# *River Braiding & Reedbed Creation Croxall Lakes, Staffordshire*

***January 2010: View of River Trent after widening and "braiding" has been completed.***

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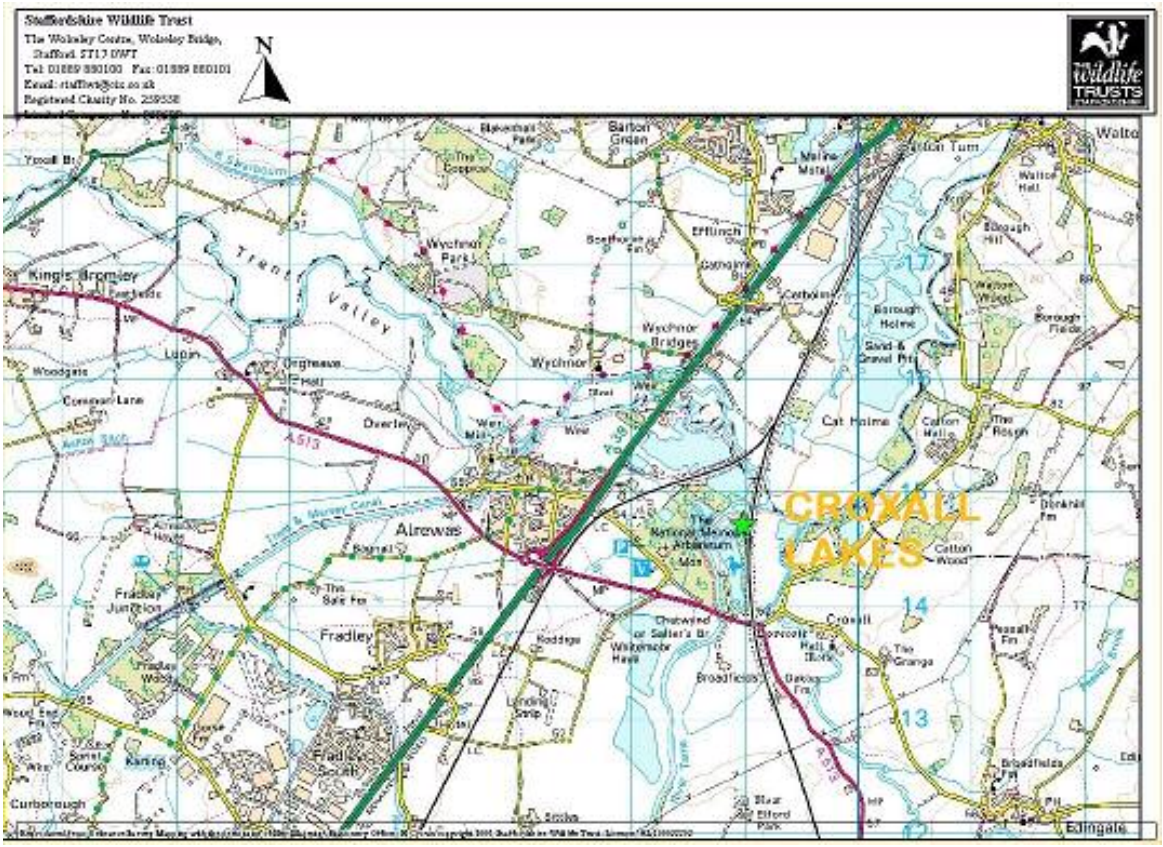
## Project partners-

**Lafarge Aggregates Landfill Communities Fund**
**Natural England**
**The National Forest Company**
**The Environment Agency**
**Network Rail**
**May Gurney**
**Staffordshire Wildlife Trust**

**Location:**
Croxall Lakes is a 50 hectare nature reserve that lies at the confluence of three major Midlands' rivers: the Tame, the Trent and the Mease. Croxall is situated just off the A38 between Lichfield and Burton-upon-Trent. It is also at the heart of the Central Rivers Initiative (CRI) which is one of The Wildlife Trusts' Living Landscape projects.



