NORTH SOMERSET INTERNAL DRAINAGE BOARD

WATER LEVEL MANAGEMENT PLAN

Final

September 2002

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ADOPTION AND APPROVAL

This water level management plan was adopted by the North Somerset Internal Drainage Board on:

.....22/10/02.....

SIGNED..... [redacted] .....
FOR THE NORTH SOMERSET INTERNAL DRAINAGE BOARD

This water level management plan was approved by English Nature on:

.....25 Nov 2002.....

SIGNED.... [redacted] .....
FOR ENGLISH NATURE

This water level management plan was approved by The Department for Environment Food & Rural Affairs on:

.....

SIGNED.....
FOR THE DEPARTMENT FOR ENVIRONMENT FOOD & RURAL AFFAIRS

INTRODUCTION

Purpose
This plan is a written statement outlining the means by which the various water level requirements for the range of activities in the area of the North Somerset Internal Drainage Board, including agriculture, flood defence, water resources, conservation, fisheries, amenity, and recreation can be balanced and integrated.

The DEFRA publication "Conservation Guidelines for Drainage Authorities" (1) states that Water Level Management Plans (WLMPs) should be produced for areas where water levels are managed and that priority should be given to Sites of Special Scientific Interest (SSSIs). The North Somerset Drainage District contains two nationally important SSSIs – "Tickenham, Nailsea and Kenn Moors" and "Biddlestreet, Yatton". It also fringes and includes a very small part of the Severn Estuary SSSI / SPA / Ramsar sites. However as the Board's activities have no influence on water levels inside this zone, the plan has been treated as having the SSSI level of priority.

Area
The whole operating area of the North Somerset IDB has been included in this plan. IDB areas are known as Drainage Districts and are defined on official maps held by the Ministry of Agriculture Fisheries and Food (DEFRA). See Appendix 3.

Responsibility
The preparation, implementation and review of a WLMP is the responsibility of the designated Operating Authority. The choice of Operating Authority is by mutual agreement but is usually either the Environment Agency or the local Internal Drainage Board, depending on the relative influence their respective activities have on the water level regime of the area.

For this plan the Operating Authority is the North Somerset Internal Drainage Board. Principal details of the Board appear in Appendix 2.

The author of the Draft Plan is Dan Alsop, Chartered Engineer, consultant engineer to the Board.

This report incorporates data and reflects views provided by various consultees. Although every effort has been made to ensure accuracy and balance, no guarantee can be made to this effect.

Programme
The programmes for completion of the plan and for the implementation and review process were sent to DEFRA in April 2002 and are reproduced in Appendix 8.

Methodology
- Board nominates Water Level Management Sub Committee (Appendix 2).
- Plan area defined and all organisations likely to have an interest contacted and asked to state their respective objectives.
- Board appoints consultant to prepare plan.
- First draft prepared. Includes detailed descriptions of the existing watercourse systems (including maintenance procedures) and of the various conservation sites. Consultation responses included in full and summary of interests and objectives prepared. Table of objectives included and suggestions made for changes aimed at reconciling any differences identified.
- Draft plan considered by the Water Level Management Sub Committee, refined and corrected.

- Principal consultees invited to join Group of Major Interests (GMI). Group formed and issued with draft plan.

- Group meets with objective of amending and agreeing WLMP.

- Once finalised and adopted by the Drainage Board, the Plan is sent to English Nature for "signing off", then formally issued to DEFRA, who also sign to indicate their approval. Other consultees are notified of issue.

- Implementation of the Plan proceeds – actioned by the various organisations identified. The Plan should also provide an input into relevant Local Environment Agency Plans (EA), Local and Structure Plans (Councils) and if relevant the appropriate Shoreline Management Plan. DEFRA High Level target 10 requires the implementation Plan to be produced and agreed by 1st April 2003.

- Where a WLMP identifies the need for physical changes to the system to achieve agreed objectives, financial assistance in the form of DEFRA grant aid may be available. The current rate of grant for the North Somerset Plan Area (national status) is 50% (The equivalent rate where European sites are present is 80%). In addition to this the Environment Agency has agreed to contribute 50% of the cost after grant, which would be equivalent to 25% of the gross cost.

  As far as the remaining 25% is concerned, apart from the Drainage Board's own resources, other sources of funding may be available, and DEFRA has indicated that it would treat any extra contributions received as "windfalls", that is the DEFRA grant would not be reduced as a consequence of any additional contributions received.

  To be eligible for grant, implementation works need to have been identified in the WLMP. Accordingly the various WLMP objectives have been worded in generalised terms so as to include any implementation works likely to be required in the future.

- WLMPs are subject to periodic review.

GENERAL DESCRIPTION OF WATER LEVEL MANAGEMENT IN THE PLAN AREA

Map 1 shows the boundary of the North Somerset Drainage District. Note the excluded area which comprises the higher ground of Nailsea. The Water Level Management Plan covers the whole of the Drainage District.

Topography

The District covers virtually all the low-lying flat land situated between the Clevedon Hills to the North and the Congresbury Yeo to the South.

To the West lies the Bristol Channel where the tidal defences delineate the District boundary. To the East the area is curtailed by rising ground levels near Wraxall.

A large "island" of higher ground is excluded from the north-east sector of the District and the town of Nailsea extends over most of this.

The lowest ground levels in the District (about 4.5 metres ODN) are found in the Kenn, Tickenham and Nailsea Moors which comprise an area of about 37 sq km of mainly peaty ground in the centre of the District.

The land nearer the coast, whilst still flat, is a raised coastal clay belt where levels in the order of 7 metres ODN are the norm. Part of the town of Clevedon is located in the north-west corner of the District on this coastal belt.

The total catchment area of some 101 sq km is bounded by the ridge of the Clevedon Hills to the North, the high plateau near Lulsgate Airport to the East and the Congresbury Yeo to the South. Apart from a controlled abstraction for summer water supply, only under exceptional flood conditions does any water from the Congresbury Yeo enter the district.

Drainage

There are two principal upland rivers entering the District from the high ground to the East – the Land Yeo and the River Kenn, but almost from the point at which they enter the District these and most of their associated minor watercourses have been modified and re-routed over the centuries for milling, flood alleviation, summer water supply and land drainage.

It is likely that before mankind's intervention these rivers would have discharged into the very low lying area just West of the "isle" of Nailsea, which consequently would have been flooded for a large part of the year. Separate outlets from the marsh areas would then have discharged surplus water to the Bristol Channel via tidal channels. Salt water would have made regular incursions inland until the first sea defences were raised in late Roman times. By the thirteenth century relatively effective sea defences were in place and organised rearrangement of the internal drainage commenced.

The almost total absence of meandering channels in the moors and the clay belt testify to the fact that nearly all the major and minor watercourses in these zones are man-made.

Drainage activity continued apace until the mid-1970s by which time virtually the whole of the water from the District had been diverted to the major Blind Yeo tidal sluice at Clevedon.

Prior to this the Land Yeo had been diverted to become a contour stream along the toe of the Clevedon Hills - discharging through the extant tidal sluice next to Wain Hill in Clevedon. This enabled it to be used both as provider of power for milling and as high level carrier to divert some of the water from the hills to the North and East around the low lying moors. In the early 1970s a further major scheme intercepted the Land Yeo just east of Clevedon and diverted it South to the Blind Yeo. The channel through the town remains, serving local drainage needs. A small flow from upstream is

maintained but partly as a result of the low flows the river through the town suffers from poor water quality, inadequate water depths and a general lack of amenity.

The rural River Kenn, which in the distant past had been routed across the neck of the moors at Nailsea Wall to disharge into the sea near Kingston Seymour, was intercepted in the early 1950s at Kenn Pier and diverted to the Blind Yeo. The lower reaches remain, but now serve only local drainage and summer-feed functions; like the Land Yeo they suffer inadequate flows and poor water quality.

Summer Water Supply

The extensive rhyne networks which characterise both the Moors and the coastal belt land are artificially fed with water to maintain high levels during the summer months. This practice is termed "penning". Tickenham and Nailsea Moors are fed from the Land Yeo, Kenn Moor principally by back feed from the Blind Yeo system whilst the (higher) coastal belt is supplied with water from the Congresbury Yeo at two points – Paiges Hatch adjacent to the M5 and Congresbury Inlet at the end of Wemberham Lane.

Flooding

About 6 sq km of the lowest parts of the Kenn, Tickenham and Nailsea Moors are subject to overland flooding. This can be expected about once in five years on average and normally results from persistently wet winter weather. Such flooding usually takes several days to disperse and waterlogged conditions can follow for a further considerable period.

Less often the upper reaches of the Land Yeo and Kenn suffer out-of-bank flows causing flooding of adjacent land. Owing to the steep ground in the upper catchments such events result from the type of intense rainfall associated with summer storms. The worst flooding of this type in recent times occurred in July 1968.

Rarely the Congresbury Yeo overtops its northern bank downstream of Congresbury but resultant flooding should be confined to the area of the West Mendip Internal Drainage Board which is separated by Gang Wall on the South side of Yatton. This area is under consideration for housing developments and the Yatton bypass and careful planning would be needed to avoid flooding problems.

The location of some rhynes close to the Bristol Channel sea defences renders them vulnerable to inundation should overtopping occur, but the various lengths of sea wall have over the years been improved to a standard which makes such occurrences unlikely. By contrast the defences alongside the tidal pill of the Congresbury Yeo are in a less satisfactory state. Although overtopping into the Board's area has nevertheless been rare, rising sea levels and ongoing deterioration of these defences give cause for concern.

INTERESTS AND OBJECTIVES

Introduction

This section forms the meat of the WLMP. It identifies the consultees and whether or not they have responded, collates the views expressed and summarises these in tabular form. The principal work of the Management Group will be to discuss, develop, refine and agree these objectives and to establish a programme for implementing any necessary changes in practice or the system.

Table of Consultees

CONSULTEE	RESPONSE RECEIVED?
North Somerset Council	✔
Avon Farming & Wildlife Group	✔
Forestry Commission	✔
DEFRA	✔
NFU	✔
Ramblers' Association	✔
Transco (Gas)	✔
SWEB	✔
Pipeline Management	✔
Serco Gulf Ltd	✔
National Grid	✔
National Power plc	✔
BT	✔
Railtrack	✔
CPRE	✔
English Nature	✔
Avon Wildlife Trust	✔
Environment Agency	✔
English Heritage	✔

CONSULTEE	RESPONSE RECEIVED?
CLA	✓
Bristol Water plc	y
Countryside Commission	×
National Trust	×
RSPB	×
Transco (gas grid operator)	✓
World Wide Fund for Nature	×
Powergen	×
Unipen Ltd	×
Mercury Communications	×
Wessex Water	×
Forestry Commission	X

Summary of Interests and Objectives

Agriculture

Agriculture was historically the catalyst for the majority of the drainage works in the Drainage District and remains an important commercial activity. Not only does the economic and social wellbeing of the district depend heavily on it, but much of the more specialised wildlife interest has developed as a result of agricultural practices.

Today's agriculture is mainly improved permanent pasture, with a small amount of arable including forage maize and is considered best suited to dairying and stock rearing.

Responses from CPRE, FWAG and the NFU (Appendix 6) variously highlight the following issues:

The importance of balancing any ecological and landscape enhancements against the need for farming in the area to remain viable.

The sensitivity of the area to changes in water level management and the need to fully understand the consequences of making changes before implementation.

