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**Whalley
Hydropower Scheme
Ecology Report**

September 2010

Control sheet

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Executive Summary

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Bowland Ecology was commissioned by Whalley Hydro to complete a desk study and an extended Phase 1 habitat survey for a section of the River Calder, and land either side (NGR SD 73454, 38896). This parcel of land has been identified for a potential hydropower scheme. The aim of the survey and desk study was to make an assessment of wildlife interests at the site with particular reference to legal requirements and potential constraints to the proposed hydropower scheme. This report considered the impact of the proposed scheme on the River Calder and the effects of the construction of the proposed generator building.

The study area supports a range of habitats including scattered trees, the River Calder (running water and associated habitats), broad leaved woodland and semi-improved grassland. These habitats support a range of fauna including nesting birds, aquatic macroinvertebrates and fish. Several trees were noted as having potential to be used as occasional bat roost sites. The invasive Japanese knotweed is present on the southern bank of the River Calder.

The proposed Hydropower scheme will lead to some small scale losses of habitat and will impact upon water levels in the vicinity of the weir. Loss of habitat will result from construction of the generator building and installation of associated structures on to the weir.

The River within the study area supports, trees, strips of woodland, tall herb communities, grassland, emergent zone vegetation and also provides a valuable commuting and foraging resource for a range of fauna. Habitats and species within the impacted areas are not considered to be particularly sensitive and vulnerable. Potential impacts on the stream environment include a reduction of flows within the depleted reach and the release of suspended sediments during construction.

The construction of the hydropower scheme will have no noticeable impact upon biological water quality and there will be no loss or impacts to high value invertebrate habitats or salmonid spawning habitat. Furthermore, the scheme will involve the creation of a new double larinier fish pass to aid the movement of migratory fish through this stretch of the river. Hence, following construction the area will be enhanced from a fishery point of view.

Whilst there will be long term benefits for fish, careful timing of works and careful working methods will be required to ensure that there are no construction related impacts to fish (particularly during the migration and spawning periods).

Vegetation clearance work should occur outside the bird breeding season, which runs from late February to September.

Japanese knotweed is present on the southern bank of the River Calder. It is an offence to plant or cause Japanese knotweed to spread in the wild under the Wildlife and Countryside Act 1981. Therefore it is recommended that control of this species with herbicide starts immediately to prevent the extent of the stand increasing, which will ultimately make the cost of control more expensive if it is left untreated.

Several trees along the southern edge of the River Calder have medium potential to be used as occasional roost sites by bats. It is considered likely that these trees, in particular the highest risk tree (Target Note 5), will be avoided by the proposed works. However, prior to construction the working areas should be checked to ensure that no moderate risk bat trees are affected by the scheme. If any of these trees require removal then this should be carried out under a supervised careful felling method statement.

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1. Introduction

- 1.1 Bowland Ecology was commissioned by Whalley Hydro in August 2010 to complete a desk study and an extended Phase 1 habitat survey for a section of the River Calder, and land either side (NGR SD 73454, 38896). This parcel of land has been identified for a potential hydropower scheme.
- 1.2 The extended Phase 1 habitat survey covered the location of the proposed hydro power scheme (weir on the River Calder in Whalley), generator location and land 100m upstream and downstream of the weir.
- 1.3 The aim of the survey and desk study was to make an assessment of wildlife interests at the site with particular reference to legal requirements and potential constraints to the proposed hydropower scheme.

2. Methodology

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Desk Study

- 2.1 Lancashire County Council, as the local ecological records holder, was contacted to obtain: information relating to non-statutory wildlife sites of relevance to the development proposals; and records of protected species and species of nature conservation interest within 1.5km of the site.
- 2.2 A review of online Environment Agency data was undertaken with particular regard to biological water quality information.
- 2.3 The National Biodiversity Network Gateway (<http://data.nbn.org.uk/>) was consulted to identify any relevant protected species records for the site or within 1.5km of the site.
- 2.4 The Multi-Agency Geographic Information Centre (<http://www.magic.gov.uk>) was also consulted to identify whether the site was designated as, or adjacent to, a statutorily designated sites.
- 2.5 Nature on the Map (<http://www.natureonthemap.org.uk/>) was also reviewed to see if any of the habitats on or adjacent to the site had been identified as a UK BAP habitat.

