partner in the project and supplied 100 tonnes of river gravels to help improve the bed structure, spawning quality and ecology of the restored section. Spoil from the works was lost in the margins of the adjacent lake to create shallows to enable BAP habitat (reedbed) creation by the volunteer group. A viewing platform has been created so visitors to the park can view the new river section and associated wildlife. This project co-ordinates well with those downstream at Tuckers Holt Farm and will allow brown trout and grayling to move upstream to establish and spawn, and so expand their current range.



**Figure 7 Pre-works**



**Figure 8 New meander being excavated**





Figure 9 New meander

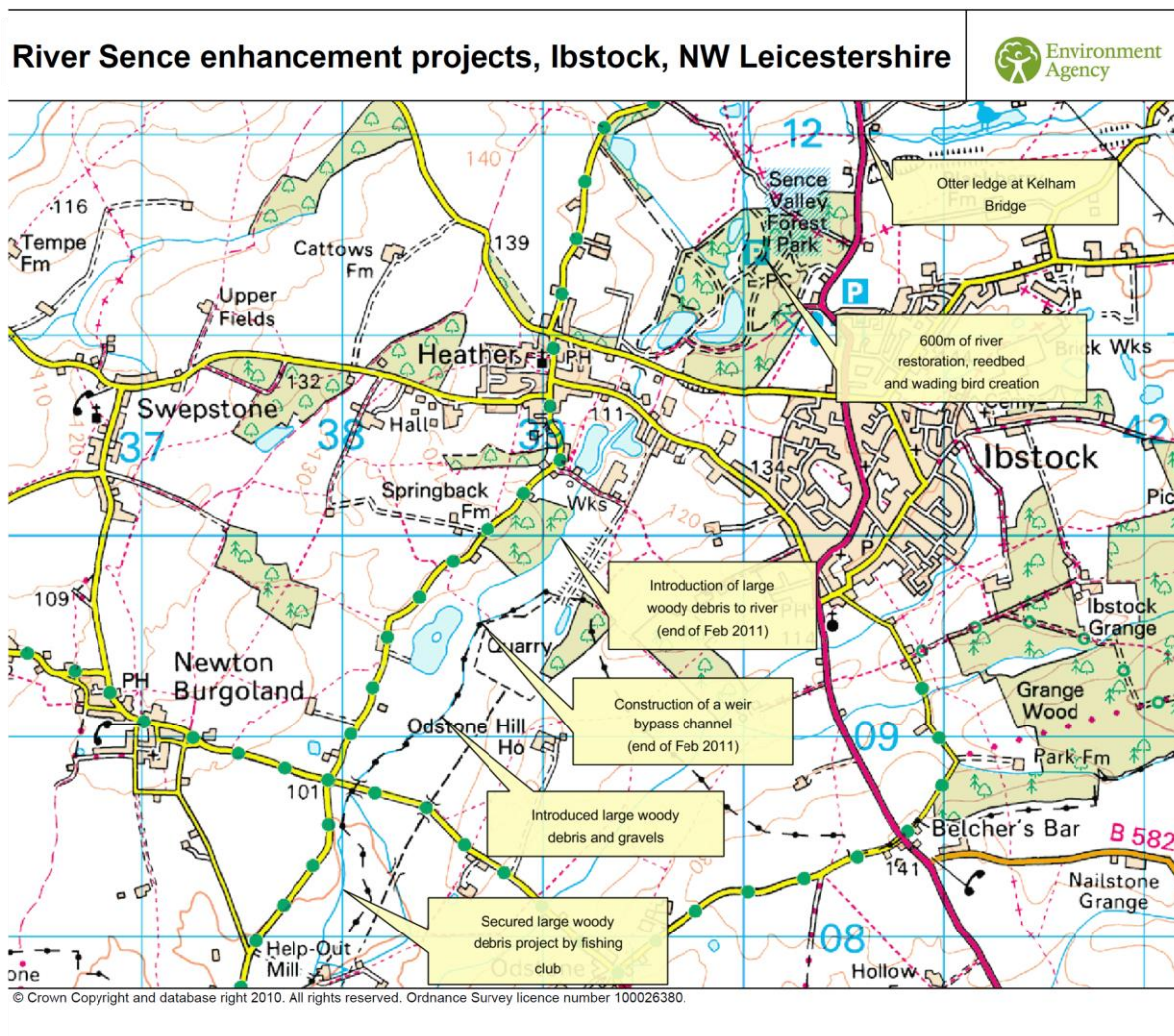


Figure 10 Sence Valley Forest Park site map