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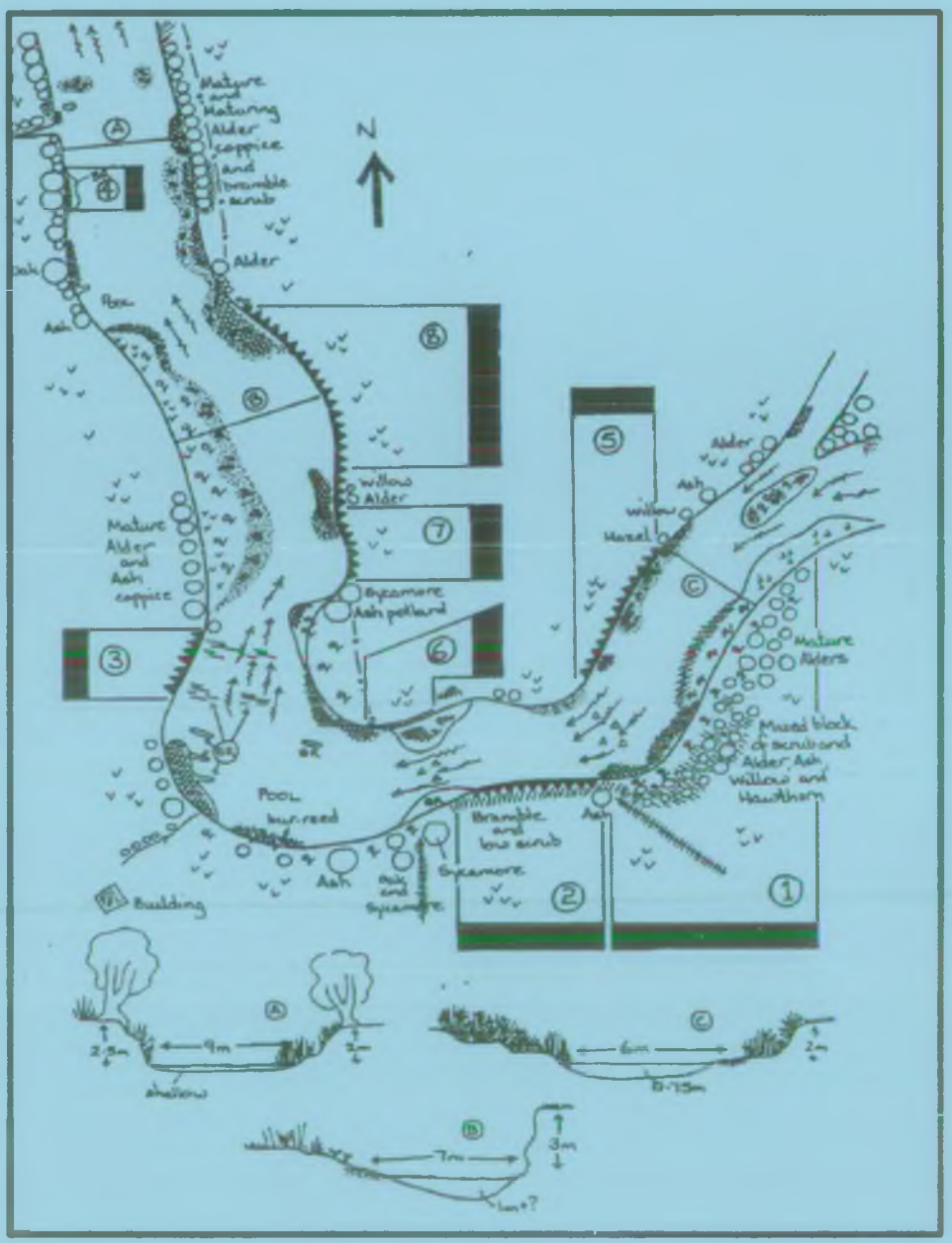
NRA

National Rivers Authority
South West Region

CORRIDOR SURVEY :

RIVER LEMON



RIVER LEMON CORRIDOR SURVEY

A REPORT PREPARED BY ECLOGUE

FOR THE NATIONAL RIVERS AUTHORITY (SOUTH WEST REGION)

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ACKNOWLEDGEMENTS

The author is grateful to all those people who have offered their assistance on the production of this report.

Report compiled by Mary de Lemos

October 1990

CONTENTS

1. INTRODUCTION - a brief description of the river and its surrounding area.

The Lemon is a lowland river in south Devon. It rises on Haytor Down at a height of about 400m above sea level, and runs south and east to Newton Abbot where it joins the River Teign. The Lemon has several small tributaries including Kester Brook and Blackford Brook.

The river cuts through alluvium and valley gravel deposits with the underlying geology consisting mainly of slates and mudstones, slates and shales and limestone.

Until it reaches Newton Abbot, where the river is canalised, the valley is rural. Upstream it is surrounded by arable land and pasture. The lower rural reaches run through woods and parkland where a public footpath alongside the river is heavily used. Various mill leats follow the upper reaches of the river. The only major road within the river corridor is the A383 between Newton Abbot and Ashburton.

The river is characterised by a heavily treed channel, with a varied pattern of riffles, slacks and pools, and a wide variety of substrates from sand to bedrock, cobbles being the most common. Both aquatic flora and macro fauna are limited. The river appears to be mesotrophic (of medium nutrient content).

The Lemon was surveyed from its Main River Limit at Millcross Bridge near South Knighton (NGR SX 8164 7189) to its confluence with the Teign (NGR SX 8696 7163). This represents 6.5km of river channel.

2. METHODOLOGY - an explanation of surveying techniques.

2.1 An outline of corridor survey techniques

The surveying technique carried out on the River Lemon is based closely on that set out in the Nature Conservancy Council (NCC) publication 'Surveys of Wildlife in River Corridors - Draft Methodology' (1985) and the Torridge Corridor Survey produced by the Devon Wildlfe Trust (1990). Essentially, the method involves dividing the river into 500 metre lengths which are then assessed in detail for their value to wildlife.

Each section was surveyed by one person, working downstream (although in the final report the downstream end of the river is taken as the first section and the survey progresses upstream). Both banks were examined wherever possible, as well as all land within the river corridor, which is defined as 50 metres to each side of the channel. The limits of each section correspond with the chainage figures used by the National Rivers Authority, each of which represents 500 metres of river.

A map was produced for each section, showing:

a. physical features such as channel form and substrate, patterns of flow and bank formations;

b. biological features such as tree cover, bankside vegetation, channel vegetation and adjacent habitats;

c. any features of interest in the surrounding land;

d. Key sites and features of particular importance to wildlife.

(It should be noted that the maps are based on field sketches, and that the width of the river has usually been exaggerated slightly for the sake of clarity.) These features are represented on the final maps by a series of symbols which are explained in the following table. The symbols are those set out by the NRA for this survey and are based on those of the NCC publication mentioned above.

Each section map is accompanied by a set of notes which describe the characteristics of the river and its corridor, and emphasize any areas of importance. Often specific management recommendations are made with reference to these sites, which are identified on the maps by a bold black line marking the extent of the feature; the number beside this line refers to the number given in the text on the opposite page. A further explanation of these key sites and features is given on page 9.

This is essentially a habitat survey, concentrating on broad areas of importance and localised points of interest. It does not deal comprehensively or definitively with the flora and fauna of the river corridor, but identifies areas which are likely to be of value, in the hope that they can be protected or improved.

Species lists of flora and fauna are given in Appendices A and B, but it should be emphasized that these are simply the species encountered in a thorough but rapid survey of the river, and do not represent its complete wildlife community. It is recommended that more detailed studies be carried out, particularly with regard to bryophytes, fish populations and aquatic invertebrates.

The survey was carried out between August and October 1990. It should be noted that this was a period of extreme drought, with correspondingly low water levels, and that the patterns of flow and the areas of exposed substrates shown on the maps will be slightly different under normal conditions.

TABLE OF SYMBOLS FOR INTERPRETING THE MAPS

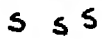
BANKSIDE FEATURES

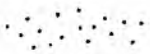

earth cliff

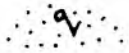
rock cliff

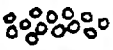

artificial bank

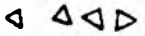

mud

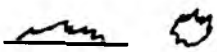

sand

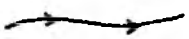

bare gravel/pebbles


vegetated gravel/pebbles

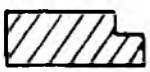

natural cobbles


natural boulders


bedrock


ditch/drain

fence


building

BANKSIDE VEGETATION

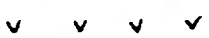

tree/large shrub (broadleaved or conifer)

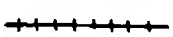
scrub/small shrubs/bramble thickets


reed/sedge


dense ruderal/tall herb vegetation


sparse ruderal/tall herb vegetation


grass


hedge


broadleaved woodland

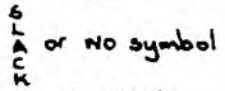

conifer woodland

RIVER FEATURES


bridge

weir

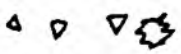

pool



slack

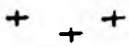

riffle

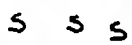

run

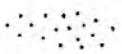

protruding rocks

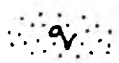

fallen log/tree

Margins/exposed substrates

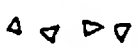

mud

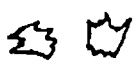

sand


bare gravel/pebbles


vegetated gravel/pebbles


cobbles


boulders


bedrock

2.2 Notes to table of symbols

The descriptions in inverted commas are taken from the NCC publication 'Surveys of Wildlife in River Corridors - Draft Methodology'.

Boulders are 'rocks larger than 25cm in diameter and up to 4m in diameter'.

Cobbles are 'rocks exceeding 6.5cm in diameter'.

Pebbles are 'smaller than cobbles but larger than 1.6cm in diameter'.

Gravel is 'smaller than pebbles and larger than 0.2cm in diameter'.

Silt is 'of soft texture and not abrasive'.

A riffle is 'shallow water flowing fast over coarse substrates; often the surface will be broken and cobbles and boulders may be exposed'.

A pool is 'a distinct, deeper area of water, often resulting in slower velocity or a swirling of the water around a deep depression'.

A slack is an 'area of deep or shallow water where the velocity is slow due to a very shallow slope in the river'.

Earth cliffs are 'at least 1m high and have a slope ranging from 80 to greater than 90 degrees'.

Artificial banks 'may be of any substance - rock, concrete, wood, metal etc. They are usually vertical or steeply sloping'.

Bedrock is shown where it forms a noticeable outcrop in the channel or banksides.

Reed/sedge are reeds and reed-like grasses or sedges, often forming distinct blocks on banksides, in the channel or on adjacent land.

Dense ruderal vegetation is composed of species such as nettles, Indian balsam or willowherb, in thick belts usually on the banktop.

Sparse ruderal vegetation is composed of species such as thistles, often combined with tall grasses.

Grass species: these areas are usually grazed, or colonized with short grasses and low-growing herb species.

Standard trees are those which have grown naturally without periodic coppicing or pollarding.

Coppiced trees are multi-stemmed, having regrown from periodic cutting.

Scrub habitats are usually blocks of bramble, blackthorn or other small shrubs of varying density.

Mud or bare earth on the bankside is usually the result of trampling or cattle grazing.

Hedgerows are shown where they are a continuous and significant feature, not having fallen into neglect or been partially removed.

Tall ruderal ground cover in the adjacent land is usually composed of species such as nettles, bracken and docks.

Agriculturally improved grassland has been greatly affected by the use of fertilisers, herbicides or even re-seeding. It supports a minimal number of grass or herb species.

Semi-improved grassland is usually partly affected by the use of artificial fertiliser, and may be heavily grazed, so that it supports a relatively small range of grasses and herb species, but more than improved grassland.

Unimproved grassland is unaffected by artificial fertiliser, and supports a varied community of grasses, sedges, rushes and herbs. This category encompasses a wide range of soil types, and also includes estuarine salt marsh.

Mud flats lie within the inter-tidal zone in estuarine sections.

3. SUMMARY including descriptions of three distinct river types.

This survey shows the Lemon to be a wildlife resource of some value within the Teignbridge District.The Lemon, although a small river, is of wildlife importance as a tributary of the Teign and in the context of the surrounding countryside. Most of the wildlife value is in the upper, rural, reaches, the stretch through Newton Abbot being relatively poor. The three distinct river types are summarised below.

The chainage lengths referred to here can be located on the maps in chapter 6.

3.1 River Teign to The Avenue road bridge SX 8696 7163 to 8651 7164

Downstream from The Avenue road bridge the tidal channel is up to 8m wide. At low tide water riffles over exposed cobbles with some cobble/gravel shoals. The banks are mostly vertical and man-made with banktop vegetation of bramble and tall herbs. Around the confluence with the Teign are small areas of mud flat and stands of common reed, with some salt marsh vegetation. All three features are of wildlife value. There is little aquatic vegetation. Surrounding land is either built up or "waste ground". Management recommendations are for the maintenance of existing vegetation and mud flats plus the planting of new trees on a disused railway siding.

3.2 The Avenue road bridge to Baker's Park SX 8651 7164 to 8525 7097

Through Newton Abbot the Lemon runs between stone walls, over a concrete base. For about 0.3km it runs beneath the buildings and roads. The vertical walls are up to 4m high with the channel of a similar width. The water was very shallow at the time of survey, riffling over deposits of cobbles or flowing over finer substrate deposits and concrete. Aquatic vegetation is sparse, but there are stretches with tall herbs/grasses along the margins. Bankside vegetation is limited to brambles and rough herbs, with very few trees, so the channel is open and sunny. The lower third of this stretch is tidal. Surrounding the river are buildings, roads and car parks. As good habitat is so limited in this stretch, what vegetation there is assumes great importance. Management recommendations concentrate on maintaining what aquatic and marginal vegetation exists and encouraging the extension of this vegetation.

3.3 Baker's Park to Main River Limit SX 8525 7097 to 8164 7189

The meandering channel has a variety of substrates from silt to bedrock, with cobbles the most frequent. The 4-10m wide channel is often shallow, riffling over exposed substrates. Between these sections are short slacks with deeper pools especially in areas of active erosion. There is little aquatic vegetation, but the river should prove good for aquatic invertebrates and part of the channel is within the River Lemon Valley Woods SSSI. Banks are mostly 1-2m high, steep to vertical, occasionally undercut, and composed of earth or earth over rock/cobbles. There is heavy, mature tree cover along almost this entire length, overshadowing the channel. The banksides

have a sparse covering of shade loving plants or are bare soil with exposed tree roots. Mosses and liverworts are common. The river passes through arable, grassland and woodland, much of the latter being SSSI. Management recommendations concentrate on maintaining channel features and most bankside tree cover, opening up short stretches to allow in more light, plus increasing scrub and tall herb cover by relocating fences to remove grazing/disturbance pressure.

It can thus be seen that the Lemon contains three distinct types of river habitat within its Main River Limits, relating to its development as a watercourse and to the nature of the surrounding land. It should also be clear that the way in which the different features are managed will determine the future wildlife character of the river. It is to be hoped that any work on the Lemon will take into account both its local and general characteristics, as described here, and will be planned and carried out with due respect for its wildlife.

N.B. Key Sites and Features are chosen for an individual section depending on which of the three river types that particular section lies within. Thus the key features noted in river type 2 (The Avenue road bridge to Baker's Park) are the most important parts of those particular sections given the relatively barren nature of that stretch. However few of those features would rate highly if encountered in river type 3 (Baker's Park to Main River Limit) which is of much greater wildlife value overall. Similarly, if the same criteria were applied to type 3 as to type 2 the whole of this upper reach would be designated a key site!

4. GENERAL MANAGEMENT - recommendations to protect wildlife.

The guidelines set out here are applicable to all parts of the river, but it should be emphasized that they are generalised recommendations; the recommendations made in individual sections should be given priority.

CHANNEL MANAGEMENT

1. Any submerged and emergent plant communities should be left intact wherever possible. Where bankside grazing or trampling has taken place, fencing of banks to exclude livestock (or people!) would improve the plant community. Should any substantial submerged vegetation develop and its removal prove essential, cut material should be left at the side of the river for 24 hours to allow invertebrate species to return to the water. No herbicides should be used in the channel.

2. The naturally occurring variations in flow and substrate should be maintained; if any damage to this pattern occurs during management work, attempts should be made to reinstate the pattern.

3. The removal of shoals should be carried out only if essential; spreading is preferable to removal.

4. Logs, flood debris and trash dams should be left intact wherever possible, as potential wildlife habitats.

BANKSIDE MANAGEMENT

1. Mature coppiced or pollarded trees which are in danger of collapsing should be carefully re-cut, working on short stretches (50m or less) in rotation, to minimise disturbance. No cutting should take place between March and July.

2. Mature standard trees should be left intact; if management work is essential, coppicing or pollarding is preferable to felling.

3. Root systems, saddles and stumps should be left intact, and any bankside hollows associated with them should be left undisturbed.