Field Survey

- 2.6 The survey followed Phase 1 habitat survey methodology (NCC, 1990). This involves walking the whole site, mapping and describing different habitats present (for example: woodland, grassland, scrub). A colour coded map of the habitats on site was produced, with corresponding target notes of ecologically interesting features.
- 2.7 The survey was extended such that evidence of fauna and faunal habitat was also recorded (for example potential bat roosts, specialist habitat such as ponds, tracks). The extended version of the Phase 1 survey is a modified approach to the Phase 1 survey and follows the approach recommended by the Guidelines for Baseline Ecological Assessment (IEA, 1995).
- 2.8 This survey was undertaken on the 11th August 2010 by Jeremy James MSc BSc (Hons) MIEEM CEnv. The Phase 1 habitat survey was undertaken within the optimal survey period for botanical surveys which allowed an adequate evaluation of habitats and their potential to support legally protected species.
- 2.9 The results of the Phase 1 survey are discussed in Section 3 and in Appendix 1 Target Notes and illustrated on the Phase 1 Habitat Plan, which is within Appendix 2 of this report

3. Results

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Desk Study

- 3.1 MAGIC identified that the study area is not designated as or adjacent to a statutory designated site (e.g. Site of Special Scientific Interest (SSSI)).
- 3.2 Consultation with Lancashire County Council identified four Biological Heritage Sites (BHS) within the 1.5km search area (see Appendix 3). These sites are: Spring Wood, Calder Bank/Broken Brow, St John's Wood and Lords Park Wood, and Banks Wood and Marsh. All of these sites are >500m from the proposed scheme. Due to the distance of these sites from the proposed scheme, it is considered that there will be no significant impacts upon BHS sites.
- 3.3 Lancashire County Council also provided records for protected and notable species (see Appendix 3), of relevance to this scheme are records for: rough horsetail *Equisetum hyemale* – this species occurs in damp shaded woodland.
- 3.4 Nature on the Map identified the following UK Biodiversity Action Plan Habitat 'Lowland mixed deciduous woodland' – these areas coincide with designated BHS sites and as a consequence no impacts are considered to be likely.
- 3.5 The National Biodiversity Network Gateway includes a number of records for the search area. Of relevance are records for otter and water vole from the 1km grid square within which the site occurs.
- 3.6 A review of online Environment Agency data confirms that the stretches of the River Calder upstream of the proposed Hydropower site have a biological water quality assessment of C - fairly good Biology worse than expected for unpolluted river. The downstream stretch of the Ribble (below the confluence of the River Hodder and River Calder) is classified as A - very good Biology similar to that expected for an unpolluted river.

Field Survey

- 3.7 The Phase 1 plan and target notes (refer to Appendix 1 & 2) map and describe the habitats present over the study area. The following habitat descriptions will focus on those habitats that would be affected by the development in its current form. In summary the habitats present include:
 - Scattered trees
 - Running water (& associated habitat)
 - Broad leaved woodland
 - Semi-improved grassland

Flora

Semi-improved grassland

- 3.8 Species poor semi-improved grassland (Target Note 1) occurs along the southern side of the River Calder. This habitat was dominated by perennial rye grass (*Lolium perenne*) with varying amounts of Yorkshire fog (*Holcus lanatus*), creeping bent grass (*Agrostis stolonifera*), bittercress (*Cardanome* sp), sorrel (*Rumex acetosa*), creeping buttercup (*Ranunculus repens*), creeping thistle (*Cirsium arvense*) and clovers (*Trifolium* spp).

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Scattered trees

- 3.9 Scattered trees occur along the banks of the River Calder, particularly the southern bank. These trees are mostly mature/semi-mature and comprise ash (*Fraxinus excelsior*), alder (*Alnus glutinosa*) and willows (*Salix spp.*). A single large mature black poplar (*Populus nigra*) occurs as a free standing tree within grassland south of the Calder (Target Note 5).