*Location Map for Croxall Lakes Nature Reserve*

**Background:**
The site at Croxall was a Redland (now Lafarge Aggregates) sand and gravel quarry until the late 1980s. The restoration was dominated by a large, deep, rectangular sailing lake. Approximately 30% of the site was infilled with pulverished fuel ash from Drakelow Power Station. The National Forest Company purchased the site as a new nature reserve in 2000 and then sold the majority of the holding to Staffordshire Wildlife Trust.

Just one other river widening or "braiding" project has been carried out in the UK. It is also in Staffordshire and focussed on a 1.8 kilometre reach of the River Tame at the former Dosthill and Middleton Hall Quarries which now forms part of an RSPB reserve.

**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 19th and 20th centuries. It's ironic that some of driest places in the Trent valley are the top of the riverbanks. This demonstrates just how heavily our main rivers have been engineered in the past. They have been deepened and straightened and the riverbanks have been raised to reduce the frequency of flooding. Natural processes have been controlled and natural features such as river islands, braided (split) channels, gravel shoals, backwaters and swamp margins have been deleted. At Croxall we wanted to unshackle the river from its engineered channel and allow it the freedom to "express" itself over time. The river was

once much shallower and wider. Simply removing material away from the river margins and widening the channel (over 90 metres in places) would, we felt, provide conditions to activate new areas of deposition and bed scouring.

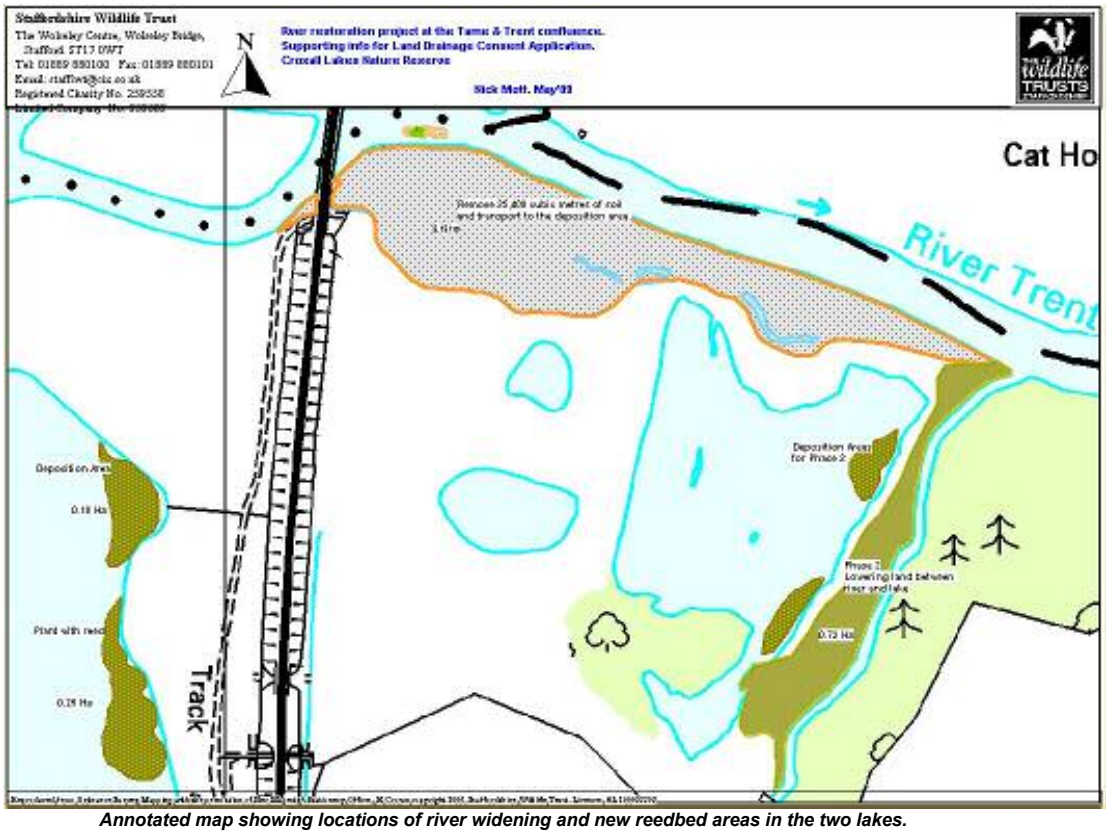
The whole scheme has been an experiment to try new river rehabilitation techniques. It is being carefully monitored to identify how successful these trials have been in terms of new habitats and favourable responses from wildlife.

