# Appendix 10.3a

# River Corridor and Otter Survey Report

# M8 BAILLIESTON TO NEWHOUSE

## RIVER CORRIDOR AND OTTER SURVEY OF NORTH CALDER WATER

**Final Report**

| | |
|---|---|
| **Prepared for:** | **Mouchel Fairhurst** |
| **Prepared by:** | **David Knox** |
| **Approved by:** | **Karen Atkins** |
| **Date:** | **February 2006** |
| **Young Associates Ref:** | **B4400/R3/Rev2** |

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## 1. INTRODUCTION

1.1.1 This report presents the findings of a field survey focussing on otter activity and evaluating otter habitat (including fisheries potential) of the North Calder Water, and tributaries, within the potential ecological 'footprint' of the M8 Baillieston to Newhouse scheme in North Lanarkshire, in accordance with the requirements of Stage 3 Design Manual for Roads and Bridges (DMRB) assessment. The aim of this survey report is to produce an up-to-date baseline ecological understanding of otter in the vicinity of the road scheme allowing mitigation plans to be carefully considered. The survey was particularly important as there was a lack of detailed information on the otter ecology of the North Calder Water catchment system.

## 2. SURVEY METHODOLOGY

2.1.1 A detailed otter and otter habitat survey was carried out combining detailed river survey using the River Corridor Survey (RCS) methodology (National Rivers Authority, 1992) and otter survey as set out in the 'New Rivers and Wildlife Handbook' (NRA/RSPB/RSNC, 1994) and 'Otters and Development' (Scottish Natural Heritage publication, out of print). The use of this methodology effectively meets the requirements for otter survey as part of a Stage 3 DMRB assessment.

2.1.2 Searches for otters were carried out along the section of the watercourses potentially affected by the proposed development (see Figure 1) and also for a distance of approximately 250m both upstream and downstream. Searches were completed along the watercourse covering a corridor of 10m width each side of the central line of the watercourse. Examination of any obvious features such as tree roots and dense vegetation was carried out along with careful searches of any overhanging bank vegetation. At some locations, it was necessary to carefully move along riverbank to examine banks, tree roots and underneath the bridges, however, much of the rivers in the area are potentially too dangerous, e.g. deep pools and very steep banks, to allow complete access for close examination.

2.1.3 The presence/absence of otters was assessed using field signs of otter activity, including otter spraints, footprints, tracks, slides, couches and holts or potential holts (Bang and Dahlstrom, 2001; MacDonald and Barrett, 1993). All field signs were recorded and mapped.

2.1.4 Otter habitat evaluation covered to two geographically distinct stretches of the North Calder Water that lie within approximately 250 m of the proposed scheme as these are zones that may be directly impacted by habitat loss or severance (see Figure 1). These are:

- the North Calder Water by the A752 and Luggie Burn to the south of Bargeddie Junction on the A8; and
- the North Calder Water by the A725 and Shirrel Burn to the south of Shawhead Junction on the A8.

2.1.5 RCS is a methodology that allows for efficient, yet detailed, assessment of the geography and general ecology of watercourses and the riparian zone that is immediately adjacent to them. For each 500m section of river a section summary form and a RCS section map were produced and are included in this report. Otter features, such as potential holt sites and sprainting locations are annotated on the RCS maps. It is important to note that although the introduced mammal species American mink *Mustela vison* is not a protected species as it is often interrelated with otter (often sharing the same feeding habitats and breeding sites) records of American mink are also noted on the RCS maps. This allows a better understanding of the survey area's riverine ecology. There were no indications of activity of the protected mammal species, water vole *Arvicola terrestris* within the ecological 'footprint' of the road scheme. Also, to allow for a full ecological understanding of the river system's ecology, records of general riverine species are given in the RCS summary tables (such as sightings of birds such as kingfisher and fish).

2.1.6 To allow for detailed survey work a hand-held GPS was used to ensure that data was recorded as accurately as possible. However, as much of the rivers are located in steep and typically heavily wooded valleys it was often not possible to achieve a good level of GPS accuracy or any satellite signals. In such cases features were mapped relative to the position of identifiable landmarks on the ordnance survey base maps.

## 3. RESULTS

3.1.1 The results of the survey are presented in Figures 2 to 9, Tables 2 to 10 and Plates 1 to 9. In the surveyed areas the North Calder Water is a mainly natural river system contained in a mostly steep-sided, secluded incised river valley with an almost complete cover of riparian woodland and, to a lesser extent, scrub. Most of the woodland is unmanaged and of low botanical interest, and includes expansive stands of the invasive species Indian balsam *Impatiens glandulifera* and Japanese knotweed *Fallopia japonica*. This is particularly well developed by the confluence of the Luggie Burn and the North Calder Water.

3.1.2 To some extent pasture farmland impinges upon the riverbank, most notably at the western end of the survey area (see Figure 2) and at the eastern margin of the surveyed area (see Figures 8 and 9). Also, there is a fairly strong urban and industrial influence on the river valley (such as the scrap yard by the river, see Figure 3) and inevitably this results in localised impoverishment of the habitats due to disturbance and pollution.

3.1.3 The RCS suggests that the North Calder Water has reasonable potential to contain fish habitat, which in turn tends to strongly favour the long-term establishment of a local otter population. Mostly notably, there is an excellent diversity of riparian habitats within the survey areas, including a good cover of bank side woodland (of varied density and shading) and small marginal areas of flood plain (such as at the western margin of the survey area, see Figure 2). Also, is important to note that there is little indication of undercut riverbank and other riverbank erosion features (e.g. exposed tree roots), which tend to suggest unfavourable river ecology, such as high level of turbidity due to soil erosion.

3.1.4 The North Calder water and tributaries are diverse, comprising deeper slow flowing areas of runs (although there are few pools) and shallower flows that are dominated by riffles. The channel substrate is natural in character, formed mainly from gravel and cobbles that form potentially suitable fish spawning habitat. Apart from overbridges (and a minor weir, see Figure 7) there has been virtually no river engineering. Nevertheless, the river valley has been considerable modified by industry and the presence of long-since disused railways in historical times.

3.1.5 In terms of otter there is incontrovertible evidence for the presence of the species throughout the surveyed areas, although otters activity in the Luggie and Shirrel Burns is limited to these rivers' confluences with the North Calder Water. It is judged that the mostly secluded character of the river valley and the presence of wildlife habitat over farmland and urbanised area tends to benefit otter. The eastern surveyed part of the North Calder Water (see Figure 7 to 9), i.e. that affected by the new M8 overbridge, is probably the best suited area for otter due the presence of steep riverbanks with an abundance of mature trees with natural holes that can be used as holts.

## 4. CONCLUSIONS

4.1.1 Overall the survey indicates that the North Calder Water within the vicinity of the road scheme contains an active population of otter and other notable riverine species (including kingfisher), but no evidence of water voles. These data tend to infer that although the water quality of the river is sufficiently good to support a characteristic complement of aquatic invertebrates and fish species. However, close to their confluences with the North Calder Water its tributaries the Luggie Burn and Shirrel Burn are considered to be in less favourable ecological condition.

## 5. REFERENCES

Bang, P. and Dahlstrom, P. (2001) **Animal Tracks and Signs** Oxford University Press.

JNCC (2003) **Handbook for Phase 1 Habitat Survey, Field Manual** JNCC Publications.

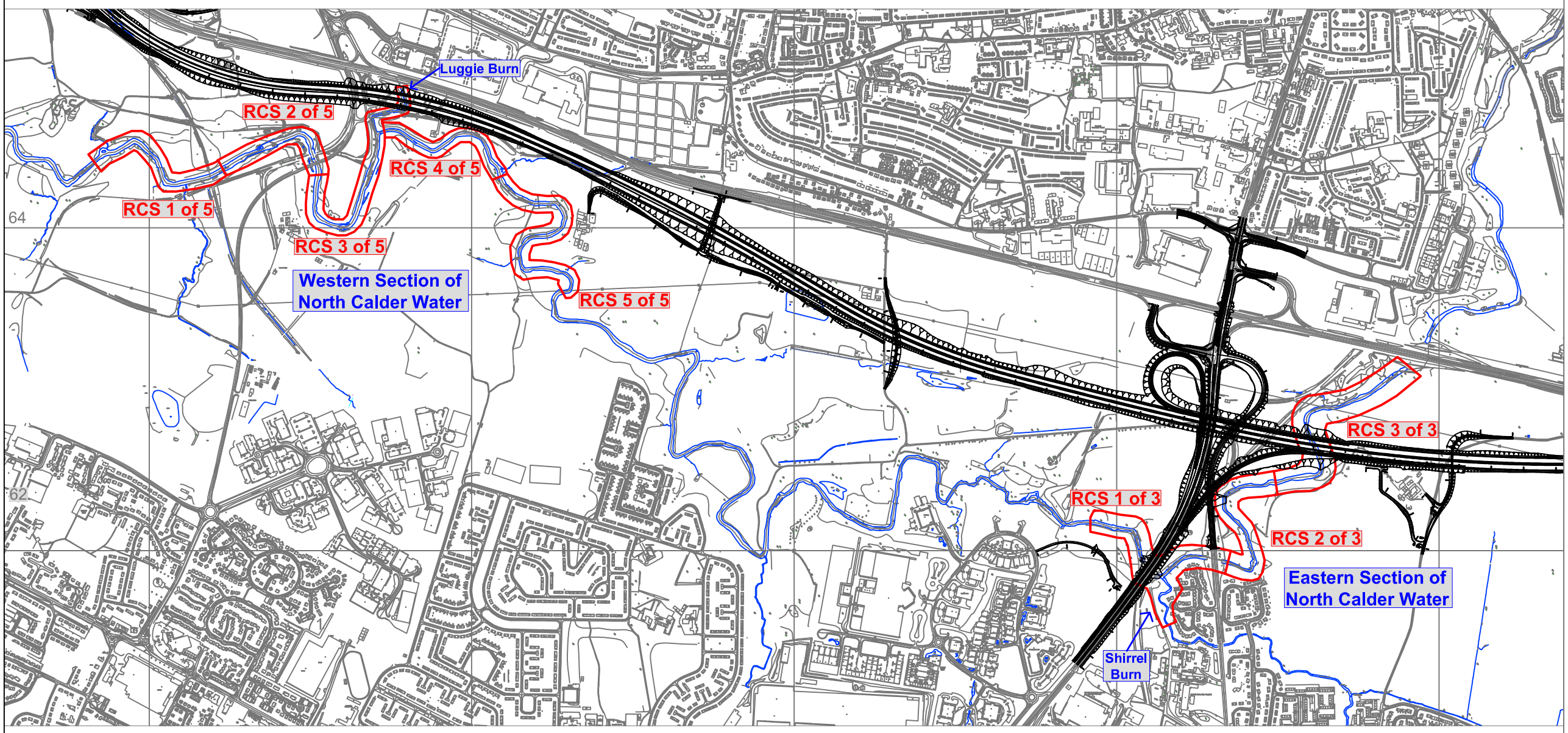
MacDonald, D. and Barrett, P. (1993) **Collins Field Guide – Mammals of Britain and Europe**, Harper Collins.

National Rivers Authority (1992) **River Corridor Surveys: Methods and Procedures**. HMSO.

Ward D, Holmes N, Jose P (editors) (1994) **The New Rivers and Wildlife Handbook**, RSPB, Sandy, Bedfordshire.