Running Water

- 3.10 The proposed Hydropower Scheme is located on the River Calder which is a broad river with a mixed bank structure showing evidence of significant modification. The stretch within the survey area has sections of artificial (stone)/reinforced, areas incorporated into gardens, semi-natural (earth) banks and eroding banks (some areas are fenced). The northern bank is shaded by trees/woodland (mostly sycamore *Acer pseudoplatanus*, with alder *Alnus glutinosa*), whilst the southern bank is more open and has occasional scattered trees (sycamore *Acer pseudoplatanus*, alder *Alnus glutinosa*, willow *Salix spp.*, ash *Fraxinus excelsior*). Where the banks are open vegetation varies; open areas have grassland, fenced areas have coarse and more diverse vegetation (creeping bent grass *Agrostis stolonifera*, red fescue *Festuca rubra*, ribwort plantain *Plantago lanceolata*, sweet vernal *Anthoxanthum odoratum*, meadowsweet *Filipendula ulmaria*, yarrow *Achillea millefolium* and common knapweed *Centaurea nigra*).
- 3.11 The edges of the River Calder have species including Himalayan balsam (*Impatiens glanduifera*), hemlock water dropwort (*Oenanthe crocata*), nettle (*Urtica dioica*). Biological water quality appears to be poor with a diatom scum over stones/cobbles in the river and filamentous green algae present on the weir and over cobbles/stones in the river. Additional species on the northern bank include redshank (*Polygonum persicaria*), bramble (*Rubus fruticosus* agg) and meadow vetchling (*Lathyrus pratensis*).
- 3.12 Two vegetated islands (Target Note 3) occur downstream of the weir and are vegetated with scrub (mostly willow, *Salix sp.*, *S. viminalis*) and tall herbs/ruderals (abundant Himalayan balsam *Impatiens glanduifera*, nettle *Urtica dioica*, reed canary grass *Phalaris arundinacea*, creeping buttercup *Ranunculus repens*). Rough horsetail (*Equisetum hyemale*) was not recorded during the survey – the closest desk study record is from the edges of the River Calder approximately 500m+ to the west.

Broad Leaved Woodland

- 3.13 A strip of broadleaved woodland runs along the northern bank of the River Calder. This band of woodland is quite narrow and dominated by sycamore (*Acer pseudoplatanus*) with ash (*Fraxinus excelsior*) over a species poor groundflora (i.e. with grassland/ruderal species).

Fauna

- 3.14 There are records on NBN for otter on the River Calder. No evidence of this species was found within the stretch of the River Calder within the study area. Habitat within the study area is considered to be suboptimal for otter due to the absence of suitable habitat for holts (e.g. mature woodland and scrub, exposed tree roosts), and high levels of disturbance along the northern bank (footpath access).
- 3.15 There are records on NBN for water vole on the River Calder. No evidence of this species was found within the stretch of the River Calder within the study area. Habitat within the study area is considered to be suboptimal for water vole due to

fast flows over the weir and the paucity of potentially good burrowing habitat in the modified stretches of the River Calder. The heavily shaded northern bank was considered to be of low value for water vole, due to shading and the lack of foraging opportunities.

- 3.16 Several mature trees along the banks of the River Calder have splits and loose bark which might provide occasional roost sites for bats (Target Notes 4 & 5).
- 3.17 Woody vegetation including trees and shrubs provide suitable nesting habitat for birds. Areas of tall vegetation including the sheltered islands (Target Note 3) also provide potential nesting areas for birds. The weir (Target Note 2) is used as a perch by a range of water birds (ducks, gulls and heron).
- 3.18 Environment Agency data indicates that the River Calder (upstream stretch) has 'fairly good' biological quality, and downstream (stretch below the confluence with the River Hodder) has 'excellent' biological water quality. It was evident, during the survey, that there is some enrichment (nutrient/runoff) within the stretch of the River Calder at the study site. This evidence is in the form of filamentous green algae (over the face of the weir), diatom scum covering rocks around the weir and the edges of the River Calder and the nature of the invertebrate fauna within the survey site. An exhaustive survey of invertebrates was not undertaken, however the surveyor (former Environment Agency Ecologist) did not find evidence of pollution intolerant species during searches of rocks/cobbles downstream of the weir. The weir will provide some benefits for invertebrates (and fish) by oxygenating water as it cascades over the weir. Typical invertebrate species found during the survey included freshwater shrimp (*Gammarus pulex*), ceaseless caddis (not determined to species), mayfly larvae (*Baetidae*), blackfly larvae (*Simulidae*), oligochaet worms and leeches. As stated the survey of invertebrates was not exhaustive and sensitive taxa such as stonefly larvae may well be present given likely improvements to water quality in recent years.
- 3.19 Whiteclaw crayfish are not present within the River Calder, the closest records are for isolated small populations on small tributaries of the River Ribble running over limestone near Clitheroe.
- 3.20 The stretch of the River Calder within the study area supports a range of fish species including roach, chub, dace, grayling and brown trout. Roach, chub and dace (coarse species) are stocked/introduced into the River Calder for commercial fishing purposes. The river also supports migratory species such as salmon, sea trout and eels. Barbel have also been recorded in the River Calder, this species is thought not to be native to the River Calder, and may have moved into the area via lower reaches of the River Ribble. The River Calder supports a varied assemblage of fish species which is considered to be benefiting from improving water quality.