4. Cut material from bankside trees should be made into stick and log piles at the side of the river, to provide wildlife habitats.

5. Cut material should not be burnt within the channel, on banksides or in important habitats such as woodland, herb-rich grassland or wetland. Improved grassland and arable land are the only suitable sites for burning. Dead wood removed from the channel should be left at the bankside to rot, and not burnt or taken away.

6. Blocks or strips of scrub should not be disturbed when working on bankside trees.

7. Banksides which are rich in herb, fern or bryophyte species should be avoided. Management work should always be carried out from the least richly-vegetated bankside.

8. Open cliff sites should always be left intact and undisturbed during management work.

9. If it essential to cut herbaceous bankside vegetation, this should be carried out in late summer or autumn. Invasive species such as Indian balsam and Japanese knotweed (should it appear) should be eradicated if possible.

10. Extensive stands of tall reed species (especially common reed Phragmites australis and reed canary grass Phalaris arundinacea) should be left undisturbed.

11. Nest boxes for grey wagtails and dippers should be installed at selected sites such as under secluded bridges; old, irregular stonework in banksides or under bridges should be retained.

ADJACENT LAND

1. When carrying out management work, machinery and vehicles should not enter sensitive areas such as semi-natural woodland, marshy grassland or mud flats. These areas should generally be avoided.

2. Drainage ditches and feeder streams should only be cleared of vegetation if essential.

5. SUGGESTIONS for the creation of new wildlife habitats.

5.1 Letting in more light

Upstream from Baker's Park the Lemon has almost continuous heavy tree cover. Whilst a high degree of tree cover is valuable for wildlife, the Lemon has become so overshadowed that much of the channel is devoid of plant life. Opening up sections of the bank, preferably the south bank, would provide sunny stretches with minimal loss of tree cover, allowing greater growth of aquatic and emergent plants. The resulting bankside vegetation of tall herbs, grasses, brambles etc. would provide useful low cover and invertebrate populations, eg damselflies, would also benefit.

Temporary openings could be created by coppicing on a short rotation, more permanent clearings by herbiciding the stumps after the initial cut. The openings should be at least 15m long, with 2 or 3 per 0.5km stretch and must be fenced to exclude livestock. Obviously this measure would be of little benefit in woodland.

5.2 Fencing of banktops

In addition to the necessary fencing after creating open stretches, certain banktops would offer better wildlife habitats if they were fenced to remove the grazing or public pressure on herbaceous and emergent vegetation. Few banksides along the Lemon have substantial vegetation between the waters' edge and the top of the bank and many of the banktops are worn bare by public passage. Any of these sites could usefully be fenced off although the gain would be greater in grassland than in woodland. Limiting public access would also reduce disturbance to fauna, but could be undesirable politically!

5.3 Tree and shrub planting

In actively eroding areas young trees and shrubs should be planted to replace those which will soon be lost through undercutting of banks. Other areas which would benefit from planting have been noted alongside the relevant map. Native species should always be used.

Alders and willows are particularly suitable for riverside planting, although oak and ash are also of value.

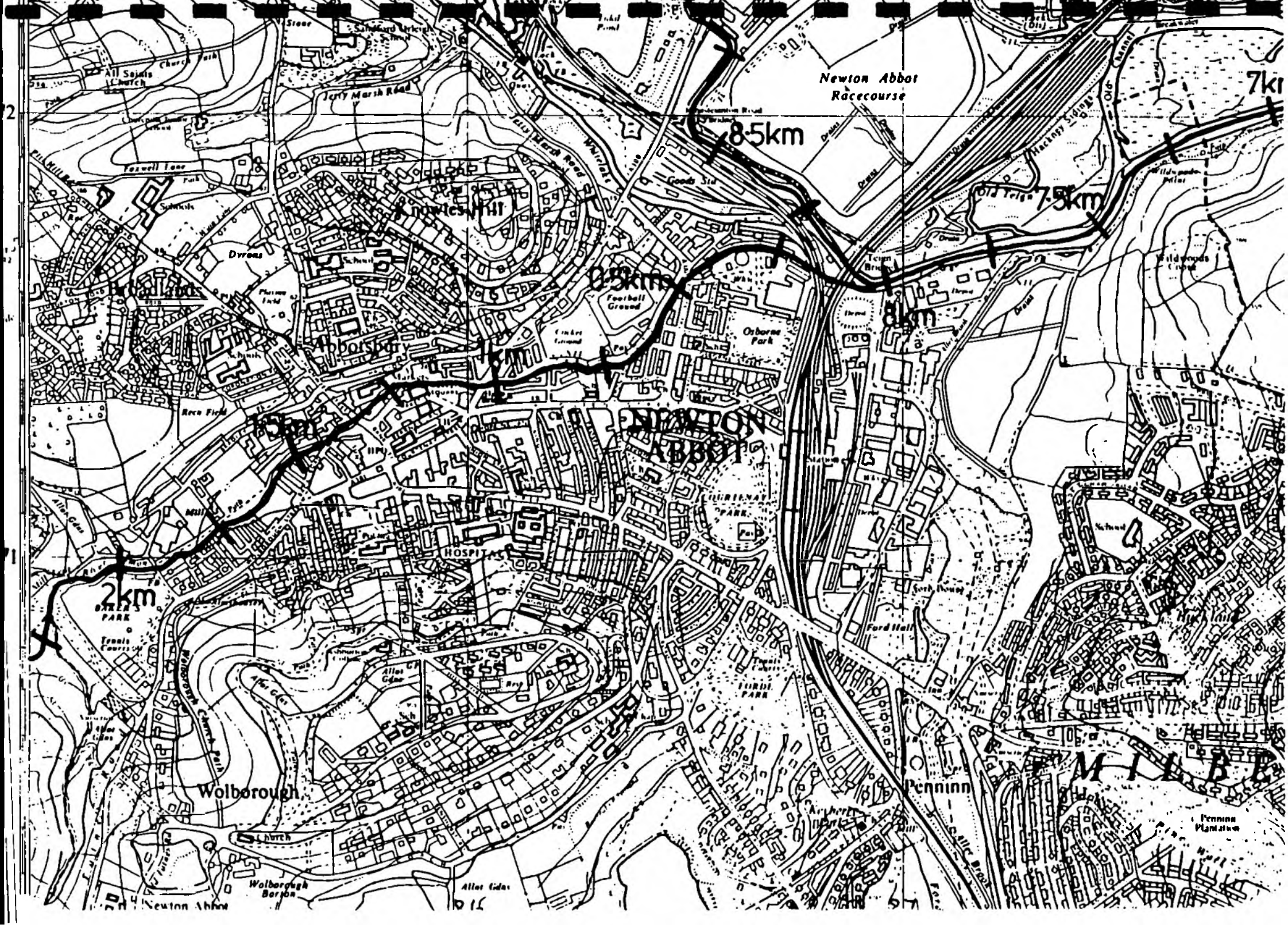
5.4 Stick piles

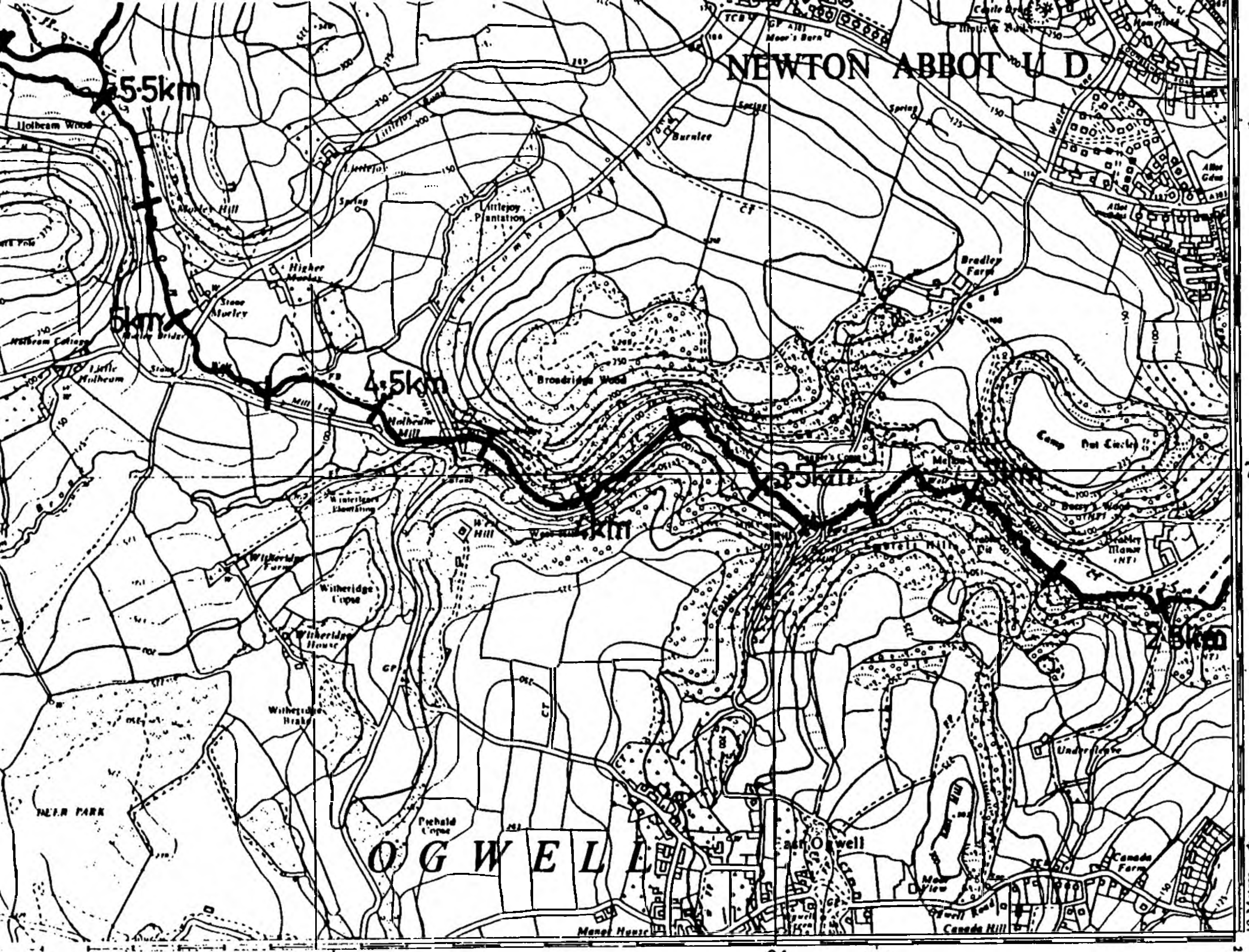
When management work is carried out on bankside trees, the cut material can usefully be made into stick and log piles, rather than burnt, to provide habitats for invertebrates, bryophytes and fungi. They should be sited close to the waters' edge and larger piles are more valuable than smaller ones. The larger logs and branches should be piled at the bottom, and the smaller material on top.

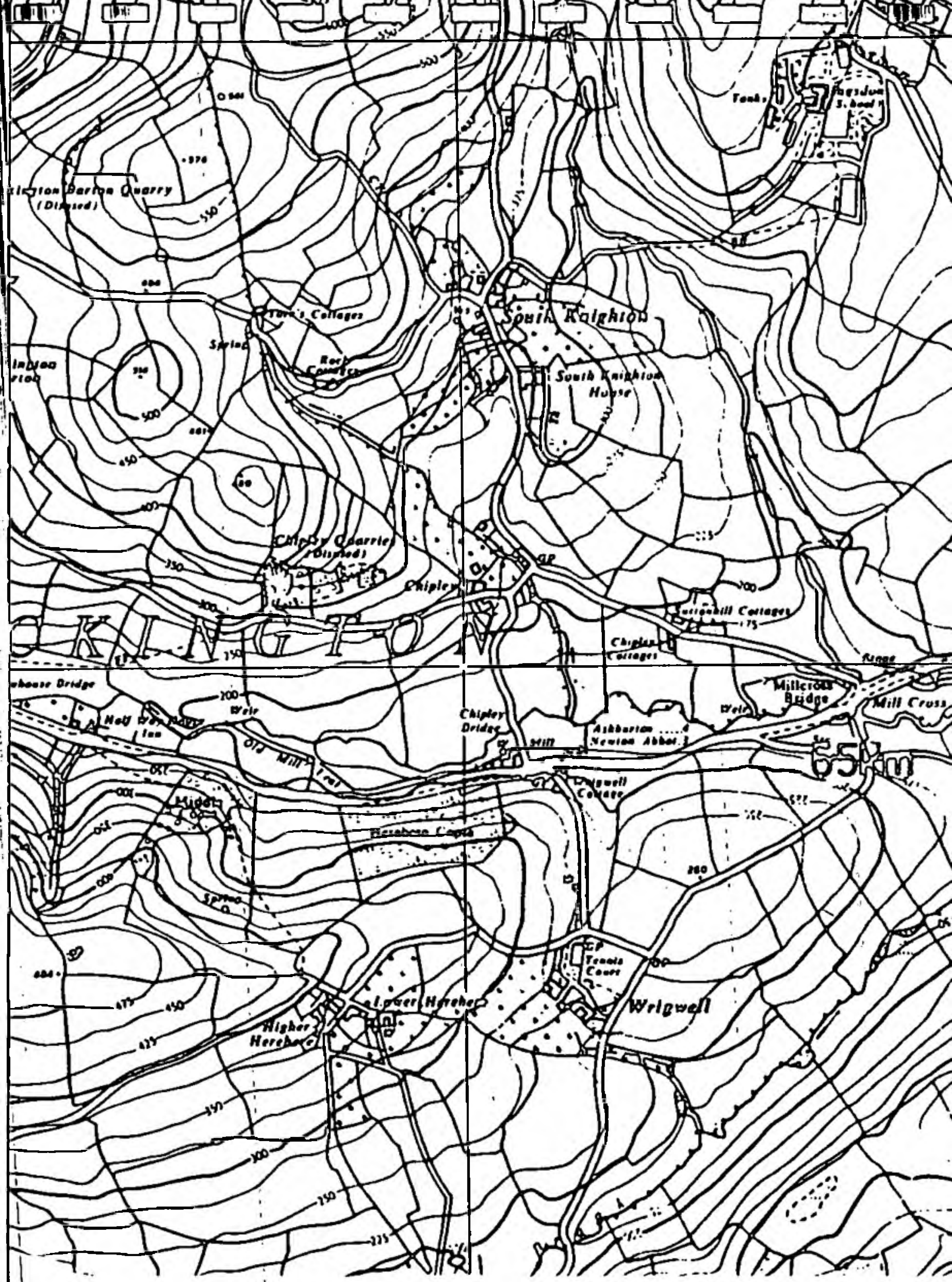
5.5 Nest boxes

Few of the bridges along the Lemon provide suitable nesting sites for dippers, although the river would otherwise be a suitable habitat for them. The siting of nest boxes under bridges and in secluded areas of old stonework would be of great value to this riverine bird. Grey wagtails may also benefit.

