



*National Rivers Authority*



## **THE RIVER AIRE**

**Conservation within the Catchment**

NEA  
Northumbria

THE RIVER AIRE

CONSERVATION WITHIN THE CATCHMENT

A SUMMARY OF SURVEY METHODS AND INFORMATION  
HELD ON THE WILDLIFE OF THE RIVER AIRE CATCHMENT



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PROTECTING AND FURTHERING NATURE CONSERVATION

PROMOTING AND ENHANCING NATURE CONSERVATION

### **RIVER REHABILITATION PROJECTS**



## INTRODUCTION

A nature conservation survey of the river Aire has been carried out in order for the NRA to fulfil its conservation duties for this catchment.

The National Rivers Authority has conservation responsibilities in respect of wildlife, landscape and natural beauty, geological and physiographical features, relating to inland waters such as the River Aire. These responsibilities are laid out in the Water Resources Act 1991, sections 2 and 16, and imposes on the NRA the following duties:

- to further conservation in respect of proposals relating to the NRA's functions, to protect sites of conservation interest and to take account of the effects that any proposals would have.

- to promote conservation to the extent that the NRA considers desirable.

The NRA's objectives, therefore, for conservation within the Aire catchment are to:

- 1) Ensure that the NRA's regulatory, operational and advisory activities take full account of the need to sustain and further nature conservation.

- 2) Promote conservation to enhance the quality of the aquatic and related environment for the benefit of wildlife and people within the Aire catchment.

In order to achieve these objectives the NRA must assess the nature conservation status of the River Aire, its tributaries, waterbodies and associated lands. This has been done by completing a survey of the catchment, a summary of which is set out below. A report containing all survey results gathered has not been produced due to the sheer volume of material involved. However, all survey results are freely available for conservation bodies and groups to consult. It is hoped that this document will adequately describe the type of information we hold so that any interested parties can be aware of, and can request details for their particular area of interest.

## ASSESSMENT OF CONSERVATION STATUS

The nature conservation assessment includes the whole of the Aire catchment. In order to cover such a large area in a relatively small length of time, data were collected from a number of different sources.

### COLLECTION OF EXISTING DATA

- 1) Sites of Special Scientific Interest - locations and descriptions obtained from English Nature.
- 2) Local Conservation Sites - locations and descriptions of conservation sites of significance at county or local level, such as Sites of Scientific Interest, Green Sites, and Urban Sites, were obtained from local authorities.
- 3) Phase 1 Landuse Survey - obtained from a number of different sources. Phase 1 is a rapid survey technique to provide a record of the semi-natural vegetation and wildlife habitats over large areas of land. It records all landuses from urban and arable to mature woodlands and natural rock features. As well as the broad land use classifications, phase 1 reports include more detailed survey target notes on sites of particular interest.
- 4) Existing River Corridor Surveys - some surveys had been completed previously, usually survey reports relating to work carried out on or around water courses. River Corridor Surveys are generally vegetation surveys of the river channel, banks and immediately adjacent land, including morphological details of these areas. See example for Oulton Beck.
- 5) Miscellaneous - various other 'patchy' survey information stored on file by the NRA.

The above types of survey information were collected and filed onto maps (at 1:10 000 scale) for reference. See example of part map SE 04 NW for lay out of information.

OULTON BECK (3)

12/7/89

Willow, Oak  
Standing dead.

o Oak, Willow, Syc, Hawthorn

/// Elder, Willow, Syc,  
Hawthorn.

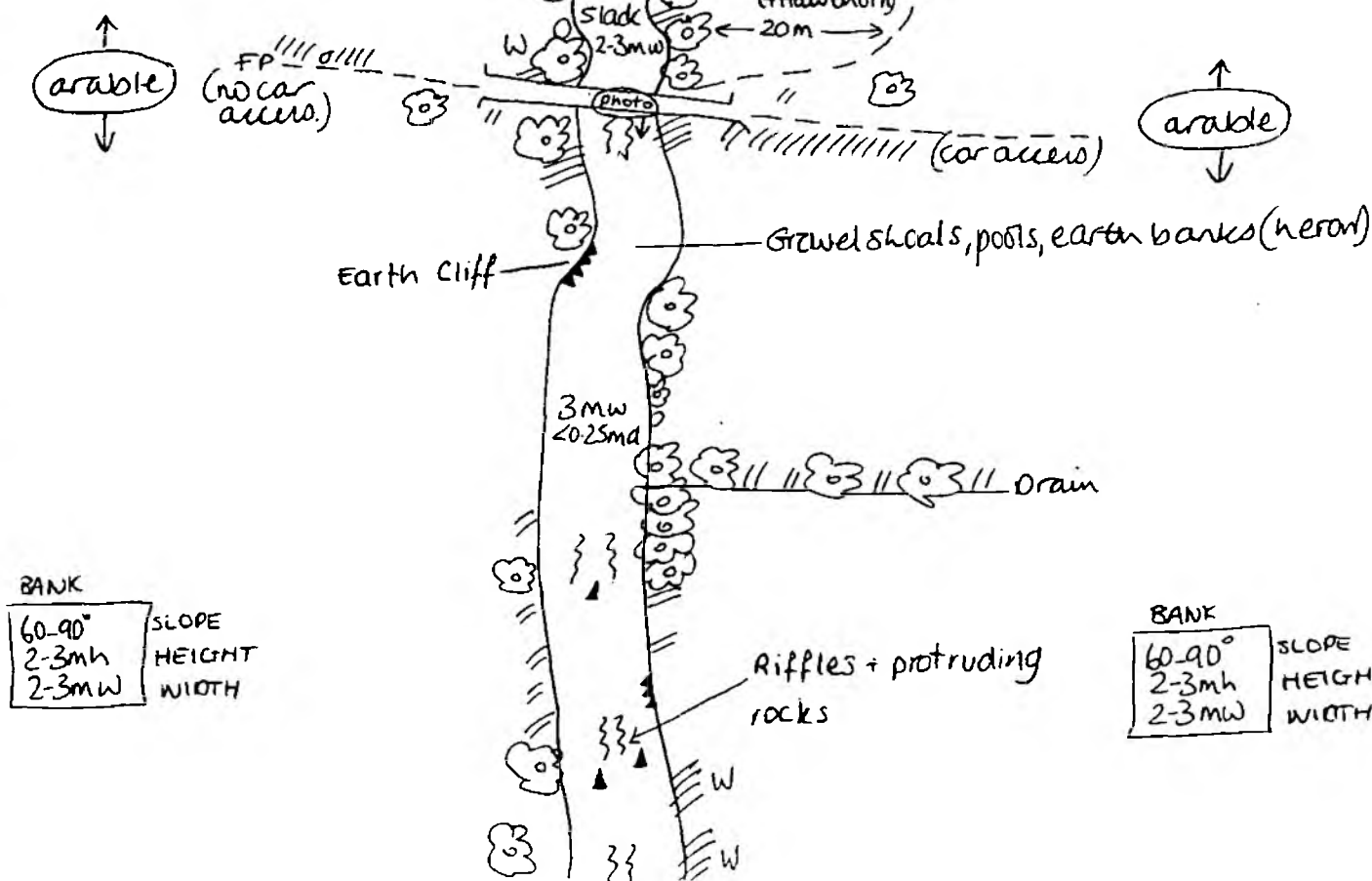
BANK 60-90°  
1mh  
1mw  
SLOPE HEIGHT  
WIDTH

BANK 30-60°  
1mh  
2-3mw  
SLOPE HEIGHT  
WIDTH

BANK 30-60°  
1mh  
15-20mw  
SLOPE HEIGHT  
WIDTH

BANK 30-60°  
1mh  
2mw  
SLOPE HEIGHT  
WIDTH

BANK 60-90°  
2-3mh  
2-3mw  
SLOPE HEIGHT  
WIDTH



EXAMPLE RIVER CORRIDOR SURVEY

SITE NO. 3

RIVER Oulton Beck. DATE 12/7/89

GRID REF SE 377 279 (SE 32 NE)

