Wildlife assessment of proposed Archimedean Screw hydro-power schemes at Millhouse Weir and Bullhouse Weir, Silkstone, South Yorkshire

A report for Mann Power Consulting

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1. Introduction

This survey was commissioned by Mann Power Consulting on behalf of Mr Charles Booth, to assess any nature conservation issues arising from a proposed hydro-electric scheme at Bullhouse near Silkstone (South Yorkshire). The scheme will consist of two Archimedean Screw turbines on the River Don, at Bullhouse Weir (National Grid Reference SE 209 026) and Millhouse Weir (SE 212 032). In both cases, water would be abstracted from the river just above an existing weir. Short sections of existing (but long-disused) mill leets would be re-instated to channel water to the turbine.

Fieldwork was undertaken on 23rd September 2009.

2. Habitat survey

2.1 Bullhouse Weir

The installation would be on the left bank of the River Don. The river bank is tree-lined but open to livestock grazing for at least part of the year. The adjoining grassland, through which the access track would run, is agriculturally-improved permanent pasture. This is characterised by perennial rye-grass (*Lolium perenne*), crested dogstail (*Cynosurus cristatus*) and white clover (*Trifolium repens*) with small amounts of Yorkshire fog (*Holcus lanatus*), common bent (*Agrostis capillaris*), meadow buttercup (*Ranunculus acris*) and dandelion (*Taraxacum officinale* agg.). This type of grassland is coded MG6 (perennial rye-grass – crested dogstail grassland) in the National Vegetation Classification, and is very widespread on enclosed permanent pastures at low to moderate elevations in the South Pennines.

The disused leet supports similar grassland with a few additional plants such as stinging nettle (*Urtica dioica*), creeping buttercup (*Ranunculus repens*), marsh thistle (*Cirsium palustre*) and common mouse-ear (*Cerastium fontanum*). There are 3 dead alder (*Alnus glutinosa*) stems along the course of the leet, together with 1 mature and 1 semi-mature living alders.

The turbine channel has similar vegetation to the old leet, i.e. rather disturbed improved pasture in partial shade. The outflow from the turbine would discharge onto an existing stone-clad spillway immediately below the stone-built weir. The river banks enclosing the weir are walled, with a few small trees (alder, grey sallow, *Salix cinerea*, and hazel, *Corylus avellana*) sprouting from the stonework or the toe of the bank.

There is a narrow strip of semi-natural riparian vegetation on the lower bank above and below the weir with species such as greater woodrush (*Luzula sylvatica*), tufted hair-grass (*Deschampsia cespitosa*), lady fern (*Dryopteris filix-femina*), herb Robert (*Geranium robertianum*), hawkweeds (*Hieracium* spp.) and various bryophytes. This is typical of streamsides on rather acidic soils in the South Pennines.

The river channel at Bullhouse Weir is stony with patchy growth of aquatic mosses. There are no in-stream vascular plants.

2.2 Mill House Weir

The turbine apparatus at Mill House Weir would also be located on the left bank of the river. Here there is rather steeper banking supporting a broader strip of riparian woodland. This comprises mixtures of ash (*Fraxinus excelsior*), alder and sycamore (*Acer pseudoplatanus*) with small amounts of rowan (*Sorbus aucuparia*), holly (*Ilex aquifolium*) and common oak (*Quercus robur*). The upper slope above the disused leet supports a large, old ash tree and a compact but aged common oak; both these trees are significant habitat features. The strip of riparian woodland extends a considerable distance downstream of Mill House Weir.

Adjoining the disused leet, the field layer and understorey vegetation is dominated by bramble (*Rubus fruticosus* agg.), stinging nettle and rough meadow-grass (*Poa trivialis*) with small amounts of raspberry (*Rubus idaeus*), cleavers (*Galium aparine*), reed canary-grass (*Phalaris arundinacea*) and broad buckler fern (*Dryopteris dilatata*). These plants are indicative of rather disturbed and nutrient-enriched conditions, probably because silt would have been cleared from the leet when it was operational and tipped on the banks. Trees and shrubs adjoining the old leet which might need to be cleared to allow access include a single mid-sized hawthorn (*Crataegus monogyna*), a small, multi-stemmed rowan, one dead alder and 3 mid-sized living alders. There is a large, multi-stemmed alder on the river bank adjoining the inlet to the leet.

The leet itself is shaded and clogged with a deep layer of organic detritus; there is no aquatic vegetation.

The river channel at Mill House Weir is stony with patchy growth of aquatic mosses and algal mats. There are no in-stream vascular plants. The outflow from the turbine would discharge into the river near the foot of the weir. Below the weir is an ‘island’ formed around lodged tree trunks.

3. Protected species assessment

Each site was surveyed for evidence of protected species which could potentially be affected by the proposed scheme.

Otter

Otter receives comprehensive protection under UK and EU legislation.

Evidence of Otter activity (e.g. spraints, runs or footprints) was sought for in the general vicinity of each weir. Note was also made of any large riparian trees or other features which might serve as Otter holts: holts are places of shelter used either as temporary laying-up places or for breeding.