## Figure 1

Location of Surveyed Watercourses




## Key

- Watercourse
- River Corridor Survey (RCS) Section Locations

| | |
|---|---|
| CLIENT | TRANSPORT SCOTLAND<br>An agency of SCOTTISH EXECUTIVE |
| PROJECT TITLE | M8 Baillieston - Newhouse |
| AMENDMENTS | REV / REVISIONS / BY / CHKD / APP'D / DATE |



| | | | |
|---|---|---|---|
| DESIGN BY: | | CHECKED BY: | KA |
| DATE: | | DATE: | March 2006 |
| DRAWN BY: | DK | APPROVED BY: | UM |
| DATE: | October 2005 | DATE: | March 2006 |

DRAFT [ ] FINAL REPORT [X]

ENGINEER: Mouchel FAIRHURST

IN ASSOCIATION WITH SIAS YA

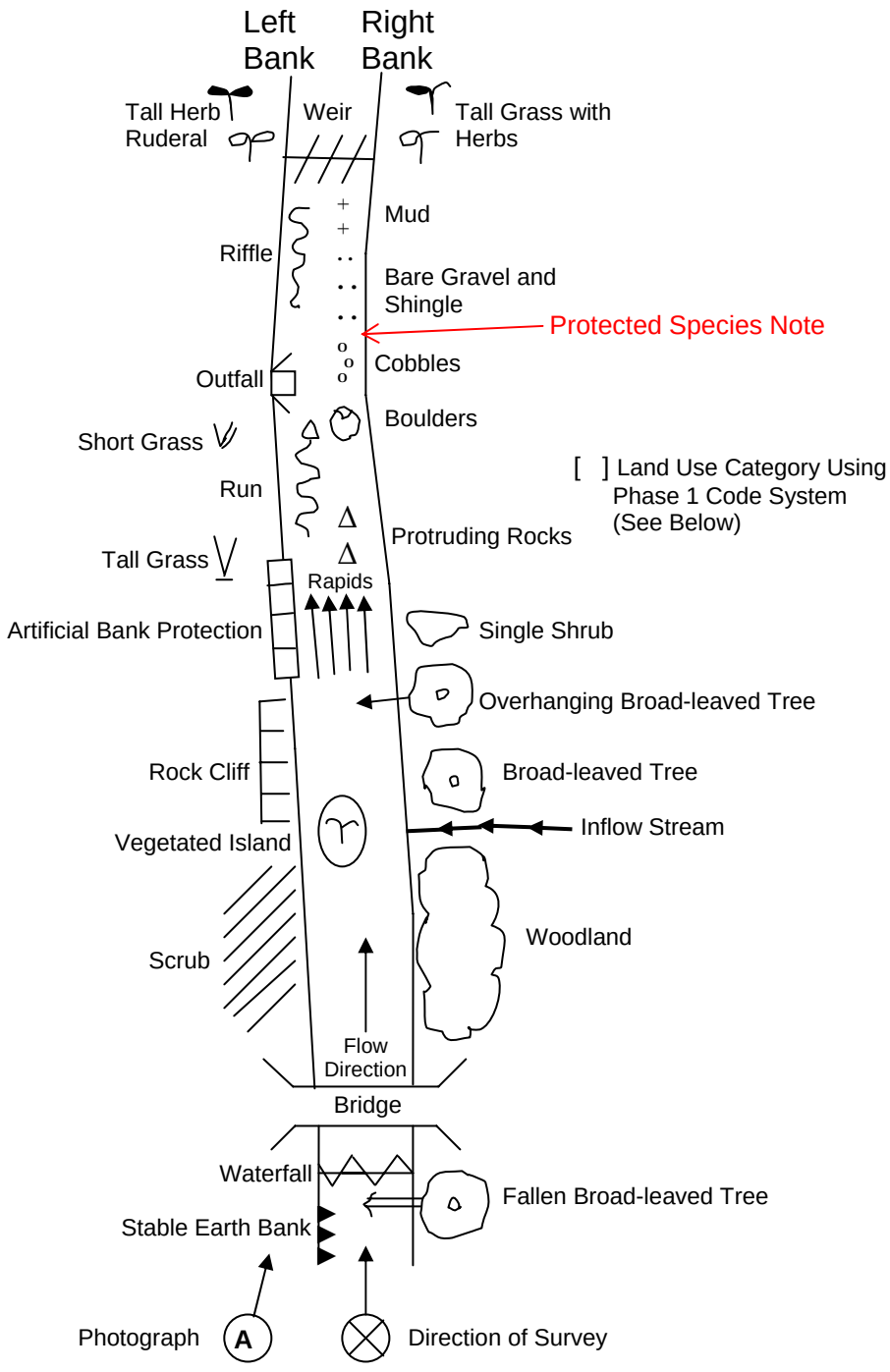
DRAWING TITLE: Map Showing Location of RCS Sections on the North Calder Water and the Luggie and Shirrel Burns

| SCALE | DRAWING NO | REV |
|---|---|---|
| 1 :14 000 AT A3 | Figure 1 | - |

## Table 1

Key to River Corridor Survey Maps

Table 1 Key to River Corridor Survey (RCS) Maps




## Phase 1 Habitat Codes

| | |
|---|---|
| A111 | Broad-leaved Semi-natural Woodland |
| A112 | Broad-leaved Plantation |
| A21 | Dense / Continuous Scrub |
| A22 | Scattered Scrub |
| B21 | Unimproved Neutral Grassland |
| B22 | Semi-improved Neutral Grassland |
| B4 | Improved Grassland |
| B6 | Poor Semi-improved Grassland |
| C31 | Tall Ruderal Vegetation |
| J11 | Arable |
| J36 | Buildings |
| J4 | Bare Ground |

## Table 2

Floral and Fauna Species Lists

## Table 2 Floral and Faunal Species Lists*

| Common name | Scientific name |
|---|---|
| **TREES** | |
| Norway maple | *Acer platanoides* |
| Sycamore | *Acer pseudoplatanus* |
| Horse chestnut | *Aesculus hippocastanum* |
| Alder | *Alnus glutinosa* |
| Birch species | *Betula sp.* |
| Beech | *Fagus sylvatica* |
| Ash | *Fraxinus excelsior* |
| Pine species | *Pinus sp.* |
| Scots pine | *Pinus sylvestris* |
| Poplar species | *Populus sp.* |
| Cherry species | *Prunus sp.* |
| Bird cherry | *Prunus padus* |
| Blackthorn | *Prunus spinosa* |
| Oak species | *Quercus sp.* |
| Willow species | *Salix sp.* |
| White willow | *Salix alba* |
| Crack willow | *Salix fragilis* |
| Rowan | *Sorbus aucuparia* |
| Lime species | *Tilia sp.* |
| Wych elm | *Ulmus glabra* |
| **SHRUBS** | |
| Dogwood | *Cornus sanguinea* |
| Hawthorn | *Crataegus monogyna* |
| Broom | *Cytisus scoparius* |
| Holly | *Ilex aquifolium* |
| Rhododendron | *Rhododendron ponticum* |
| Dog rose | *Rosa canina agg.* |
| Raspberry | *Rubus idaeus* |
| Bramble | *Rubus fruticosus agg.* |
| Goat willow | *Salix caprea* |
| Willow species | *Salix sp.* |
| Elder | *Sambucus nigra* |
| Gorse | *Ulex europaeus* |
| **CLIMBERS** | |
| Ivy | *Hedera helix* |
| Honeysuckle | *Lonicera periclymenum* |
| **GRASSES** | |
| Sweet vernal-grass | *Anthoxanthum odoratum* |
| Crested dog's-tail | *Cynosurus cristatus* |
| Cock's-foot | *Dactylis glomerata* |
| Tufted hair-grass | *Deschampsia cespitosa* |
| Red fescue | *Festuca rubra* |

| Common name | Scientific name |
|---|---|
| Fescue species | *Festuca sp.* |
| Reed sweet-grass | *Glyceria maxima* |
| Yorkshire fog | *Holcus lanatus* |
| Creeping soft-grass | *Holcus mollis* |
| Reed canary-grass | *Phalaris arundinacea* |
| **RUSHES** | |
| Soft rush | *Juncus effusus* |
| Great woodrush | *Luzula sylvatica* |
| **HERBS** | |
| Sneezewort | *Achillea ptarmica* |
| Moschatel | *Adoxa moschatellina* |
| Ground-elder | *Aegopodium podagraria* |
| Bugle | *Ajuga reptans* |
| Wood anemone | *Anemone nemorosa* |
| Wild angelica | *Angelica sylvestris* |
| Cow parsley | *Anthriscus sylvestris* |
| Burdock species | *Arctium sp.* |
| Lords-and-ladies | *Arum maculatum* |
| Daisy | *Bellis perennis* |
| Wavy bitter-cress | *Cardamine flexuosa* |
| Hairy bitter-cress | *Cardamine hirsuta* |
| Cuckooflower | *Cardamine pratensis* |
| Black knapweed | *Centaurea nigra* |
| Common mouse-ear | *Cerastium fontanum* |
| Rosebay willowherb | *Chamerion angustifolium* |
| Opposite-leaved golden-saxifrage | *Chrysosplenium oppositifolium* |
| Enchanter's-nightshade | *Circea lutetiana* |
| Creeping thistle | *Cirsium arvense* |
| Marsh thistle | *Cirsium paluste* |
| Pink purslane | *Claytonia sibirica* |
| Pignut | *Conopodium majus* |
| Marsh hawk's-beard | *Crepis paludosa* |
| Crosswort | *Cruciata laevipes* |
| Common spotted-orchid | *Dactylorhiza fuchsii* |
| Foxglove | *Digitalis purpurea* |
| Great willowherb | *Epilobium hirsutum* |
| Broad-leaved willowherb | *Epilobium montanum* |
| Marsh willowherb | *Epilobium palustre* |
| Japanese knotweed | *Fallopia japonica* |
| Meadowsweet | *Filipendula ulmaria* |
| Cleavers | *Galium aparine* |
| Marsh bedstraw | *Galium palustre* |
| Fen bedstraw | *Galium uliginosum* |
| Herb-robert | *Geranium robertianum* |
| Wood crane's-bill | *Geranium sylvaticum* |
| Water avens | *Geum rivale* |

| Common name | Scientific name |
|---|---|
| Wood avens | *Geum urbanum* |
| Ground ivy | *Glechoma hederacea* |
| Hogweed | *Heracleum sphondylium* |
| Dame's violet | *Hesperis matronalis* |
| Spanish bluebell | *Hyacinthoides hispanica* |
| Bluebell | *Hyacinthoides non-scripta* |
| Hybrid bluebell | *Hyancinthoides non-scripta x H. hispanica* |
| Perforate St.John's-wort | *Hypericum perforatum* |
| Indian balsam | *Impatiens glandulifera* |
| Yellow iris | *Iris pseudacorus* |
| Nipplewort | *Lapsana communis* |
| Meadow vetchling | *Lathyrus pratensis* |
| Dog's mercury | *Mercurialis perennis* |
| Water forget-me-not | *Myosotis scorpioides* |
| Sweet cicely | *Myrrhis odorata* |
| Wood sorrel | *Oxalis acetosella* |
| Butterbur | *Petasites hybridus* |
| Ribwort plantain | *Plantago lanceolata* |
| Silverweed | *Potentilla anserina* |
| Barren strawberry | *Potentilla sterilis* |
| Selfheal | *Prunella vulgaris* |
| Meadow buttercup | *Ranunculus acris* |
| Lesser celandine | *Ranunculus ficaria* |
| Creeping buttercup | *Ranunculus repens* |
| Common sorrel | *Rumex acetosa* |
| Sheep's sorrel | *Rumex acetosella* |
| Curled dock | *Rumex crispus* |
| Broad-leaved dock | *Rumex obtusifolius* |
| Wood dock | *Rumex sanguineus* |
| Figwort | *Scrophularia nodosa* |
| Common ragwort | *Senecio jacobaea* |
| Red campion | *Silene dioica* |
| Smooth sow-thistle | *Sonchus oleraceus* |
| Hedge woundwort | *Stachys sylvatica* |
| Lesser stitchwort | *Stellaria graminea* |
| Greater stitchwort | *Stellaria holostea* |
| Common chickweed | *Stellaria media* |
| Common comfrey | *Symphytum officinalis* |
| Dandelion | *Taraxacum officinalis agg.* |
| Pick-a-back plant | *Tolmiea meziesii* |
| Lesser trefoil | *Trifolium dubium* |
| White clover | *Trifolium repens* |
| Colt's-foot | *Tussilago farfara* |
| Bulrush | *Typha latifolia* |
| Common nettle | *Urtica dioica* |
| Germander speedwell | *Veronica chamaedrys* |
| Common vetch | *Vicia sativa* |
| Bush vetch | *Vicia sepium* |

| Common name | Scientific name |
|---|---|
| Dog violet | *Viola riviniana* |
| **FERNS & ALLIES** | |
| Lady-fern | *Athyrium filix-femina* |
| Hard fern | *Blechnum spicant* |
| Broad buckler-fern | *Dryopteris dilatata* |
| Scaly male-fern | *Dryopteris affinis* |
| Male fern | *Dryopteris filix-mas* |
| Hart's-tongue fern | *Phyllitis scolopendrium* |
| Hard shield fern | *Polystichum aculeatum* |
| Bracken | *Pteridium aquilinum* |
| Field horsetail | *Equisetum arvense* |
| Wood horsetail | *Equisetum sylvaticum* |
| **MOSSES *** | |
| *Eurhynchium praelongium* | |
| *Isothecium myosuroides* | |
| *Mnium hornum* | |
| *Pleurozium schreberi* | |
| *Polytrichum commune* | |
| *Rhytidiadelphus squarrosus* | |
| **LIVERWORTS *** | |
| *Lophocolea bidentata* | |
| *Pellia epiphylla* | |

| Common name* | Scientific name |
|---|---|
| **MAMMALS** | |
| Roe deer | *Capreolus capreolus* |
| Otter | *Lutra lutra* |
| Badger | *Meles meles* |
| Common field vole | *Microstis agrestis* |
| Mink | *Mustela vison* |
| Rabbit | *Oryctolagus cuniculus* |
| Brown rat | *Rattus norvegicus* |
| Grey squirrel | *Sciurus carolinensis* |
| Common shrew | *Sorex araneus* |
| Fox | *Vulpes vulpes* |
| **BIRDS** | |
| Skylark | *Alauda arvensis* |
| Kingfisher | *Alcedo atthis* |
| Mallard | *Anas platyrhynchos* |

| Common name* | Scientific name |
|---|---|
| Swift | *Apus apus* |
| Grey heron | *Ardea cinerea* |
| Tufted duck | *Aythya fuligula* |
| Buzzard | *Buteo buteo* |
| Treecreeper | *Certhia familiaris* |
| Woodpigeon | *Columba palumbus* |
| Carrion crow | *Corvus corone* |
| Rook | *Corvus frugilegus* |
| Mute swan | *Cygnus olor* |
| Great spotted woodpecker | *Dendrocopos major* |
| Robin | *Erithacus rubecula* |
| Kestrel | *Falcon tinnunculus* |
| Chaffinch | *Fringilla coelebs* |
| Coot | *Fulica atra* |
| Oystercatcher | *Haematopus ostralegus* |
| Swallow | *Hirundo rustica* |
| Grey wagtail | *Motacilla cinerea* |
| Blue tit | *Parus caeruleus* |
| Great tit | *Parus major* |
| Grey partridge | *Perdix perdix* |
| Chiffchaff | *Phylloscopus collybita* |
| Willow warbler | *Phylloscopus trochilus* |
| Dunnock | *Prunella modularis* |
| Goldcrest | *Regulus regulus* |
| Sand martin | *Riparia riparia* |
| Woodcock | *Scolopax rusticola* |
| Wren | *Troglodytes troglodytes* |
| Blackbird | *Turdus merula* |
| Song thrush | *Turdus philomelos* |
| **AMPHIBIANS** | |
| Common toad | *Bufo bufo* |
| Common frog | *Rana temporaria* |
| **INVERTEBRATES** | |
| Orange tip butterfly | *Anthocharis caradamines* |
| Green-veined white | *Artogeia napi* |

* This represents those species positively identified by surveyors and is not intended to provide a complete list.