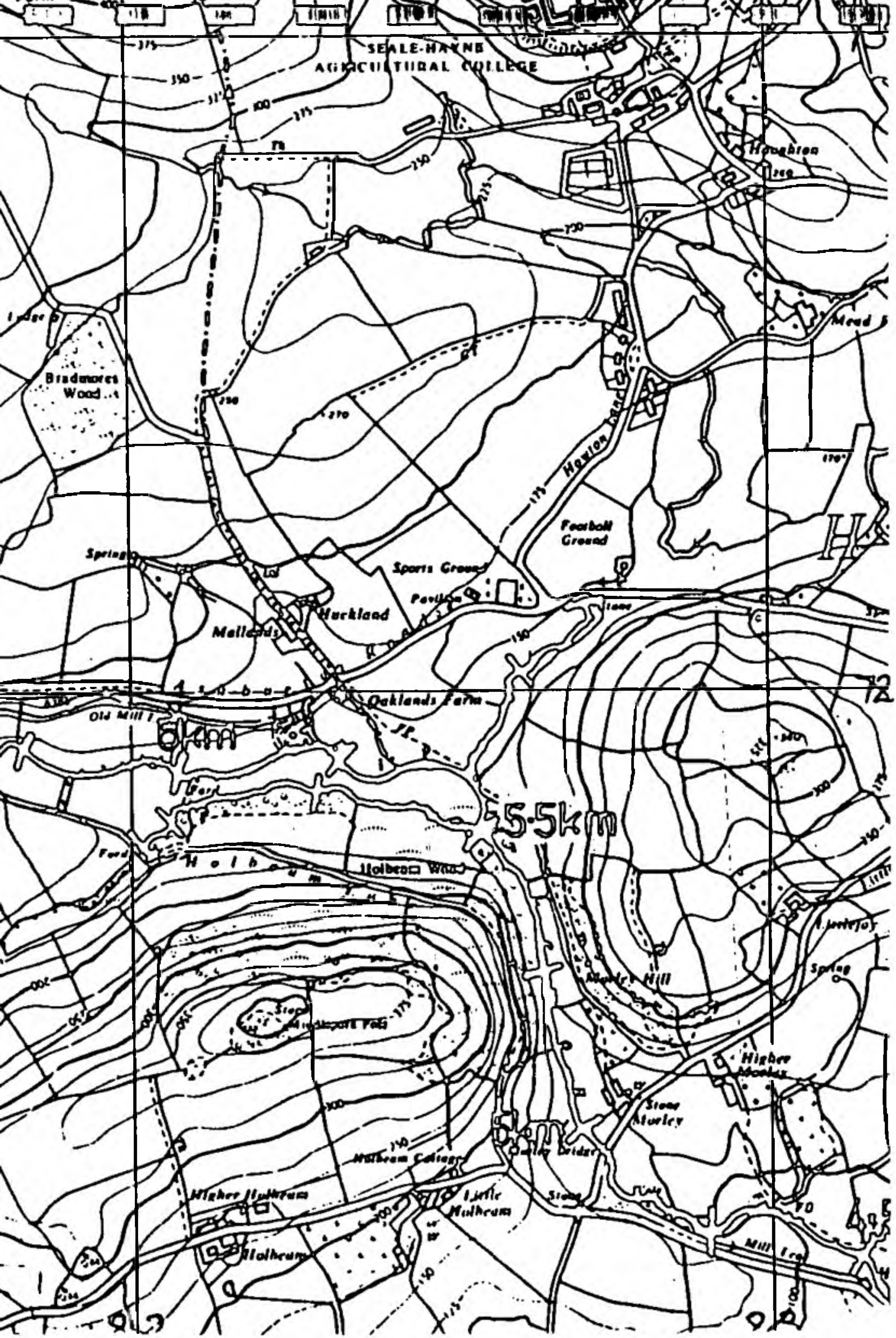
6. MAPS SHOWING LOCATIONS OF CHAINAGE LENGTHS


Newton Abbot Racecourse
8·5km
7·5km
0·5km
1km
2km
NEWTON ABBOT
Knowles Hill
Abbotsbury
Broadlands
Wolborough
Penninn
MILBE
All Saints Church
Jetty Marsh Road
Foxwell Lane
Drums
Goods Sid
Osborne Park
Football Ground
Cricket Ground
Rees Field
HOSPITAL
Ford Hall
Wolborough Church Path
Wolborough Barton
Newton Abbot
Penninn Plantation


5.5km
5km
4.5km
4km
3.5km
3km
2.5km
NEWTON ABBOT U D
OGWELL
East Ogwell
Broadridge Wood
Littlejoy Plantation
Bradley Farm
Burnlee
Higher Morley
Stone Morley
Morley Hill
Holbeam Wood
Holbeam Cottage
Little Holbeam
Holbeam Hill
Witheridge Farm
Witheridge Copse
Witheridge House
Witheridge Brake
West Hill
Prehald Copse
Manor House
Moor View
Canada Hill
Canada Farm
Underleave
Camp
Bradley Manor
Moor's Barn
Littlejoy
71
83
84
70000
10 Metres
LAT 50° 32'
LONG
NEWTON ABBOT U D
KINGSBOROUGH PH



South Knighton
South Knighton House
Rock Cottages
Spring
Chipley Quarries (Disused)
Chipley
Chipley Cottages
Chipley Bridge
Mill
Weir
Millcross Bridge
Mill Cross
Ashburton
Newton Abbot
Tennis Court
Wrigwell
Tanks



SEALE-HAYNE
AGRICULTURAL COLLEGE
Houghton
Bradmores Wood
Haxton Lane
Football Ground
Sports Ground
Pavilion
Huckland
Mallands
Spring
Oaklands Farm
Old Mill
5·5km
Holbeam Wood
Higher Holbeam
Holbeam
Stone
Mill

7. **SURVEY** - individual section maps and notes.

MAP 1 Chainage 0.0 to 0.5 Grid ref: SX 8696 7163 to 8649 7161

A tidal section starting at the confluence with the River Teign.

Channel
All but the extreme downstream end of this tidal section is canalised. It is 8m wide, narrowing towards the mouth. One road, one foot and two railway bridges cross it and there are two large drain inlets on the right bank. Substrates are mostly gravel, cobbles and mud, with low, wide shoals exposed at low tide. Most wildlife is downstream of the footbridge where the substrate is mud with areas of mud flat exposed at high tide. These are of potential wildlife value for their invertebrates and wading birds. Marginal stands of common reed, downstream, are valuable for birds and invertebrates. Algae were the only plants in the channel.

Banksides
Above the footbridge the banks are 3m high vertical concrete or stone walls which support little wildlife. On the left banktop a footpath runs through grass, thistles and mugwort. Along the right bank is a tangle of ivy, bramble, nettle and red valerian. Even this vegetation is of some worth in this relatively barren stretch. Below the foot bridge the right bank is a wall with a few small trees, but little else. The left bank is of earth, with stands of common reed and tall herbs (eg mugwort, docks and brambles). This vegetation is of some wildlife value.

Adjacent land
The right bank has houses, small gardens and limited amenity planting of low wildlife interest. Downstream are railway lines and a good area of ornamental trees. The left bank has industrial development upstream, then waste ground (old railway sidings). This is of bare earth, short grass and taller herbs such as weld, docks and thistles. Beside the railway line are a number of mature shrubs including elder, willow and buddleja. Some field maple have recently been planted. This area has some wildlife value which will increase with time. Beyond it flows the River Teign. Below this railway the two rivers are separated by a valuable area of common reed, tall herbs and salt marsh with sea aster. There are some small trees beside the railway and open mud flats at the confluence. This triangle is of wildlife value for its plants, invertebrates and birds and is considered the most important area of habitat in this stretch.

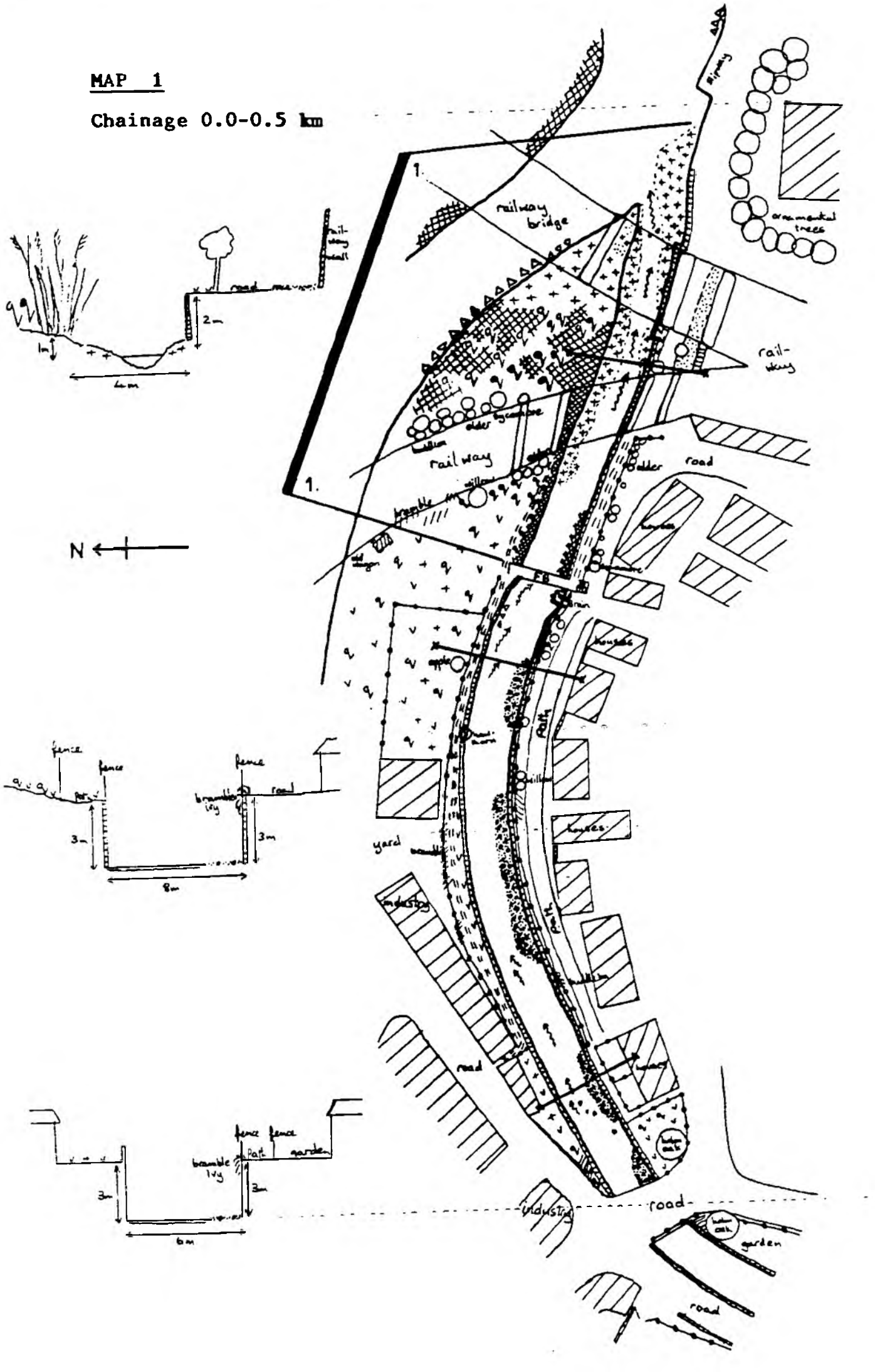
Key sites and features
1. Area of shrubs, tall herbs, reed, saltmarsh and mudflats.

Summary
The very limited wildlife value of the canalised stretch is provided by the banktop bramble, ivy etc. Downstream inter-tidal mud flats and a mosaic of common reed, tall herbs, salt marsh and shrubs greatly increases the wildlife importance.

Management
Retain the triangle between the railways, the mud flats and the reed beds in an undisturbed state. Augment the old railway siding area and right bank by planting native shrubs and trees.

MAP 1

Chainage 0.0-0.5 km



MAP 2 Chainage 0.5 to 1.0 Grid ref: SX 8649 7161 to 8606 7140

A largely tidal section running through Newton Abbot.

Channel
This 4m wide section is tidal for over half its length. It is all canalised and has a concreted bed covered in fibrous algae which have collected a coating of silt. At low tide silty concrete is exposed along much of the channel edge. Other plants (reed canary-grass and fool's water-cress) are infrequent in the tidal portion and coated in mud. Further upstream the channel edges support some vegetation including reed canary grass, hemp agrimony, hemlock water-dropwort and fool's water-cress. Even this sparse cover is of some wildlife value in such a barren section. Grey wagtails were seen near the centre of the section. The channel is traversed by two roads, a footbridge and two "aerial" pipes.

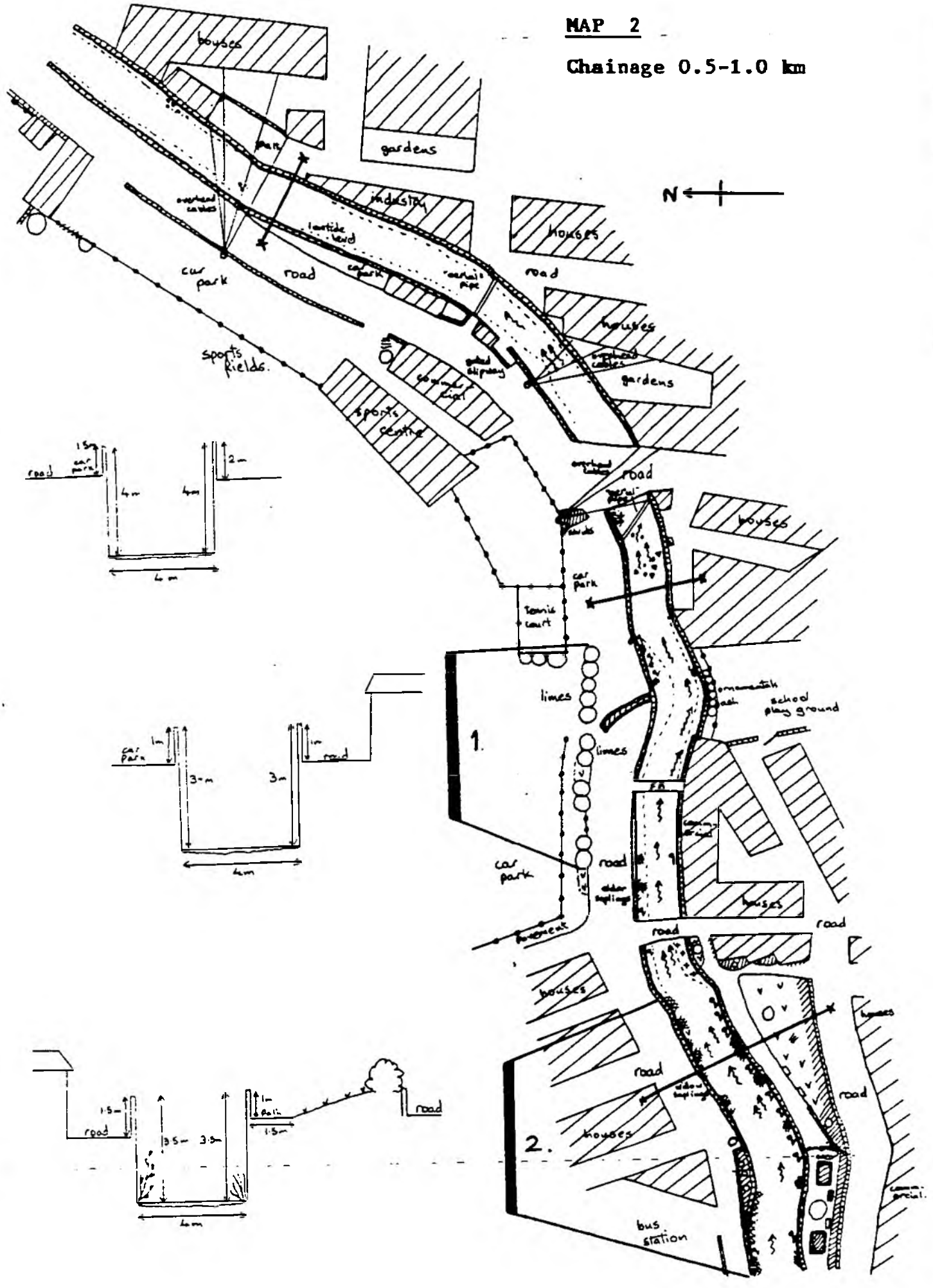
Banksides
The banks are 3-4m high vertical walls of cemented stone which house a number of drain and pipe outlets. In many places these banks form the walls of riverside buildings. Elsewhere, rising above the true bank level, they provide barriers for roads and paths. There is a gated concrete slipway to the river from the left bank. Mostly these banks support very little vegetation, but at the upstream end there is some red valerian and occasional specimens of ivy, ivy-leaved toadflax and bramble. Some sallow saplings have established at the base of the wall. In such a barren stretch even this sparse vegetation adds to the wildlife value.

Adjacent land
This is all built up with roads, buildings and car parks, although there are a few small areas of amenity planting (shrubs, trees, improved grass) and some gardens nearby. A line of mature lime trees runs parallel to part of the left bank with, upstream, sports fields nearby.

Key sites and features
1. Row of mature limes.
2. Channel edge and bankwall vegetation.

Summary
A relatively barren, largely tidal section in a built up area. Wildlife interest lies in all existing channel and bank vegetation and in nearby amenity planting.

Management
Maintain and encourage as much channel edge and bank wall vegetation as possible, cutting only when absolutely necessary.Retain limes and other trees near to the channel. Leave sallow saplings to mature. Encourage maintenance of amenity plantings.


MAP 2
Chainage 0.5-1.0 km
houses
gardens
N
industry
houses
road
car park
road
sports fields.
houses
gardens
sports centre
road
houses
car park
tennis court
limes
ornamental wall
school play ground
1.
limes
car park
road
houses
road
road
houses
houses
road
road
houses
2.
bus station
4m
4m
4m
3m
3m
4m
3.5m
3.5m
4m

MAP 3 Chainage 1.0 to 1.5 Grid ref: SX 8606 7140 to 8561 7123

A largely subterranean section passing through the centre of Newton Abbot.

Channel
The whole of the channel has been canalised and the majority runs underground, beneath the buildings and roads of Newton Abbot town centre. This portion may well be used by bats as a roost site. This would make it of considerable wildlife importance: all bats are protected by law. Where it is open, at the beginning and very end of the section, the channel is about 3-4m wide, the shallow water running over cemented stone. The (open) channel bed has a covering of willow moss or algae which has collected a covering of silt. In places the edges of the channel support fool's water-cress and reed canary-grass with a stand of tall herbs (eg great willow-herb) and sallow on the extreme downstream left bank. Such vegetation is valuable to wildlife in an otherwise barren stretch. Grey wagtails were noted. Downstream a large drain joins the channel at a recess in the right bank.