No evidence of Otter activity was found at either location, although it is possible that Otters may pass through this section of the River Don. Two features were noted as providing *potential* ‘couches’ (above-ground resting places):

- a small ‘island’ a short distance downstream of Mill House weir and below the proposed outflow of the turbine channel; this comprises two tree trunks lodged mid-stream with an accumulation of silt and debris around them

- a large multi-stemmed alder on the river bank immediately adjoining the downstream side of the leet intake at Mill House weir; the base of this effectively forms a coppice stool with potential lying-up space (▼ photo, below).

These features should be retained if possible as they provide potential places of shelter for Otters, although there was no sign that they are currently used. If it is necessary to remove either feature, it should be re-checked for evidence of Otter activity beforehand. This is because Otters are in the process of re-colonising the Don catchment and it is likely that the range of the species will be expanding currently.



This section of the River Don contains extensive areas of wooded bankside habitat, so the effect of any small-scale, localised tree removal necessary for the two hydro projects will be trivial in terms of the habitat resource.

Badger

Badgers and their setts receive protection under the Protection of Badgers Act 1992.

Evidence of Badger activity (e.g. setts, latrines, paths, footprints) was sought for at both locations. None was found.

Water Vole

Water Voles and their burrows receive protection under Schedule 5 of the Wildlife & Countryside Act (1979, as amended).

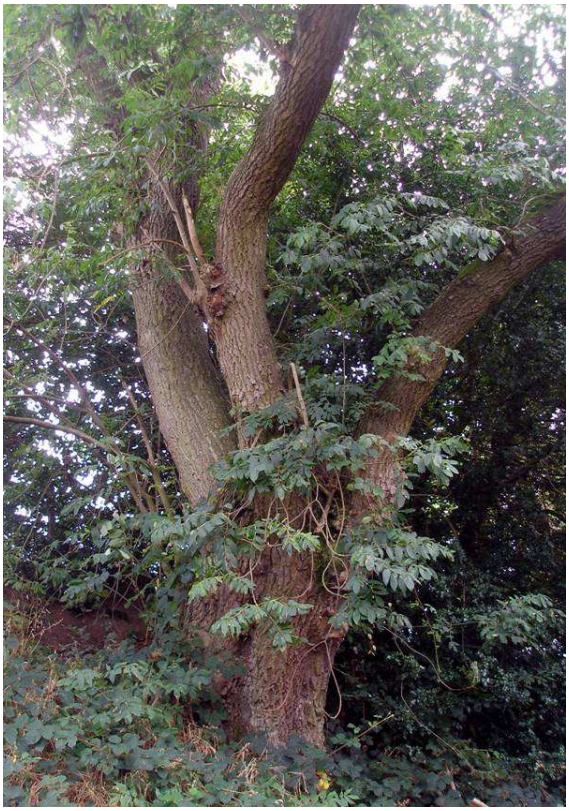
At each location, the river banks are rocky with some stone walling adjoining the weirs. In addition, there are almost continuous overhanging trees and the river is subject to spates. These factors suggest that Water Voles are unlikely to occur in the vicinity. No evidence was found of Water Vole burrows or territorial latrines.

Bats

Bats and their roosting places receive comprehensive protection under UK and EU legislation.

At each location, a visual inspection was made of bankside trees within the working area to ascertain whether any were likely to support bat roosts, based on the presence of splits, crevices or cavities.

At the Bullhouse Mill site, none of the trees were considered suitable for roosting bats. A dead alder is present on the route of the old leet and would presumably need to be removed to re-instate the feeder channel for the turbine. This had woodpecker peck-holes on the upper stem but did not appear to contain any more significant cavities.



At Mill House weir, trees adjoining the old leet are predominantly sound, mid-sized trees (plus a small dead alder in an advanced state of decay). However, uphill of the leet there is a large old ash (◄ photo opposite) and, on the boundary of the wooded strip, an old oak. Both these trees are valuable features in their own right and contain splits and fissues which could potentially be suitable for roosting bats. Care should be taken to protect both these trees and, if essential, felling or major surgery should only be undertaken after inspection by a licensed bat surveyor.

Riparian birds

All birds receive general protection under the provisions of the Wildlife & Countryside Act.

At both locations, the river banks are wooded and are rocky, shaley or lined by stonework. Consequently, they are unlikely to provide nesting sites for burrowing birds such as Kingfisher or Sand Martin. At Millhouse Weir, the mature riparian tree belt is likely to provide nesting habitat for various common woodland birds, so any clearance works should take place outside the bird breeding season. At Bullhouse Weir, the left bank of the river is accessible to livestock and lacks dense field- or shrub- layer vegetation but any removal of trees should also avoid the nesting period (or a prior check should be made by a suitably experienced ecologist).

Dipper was reported to have bred at Bullhouse Mill in 2007 (Thomas, 2009). This bird makes its nest under natural overhangs or on ledges beside streams but also utilises retaining walls, bridges and culverts. Since Dippers occupy the same breeding territory from year to year, it is important that both sites are checked for nesting Dippers if any works are to take place between the beginning of March and the end of July. If nesting

Dippers are present close by, and likely to be disturbed by engineering operations, it may be necessary to delay works until breeding has finished.