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4. Potential Impacts and Recommendations

- 4.1 This report considers the impact of the proposed scheme on the River Calder and the effects of the construction of the proposed generator building. The report and survey do not take account of any cabling routes and associated impacts which may require further survey and assessment.
- 4.2 The proposed Hydropower scheme will lead to some small scale losses of habitat and will impact upon water levels in the vicinity of the weir. With regards to the latter this will be a consequence of water level reduction/depletion within a stretch of the Calder upstream of the weir.
- 4.3 Loss of habitat will result from construction of the generator building and installation of associated structures on to the weir.
- 4.4 The stretch of the River Calder within the study area is a valuable wildlife habitat. The River supports, trees, strips of woodland, tall herb communities, grassland, emergent zone vegetation and also provides a valuable commuting and foraging resource for a range of fauna
- 4.5 Habitats and species within the impacted areas are not considered to be particularly sensitive and vulnerable. Potential impacts on the stream environment include a reduction of flows within the depleted reach and the release of suspended sediments during construction.
- 4.6 Immediately upstream of the weir, the River Calder has 'slack' flow which is characterised by slow moving and relatively deep water. There are no riffles and/or exposed rocky habitats which might provide suitable habitats for invertebrates or spawning fish. The construction of the hydropower scheme will have no noticeable impact upon biological water quality and there will be no loss or impacts to high value invertebrate habitats or salmonid spawning habitat.
- 4.7 Furthermore, the scheme will involve the creation of a new double larinier fish pass to aid the movement of migratory fish through this stretch of the river. Hence, following construction the area will be enhanced from a fishery point of view.
- 4.8 Whilst there will be long term benefits for fish, careful timing of works and careful working methods will be required to ensure that there are no construction related impacts to fish (particularly during the migration and spawning periods). Uncontrolled working can lead to the release of silts which can cause physical damage to fish and smother spawning habitats. In addition, construction during migration and spawning can also lead to damage and mortality of fish.
- 4.9 To avoid impacts to fish the following measures will need to be employed:
 - Work in low flows, over pump or dam off the working area to create a dry construction site.
 - Consult with the Environment Agency regarding the timing of works (e.g. which may require avoidance of migration/breeding during autumn) and the need for fish rescues.
 - Careful monitoring and management of works to ensure that no silts or materials are released into the River Calder during the works. The works will need to follow Environment Agency Pollution Prevention Guidelines to ensure best practice during in river works.

4.10 Vegetation clearance work should occur outside the bird breeding season, which runs from late February to September. If vegetation is cleared during the nesting season it should be preceded by a pre-clearance nesting bird survey by an experienced ecologist. If nesting birds are found an exclusion zone should be maintained around any occupied nest and these areas should not be cleared until declared free of nesting birds by the ecologist. Breeding birds are protected by Section 1 of the Wildlife and Countryside Act (1981, as amended). All birds, their nests and eggs are protected by law and it is thus an offence, with certain exceptions, to intentionally;

- Kill, injure or take any wild bird,
- Take, damage or destroy the nest of any wild bird while it is in use or being built,
- Take or destroy the egg of any wild bird.

4.11 Japanese knotweed is present on the southern bank of the River Calder. It is an offence to plant or cause Japanese knotweed to spread in the wild under the Wildlife and Countryside Act 1981. Therefore it is recommended that control of this species with herbicide starts immediately to prevent the extent of the stand increasing, which will ultimately make the cost of control more expensive if it is left untreated.

4.12 Several trees along the southern edge of the River Calder have medium potential to be used as occasional roost sites by bats. It is considered likely that these trees, in particular the highest risk tree (Target Note 5), will be avoided by the proposed works. However, prior to construction the working areas should be checked to ensure that no moderate risk bat trees are affected by the scheme. If any of these trees require removal then this should be carried out under a supervised careful felling method statement as follows (Bat Conservation Trust, 2000):

- Fell trees in autumn or spring to avoid periods when bats are particularly vulnerable - during hibernation or when non-flying young are present.
- When preparing to cut a tree look for evidence of bat occupancy - obvious holes, cavities and splits; dark staining on a tree below a hole; staining around a hole; maze of tiny scratch marks around the hole; noise coming from a hole; on close inspection the hole may contain droppings.
- Bats may be anywhere inside a hole, try to cut as far above a hole as possible.
- If there is doubt about the presence of a possible roost, do not cut and seek ecological advice
- Bats may be inside cracks held open by weight of branch, which will close when branch taken off. Search such splits for bats before removing large limbs.
- When felling ivy clad trees, once felled allow a 24 hour rest period before limbing and removing ivy.
- Where possible ring bark and leave up to 15 metres standing dead wood (trunk), with due regard to Health and Safety issues.