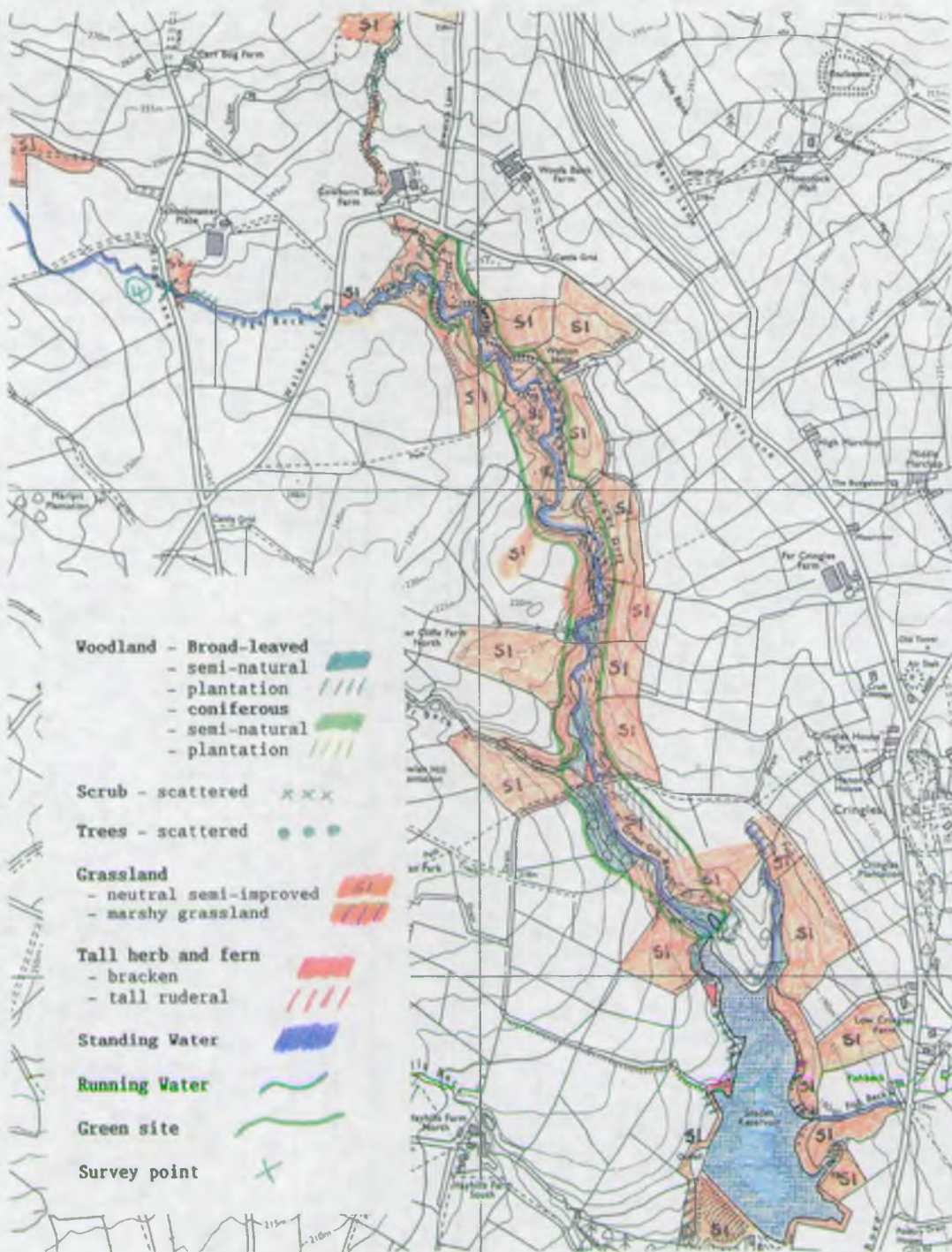
NOTES

Heron WaterVole

Small white  
dragon flies. (lg. brown).

ACER CAN	BEYO DIO	CONT MAC	GALI VER	LAMI ALB	NARC PSE	PRUN VUL	SCUT GAL	VALE DIO
ACER PLA	BUSD DAV	CONC MAJ	GERA BIS	LAMI PUR	NAST OFF	PRUN AVI	SENE JAC	VALE OFF
ACER FEE	BUSD LNB	CONV ARV	GERA MOL	LAPS CON	NUPH LUT	PRUN SPI	SENE VUL	VERC ANA
ACNI MIL		CORN SAN	GERA ROS	LATH PRA	NYMP ALB		SILE ALB	VERC REC
ACOR CAL	CALA CAN	COST AVE	GEUN URE	LENN GIE	ODON VER	QUER PET	SILE DIO	VERC CAT
ACED PED	CALL SP.	CRAT MON	GLEC HED	LENN MIN	CENA AQU	QUER ROB	SILE VUL	VERC DHA
ACSC HIF	CALL HAN	CREP CAP	GLYC SP.	LENN TRI	CENA FIS		SISY OFF	VERC SCU
ACRI EUP	CALL DET	CYNO CRI	GLYC REC	LEON HIS	ONON REP	RANU ACR	SOLA DUL	VIED LAN
AGRO CAN	CALL STA		GLYC FLU	LEUC VUL	ONON SPI	RANU AQU	SOLI CAN	VIED OPU
AGRO CAP	CALL PAL	DACT ELO	GLYC MAX	LIGU OVA	ORCH MAC	RANU BUL	SOLI VIR	VIED CRA
AGRO STO	CALL SEP	DACT FUC	GLYC PLI	LIGU VUL		RANU FIC	SONG ARV	VIED SAT
AJUG REP	CAMP ROT	DESC CES	GROE DEN	LINA VUL	PAPA RHO	RANU FLA	SONG ASP	VIED SEP
ALIS PLA	CAPS BUR	DESC FLE		LINU CAT	PETA HYB	RANU HED	SONG OLE	VIED RIE
ALLI PET	CARD ANA	DIPS FUL	HEBE HEL	LOLI MUL	PHAL ARU	RANU PEL	SORG ART	VIED RIV
ALNU GLU	CARD FLE	DIPS FIL	HERA MAN	LOLI PER	PHLE PRA	RANU REP	SORG AUC	ZANN PAL
ALOP PRA	CARD HIR		HERA SPH	LOMI PER	PHRA AUS	RANU SCE	SPAR ANG	
ANAG ARV	CARD IMP	ELED PAL	HESP MAT	LOTU COR	PICR ECH	REYN JAP	SPAR ENE	
ANEM NEM	CARD FRA	ELOS CAN	HIER SP.	LOTU ULG	PIAP MAJ	RORI AMP	SPAR ERE	
ANGE SYL	CARDU NOI	ELYN CAN	HIPP VUL	LUZU CAN	PIAP SAX	ROSA ARV	STAC SYL	
ANTH DIO	CARE ACUTA	ELYN REP	HOLD LAN	LYCH FLO	PLAN LAN	ROSA CAN	STEL MED	
ANTH SYL	CARE ACUTE	EPIL HIR	HOLD MOL	LYCD EUR	PLAN MAJ	RUBU FRU	STMP OFF	
APIU NOD	CARE BIS	EPIL MON	HORD MUR	LYSI NEM	POA ANN	RUNE ACE		
ARCT LAP	CARE ELA	EPIL PAL	HORD SEC	LYTH POR	POA PRA	RUNE ACET	TARA OFF	
ARCT MIN	CARE FLA	EUPA CAN	HYAC NON		POA TRI	RUNE CRI	THAL FLA	
ARRH ELA	CARE HIR	EUPH SP.	HYDR VUL	MALU SYL	POLY AMP	RUNE HYD	THLA ARV	
ARTE VUL	CARE HIS		HYPE PER	MALV SYL	POLY AVI	RUNE OBT	TORI JAP	
ASUM MAC	CARE OTR	FAGU SYL	HYPE TET	MATR MAT	POLY HYD		TRAG PRA	
ATRI PAT	CARE PAN	FEST GIG	HYPO RAD	MEDI LUP	POPU ALB	SAGI SAG	TRIF CAN	
AVEN PRA	CARE RIF	FEST OVI		MELI OFF	POPU TRE	SALI SP.	TRIF DUB	
	CARE ROS	FEST PRA	ILEX AQU	MENT AQU	POTA BER	SALI ALB	TRIF PRA	
BARB VUL	CARE RES	FEST RUB	IRPA CLA	MENT ARV	POTA CRI	SALI CAP	TRIF REP	
BEUL PER	BEAT NIG	FILA VUL	IRIS FEE	MENY TRI	POTA LUC	SALI CIN	TRIP IND	
BERU ERE	BEAT SCA	FILT ULN		MERC PER	POTA NAT	SALI FRA	TRIS FLA	
BEU FEN	BEATA ERY	FRAX EXC	JUNC AQU	MINU SP.	POTA PEC	SALI VIN	TUSS FAR	
BEU PUB	BEA FOM		JUNC ART	NYCE MUR	POTA PER	SANS NIG	TYPH ANG	
BRAC SYL	BEHA ANG	GALA NIV	JUNC BUF	NYOS ARV	POTA PUS	SANG RIN	TYPH LAT	
BRAS NAP	BEPY SEG	GALE SPE	JUNC EUL	NYOS LAX	POTE ANS	SANG OFF		
BRAS RAP	BEPC LUT	GALE TET	JUNC EFF	NYOS SCOR	POTE PAL	SCAB COL	ULEX EUR	
BRIZ RED	BEPS ARV	GALI APE	JUNC INF	NYOS SEC	POTE REP	SCHO LAC	ULAU GLA	
BRON RAM	BEPS PAL	GALI CRU		NYOS AQU	POTE REPT	SEIR NAP	ULAU PRO	
BRON STE	BEPS VUL	GALI PAL	KNAU ARV	NYRI SPI	PRIM VER	SCRDV	URT DIO	

SPECIES LIST FROM EXAMPLE RIVER CORRIDOR







## COLLECTION OF NEW SURVEY INFORMATION

Following collection and collation of the above 'existing' data, as expected, there were gaps in information that required the completion of new surveys. These surveys were carried out over the summer of 1992.