Banksides
In the open parts the banks are cemented stone walls mostly 4-5m high. They support a few plants (eg. ivy, ivy leaved-toadflax, buddleja), but are mostly bare. The left bank downstream is lower (2m) and supports nettle and bramble which also line the banktop footpath there. There is a gated concrete slipway to the river from an adjacent car park.

Adjacent land
Adjacent land consists of roads, car parks and buildings. There are some small areas of amenity planting which although of little inherent importance do add to the wildlife value of this barren built environment.

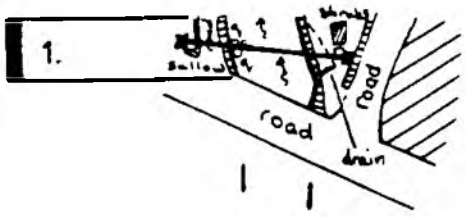
Key sites and features
1. & 2. Channelside vegetation.

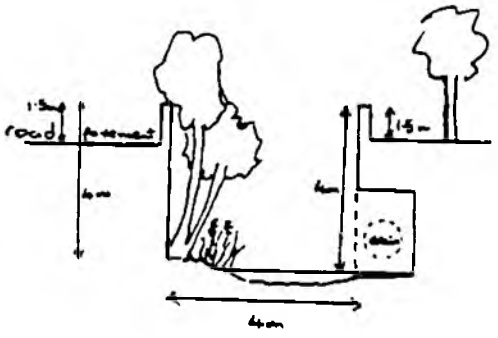
Summary
A canalised and largely underground section in the centre of Newton Abbot. The subterranean section may be used by bats as a roost site. The low wildlife value of the open sections is augmented somewhat by areas of channelside vegetation.

Management
Before any work is carried out on the underground section the Nature Conservancy Council should be consulted over the implications for bats. Maintain and encourage as much channelside and bankwall vegetation as possible: control only by cutting when absolutely necessary. Encourage maintenance of amenity plantings.

MAP 3

Chainage 1.0-1.5 km





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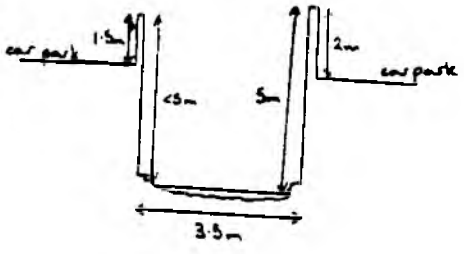
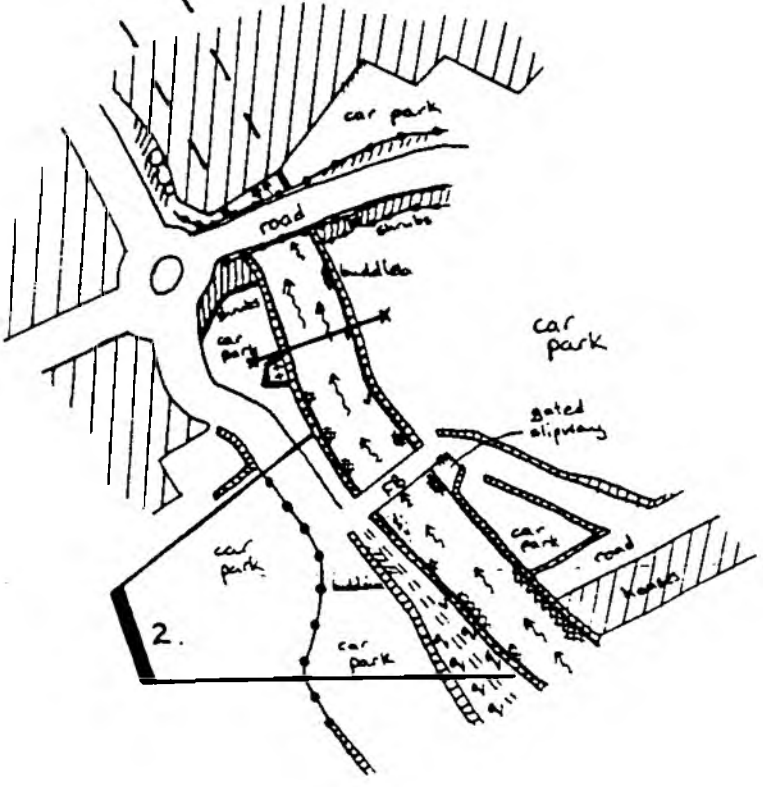




MAP 4 Chainage 1.5 to 2.0 Grid ref: SX 8561 7123 to 8521 7097

A largely canalised section running through Newton Abbot.

Channel
For most of this section the 4m wide channel is shallow and canalised. Substrates are of stone set in concrete and cobbles/gravel, probably over a concreted base. However, upstream, where it is overhung by trees, the channel is deeper and underlain by soft deposits of sand and silt. There is very little plant life within the channel itself, although downstream valuable vegetation emerges from the concrete at the edges of the channel eg reed canary-grass, hemp agrimony and hemlock water-dropwort. A pair of grey wagtails inhabit the downstream end and fish were present throughout. The section has two shallow weirs, four footbridges and numerous pipes and drains emerging from the walls.

Banksides
All the banks are man-made, of cemented stone or concrete. For most of the section the left wall is 1-2m high. The 4m high right bank wall forms a barrier for the residential area behind. Both walls have been colonised in places by bramble, ivy, bindweed, red valerian and ivy-leaved toadflax. A number of shrubs have established in the walls including buddleja, sycamore, elder, ash and elm. All the areas of vegetation are quite small, but add to the wildlife value of an otherwise fairly barren stretch.

Upstream the banks are largely obscured by vegetation: bramble and herbs on the left bank, a line of overhanging trees and scrub on the right. This is the first good wildlife cover on the Lemon.

Adjacent land
Adjacent to the right bank are a public park, houses and gardens and industrial development. The left bank is mainly developed for industry and car parking with a strip of land encompassing a footpath between the river and the tarmac. Downstream the strip, although narrow, supports large elder and buddleja which are good for birds and insects. Where this strip is wider it supports grasses, tall herbs (eg mugwort, nettles, docks) and brambles. This area is valuable for invertebrates such as butterflies and grasshoppers. The neglected allotments upstream are valuable for birds and invertebrates.

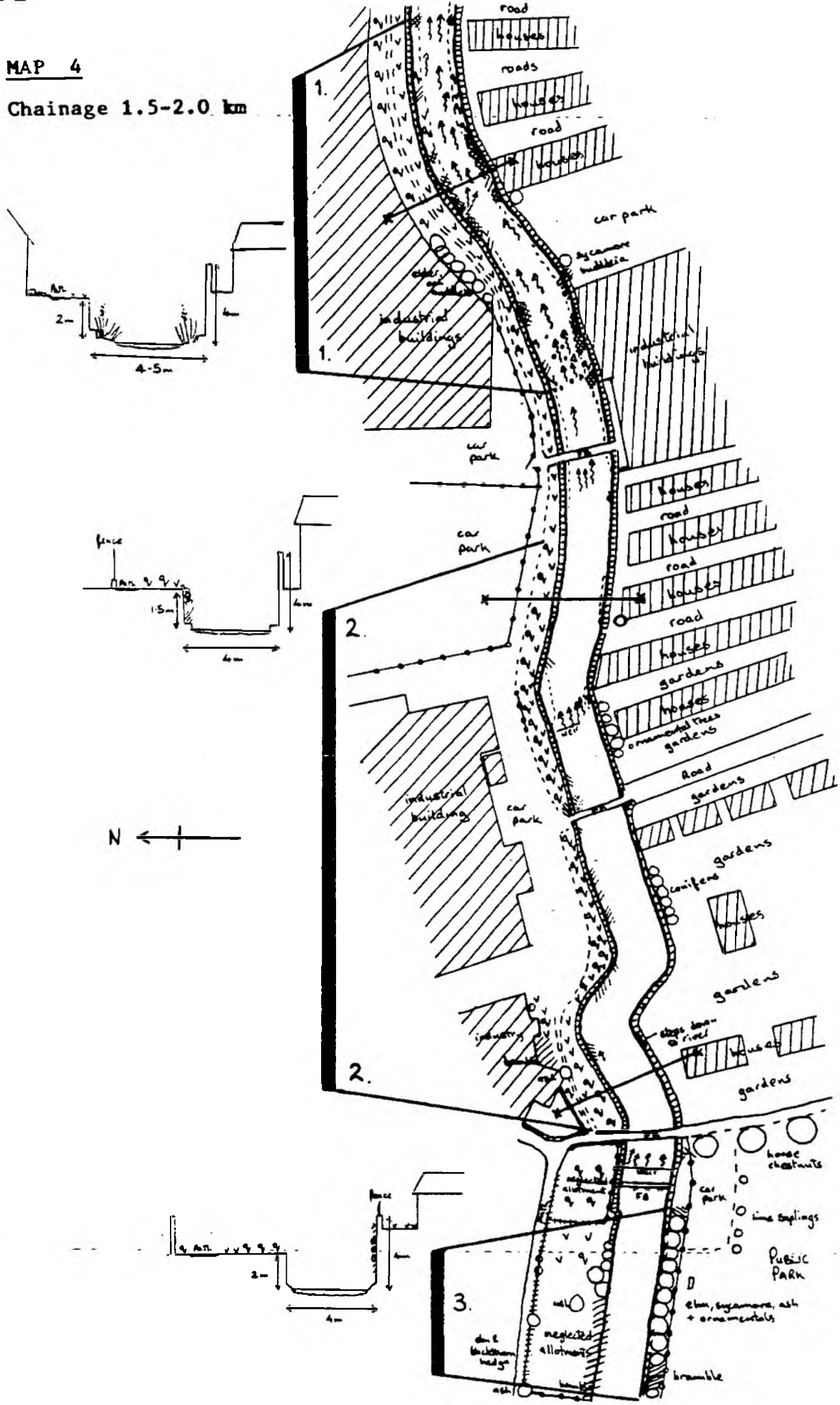
Key sites and features
1. Channel edge vegetation.
2. Strip of tall herbs, brambles, etc.
3. Trees and bank vegetation.

Summary
Largely a canalised section of low wildlife value. Some interest is provided by channel edge vegetation downstream and the bankside strip of tall herbs and bramble. Upstream are valuable bankside trees and herbs which constitute the first good cover on the river.

Management
Retain and encourage all the existing vegetation. The tall herb strip should be cut once every 2-3 years, in early autumn, and the cuttings removed. Channel edge vegetation should be cut only when absolutely necessary.

MAP 4

Chainage 1.5-2.0 km



MAP 5 Chainage 2.0 to 2.5 Grid ref: SX 8521 7097 to 8485 7071

A well treed section passing through parkland and woodland. Part of this section is included in the River Lemon Valley Woods SSSI.

Channel
The meandering channel is 5-6m wide. The substrate is mostly cobbles intermingled with smaller particles and occasional boulders. There are a number of wide, unvegetated shoals of gravel, sand and cobbles.The water is generally shallow, riffling over exposed substrates in many places, but there are deeper areas and occasional pools. Five drains/streams join the river here: of particular wildlife interest is the stream near the mid-point of the section. Downstream a weir and a large "aerial" pipe traverse the channel. Beyond this the river has been canalised. There is little aquatic vegetation except just above the weir (willow moss, water-cress, starwort). The varied flow structure and substrates are valuable for aquatic invertebrates, but the high level of disturbance from the public parkland reduces the value for birds and mammals. The upstream half of the channel is within the SSSI.

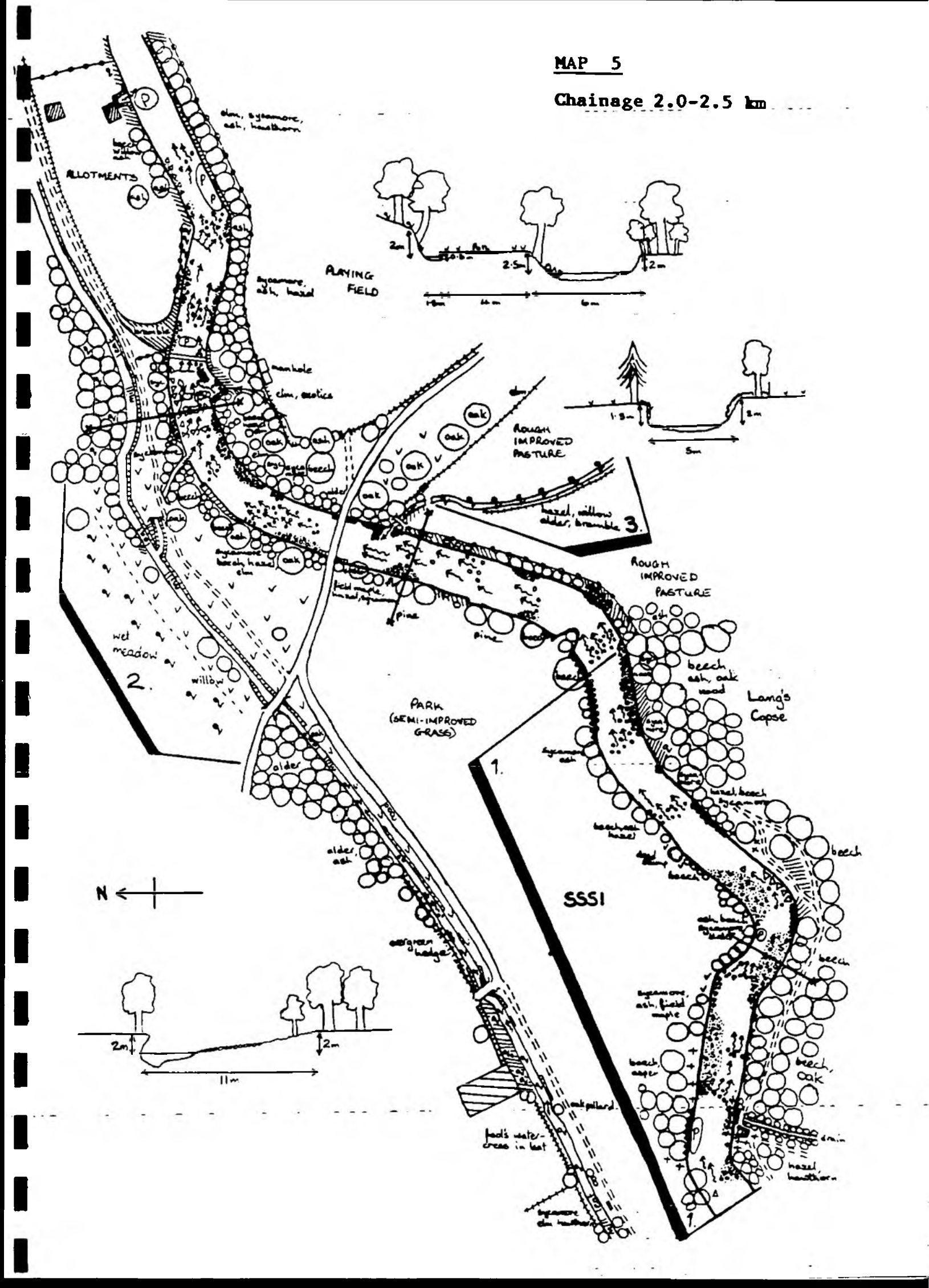
Banksides
Mostly earth banks to 2m high and, in the canalised section, concrete, earth and stone to 3m. In the upstream half flow action has undercut the banks in places leaving unvegetated soil below the tree roots. Both banks have much valuable tree cover with many branches overhanging. Many of the fine mature specimens are beech, with much sycamore and ash plus some alder, hazel and oak. The bankside ground flora is of bramble, ivy, ferns and grasses. Much of the left banktop is worn to short grass or bare soil, but where there is no public access undergrowth provides good cover eg the bramble, tall herbs and bindweed by the allotments. The banks of the tributary stream have a good herbage of low shrubs and thick stands of willowherb, meadowsweet and water mint.

Adjacent land
On the right bank are a playing field and rough, agriculturally improved pasture with, upstream, Lang's Copse. This beech, ash and oak wood is of considerable wildlife value and part of the SSSI, but is suffering a little from great public usage. The left bank is mostly parkland of semi-improved grass. Beyond this is a mill leat which, with its sunny position and stands of water-cress, fool's water-cress and starwort, forms a valuable complement to the shady river. Beyond the leat is a wood (in the SSSI), an alder copse and an area of wet meadow with meadowsweet, angelica and sedges. All of these are valuable habitats. Downstream are allotments.

Key sites and features
1. SSSI channel & woodland. 2. Wet meadow area. 3. Vegetation of tributary.

Summary
A valuable stretch for wildlife with good tree cover and good potential for aquatic invertebrates. Valuable adjacent habitats are the three areas of woodland, the tributary stream, mill leat and the wet meadow.