The value of getting Drainage Board farmer members to identify local farming priorities.

CPRE recommend the seeking of ESA status for the area, whilst English Nature would not support such a move .

Drainage Board farmer members have prepared a separate submission (Appendix 6) which includes the following points:

> The present well-established water level control practices which feature high summer and low winter levels are of great importance to agriculture and are likely to have been an essential element of the development of the existing high conservation interest of the area. Both farming and wildlife would almost certainly be very sensitive to any changes in water levels and maintenance of the status quo is thus advocated.
>
> Any increase in flood risk is likely to carry an associated increase in the risk of pollution.
>
> The move towards conservation is recognised and raised water level schemes should be supported provided that they are voluntary and accompanied by any necessary measures to protect adjacent land from adverse effects.

Archaeology

Responses from North Somerset Council identify the following issues:

> It is becoming apparent that the archeological interest of the area is of greater importance than was previously recognised.
>
> Continuation of existing high water table regimes are crucial to the preservation of certain important sites, particularly those situated in peat soils.
>
> More use should be made of the District Local Plan process to protect archeological sites.
>
> Knowledge of the IDB maintenance work programme and more regular communication between the IDB and the Council Archeological Officer could realise opportunities for improved archeological monitoring and the addition of extra information to the existing Council database (SMR).
>
> The Council would like the IDB to adopt a formal archeological management plan.

Commerce and Industry

A significant number of commercial and light industrial organisations depend either directly or indirectly on the effective flood protection and water level management of the area. Certain low lying premises and the many minor roads which cross the area (which provide essential transport links for trade vehicles, employees travelling to and from work schoolchildren and support services) would suffer flooding or waterlogging without adequate maintenance of the sea defences, main River systems and IDB rhyne network,

North Somerset Council comments that the Local Plan has only one major employment site within the Plan area. This is South Clevedon. The Environment Agency has taken the lead in specifying supplementary tidal flood protection and surface water drainage for this zone. The plan is currently under review and relevant organisations are being consulted.

Housing

The provision of adequate housing is a national priority and planning authorities are charged with making sufficient land available. North Somerset is under particular pressure owing to its proximity to Bristol whilst the extensive areas of low lying land are more than usually vulnerable to the adverse effects of increased urbanisation. These include increased peak surface water flows, reduced low flows, degredation of water quality and watercourse maintenance difficulties in urban zones.

Safeguarding urban development (housing, commercial, infrastructure) from flooding and protecting other interests from the adverse effects of new development are considered to be key Drainage Board activities.

The local planning authority (LPA) which is North Somerset Council consults both the Environment Agency and the North Somerset Internal Drainage Board on strategic issues (local district plans, etc) and also on individual applications. Whereas the EA is a statutory consultee, at present drainage boards are not. National changes may elevate IDBs to statutory consultee status in the near future, although in this area there would be little difference in practice, as the board is consulted on all major proposals.

The need for stricter development control has been identified as an issue by both the Environment Agency and the Council for the Preservation of Rural England (CPRE).

It should be recognised that in many cases planners and drainage organisations could use new development as a catalyst for watercourse enhancements rather than simply seeking to limit adverse effects.

The DoE's recent publication PPG 25 (ref G6) provides detailed guidance to Local Planning Authorities (LPAs) and their consultees on the control of new development in floodable areas and the control of resultant runoff.

A response from the North Somerset Council indicates that only one of their main housing site allocations falls within the Drainage Board catchment area. This is North West Nailsea. They point out that following opposition from the Council a large area south of Clevedon favoured by developers has not been allocated for development. The implications of the Secretary of State's directive to increase revised Structure Plan housing numbers up to the year 2011 have yet to be worked through.

The plan is currently under review and relevant organisations are being be consulted.

Nature Conservation & Environment

Responses from English Nature, the Environment Agency, The Avon Wildlife Trust, North Somerset Council, the Council for the Preservation of Rural England and the Farming and Wildlife Advisory Group identify the following issues:

Although several of the designated conservation sites are of national or international importance and should thus be given the highest priority, virtually the whole of the IDB area is a valuable wetland resource and ecological preservation and enhancement should be encouraged throughout the area.

The network of watercourses is the most important topographical feature from an ecological viewpoint.

Development pressures pose a particularly strong threat to the ecology of the area.

More raised water level schemes and schemes to maintain minimum winter water depths in all watercourses would be welcome. Where available, grants should be sought to assist these objectives.

English Nature organises a Wildlife Enhancement Scheme which encourages landowners to adopt management practices which are sympathetic to wildlife.

The policies in the Woodspring District Local Plan which encourage ecological enhancement in the area should be supported

The work of the IDB should complement that of the Environment Agency, and in particular the provisions of their North Somerset Rivers Local Environment Agency Plan.

Environmentally responsible farming should be actively encouraged.

Several consultees would like to see an extension of the various agri-environment schemes, whereby land managers are paid financial incentives to favour habitat improvements at the expense of reduced agricultural output. However opinions vary on whether or not ESA status should be sought for the area, English Nature in particular being opposed to this. A national review of agri-environment schemes is currently out for consultation.

The Plan Area falls within the North Somerset Levels and Moors Project Area. The project is a partnership between North Somerset Council, English Nature, The Wildlife Trust and The Environment Agency which aims to achieve a greater understanding of the local wetland sites.

Drainage Board water level management and maintenance practices and programming should be modified where necessary to protect and enhance habitats and biodiversity.

The low flow, poor water quality and lack of amenity in the Land Yeo through Clevedon should be remedied. Action currently under way as an Environment Agency / North Somerset Council / Clevedon Town Council joint initiative.

The section of the River Kenn downstream of Kenn Pier has a similarly unsatisfactory flow regime and also requires attention.

The EA's fishery concerns include the falling eel population, stagnant watercourses, inadequate water depths, excessive duckweed, high velocities caused by sudden sluice operation and the timing of rhyne maintenance operations. Scope for fishery enhancement is identified.

Stricter control of new development is necessary to safeguard the area from excessive runoff and other adverse effects.

Water quality concerns include excessive algal growth and low oxygen levels, particularly in some of the smaller watercourses. Revised management practices are seen as a possible method of alleviating these problems.

Recreation

The Ramblers seek to preserve existing footpaths and the general amenity of the area.

North Somerset Council comments that demand for sport and recreation is increasing steadily, and that the provision of adequate facilities are a Local Plan issue.

The Environment Agency supports angling in the area as well as other recreational uses of its various riparian land holdings.

Services

All the main statutory undertakers were contacted and this confirmed the presence of many cables, pipelines etc in the area. The government strategic oil pipeline and a very large national network gas pipeline (soon to be duplicated on a similar alignment) are seen as particularly important. All the services organisations identify safety from disturbance as their key concern, but SWEB added that they are also worried about the possible consequences of raised water levels on underground cables.

Transport

Railways, the M5 motorway and many lesser roads in the area rely on the protection from flooding provided by the EA and IDB flood defence systems. Without continued maintenance of these systems a significant proportion of the transport networks could become unviable, adversely affecting the local and regional communications and economy.

The main Bristol Exeter railway runs through the area and Railtrack caution against any activities which might adversely affect their permanent way.

Cycleways are being actively encouraged and careful planning is needed to avoid conflicts with watercourse operational and maintenance needs.

SUMMARY TABLE OF OBJECTIVES

This section has been distilled from the full returns provided by consultees and discussuions at meetings of the Group of Major Interests. It highlights not only those proposals or aspirations upon which full consensus is unlikely to be reached in the first instance, but also those where a co-operative approach is likely to be required.

REF	OBJECTIVE	AGREED	SUGGESTED BY	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION
1	Achieve and maintain appropriate water levels for the continuation of viable agricultural activities.	YES	IDB Farming Group	EA IDB
2	Encourage the extension of agri-environmental schemes within the Plan area	YES	Various	All
3	Maintain appropriate water levels to safeguard existing man-made assets and infrastructure	YES	Services IDB	EA IDB
4	Minimise watercourse bed exposure during winter months	YES	Wildlife Trust	EA IDB
5	Encourage the development of raised water level / water level management schemes	YES	Wildlife Trust	Land managers EA WT
6	Improve water quality generally in the systems	YES	CPRE EA	EA
7	Ensure new development is sustainable with respect to water level management in the Plan Area	YES	EA IDB	EA IDB NSC
8	Achieve and maintain appropriate water level management and flood protection for new and existing urban development	YES	IDB	IDB NSC

REF	OBJECTIVE	AGREED	SUGGESTED BY	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION
9	Carry out general amenity enhancements at appropriate locations	YES		Ad hoc partnerships
10	Seek opportunities to develop water level management and rhyne maintenance practices to protect habitats and encourage biodiversity	YES	EN	IDB
11	Improve consultation between IDB and other relevant agencies and organisations	YES	NSC	NSC IDB
12	Maintain and where necessary improve to appropriate standards sea and tidal defences and water control infrastructure	YES	IDB	EA
13	Optimise fish and eel populations	YES	EA	EA IDB
14	Improve water level monitoring arrangements	YES	IDB EA	IDB EA

Comments on the Table

1. This objective submitted by the IDB Farming Group seeks to ensure that where commercial farming operations continue to be carried out, appropriate water levels are maintained. The threat of reduced trafficability where raised water levels might be adopted is a particular concern.

3. This particularly refers to the minor road network which crosses the plan area.

4. Many existing penning structures have no provision for holding intermediate levels – they either maintain the high summer level or nothing at all. This objective is likely therefore to require the upgrading of some existing water control structures and the provision of some new ones.

6. Apart from general pollution control monitoring this may involve the improvement of existing summer water feed arrangements, to permit higher through flows which help to avoid stagnation.

8. This would include proper consideration for the disposal of surface water runoff and siting to avoid

the need for future consequential works. PPG 25 refers.

11. The North Somerset Council and the Avon Wildlife Trust have both commented on the potential benefits of closer co-operation with the Drainage Board.

12. The Drainage Board has particular concerns about the standard of sea defence along certain sections of the Congresbury Yeo estuary.

14. The IDB system has very few gaugeboards and remedying this situation is regarded as a priority.

WATERCOURSES – DESCRIPTION, OPERATION AND MAINTENANCE

Reference should be made to the maps included in Appendix 3

MAIN RIVERS & CONTROL STRUCTURES

The following list identifies the relevant Main Rivers that affect the WLMP area and the associated Control Structures on them. The length of Main River is listed in brackets after each watercourse. Some of these control structures are not operated by the Environment Agency (Table 1 gives further details on operators). In addition some of these structures are fixed weirs where no adjustment to water levels is possible.

The text describes each Main River and each structure on them including the seasonal adjustment (if applicable) that is carried out. Precise details on target water levels are given in Table 1 and its supplementary notes which are meant to be a quick reference guide.

There are other structures adjacent Main River which act as water feeds to private/Drainage Board rhynes which are not Agency operated eg at Jacklands Farm and between Tickenham Mill and Moor Lane. These could affect water levels in the Main River if left open too long or if damaged, leaking etc but these are not covered in this document.

The principal flood defence issue in terms of water level management are the problems associated with the Land Yeo through Clevedon. There is a conflict of interest here between the agricultural need for low water levels and the need for water for amenity in Clevedon. This is explained in more detail in the main text under the Land Yeo system.