A further aim is to promote and inspire river “braiding” at appropriate quarry sites elsewhere in the UK. The basic premise is to revise the restoration scheme to secure permission for the mineral operator to extract gravels from the 30 metre “no go” buffer strip usually set in place along rivers. In many cases permissions to extract the aggregate located within 30 metre strips will help to make the extension commercially viable to the individual quarry company. At the same time, major gains for wildlife, biodiversity targets and a re-established link between the river and its floodplain will be achieved.

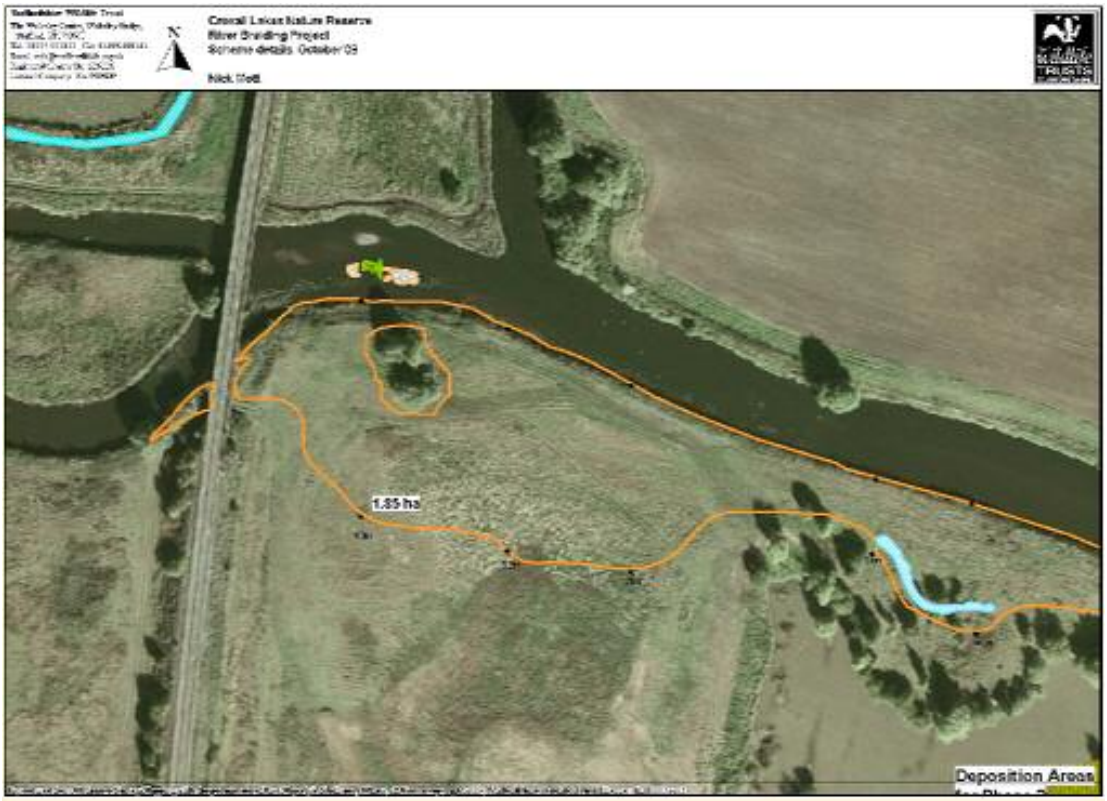
A baseline geomophological (river structure) survey has been carried out by JBA Consulting and the University of Salford. We will therefore be able to monitor these changes at the site through repeat surveys.