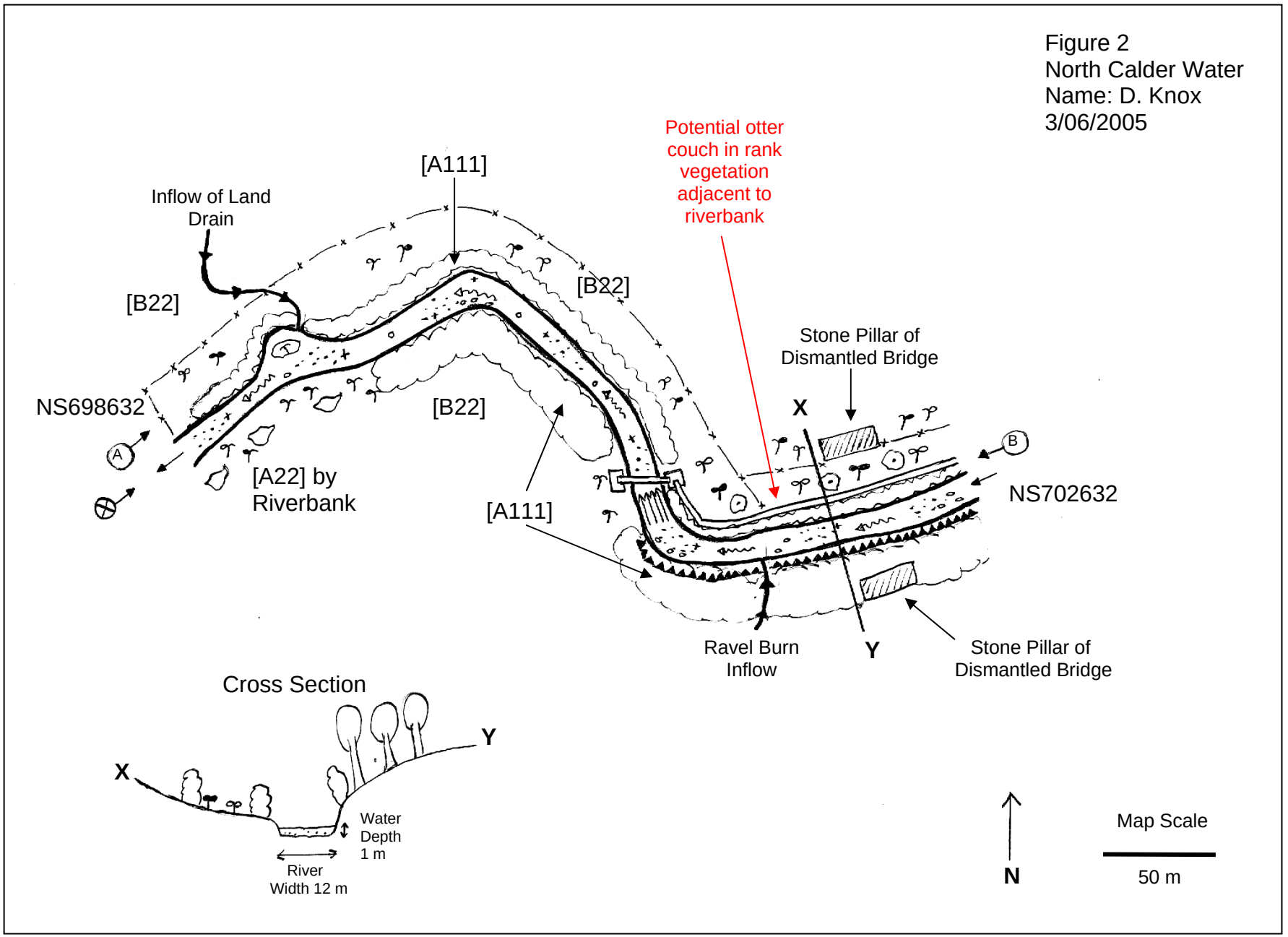
**North Calder Water – West Section 1 of 5**

Figure 2

Table 3

Plate 1

Figure 2
North Calder Water
Name: D. Knox
3/06/2005



## River Corridor Survey Section Summary Description

### Table 3

| | | |
|---|---|---|
| **River:** North Calder Water – West Section | **Section:** 1 of 5 | **Date:** 3/06/2005 |
| **Weather:** The conditions at the time of survey were dry, calm and quite warm. However, there had been considerable rain over the previous week and the level of the river was above average (but it was not in spate). | | **Surveyor:** D.Knox |
| **Flow rate/current features/water level:** A moderately fast flowing river, where run is the predominant flow feature. There is a short section of rapids just past a tight bend in the river (where a pipeline crosses over the channel). Overall the water depth is difficult to judge due to the turbid nature of the river and it is estimated that water depth is typically > 1 m. | | |

**Physical Features of Channel**

| |
|---|
| i). Broad description: This section of the North Calder Water is a zone where a mostly constricted section of V-shaped river valley expands out into a much broader valley that contains reasonably expansive floodplain deposits (on either bank). Apart from localised engineering work (such as the pipeline and embankments/stonework of a dismantled railway bridge), the river is natural in character and comprises natural meanders. Also, the adjacent land has not been greatly modified by human activity, as it comprises well-established native woodland and low intensity pasture. Water quality in the section appears to be fairly good (although there is a certain degree of effluent smell), and the turbid nature of the water is most likely a consequence of recent high rainfall level washing soil particles into the river. |
| ii). Dimensions: The study section is 500m in length and comprises two meanders with tight 'elbow like' bends. The width of the river is approximately 10-14 m and its depth is in the region of 1 m (estimate). Its banks are steep, with a height to the top of bank of 1.5 – 2 m. The majority of the river section is enclosed in a fairly narrow steep valley (sloping ~30°) that rises ~ 25 m above the river level on either bank. |
| iii). Substrate: Predominantly alluvial mud, sand and fine-sized gravel. However, there are protruding rock exposures and boulders by the small section of rapids (where the pipeline crosses over the channel). |
| iv). Bank Type: The banks are mostly steep and natural being formed from thick alluvium deposits. The banks are naturally stabilised by vegetation (see below). |
| v). Special Features: The remnants of a river terrace lie about 20 m above the present river. This represents the outline of a much larger watercourse (200 m across) that was created by glacial meltwater. |

**Vegetation Description**

| |
|---|
| **Aquatic Vegetation:** There is virtually no aquatic vegetation, due to the deep and fairly fast flowing (*i.e.* erosive) nature of the river. |
| **Marginal Vegetation (both banks):** Similar to aquatic vegetation. There is a small vegetated island with reed canary grass close to the outfall of a minor stream, in the downstream part of the section. |
| **Bank Vegetation (both banks):** There is typically well-developed riparian woodland throughout the section. This is quite dense on the southern bank as the banks are steep and have not been farmed (and the field layer vegetation is rather poor due to the dense nature of the woodland). On the northern banks, the riparian woodland is more open in character with lush tall ruderal vegetation (dominated by common nettle with rosebay willowherb with the alien species Indian balsam also commonplace). Tree/shrub species include sycamore and tree-sized willows and shrub-sized goat willow and hawthorn. Shrub-sized wych elm is also common on the north bank (but does not reach maturity due to Dutch elm disease). |
| **Adjacent Landuse:** The southern side of the river comprises undisturbed semi-natural woodland with pasture beyond. On the north side of the river the land is low intensity pasture. |

| |
|---|
| **Additional Ecological Notes:** The adjacent land of the section supports common breeding woodland birds. The river probably forms good otter hunting territory and there is a potential otter couch (a laying up area in dense vegetation) on the north bank (NS701631). There are no immediately obvious locations for holts along the section. It is unlikely that water vole populate the watercourse as it is too fast flowing and does not contain suitable soft sandy substrate for burrowing (which would be susceptible to erosion anyway) and there are also too many tree/shrub roots. The long section of near vertical stable earth bank on the south bank (close to the dismantled bridge) forms potentially suitable kingfisher habitat and there are also many suitable kingfisher feeding perches along much of the section, coupled with the well shaded nature of the river (good for fish). The section is not particularly good for dipper, except for the short section of exposed rocks associated with the small section of rapids where the pipeline crosses over the channel. The section represents good bat foraging habitat along the river its riparian woodland/scrub. It is possible that bats roost in the stone pillars of the dismantled railway bridge. |
| **Recreational Features:** There are no recreation features in the section. |
| **Existing Management:** The water quality is moderately good and there is no obvious pollution (point or diffuse) feeding into the river in the section. |
| **Potential Threats:** Pollution impacts on otters, dippers and kingfishers. |

**Recommendations**

| |
|---|
| i). Habitats to be retained: Trees/shrubs and the stone pillars of the dismantled bridge, which form potential bat habitat. |
| ii). Enhancement Suggestions: Maintain status quo. |

A

Looking upstream along the North Calder Water, from the margin of a fairly extensive area of floodplain, that lies downstream of the area described in this report. The majority of the river in this section is characterised by a narrow valley with steep, high riverbank. The flow regime illustrated in the photograph is run, which is dominant in this section. The section represents highly suitable for otter and kingfisher.

Looking west from just beyond the upstream end of this RCS section. The narrow, steep sided nature of the river is illustrated. Dense riparian woodland characterises the south bank, whereas scattered scrub and trees are commonplace on the north bank. In general the riverbanks are well shaded and form good fish habitat, and therefore also good otter hunting habitat.

B

**Plate 1**

Project: M8 Baillieston to Newhouse

Title: North Calder Water near dismantled railway bridge

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## North Calder Water – West Section 2 of 5