### 1 Location of Survey Sites

A detailed survey of every kilometre of watercourse within the Aire catchment was not carried out. It was found from comparing phase 1 surveys with detailed river corridor surveys that adjacent land use in general can imply a certain beck form and conservation value. So, instead, lengths with similar habitats were identified from the Phase 1 surveys collected, and a survey point chosen within each length. Additional survey points were chosen where either the phase 1 survey showed a change in habitat or the map showed an obvious change in channel form, for example from meandering to straight. Where blocks of the same habitat were large, sites were chosen at about 2 km distant. For ease of access, survey points were chosen where bridges crossed the watercourses, unless no bridges were present within that particular stretch. Lengths of watercourses that form part of a designated site with documented conservation value such as a SSSI were not surveyed.

For example, see part map no. SE 04 NW - Silsden Beck.

From the map it can be seen that the Phase 1 survey has identified a number of different land uses around Silsden Beck, varying from urban/industrial, to Great Gill Green Site. Sites were chosen within each land use, from the confluence with the Aire as follows:

Semi-improved Pasture	site 1 SE 039 453
Urban	site 2 SE 042 466
Pasture with wooded patches	site 3 SE 044 472
Great Gill Green Site	no survey point
Improved pasture and arable	site 4 SE 034 494

### 2 Surveyed Details

For each survey point a survey sheet was completed, and a photograph of the watercourse taken. The sample survey sheet A illustrates the details recorded at each survey point.

The survey sheets for part map SE 04 NW - Silsden Beck - are included to show how a picture of the conservation value of a watercourse is built up.

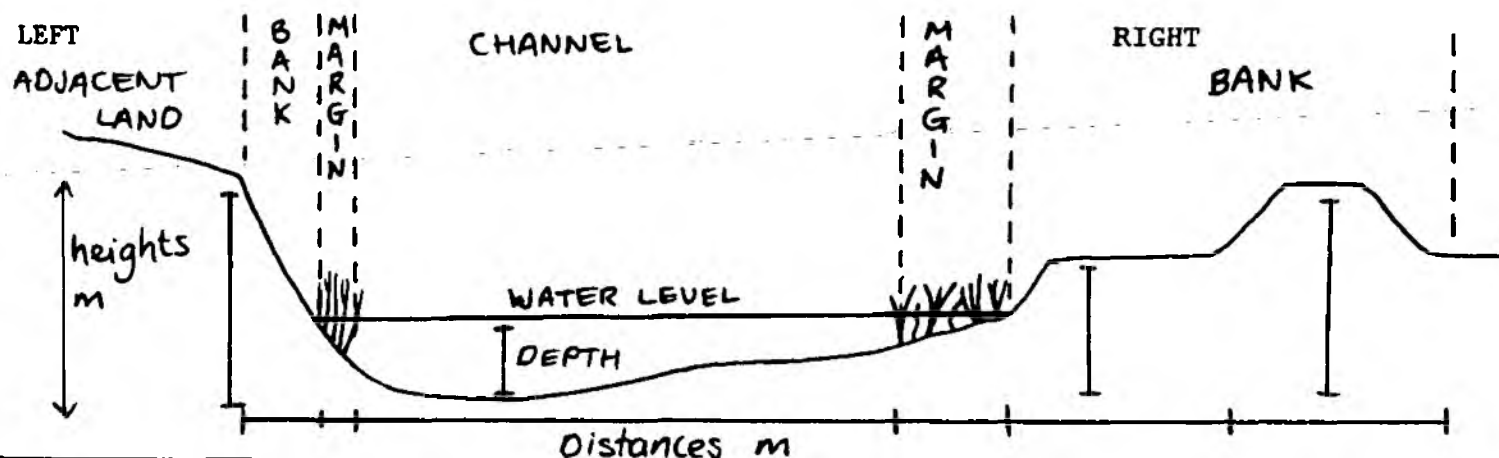
# SHEET A - details recorded at each survey point

## RIVER SURVEY SHEET

River: <b>NAME</b>	Location: <b>TOWN/VILLAGE</b>	Surveyor: <b>NAME</b>
Conservation Grade: <b>*</b>	Sheet No: <b>MAP SQUARE</b>	Date:
	Grid Ref:	Photo: <b>YES/NO</b>

Enhancement Recommendations:

### TYPICAL CROSS-SECTION (looking downstream) measurements in metres



	LEFT BANK	MARGINS	AQUATIC	RIGHT BANK
<b>PLANT COMMUNITIES</b> Dominants Rarities Aliens  Trees/Shrubs Spp & Abundance	Dominant species listed			
<b>SUBSTRATE</b> (BR, B, C, P, G, S, +)	These described	see over		
<b>PHYSICAL FEATURES</b> (protruding rocks, weir, earthcliff, slump, etc)	Description			
<b>FLOW</b>	Flow described	- see over		
<b>MANAGEMENT</b>	Eg. GRAZED,	MOWN,	CUT,	UNMANAGED.

ANYTHING ELSE - overleaf (e.g. fauna, islands, threats, archaeological features, more details if needed etc)

\* Grade allocated based on value of channel, banks and adjacent land.

## DEFINITIONS OF SUBSTRATE AND FLOW GIVEN ON SURVEY SHEETS

### SUBSTRATE

- BR - Bed rock - Exposure of underlying solid rock in river bed.
- B - Boulders - Rocks larger than 256 mm diameter, up to 4 m.
- C - Cobbles - 64-256 mm in diameter.
- P - Pebbles - 16-64 mm in diameter.
- G - Gravels - 2-16 mm in diameter.
- S - Sand - Smaller than 2 mm in diameter.
- + - Silt/mud - Fine material of a soft texture, not abrasive to the hands if rubbed.

Any other type of substrate named, for example artificial - concrete, brick, timber, etc.

### FLOW

- Pool - A distinct, deeper area of slow-flowing water, often with an eddying flow, between fast-flowing stretch.
- Slack - Area of deep or shallow water where the velocity is slow due to a very shallow slope in the river, natural or artificial ponding. There is no widespread eddying and as river levels rise the water velocity increases much quicker than areas recorded as pool.
- Riffle - Fast flowing shallow water with a distinctly broken or disturbed surface.
- Run - Fast or moderate flowing, deeper water with a surface generally undisturbed except for occasional swirls and eddies.
- Rapids - Rapid water velocity with a severely broken surface, deeper than a riffle.
- Waterfall - Solid rock falls exposed causing a vertical drop (>1 m) drop in the river water.



RIVER SURVEY SHEET

River: <u>SILSDEN BECK</u>	Location: <u>near SILSDEN</u>	Surveyor: <u>ALB</u>
Conservation Grade: <u>4</u>	Sheet No: <u>SE 04 NW</u>	Date: <u>5 AUGUST 92</u>
	Grid Ref: <u>SE 039 453</u>	Photo: <u>YES</u>

Enhancement Recommendations: Control of *Impati gland.*  
Tree + shrub planting

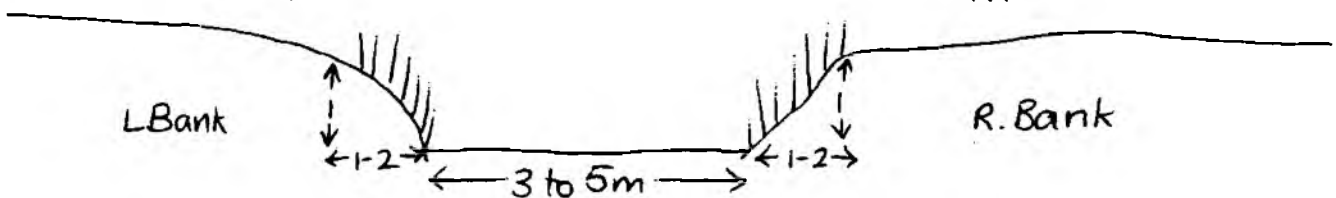
TYPICAL CROSS-SECTION (looking downstream) measurements in metres

LEFT

RIGHT

SEMI-IMPROVED  
PASTURE - sheep

SEMI-IMPROVED  
PASTURE - sheep



	LEFT BANK	MARGINS	AQUATIC	RIGHT BANK
PLANT COMMUNITIES Dominants Rarities Aliens  Trees/Shrubs Spp & Abundance	dominated by <i>Imp. gland.</i> with <i>Lol per</i> <i>Cyno. crist.</i> <i>Dactyl. glom.</i> <i>Hol. lan.</i> <i>Cirs. arv.</i>	<i>Gly. fluit</i> <i>Imp. gland.</i> <i>Solan. dulc.</i> <i>Epil. hirs.</i> <i>Gly. max.</i> <i>Petas. alb.</i> <i>Mimul. gutt.</i>	no aquatic spp. seen.	as L. BANK
SUBSTRATE (BR, B, C, P, G, S, +)	EARTH	SILT some COBBLE	SILT to COBBLE	
PHYSICAL FEATURES (protruding rocks, weir, earthcliff, slump, etc)	some slumps resulting in <0.5m earth cliffs	—	some cobble SHOALS	
FLOW	—	—	up RIFFLING down PONDED	
MANAGEMENT	slightly grazed	—	—	↓

ANYTHING ELSE - overleaf (e.g. fauna, islands, threats, archaeological features, more details if needed etc)

RIVER SURVEY SHEET

River: SILSDEN BECK	Location: MITCHELL LANE SILSDEN	Surveyor: ALB
Conservation Grade: 5	Sheet No: SE 04 NW	Date: 5 AUGUST 92
	Grid Ref: SE 042 466	Photo: YES

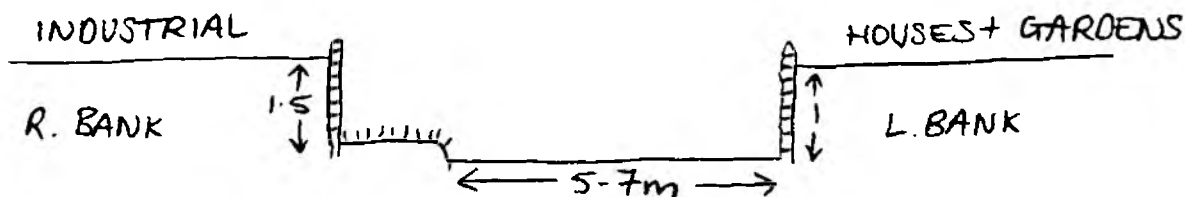
Enhancement Recommendations: encourage garden planting of natives rather than ornamentals.