***Aerial photo of Croxall Lakes in March 2003 prior to scheme being delivered. Notice the engineered character of the three main rivers. Photo © and courtesy of The Environment Agency.***


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




*Annotated map showing locations of river widening and new reedbed areas in the two lakes.*




*Aerial map showing area at the Tame-Trent confluence where the river was widened out over 90 metres. The plan also shows where land drainage consent was given for the creation of a new river island.*

**Why Croxall?**
The aim is to use the scheme for demonstration purposes to inspire similar work at appropriate locations in the Central Rivers Initiative (CRI) area and elsewhere in the UK. We are particularly keen to encourage mineral companies, mineral planners, local authorities, the Environment Agency and local communities to get together to consider river braiding schemes at other existing and former quarry sites. The CRI Action Plan has targets to promote river braiding schemes at Tucklesholme, Barton, Barton West and Whitmore Haye quarries. Further afield, Uttoxeter Quarry, would also be a superb site to undertake a similar project.

**Scheme Summary**

- **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. (UK & LBAP targets for creation of new reedbed)
- Approximately 43,000 cubic metres (86,000 tonnes) of soil was removed from the riparian zone and transported to the lake deposition areas.
- Baseline geomorphological survey carried out including a 1D Hydraulic model.
- Baseline surveys carried out for UK & LBAP (& other "indicator") species.
- Croxall Lakes in a Countryside Stewardship Scheme with NE. Capital works for the last phase of the scheme were funded (Dec'09 and Jan'10) as a special project.

**Funding (approx.)**

| | |
|---|---|
| • Lafarge | £50,600 |
| • Natural England | £85,000 |
| • National Forest Company | £ 5,500 |
| • May Gurney & Network Rail | £17,000 (In kind works for 1st Phase of the scheme) |
| • Environment Agency | £ 7,900 |
| • Staffordshire Wildlife Trust | £10,000 (In kind project management, supervision, clerk of works) |
| • **TOTAL** | **£176,000** |
| • …of which, **Capital Works** | **£159,000** |

**Wildlife**
Baselines have been established 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.

Prior to works, this area of Croxall Lakes Nature Reserve could be viewed as a blank canvas in many ways. The riparian zone was a very dry area dominated by rank grassland. Nearby sensitivities included a former nesting site for sand martins (on the opposite side of the river), and nearby records of breeding skylark and harvest mouse.

Recent records for white-clawed crayfish and otter were also catered for via baseline surveys.

Of course the full benefits for wildlife are yet to be revealed. SWT will be carrying out repeat surveys for BAP and other "indicator" species at the site. However, good 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. We are promoting further links with universities to ensure that ongoing research and monitoring is in place.

**Consents required**

- Two separate Environment Agency land drainage consents.
- Natural England: separate consent for re-profiling River Mease SAC.
- We were advised by Lichfield District Council that Planning Permission was not required for this scheme.