If bats are found:

- If the roost is still intact and bats are not injured, seek ecological advice immediately.
- If help is not available allow bats to fly out of harms way.

- If the timber is felled, the roost is not exposed and the bats are not injured, temporarily seal and isolate roost and seek ecological advice immediately and contact Natural England.
 - If help not readily available, position the roost off the ground, re-open it and allow bats to relocate of their own accord.
 - If a roost has been exposed, and bats have been injured, collect bats into a secure box or bag (using a glove) and seek ecological advice immediately. Do not handle bats without gloves.
 - In all cases where bats are found to occupy a tree, inform the supervising ecologist and Natural England immediately.
 - Where absence of a roost cannot be confirmed, trees will be felled under supervision of a licensed bat worker, on a precautionary basis.
- 4.13 All UK bat species receive full protection under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) and are therefore subject to the provisions of Section 9 of the Act.
- 4.14 The Countryside and Rights of Way Act (2000) amends the Wildlife and Countryside Act (1981) and also makes it an offence to intentionally or recklessly damage, destroy, or obstruct a place that a bat uses for shelter or protection. The term 'reckless' is defined by the case of Regina versus Caldwell 1982. The prosecution has to show that a person deliberately took an unacceptable risk, or failed to notice or consider an obvious risk.
- 4.15 The Conservation (Natural Habitats & c.) (Amendment) Regulations 2007 amend the Conservation (Natural Habitats & c.) Regulations 1994 which make provision implementing Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive).

References

IEA. 1995. *Guidelines for Baseline Ecological Assessment*. Chapman and Hall

Nature Conservation Committee (1990). *Handbook for Phase 1 Habitat Survey: A technique for environmental audit*. JNCC

Appendices

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Appendix 1 Phase 1 Target Notes 320110580P

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TN	Photo	Description
1		Poor semi-improved grassland, dominated by perennial rye grass (<i>Lolium perenne</i>) with varying amounts of Yorkshire fog (<i>Holcus lanatus</i>), creeping bent grass (<i>Agrostis stolonifera</i>), bittercress (<i>Cardanime</i> sp), sorrel (<i>Rumex acetosa</i>), creeping buttercup (<i>Ranunculus repens</i>), creeping thistle (<i>Cirsium arvense</i>) and clovers (<i>Trifolium</i> spp).
2		Large curved stone weir with rocky cascades downstream. Slack water upstream. Weir is used as a perch by mallard, corvids and gulls. A grey heron was feeding by the weir during the survey. Grey wagtails were also observed foraging around the weir and islands downstream. The weir is mostly unvegetated, small patches of reed canary grass (<i>Phalaris arundinacea</i>) occurs downstream. Filamentous green algae (<i>Cladophra</i> sp) is frequent on the stonework of the weir. There is a pool on the south side of the weir.
3		Two vegetated islands (1 relatively large and 1 small). Both islands occur downstream of the weir and are vegetated with scrub (mostly willow, <i>Salix</i> sp, <i>S. viminalis</i>) and tall herbs/ruderals (abundant Himalayan balsam <i>Impatiens glanduifera</i> , nettle <i>Urtica dioica</i> , reed canary grass <i>Phalaris arundinacea</i> , creeping butter cup <i>Ranunculus repens</i>). The islands provide good refuge and nesting habitat for birds.
4		The River Calder – a broad river with a mixed bank structure showing evidence of significant modification. The stretch within the survey area has sections of artificial (stone)/reinforced, areas incorporated into gardens, semi-natural (earth) banks and eroding banks (some areas are fenced). The northern bank is shaded by trees/woodland (mostly sycamore <i>Acer pseudoplatanus</i> , with alder <i>Alnus glutinosa</i>), whilst the southern bank is more open and has occasional scattered trees (sycamore <i>Acer pseudoplatanus</i> , alder <i>Alnus glutinosa</i> , willow <i>Salix</i> spp, ash <i>Fraxinus excelsior</i> – nb a single willow on this bank has risk to be used as a roost site by bats). Where the banks are open vegetation varies – open areas have grassland similar to Target Note 1, fenced areas have coarse and more diverse vegetation (creeping bent grass <i>Agrostis stolonifera</i> , red fescue <i>Festuca rubra</i> , ribwort plantain <i>Plantago lanceolata</i> , sweet vernal <i>Anthoxanthum</i>