TYPICAL CROSS-SECTION (looking downstream) measurements in metres

LEFT NOTE XS REVERSED LOOKING UPSTREAM.

RIGHT

DOWNSTREAM - wier and duckpond - bed sand and gravel.  
no plants, at edge weeping willow. Downstream of pond - large wier with *Peta. alb*, *Epil. hirs.*



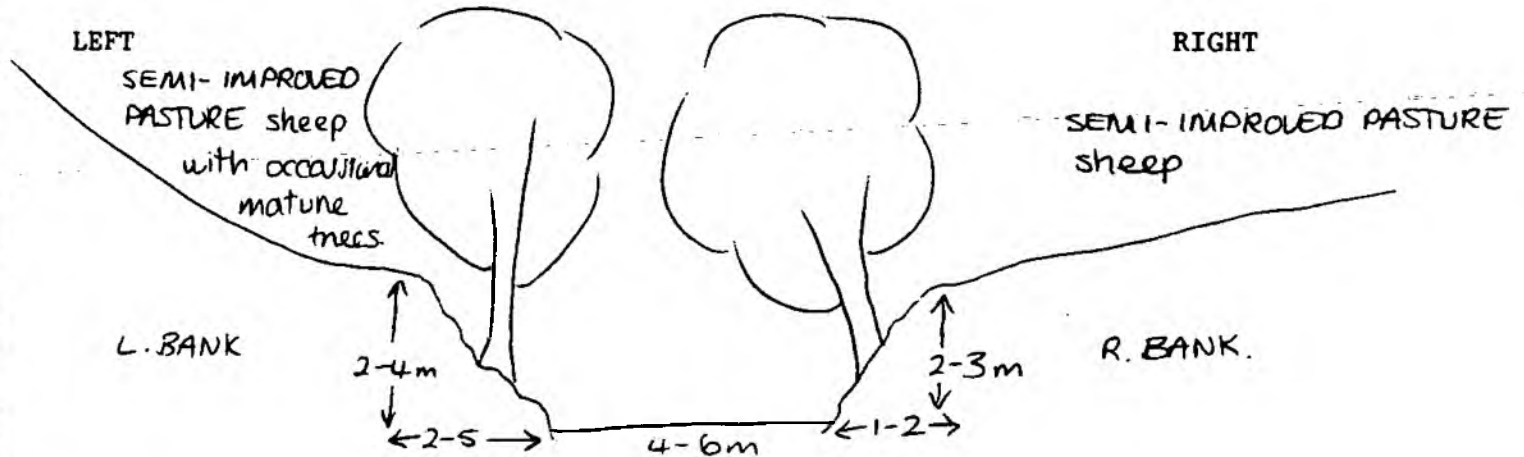
	LEFT BANK	MARGINS	AQUATIC	RIGHT BANK
PLANT COMMUNITIES Dominants Rarities Aliens  Trees/Shrubs Spp & Abundance	Frequent elder sycamore elm ash  some ferns nettles & others	nettle jap. knot rarely	algae only	small grassy bank at base of wall - Lol. per. occasional Jap. knot, some planted willows some ferns.
SUBSTRATE (BR, B, C, P, G, S, +)	walled	COBBLE	GRAVEL to COBBLE	WALLED
PHYSICAL FEATURES (protruding rocks, weir, earthcliff, slump, etc)	—	—	wier just upstream down ponded & wier	—
FLOW	—	—	RIFFLING	—
MANAGEMENT	—	—	—	—

ANYTHING ELSE - overleaf (e.g. fauna, islands, threats, archaeological features, more details if needed etc)

RIVER SURVEY SHEET

River: SILSDEN BECK	Location: BREAKMORE AVE. SILSDEN	Surveyor: ALB
Conservation Grade: 3	Sheet No: SE 04 NW	Date: 5 AUGUST 92
	Grid Ref: SE 044 472	Photo: YES

Enhancement Recommendations:

TYPICAL CROSS-SECTION (looking downstream) measurements in metres

	LEFT BANK	MARGINS	AQUATIC	RIGHT BANK
PLANT COMMUNITIES Dominants Rarities Aliens  Trees/Shrubs Spp & Abundance	Dominated by mature Alder, Syc, hawthorn, holly, ash, above Rubus fruit, urt dio, Hol lan, Agrostis sp ferns rarely Him bals	Mostly bare. Rarely Card. flex. Impat gland Epil. sp. Phal arun.	no aquatic plants noted	US LEFT BANK
SUBSTRATE (BR, B, C, P, G, S, +)	EARTH some COBBLE	SAND to BOULDER	to BOULDER SIZE	
PHYSICAL FEATURES (protruding rocks, weir, earthcliff, slump, etc)	—	—	protruding boulders with masses, lichens	
FLOW		—	RIFFLE/POOL	
MANAGEMENT	UNMANAGED	UNMANAGED	—	↓

ANYTHING ELSE - overleaf (e.g. fauna, islands, threats, archaeological features, more details if needed etc)

RIVER SURVEY SHEET

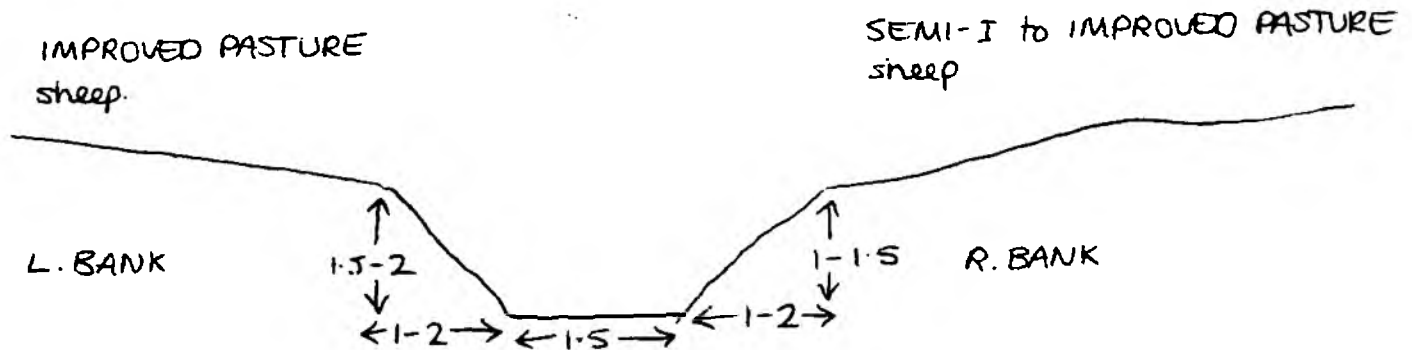
River: SILSDEN BECK	Location: RIDGE LANE	Surveyor: ALB
Conservation Grade: 3	Sheet No: SE 04 NW	Date: 5 AUGUST 92
	Grid Ref: SE 034 494	Photo: YES

Enhancement Recommendations:

TYPICAL CROSS-SECTION (looking downstream) measurements in metres

LEFT

RIGHT



	LEFT BANK	MARGINS	AQUATIC	RIGHT BANK
PLANT COMMUNITIES Dominants Rarities Aliens  Trees/Shrubs Spp & Abundance	Hol lan. Lol per. Festuca sp. Arr ela. Cirs ar. some June eff Prun vulg rarely bramble occasional gorse	Ranun. rep grasses as bank. June eff	No aquatic species	as LEFT BANK
SUBSTRATE (BR, B, C, P, G, S, +)	EARTH	MUD some COBBLE	SILT to COBBLE	
PHYSICAL FEATURES (protruding rocks, weir, earthcliff, slump, etc)	some small slumps	poached by cattle	—	
FLOW	—	—	up RIFFLING down PONDED	
MANAGEMENT	sheep + cattle GRAZED	cattle poached		↓

ANYTHING ELSE - overleaf (e.g. fauna, islands, threats, archaeological features, more details if needed etc)

Further downstream on left bank frequent and mature  
sycamore, willow and Hawthorn.