CONTROL STRUCTURES ON MAIN RIVER

a.) Land Yeo [15.4 Km]

i.)	Land Yeo Outfall (Sluice/Flap)	ST 392 705
ii.)	Tickenham Mill (Sluice/Weir)	ST 454 717
iii.)	Wraxall Gauging Station	ST 483 715
iv.)	Wraxall House Control Structures	
	- Weir A	ST 484 715
	- Sluice A	ST 483 715
	- Sluice B	ST 486 713 (redundant)
v.)	Watercress Farm Control Structures	
	- S1 (Boards & Weir)	ST 501 704
	- S2 (Sluice & Weir)	ST 501 705
	- S3 (Overflow Weir)	ST 500 705
	- S4 (Intake Sluice)	ST 500 705

b.) (New) Blind Yeo [6.1 Km]

i.)	Blind Yeo Outfall	ST 392 702
ii.)	Fishing Weirs	
	- Weir P	ST 422 698
	- Weir Q	ST 406 698
	- Weir R	ST 398 699

c.) Yearling Ditch [1.6 Km]

i.)	Cooks Clyse (Tilting Weirs)	ST 425 709

d.) Tickenham Boundary Rhyne (TBR) [2.6 Km]

e.) Clevedon Boundary Rhyne (CBR) [1.4 Km]

f.) River Kenn [10.9 Km]

i.)	Kenn Outfall - Flap	ST 384 686
	- Sluice	ST 387 686
ii.)	Treble House (Farm)Sluice	ST 388 686
iii.)	Kenn Moor Bridge Sluice	ST 426 696
iv.)	Kenn Pier ' Sluice '	ST 426 697 (Redundant)
v.)	Kenn Moor Gauging Station	ST 450 680

g.) Black Ditch Rhyne [2.1 Km]

i.)	Black Ditch Sluice	ST 432 696

h.) Congresbury Yeo

i.)	Tutshill Sluice - twin tide flaps, twin emergency gates, single tilting weir	ST 382 658
ii.)	Phipps Sluice - fixed weir plus vertical lift gate	ST 394 652

2.3.1 Land Yeo

The Land Yeo watercourse originates on the high ground above Barrow Reservoir outside the catchment area, whilst the Main River designation starts at Station Road in Flax Bourton. The watercourse then flows in a generally westerly direction from this high ground and past the northern parts of the low moorland area (i.e. Tickenham and Clevedon Moors). Most of the flow in the Land Yeo is conveyed to the Blind Yeo via the Yearling Ditch. The Land Yeo was diverted into the Blind Yeo this way under the M5 Motorway Land Yeo/Blind Yeo Scheme in the early 1970's (refer to Appendix 2 for more details). The remaining flow passes through Clevedon to an outfall on the Clevedon Pill.

The operation of the lower Land Yeo system is not ideal requiring astute water level management of the outfall sluice and of Cooks Clyse (see below and section 2.3.3) to satisfy the needs of the legitimate interests.

There are a few control structures along this watercourse (mostly in the upper regions) which are described below :

Land Yeo Outfall

This structure is located at the outfall of the Land Yeo into the Clevedon Pill and historically used to be outfall for the whole of the Land Yeo (before most of it was diverted into the Blind Yeo system).

This control structure consists of a tidal flap on the downstream side of the sea wall and a vertical sluice penstock on the upstream face. The previous tidal gate on a headwall located approximately 15 m upstream which used to form a second line of defence has

been removed. There is a gauge board on the upstream face of this headwall.

The tidal non return gate consists of a 1.2 m diameter double hung cast iron flap supplied by Simon-Hartley Ltd and installed in 1993. The door may be opened by a wire attached to the lower part of the door. There is no permanent winch on site but the structure was designed to be opened by a mobile winch system (e.g. a Land Rover).

The sluice consists of a 1.2 m diameter cast iron penstock, with a non rising spindle supplied by Adams Hydraulics Ltd and operated manually by a handwheel mounted directly on top of the penstock frame. The invert to the pipe is at a level of approximately 3.38 m.

Under normal operation the outfall sluice is closed most of the time in both summer and winter. It is sometimes opened slightly by about 25 mm to allow fresh water to flow through Clevedon. The water levels upstream would have to be sufficiently high at Cooks Clyse to do this. In addition the sluice would only be opened slightly for a short while to avoid depleting the penned flows at Cooks Clyse. As a guide in summer the outfall sluice would not be opened unless the water levels here were in excess of 4.75 m. In winter flood conditions the gate should be opened when the waters reach a level of around 4.60 to 4.70 m at the outfall.

There is currently no penning control at the outfall structure although there are stoplogs grooves to accommodate penning boards. However such boards if installed would be very difficult to remove in the event of high rainfall/flood conditions and hence this is not done.

The Land Yeo outfall sluice is to a large extent operated hand in hand with the Cooks Clyse tilting weir. The Agency's operator here aims to maintain a balance between the need for enough fresh flow (and sufficient depth of water) through Clevedon and the agricultural need for water levels that do not flood the fields in the low moorland area. This sensitive balance is required in both the summer and winter months.

As mentioned when the sluice is open fresh water flows through Clevedon, however if this is left open too long the penned flow upstream is lost. When the sluice is closed the water becomes stagnant increasing weedgrowth and complaints from Clevedon residents. Increasing the penning at the tilting weir would allow enough water to flow through the town, however this would increase the risk of flooding to agricultural land.

Hence the water level management here is a delicate operation requiring a balance between the legitimate needs.

Tickenham Mill

The Tickenham Mill control structure is located directly north west of Tickenham Court and immediately adjacent the Bristol Water Pumping Station. The structure consists of a 4.50 m long penning sluice gate below which there is a fixed weir and to the side of which is a smaller sluice gate. Some water also flows under the adjacent building which used to be a Mill (the wheel has since been removed).

The penning gate was constructed in March 1968 and replaced the previous sluice gate whose operation was inadequate. The sluice is made up of two 300 mm (high) by 150 mm (thick) timber boards which may be operated individually or together to form either a 300 mm high weir or a 600 mm high weir. This is achieved by a threaded bolt mechanism located at each end of the gate. The gate is raised by a winch system which consists of wire ropes attached to the ends of the board, an overhead metal frame and

a operating handle on the right hand bank. Immediately upstream of this gate there are 150 mm wide stoplog grooves located in the both banks. There is also a gauge board located upstream of this gate on the left hand bank.

In summer only the lower board is in place whilst in winter the whole gate is raised from the bed (i.e. unpenned). In theory the summer level may be raised by an additional 300 mm by lowering the second board/gate. However if this was done all the flow would probably go under the house and the higher penn would not be achieved. Thus the flow under the house would have to be closed off by sandbags or by other means etc. This upper gate is currently not utilised.

Immediately downstream of this gate there is a 2 m high (approximately) fixed crest stone weir. In plan this is in an ' L' shape with a shorter side of 1.3 m and a longer side of 2.7 m (total crest length 4.0 m).

To the right of the penning sluice there is a 1.0 m square (approx.) metal sluice operated by a horizontal handwheel situated above the gate. Under typical conditions in both summer and winter this gate is closed (and locked). It is only opened when there is a need to do maintenance work at the penning gate or at the inlet under the house (e.g. to clear the filters/screens). The invert at the minor sluice is lower than elsewhere e.g. 8.4 m as compared to 8.9 m at the penning gate approximately.

In the past this gate has been opened in winter (with the penning gate fully raised) in order to aid flood evacuation further upstream. However this was found to have little benefit and is unlikely to be repeated in the future.

As mentioned some of the water on the Land Yeo here also finds it's way under the adjacent building which used to be a Mill but presently is not used for anything. There is no control structure here but there is a weedscreen/filter to stop debris flow downstream.

Wraxall (Bridge) Gauging Station

Wraxall (Bridge) Gauging Station is located just downstream of the B3130 between Wraxall and Nailsea adjacent Wraxall House (now Wraxall Manor Restaurant). This gauging station was originally commissioned during January 1971 and it serves a total catchment area of 23.3 km^2.

The structure consists of a 450 mm high triangular profile (Crump) weir with a 3 m long base and which extends for 5 m across the channel. The crest height of the weir is 11.30 m AOD. There is a gauge board upstream of the weir which indicates the depth of flow over the crest of the weir. There is also a 1 m long sensor plate on the weir.

Approximately 15 m downstream of this gauging weir there is another fixed weir of crest height 100 -150 mm and length 5 m (across the channel). This weir is formed from a series of interlocking trench sheets which were originally installed as scour protection.

Both of the aforementioned weirs have fixed crests and thus water level adjustments are not possible here.

Wraxall House Control Structures

Wraxall House control structures consist of an arrangement of weirs and sluices adjacent Wraxall Manor Hotel and upstream of the aforementioned gauging station (refer to Detail B on Map 2).

At a point approximately 150 m upstream of Cradle Bridge the Land Yeo divides into two channels, however only the northern route is Statutory Main River. The higher water levels are to be found in the northern channel and the southern channel effectively acts as an overflow watercourse. These two channels then join together immediately upstream of the B3130.

The control structures here dictate the relative flows along the two routes of the Land Yeo.

Weir A (from Map 2) is a 1.50 m high (approx.) fixed crested stone weir with a crest length of 3.30 m. This is situated at where the old Wraxall Mill wheel used to be located (hence the fall) which has since been removed.

Sluice A controls the flow of water from the northern route of the Land Yeo to the southern route. The structure consists of a 1.0 m high, 800 mm wide vertical metal sluice gate in a stone headwall. There is a 75 to 100 mm vertical gap along the whole depth of the gate with small channels to accommodate a narrow plate here. This gap (and plate) provides water level control without the need to open the gate. Because of the narrow width of this opening it gets easily clogged up with debris.

However in recent years this gate has apparently been kept shut all of the time and no controlling plate has been used in the slot. The Agency do occasionally check to see whether the gate is kept shut but they do not operate it. The slot in the gate would appear to allow just enough water to feed a pond further downstream with fresh water.

The sluice at the ' Sluice B ' location has been removed and thus this structure is currently redundant. There are slots here to accommodate a sluice or penning boards of 1.4 to 1.5 m length. At present the channel here is blocked with debris which maintains a depth of water here. There is a balancing pond adjacent this southern channel from the housing development to the south and a review of the structure here may be necessary in the future.

Watercress Farm Control Structures

These control structures are located between Wraxall and Flax Bourton immediately adjacent Watercress Farm (now derelict buildings). These structures which consist of an arrangement of weirs and sluices are wholly operated by the Tyntesfield Estate. The structures enable water to be penned higher in this area to provide feed water to run a water wheel (there is also an overflow facility here). They are included in this report since they are located on Main River.

In this area the Land Yeo again divides into two channels (both of which are Statutory Main River) and higher water levels are held in the most northern route. However it is only the southern channel which is managed as Main River and the Estate carry out their own bankside maintenance on most of the northern route (as well as operating the structures).

These structures are listed and described below and are also shown on Detail C, on Map 2.

a.) S1 - Boards & Weir
b.) S2 - Sluice & Weir
c.) S3 - Overflow Weir
d.) S4 - Intake Sluice to pump house.

a.) ***S1 - Boards & Weir***

The control structure here consists of removable timber boards across the channel below which there is a fixed stone weir. This structure penns water in the northern channel as well as providing feed water to the southern channel.