Figure 3

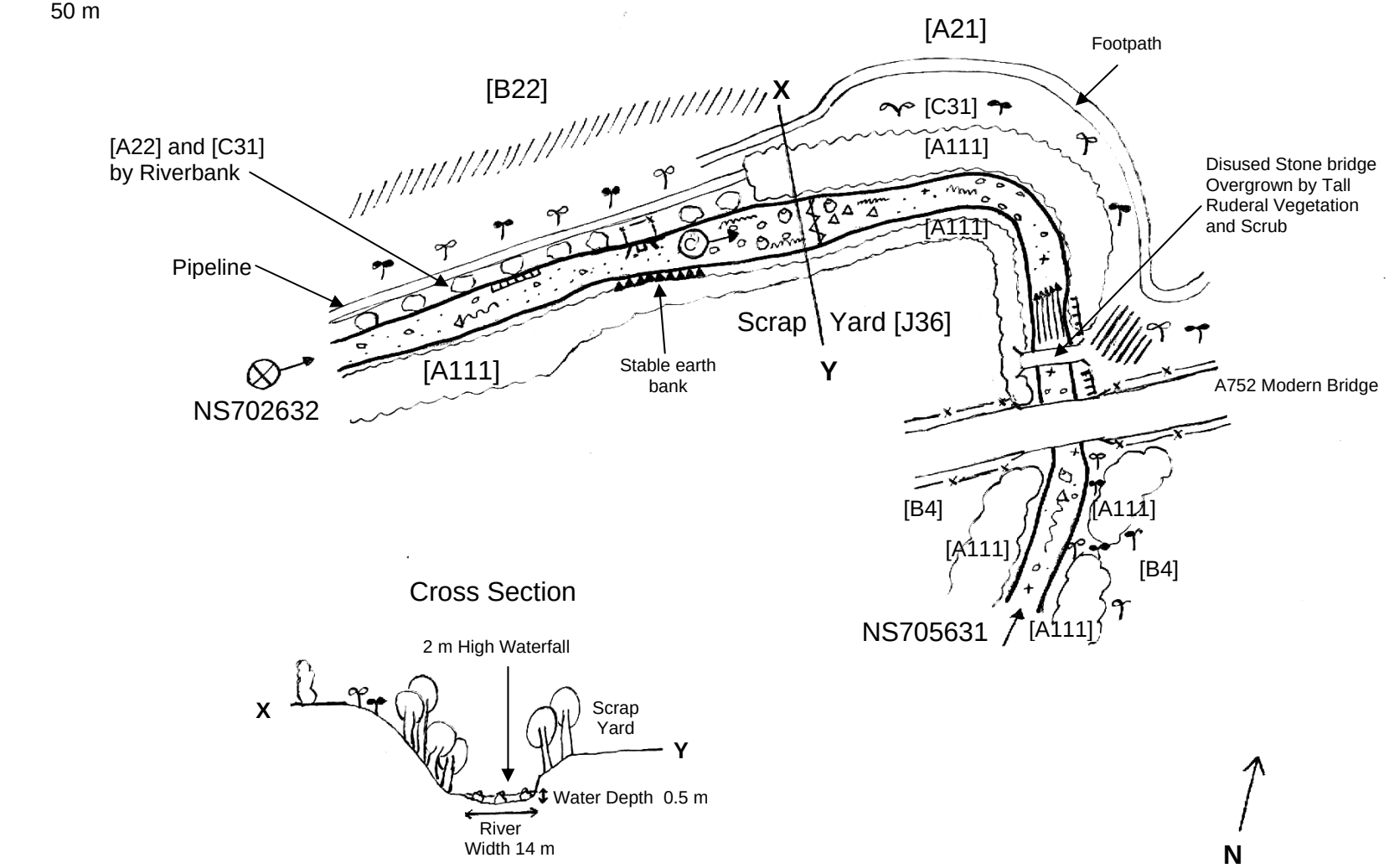
Table 4

Plate 2

Figure 3
North Calder Water
Name: D. Knox
3/06/2005

Map Scale

50 m



## River Corridor Survey Section Summary Description

### Table 4

| | | |
|---|---|---|
| **River:** North Calder Water – West Section | **Section:** 2 of 5 | **Date:** 3/06/2005 |
| **Weather:** The conditions at the time of survey were dry, calm and quite warm. However, there had been considerable rain over the previous week and the level of the river was above average (but it was not in spate). | | **Surveyor:** D.Knox |
| **Flow rate/current features/water level:** A moderately fast flowing river. Run is the predominant flow feature in the upstream and downstream margins of the section. The central part of the section includes fairly shallow riffles and an impressive 2 m high natural waterfall. Upstream from the waterfall, by an old disused bridge, there is a short section of rapid. Overall the water depth is difficult to judge due to the turbid nature of the river and it is estimated that water depth is typically > 1 m in the areas where runs are dominant and 0.3-0.5 m deep where riffles are commonplace. | | |
| **Physical Features of Channel** | | |
| i). Broad description: This section of the North Calder Water is a zone comprising of a constricted V-shaped river valley, with a tight bend about 100 m downstream, where the modern A752 bridge crosses over the river. The inside of the bend contains a small scrap yard in flat lying ground, which is likely to represent a small area of floodplain. The river is natural in character and is meandering. Also, the adjacent land to the north has not been greatly modified by human activity, as it comprises well-established native woodland. However, a scrap yard on the south bank impacts on the river's landscape. Water quality in the section appears to be fairly good (although there is a certain degree of effluent smell), and the turbid nature of the water is most likely a consequence of the recent high rainfall washing soil particles into the river. | | |
| ii). Dimensions: The study section is 500m in length and comprises a meander, with a tight 'elbow like' bend. The width of the river is approximately 10-14 m and its depth is in the region of 1 m (estimate) where run is common, and 0.3-0.5 m where riffles are present. Its banks are steep and the height to the top is 1.5 – 2 m. The majority of the river section is enclosed in a narrow steep valley (sloping ~30°) that rises ~ 25 m above the river level on either bank. By the bend in the river, the section is almost gorge-like in character. | | |
| iii). Substrate: Predominantly alluvial mud, sand and fine-sized gravel in the deeper section of river (runs). However, there are protruding rock exposures and boulders by the waterfall and small section of rapids. | | |
| iv). Bank Type: The banks are mostly steep and natural being formed from thick alluvium deposits. The banks are naturally stabilised by vegetation (see below). | | |
| v). Special Features: The remnants of a river terrace lie about 20 m above the present river. This represents the outline of a much larger watercourse (200 m across) that was created by glacial meltwater. | | |
| **Vegetation Description** | | |
| **Aquatic Vegetation:** There is virtually no aquatic vegetation due to the deep and fairly fast flowing (*i.e.* erosive) nature of the river. | | |
| **Marginal Vegetation (both banks):** Similar to aquatic vegetation. | | |
| **Bank Vegetation (both banks):** There is well-developed and dense riparian woodland throughout the section. The field layer vegetation is rather poor due to the dense nature of the woodland. On the northern banks, the riparian woodland is more open in character, with lush tall ruderal vegetation (dominated by common nettle with rosebay willowherb and the alien species Indian balsam also commonplace). Tree/shrub species include sycamore, ash and tree-sized willows and shrub-sized goat willow and hawthorn. Shrub-sized wych elm is also common (but does not reach maturity due to Dutch elm disease). | | |
| **Adjacent Landuse:** Immediately to the north is semi-natural broad-leaved woodland that has never been used due to its steep nature. Beyond it lies pasture. A small scrap yard is situated on the south bank of the river. It is reasonably well screened from the river by well-developed riparian woodland. | | |
| **Additional Ecological Notes:** The woodland and scrub of the section supports common breeding woodland birds. The river probably forms good otter hunting territory. There are no immediately obvious locations for holts along the section. It is unlikely that water vole populate the watercourse as it is too fast flowing and does not contain suitable soft sandy substrate for burrowing (which would be susceptible to erosion anyway) and there are also too many tree/shrub roots as well. The short section of near vertical stable earth bank on the south bank forms potentially suitable kingfisher habitat and there are also some suitable kingfisher feeding perches along much of the section, coupled with the well shaded nature of the river (good for fish). The section is particularly good dipper habitat as it contains a short section of rock exposure (with crevices for nesting). The section represents good bat foraging habitat, with riparian woodland/scrub along the river. It is possible that bats roost in crevices in the disused stone bridge and possibly in the adjacent rock cliff. | | |
| **Recreational Features:** There are no recreation features in the section. | | |
| **Existing Management:** The water quality is moderately good and there is no obvious pollution (point or diffuse) feeding into the river in the section (including an outfall on the north side of the river and the scrap yard on the south side). However, there has been pollution caused by a small spillage of oil about 20 m east of the old bridge (on a footpath). The spillage appears to be localised and does not probably feed into the river. | | |
| **Potential Threats:** Pollution impacts on otters and kingfishers. | | |
| **Recommendations** | | |
| i). Habitats to be retained: Trees/shrubs and the disused stone bridge, which form potential bat habitat. | | |
| ii). Enhancement Suggestions: Maintain status quo. | | |

C

Looking upstream at the 2m high (approximately) waterfall, near the central part of this section of the RCS. Riffle is the predominant flow regime of this section. The river at this point is appreciably wider (about 14 m wide) compared with the rest of the survey area. The river is also considerably shallower (about 0.5 m) and has a coarse substrate of cobbles, coarse gravel and sparse boulders. There are also some rock exposures, most notably forming the actual waterfall. The photograph illustrates the inaccessibility of this stretch of the river, as it flows through a narrow, steep-sided valley, with dense riparian woodland on either side. This stretch of the river represents suitable otter hunting territory as it is also very suitable fish habitat. This section of river also forms very good dipper habitat as there are rocky crevices for nesting, coupled with very suitable foraging habitat.

**Plate 2**

Project: M8 Baillieston to Newhouse

Title: North Calder Water downstream of dismantled railway bridge

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## North Calder Water – West Section 3 of 5

Figure 4

Table 5

Plate 3

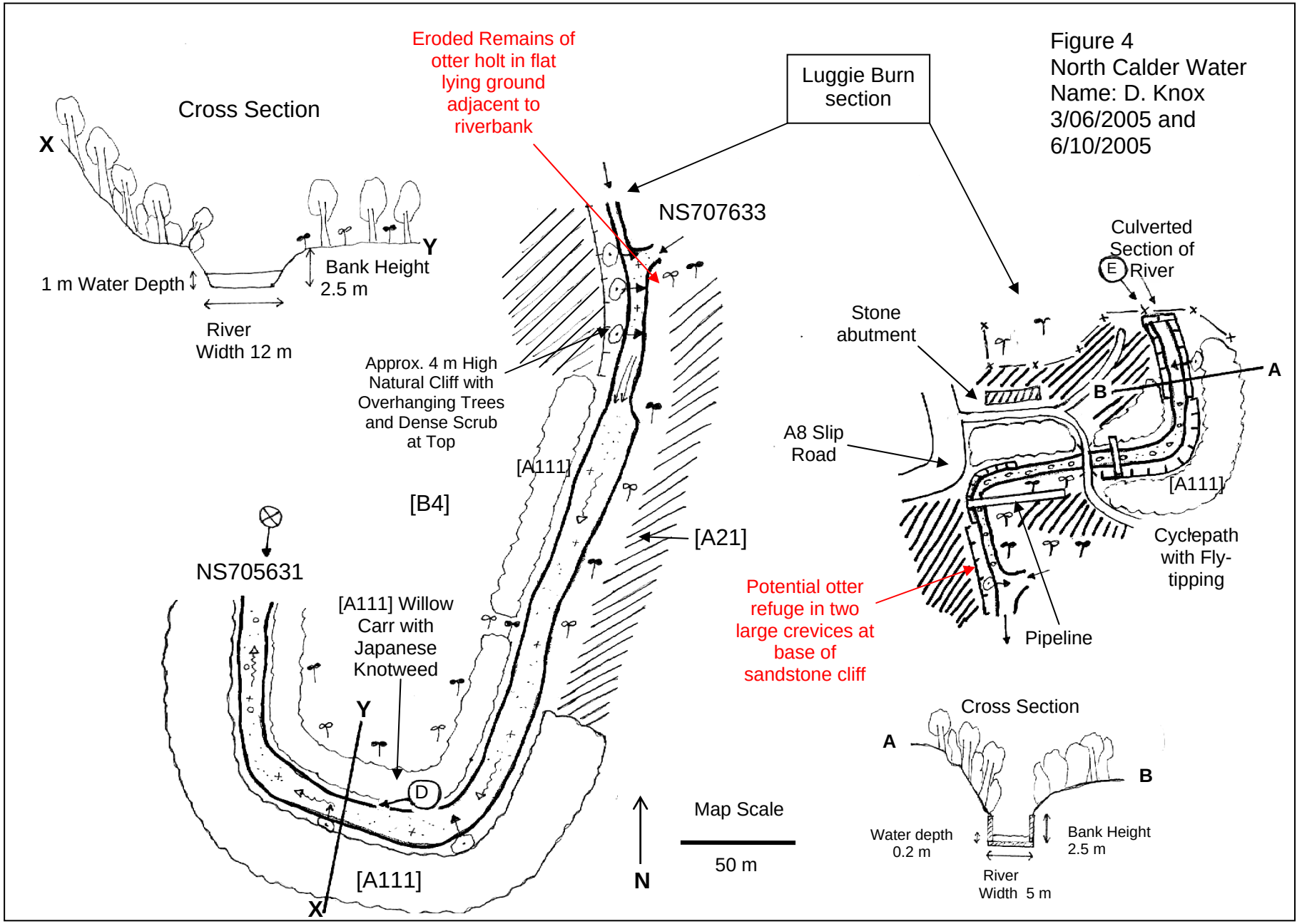
Figure 4
North Calder Water
Name: D. Knox
3/06/2005 and
6/10/2005
Eroded Remains of otter holt in flat lying ground adjacent to riverbank
Luggie Burn section
Cross Section
X
Y
1 m Water Depth
Bank Height 2.5 m
River Width 12 m
NS707633
Approx. 4 m High Natural Cliff with Overhanging Trees and Dense Scrub at Top
[A111]
[B4]
[A21]
NS705631
[A111] Willow Carr with Japanese Knotweed
D
[A111]
Map Scale
50 m
N
Culverted Section of River
E
Stone abutment
A
B
A8 Slip Road
[A111]
Cyclepath with Fly-tipping
Potential otter refuge in two large crevices at base of sandstone cliff
Pipeline
Cross Section
A
B
Water depth 0.2 m
Bank Height 2.5 m
River Width 5 m