SE 04 NW

SILSDEN BECK SE 034 494

5 AUGUST 1992



SILSDEN BECK SE 044 472

5 AUGUST 1992



SE 04 NW



SILSDEN BECK

SE 042 466

5 AUGUST 1992



SILSDEN BECK

SE 039 453

5 AUGUST 1992





## PURPOSE OF THE SURVEY

As described in the introduction, the survey results will be put to two broad uses, firstly to aid the NRA in protection and in furthering conservation while carrying out its responsibilities, and secondly to promote conservation outside of these other responsibilities.

## PROTECTING AND FURTHERING NATURE CONSERVATION

The survey has provided us with information from which the conservation status of particular stretches of watercourse has been determined. This information has been broadly summarised in the 'River Aire Catchment Management Plan'. From this allocation of status, three clear strategies are suggested. For the best sites protection of the existing resource is essential. Other sites retain elements of interest which can be improved and enhanced by better management. At the bottom of the scale are sites which are so degraded that they have lost virtually all conservation value. It is these sites where opportunities for restoration should be pushed most vigorously. These principles will drive our own work and also form an important consideration in the granting of licences or consents by the NRA.

## PROMOTING AND ENHANCING NATURE CONSERVATION

Now that we have a better knowledge of the wildlife interest of the Aire Catchment, our aim is also to improve this nature conservation interest. We hope to do this by developing specific riverside projects, and by co-ordinating and extending existing projects. As water quality improves, it is vital that the physical features and habitats of the river are restored so that plants and animals can return to formerly degraded sites. In addition, developments within the Catchment afford tremendous opportunities for conservation gain.

### Choosing project sites

The NRA itself is a very small landowner, and so the types and extent of projects that we can carry out as an organisation on our own land are quite limited. As a result of this we want to work very closely with riverside landowners to help them to improve the nature conservation value of their particular stretch of river or stream. In addition to involving landowners, we hope to liaise with other environmental organisations, local authorities, conservation groups, local industries etc., who with their local knowledge of the River Aire should be able to help greatly with choosing suitable sites for nature conservation projects.

We are very aware that people living within the Aire Catchment have a great interest in and a great knowledge of the conservation value of their 'patch' of the river Aire Catchment. Local people and



conservation groups are more likely to be aware of specific sites that could be managed differently to enhance their value. Because of this we hope to gain from local groups, as well as from our own surveys, details of sites that would be suitable for conservation improvement projects. To this end, we have drawn together ideas for a number of different conservation projects that would be suitable for various watercourses within the Aire Catchment (see last section of report).

#### Setting up projects

Once suitable sites have been found, further work particular to that site will be carried out. This will include more detailed site specific surveys, to ensure any existing value of the site is retained; setting up site or area committees to include local conservation groups, interested bodies etc.; drawing up site management plans with the inclusion all interested parties; and raising funds for the project. Some funds are available from the NRA for conservation work, and NRA staff will be able to give considerable time to the development of projects. Incentives for sensitive land management are now available from a number of sources such as the Countryside Commission's Countryside Stewardship Scheme, and Local Authority Landscape Conservation Grants.

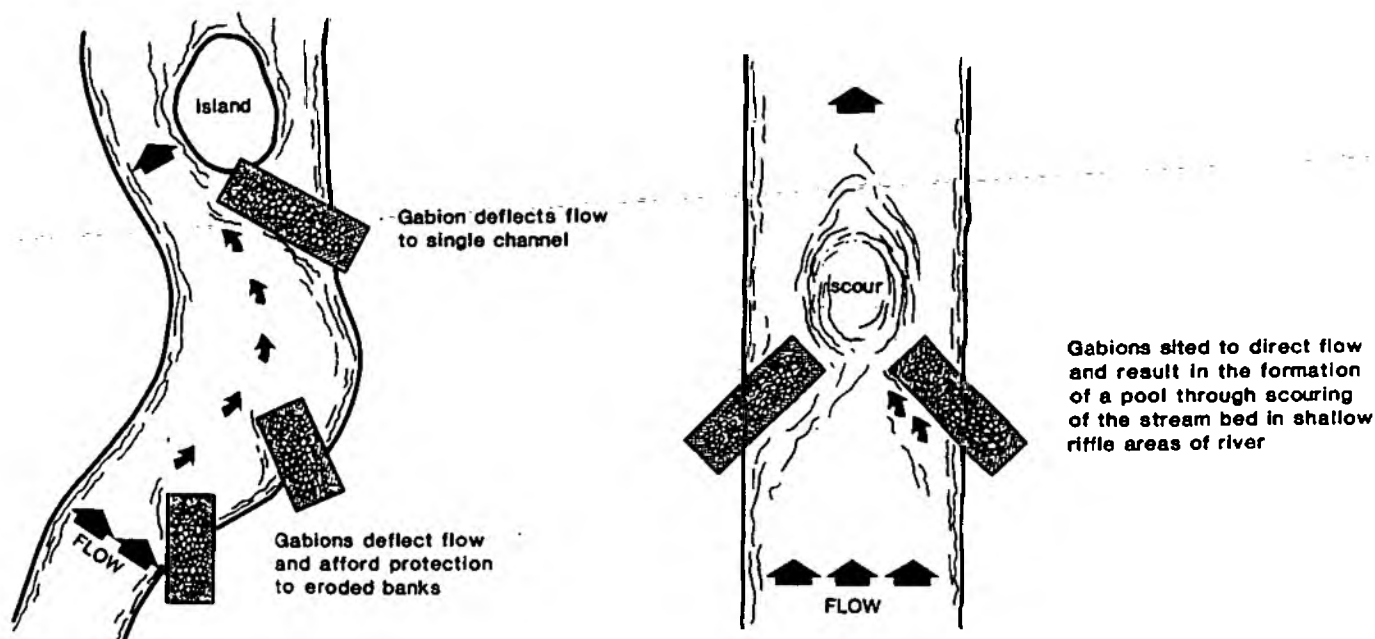
## RIVER REHABILITATION PROJECTS

The purpose of this section of the report is to describe the sorts of projects that the NRA would like to see being developed in the Aire Catchment. Our aim is to give ideas about the kind of work that can be carried out rather than to give technical details of how to complete these projects. Hopefully, from this, people who live within the Aire Catchment will be able to approach the NRA with details of sites that they know would be suitable for any of these projects. The list of projects is not intended to be exhaustive, certainly there are other types of conservation enhancement that are not included, but merely to be a selection of suitable ideas.

**PROJECT 1 - Introducing groynes or boulders to channel**

**Example:** The River Aire at Gargrave - see photograph 1

**Diagram:** Showing placing of groynes at channel edge.



Gabions wire baskets filled with stone, may be sited to counter or deliberately create erosion of a rivers banks or bed.

**Benefits to conservation:** These structures alter the natural river flow in such a way as to create pools and riffles, and a range of flow velocities across the channel. This diversity in channel form equates with an increase in habitat diversity. Groynes or boulders provide fish with shelter in pools, and may improve spawning conditions elsewhere by increasing flow speed. Groynes or boulders also provide a substrate on which algae, mosses and invertebrates may grow. Positioning of these structures along the river bank also increases the length of channel boundary, and therefore increases any biological activity in the river margin.

**Suitable sites:** Any type of area from urban to rural, and almost any size of water course.

## PROJECT 2: Rubbish clearance

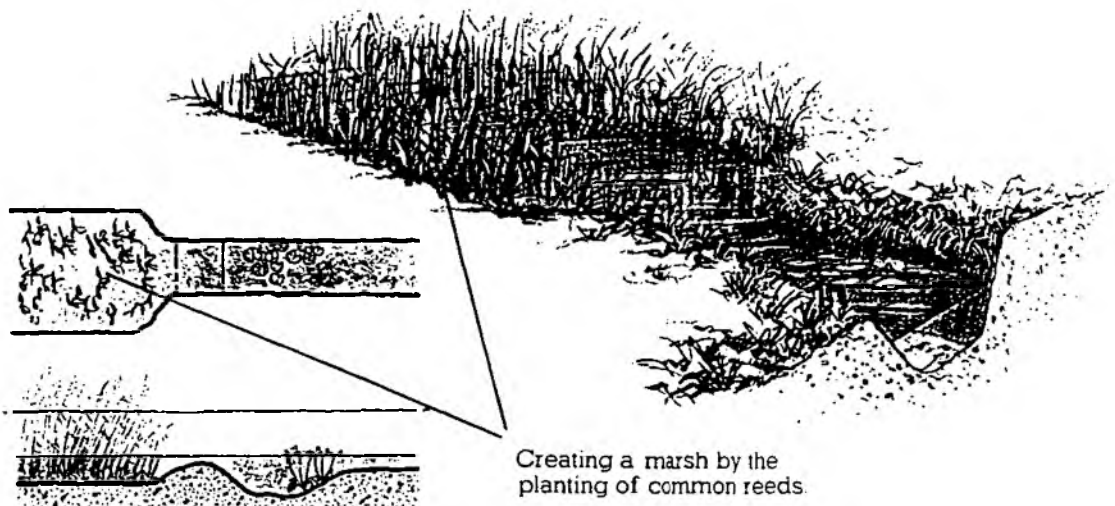
**Example:** Oil Mill Beck in Leeds - see photograph 2. The NRA helped to organise a litter pick in April 1992 on Oil Mill Beck, along with a local school and community association, as part of Tidy Britain Group's Spring Clean week.