There are three sets of removable boards located side by side here each of length 1.58 m approximately which form a weir of total length 5 m approximately. These 25 mm thick boards fit into metal slots or grooves. They also have a metal bar attached to their midpoint for lifting and securing in place (there is a special locking mechanism to do this).

The height of the boards usually in place is 300 mm from bed level although it is possible to increase this to 750 mm if required with additional boards.

Immediately downstream of this penning gate there is a 1.0 m high fixed crest stone weir.

b.) ***S2 - Sluice & Weir***

This control structure consists of a 1.25 m long, 0.30 m high culvert in a 0.65 m thick, 1.2 m high headwall which is covered by a metal sluice gate. The gate may be adjusted to allow water through the culvert or water may flow over the top of the gate (which corresponds to the top of the headwall) to act as a weir.

Downstream of this structure there is also a 950 mm wide flume on the channel, but no control to adjust water levels.

c.) ***S3 - Overflow Weir***

On the northern channel of the Land Yeo (which has the higher water levels) there is an overflow weir which can redirect water into the southern channel of the Land Yeo if water levels are high enough. This fixed crest stone weir has a crest height of 500 mm and a length of 5 m (maximum).

d.) ***S4 - Intake Sluice to Pump House***

This 900 mm wide, 350 mm high metal sluice controls the flow of water over the water wheel situated in a building immediately downstream and directly adjacent the Watercress Farm buildings. This is used to power a pump which is used to raise water from adjacent springs. This system is also supplemented by an electric pump. On average this pump is used once or twice a week and mostly in the winter months

2.3.2 (New) Blind Yeo

The New Blind Yeo (referred to more commonly as just the Blind Yeo) is a man made channel which extends from the Clevedon Boundary Rhyne (CBR) at Nailsea Wall for 4.5km to its own outfall on the south west outskirts of Clevedon.

It was originally cut as part of the River Kenn Scheme in the early 1950's to provide relief from flooding to 2,100 acres of the moorland situated between Clevedon, Tickenham and Yatton. This watercourse was also enlarged as part of the M5 Motorway, Land Yeo/Blind Yeo Scheme in the early 1970's (refer to Appendix 2 for further details of these schemes).

The previous route of the Blind Yeo (the Old Blind Yeo) is located approximately 20m south and parallel to the New Blind Yeo. This substantially smaller watercourse has minimal drainage value and most of it has been de mained (except for the section between the Yearling Ditch and the CBR which is still statutory Main River).

Water levels along the Blind Yeo and its associated tributaries are determined by the operation of the Blind Yeo control structure which is described below. This structure is the most influential structure in terms of water level management in the North Somerset catchment. In addition there are fishing weirs along the Blind Yeo which are used to maintain a depth of water in the winter months and which are also described below.

Blind Yeo Outfall

The outfall consists of two separate structures built side by side, but at different times and which effectively act as two parallel outfalls to sea. However the older outfall and it's associated structures is effectively redundant and water level control in the area is undertaken by the newer outfall. Both are described below;

Left Hand Channel

The south or left hand channel (LHC) structure was built as the original outfall under the River Kenn Scheme in 1952. It consists of twin tidal flaps on the downstream wall face which close automatically over two 1.83 m wide, 1.52 m high openings, behind which is a single emergency gate 4.27 m wide, 1.52 m high and a 3.66 m wide, 3.35 m high vertical lift penning gate on the upstream side. The steel penning gate has a removable timber top board which if used would maintain a penn of around 3.86 m.

These structures are currently not operated and the emergency gate is always left closed. Both the tidal flaps and the penning gate are usable but the pulleys on the emergency gate have been damaged. There are however chains attached to the emergency gate to allow it to be lifted in an emergency for example in a flood when the adjacent tilting weir was jammed open. The gate lifting would have to be performed by a mobile crane but there is a procedure for doing this.

In addition upgrading works would also be required to the penning gate before it can be brought back into operation since the seals of the gate are known to leak. The penning gate is normally left lowered, however it is occasionally lifted to check that it is still operational.

Therefore improvement works are required at this outfall before it can be operational. If working, this outfall would provide a useful backup for the adjacent channel for penning and for flood evacuation.

A full inspection of the control structures in the left hand channel were carried out in 1995 by the Environment Agency and full details are given in a report dated the 28 December 1995 (Appendix 3). This recommended that the structure be included in the Agency's future capital programme for full refurbishment.

Right Hand Channel

The more recent north or right hand channel structure was built in about 1972 as part of the M5 Motorway Land Yeo/Blind Yeo Stage 1 Scheme. It has a single 2.44 m x 2.44 m tidal flap on the downstream face with a non rising spindle penstock behind it as an emergency gate and a 3.66 m wide, 2.44 m high tilting weir sluice on the upstream face for penning control.

Both the emergency gate penstock and the tilting weir are electrically operated manually controlled. A control house containing the electrical controls is built over the new outfall. Automatic operation has been attempted in the past though unsuccessfully.

There are stoplog grooves upstream of the tilting weir to accommodate 300 mm high, 4 m long approx. penning boards which are stored on site. When these boards are in place they will maintain the summer penn. There are metal bars through these boards to aid installation and removal (by crane). These boards are installed if there is a fault with the tilting weir (i.e. it will not raise to summer penn) or if it is necessary to carry out maintenance work on the tilting weir, emergency gate or flap gate downstream.

The tidal flap can also be open via an overhead winch, although this is rarely done (to help clear blockages etc.).

Under normal operating conditions the tilting weir penns in both the summer and the winter time. The gate is linked to the telemetry system which allows remote monitoring of the water levels here in addition to in-built alarms for high or low water levels. The gate can penn up to a level of around 4.0 m when fully raised (under normal flow) however this is likely to cause flooding upstream in the fields adjacent the Black Ditch Rhyne.

The emergency gate is normally left raised except when it is closed to provide a second line of defence if the tidal flap fails to close because of a blockage etc. If a fault develops with the tilting weir, theoretically the emergency gate could be used for penning (by undershooting the gate) although this does not provide ideal penning control.

Immediately downstream of the outfall structure there is a series of interlocking trench sheets which act as a fixed crested weir which were originally installed as scour protection.

Fishing Weirs

There are three fishing weirs along the Blind Yeo which are shown on Map 2 and which are referred to as Weir P, Weir Q and Weir R respectively. Weir P is located 38 m downstream of Manmoor Lane, Weir Q is located 15 m downstream of Kenn Road adjacent the Fisherman's car park and Weir R is located 72 m downstream of Strode Road.

These fixed weirs were installed to maintain a depth of flow in the Blind Yeo during winter and as a safeguard against a fault at the outfall which would cause the levels to fall significantly below the target levels. When the Blind Yeo is at winter penn, water levels will be just above these weir crests. The levels at these weirs were surveyed in March 1991 and these have been summarised below ;

WEIR P	Centre 2.38 m	(LHS = 2.40 m, RHS = 2.35 m)
WEIR Q	Centre 2.52 m	(LHS = 2.50 m, RHS = 2.56 m)

WEIR R Centre 1.99 m (LHS = 2.65 m, RHS = 2.68 m)

The weirs consists of interlocking trench sheets across the watercourse with loose stone placed on both sides of the weir except at Weir Q which is stone based only.

2.3.3 Yearling Ditch

The Yearling Ditch is a short section of Main River (about 1.6 km long) that links the Land Yeo to the north with the New Blind Yeo to the south. There is only one control structure on this watercourse namely Cooks Clyse which is described below:

Cooks Clyse

This control structure is located where the Middle Yeo joins into the Yearling Ditch approximately 400 m north of Cook's Lane. It was originally constructed as part of the M5 Motorway Land Yeo/Blind Yeo Stage 1 Scheme when the Land Yeo was diverted into the Blind Yeo. It consists effectively of two separate electrically actuated manually controlled tilting weirs within a single concrete superstructure and situated in a locked compound.

One tilting weir is on the Yearling Ditch (1.85 m wide) whilst the other is on the Middle Yeo (1.22 m wide). The weir on the Middle Yeo is a Drainage Board structure but the Agency operate it on their behalf. The tilting weir on the Yearling Ditch controls the water levels on the Yearling Ditch and the Land Yeo in the low moorland area (including through Clevedon to the outfall).

Attempts to automate the operation of this structure in the past have been unsuccessful.

As previously mentioned the operation of the tilting weir on the Yearling Ditch is closely linked to the opening of the outfall sluice on the Land Yeo (refer to section 2.3.1). The tilting weir maintains a penn in both the summer and winter months (refer to Table 1 for target water levels). The gate when fully raised under normal flow conditions in summer can penn up to about 5.0 m upstream. However this is not usually done since at this level flooding of farmland occurs.

There are stoplog grooves upstream of the Yearling Ditch tilting weir to accommodate 200 mm high, 200 mm thick and 2.35 m long penning boards. When all the boards are in place the summer penn can be maintained. These boards are only used when a fault occurs with the penning gate (i.e. it will not raise) or if maintenance work is required on the gate. When the boards are not in use they are stored within the structure compound. In winter the tilting weir is adjusted frequently to deal with high flows and to maintain enough water along the Clevedon section of the Land Yeo.

The operation of the Middle Yeo tilting weir is more straightforward, in summer it is fully raised and in winter it is fully lowered.

2.3.4 Tickenham Boundary Rhyne (TBR)

The Tickenham Boundary Rhyne (Main River section) flows for 2.6 km from the Causeway Bridge near Tickenham Court to join into the Clevedon Boundary Rhyne adjacent Smeathyard Farm. There are no control structures on this section and thus water levels here are determined by the water levels in the Blind Yeo. There are however 2.3 m long (approx.) penning boards located in slots in a concrete headwall on the upstream side of the Causeway Bridge but these are not used by the Agency. There is also a gauge board on the downstream face of this bridge.

2.3.5 Clevedon Boundary Rhyne (CBR)

The Main River part of the Clevedon Boundary Rhyne flows for 1.4 km from the TBR to the New Blind Yeo. As with the TBR water levels on this watercourse are determined by the water levels in the Blind Yeo.

2.3.6 River Kenn

Historically the River Kenn used to flow from the highland to the east through the low moorland area and eventually to the sea at Kingston Pill. (The Main River part of this watercourse begins adjacent Kenn Moor Gate as shown on Map 2). Following the River Kenn Scheme in the early 1950's (see Appendix 2) this watercourse was diverted into the Blind Yeo via the road culvert at Kenn Pier and the outfall effectively became redundant. Thus the flow from Kenn Pier to the outfall was reversed and this section is sometimes referred to as the Old River Kenn. This section of the Kenn is penned by control structures at Kenn Pier and at Treble House Farm (see below) with excess water overflowing to the Blind Yeo. These penning structures were originally installed under the River Kenn Water Control Scheme (see Appendix 2).

There are several control structures along the Kenn and these have been described below.

Kenn Outfall

This control structure is located at the western extreme of the River Kenn and historically used to be the outfall for the whole of the River Kenn. Following the River Kenn Scheme it's function changed and it effectively became redundant. The outfall to the Kenn is also referred to as Hook's Ear (outfall).

The structure consists of a 1.2 m diameter outfall pipe with a sluice penstock at the upstream end and a non return gate at its downstream end.

The 1.2 m diameter double hung non return gate manufactured by Ham Baker is located in a 4 m high (approx.) concrete and trench sheet structure. This structure also contains the outfall for the Wessex Water treatment works and for the previous route of the Kenn in this area.