**Machinery used**

- 2 x 22 tonne dumptrucks fitted with low ground pressure tyres
- 2 x 17 tonne excavator
- 1 x 31 tonne excavator
- 1 x 9 tonne excavator fitted with low ground pressure tracks
- 1 bulldozer

**Constraints**

- *River Mease Special Area of Conservation (SAC).* Site meetings were held with representatives from Natural England (NE) and the Environment Agency to secure permission to extend the scheme to the Mease-Trent confluence and a fifty metre section of the Lower Mease. A separate consent from NE was required.
- *High Pressure Gas Main*. A new concrete pad was constructed to form a suitable crossing route over the high pressure gas main. The weight threshold was well within the margin required for the fully loaded dumptrucks and excavators during the scheme.
- *American signal crayfish.* (1st site record identified in October 2009). Machines used at the site were disinfected with 'Virkon' disinfectant (Environment Agency approved) before they were removed from the site.
- *Himalayan balsam*. (Controlled prior to site works, but seed bank will be a consideration in the shallow margins of the lake)

**Further opportunities**

An initial meeting with Network Rail and the Environment Agency took place in November 2009 to promote the construction of a new channel beneath Wichnor Viaduct to improve the link with the river restoration project area.

*Phragmites* reed planting is scheduled to take place at the two lake deposition sites in mid May 2010 using Staffordshire Wildlife Trust and Burton Conservation volunteer groups.

The next Central Rivers Initiative Conference, to be held in March 2010, will showcase the scheme to mineral companies, mineral planners, local authorities, Environment Agency, Natural England representatives and to other decision makers.

**Project Partners & Acknowledgements:**
Many, many thanks to all of our project partners including:
Lafarge Aggregates through its “Lafarge Aggregates Landfill Communities Fund”, Natural England who provided funding for the second phase of the scheme: 01-12-09 to 10-02-10, The Environment Agency, National Forest Company, May Gurney, Network Rail, JBA Consulting and Salford University. Thanks also to SWT’s Reserves Department who gave permission for, and remained very patient, whilst we delivered the scheme! Thanks to Derbyshire Environmental Fund for administering and supporting project. Thanks to West Midland Bird Club and all the other volunteer birdwatchers and to Staffordshire Mammal Group who provided crucial species’ baselines for BAP species at the site. Finally, huge thanks to Mark Stubbs Contractors Ltd. who carried out the scheme to such a high standard.

## Visual Summary of Scheme Delivery 03/09/2009 to 15/01/2010

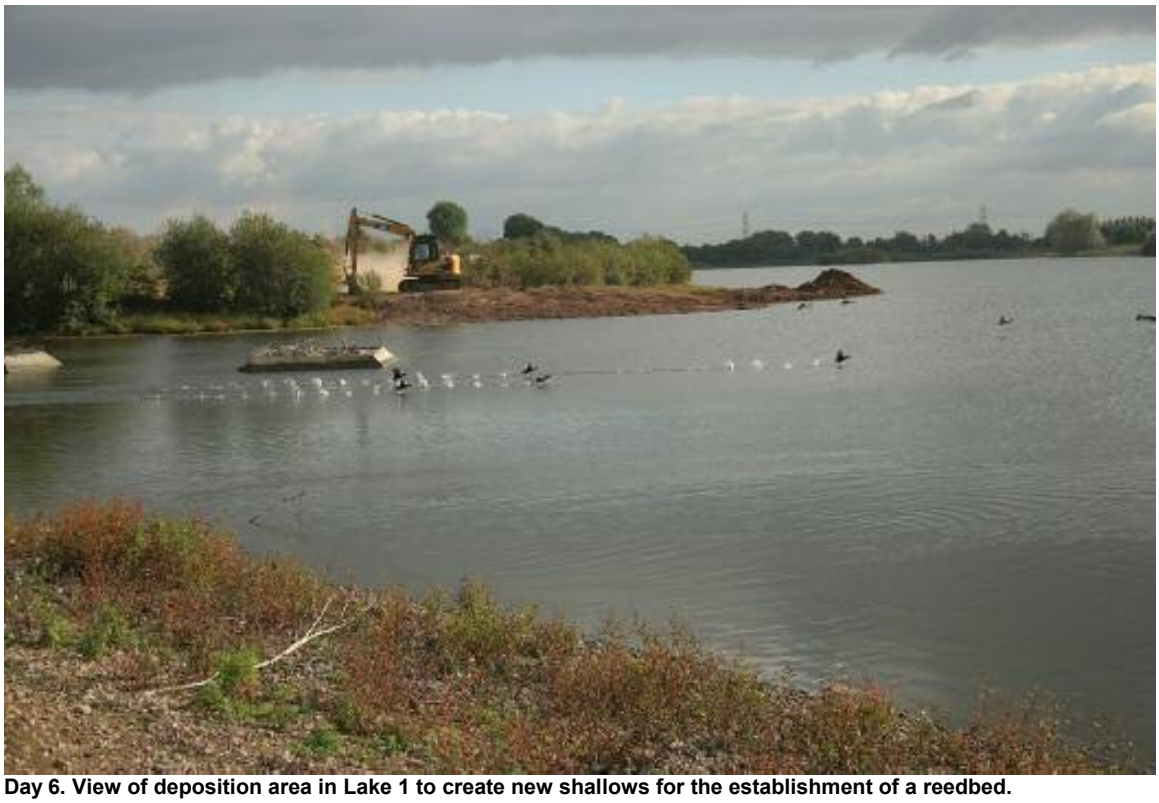
**View of Tame-Trent confluence at Croxall Lakes in February 2008. Prior to the scheme being implemented.**