**Benefits to conservation:** Obvious immediate benefits to landscape in cleaning up a section of river. Also through removal of rubbish that may be damaging to wildlife.

**Suitable sites:** Any site where rubbish is a problem, and where a group of volunteers can easily and safely gain access to the river. Any litter pick should preferably be followed up by visits to local schools and groups to encourage against litter dropping and tipping.

## PROJECT 3: Widen watercourse to create a reed bed.

**Diagram:** Showing creation of reed bed in small slow flowing water course.



**Benefits to conservation:** The reeds may remove excess nutrients and possibly other pollutants from the watercourse. Creation of the reed bed habitat which will be used by various invertebrates and reed-dwelling birds. Species of plant other than reed can also be introduced, which are of value in themselves and also of value to invertebrate life.

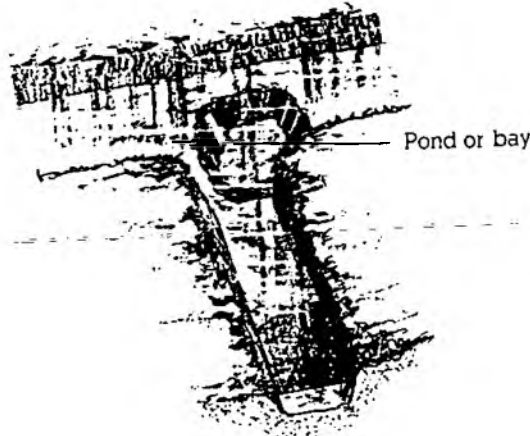
**Suitable sites:** Most suitable on small, slow flowing water courses. On larger watercourses the widening of the channel to create the reed bed



would require large amounts of land-take.

**PROJECT 3:** Deepening of the bed to form pools.

**Diagram:** Showing pool created at junction of two drainage ditches.



**Benefits to conservation:** Provides permanent deep water even if the watercourse has a reduced flow in summer. This allows plants, amphibians, fish, and invertebrates to survive even in dry conditions. The pool also creates a diversity of habitats on the river bed.

**Suitable sites:** Relatively slow flowing watercourses, over 2 m wide, where the pool will not quickly disappear due to accumulation of moving gravels and cobbles etc.

**PROJECT 4:** Narrowing an over wide channel using backing boards.

**Example:** Oulton Beck at Rothwell. The channel had become over wide due to mining subsidence, resulting in slow flows and silting up of the channel. The boards were introduced to reduce the width of the channel, creating faster flows, but allowing the reeds at the side of the channel to be retained. See photograph 3.

**Benefits to conservation:** Reeds and other emergent plants at the edges of the water course were retained along with their associated wildlife. Speed of flow was increased and allowed to meander through the boarded section, diversifying habitats through this stretch of beck. These increased flows may also help to prevent emergent plants encroaching across the watercourse, so increasing the time period between severe management to remove these plants. Shortly after the boards were placed kingfishers were seen using them as fishing perches - an additional unexpected benefit!

**Suitable sites:** Any watercourse where overwidening has caused a problem with stagnant water etc., or where the width of channel is not necessary to take peak flows.

#### **PROJECT 5: Creation of backwaters.**

**Backwaters** are areas of relatively still water sited off the main channel of the river, but still connected to the river via a channel or pipe. They are often formed from old cut off channels, or can be created artificially, like ponds, and then connected to the main river channel.

**Example:** Back waters have been created by the NRA at a number of sites on rivers such as the Swale and Derwent mainly to allow fish to use these sites as spawning areas.

**Benefits to conservation:** The still water within these backwaters can be inhabited by a different variety of plants and animals to those found within the main channel of the watercourse, and as mentioned above, the often warmer conditions help to form ideal spawning areas for fish.

**Suitable sites:** Adjacent to any river where a suitably sized area of land is available.

#### **PROJECT 6: Opening up of culverts or pipes.**

**Benefits to conservation:** By recreating an open channel where previously it has been culverted or piped there are huge benefits for conservation. The open channel can be created with a range and diversity of habitats, to include shallow riffles and deeper pools in the channel, varying bank slope and height, and possibly different bankside habitats such as trees and hedgerows given the constraints of any particular site. This variation in the channel and banks should result in variation of the type of wildlife inhabiting the watercourse, greatly increasing its nature conservation value.

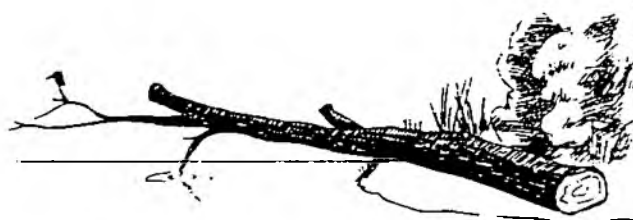
**Suitable sites:** Where a water course is known to be culverted and the overlying and adjacent land-use allows space for open water and sloping banks to be created. Derelict sites may be the most suitable.

#### **PROJECT 7: Kingfisher nests and perches**

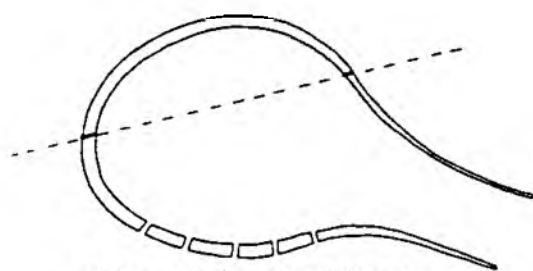
Vertical earth banks for nesting kingfishers are often lacking along rivers otherwise suitable for these birds. At some sites, it may be possible to allow the river to naturally erode these steep banks, and so create additional potential nesting sites. Along rivers where this is not possible, nest tunnels and chambers can be excavated in vertical earth banks, or fibre glass or concrete chambers can be introduced to a

bank. Tunnels can also be created in artificially constructed banks, stone or concrete walls. Branches or sticks should be fixed near the nesting site to allow the kingfishers to perch.

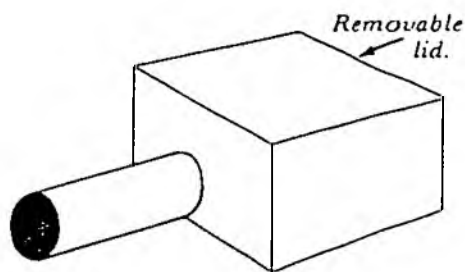
**Diagram:**



*A dead tree or large branch running out into the water provides an excellent bird roost and a fishing perch for kingfishers.*



*Kingfisher nest chamber of fibreglass. Chambers are made in 2 sections and held together by wire. Note drainage holes.*



**Tunnel and chamber**

**Benefits to conservation:** Allows kingfishers to nest close to suitable feeding sites where previously the banks were unsuitable for them to create their own nesting sites. Provision of perches may allow kingfishers to utilise rivers that they couldn't previously due to lack of these sites.

**Suitable sites:** Where kingfishers are known to frequent and feed but where there appear to be no nesting pairs due to lack of sites.