The flap has a loop at the bottom of the gate for it to be lifted to clear debris, blockages and for maintenance. There is no lifting gear permanently on site, but since the flap is not raised that often a winch is not warranted.

The outfall sluice at the upstream end of the culvert consists of a 1.4 m x 1.4 m sluice penstock manufactured by Adams Hydraulics Ltd and operated by a horizontal handwheel immediately above the sluice. The sluice which also has a counterbalance weight is located against a 3.5 m high concrete headwall structure.

Under normal conditions in summer and winter this sluice is closed most of the time. Under certain conditions when the boards at Treble House Farm are removed to aid flood evacuation and possibly to freshen the water, the sluice is also open to provide flood relief. This happens typically half a dozen times during the year.

This sluice penstock when closed can also provide a second line of defence against the tide which is useful should there be problems with the operation of the downstream tidal gate e.g. debris causing it to be open.

Treble House Sluice

This control structure is located adjacent Treble House Farm approximately 40 m upstream of the Kenn Outfall Sluice. It consists of 1.5 m long, 50 mm thick penning boards located in slots in a 900 mm thick stone headwall. Some of these boards have bars through them to aid installation and removal. When all the boards are in place they form a barrier of height approximately 1.5 m high. In the past at this location there used to be a single gate operated by an overhead winch but both these items have since been removed.

These boards are usually left in place in both the summer and winter periods to maintain a constant penn along the Old River Kenn. These boards are removed to aid flood evacuation in the adjacent area and also to freshen up the Old River Kenn system. As a guide this happens typically half a dozen times a year, as necessary.

Kenn Moor Bridge Sluice

This control structure is located at the eastern side of the Kenn Moor Road bridge adjacent Kenn Pier. This structure along with the boards at Treble House Farm are used to penn the Old River Kenn in the summer and winter period. Excess water from this system overflows into the Blind Yeo system.

The structure consists of a 1.65 m square, 75 mm thick timber gate which runs along slots in a concrete headwall. The sluice is lifted by an overhead horizontal drum which when rotated lifts the gate by means of wire ropes attached to the ends of the gate.

The upper 300 mm section of the gate can be lifted and detached from the rest of the gate and in normal summer and winter periods this is usually done. In theory the penning level can be raised by lowering this additional 300 mm by means of a screwed bolt mechanism at both ends of the gate. However to achieve this higher penn additional boards would be required at Treble House Farm and additional measures would be required to avoid water loss to other channels such as the Drainage Board Rust Rhyne.

The gate here is closed in both the summer and winter period and is only rarely opened to aid flood evacuation in the Old River Kenn adjacent Kenn Pier (but much less often that the Treble House Farm sluice).

Kenn Pier Sluice

There are no longer any sluices present at the Kenn Pier culvert and hence there is no water level control at this location.

In the past there used to be sluices on the upstream side of the two culverts which allowed adjustments to the penning level.

Kenn Moor Gauging Station

The Kenn Moor Gauging Station is located near the upstream extent of the River Kenn (Main River) near Kenn Moor Gate. The station is actually owned and operated by the Bristol Waterworks Company and serves a total catchment area of 17.9 sq. km. Records for the station originally began in June 1957 but the station has been modified since

then, with the land drainage consent for the latest modifications being granted in August 1991.

The structure consists of a 4.45 m long, 200 mm high steel plate which forms a sharp edged weir across the channel. This plate can be lifted off the river bed by means of wire ropes attached to the ends of the plate and operated manually from winches located on an overhead footbridge. Water will still be penned even if the whole gate is lifted due to the high concrete invert under the gate.

In this plate, about 1 m from the right end of the weir there is also a 150 mm deep, 500 mm long local lowering of the plate which has small channels at both ends of this opening in which a plate can be inserted to close the opening (although this is not usually done). This slot is sized so as to allow enough water to be discharged downstream.

On the left bank of the weir structure there is a 800 mm diameter concrete culvert with a 850 mm wide vertical sluice penstock at it's inlet. When the sluice is opened water can bypass the fixed weir.

There is a gauge board upstream of this weir which is used to record the depth of flow at the weir (not AOD).

The typical operation of the structure is that the weir is lowered in summer and raised fully from the bed in winter (in both situations a penn is achieved). The sluice gate adjacent the weir is opened from time to time to aid flood evacuation and/or to allow maintenance work to be carried out on the weir.

2.3.7 Black Ditch Rhyne

The Black Ditch Rhyne flows northwards from the Little River below Claverham Drove to the River Kenn adjacent Moat Cottage. There is one control structure on this watercourse namely the Black Ditch Sluice which is described below.

Black Ditch Sluice

The Black Ditch Sluice is located at the very downstream end of the Black Ditch Rhyne as it joins into the River Kenn. It was originally constructed under the River Kenn Water Control Scheme in March 1958 (although the concrete structure was originally built in 1955).

It consists of a 1.85 m wide, 1.42 m high cast iron vertical sluice gate with a non rising spindle which is manually operated. This sluice is usually fully raised i.e. unpenned in both summer and winter. Thus the water levels here are determined by the water levels in the Blind Yeo. There is also a gauge board immediately upstream of this structure.

At the request of the Drainage Board the sluice may be lowered in the summer months to penn the Black Ditch Rhyne system (at a level of about 3.90 m at the sluice). This is done to feed the DB rhynes in the moorland area above Claverham Drove. The bankfull level of the Black Ditch Rhyne adjacent the pylon line (about 800 m upstream from the sluice) is around 4 m. Consequently when Black Ditch Sluice is penning and additional heavy rainfall occurs the sluice should be raised to prevent these fields from flooding. Thus careful water level management here is important.

The sluice may also be lowered if the water levels in the Blind Yeo are reduced (below 3.75 m say) so that the penning level is maintained in the Black Ditch system. This could happen for example if the DB requested a temporary lowered water level in the TBR via Blind Yeo Sluice.

The gate also has an upper 230 mm high detachable section which is raised when the gate is penning (it also forms part of the winding gear). Theoretically if this section was lowered it could be used to raise the penning level (which was the original intention under the Water Control Scheme). However in reality this higher level would flood the fields adjacent the pylons as previously mentioned and thus this is not done.

2.3.8 Congresbury Yeo

Water levels along this watercourse are determined by Phipps Sluice and Tutshill Sluice, both of which are the responsibility of the Agency. The water levels maintained at these controls are detailed below. During summer months water is penned at Tutshill and Phipps Sluices to provide irrigation water for the adjacent internal drainage board s whilst in winter the tilting weirs / gates at both sites are opened to allow maximum drainage.

	Summer (m)	Winter (m)
Tutshill Sluice	3.90	2.80 (typical)
Phipps Sluice	5.35	4.35 (typical)

Tutshill (Ear) Sluice which represents the current tidal limit was constructed in 1971 downstream of the new M5 motorway to replace Phipps Sluice, the previous tidal limit just upstream of the M5. This enabled the motorway to be constructed below tidal defence level. At the same time the opportunity was taken to widen the Congresbury Yeo upstream to Phipps Sluice to provide extra storage capacity during tidelock conditions.

This structure consists of twin 2.13m x 2.13m (7' x 7') waterways with tidal flaps on the downstream bulkhead, behind which are emergency double seal doors. The tidal flaps can be lifted using hand winches. The south (left hand) waterway has a 2.13m x 2.13m (7' x 7') tilting weir to provide water level control. The penstocks and the tiltingweir are electrically operated from panel mounted controls in the masonry constructed control house on the site.

Phipps Sluice was originally constructed in 1940 to replace Mendip Mill weir as the tidal limit and in doing so rendered a further 7km of the river non tidal as part of the compensation works to permit increased abstraction from Blagdon Lake. With the construction of Tutshill Sluice as the new tidal limit this structure became purely a penning sluice. Modifications were carried out in the late 1970's to facilitate water level control.

The structure in its present form comprises two 5.18m (17') wide waterways, one containing a fixed crest concrete weir whilst the other has a 2.01m (6'-6") high vertical lift sluice gate, which determines the normal penning level. However under dry conditions stoplog rebates over the gate can be used to hold a higher penn.

During flood conditions both Tutshill and Phipps Sluices are opened. Under such conditions it is necessary to ensure that the Congresbury floodbanks are secure and that all outfalls, bridges and weirs are clear of debris. It is also important to check that all the drainage board inlets situated on this main river are closed.

A Met Office Network raingauge (non telemetered) is situated at Yatton.

Gauge boards are situated as follows and are regularly monitored by the Agency:

Tutshill Sluice	ST 382 658
Phipps Sluice	ST 394 652
A370 Bridge, Congresbury	ST 437 639 (7.1m bankfull)

TABLE 1

TARGET WATER LEVELS AT CONTROL STRUCTURES

CONTROL STRUCTURE	OPERATOR	SUMMER WL (m AOD)	WINTER WL (m AOD)	FLOOD OPERATION
1. LAND YEO				
- Outfall Sluice	Agency	Closed	Closed	Open
- Tickenham Mill				
- Penning Sluice	Agency	9.25 (see note 9)	9.0 (Unpenned)	Sluice
- Minor Sluice	Agency	Closed	Closed	Raised
- Wraxall Gauging Station	None	Fixed Weir 11.30	Fixed Weir 11.30	see note 10
- Wraxall House Control Str.				-
- Weir A	None	Fixed Weir	-	
- Sluice A	see note12	partly open	partly open	-
- Sluice B	Redundant	-	-	-
- Watercress Farm Control Str.				-
- S1 (Boards/Weir)	WCE	-	-	
- S2 (Sluice & Weir)	WCE	-	-	-
- S3 (Overflow Weir)	None	Fixed Weir	-	-
- S4 (Intake Sluice)	WCE	-	-	-
				-
2. (NEW) BLIND YEO				
- Blind Yeo Outfall =				
LHC (Penning Gate)	Agency	No penn (Closed)	No penn (Closed)	-
(Emergency Gate)	Agency	Closed	Closed	see note 14
RHC (Tilting Weir)	Agency	3.66	2.65	Lowered
(Emergency Gate)	Agency	Open	Open	Open
- Fishing Weirs				
- Weir P	None	' Drowned '	2.38 (see note 18)	-
- Weir Q	None	' Drowned '	2.52 (see note 18)	-
- Weir R	None	' Drowned '	1.99 (see note 18)	-
3. YEARLING DITCH				
- Cooks Clyse =				
a. Tilting Weir (Yearling Ditch)	Agency	4.80	4.60-4.70 approx	see letter 15/4/11
b. Tilting Weir (Middle Yeo)	Agency	4.25 approx	Unpenned	
4. RIVER KENN				
- Kenn Outfall Sluice	Agency	Closed	Closed	-
- Treble House Sluice	Agency	4.30	4.30	see note 22
- Kenn Moor Bridge Sluice	Agency	4.30 (Closed)	4.30 (Closed)	see note 22
- Kenn Pier Sluice	Redundant	No sluice	No sluice	No sluice
- Kenn Moor Gauging Station	BWC	Weir in place	Weir raised	-
5. BLACK DITCH				
- Black Ditch Sluice	Agency	Unpenned	Unpenned	Open

WLMP File

NORTH SOMERSET (2005) INTERNAL DRAINAGE BOARD

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HAM LANE
KINGSTON SEYMOUR
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15th April, 2011.

Mr. A. Wheeler,
Flood and Coastal Risk Management Dept,
Environment Agency,
Rivers House
East Quay,
Bridgwater,
Somerset TA6 4YS.