## River Corridor Survey Section Summary Description

**Table 5**

| | | |
|---|---|---|
| **River:** North Calder Water and Luggie Burn – West Section | **Section:** 3 of 5 | **Date:** 3/06/2005 |
| **Weather:** The conditions at the time of survey were dry, calm and quite warm. However, there had been considerable rain over the previous week and the level of the river was above average (but it was not in spate). | | **Surveyor:** D.Knox |
| **Flow rate/current features/water level:** A moderately fast flowing river (including the tributary, Luggie Burn). Run is the predominant flow feature of the North Calder Water. Overall the water depth is difficult to judge due to the turbid nature of the river and it is estimated that water depth is typically > 1 m. The Luggie Burn comprises riffle along the natural section of the watercourse, although in the section, up to 40 m downstream of where it emerges from the culvert under the A8, the channel is wholly man-made (very fast flowing water over concrete base of structure). | | |
| **Physical Features of Channel** | | |
| i). Broad description: This section of the North Calder Water comprises a conspicuous well-rounded meander, with steep wooded or scrubby land on steep ground to the south, and flat-lying land on the inside of the meander (north bank) with riparian and wet woodland (willow carr). The central part of the meander is utilised for intensive agriculture. The upstream part of the section is almost gorge-like in character, with a vertical cliff forming the west bank of the river. This area includes the confluence with the Luggie Burn. The burn is contained in a very narrow and mostly steep sided valley. The burn is mostly natural in character, with two very tight meanders present. There are sections of man-made bank (by a slip road) and also a 100 m long section of steep rocky cliff, which is gorge-like in character. The North Calder is moderately good quality but the Luggie Burn is much more polluted (including discoloration and an effluent-like smell) and not particularly suitable for riverine wildlife (such as otter or kingfisher). | | |
| ii). Dimensions: The study section is 500m in length and comprises a meander of a fairly well-rounded character. The width of the river is approximately 12-14 m and its depth is in the region of 1 m (estimate). Its banks are steep and with a height to top of bank of 1.5 m. The meander is enclosed in a narrow steep valley (sloping ~30°) that rises ~ 40 m above the river level to flat-lying farmland. The upstream 100 m of the section, lies beyond the meander and is formed from an enclosed V-shaped valley with a vertical 4 m high rock cliff on the west bank.<br>The Luggie Burn passes through a narrow and deep valley that is approximately 50 m in width and is almost gorge-like in character. The burn is about 4-5 m wide and is relatively shallow (~ 0.3 m deep). | | |
| iii). Substrate: Predominantly alluvial mud, sand and fine-sized gravel in the section of river by the meander and the confluence with the Luggie Burn. The short section of rapid, downstream of the confluence, comprises a substrate of cobbles and small boulders. | | |
| iv). Bank Type: By the meander and the confluence with the Luggie Burn the banks are mostly steep and natural, being formed from thick alluvium deposits. Much of the banks of the Luggie are steep and include sections of rock cliff, artificial banking (by the slip road) and boulders (probably glacial boulder clay deposits). By the culvert, under the A8, the burn's channel and banks are totally artificial and have no wildlife value. | | |
| v). Special Features: The meander is constrained within an approximately 200 m wide zone, with river terraces to the south and north. The river terrace illustrates the outline of a much larger watercourse that carried glacial meltwater at the end of the last glacial period. High ground, immediately west of the confluence of the Luggie Burn and the North Calder Water, was an industrial site in historical times, which since its demolition has become colonised by dense scrub. There is a remnant stone abutment of a railway bridge by the Luggie Burn (near the cycle path). It has some bat potential (see ecological notes below). | | |
| **Vegetation Description** | | |
| **Aquatic Vegetation:** There is virtually no aquatic vegetation due to deep and fairly fast flowing (*i.e.* erosive) nature of the river. | | |
| **Marginal Vegetation (both banks):** Similar to aquatic vegetation about. | | |
| **Bank Vegetation (both banks):** There is well-developed and dense riparian woodland throughout the section. The field layer vegetation is rather poor due to the dense nature of the woodland). On the northern banks the riparian woodland is more open in character, with lush tall ruderal vegetation (dominated by common nettle and rosebay willowherb with the alien species Indian balsam also commonplace). Tree/shrub species include sycamore, ash and tree-sized willows and shrub-sized goat willow and hawthorn. Shrub-sized wych elm is also common (but does not reach maturity due to Dutch elm disease). | | |
| **Adjacent Landuse:** The north semi-natural broad-leaved woodland has never been used due to its steep nature. Land beyond the wooded riverbanks is mostly used for pasture, although the land within the meander may have also been used for producing crops. | | |
| **Additional Ecological Notes:** The woodland and scrub of the section supports common breeding woodland birds. The North Calder Water probably forms good otter hunting territory. However, the Luggie Burn is too polluted to form otter habitat. There are remains of a holt, burrowed into flat ground a few metres above the riverbank, at the confluence of the North Calder Water and the Luggie Burn. It is unlikely that water vole populate the watercourses as they are too fast flowing and do not contain much suitable soft bank substrate for burrowing and there are too many tree and shrub roots (that impede burrowing). Also, by the confluence, at the base of a sandstone cliff, there are two moderate-sized crevices that form potential otter refuges. A population of small fish were noted in the Luggie Burn about a hundred metres upstream of its confluence with the North Calder Water. There are suitable kingfisher feeding perches along much of the section of the North Calder Water, coupled with the well shaded and slow flowing nature of the river (good for fish). The section represents good bat foraging habitat along the river its riparian woodland/scrub. There is potential bat habitat in crevices in a stone abutment close to the A8 slip road. It is also possible that bats roost in the mature trees of the section (mainly located on the steep banking to the south of the river). | | |
| **Recreational Features:** There is a cyclepath / footpath by the Luggie Burn section (North Calder Heritage Trail) but excessive fly-tipping and vandalism result in low levels of use by the public. | | |
| **Existing Management:** The water quality management of the North Calder Water has been effective and consequently its water quality is moderately good. In contrast the water quality of the Luggie Burn is poor and is probably unmanaged. | | |
| **Potential Threats:** Pollution impacts on otters and kingfishers. | | |
| **Recommendations** | | |
| i). Habitats to be retained: Trees/shrubs. | | |
| ii). Enhancement Suggestions: The water quality of the Luggie Burn needs to be addressed. | | |

D

A medium distance view downstream from the southernmost part of a meander. At this point, the river is slow flowing, with run being the main flow regime. The river substrate is fine in nature (sand and mud). Steep, dense native woodland covers the south side of the valley, with open wet woodland (willow carr) and extensive stands of the highly invasive species Japanese knotweed and Indian balsam forming the field layer vegetation.

E

A view from where the Luggie Burn emerges from a major section of culvert under the A8. The burn is almost gorge-like and is relatively natural beyond the concrete walls that extend out about 30m south from the culvert. Dense broad-leaved woodland and scrub cover the valley, and the area is quite inaccessible in summer when the ground layer is very lush. Tracks allow access to the area. The Luggie Burn is heavily polluted and is not, by itself, of particular riverine wildlife interest, although the adjacent woodland/scrub is of appreciably high ecological interest.

**Plate 3**

Project: M8 Baillieston to Newhouse

Title: North Calder Water downstream of dismantled railway bridge

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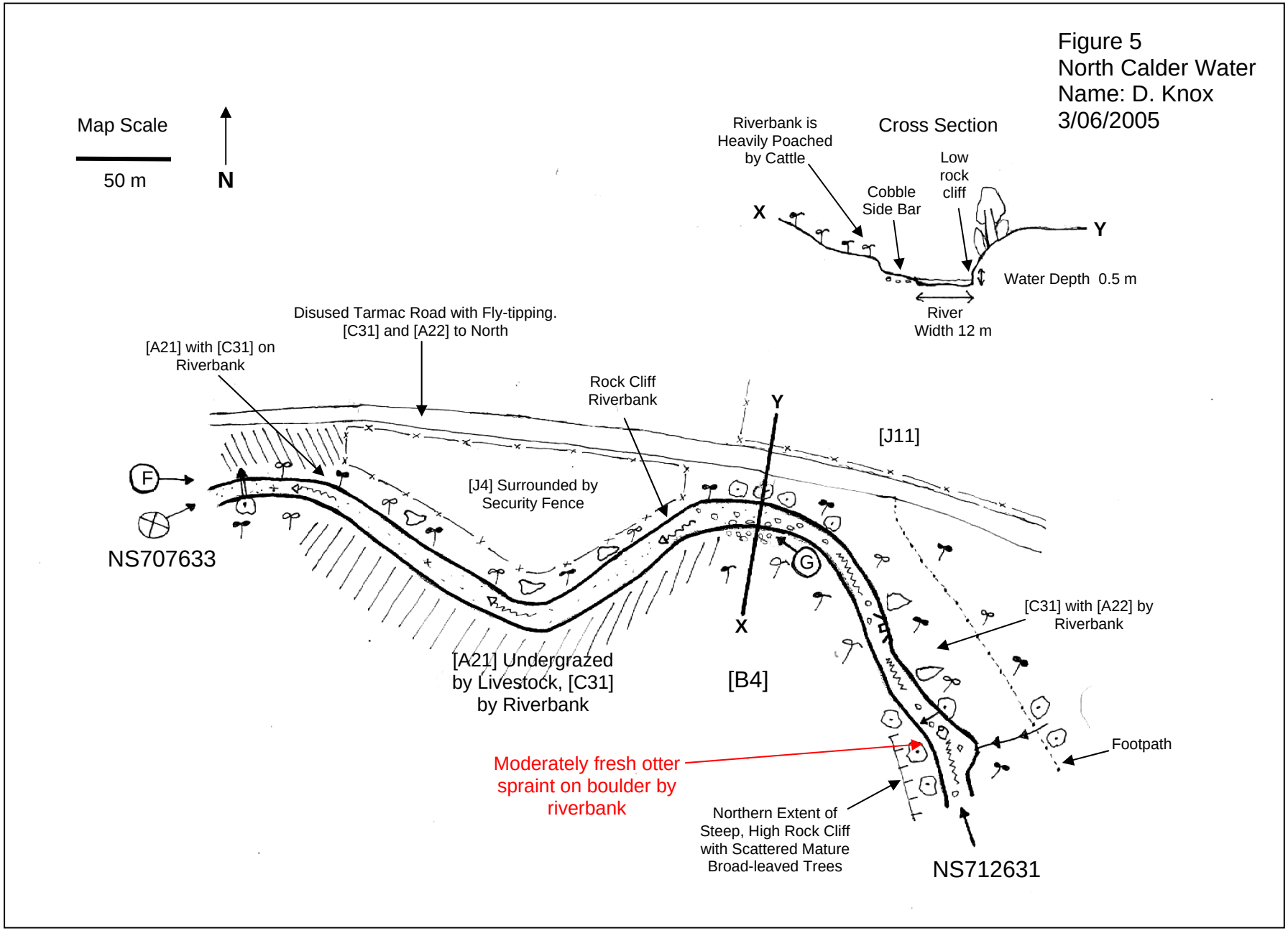
## North Calder Water and Luggie Burn – West Section 4 of 5

Figure 5

Table 6

Plate 4

Figure 5
North Calder Water
Name: D. Knox
3/06/2005



## River Corridor Survey Section Summary Description

### Table 6

| | | |
|---|---|---|
| **River:** North Calder Water – West Section | **Section:** 4 of 5 | **Date:** 3/06/2005 |
| **Weather:** The conditions at the time of survey were dry, calm and quite warm. However, there had been considerable rain over the previous week and the level of the river was above average (but it was not in spate). | | **Surveyor:** D.Knox |
| **Flow rate/current features/water level:** A moderately fast flowing river. Run is the flow feature of the downstream part of this section, with riffles commonplace in the upstream part. Overall the water depth is difficult to judge due to the turbid nature of the river and it is estimated that water depth is typically > 1 m in the downstream part of the section and ~0.5 m in the upstream part. | | |
| **Physical Features of Channel** | | |
| i). Broad description: This section of the North Calder Water comprises three gently curved meanders with steep scrub on steep ground (mainly to the south). The downstream 300 m of the section comprises a narrow V-shaped valley with steep sides by the river of ~20 to 30° slope. The upstream 200 m of the section is generally less enclosed, with a minor area of floodplain to the south and a large area of floodplain to the north. The north side of the river probably comprises a high proportion of made ground (including a disused road and a moderately large area of flat bare ground) but the north bank of the river has become reasonably well naturalised in recent times. The upstream end of the section features the northern end of a 200 m long vertical rock cliff forming the south riverbank. A floodplain lies to the north of the cliff and forms the north riverbank. In water quality terms the North Calder is moderately good quality, although there was some reddish water discoloration evident. | | |
| ii). Dimensions: The study section is 500 m in length. The width of the river is approximately 12 m and its depth is in the region of 1 m (estimate) in the downstream part of the section and ~ 0.5m in the upstream part. Its banks are steep and with a height to top of bank of 1.5 to 2 m. | | |
| iii). Substrate: Predominantly alluvial mud, sand and fine-sized gravel are prevalent in the downstream 300 m of the section (runs dominated) and coarser sediments (coarse gravel with cobbles and occasional boulders) in the upstream 200 m of the section (riffle dominated). | | |
| iv). Bank Type: The 300 m downstream section features riverbank mostly formed from fairly stable substrate. Made ground is probably present on the north bank, whereas natural soil (including boulder clay) forms the south bank (agricultural land colonised by dense scrub). There is also a short section of the north bank composed of low rock cliff, where the river lies close to the disused road. Upstream of this point, the riverbank is composed of alluvial sediments (flood plain deposits), except for the north end of the steep vertical rock cliff (see Table 3). | | |
| v). Special Features: The collapsed tree, at the downstream end of the section, forms a bridge over the river, allowing wildlife to cross the river at times of high water flow. In past times a railway crossed over the downstream part of the section but the only evidence of this are two stone abutments, surrounded by dense scrub, on the south side of the river. The abutments may have wildlife habitat potential (*e.g.* breeding bird and bat roost). | | |
| **Vegetation Description** | | |
| **Aquatic Vegetation:** There is virtually no aquatic vegetation due to the deep and fairly fast flowing (*i.e.* erosive) nature of the river. There is a very small stand of reed canary grass close to the south bank, where the river runs close to the disused road. | | |
| **Marginal Vegetation (both banks):** Similar to aquatic vegetation about. | | |
| **Bank Vegetation (both banks):** Dense tall ruderal vegetation is prevalent in most of the section. It is composed of tall growths of common nettle with rosebay willowherb, bramble and raspberry. Reasonably dense scrub (hawthorn) that has colonised pasture (used for grazing to some extent) on the south side of the river. There is rank grassland further upstream by the river's south bank. The north bank features dense stands of tall ruderal vegetation with scattered scrub (hawthorn and scrubby willow). | | |
| **Adjacent Landuse:** The north bank of the river was probably occupied by an industrial site in past times but has since been neglected. The south side of the river is low intensity pasture. | | |
| **Additional Ecological Notes:** The scrub and scattered trees of the section support common breeding woodland birds. The North Calder Water probably forms good otter hunting territory. A moderately fresh otter spraint was recorded on a boulder at the base of the large cliff at the upstream end of this RCS section. There is good kingfisher hunting territory in the downstream end of the section by the collapsed trees that bridges the river. There is also good dipper habitat in the upstream part of the section, most notably by the low rock cliff that forms the north river bank (close to where the river runs close to the disused road). | | |
| **Recreational Features:** There is a cyclepath / footpath that follows the disused road and then along the floodplain at the eastern end of the section (North Calder Heritage Trail), but excessive fly-tipping (including burnt out cars) and vandalism result in low levels of use by the public. | | |
| **Existing Management:** The water quality management of the North Calder Water has been effective and consequently its water quality is moderately good. | | |
| **Potential Threats:** Pollution impacts on otters and kingfishers. | | |
| **Recommendations** | | |
| i). Habitats to be retained: Trees/shrubs. | | |
| ii). Enhancement Suggestions: Maintain status quo. | | |