	odoratum, meadowsweet <i>Filipendula ulmaria</i>, yarrow <i>Achillea millefolium</i> and common knapweed <i>Centaurea nigra</i>). The edges of the Calder have species including Himalayan balsam (<i>Impatiens glanduifera</i>), hemlock water dropwort (<i>Oenanthe crocata</i>), nettle (<i>Urtica dioica</i>). Biological water quality appears to be poor with a diatom scum over stones/cobbles in the river and strong odour. Additional species on the northern bank include redshank (<i>Polygonum persicaria</i>), bramble (<i>Rubus fruticosus</i> agg) and meadow vetchling (<i>Lathyrus pratensis</i>).	320110580P
5	Large black poplar (<i>Populus nigra</i>) with slits, cracks, lifted bark providing opportunities for bat roosting.	
6	Small stand of Japanese knotweed.	

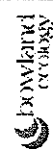
Appendix 2 Phase 1 Plan

Whalley Hydro Scheme

Drawing Title: Phase 1 Plan



Drawn By: GH	Date: Oct 2010
Checked By: JJ	Scale: NTS



Legend

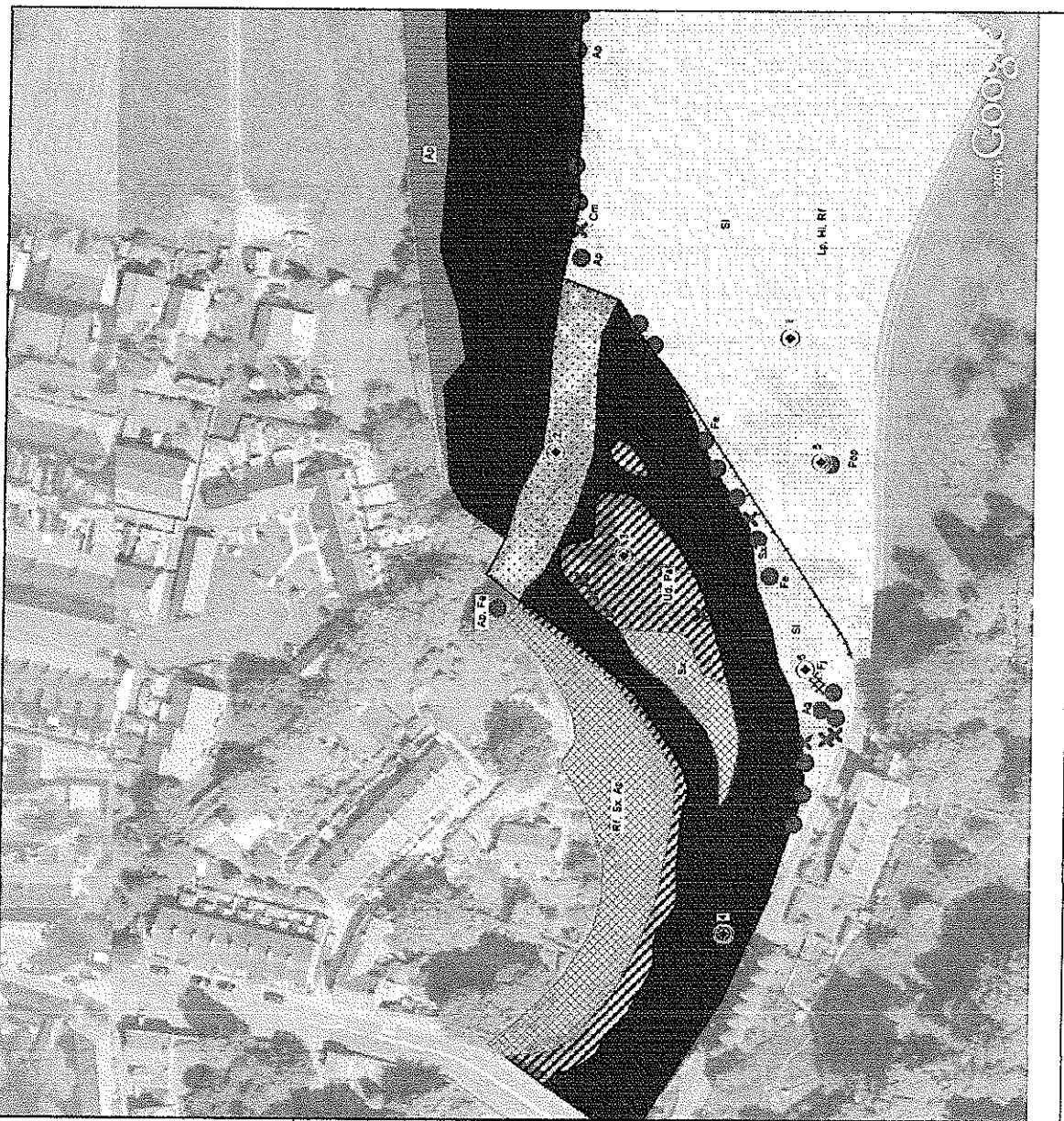
- A1.1 Woodland, Broadleaved, semi-natural
- A2.1 Scrub, dense/continuous
- B6 Grassland and marsh: Poor semi-improved
- C3.1 Tall herb and fern: Other, tall ruderal
- G2 Open water: Running water
- J1.4 Cultivated/ disturbed, introduced shrub
- J4 Miscellaneous: Bare ground