Management
Excluding the public would reduce trampling and disturbance, but this is likely to be unacceptable. Retain existing tree cover, on left bank planting replacements for standards which will eventually be lost to erosion. Retain the varied flow and substrate pattern. Maintain the tall herbs along the tributary by continuing to coppice the trees and limited periodic cutting of patches of herbs. Maintain the wet meadow by yearly cutting at the end of summer, removing cut material. Avoid disturbance of the woods consulting NCC before any management in the SSSI.


MAP 5
Chainage 2.0-2.5 km
ALLOTMENTS
PLAYING FIELD
ROUGH IMPROVED PASTURE
ROUGH IMPROVED PASTURE
PARK (SEMI-IMPROVED GRASS)
wet meadow
willow
Lang's Copse
beech, ash, oak wood
SSSI
N
1.
2.
3.
manhole
elm, exotics
elm, sycamore, ash, hawthorn
sycamore, ash, hazel
sycamore, beech, hazel, elm
hazel, willow alder, bramble
alder
alder, ash
evergreen hedge
oak pollard
fool's water-cress in leat
beech
beech, oak
hazel, hawthorn
2m
2.5m
11m
5m

MAP 6 Chainage 2.5 to 3.0 Grid ref: SX 8485 7071 to 8443 7095

A heavily treed section passing through woodland and parkland. Within the River Lemon Valley Woods SSSI.

Channel
The meandering channel is 5m wide and mostly shallow with a good varied flow pattern of riffles, short, shallow slacks and deeper pools. The substrate is mostly of cobbles with some gravel and sand, a few boulders and occasional outcrops of bedrock. There are a number of unvegetated, shoals of gravel, sand and cobbles. There is very little channel vegetation (filamentous algae and some duckweed), but the varied flow and substrates make this a good section for aquatic invertebrates. Fish were abundant and grey wagtail were present, but disturbance caused by public access does limit the wildlife potential. The channel is included in the SSSI. There is a small footbridge downstream.

Banksides
These are of earth or earth over rock, mostly vertical and 2m high rising to 3.5m at one bend. In places the banksides are bare earth, elsewhere grow ivy, ferns, bramble and dog's mercury, but this is often sparse. In several places the banks are undercut, undermining some of the many trees which line the banktops. These are mostly sycamore and beech, with many ash and hazel plus some alder and oak: most are mature, but there are many younger specimens. The trees are very important for wildlife and the undergrowth is also valuable. Upstream there is a rich bryophyte flora especially near the water's edge. The ground around the parkland trees is worn bare through public usage.

Adjacent land
The right bank, and left bank upstream is SSSI woodland which is very important for wildlife. The canopy is largely beech with ash and oak, plus more sycamore upstream. The ground flora is rich and the structure varied. A path follows the river: public pressure causes trampling of ground flora and disturbance. Most of the left bank is parkland of semi-improved grass. Beyond the parkland is a shallow mill leat, 1.5m wide. It has a low concrete wall and runs over gravel, sand and silt. In places the leat is choked with fool's water-cress and other water plants. Its north bank supports great willowherb, bramble and woodland. Downstream there is semi-improved pasture to the north of the leat. The leat's vegetation and sunny situation make it of wildlife value, complementing the shady river.

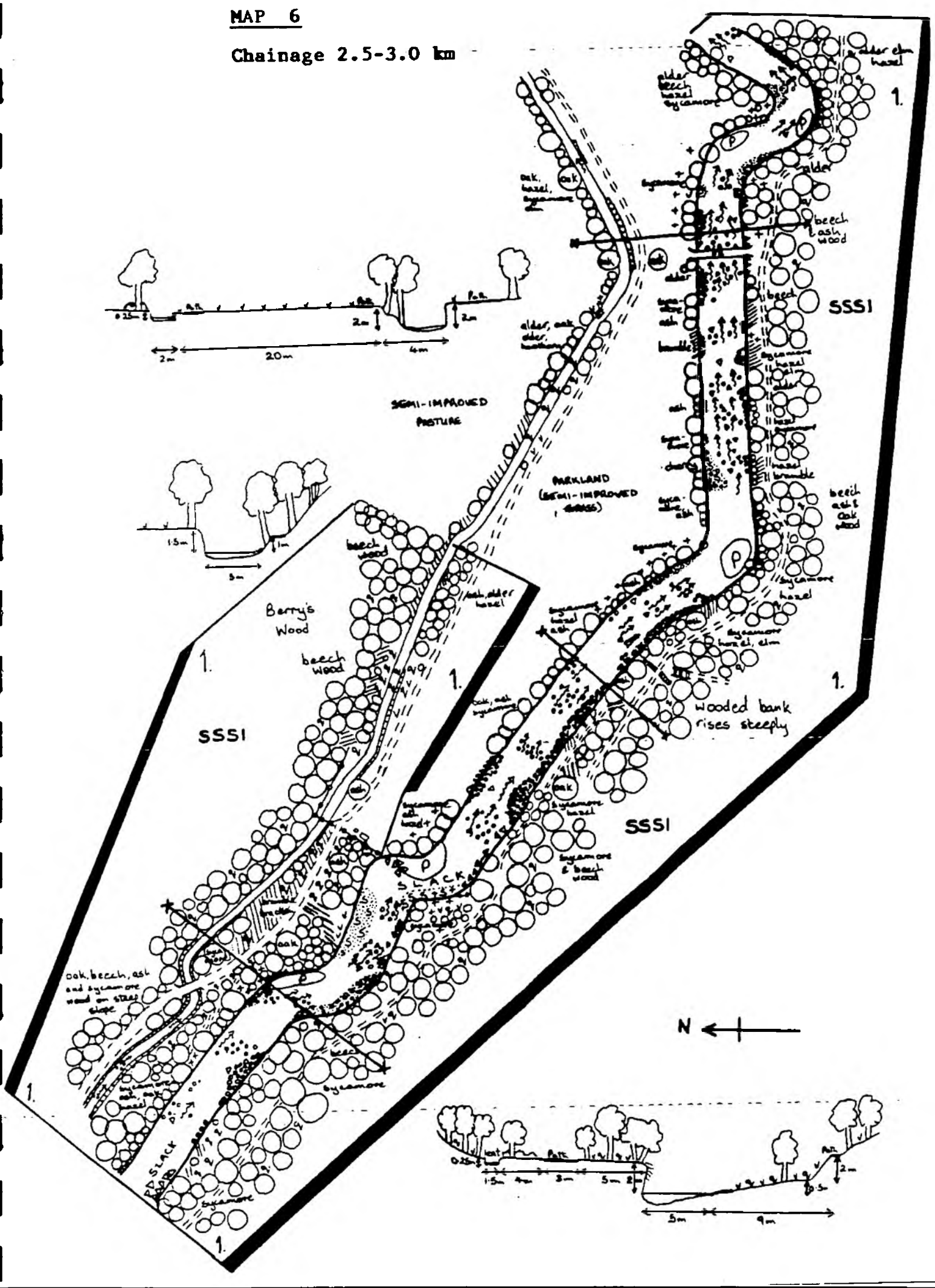
Key sites and features
1. Channel and woodland: both are entirely within the SSSI.

Summary
This section of river has good varied flows and substrate. The channel is designated SSSI as is all of the very rich woodland. The trees along the left bank are also important and the sunny leat complements the river.

Management
Excluding the public would reduce disturbance and trampling, but is likely to be unacceptable. Avoid damage or disturbance to the channel and woodland and plant young trees to replace parkland trees at risk from river erosion. Retain the leat in its present state by limited periodic cutting of weed. Consult NCC before any management within the SSSI.

MAP 6

Chainage 2.5-3.0 km



MAP 7 Chainage 3.0 to 3.5 Grid ref: SX 8443 7095 to 8398 7098

A well treed section through grassland. The channel and woodland downstream are within the River Lemon Valley Woods SSSI.

Channel

The gently meandering channel is 4-5m wide, wider upstream. It is mostly quite shallow with frequent riffles, however there are many deeper stretches including a number of pools. Substrates range from sand to bedrock with cobbles most common.There are a number of unvegetated shoals of gravel and sand or of cobbles. The varied flow pattern and substrates are good for aquatic invertebrates. Apart from algae in the sunnier parts there is very little channel vegetation: some duckweed and very occasional fool's water-cress, willow moss, etc. Grey wagtails use this section, but other large animals may be disturbed by the busy footpath along the left bank. A large weir dams the river for a mill leat and the channel is crossed by a ford and a footbridge. There is a small waterfall downstream and, upstream, a wide "pool" at a point of active erosion. Downstream the channel is SSSI.

Banksides

The banks are of earth and earth over rock, 1-2.5m high and mostly steep or vertical. Both banks have good heavy tree cover with young and mature specimens of alder, sycamore and hazel plus some ash, beech and oak. The more open stretches allow valuable sunlight in to the river. Mostly the banksides have a sparse cover of woodland herbs with some good bryophytes near water level, but occasionally they are bare earth. The banktops have bramble and bracken, grasses or woodland herbs. There is a high level of disturbance by the public and dogs.

Adjacent land

Downstream is mature woodland of ash, beech, oak and sycamore with a hazel, field maple and holly understorey and rich ground flora. It is of great wildlife importance and is within the SSSI. The right bank rises quite steeply while the flat left bank holds a mill leat and public footpath. Elsewhere the right bank has agriculturally improved pasture, a house and a garden, beyond which rises woodland. On the left bank is a wet semi-improved meadow with meadowsweet, yellow flag and hard rush. The copse in this field has a good canopy but the ground flora has been destroyed by over-grazing. The adjacent field has species-poor improved grass at river level, but where it rises steeply is unimproved calcareous grassland - a habitat very rare in Devon. Its herbs include salad burnet, burnet-saxifrage and devil's-bit scabious.

Key sites and features

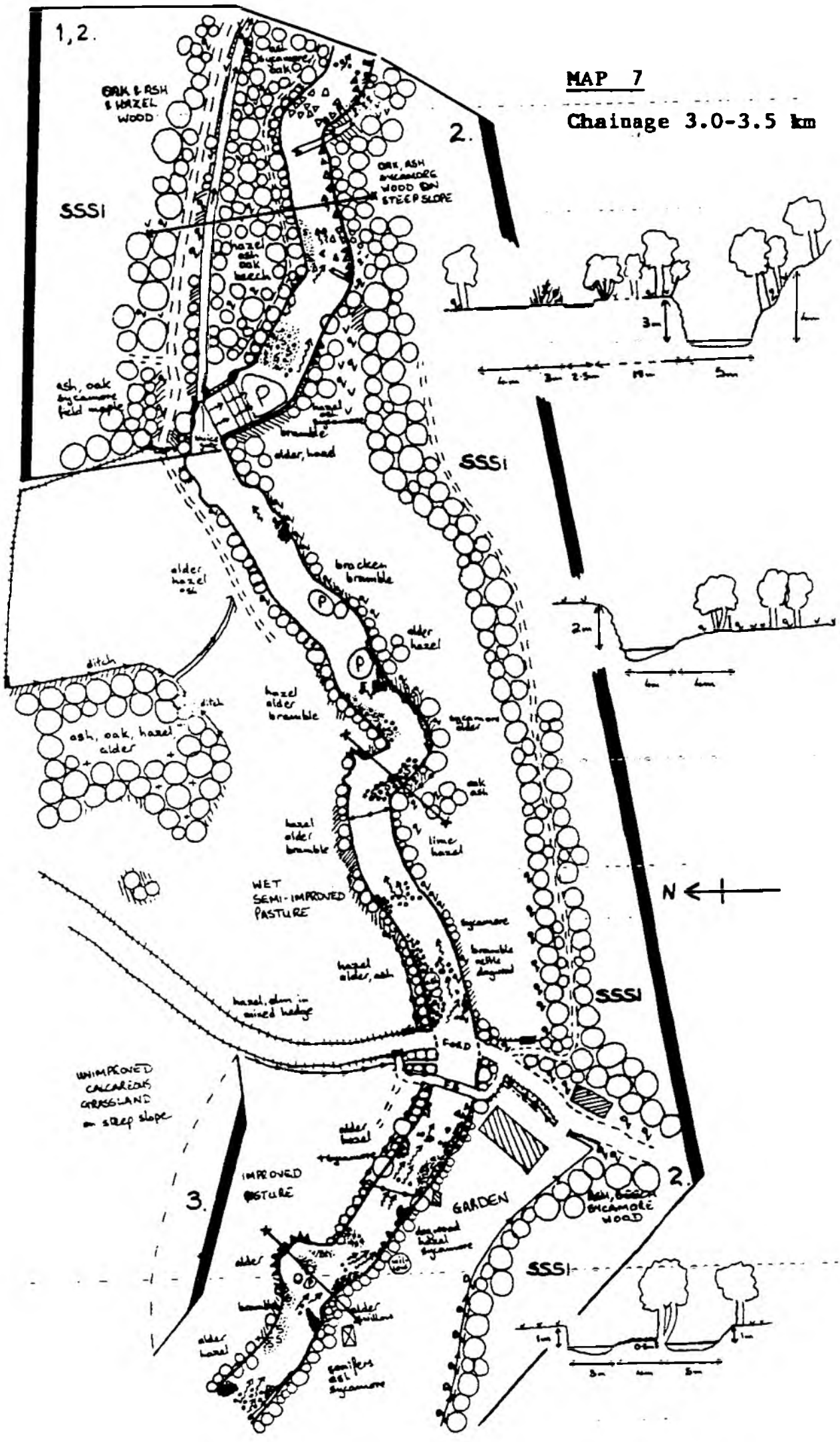
1. Channel within SSSI. 2. Woodland: all is in SSSI.
3. Unimproved calcareous grassland.

Summary

The varied flow and substrate plus bankside tree cover are good and the woodland is very important. The semi-improved wet meadow is of some interest while the area of unimproved calcareous grass is of great importance.

Management

Retain bankside trees and channel flow/substrate in present form. Consult NCC over any work within SSSI. Avoid disturbance to or agricultural improvement of wet and calcareous grasslands. Fencing of banks further inland to exclude stock would allow development of more valuable cover.


MAP 7
Chainage 3.0-3.5 km
1,2.
2.
3.
SSSI
OAK & ASH & HAZEL WOOD
OAK, ASH SYCAMORE WOOD ON STEEP SLOPE
ash, oak sycamore field maple
hazel ash oak beech
bramble
alder, hazel
bracken bramble
alder hazel
ash
ditch
ash, oak, hazel, alder
hazel alder bramble
sycamore alder
oak ash
lime hazel
hazel alder bramble
WET SEMI-IMPROVED PASTURE
sycamore
hazel alder, ash
bramble nettle dogmel
hazel, elm in mixed hedge
FORD
UNIMPROVED CALCAREOUS GRASSLAND on steep slope
IMPROVED PASTURE
alder hazel
sycamore
GARDEN
ash, beech SYCAMORE WOOD
alder
alder hazel
willow
conifers ash sycamore
N
3m
4m
2.5m
1m
5m
2m
4m
4m
1m
1m
3m
4m
5m

MAP 8 Chainage 3.5 to 4.0 Grid ref: SX 8398 7098 to 8360 7096

A heavily treed section entirely within the River Lemon Valley Woods SSSI.

Channel
The meandering channel is 6-10m wide with a good variety of flow patterns and substrates. It is within the SSSI. There are shallow stretches, where the water often riffles over exposed substrates, and deeper slacks with occasional pools. The substrates are cobbles with some sand and gravel. There are some parts with more of the finer particles and occasional boulders. There are a few shoals of cobbles with sand or gravel. In the sunnier stretches are willow moss and algae, with hemlock water-dropwort, fool's water-cress and nettles on some shoals. The many overshadowed stretches have no channel vegetation, however. A dipper was seen feeding here. Upstream is an old weir which supplied the leat running parallel to this section. However, the course of the river has been diverted, bypassing the weir and leaving the weir, old river bed and leat dry.