F

View downstream along the North Calder Water, from the western edge of this RCS section. The river runs through a narrow valley with dense to scattered scrub by the riverbank. The bankside vegetation is dominated by very lush growth of tall ruderals, dominated by common nettle and bramble. The main flow regime of this section is run, with a substrate that is composed of mud and sand. The large felled tree over the river forms a potential bridge to terrestrial mammals. This section represents particularly suitable kingfisher hunting habitat.

G

A view downstream on the eastern part of this RCS section. The river here is shallow with riffle forming the main flow regime. Low intensity pasture is present to the south of the river (with a rather poached and collapsed bank). In comparison, the north bank is composed of broad-leaved trees situated at the top of a very steep riverbank. The north riverbank includes a section of low rock cliff, whereas the south river bank is composed of a bar formed from cobbles.

**Plate 4**

Project: M8 Baillieston to Newhouse

Title: North Calder Water downstream of dismantled railway bridge

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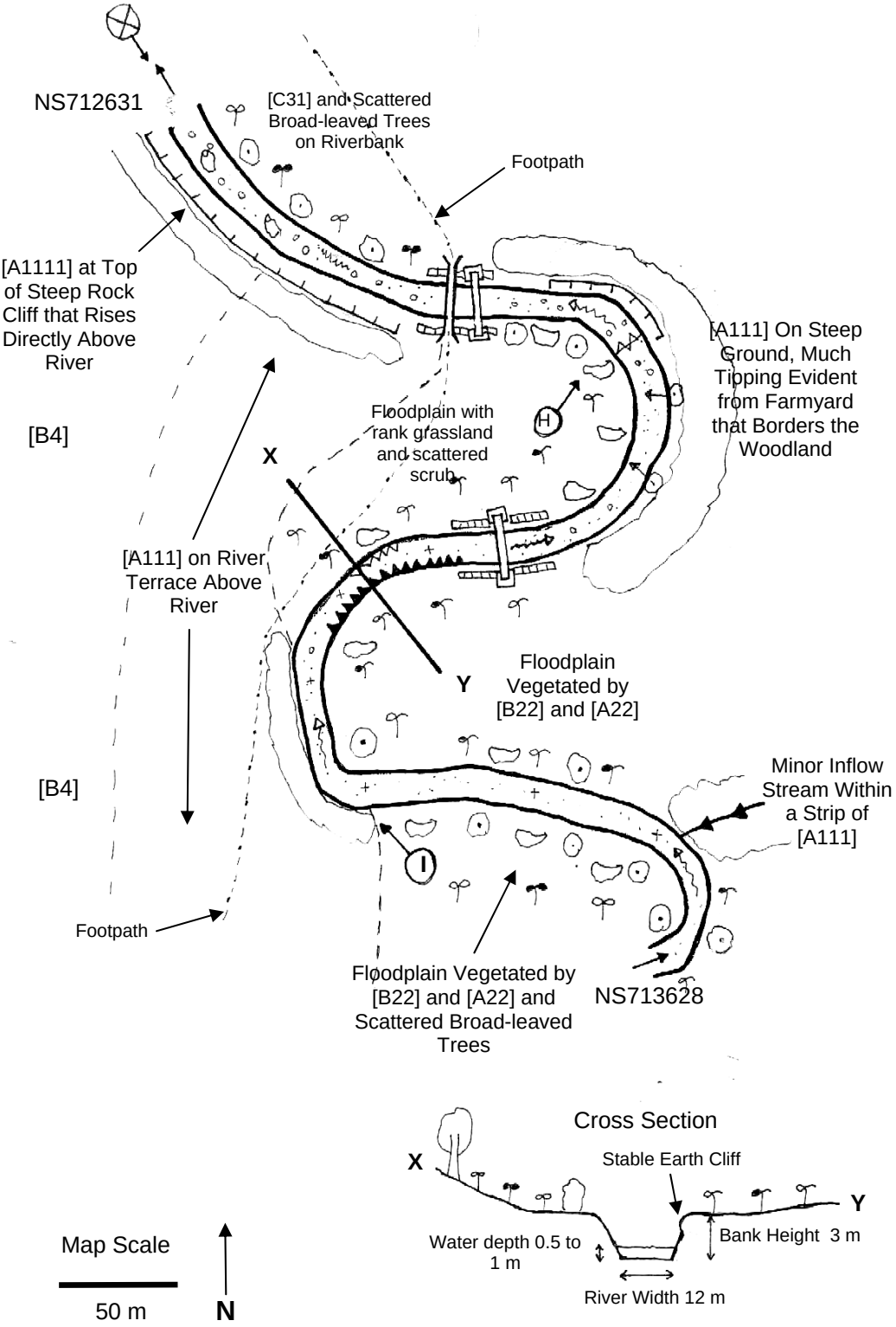
**North Calder Water – West Section 5 of 5**

Figure 6

Table 7

Plate 5

Figure 6
North Calder Water
Name: D. Knox
3/06/2005



## River Corridor Survey Section Summary Description

### Table 7

| | | |
|---|---|---|
| **River:** North Calder Water – West Section | **Section:** 5 of 5 | **Date:** 3/06/2005 |
| **Weather:** The conditions at the time of survey were dry, calm and quite warm. However, there had been considerable rain over the previous week and the level of the river was above average (but it was not in spate). | | **Surveyor:** D.Knox |
| **Flow rate/current features/water level:** A moderately fast flowing river. Run is the main flow feature of this section, except for riffles which are common in the downstream part (~150 m in extent). Overall the water depth is difficult to judge due to the turbid nature of the river and it is estimated that water depth is typically 0.5 to 1 m in the main part of the section and 0.3 to 0.5 m in the downstream section where riffles are common. | | |
| **Physical Features of Channel** | | |
| i). Broad description: This section of the North Calder Water is natural in character, comprising three virtually circular-shaped meanders enclosed within a narrow V-shaped valley that is ~300 m wide at the top and ~150m wide at the base. The slope of the valley sides varies from ~20 to 30°. The base of the valley is a narrow zone of floodplain vegetated mainly by rank grassland with riparian woodland (including scattered scrub). The sides of the valley are mostly covered by mature semi-natural broad-leaved woodland. To the south of the valley lies pasture and to the north the farmland is mainly arable land. | | |
| ii). Dimensions: The study section is 650 m in length. The width of the river is ~10 to 12 m and its depth is in the region of 05 to 1m in the main part of the section and ~0.5 m in the downstream part (riffle dominated). In general the riverbanks are steep and with a height to top of bank of ~3 m. | | |
| iii). Substrate: Predominantly alluvial mud, sand and fine-sized gravel are prevalent in the main part of the section, with coarser sediments (coarse gravel with cobbles and occasional boulders) in the downstream ~150 m of the section. There is a waterfall formed by rock exposure in the most downstream meander (~80 m upstream of the footbridge). | | |
| iv). Bank Type: The banks of the section are natural in character, with only three minor man-made sections of bank (concrete construction) that are a footbridge and a pipeline crossing the river at two points. In general the riverbank is composed of competent alluvial sand and mud that tend to form high and near vertical riverbank. | | |
| v). Special Features: The side of the river valley (river terrace) represent the banks of a much larger watercourse that flowed with glacial meltwater at the end of the last glacial period. Subsequently, the North Calder Water has eroded several tens of metres down to form the present day V-shaped valley. | | |
| **Vegetation Description** | | |
| **Aquatic Vegetation:** There is virtually no aquatic vegetation due to the deep and fairly fast flowing (*i.e.* erosive) nature of the river. There is a very small stand of reed canary grass close to the south bank where the river runs close to the disused road. | | |
| **Marginal Vegetation (both banks):** Similar to aquatic vegetation about. | | |
| **Bank Vegetation (both banks):** Dense rank grassland vegetation is prevalent in most of the section, although the floodplain at the southern edge of the section is dominated by tall ruderal vegetation. The rank grassland is composed of stands of grass species such as cock's-foot and common herbs such as rosebay willowherb and common nettle. The riparian woodland is mostly composed of sycamore with some scrubby willows. There is a small area of wetland (pond and swamp) just west of the footpath ~50 m south of the footbridge. | | |
| **Adjacent Landuse:** Land within the river valley has been unused for farming for many years. The woodland that covers much of the valley sides is ancient. The flat lying land by the river was farmed in past times. Beyond the valley there is pasture to the south and arable land to the north. Bankhead Farm is situated on high ground in the northeast part of the section, but it is now disused. | | |
| **Additional Ecological Notes:** Otter sprainting sites are located at the upstream and downstream edges of the large, tunnel-like, A725 bridge over the North Calder Water. Four spraints were present at the upstream site, varying from old to fresh in character. Also under a sheltered boulder on the north bank of the river about 20 m upstream of the A725 bridge another fresh otter spraint was recorded. Also, fresh mink footprints were noted in mud on the north side of the A725 bridge (downstream side).<br>The scrub and scattered trees of the section support common breeding woodland birds. The North Calder Water probably forms good otter hunting territory. There is good kingfisher nesting (including soil, vertical earth riverbank) and hunting territory (including fishing locations) throughout much of the section. There is also good dipper nesting and foraging habitat in the downstream part of the section that is characterised by the high rock cliff and riffles. There is reasonably good bat potential in the section with numerous mature trees that could support bat roosts and there is bat foraging habitat along the river's surface, riparian woodland and woodland edges. | | |
| **Recreational Features:** The valley contains a footpath that is part of the North Calder Heritage Trail that connects the river valley with the Viewpark estate. This section of footpath is in good condition and does not suffer from fly tipping or excessive vandalism. | | |
| **Existing Management:** The water quality management of the North Calder Water is moderately good. However, at the time of the survey the river was obviously heavily discoloured (reddish tinge) and this was probably due to discharge from disused mine workings upstream of the section. This is probably a common occurrence after periods of prolonged heavy rain. | | |
| **Potential Threats:** Pollution impacts on otters and kingfishers. | | |
| **Recommendations** | | |
| i). Habitats to be retained: Maintain riverbank character, including the retention of riparian woodland/scrub and semi-natural woodland on the sides of the valley. | | |
| ii). Enhancement Suggestions: It will be advantageous to expand woodland cover on the east side of the valley to the level of cover that existed in past times (shown on historical maps). This will benefit the water quality of the North Calder Water. | | |

H

A view looking down at a small waterfall, near the centre of a meander in the North Calder Water. Dense broad-leaved woodland covers the far away (north) bank and rank grassland with scattered scrub characterises the riverside habitat in the foreground. In general the river represents good otter hunting habitat as it is also very good fish habitat (*i.e.* there is an appreciable diversity of flow and substrate types and tree shading is also commonplace).

I

A view downstream at the south part of this RCS section. The banks are mostly high and steep. The bank vegetation is composed of rank grassland or tall ruderal habitat, with dense to scattered woodland and shrubs. The river is fairly deep along the section, with run forming the main flow regime. In general the section represents very suitable kingfisher nesting and feeding habitat. However, the river at the time of survey was strongly discoloured by ferruginous particles washed into it after a few days of rain.