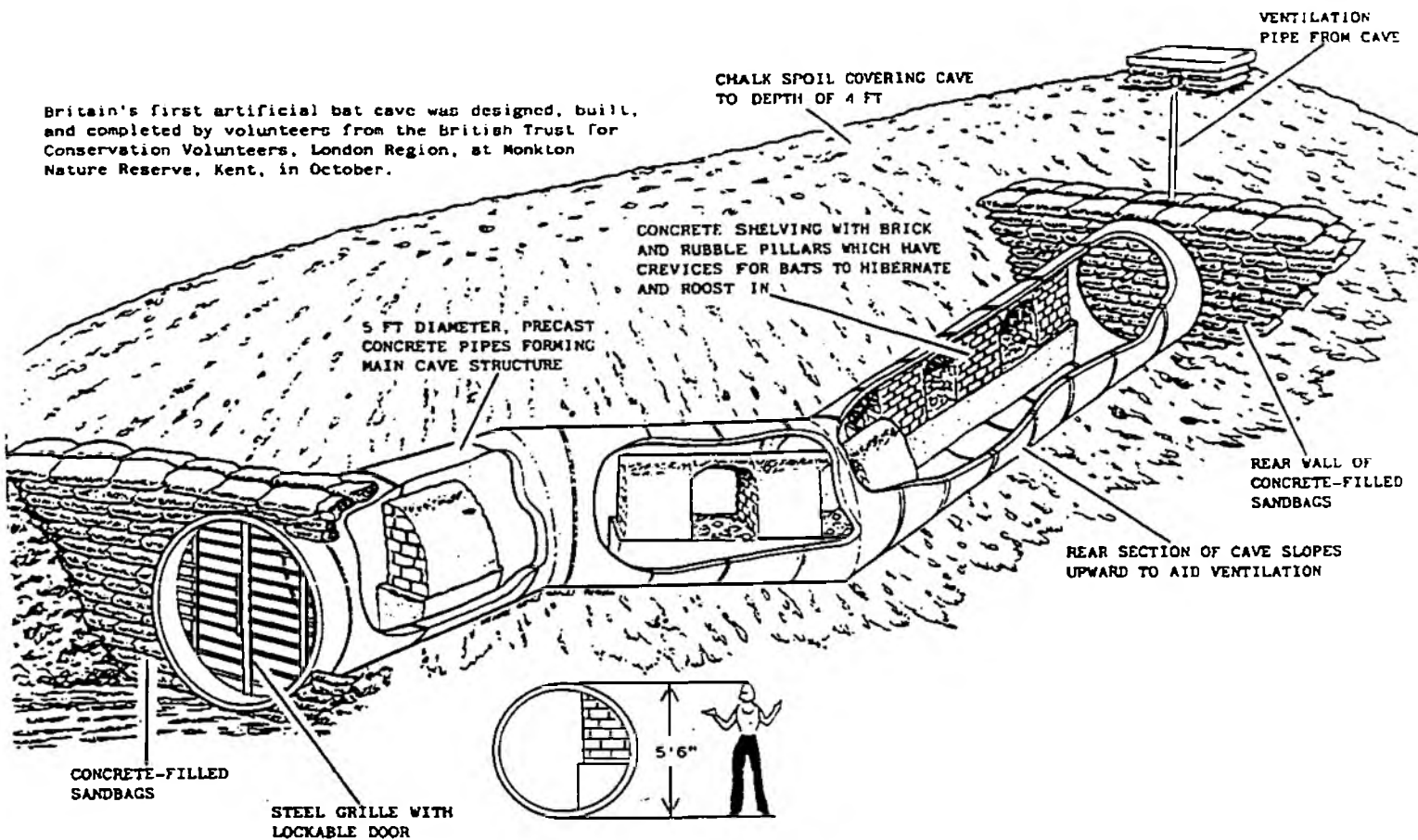
#### **PROJECT 8: Bat boxes and bat caves**

**Example:** The NRA have installed a number of bat roosting boxes along the river Ouse, following the advice and help of the York Mammal and Bat Society. Monitoring by the Society has shown that some of the boxes are being used, it is thought by Pipistrelle bats. The boxes are situated on riverside trees, the river forming an important travelling route and feeding ground for some species of bat. The boxes are hopefully providing alternative summer roosts to the old buildings which have been

demolished along the river, the newer buildings not having as many crevices for the bats to use.

Similarly bat caves can be constructed to house hibernating bats.

**Diagram:** Artificial Bat Cave at Monkton Nature Reserve in Kent



Layout of bat boxes on a tree



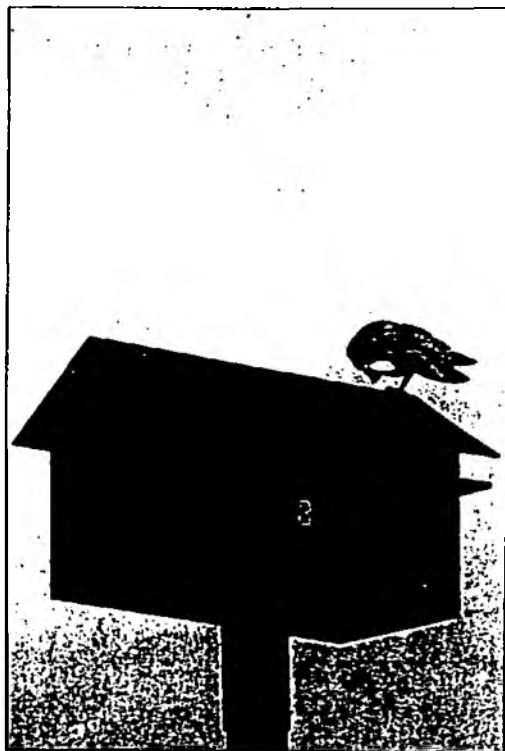
**Benefits to conservation:** Replacing lost roost/hibernation sites.

**Suitable sites:** Tall riverside trees, in warm and sheltered areas, near to known bat feeding sites.

**NOTE:** All bats and their roosts are protected under the Wildlife and Countryside Act and neither should be disturbed unless the handler has a licence.

#### **PROJECT 9: Bird Boxes**

**Example:** Barn owl boxes have been placed on various NRA buildings, installations and poles, where it is known that there are abundant supplies of the barn owls' prey. Areas have been chosen where the owls are particularly abundant, and boxes have been placed at one-kilometre intervals in the hope that they will spread out and recolonise new sites.



**A barn owl box in use.**

Boxes can similarly be provided for other less common birds that may be found along riversides, such as kestrels, nut hatches, and especially dippers and wagtails. Nests and roosting sites for some of these species can also be built into bridges, either by leaving gaps in brick work, or casting holes into the faces of concrete walls.

**Benefits to conservation:** Provision of nesting and roosting sites where none other available.

**Suitable sites:** Dependent upon species. Generally areas where the

species is known to frequent but where few nesting sites have been recorded.

#### PROJECT 10: Alien Control

In recent years the abundance of alien, introduced species has increased greatly along the banks of the River Aire and many of its tributaries. It is feared, although in some contention, that this spread may be causing some harm to native species.

**Benefits to conservation:** Control of alien species such as Himalayan Balsam, Japanese Knotweed and Giant Hogweed may be desirable in certain areas, especially those such as Sites of Special Scientific Interest, and other nature conservation sites. Total eradication of these species is impossible, but it may be possible to limit the extent and density of these species, and in doing so protect sites and species of value to nature conservation.

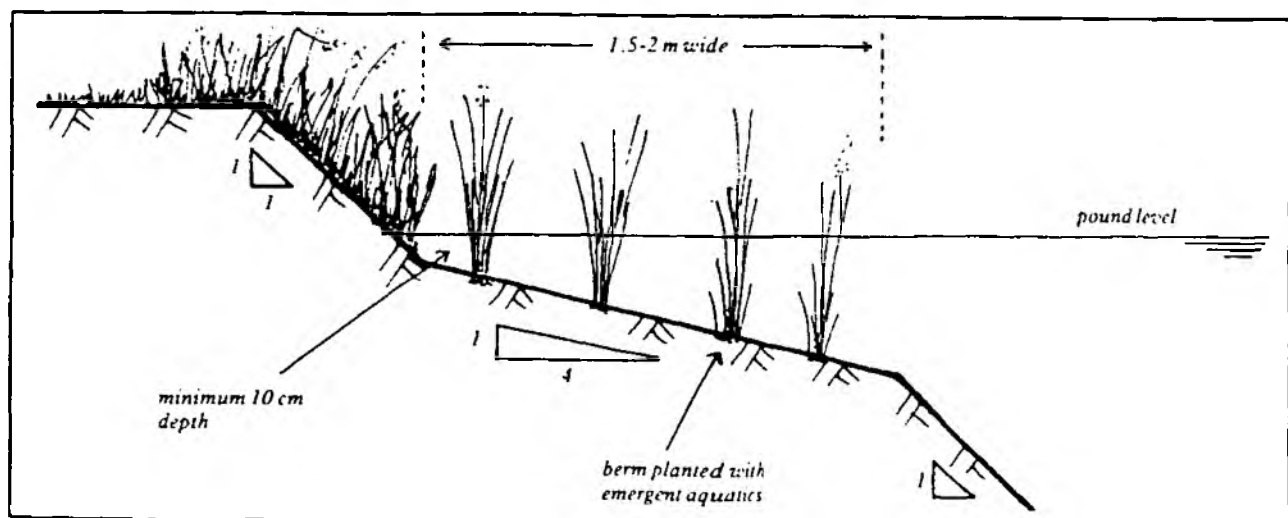
**Suitable sites:** Those of documented conservation or aesthetic value, and those where invasion is limited and re-invasion can be controlled.

#### PROJECT 11: Creation and management of berms.

River berms are flat areas of land between the main slope of the bank, and the main river channel, which have been created usually to add capacity to the channel, and will be wetted in times of flood. They can also be submerged, or seasonally wetted, and created for their conservation value.

**Example:** River Hull berm see photograph 4. The previously mown berm has been left unmanaged, and as a result, species such as Reed-canary Grass have developed into larger patches, and shrubs such as willows have grown up, resulting in a much wider range of habitats.

**Diagram:** The creation of a submerged berm.





**Benefits to conservation:** Creation of a wider diversity of habitats, with their associated wildlife. Submerged berms with emergent aquatic plants may provide cover and food for invertebrates, fish and birds.

**Suitable sites:** Existing berms where channel size would allow a change in management and development of trees and shrubs. Creation of new berms may require considerable land-take, and so a fairly large strip of land must be available alongside the water course.

#### **PROJECT 12: Grassland Management - on both river banks and adjacent land.**

**Example:** River flood bank at Helperby on the River Swale. See photograph 5. This very old flood bank has been managed in the same way for many years; the plants growing on the floodbank are allowed to flower each year before the bank is mown late in the summer. This mowing regime has resulted in a very diverse range of species on the bank, as can be seen from the photograph.