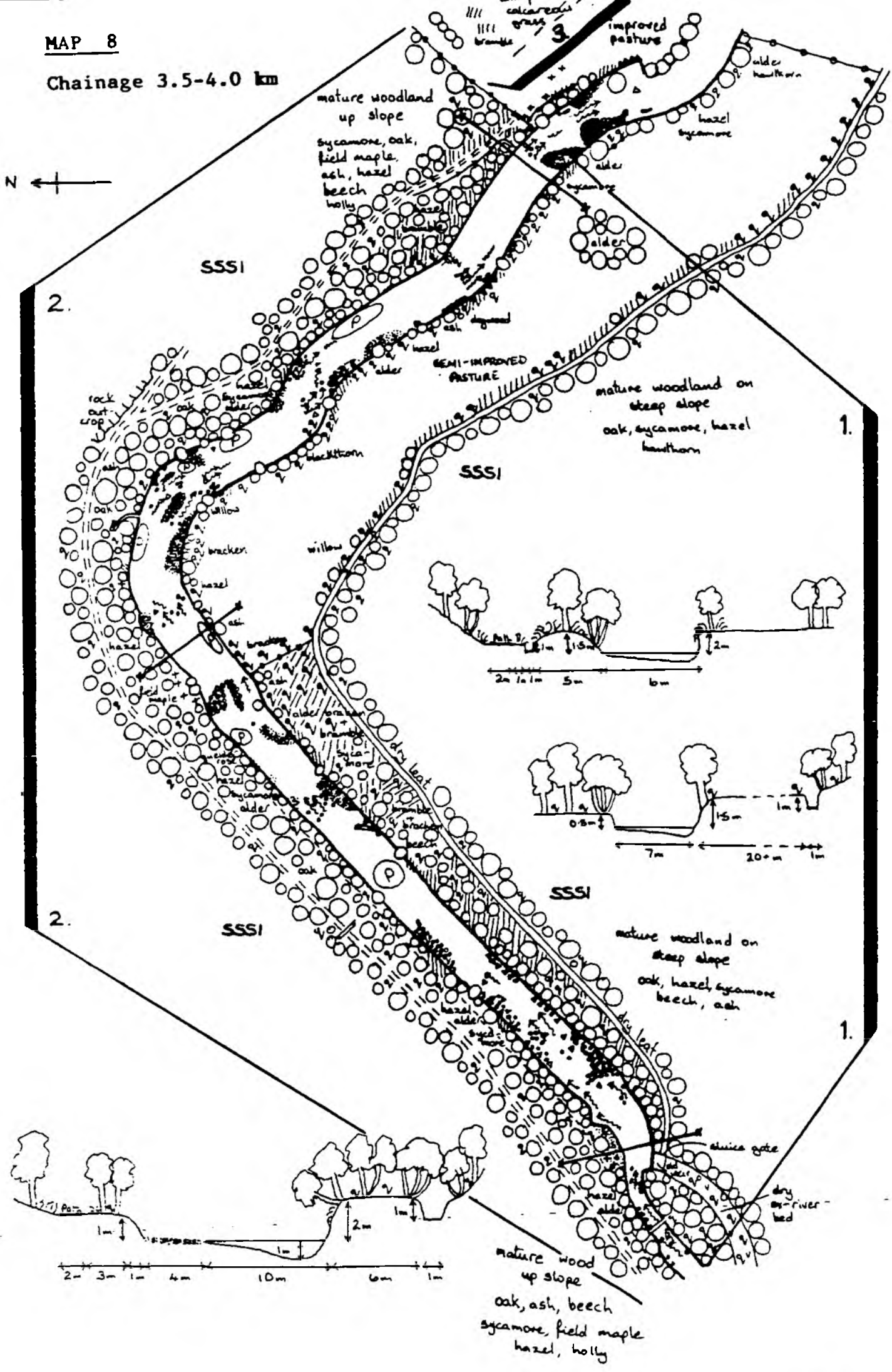
Banksides
The banks are mostly 1.5m high (0.5-2m), near vertical and of earth or earth over rock. Both banks have good heavy tree cover although the right bank is more open in one stretch. There are large hazel stools, alder and sycamore plus beech, willow, guelder-rose and other shrubs. The right bank supports much bramble, bracken and tall herbs. The left banktop has a short flora of typical woodland plants. The banksides have bare earth and roots or a sparse vegetation of ivy, bramble and ferns with good bryophytes nearer the water. Both the tree and tall herb cover are valuable for wildlife and the open stretches on the south bank provide important sunny patches with more aquatic vegetation.

Adjacent land
The left bank and much of the right bank bear very valuable woodland which is part of the SSSI. The trees include beech, oak, ash, sycamore and field maple with hazel and holly. A public footpath follows the left bank and beyond this the ground rises steeply with rock outcrops in places. On the right bank is a semi-improved meadow, dominated by creeping buttercup and white clover, beyond which are the dry mill leat and SSSI woodland. Its secluded position and tall sward give the meadow some wildlife value. Downstream the left bank supports agriculturally improved grass and, further up the slope, good unimproved calcareous grassland.

Key sites and features
1. Channel in SSSI. 2. Woodland: all within SSSI.
3. Unimproved calcareous grassland.

Summary
The channel, with its variety, and the woodland are very valuable and within the SSSI. Bankside tree and herb cover is also important. The calcareous grassland downstream is a rare habitat in Devon.

Management
Avoid damage or disturbance to the woodland, channel flow/substrates or most bankside trees. However, opening up a few stretches of the south bank would allow in valuable sunlight. Consult NCC before carrying out any work within the SSSI. Avoid disturbance to or agricultural improvement of unimproved calcareous grassland.


MAP 8
Chainage 3.5-4.0 km
N
improved pasture
mature woodland up slope
sycamore, oak, field maple, ash, hazel beech holly
alder
hazel sycamore
alder buckthorn
SSSI
2.
1.
SEMI-IMPROVED PASTURE
rock outcrop
mature woodland on steep slope
oak, sycamore, hazel hawthorn
willow
bracken
hazel
dry leat
mature woodland on steep slope
oak, hazel, sycamore beech, ash
sluice gate
dry ex-river bed
mature wood up slope
oak, ash, beech sycamore, field maple hazel, holly

MAP 9 Chainage 4.0 to 4.5 Grid ref: SX 8360 7096 to 8315 7114

A heavily treed section, with old leats/drains, within the River Lemon Valley Woods SSSI.

Channel
The meandering channel is 4-9m wide, with a good varied flow pattern of shallow water riffling over exposed substrates, deeper slacks and occasional pools. There is also a good variety of substrates from sand to bedrock, although cobbles are probably most common. There are occasional exposed drifts of cobbles and boulders. Aquatic vegetation is very sparse in this heavily shaded section. A stream and several leats/drains flow into this section and it is crossed by a road bridge. At the extreme downstream end the present channel by-passes the old dry river bed. Downstream the channel is within the SSSI.

Banksides
The banks are 1-2m high, vertical and of earth or earth over rock. Both banktops are heavily treed, mostly with hazel, alder and sycamore plus some ash, guelder-rose, beech and oak. Bramble and bracken or woodland ground flora grow amongst the trees. The banksides are bare earth and tree roots, have a sparse cover of bramble, ivy and ferns or support good populations of bryophytes.

Adjacent land
On the left bank are improved pasture, a garden and mature woodland of oak, beech, ash, hazel and holly. This wood is very important for wildlife and is designated SSSI. The woodland rises steeply away from the river and sports occasional outcrops of limestone. A public footpath follows the river and introduces a level of disturbance and trampling.

On the right bank are a garden, road and mature woodland of beech, field maple, oak and hazel. This woodland is very valuable for wildlife and, downstream, is within the SSSI. The SSSI woodland rises steeply away from the river. There is also a plantation of young conifer and taller poplar which provides some cover, but is of less wildlife value.

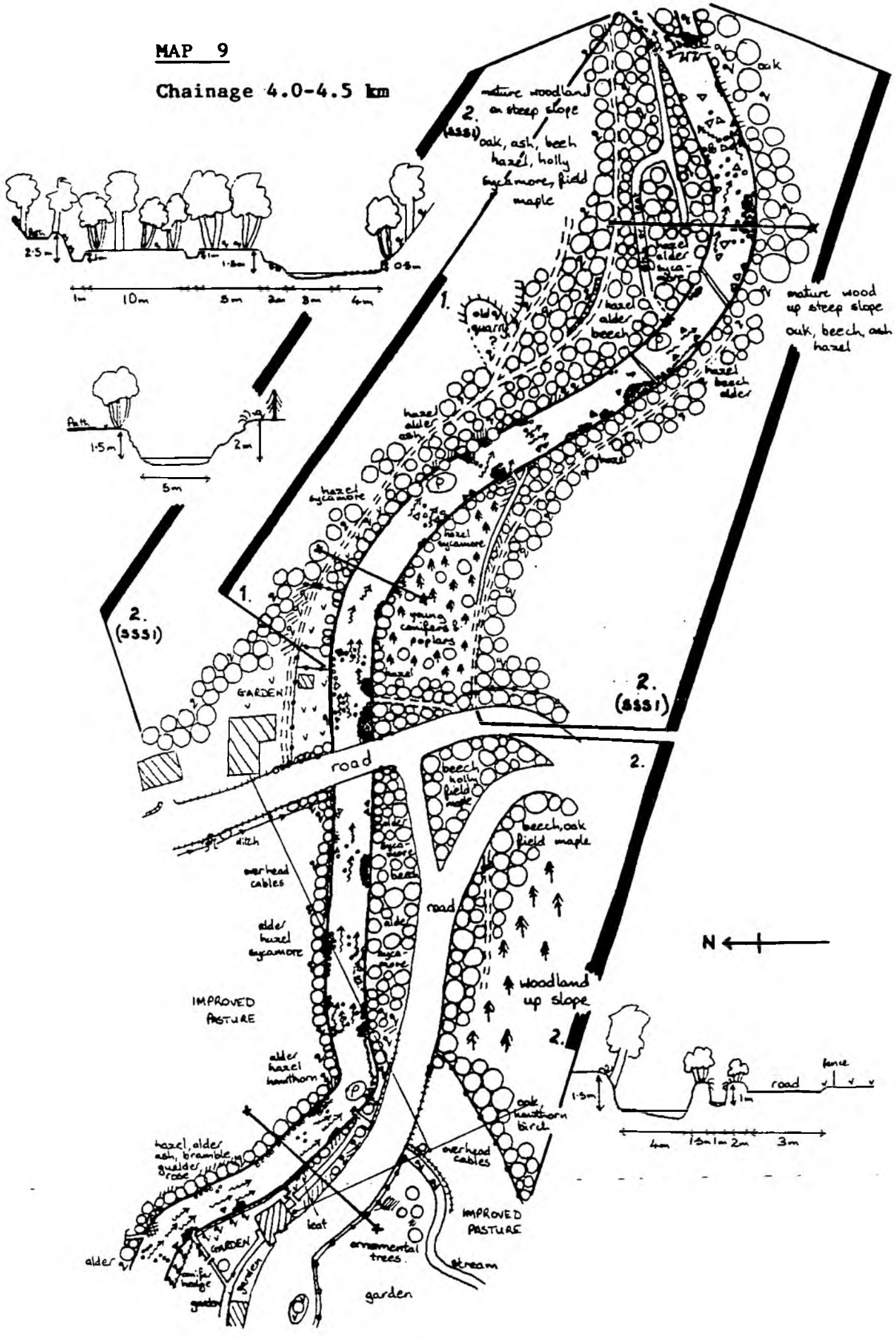
Key sites and features
1. Channel within SSSI. 2. Woodland: most is within the SSSI.

Summary
The varied flow pattern/substrates are valuable for wildlife as is the bankside tree cover. The mature broadleaved woodland is very important. Much of this woodland and some of the channel are within the SSSI.

Management
Retain existing channel features as far as possible. Retain most bankside tree cover, opening up short stretches upstream to allow in more light. Avoid damage or disturbance to the mature broadleaved woodland. Consult NCC before undertaking any works within the SSSI.

MAP 9

Chainage 4.0-4.5 km



MAP 10 Chainage 4.5 to 5.0 Grid ref: SX 8315 7114 to 8271 7133

A heavily treed section with a weir and a mill leat running parallel.

Channel
The meandering channel is 4-6m wide with shallow sections, where water riffles over exposed substrates, deeper slacks and occasional pools. Substrates are mainly cobbles with much sand, boulders and rocky outcrops. There are occasional marginal shoals of cobbles with sand or gravel. This variety is valuable for aquatic invertebrates. There is practically no aquatic vegetation as this section is heavily overshadowed. Upstream a weir dams up water for a mill leat which runs parallel to the channel. This leat is in poor repair and in several places leaks back into the river. The channel is crossed by fences, overhead cables, a road bridge and an underground gas line.

Banksides
The banks are 1-2m high, steep to vertical, sometimes undercut and of earth or earth over rock. Both banks have good heavy tree cover of mature hazel, alder and sycamore. The banksides are of bare earth and roots or have a sparse covering of ivy and bramble. There are good bryophytes near water level. In places the banktops support bramble, bracken or blackthorn while, downstream, the right bank is topped by a coniferous garden hedge.

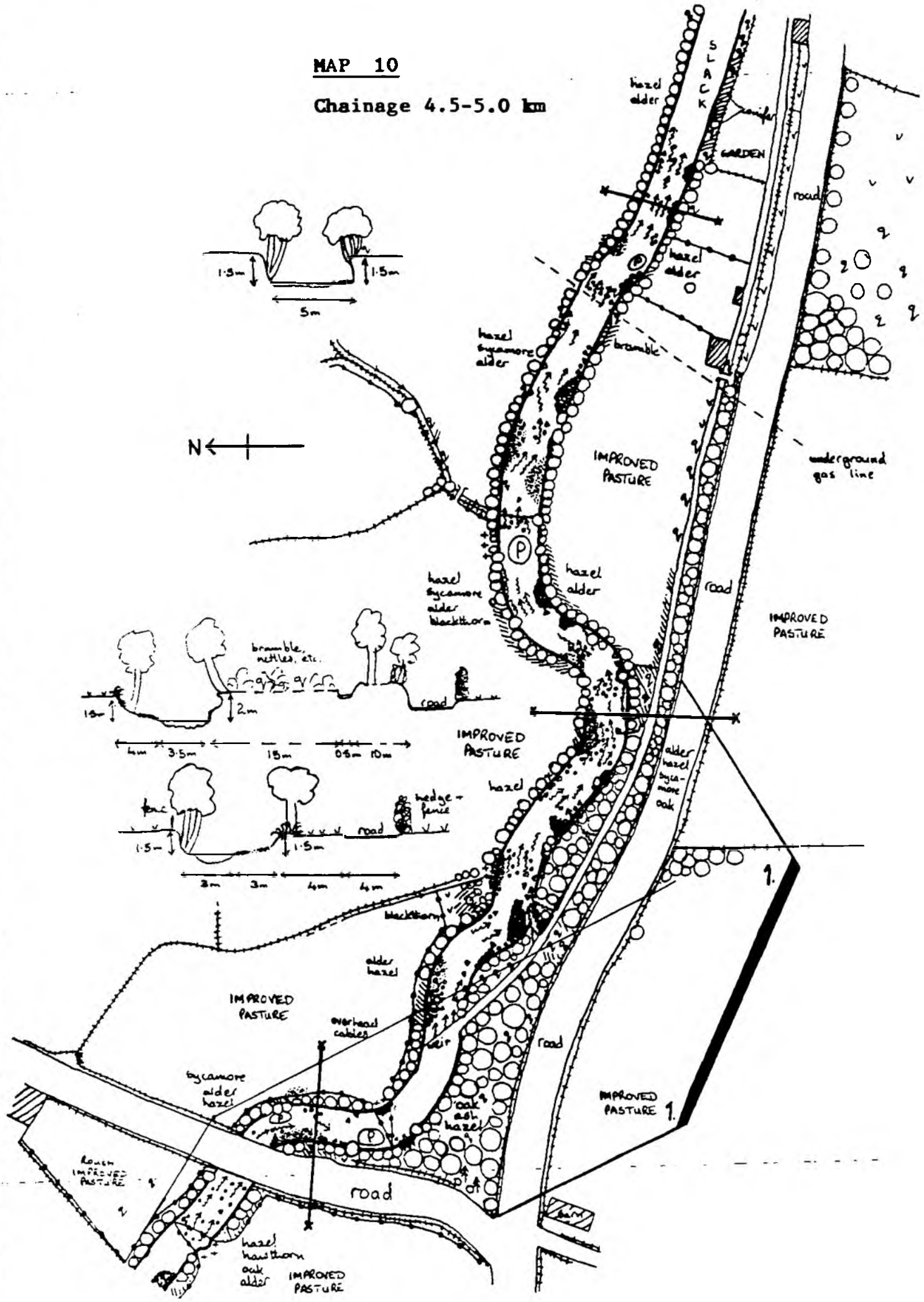
Adjacent land
This is mostly agriculturally improved grassland of low wildlife value. The right bank supports a garden upstream and a wooded belt downstream. To the south a road and the mill leat run parallel to the river. In several places the bank of the leat is broken down and the water leaks back into the river.

Key sites and features
1. Wooded strip.

Summary

The varied flow structure and substrate are important and the mature trees provide valuable cover.

Management
Retain existing flow/substrate pattern and most bankside trees. However this section would benefit greatly from the extra light provided by opening up a few short stretches perhaps by re-coppicing bankside trees. In the pasture, fence further out from the river to allow development of a wide band of low vegetation.


MAP 10
Chainage 4.5-5.0 km
N
hazel alder
SLACK
GARDEN
road
hazel alder
hazel sycamore alder
bramble
IMPROVED PASTURE
underground gas line
hazel sycamore alder blackthorn
hazel alder
road
IMPROVED PASTURE
bramble, nettles, etc.
road
IMPROVED PASTURE
alder hazel sycamore oak
hedge
fence
road
hazel
blackthorn
alder hazel
IMPROVED PASTURE
overhead cables
weir
road
sycamore alder hazel
oak ash hazel
IMPROVED PASTURE
1.
road
hazel hawthorn oak alder
IMPROVED PASTURE
1.5m
5m
1.5m
2m
4m
3.5m
15m
0.5m
10m
3m
3m
4m
4m

MAP 11 Chainage 5.0 to 5.5 Grid ref: SX 8271 7133 to 8255 7179

A heavily treed section with a flood water control dam upstream.