**Plate 5**

Project: M8 Baillieston to Newhouse

Title: North Calder Water downstream of dismantled railway bridge

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## North Calder Water – East Section 1 of 3

Figure 7

Table 8

Plate 6

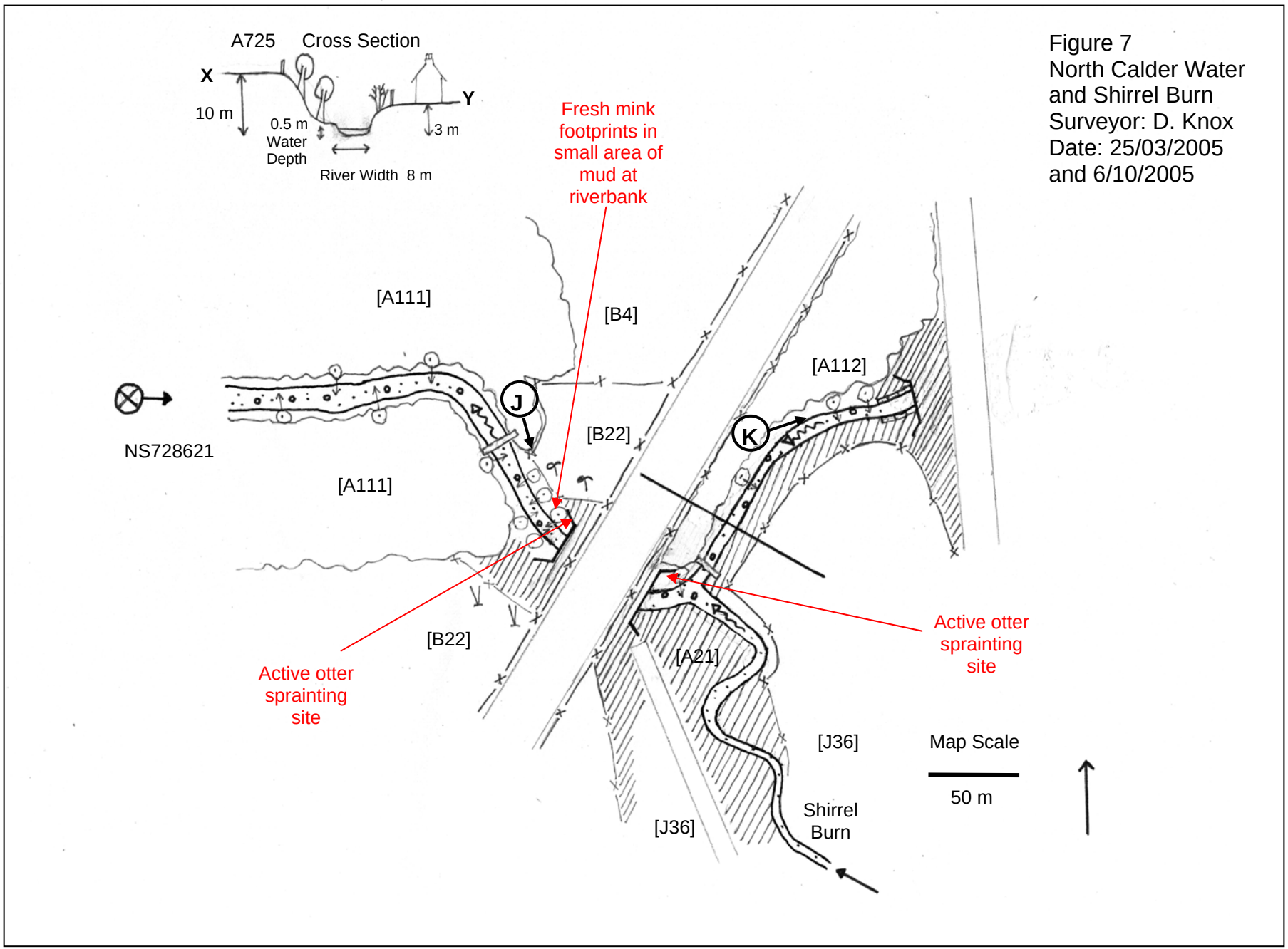


Figure 7
North Calder Water and Shirrel Burn
Surveyor: D. Knox
Date: 25/03/2005 and 6/10/2005

## River Corridor Survey Section Summary Description

### Table 8

| | | |
|---|---|---|
| **River:** North Calder Water and Shirrel Burn – East Section | **Section:** 1 of 3 | **Date:** 25/03/2005 and 6/10/2005 |

| | |
|---|---|
| **Weather:** The conditions at the time of survey were dry, calm and mild. | **Surveyor:** D.Knox |

**Flow rate/current features/water level:** A moderately fast flowing section of the North Calder Water where run is the predominant flow feature. Overall the water depth varies within the section between 0.2 to 0.5 m. The Shirrel Burn is a small, moderately fast flowing watercourse that is predominantly riffle with shallow water depth.

**Physical Features of Channel**

i). Broad description: This section of the North Calder Water is situated within a natural and mostly very secluded V-shaped river valley. However, where two road bridges (carrying the A725 and B7070) cross over the section the valley has been considerably engineered. It is also likely that the river valley has been heavily engineered in historical times, although this is not always immediately obvious due to recolonisation of the area by natural vegetation.

ii). Dimensions: The study section is 500 m in length and comprises a gentle meander in the North Calder Water and its confluence with a minor tributary (the Shirrel Burn). The width of the North Calder Water is approximately 8 m and its depth is in the region of 0.2 to 0.5 m. The banks are steep and with a height of 0.5 m, although the channel lies within a deep valley, with a height to the top of the bank (from water level) in the region of 3 to 4 m. The river valley itself has a maximum height of 10 m.

iii). Substrate: Predominantly alluvial gravel and cobbles, although there are occasional boulders (sandstone) and areas of bedrock (river bed formed from the geological bedding plane of sandstone).

iv). Bank Type: The banks are composed of mostly fairly well compacted subsoil material (often deep deposits of glacial boulder clay).

v). Special Features: The two road bridges in the section are large in scale and sufficiently wide not to seriously disrupt the river's capacity to act as an important wildlife corridor.

**Vegetation Description**

**Aquatic Vegetation:** There is virtually no aquatic vegetation due to the fast flowing (*i.e.* erosive) nature of the river.

**Marginal Vegetation (both banks):** As riparian woodland dominates the riverbank, marginal vegetation tends to be that of woodland. There are, however, sparse small vegetation islands (with rank grassland vegetation) and minor stands of reed sweet-grass by the riverbank.

**Bank Vegetation (both banks):** There is typically well-developed riparian woodland and scrub throughout the section. The mature woodland is mainly dominated by sycamore and ash, with beech and occasional oak. Immature wych elm is also common (never reaching maturity due to Dutch elm disease). Beech is common but tends to dominate the broad-leaved plantation areas (where mature specimen beech trees are common). The scrub tends to be dominated by goat willow. In general the banks tend to be well shaded by the trees/scrub and therefore the groundlayer vegetation is not well developed and at the open edge of the woodland/scrub the vegetation is a typically lush growth of bramble, rosebay willlowherb and common nettle (tall ruderal vegetation).

**Adjacent Landuse:** Land use is very varied in the area. By the Shirrel Burn confluence a new housing estate has been built on a brownfield site (a former hospital). Pasture farmland is present to the west of the A725 bridge but is probably now neglected. The steep and inaccessible nature of the river valley results in the abundance of considerably sized woodlands (although the area was industrial in historical times).

**Additional Ecological Notes:** On the north side of the North Calder Water, at either side of the A725 bridge, there are regular otter sprainting sites. Both contain several spraints, varying in age from old to fresh. At the downstream end of the bridge there are also mink footprints in a small area of mud by the riverbank. Also, about 20 m upstream of the bridge (just by the river's confluence with the Shirrel Burn) a fresh otter spraint was recorded on a flat boulder.
The adjacent land of the section supports common breeding woodland birds.

**Recreational Features:** There are no recreation features in the section. An unofficial path network is located by the north bank of the North Calder Water between the A725 and the B7070 and as a consequence there is a fair degree of human disturbance in this area (mainly low levels of dumping and vandalism).

**Existing Management:** In general, the rivers in the section are unmanaged and the area has an air of neglect (but this is probably due to the inaccessible nature of the river valley). The water quality in the North Calder Water is reasonably good, considering the urbanised and industrial nature of the local area. However, there is a pronounced effluent smell present. The Shirrel Burn has poor water quality.

**Potential Threats:** Pollution impacts on otters, dippers and kingfishers.

**Recommendations**

i). Habitats to be retained: Trees/shrubs

ii). Enhancement Suggestions: Implement improved water quality improvement measures. This could include a Sustainable Drainage System to treat road run-off from the A725 and B7070.

J

Looking up stream, along the North Calder Water to the A725 road bridge. The area is very secluded with dense riparian woodland, including trees overhanging the river. The banks are mainly steep in character. The water depth varies from 0.2 to 0.5 m and the main flow type is run.

Looking upstream along North Calder Water from the north river bank. The riverbank in the area is natural in character. The north bank is dominated by mature, broad-leaved plantation and the south bank is principally dense scrub, which borders a new housing estate. The river is fast flowing with a water depth in the region of 0.3 to 0.5m.

K

**Plate 6**

Project: M8 Baillieston to Newhouse

Title: North Calder Water - Shawhead Junction Area

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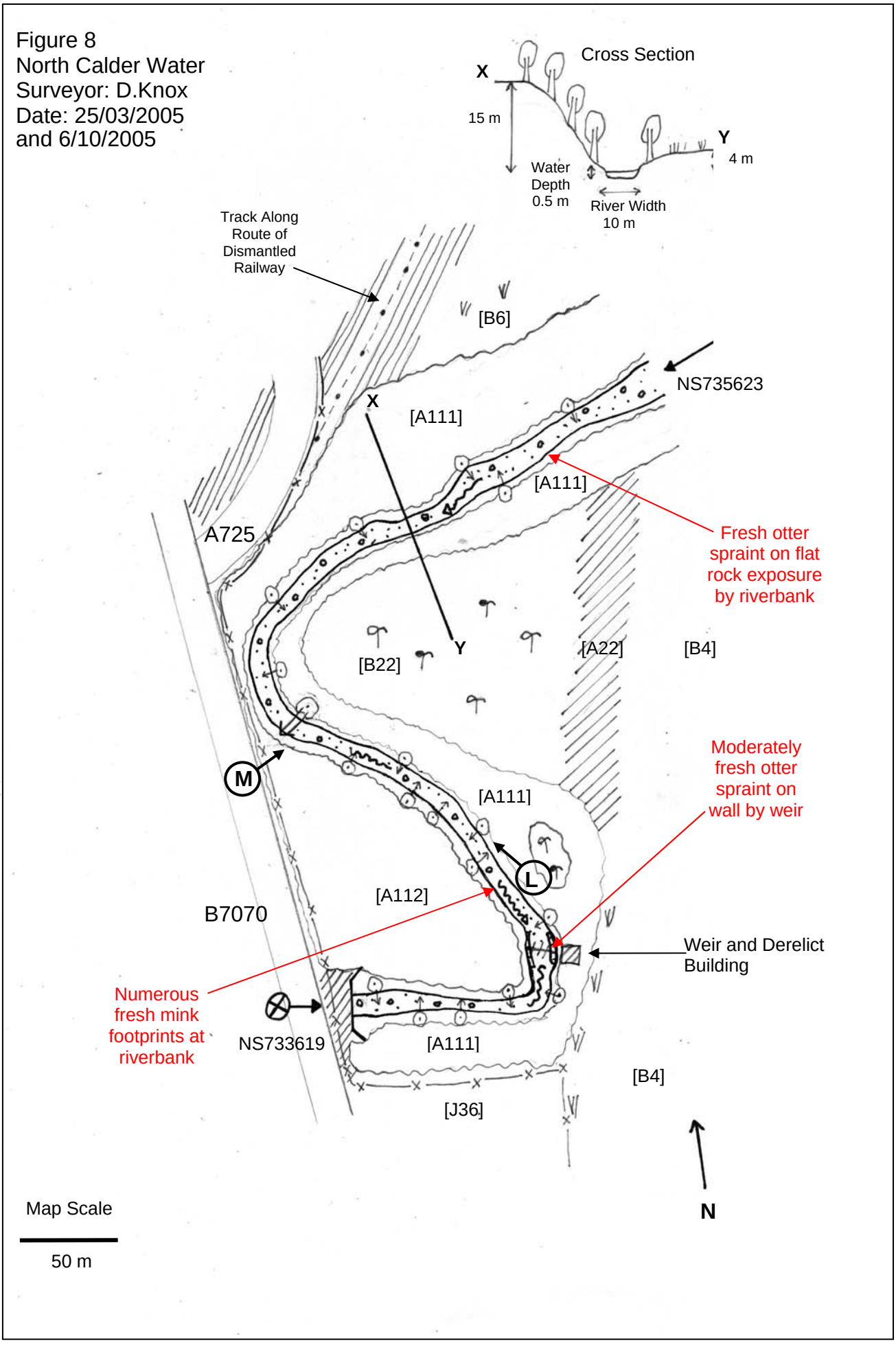
## North Calder Water – East Section 2 of 3