----- J2.4 Miscellaneous: Boundaries, Fence

● Broadleaved Trees

✕ Scattered Scrub

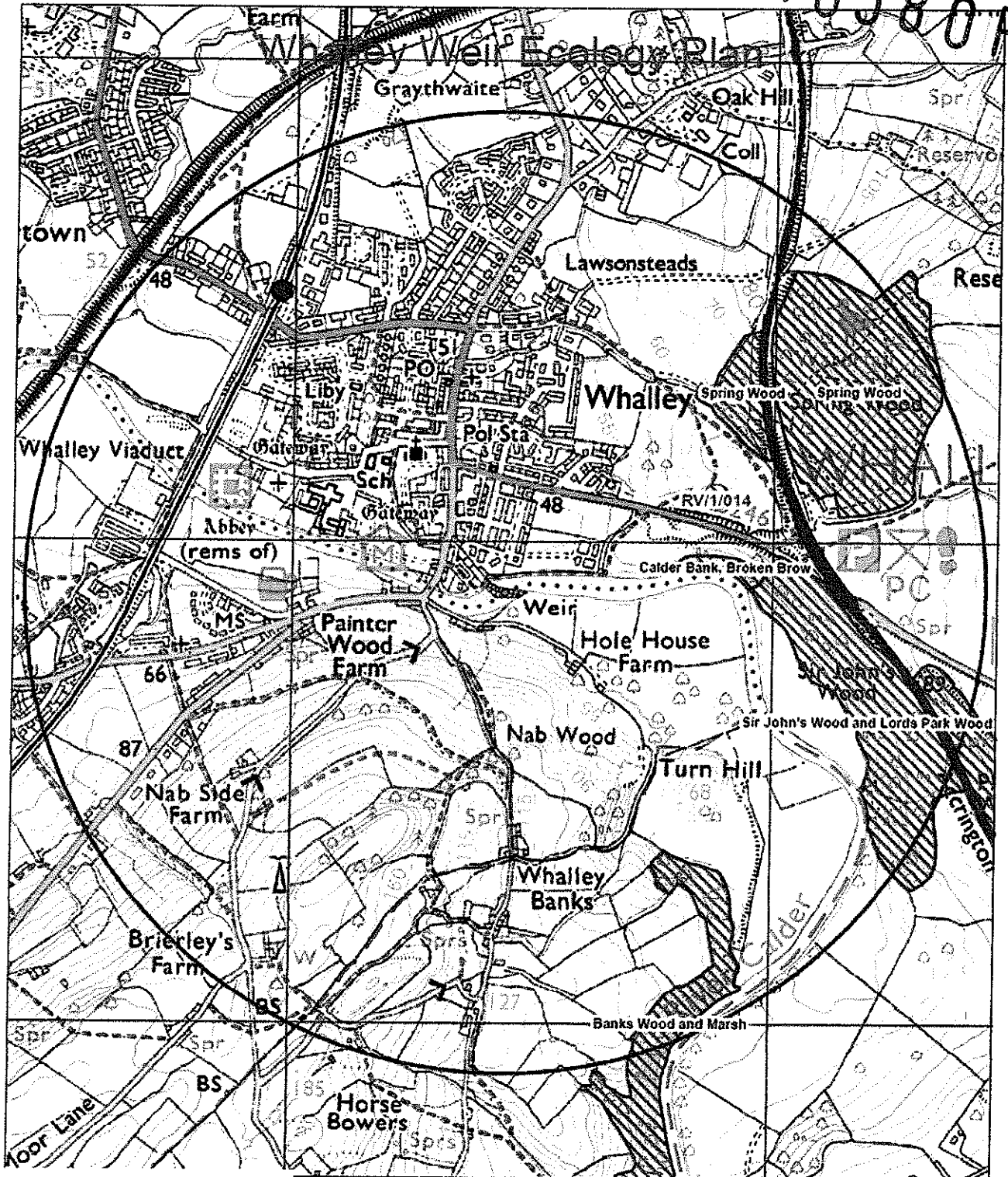
⊙ Target Note



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Appendix 3 Data Search Results