Channel
The relatively straight channel is 5-6m wide and mostly shallow, riffling over exposed cobbles and boulders. There are occasionally stiller and deeper stretches. The substrate is largely bedrock strewn with many cobbles and boulders especially along the edges of the channel. There is some sand/gravel between the larger particles and upstream some shoals of cobbles, gravel and sand. The flow pattern and substrate are sufficiently varied to be of value to wildlife. Upstream is a large flood water control dam where the channel is concreted and of low wildlife value. This section has a little aquatic vegetation: mostly willow moss and algae, with some water-cress, hemlock water-dropwort and starwort just upstream of the dam. Grey wagtail was noted here. Overhead power cables run nearby.

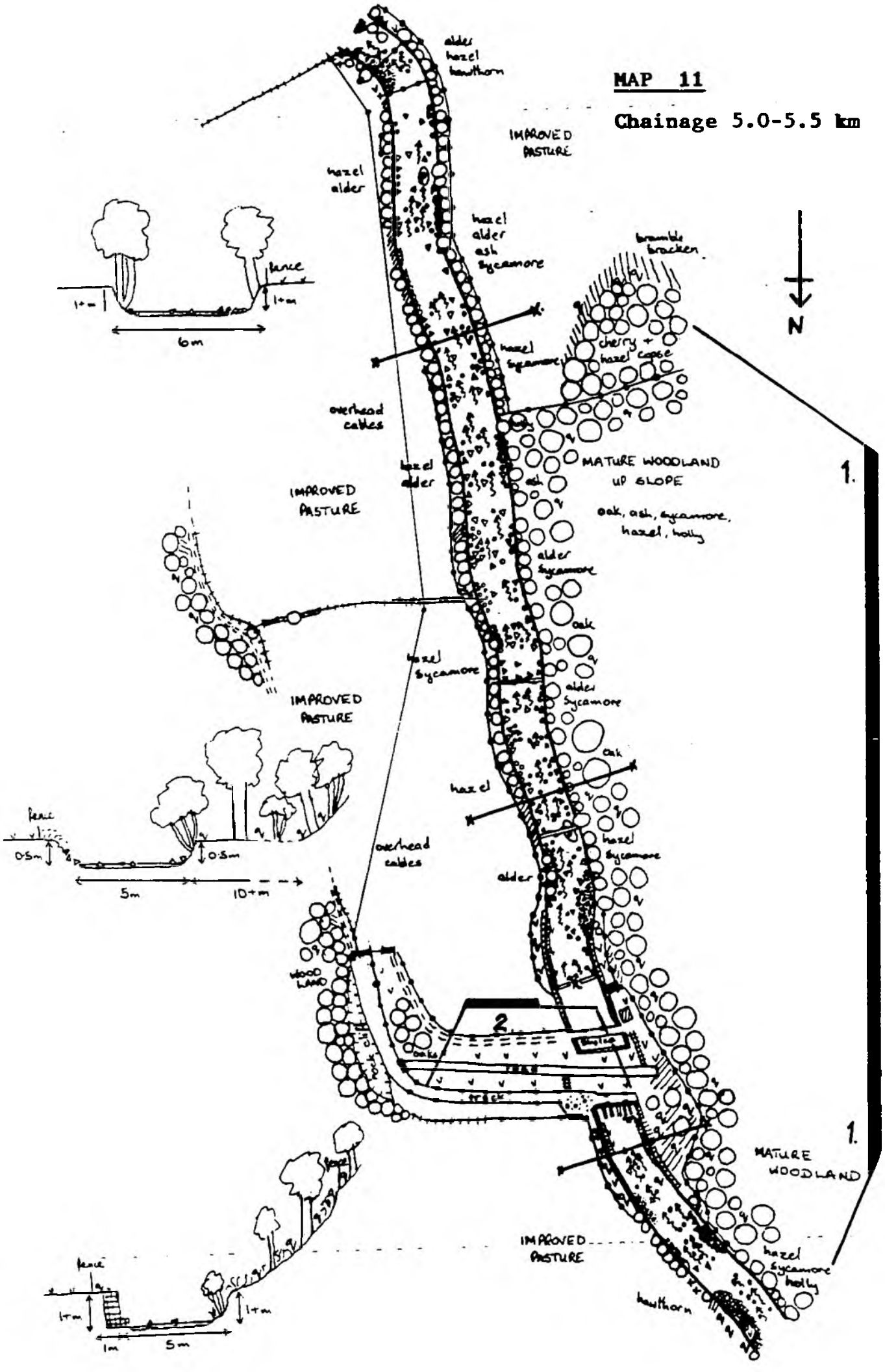
Banksides
The banks are 0.5-1.5m high, vertical or steeply sloping and of earth or earth over rock. Both banks are heavily treed with mature coppiced hazel, alder and sycamore which provide valuable wildlife cover. The sides of the banks are characterised by bare soil and tree roots with a sparse cover of ivy and ferns. There are good bryophyte communities nearer water level and some bramble on the banktops. Either side of the dam the banks are protected by gabions which tall herbs are colonising. Just upstream of the dam is a short stretch of bare rock bank around which scrub and tall herbs are developing. Upstream, stock have access to the left bank which is relatively shallow.

Adjacent land
This is largely agriculturally improved grassland, but much of the steep right bank supports mature woodland of oak, hazel and sycamore with ash, holly and small-leaved lime. The ground flora is sparse and understorey limited, but this is still a very valuable habitat. The sward on the sides of the dam is of fine grasses and contains a number of herbs. Although only recently established it should eventually develop into a very good habitat, given the right management.

Key sites and features
1. Woodland. 2. Sward on dam.

Summary
There are good varied flow pattern and substrates. Both banks have valuable tree cover and on the right is a good area of broadleaved woodland. The recently established sward on the dam has good potential as a grassland habitat.

Management
Avoid damage or disturbance to flow/substrate features, woodland and most bankside trees. The channel would benefit from a little extra light and two or three short stretches of trees recoppiced on a short cycle would achieve this.Move fence on left bank out to remove grazing pressure and allow the formation of denser cover. Manage the dam sides by cutting, although sheep grazing would be preferable. Cut at the end of summer, removing all the cut material. Cattle grazing would be less desirable than sheep.


MAP 11
Chainage 5.0-5.5 km
alder
hazel
hawthorn
IMPROVED PASTURE
hazel
alder
hazel
alder
ash
sycamore
bramble
bracken
N
fence
1+m
1+m
6m
hazel
sycamore
cherry +
hazel copse
overhead
cables
hazel
alder
MATURE WOODLAND
UP SLOPE
1.
oak, ash, sycamore,
hazel, holly
IMPROVED
PASTURE
alder
sycamore
oak
hazel
sycamore
IMPROVED
PASTURE
alder
sycamore
oak
hazel
hazel
sycamore
fence
0.5m
0.5m
overhead
cables
alder
5m
10+m
WOOD
LAND
2
1.
MATURE
WOODLAND
IMPROVED
PASTURE
hazel
sycamore
holly
hawthorn
fence
1+m
1+m
1m
5m

MAP 12 Chainage 5.5 to 6.0 Grid ref: SX 8255 7179 to 8207 7188

A heavily treed section running parallel to, then joining Kester Brook.

Channel
The meandering channel is 4m wide with a good variety of flow patterns and substrates. It is often shallow, riffling over exposed substrates, and has occasional shoals and marginal drifts of cobbles or boulders. There are also deeper stretches, pools and runs. The substrates are mostly cobbles with some gravel and sand plus occasional boulders and rock. The only vegetation is a little algae and willow moss. Heron and grey wagtail use this section. This section is crossed by overhead power lines and a small footbridge.
Downstream two small brooks join the river. One, from the north, is 1m wide, has 0.5m high earth banks and a low hedge on one side. Its sunny channel has much fool's water-cress, brooklime and floating sweet-grass. Together with the bankside nettles, thistles etc., this vegetation is valuable for wildlife. The Kester Brook, to the south, is 2-3m wide with vertical earth banks 0.5-1m high. Its shady channel has many drifts of exposed cobbles, mostly shallow water with areas of riffles and slacks, and no channel vegetation.

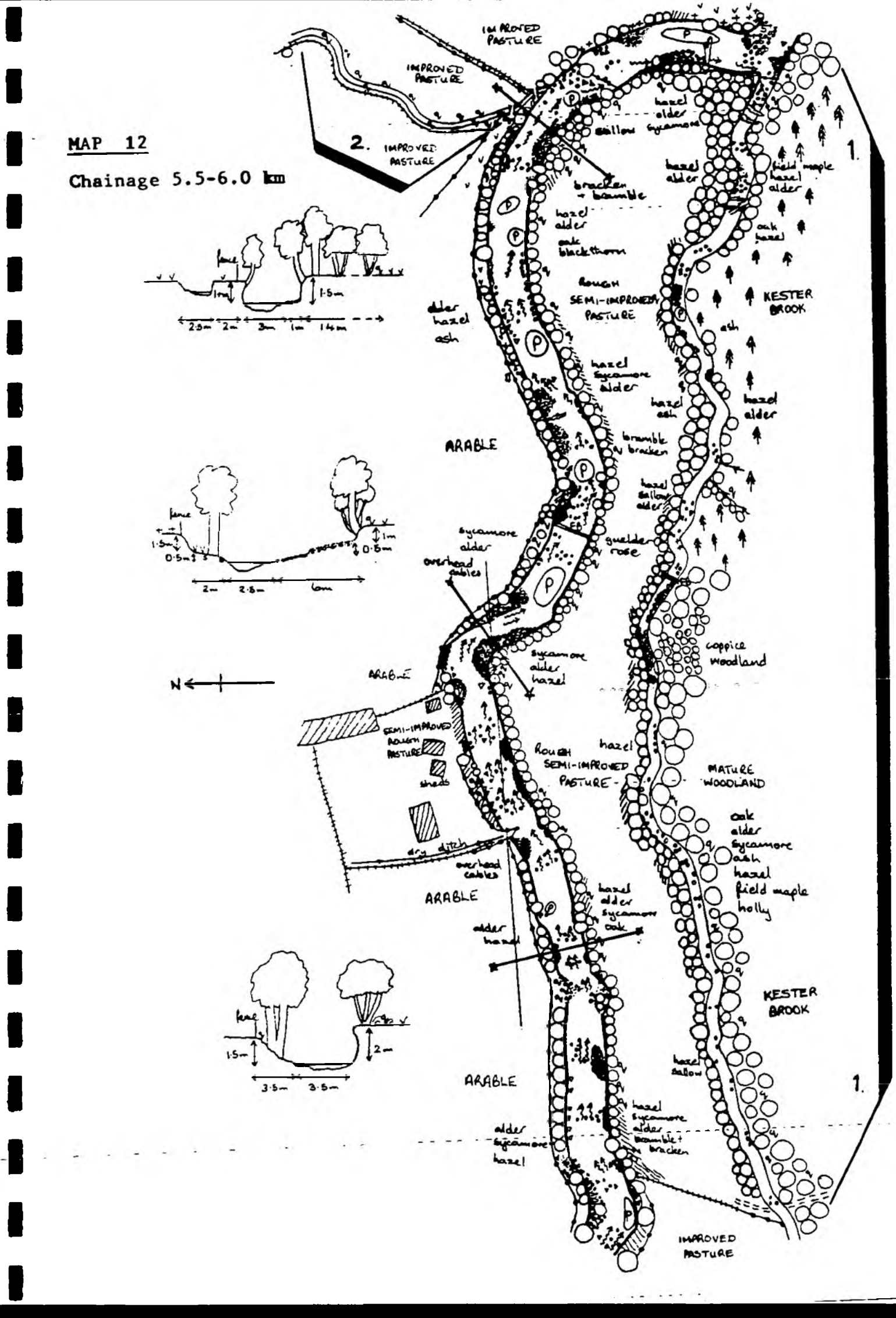
Banksides
The river banks are 1.5-2m high, mostly vertical and composed of earth or earth over rock/cobbles. Both banktops have valuable heavy cover of mature standards, ex-coppice trees and shrubs. Alder, hazel and sycamore are most common with some oak, ash, holly, blackthorn and guelder-rose. Bracken and bramble on the right banktop add to the cover value. The banksides are mostly of bare earth and roots with a sparse covering of ivy, ferns and woodland herbs. Near water level are good mosses and liverworts. Kester Brook is overshadowed by a line of hazel, sallow, alder and bramble on the left and woodland on the right bank.

Adjacent land
To the left of the river is arable and agriculturally improved pasture of low wildlife value. On the right bank is a long narrow field bounded on the opposite side by the bankside trees of the Kester Brook. Its secluded nature and coarse semi-improved sward mean this field has some value for birds and invertebrates. Beyond Kester Brook are conifer plantation, mature broadleaved woodland and coppice. The latter are very good for wildlife.

Key sites and features
1. Woodland. 2. Aquatic vegetation in brook.

Summary
The Lemon's flow/substrate have potential for aquatic invertebrates. Both the Lemon and Kester have good tree cover and the broadleaved woodland is important. The dense aquatic and bankside herbs of the sunny tributary provide a valuable contrast to the shady river. The long, secluded field also has some value.

Management
Retain varied flow/substrates, aquatic and bankside vegetation, opening up a few stretches of the Lemon and Kester to allow in more light. Avoid disturbance to wood and long field or agricultural improvement of the latter. Move back the fence on the left bank to allow development of dense undergrowth for cover.


MAP 12
Chainage 5.5-6.0 km
IMPROVED PASTURE
IMPROVED PASTURE
2. IMPROVED PASTURE
1.
hazel alder sycamore
sallow
hazel alder
field maple hazel alder
bracken + bramble
hazel alder
oak blackthorn
oak hazel
ROUGH SEMI-IMPROVED PASTURE
KESTER BROOK
alder hazel ash
hazel sycamore alder
ash
hazel alder
ARABLE
bramble bracken
hazel sallow alder
guelder rose
sycamore alder
overhead cables
coppice woodland
sycamore alder hazel
ARABLE
N
SEMI-IMPROVED ROUGH PASTURE
sheds
ROUGH SEMI-IMPROVED PASTURE
hazel
MATURE WOODLAND
dry ditch
overhead cables
oak alder sycamore ash hazel field maple holly
ARABLE
hazel alder sycamore oak
alder hazel
KESTER BROOK
ARABLE
hazel sallow
1.
hazel sycamore alder bramble + bracken
alder sycamore hazel
IMPROVED PASTURE
fence
1m
1.5m
2.5m
2m
3m
1m
1.4m
fence
1.5m
0.5m
1m
0.5m
2m
2.5m
6m
fence
1.5m
2m
3.5m
3.5m

MAP 13 Chainage 6.0 to 6.5 Grid ref: SX 8207 7188 to 8164 7189

A section with heavy tree cover, the road bridge upstream marking the Main River Limit.

Channel
The meandering channel is up to 7m wide with many shallow riffling stretches and exposed substrates plus deeper and stiller stretches and occasional pools. The substrate is mostly cobbles with some gravel and sand. In stiller parts are deposits of silt and bedrock is occasionally exposed. There are numerous small shoals along the channel edges. Upstream the water threads between large shoals of cobbles and gravel. This varied pattern of flow and substrate is valuable for aquatic wildlife (numerous pond skaters!) There is little channel vegetation: some reed canary-grass with monkeyflower, water-pepper and other small herbs on the shoals upstream. Mink tracks were noted here and brown trout were numerous. A large fallen tree creates a deep pool upstream and the channel is crossed by electricity power lines.

Banksides
Mostly 2-2.5m high, the banks are of earth or earth over rock. In several places they have been reinforced by rough stone walls. Both banks support many large standard and ex-coppice trees and shrubs, mainly of alder, sycamore and hazel, with elm, oak and ash. These overhang the river and in the shady areas the bankside vegetation is of sparse ivy, ferns and woodland herbs or there is bare soil. In sunnier areas there are patches of tall herbs including great willowherb, hemlock water-dropwort and Indian balsam. On the banktops bramble is common throughout. The thick bank vegetation and mature trees and shrubs provide valuable cover for wildlife. However the river would benefit from more sunlight.

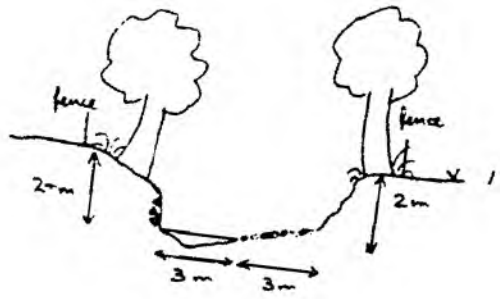
Adjacent land
The left bank is arable land, the right agriculturally improved pasture. Both are of minimal wildlife value.