Figure 8

Table 9

Plate 7

Figure 8
North Calder Water
Surveyor: D.Knox
Date: 25/03/2005
and 6/10/2005



## River Corridor Survey Section Summary Description

### Table 9

| | | |
|---|---|---|
| **River:** North Calder Water – East Section | **Section:** 2 of 3 | **Date:** 25/03/2005 |
| **Weather:** The conditions at the time of survey were dry, calm and mild. | | **Surveyor:** D.Knox |
| **Flow rate/current features/water level:** A moderately fast flowing river with run in deeper sections and riffle in shallow ones. | | |
| **Physical Features of Channel** | | |
| i). Broad description: This section of the North Calder Water is mostly naturalised, contained within a moderately steep and secluded section of V-shaped river valley. Although the section comprises two meanders the downstream one has a tight 'elbow like' bend and the upstream one is more gently rounded. | | |
| ii). Dimensions: The study section is 500 m in length. The width of the river is approximately 10 m and its depth is in the region of 0.2 to 0.5 m, although there are deeper pooled areas with depths of >1 m (e.g. upstream of the weir at the downstream end of the section). The riverbanks are steep, with a height to top of bank of 1.5 – 2 m. The majority of the river section is enclosed in a fairly narrow steep valley (sloping ~30°) that rises ~ 15 m above the river level on either bank, except for a fairly flat lying area of floodplain situated to the east of the river (within the upstream meander). | | |
| iii). Substrate: Predominantly gravel and cobbles, although there are occasional boulders (sandstone) and small sections of the riverbed formed from bedrock (river bed formed from the geological bedding plane of sandstone). | | |
| iv). Bank Type: The banks are mostly steep and natural, being formed from river eroded subsoil (often deep deposits of glacial boulder clay). The banks are mostly stabilised by natural vegetation. | | |
| v). Special Features: A concrete-constructed weir and associated derelict building is present at the downstream part of the section. During normal flow conditions it forms a barrier to the river's flow but at times of higher flow the weir is probably 'swamped' by backed-up water. | | |
| **Vegetation Description** | | |
| **Aquatic Vegetation:** There is virtually no aquatic vegetation due to the deep and fairly fast flowing (*i.e.* erosive) nature of the river. | | |
| **Marginal Vegetation (both banks):** As riparian woodland dominates the riverbank marginal vegetation tends to be that of woodland. | | |
| **Bank Vegetation (both banks):** There is typically well-developed riparian woodland throughout the section. Overhanging trees are present but not commonplace. The woodland is typically composed of sycamore, ash and immature wych elm (never reaching maturity due to Dutch elm disease) with abundant beech. Specimen beech trees tend to dominate the broad-leaved plantation (west of the river by the B7070). Groundlayer vegetation is not particularly well developed due to heavy shading, and at the edges of woodland (and scrub) lush, tall ruderal vegetation dominates (mainly rosebay willowherb, common nettle and locally abundant bramble). The only vegetation of note is a small stand of the ancient woodland indicator, herb species, sanicle (*Sanicula europea*) in a beech plantation on the west side of the river (in the vicinity of where the A725 crosses under the B7070). | | |
| **Adjacent Landuse:** The river valley itself has rather an air of neglect and there has been little land use in recent times, although the area comprised industrial and estate (policy woodland) in historical times. The grassland that lies to the east of the river is probably not grazed by livestock on a regular basis. | | |
| **Additional Ecological Notes:** On the east bank of the river, on a wall adjacent to the weir, a moderately fresh otter spraint was recorded. On virtually the opposite bank of the river, numerous fresh mink footprints were recorded. Also, at the upstream end of the RCS section (on the east bank) a fresh otter spraint was noted on a flat rock exposure near the riverbank.<br>The adjacent land of the section supports common breeding woodland birds. The river probably forms good otter hunting territory. | | |
| **Recreational Features:** There are no recreation features in the section. An unofficial path network is located by the west bank of the river in the downstream part of the section by the B7070 and as a consequence there is a fair degree of human disturbance in this area (mainly low levels of dumping and vandalism). A track is present in an area of extensive scrub that has colonised the route of a dismantled railway. | | |
| **Existing Management:** In general, the river in this section is unmanaged and the area has an air of neglect (but this is probably due to the inaccessible nature of the river valley). The water quality is moderately good and there is no obvious point-source pollution feeding into the river in the section. There is occasional livestock grazing of the small area of poor semi-improved grassland, lying at the western edge of the river valley (land is quite poached). | | |
| **Potential Threats:** Pollution impacts on otters, dippers and kingfishers. | | |
| **Recommendations** | | |
| i). Habitats to be retained: Trees/shrubs. | | |
| ii). Enhancement Suggestions: Implement improved water quality improvement measures. This could include a Sustainable Drainage System to treat road run-off from the A725 and B7070. | | |

L

Looking upstream along the river from the weir. The presence of the weir results in the river being slow and deep (over this length of approximately 100m, upstream). Broad-leaved woodland fringes the river in the area, and the river is mostly very shaded in character. The banks are mainly naturalised, although much of them may have been modified in historical times.

Looking approximately east from the very steep western side of the river valley to the river. The flow is mainly fast and water depth is 0.5 m but is much shallower in places. Mature woodland dominates the river valley, although at this location the steepness of the slope results in high levels of tree instability. At this particular location tree collapse and associated soil erosion is particularly pronounced.

M

**Plate 7**

Title: North Calder Water – Shawhead Junction Area

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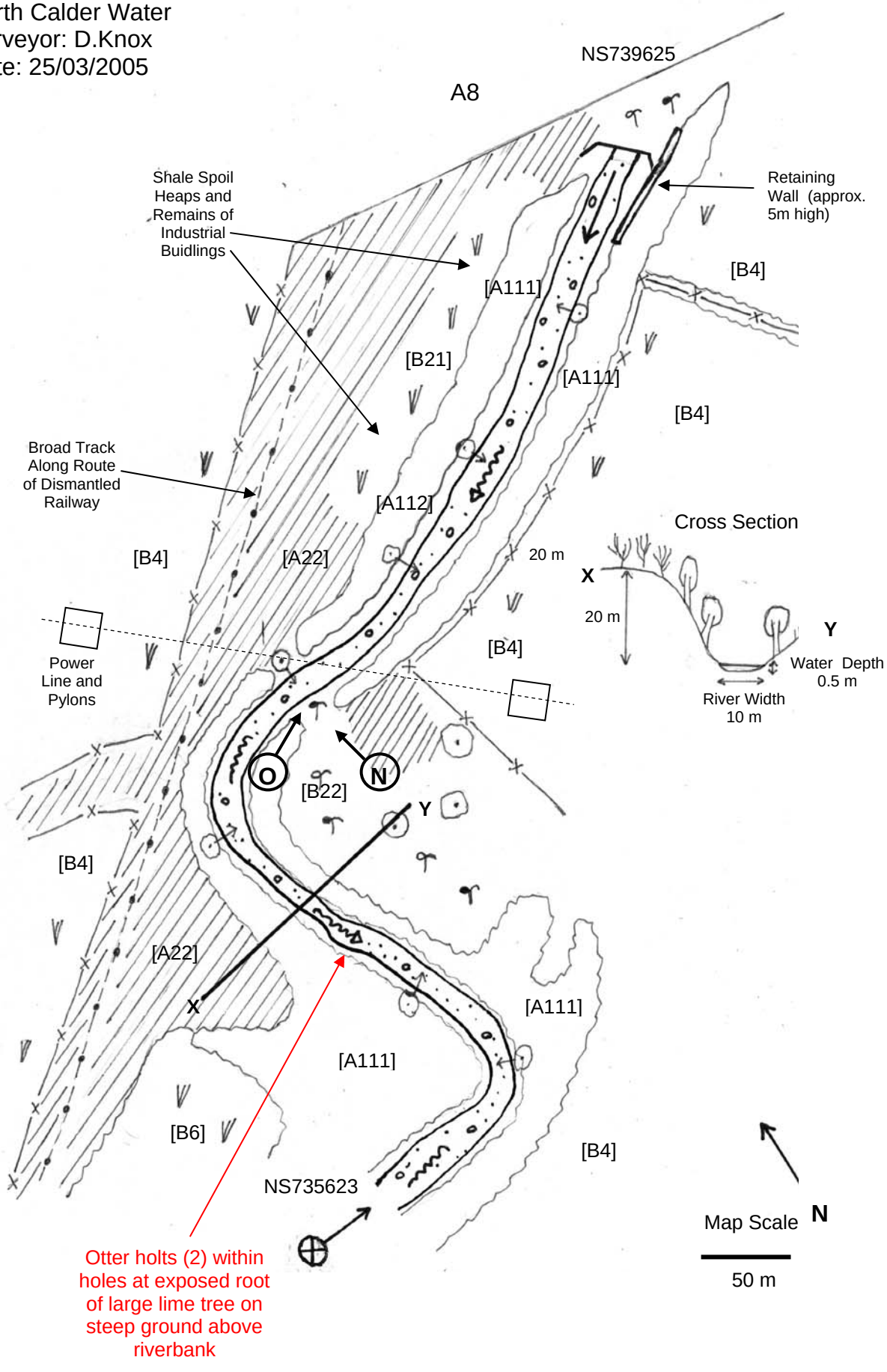
## North Calder Water – East Section 3 of 3

Figure 9

Table 10

Plate 8

Figure 9
North Calder Water
Surveyor: D.Knox
Date: 25/03/2005



## River Corridor Survey Section Summary Description

**Table 10**

| | | |
|---|---|---|
| **River:** North Calder Water – East Section | **Section:** 3 of 3 | **Date:** 25/03/2005 and 6/10/2005 |
| **Weather:** The conditions at the time of survey were dry, calm and mild. | | **Surveyor:** D.Knox |
| **Flow rate/current features/water level:** A moderately fast flowing river with run in deeper sections and riffle in shallow ones. | | |
| **Physical Features of Channel** | | |
| i). Broad description: This section of the North Calder Water is mostly naturalised and has a constricted section of V-shaped river valley. | | |
| ii). Dimensions: The study section is 500 m in length and comprises two meanders. The downstream section has a tight 'elbow like' bend and the upstream section is more gently rounded. The width of the river is approximately 10-14 m and its depth is in the region of 0.5 m (estimate). Its banks are steep, with a height to the top of the bank of 1.5 – 2 m. The majority of the river section is enclosed in a fairly narrow steep valley (sloping ~30 to 40°) that rises ~ 20 m above the river level on either bank. | | |
| iii). Substrate: Predominantly gravel and cobbles. | | |
| iv). Bank Type: The banks are mostly steep and natural and formed from thick alluvium deposits. The banks are naturally stabilised by vegetation (see below). | | |
| v). Special Features: | | |
| **Vegetation Description** | | |
| **Aquatic Vegetation:** There is virtually no aquatic vegetation, due to the deep and fairly fast flowing (*i.e.* erosive) nature of the river. | | |
| **Marginal Vegetation (both banks):** As riparian woodland dominates the riverbank, marginal vegetation tends to be that of woodland. | | |
| **Bank Vegetation (both banks):** There is typically well-developed riparian woodland throughout the section. Overhanging trees are present but no commonplace. The woodland is typically composed of sycamore, ash and immature wych elm (never reaching maturity due to Dutch elm disease), with beech abundant. Specimen beech trees tend to dominate the broad-leaved plantation (west side of the river valley in the central part of the section). Groundlayer vegetation is not particularly well developed due to heavy shading and at the edges of woodland (and scrub) lush, tall ruderal vegetation dominates (mainly rosebay willowherb, common nettle and locally abundant bramble). | | |
| **Adjacent Landuse:** The southern side of the river comprises undisturbed semi-natural woodland and fairly naturalised broadleaved plantation, with farmland on either side of the river valley. | | |
| **Additional Ecological Notes:** At the downstream part of the RCS section (on the west riverbank, at NS 73617 62236) there are two holts, within the exposed roots of a large lime tree location, very close to the (steep) riverbank. A fresh otter spraint was recorded close to the tree. The adjacent land of the section supports common breeding woodland birds. The river probably forms good otter hunting territory. | | |
| **Recreational Features:** There are no recreation features in the section. A track is present in an area of extensive scrub that has colonised the route of a dismantled railway. | | |
| **Existing Management:** The water quality is moderately good and there is no obvious pollution (point source) feeding into the river in the section. There is no woodland management in the area. There is occasional livestock grazing of the small area of poor semi-improved grassland lying at the western edge of the river valley (land is quite poached). | | |
| **Potential Threats:** Pollution impacts on otters, dippers and kingfishers. | | |
| **Recommendations** | | |
| i). Habitats to be retained: Trees/shrubs. | | |
| ii). Enhancement Suggestions: Implement improved water quality improvement measures. This could include a Sustainable Drainage System to treat road run-off from the A725 and B7070. | | |

N

Looking northwest from rough grassland on the east side of the river valley to mature woodland clad on the western side of the valley. The grassland has developed due to occasional livestock grazing, in a small area of floodplain, in a fairly gentle meander on the river. Riparian woodland dominates the riverbank as it is too steep for livestock. The edge of an area of gorse and hawthorn scrub is present at the river hand edge of the photograph.

Looking upstream along the river. The river flow in the area is moderate (as the river is contained in a gentle meander in this part of the river valley). The channel substrate is predominantly unvegetated cobbles and gravel. The banks are typically quite steep with riparian woodland the dominant bank vegetation type. There is occasional livestock grazing on the east side of the river valley.

O

**Plate 8**

Project: M8 Baillieston to Newhouse

Title: North Calder Water near dismantled railway bridge

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