Dear Alan,

NSIDB - Water Level Management Plan

I refer to your e.mail of 6th April concerning the winter water levels in the Land Yeo (Cooks Clyse) as set out in the North Somerset IDB Water Level Management Plan.

At a Board meeting on 14th April 2011, members formally proposed, seconded and agreed that the figures on page 31, Table 1 section 3 Yearling Ditch, Cooks Clyse, should read winter water level at 4.60 to 4.70. AoD. It was agreed that the original figures were a typing error.

I am copying this to Dan Alsop, Board Engineer and Karen Pollock of Natural England for them to revise their copies of the WLMP.

Yours sincerely,

[redacted]

Gillian Harris
Clerk to the Board.

c.c. Dan Alsop, IDB Engineer,
Karen Pollock, Natural England.

NOTES

1. WATER LEVELS - The above target water levels are based on the "National Rivers Authority Somerset Area Water Level Specification for Main River Control Structures - Revision 009 (02 March 1993)" and on discussions with the Agency's day to day water level operator for the area.

2. CONTROL STRUCTURES - the control structures listed here are those that are on or immediately next to Main River and thus include some structures that are not operated by the Agency. The table is not meant to identify all of the structures in the WLMP area.

3. GAUGE BOARDS - Details of the gauge boards in the catchment are shown in Table 2.

4. OPERATIONAL CONTROL - all of the structures in this table are manually controlled. The Blind Yeo tilting weir and emergency gate (right hand channel) and the tilting weirs at Cooks Clyse are electrically activated. Automatic operation has been tried at these structures but was unsuccessful. There are telemetry links to the Blind Yeo tilting weir only with alarms for water levels that are too high and too low.

5. FLOOD PROCEDURES - The flood procedures affecting this catchment are summarised in the last column of this table. This information is based on the ' National Rivers Authority, South Western Region Local Flood Procedures, Avon Catchment - Version SA2, October 1994 '. As a guide about 12 km^2 of low lying land in Tickenham, Nailsea and Kenn Moors does flood, about 1 in 5 years in winter and about 1 in 20 years in summer.
6. OPERATORS - the following abbreviations have been used in the ' Operators ' column of this Table ;

None	=	These structures are fixed i.e. they cannot be altered to change the adjacent water levels
WCE	=	Wraxall Court Estate
BWC	=	Bristol Waterworks Company

7. LOWER LAND YEO SYSTEM - in this area water levels are determined by the tilting weir on the Yearling Ditch (Cooks Clyse) and the outfall sluice penstock. Both these structures are operated together to allow enough water to pass down the Land Yeo to maintain fresh conditions in that channel and also to flush out Clevedon Pill, whilst keeping the flood levels in the Land Yeo upstream of the motorway sufficiently low in order to prevent overtopping of the banks.

8. LAND YEO OUTFALL SLUICE - most of the time this outfall sluice penstock is closed, however it is sometimes opened (about 25 mm say) to provide some gravity flow but only for a limited period (it is also opened for flood evacuation). NB There is currently no penning control at this outfall.

9. TICKENHAM MILL (Penning Sluice) - the summer water level here is based on one single gate/board being lowered onto the bed. Theoretically the penning level may be raised by a further 300 mm by lowering the upper gate but this is not usually done (the inlet under the house would also have to be closed off). In winter both gates are raised from the bed i.e. fully unpenned. The winter level is a typical level based on about 100 to 150 mm flowing over at the gate location although in floods this can be as high as 500 mm. In summer floods the gate is raised when the level reaches around 9.4 m.

10. TICKENHAM MILL (Minor Sluice) - this sluice is closed almost all of the time except when maintenance work is carried out at the penning sluice or the intake screens to the house are cleaned. Opening this sluice in winter (in addition to the penning gate) would have minimal effect in evacuating flood waters upstream

11. WRAXALL GAUGING STATION - there is also a fixed weir (sheet piled) downstream of this gauging weir which holds a level of around 11.0 m.

12. WRAXALL HOUSE (SLUICE A) - this sluice would appear to be closed all of the time. There is however an opening in the gate which would appear to allow a regular water feed to the southern channel here and the associated pond. This slot has the facility to accommodate a board but this is not currently utilised.

13. WATERCRESS FARM - the control structures here are operated by the Wraxall Court Estate. They are operated as necessary to provide feed water into the water wheel adjacent to Watercress Farm buildings. As a guide the water level upstream of Sluice S1 in October 1995 was levelled to be 20.75 m (with the boards in place) and 19.50 m immediately downstream.

14. BLIND YEO OUTFALL (LHC) - the control structures in the Left Hand Channel are effectively redundant and are currently not used. There are however chains attached to the emergency gate to allow for it to be lifted in emergency situations (by the use of a crane). The penning gate and the tidal flaps are both usable although the seals to the penning gate are known to leak. Improvement works are required to bring these structures back into operation which would provide an useful back up for penning/flood control if faults developed with the adjacent tilting weir.

15. BLIND YEO OUTFALL (RHC-Tilting Weir) - the tilting weir here penns in both the summer and the winter period. The target summer level of 3.66 m (12 ft) here gives a level of around 3.8 m + at Kenn Pier which meets the needs of the local farmers there. As a rough guide the level at Kenn Pier is about 200 -225 mm higher than that at the Blind Yeo Outfall. The tilting weir can penn up to around 4.0 m when fully raised but this will cause flooding on the fields adjacent the Black Ditch further upstream and is thus not done. Stoplogs (which are stored on site) can also be used to maintain a temporary penn for maintenance or if there is a fault with the gate.

16. BLIND YEO TILTING WEIR (Telemetry Alarms) - alarms are activated when the water levels at this structure are too high (4.10 m in summer, 4.00 m in winter) and if the water levels are too low (2.30 in winter, 3.50 m in summer). These alarms are adjusted as required and reference should be made to the latest telemetry alarm response specification.

17. BLIND YEO OUTFALL (RHC-Emergency Gate) - The emergency gate here is usually raised except in situations when it is closed to provide a second line of defence if the tidal flap fails to close because of a blockage etc.

18. BLIND YEO FISHING WEIRS - these weirs have no effect during the summer penn i.e. they are drowned out. In winter rippling occurs when the target winter water level is achieved. The levels quoted in this table are those at the centre of the weir (surveyed March 1991) and only come into effect if the water levels fall below the winter penn.

19. COOKS CLYSE (Yearling Ditch) - this tilting weir structure penns in both the summer and the winter period. As mentioned above it is operated in conjunction with the Land Yeo Outfall sluice penstock. In summer it can penn up to 5.0 m but this is not done since it would risk flooding fields further upstream. Stoplogs which are stored on site can be used to maintain a temporary penn.

20. COOKS CLYSE (Middle Yeo) - this tilting weir structure is owned by the North Somerset DB, but the Agency operated it on their behalf. The weir is fully raised in summer and fully lowered in winter.

21. KENN OUTFALL SLUICE - general operation is that the sluice is closed and only opened when the boards at Treble House are removed (for flood evacuation and to freshen the Old River Kenn).

22. OLD RIVER KENN - the section of the River Kenn from Treble House Farm to Kenn Moor Bridge is penned by structures at these locations in the summer and winter period. Excess water above that required for penning flows to the Blind Yeo (to the east). The Kenn Moor Bridge Sluice has a detachable top 300 mm which could possibly be used to raise penning levels but this is currently not used i.e. it is always raised. The boards at Treble House are removed to evacuate flood waters

and to freshen the Old River Kenn (say half a dozed times a year) whilst the Kenn Moor Bridge Sluice is raised to evacuate floods adjacent Kenn Pier (but much less often).

23. KENN PIER SLUICE - although this structure is currently redundant i.e. the sluice gates have been removed, the culvert here that links the Kenn to the Blind Yeo is very much operational.

24. KENN MOOR GAUGING STATION - in summer the weir plate is lowered whilst in winter it is fully raised, the high invert level of the bed though maintains a penn during this time. The plate may also be raised in summer floods. The bypass sluice is opened to help flood evacuation and/or to carry out maintenance work on the weir. As a very crude estimate the summer water level here has been estimated to be 4.4 - 4.5 m whilst in winter it will be around 200 mm lower.

25. BLACK DITCH SLUICE - this sluice is usually left in the raised (unpenned) position and thus water levels in this system are determined by the Blind Yeo Sluice further downstream. On the request of the Drainage Board the sluice is occasionally lowered to penn the Black Ditch Rhyne (at about 3.90 m) so that water may be feed to the fields upstream of Claverham Drove or if water levels in the Blind Yeo are temporarily lowered. The bankfull level adjacent the pylons (about 800 m upstream) is about 4 m therefore care should be taken when penning to avoid flooding these fields at the onset of additional rain.

TABLE 2

GAUGE BOARD DETAILS

GAUGE BOARD	GRID REFERENCE	LOCATION	FREQUENCY OF READINGS
1. Land Yeo			
- Land Yeo Outfall	ST 392 705	u/s	~ Weekly
- Strode Road Bridge	ST 401 706	u/s	As required
- Coleridge Vale	ST 405 708	d/s	~ Weekly
- Triangle	ST 409 712	u/s	~ Weekly
- Tickenham Mill	ST 455 717	u/s	As required
- Jacklands Bridge	ST 471 716	d/s	As required
2. (New) Blind Yeo			
- Blind Yeo Outfall	ST 392 702	u/s	~ Weekly
- Strode Road Bridge	ST 399 698	u/s	As required
- Kenn Pier	ST 426 697	d/s	~ Weekly
- Maynards Bridge	ST 434 698	d/s	As required
3. Yearling Ditch			
- Cooks Clyse	ST 426 709	u/s	Weekly
4. Black Ditch			
- Black Ditch Sluice	ST 432 697	u/s	~ Weekly
- Black Ditch Road Br.	ST 432 678	u/s & d/s	As required
5. Tickenham B. Rhyne			
- Causeway Bridge	ST 457 711	d/s	As required

GAUGE BOARD	GRID REFERENCE	LOCATION	FREQUENCY OF READINGS
6. Congresbury Yeo			
- Tutshill Sluice	ST 382 658	u/s	
- Phipps Sluice	ST 394 652	u/s	
- Congresbury Bridge	ST 437 639		

NOTES

1. DATABASE - The details in Table 2 are taken from the ' National Rivers Authority North Wessex Region Gauge Board Database - Revision 003 (24 February 1993) ' with minor revisions in September 1997 and supplemented where necessary by site visits to some of these areas.

2. METRIC - all the gauge boards in this table are metric.

3. LOCATION - the location column refers to the location of the gauge board relative to the named structure, u/s being upstream and d/s being downstream.

4. FREQUENCY OF READINGS - the above gauge boards are read on an approximately weekly basis in the summer months only. In the winter months they are all read on a less frequent basis and usually on an as required basis.