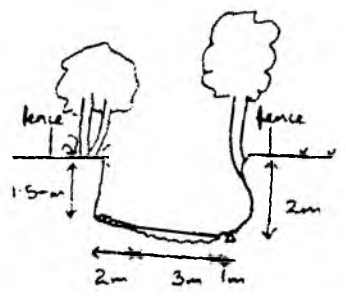
Key sites and features
1. Area with dense scrub plus tall herbs and aquatic/shoal vegetation in sunny spots.

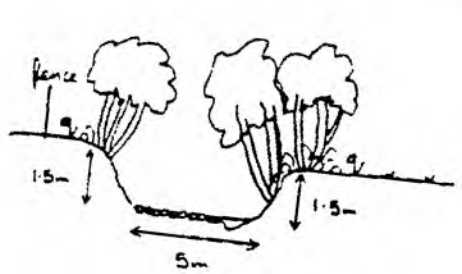
Management
Retain existing flow/substrate pattern. Retain most of existing bankside vegetation, re-coppicing trees in short sections on the south bank to allow sunlight in. Move back fences on both banks to allow development of more ungrazed tall herbs.

MAP 13

Chainage 6.0-6.5 km







APPENDIX A : FLORA

Full species list of plants recorded during the survey.

A.1 Plants of the channel and margins

Apium nodiflorum	fool's water-cress
Callitriche sp.	water-starwort
Lemna minor	common duckweed
Nasturtium officinale	water-cress
Oenanthe crocata	hemlock water-dropwort
Phalaris arundinacea	reed canary-grass
	willow moss

A.2 Plants of the banksides and adjacent land

Agrostis sp.	bent grass
Ajuga reptans	bugle
Alliaria petiolata	garlic mustard
Angelica sylvestris	wild angelica
Anthriscus sylvestris	cow parsley
Arctium minus	lesser burdock
Artemisia vulgaris	mugwort
Arrhenatherum elatius	false oat-grass
Aster novi-belgii	Michaelmas-daisy
A. tripolium	sea aster
Atriplex hastata	spear-leaved orache
Athyrium filix-femina	lady-fern
Brachypodium sylvaticum	false brome
Calystegia sepium	bindweed
Carex remota	remote sedge
C. sylvatica	wood-sedge
Centaurea nigra	common knapweed
Centranthus ruber	red valerian
Cerastium fontanum	common mouse-ear
Chamerion angustifolium	rosebay willowherb
Circaea lutetiana	enchanter's-nightshade
Cirsium arvense	creeping thistle
C. palustre	marsh thistle
C. vulgare	spear thistle
Coronopus squamatus	swine-cress
Crepis capillaris	smooth hawk's-beard
Chrysosplenium oppositifolium	opposite-leaved golden-saxifrage
Cymbalaria muralis	ivy-leaved toadflax
Dactylis glomerata	cock's-foot
Daucus carota	wild carrot
Digitalis purpurea	foxglove
Dipsacus fullonum	teasel
Dryopteris sp.	buckler-fern
Epilobium hirsutum	great willowherb
Epilobium sp.	willowherb
Erigeron canadensis	Canadian fleabane
Eupatorium cannabinum	hemp-agrimony
Euphorbia amygdaloides	wood spurge
Filipendula ulmaria	meadowsweet
Fumaria sp.	fumitory
Galium aparine	cleavers
G. mollugo	hedge-bedstraw
Geranium robertianum	herb-robert

Glechoma hederacea	ground-ivy
Glyceria fluitans	floating sweet-grass
Hedera helix	ivy
Heracleum sphondylium	hogweed
Holcus lanatus	Yorkshire-fog
Humulus lupulus	hop
Hyacinthoides non-scripta	bluebell
Impatiens glandulifera	Indian balsam
Iris foetidissima	stinking iris
Juncus bufonius	toad rush
J. effusus	soft-rush
J. inflexus	hard rush
Lamiastrum galeobdolon	yellow archangel
Lapsana communis	nipplewort
Linaria purpurea	purple toadflax
Lolium perenne	perennial rye-grass
Lonicera periclymenum	honeysuckle
Lysimachia nemorum	yellow pimpernel
Malva moschata	musk mallow
Medicago lupulina	black medick
Mentha aquatica	water mint
Mercurialis perennis	dog's mercury
Mimulus guttatus	monkeyflower
Montia sibirica	pink purslane
Oxalis acetosella	wood-sorrel
Parietaria judaica	pellitory-of-the-wall
Phleum pratense	timothy
Phragmites australis	common reed
Phyllitis scolopendrium	hart's-tongue
Plantago lanceolata	ribwort plantain
P. major	greater plantain
Polygonum hydropiper	water-pepper
P. persicaria	redshank
Polypodium vulgare	polypody
Primula vulgaris	primrose
Prunella vugaris	selfheal
Pteridium aquilinium	bracken
Pulicaria dysenterica	common fleabane
Ranunculus repens	creeping buttercup
Reseda luteola	weld
Ribes rubrum	red currant
Rosa arvensis	field-rose
R. canina	dog-rose
Rubus fruticosus	bramble
Rumex acetosa	common sorrel
R. crispus	curled dock
R. obtusifolius	broad-leaved dock
R. sanguineus	wood dock
Ruscus aculeatus	butcher's-broom
Sanicula europaea	sanicle
Scrophularia aquatica	water figwort
S. nodosa	common figwort
Senecio jacobaea	common ragwort
Silene dioica	red campion
Sisymbrium officinale	hedge mustard
Solanum dulcamara	bittersweet
Stachys sylvatica	hedge woundwort
Tanacetum vulgare	tansy
Taraxacum officinale	common dandelion
Trifolium pratense	red clover
T. repens	white clover

Tripleurospermum inodorum	scentless mayweed
Urtica dioica	common nettle
U. urens	small nettle
Valeriana officinalis	common purslane
Veronica beccabunga	brooklime
V. montana	wood speedwell
Vinca major	greater periwinkle
Viola sp.	violet

A.3 Trees and shrubs

Acer campestre	field maple
A. pseudoplatanus	sycamore
Alnus glutinosa	alder
Betula pendula	silver birch
Buddleja davidii	butterfly-bush
Cornus sanguinea	dogwood
Corylus avellana	hazel
Crataegus monogyna	hawthorn
Euonymus europaeus	spindle
Fagus sylvatica	beech
Fraxinus excelsior	ash
Ilex aquifolium	holly
Pinus sylvestris	Scots pine
Populus sp.	poplar
Prunus avium	wild cherry
Prunus spinosa	blackthorn
Quercus robur	common oak
Sambucus nigra	elder
Salix cinerea	common sallow
S. alba	white willow
Tilia cordata	small-leaved lime
T. x vulgaris	lime
U. procera	English elm
Viburnum lantana	wayfaring tree
V. opulus	guelder rose

APPENDIX B : FAUNA

Full species list of animals recorded during the survey.

B.1 Birds

long-tailed tit
grey heron
buzzard
dipper
wood pigeon
robin
jay
black-headed gull
grey wagtail
great tit
sparrow
dunnock
nuthatch
wren
blackbird

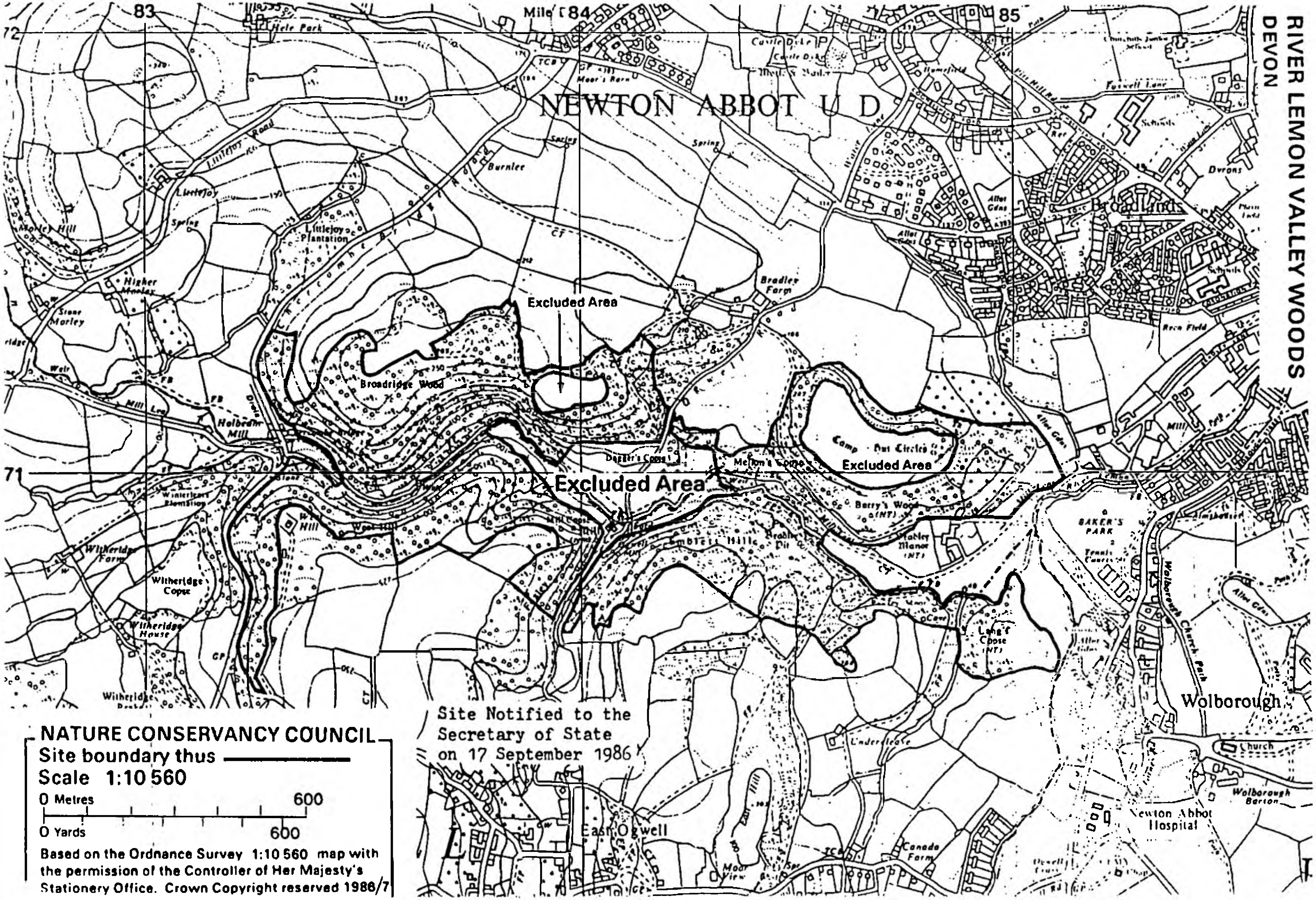
B.2 Other animals

brown trout
common darter
grey squirrel
mink
minnow
pondskater
red admiral
speckled wood

APPENDIX C: SITE OF SPECIAL SCIENTIFIC INTEREST

Citation sheet and list of Potentially Damaging Operations

RIVER LEMON VALLEY WOODS
DEVON



Site Notified to Secretary
of State on 17 September 1986

CITATION SHEET

COUNTY: DEVON SITE NAME: RIVER LEMON VALLEY WOODS

DISTRICT: TEIGNBRIDGE

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981 (as amended)

Local Planning Authority: Devon County Council, Teignbridge District Council

National Grid Reference: SX 837710 Area: 72.3 (ha) 178.7 (ac)

Ordnance Survey Sheet 1:50,000: 202 1:10,000: SX 87 SW

Date Notified (Under 1949 Act): 1969 Date of Last Revision: 1976

Date Notified (Under 1981 Act): 1986 Date of Last Revision: -

Other Information: Name changed from Chercombe Bridge Old Quarry, site boundary extended Part owned by the National Trust.

Description and Reasons for Notification:

This site presents an extensive example of ancient semi-natural woodland developed almost wholly on limestone and calcareous soils, a habitat rare in Devon. Two disused limestone quarries, Chercombe and Broadridge, show important exposures of the Devonian limestones and have yielded a wealth of fossils.

The site lies between 15 and 70m altitude in the valley of the River Lemon, which flows west to east, cutting a steep-sided valley. Soils of the valley sides are thin, clayey, calcareous earths, and in the valley bottom drainage is restricted.

There are various stand-types within the wood, the principal canopy trees being Ash (Fraxinus excelsior), Pedunculate Oak (Quercus robur) and Beech (Fagus sylvatica), with Small-leaved Lime (Tilia cordata), Field Maple (Acer campestre) and Sycamore (A. pseudoplatanus) also present. Alder (Alnus glutinosa) is common beside the river. Wych Elm (Ulmus glabra) is present throughout but most of the tall trees are dead. Small areas have been planted with broadleaved trees, but in general the woods have a semi-natural structure. The shrub layer is very varied and includes areas of old Hazel (Corylus avellana) coppice, with Wild Service-tree (Sorbus torminalis), Spindle (Euonymus europaeus), Wayfaring Tree (Viburnum lantana), Guelder Rose (V. opulus), Dogwood (Cornus sanguinea) and Crab Apple (Malus sylvestris). The ground flora is species-rich and luxuriant, with many species characteristic of woodland on calcareous soils. The most notable species are Butcher's Broom (Ruscus aculeatus), Spurge Laurel (Daphne laureola), Southern Woodrush (Luzula forsteri), Bird's-nest Orchid (Neottia nidus-avis), Wood Vetch (Vicia sylvatica), Small Teasel (Dipsacus pilosus) and Wood Small Reed (Calamagrostis epigejos).

Broadridge Quarry forms a large clearing in the woodland. Plants typical of calcicolous grassland which is a rare habitat in Devon, grow on the ledges of the almost sheer rockface. Rock Rose (Helianthemum chamaecistus), Wild Thyme (Thymus drucei), Dropwort (Filipendula vulgaris) and Fragrant Orchid (Gymnadenia conopsea) are found along with the mosses Grimmia orbicularis, Gyroweisia luisieri and Camptothecium lutescens.

The fast-flowing River Lemon contains Salmon (Salmo salar), Stone Loach (Noemacheilus barbatulus) and Bullhead (Cottus gobio), and with its associated Alder woods is an important component of the site.

The fauna has not been studied in detail, but a wide range of woodland birds breed here, and the Dipper (Cinclus cinclus) nests in the river bank. Butterflies include the White Admiral (Limenitis camilla).

Chercombe Bridge Quarry is the type locality of the Devonian Chercombe Bridge Limestone (late Eifelian-Givetian age). The lowest horizons exposed comprise shaley limestones with a rich Eifelian trilobite fauna. Broadridge Quarry is complementary in providing the best exposures of the upper horizons on the Chercombe Bridge Limestone. Both quarries are richly fossiliferous and show good examples of coral and stromatoporoid/coral bioherms or 'reefs', and are important in displaying facies variations which occur in the Middle Devonian of South Devon.

RIVER LEMON VALLEY WOODS, DEVON

Site Notified to the Secretary of State on 17 September 1986

OPERATIONS LIKELY TO DAMAGE THE FEATURES OF SPECIAL INTEREST

Standard Ref No	Type of Operation
1	Cultivation, including ploughing, rotovating, harrowing and reseeding.
2	Grazing.
3	Stock feeding.
4	Mowing or other methods of cutting vegetation.
5	Application of manure, fertilisers and lime.
6	Application of pesticides, including herbicides (weedkillers).
7	Dumping, spreading or discharge of any materials.
8	Burning.
9	The release into the site of any wild, feral or domestic animal*, plant or seed.
10	The killing or removal of any wild animal*, including pest control.
11	The destruction, displacement, removal or cutting of any plant or plant remains, including tree, shrub, herb, hedge, dead or decaying wood, moss, lichen, fungus, leaf-mould.
12	Tree and/or woodland management including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand or underwood, changes in species composition, cessation of management.
13a	Drainage (including the use of mole, tile, tunnel or other artificial drains).
13b	Modification of the structure of water courses (eg rivers, streams, springs, ditches, dykes, drains), including their banks and beds, as by re-alignment, regrading and dredging.
13c	Management of aquatic and bank vegetation for drainage purposes.
14	The changing of water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes).
15	Infilling of ditches, dykes, drains, quarries or pits.
16a	The introduction of freshwater fishery production and/or management including sporting fishing and angling.
20	Extraction of limestone minerals, topsoil, sub-soil.
21	Construction, removal or destruction of roads, tracks, walls, fences, hard-stands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22	Storage of materials within the site boundary.
23	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
24	Modification of natural or man-made features (including cave entrances), clearance of boulders, large stones, loose rock or scree and battering, buttressing or grading rock-faces and cuttings, infilling of pits and quarries.
26	Use of vehicles or craft likely to damage or disturb features of interest.
27	Recreational or other activities likely to damage features of interest.
28	Game and waterfowl management and hunting practice.

* "animal" includes any mammal, reptile, amphibian, bird, fish or invertebrate.

APPENDIX D: BIBLIOGRAPHY

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