White-clawed Crayfish

White-clawed Crayfish is protected under the Wildlife & Countryside Act.

At each location, crayfish were searched for by kick sampling, turning stones and netting beneath undercut banks and amongst submerged tree roots. Searches were undertaken both above and below each weir, although it was only possible to survey the deep pool above Mill House weir from the banks. The survey was well-timed to locate crayfish. Both surveyors hold Natural England licences for surveying for White-clawed Crayfish.

It was considered that both locations, and especially Bullhouse weir, provided potentially favourable habitat for White-clawed Crayfish in terms of habitat structure. However, no evidence was found. This section of the River Don drains a catchment dominated by millstone grit and shales. Whilst the water is not markedly acidic – as shown by an abundance of freshwater shrimps (*Gammarus pulex*) and caddis larvae – it is probably too poor in free calcium to be amenable to the native crayfish, which requires at least 5 mg/l calcium (Holdich, 2003).

4. Conclusions

The footprint of the proposed Archimedean Screw turbines and associated infrastructure would be small and would require little disturbance or loss of semi-natural habitats. At Bullhouse Weir the impact would be negligible. At Mill House Weir, reinstatement of the feeder channel and creation of the turbine channel may require removal of a small number of small- and mid-sized trees to allow access for machinery but this impact would be trivial in relation to the area of riparian woodland/tree cover on this section of the River Don.

There was no evidence of Badger, Otter or Water Vole activity in the vicinity of either site and White-clawed Crayfish do not appear to be present at either location. Features of *potential* value for bats and Otters have been identified in the vicinity of Mill House weir and should be protected. These are indicated on the attached map (page 7 of this report).

Dipper (a protected bird associated with fast-flowing streams) has been reported to breed in the general vicinity of Bullhouse Mill. If works are planned during the bird breeding season (March to July inclusive), it will be important to check whether Dippers are nesting nearby, before works commence. If this is found to be the case, it may be necessary to postpone work until nesting has finished.

As a matter of best practice, and in order to ensure full compliance with the Wildlife & Countryside Act, any substantial clearance of vegetation (trees, shrubs, brambles) should avoid the bird breeding season (March to July inclusive).

Access tracks and generator buildings would be sites on agriculturally-improved grassland of negligible conservation interest.

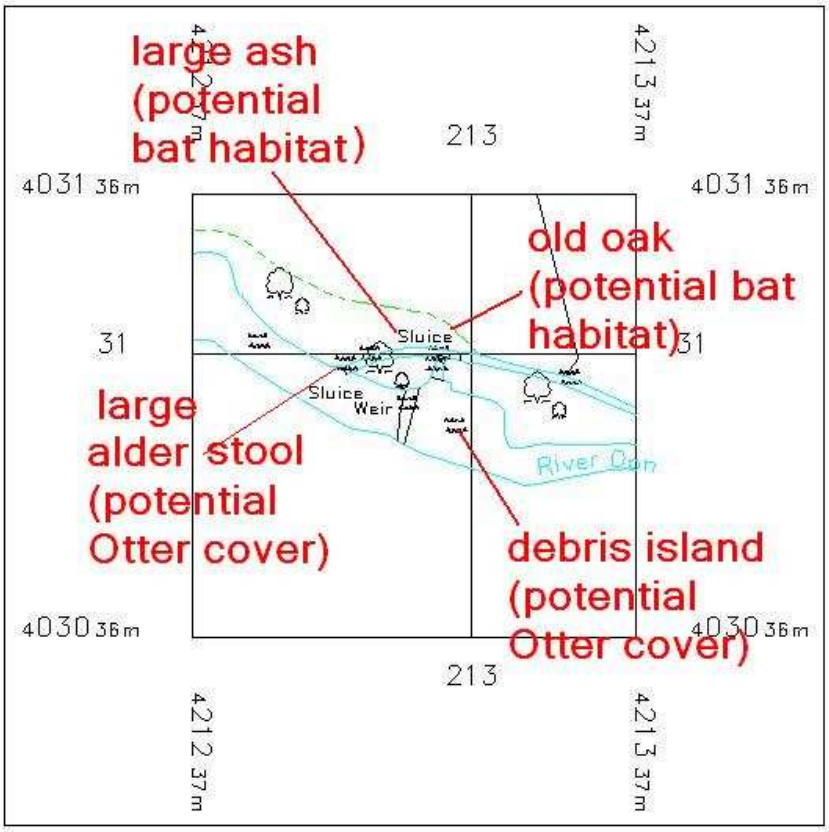
5. References

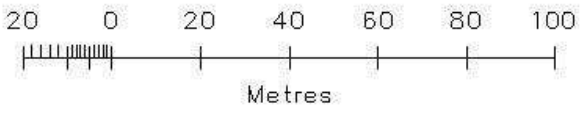
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