5. SPECIFIC SITES - more detailed explanations of some of these sites is as follows ;
   a.) Coleridge Vale - on Coleridge Vale Road North off Old Church Road adjacent the Vauxhall dealer garage but downstream of the road bridge.
   b.) Triangle - adjacent the Conservative Club and upstream of the B 3133

CHANNEL MAINTENANCE

3.1 ROUTINE WEED CONTROL

The following section outlines the current maintenance of aquatic vegetation (which is conveniently referred to as ' weed ') on the Main Rivers within the Plan area. It is based on the latest Environment Agency, North Wessex (Somerset Area) Weedcutting and Flail Service Level Agreement (Revision 4 - January 1998) which is frequently reviewed. Reference D4.

a) Land Yeo *Specification B & L*

On the Land Yeo three different weedcutting specifications are carried out as detailed below :

i.) Upstream of Wraxall G.S *Spec B*

On the upland section of the Land Yeo two mechanical cuts of weed are undertaken in July and October each year. Here the submerged weed and the emergent vegetation on the working bank only is cut and deposited on the non working bank where the machine reach permits. The emergent vegetation of the

non working bank is retained except where it encroaches across the channel in which case it is trimmed. If access is possible on both banks the working bank alternates after each weedcut.

In addition both banks are tractor flailed once a year prior to the Bradshaw weedcut.

ii.) Wraxall G.S to M5 *Spec L (Raised Floodbanks Spec.)*

On this section of the Land Yeo like the previous section two mechanical cuts are undertaken in July and October each year. In this section however both the submerged weed and the emergent vegetation on both banks are cut and deposited on the non working bank if the machine reach permits. If access is possible on both banks the working bank alternates after each weedcut.

In addition both banks are flailed once a year prior to the weedcut if they are not grazed.

iii.) M5 to Outfall *Spec B*

The specification and timing for this section of the Land Yeo is almost identical to that upstream of Wraxall Gauging Station. However the only difference is that on this section both banks are flailed twice a year.

b.) Blind Yeo *Specification X*

On the Blind Yeo two weedcuts are undertaken in July and October each year. However the weedcutting procedure here does not fall into any of the standard categories of the ' Weedcutting and Flail Service Level Agreement ' mentioned above.

On the first cut, 50 % of the channel weed is cut from the right bank whilst on the second cut the other 50 % is cut from the left bank. No flailing of either bank takes place on this watercourse. Downstream of Strode Road however weedcutting takes place on an as required basis. Bed weed is generally not a problem here because of the relatively high flows and large depth of water and thus an annual cut is not justified.

c.) River Kenn *Specification F & D*

i.) Upstream of Kenn Pier *Spec F*

On this section of the River Kenn two mechanical cuts of weed are undertaken in June and September each year. Here only the submerged weed is cut and deposited on the non working bank where the machine reach permits. The emergent vegetation at the waters edge on both banks is retained except where it encroaches across the channel in which case it will be trimmed. If access is possible on both banks the working bank alternates after each weedcut.

No tractor flailing of either bank takes place.

ii.) Downstream of Kenn Pier *Spec D*

On this section of the River Kenn only one weedcut is undertaken in September each year. Here only the submerged weed is cut and deposited on the non working bank where the machine reach permits. The emergent vegetation at the waters edge on both banks is retained except where it encroaches across the

channel in which case it is cut.

If access is possible on both banks the working bank alternates after each weedcut. In addition the right hand bank is flailed once a year, if it is not grazed prior to the weedcut.

d.) Yearling Ditch, TBR, CBR & Black Ditch *Specification F*

The weedcutting specification here is identical to that for the River Kenn upstream of Kenn Pier (see above). On these watercourses however two weedcuts are undertaken in July and October each year.

e.) Congresbury Yeo

Congresbury Mill to Railway Bridge *Specification L*

Two weedcuts are carried out each year – in July and September. The submerged and emergent weed on both banks is cut and deposited on the non-working bank where the machine reach permits. If machine access is possible on both banks, the working bank is alternated after each cut.

Railway Bridge to Tutshill Sluice *Specification K*

One cut is undertaken annually, usually in July or August. The submerged and emergent vegetation on the working bank only is cut and deposited on the non-working bank where the machine reach permits.

3.2 OTHER ROUTINE MAINTENANCE

The normal management practice for trees or branches and bushes which are within the channel area is that they will be either trimmed, coppiced or pollarded, so that the full cross sectional area of the channel is available to flood flows and that as much shade as possible is retained to reduce weedgrowth. Removal takes place in exceptional circumstances where blockage of the channel has occurred or is likely to occur.

It is normal practice to provide access for weedcutting machinery which consists of culverting side ditches and providing gates and side fencing so that travel across field boundaries is unrestricted.

Dredging of channels and the maintenance of structures is carried out on an as required basis. Modifications or improvements to structures in the SSSIs are not carried out unless there has been prior consultation with English Nature.

MAIN RIVER CONTINGENCY ARRANGEMENTS

Flood

Under flood conditions it is not always possible to control water levels in the Main Rivers. The Environment Agency will inform English Nature of situations where agreed water levels are not been achieved in SSSI's.

Where necessary sluices will be opened to assist evacuation until the appropriate target water level is regained.

Drought

Close liaison must be maintained between the Operating Authority and the Agency to conserve what water is available and to ensure its fair distribution between all occupiers so far as possible.

Consideration is given to raising penning levels above normal and/or introducing the summer penn earlier, subject to consultation between the Environment Agency and the Drainage Board (and also with English Nature if SSSI water levels are affected).

Pollution

Seek immediate assistance from the Agency's Pollution Officer.

DRAINAGE BOARD WATERCOURSES

Viewed Rhynes

The Land Drainage Act 1991 gives the Drainage Board certain powers over all watercourses within its district, except for Main Rivers where the Environment Agency is the relevant organisation. Included in these powers is the authority to select certain key watercourses for adoption and maintenance at the board's expense. This is termed "taking into view" and is done by resolution of the board, no public advertisement or reference to DEFRA being required as is the case for Main Rivers. Watercourses so adopted by the board are termed "Viewed Rhynes".

Maintenance Practices

Routine Work - Programme

Bank mowing and keetching (removal of bed weed) is carried out on the majority of viewed rhynes twice per year – in June and September – and once or three times per year (May, June, September) as follows:

Once	14th September – 31st October
Twice	14th June – 31st July 14th September – 31st October
Three times	Mid to late May Late July / early August 14th September – 31st October

Routine Work – Specification

First Keetch: Cut back grass and all vegetation including saplings and briars from working bank, min 100mm high or as otherwise directed. Remove all weeds.

Second and third keetches: Cut back grass and all vegetation including saplings and briars from both banks, min 100mm high or as otherwise directed. Remove all weeds.

Non Routine Work

Channels are dredged when their condition has deteriorated to the extent that they are no longer capable of sustaining a reasonable flow of water.

No aquatic herbicides are used in the Board's watercourses.

The Board generally accepts no responsibility for bridges and culverts on viewed rhynes, basic liability for which normally rests with the landowner or highway authority. However a structure is used by the Board for access, ex-gratia contributions are occasionally made towards the cost of any necessary maintenance, proportional to the Board's usage of the facility.

The Board does not normally accept liability for the maintenance of droves, and carries out maintenance, or contributes towards the cost of such work, only where the drove is essential for the Boards own access requirements, or where the Board's own operations have caused damage.

The Board's practice is to "Keetch" (clear vegetation and light silt deposits) from viewed rhynes on a regular basis, the frequency varying between once and three times per year, depending on the importance of the watercourse, its propensity to regrowth, etc.

Dredging of viewed rhynes is carried out on an ad-hoc basis only when necessary.

For operational purposes the Board divides the District into 5 zones. The table below indicates these zones, the watercourses and maintenance regime. A separate table lists all the control structures and relevant water levels.

Details

KINGSTON SEYMOUR ZONE

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Dowlais Ditch Dowlais Drove to Blind Yeo (EA) Drains land inside sea wall	60 (1207)	1
Lower Strode Road Hays Farm to Blind Yeo (EA) Drains land south of Strode Road	42 (845)	1
Broadstone Rhyne Cattle grid Riverside Farm to Milleaze hatch outlet Drains Kingston Seymour land inside sea wall. Middle Lane Rhyne drains into it at Broadstone Gout. Outlet to tidal contributory to Congresbury Yeo	164 (3299)	2
Middle Lane Rhyne Kingsmead Cottage to Broadstone Gout Drains agricultural land centre of Kingston Seymour	85 (1710)	2
Ham Rhyne Chapel gateway to Broadstone Rhyne at Milleaze Hatch Drains centre of village. Mendip View Hatch controls summer penning levels. Higher level in village due to lower land at Broadstone.	158 (3178)	2
Milleaze Rhyne Ham Lane to Tutshill outlet *Drains south Kingston Seymour to M5. Yeo Bank Hatch controls summer penning level.*	66 (1328)	2

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Cranmore Rhyne Lampley Road to Yeo Bank Lane *Drains land south of Kingston Seymour. Ttransfers water to Kenn during summer.*	141 (2837)	2
Paiges Congresbury Yeo to Cranmore Rhyne *Summer penning level for Kingston Seymour and Kenn is controlled at Paiges Hatch Inlet, water from Congresbury Yeo via pipe under M5.*	47 (946)	2
Lampley Rhyne Lampley Bow under M5 to Chapel gateway *Drains water from Kingston Seymour during winter months. Lampley Hatch controls summer level in Kingston Seymour.*	43 (865)	2
New Rhyne Lampley Lampley Bow to Yatton Little River *Drains Kingston Seymour and Kenn in winter. New Rhyne Hatch controls summer level in Kenn.*	42 (845)	2
Rust Rhyne Lampley Bow to River Kenn *Transfers water in summer to Kenn and Yatton. Drains water from Kenn in winter. Rust Hatch on junction with Kenn River controls summer level.*	118 (2374)	2
Thirteen Acre Rhyne M5 motorway to River Kenn *Drains water from Kenn in winter and transfers in for summer. Thirteen Acre Hatch controls winter and summer levels.*	5 (101)	2

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Yatton Little River Congresbury Yeo to M5 motorway *Yatton Little River Flap controls drainage from Yatton.*	18 (362)	2
Tynever Gout Rust Rhyne to Meadmoor Rhyne *Transfers water to Kenn in summer and drains via Thirteen Acre, Rust and Meadmoor Rhynes in winter.*	82 (1650)	2

YATTON & CLAVERHAM ZONE

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Yatton Little River River Kenn to M5 *Main inlet and outlet for Yatton, controlled by Crossman Hatch South of M5. Ham Bow Hatch used for summer penning. Water West of Ham Bow drains via Black Ditch (EA) at Kenn Moor Gate. Summer levels are controlled via hatch in Black Ditch.*	331 (6660)	2
Stowey Rhyne Hangstones playing field to Yatton Little River, Northend *Drains Yatton storm water. From one field South of the railway, water drains to Yatton Little River. Remainder drains via The Cut to Middle Rhyne.*	111 (2233)	1
The Cut Joins Middle and Stowey Rhynes	10 (201)	2
Middle Rhyne OS 0068 to Moor Street Bow *Drains North Yatton.*	114 (2294)	2

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Westmead Streamcross Claverham to Yatton Little River at Moor Street *Drains Claverham.*	133 (2676)	2
Jasmine Rhyne Jasmine Lane to Tannery Ditch *Drains Lower Claverham into Tannery Ditch.*	62 (1247)	1
Tannery Ditch Railway to Chestnut Drive Branch OS 6250 to Laurel Farm Branch OS 6065 to Streamcross farmtrack *Drains water from Jasmine Rhyne and several branches drain central Claverham.*	18 (362) 62 (1247)	1 2
Springwell Yatton Little River to Clarence House, Lower Claverham *Drains lower Claverham.*	42 (845)	2
Wemberham Lane Rhyne Stowells Concrete yard to junction with Yatton Little River *Main inlet and outlet for Horsecastle, Yatton.*	107 (2153)	3
Biddlestreet Rhyne (1) Wemberham Penn to junction with Biddlestreet Rhyne	50 (1006)	3
Biddlestreet Rhyne (2) Boundary OS 0085 to junction with Biddlestreet Rhyne	27 (543)	3