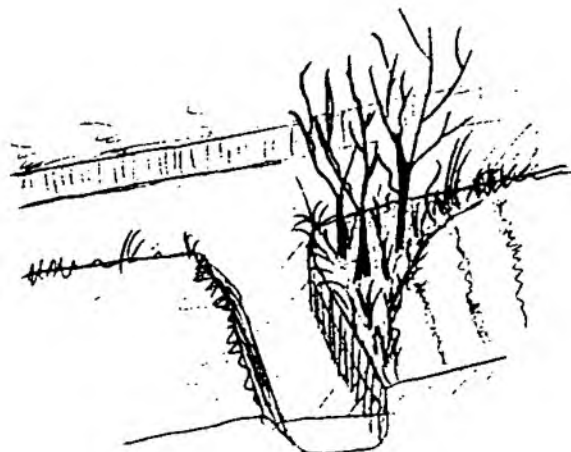
**Benefits to conservation:** Any grassland whether on the river bank or adjacent to the river can be managed in such a way as to increase the diversity of plant life. The methods usually used are to treat the grassland as hay meadows, only cutting after certain species have been allowed to flower. The taller growth resulting from this management can also be of benefit to insects and small mammals, and their predators.

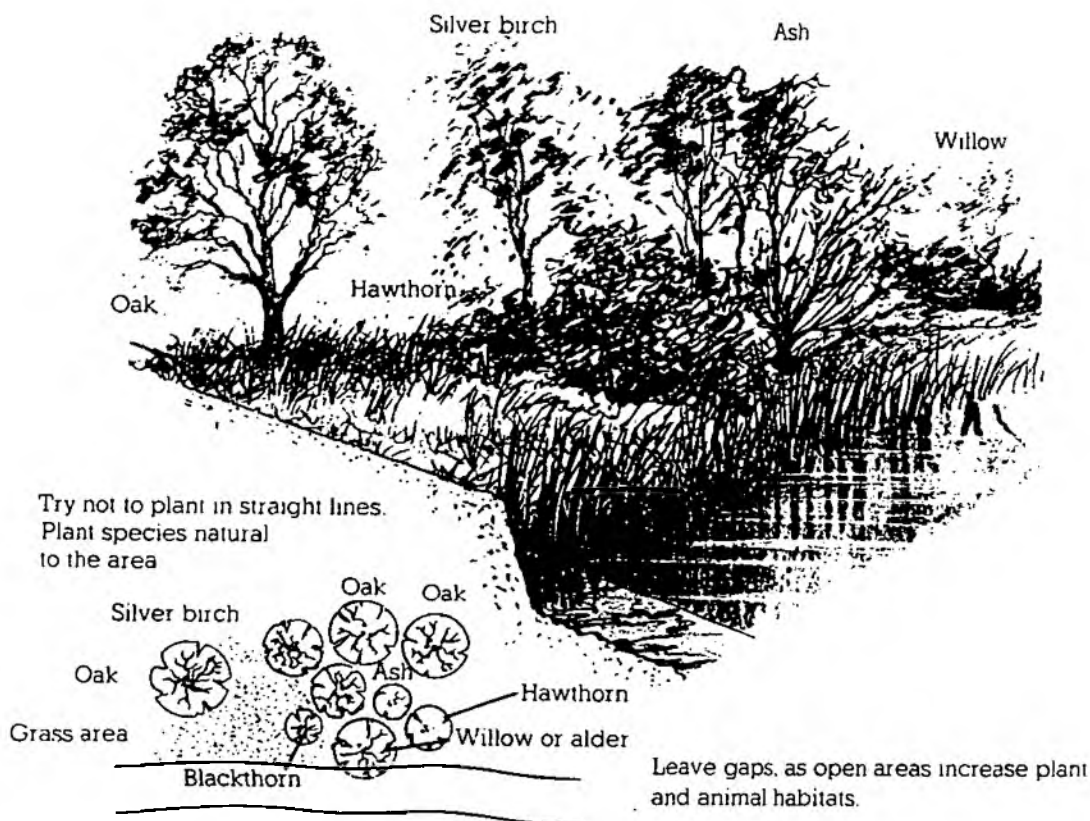
**Suitable sites:** Any areas of grassland.

#### **PROJECT 13: Tree and shrub planting/ hedge planting**

**Example:** The NRA have been involved in many riverside tree planting schemes throughout the Yorkshire region. Often willows are planted at the foot of banks to aid in bank protection and stabilisation. Trees and shrubs can be introduced in small numbers along bank tops, or in small field 'corners' where normal management is difficult and in other such sites. Larger planting schemes can take place where more land is available, or links can be made with existing woodland by creating hedgerows or belts of trees. Trees can also be used to shade out excessive growth of water plants where this is desirable.

**Diagram:**





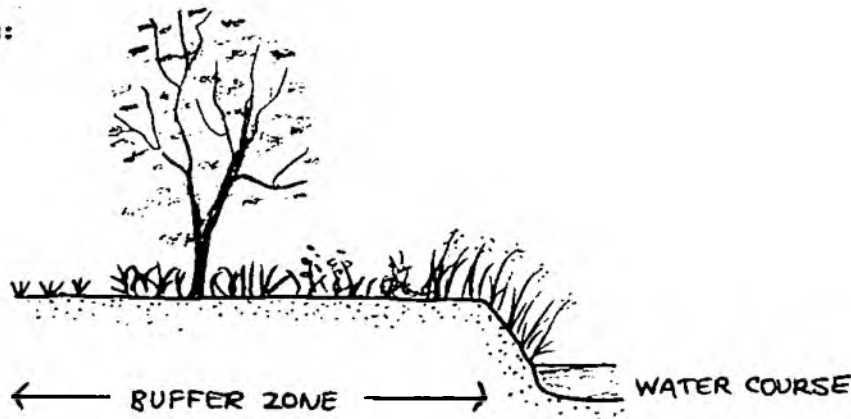
**Benefits to conservation:** The trees are of benefit in themselves, and of benefit to the wildlife that they support. Can add diversity of habitat in very open areas. Forms links to important woodland sites.

**Suitable sites:** As described above.

#### PROJECT 14: Creation of buffer strips

Buffer strips are stretches of natural vegetation between the river and any adjacent land-use. Such areas can be planted up with trees and shrubs, or be allowed to colonise naturally by simply not managing the area. Similarly more natural vegetation can be allowed to develop on river banks simply by fencing the bank off from grazing, and not managing the bank at all. Buffer strips need not be only trees and shrubs, the strip can be grassland, reed beds or other such habitats.

Diagram:



**Benefits to conservation:** Especially of value in arable areas where wildlife habitats are rare. Leaving a strip untreated by herbicides and fertilisers acts as a buffer zone to the bank slope and river itself.

**Suitable sites:** Where adjacent land is managed intensively, such as arable land or on golf courses, and where land take is possible.

#### **PROJECT 15: Washland management for nature conservation.**

**Example:** Lowther washlands at Allerton-Bywater, photograph 6. Lowther Washlands was designed in the 1970s for flood alleviation, and consists of several subsistence flashes caused by coal mining in the area. These areas of water and surrounding reed beds are of regional importance for migrating birds and breeding wildfowl. The area is designated a Site of Scientific Interest due to the presence of rare aquatic species. This is a washland site owned by the NRA, and as a result we have been able to manage the site for conservation, and to develop access to and within the site, with the help of the local community and schools. School children have been involved in producing a display of the site, designing and building an interpretation board, building bird boxes and planting trees. South Leeds Groundwork Trust have also been involved in fencing repair work, building foot-bridges, tree planting, and laying of paths and board walks, some of which can be seen in the photograph.

**Suitable sites:** This type of project hopefully will be able to be developed on other washland sites, with the help of local landowners, conservation and community groups. Sites that do not have permanent water may be able to be managed as seasonally wet sites, with benefits to grassland communities and wintering and migrating birds.

#### **PROJECT 16: Creation of semi-natural habitats adjacent to watercourses**

Almost any type of habitat could be created adjacent to watercourses, dependent on locality and type and area of land available. Those most suited would be habitats with an aquatic link, such as marshy grassland, ponds, reedbeds and willowcarr. Other types of habitat can be valuable too, many steep riverside banks are valuable for their woodland, and 'new' woodland can be created to join these valuable areas. Other

important riverside habitats can be those such as unimproved acidic grassland, with its specific mix of species, and attempts can be made to recreate these.





PHOTO 1      Introducing boulders to the River Aire at Gargrave to diversify fish habitats.



PHOTO 2      Oil Mill Beck litter pick, April '92. Carried out in Tidy Britain Group's Spring Clean Week.





PHOTO 3      Backing boards being placed in Oulton Beck at Rothwell.



PHOTO 4      A berm on the River Hull. The berm has been left uncut, allowing taller wetland vegetation to develop and willows to mature.





PHOTO 5      Flood bank on the River Swale at Helperby  
showing diversity of plant life.



PHOTO 6      Lowther Washlands at Allerton Bywater