**Steep, dry, engineered river banks on the R.Trent at Croxall before re-profiling.**

**View near confluence on Day 1 of Capital Works.**

**Day 2. Bank to be re-profiled.**

**Day 3. View before river widening.**



**Day 6. View of deposition area in Lake 1 to create new shallows for the establishment of a reedbed.**

**Day 7. Finally! A seam of gravel encountered for the first time and retained for the creation of "braided" channels, mid channel bars, spits and islands.**

**Day 16. Re-profiling.**

**Day 20. Stripping back to expose gravel seam.**

**Day 22. Laser Scanner for baseline geomorphological assessment conducted by JBA Consulting and the University of Salford.**

**Day 22. Taking readings for baseline geomorphological survey.**

**Day 23. Gravels retained for re-positioning.**

**Day 30. Using gravels to form low gravels bars and islands.**

**Day 30. Using retained gravels to create bars, lagoons, spits and islands.**

**Day 30. Demonstrating technique for creation of gravels bars and islands.**

**Day 38. Stripping back and lowering at the confluence of the Tame and Trent rivers.**

**Day 43. Wettest November on record!**

**Day 70. Machines with low ground pressure tyres and tracks were used for the scheme to cope with the very wet Autumn and Winter conditions.**

**Day 85. Micro-topography in widened channel.**

**Day 85. View opposite the Tame-Trent confluence where the channel has been widened over 90 metres.**

**Day 86. Fine detail of the widened channel showing lagoons, perched pools, backwaters, spits, gravel bars and islands.**

**Day 86. Further views of micro-topography.**

**Day 88. Views of widened channel and the bars and islands created at the confluence of the Tame and Trent rivers.**

**Day 88. Views of river island creation works. Creating scrape in channel substrate.**

**…Placing the living willow tree Large Woody Debris (LWD) with the root plate facing upstream.**

**…clay on top of the root plate.**

**…gravel on top of the LWD and the clay.**

**View of the newly created river island. If successful the willow will send adventitious roots into the river sustrate and grow steadily. The new island will also affect deposition patterns in the river channel to generate new complexity. It should provide additional opportunities and habitats for a wide range of species including otter, depressed river mussel, white-clawed crayfish, eel, Atlantic salmon and a variety of bird species.**

**Day 88 Various views of completed widened channel….**

**View of one of several new 'living willow islands' established within the braided channel to create additional habitat diversity as the scheme matures over time.**

**Day 90. Approximately 40,000 cubic metres of soil was taken to the lakes' depostion areas. All material had to be lowered beneath the summer level of the lakes to: (a) adhere to the conditions of the land drainage consent and, (b) to create suitable conditions for the future establishment of reedbeds.**

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**10 February 2010**