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Legend

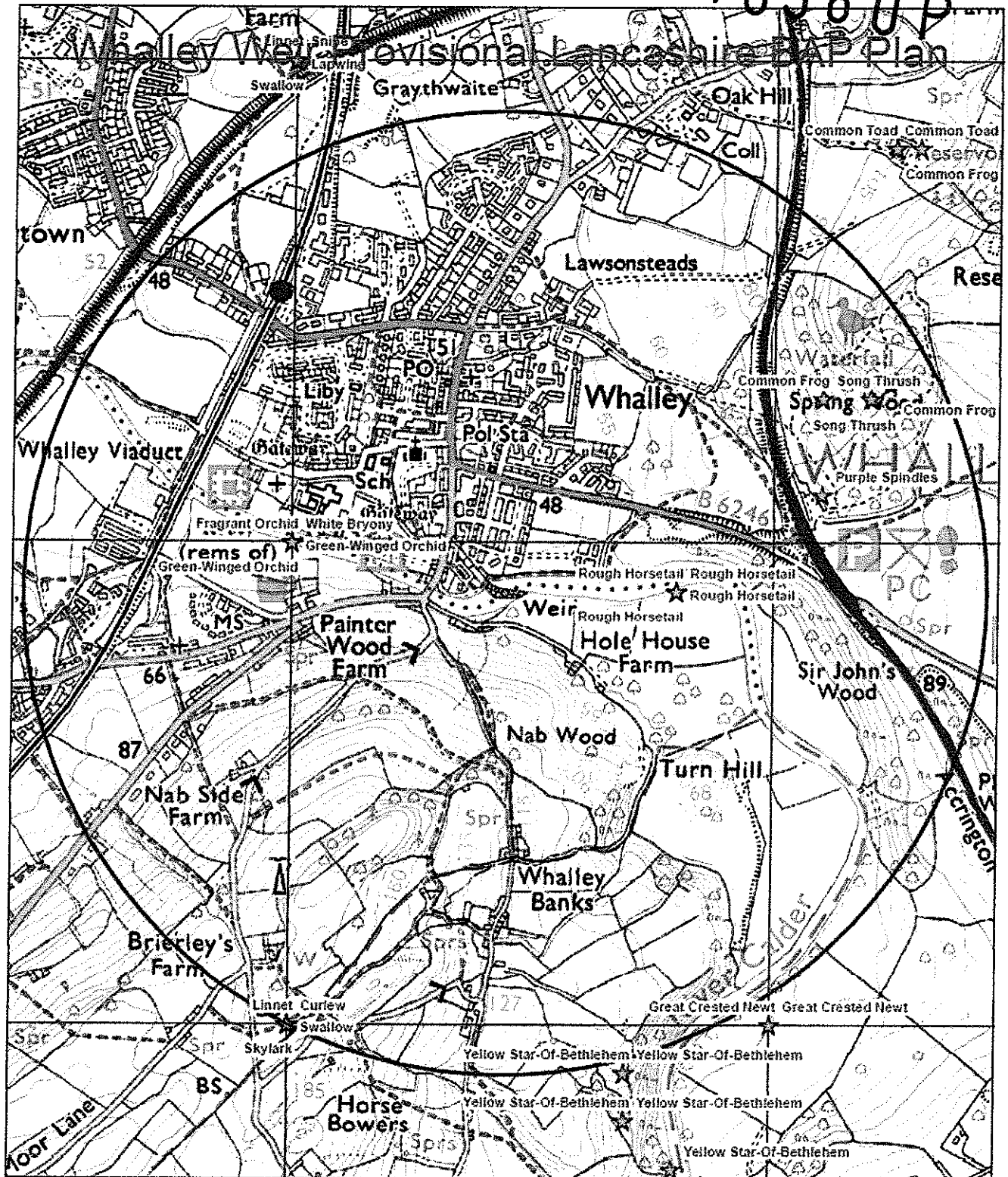
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- Whalley Weir
- Water Voles 2008-2009
- Biological Heritage Sites
- Local Geodiversity Sites

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Legend

Buffer_of_Whalley_Weir

Whalley Weir

Lancashire_BAP_Provisional_Long_List

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