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Biddlestreet Rhyne (3) Junction Biddlestreet Rhyne to Cheddar Valley Railway *Summer levels for all three above are controlled by Wemberham Lane Hatch. Drains south Yatton to Wemberham Lane Rhyne to Little River.*	52 (1046)	2
Congresbury Inlet Congresbury Inlet to Wemberham Penn *Main inlet control for Yatton levels*	6 (121)	2
Branch Rhyne Alongside Cheddar Valley Railway walk Biddlestreet to Osmond Bridge to Cheddar Valley Railway *Drains land west of Cheddar Valley Railway line*	5 (101) 52 (1046)	1 2
Paiges Congresbury Yeo to Yatton Little River *Inlet control for Kingston Seymour and Kenn*	4 (80)	2
Claverham Court Rhyne Springwell (under railway line) to Streamcross Lane *Drains Lower Claverham*	30 (603)	1

KENN MOOR ZONE

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Claverham Drove Rhyne Kenn Moor Gate Drove to Yatton Little River *Drains Claverham Moor*	126 (2535)	2
Meadmoor Claverham Drove Rhyne to OS 3651 *Drains south Kenn*	71 (1429)	1
Mawkins Rhyne Meadmoor Rhyne to Say's Rhyne Say's Rhyne to Black Ditch *Drains Kenn*	20 (402) 24 (483)	1 2
Western Drainage Rhyne Mawkins Rhyne to Claverham Drove Rhyne Mawkins Rhyne to OS 8719 *Drains part of Kenn Moor*	90 (1811)	2
Spencers Sluice Kenn River to Black Ditch *Drains Kenn Moor* *Spencers Sluice Hatch controls levels between Spencers Sluice and Kenn River* *Fixed level*	36 (724)	2
Eastern Drainage Claverham Drove Rhyne to Spencers Sluice *Drains Kenn Moor*	45 (905)	2
Thirteen Acre Tynever Gout Rhyne to Kenn River *Feeds Kenn River*	50 (1006)	2
Kenn Street From Kenn River (E.A.) to Kenn Street O.S. 6622 *Drains Kenn*	15 (301)	1

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Mill Farm Rhyne From Mill Farm Kenn to Kenn River (EA) *Drains properties in proximity of Mill Farm*	21 (422)	1

NAILSEA AREA 1 AND TICKENHAM ZONE

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Top End Parish Brook Three Chains above Moor End Spout *Feeds water from Land Yeo to Parish Brook*	3 (60)	1
Top Kenn River Brook Farm gateway to Backwell Lake *Takes water form Flax Bourton area*	92 (1851)	1
North Drove Corner Watery Lane to Clevedon Boundary Rhyne *Drains Tickenham Moor*	132 (2656)	1
Clevedon Boundary Middle Yeo to corner Tickenham Boundary Rhyne *Drains Clevedon Moor* *Clevedon Boundary Hatch controls levels on Clevedon Boundary between Clevedon Boundary and Middle Yeo.* *Fixed Hatch*	27 (543)	1
Clevedon Drainage Clevedon Boundary Rhyne to Yearling Ditch *Drains Clevedon Moor* *Clevedon Drainage Hatch controls level on Clevedon Drainage between it and Middle Yeo* *Fixed level*	29 (583)	1
Storm Water Ditch Nailsea Storm Water outlet to Tickenham Boundary Rhyne	15 (302)	1

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
Backwell Lake (Kenn River) Length of Backwell Lake *Water from Flax Bourton area*	17 (342)	2
Parish Brook Moor End Spout to Maynards Bridge (end of Clevedon Boundary Rhyne) *Feeds water around south Nailsea Moor*	212 (4265)	2
Ten Foot Rhyne OS 4734 Nailsea to Maynards Bridge (end of Clevedon Boundary Rhyne) *Drains Tickenham Moor*	114 (2294)	2
Middle Yeo Moor End Spout to OS 0048 Triggols Cut Triggols Cut to Yearling Ditch Bridge Farm to Yearling Ditch *Drains Tickenham Moor. Triggols Cut Hatch feeds water from Land Yeo to Middle Yeo* *Cooks Lane Hatch controls levels bottom end of Middle Yeo. NOTE At top end connection to motorway outfall is DTR maintained.*	181 (3642)	2
Tickenham Boundary Rhyne Moor End Spout to Tickenham Causeway Bridge *Drains Tickenham Moor*	45 (905)	2
Broadmead OS 0452 West End Farm Nailsea to Parish Brook *Drains West End Nailsea*	17 (342)	2

NAILSEA AREA 2 ZONE

WATERCOURSE	LENGTH CHAINS (METRES)	KEETCH FREQUENCY TIMES/YEAR
River Kenn Railway at Midgell Farm, Chelvey to Backwell Lake. Includes two branches: land at Midgell Farm and behind stables Chelvey Court *Drains water from Nailsea and Flax Bourton areas* *Main drain*	175 (3521)	2

Details of Structures

(Where indicated, photographs of structures are included in Appendix 9)

HATCHES BOARDS AND WEIRS

NAME	GRID REF	SUMMER WL	WINTER WL	COMMENTS
BIDDLESTREET	ST 408 654			Boards Junction Biddlestreet Rhyne & Wemberham Lane Rhyne
CLEVEDON BOUNDARY (photo)	ST 433 710			Fixed boards Junction of Clevedon Boundary Rhyne and Middle Yeo
CLEVEDON DRAINAGE (photo)	ST 427 704			Fixed boards Junction of Clevedon Drainage & Yearling Ditch
CAUSEWAY (photo)	ST 478 712			Boards Tickenham Boundary Rhyne
CONGRESBURY (GATTONS) INLET (photo)	ST 406 652			Hatch Junction Wemberham Lane Rhyne & River Yeo
COOKS LANE (photo)	ST 426 705			Hatch Middle Yeo at junction with Yearling Ditch
CROSSMANS (photo)	ST 393 653			Hatch Yatton Little River

NAME	GRID REF	SUMMER WL	WINTER WL	COMMENTS
HAM BOW (photo)	ST 418 671			Hatch Yatton Little River
JACKLANDS (photo)	ST 471 716			Boards Adjacent to Land Yeo (EA). Connects to Parish Brook.
JASMINE	ST 446 668			Boards Jasmine Rhyne
LAMPLEY BOW (photo)	ST 409 669			Hatch Lampley Rhyne
MAWKINS (photo)	ST 425 683			Fixed boards Mawkins Rhyne
MEADMOOR (photo)	ST 424 673			Hatch Junction of Meadmoor Rhyne & Claverham Drove Rhyne
MENDIP VIEW (photo)	ST 382 665			Hatch Ham Rhyne
MILLEAZE (photo)	ST 379 665			Hatch Junction of Ham & Broadstone Rhynes
MOOREND SPOUT	ST 467 715			Fixed weir Junction of Parish Brook & Middle Yeo
NEW RHYNE (photo)	ST 412 665			Hatch New Rhyne
PAIGES (photo)	ST 393 652			Hatch Yatton Little River
RUST (photo)	ST 403 688			Hatch Junction Rust Rhyne and Kenn River (EA)
SPENCERS SLUICE (photo)	ST 439 691			Fixed boards Junction of Spencers Sluice Rhyne & Kenn River (EA)
THIRTEEN ACRE (photo)	ST 410 689			Hatch Thirteen Acre Rhyne adjacent to M5
TRIGGOLS CUT (photo)	ST 452 718			Hatch Adjacent to Land Yeo (EA)

NAME	GRID REF	SUMMER WL	WINTER WL	COMMENTS
WEMBERHAM LANE (photo)	ST 419 655			Hatch Biddlestreet Rhyne
YEO BANK HATCH (photo)	ST 383 660			Hatch Mill Leaze Rhyne

CULVERTS CARRYING IDB RHYNES UNDER MOTORWAY (DTR MAINTAINED)

NAME	GRID REF	COMMENTS
MILL FARM	ST 411 694	MILL FARM RHYNE (PIPE)
THIRTEEN ACRE	ST 410 691	THIRTEEN ACRE RHYNE
NAME	GRID REF	COMMENTS
RUST	ST 408 682	RUST RHYNE
LAMPLEY	ST 406 668	LAMPLEY RHYNE
CRANMOOR	ST 403 663	CRANMOOR RHYNE
CROSSMANS	ST 394 653	LITTLE RIVER BUT INCORPORATES PIPE CARRYING PAGES RHYNE

CULVERTS CARRYING IDB RHYNES UNDER RAILWAY (RAILTRACK MAINTAINED)

NAME	GRID REF	COMMENTS
ANON	ST 474 689	RIVER KENN (1st CROSSING) near YOUNGWOOD HOUSE FARM
ANON	ST 468 687	RIVER KENN (2nd CROSSING) near CHELVEY CROSS
ANON	ST 461 682	RIVER KENN (3rd CROSSING) near NAILSEA FORD
ANON	ST 455 679	RIVER KENN (4th CROSSING) near NAILSEA COURT
SPRINGWELL	ST 446 674	CLAVERHAM, SPRINGWELL RHYNE
CLAVERHAM CT	ST 445 673	CLAVERHAM, CLAVERHAM COURT RHYNE

NAME	GRID REF	COMMENTS
TANNERY	ST436 668	TANNERY DITCH
WESTMEAD	ST 431 665	YATTON, WESTMEAD RHYNE
MIDDLE	ST 430 664	YATTON, MIDDLE RHYNE
STOWEY	ST 428 663	YATTON, STOWEY RHYNE
BRANCH	ST 442 659	YATTON, BRANCH RHYNE

PRIVATE DITCHES

Responsibility for the maintenance of all watercourses in the District other than Main River (EA) or Viewed Rhyne (IDB) almost always rests with the relevant riparian owner(s). The Board has powers to serve notice on owners to maintain private ditches in a satisfactory condition.

AGREED WATER LEVEL MANAGEMENT ISSUES

The Group of Major Interests was in agreement on all the issues set out in the Summary Table of Objectives.

UNRESOLVED DIFFERENCES

The agreement noted above relates mainly to matters of principle. However during the Implementation phase it would be naive not to expect differences to arise, particularly in matters of scale, location and timing.

PROPOSED CHANGES TO WATER LEVEL MANAGEMENT

These will be developed by the GMI during the Implementation period.

MONITORING ARRANGEMENTS

Water levels in Drainage Board watercourses will continue to be checked as part of the established inspection routine. In addition reported problems are investigated on an ad hoc basis.

At present nearly all the IDB water levels are maintained to locally established datums. However as part of the Implementation process it is intended that a comprehensive gauge board network will be installed, with levels related to Ordnance Datum. The requisite levelling exercise will involve a considerable amount of survey work and it is intended to treat this as an integral part of the gauge board network improvement scheme.

Once gauge boards are available a formal monitoring scheme could be adopted.

English Nature will continue to carry out biological monitoring to assess changes (if any) to the wildlife resource, and the Board will seek input from farmers and representative organisations as to changes (if any) in the farming viability.

The Environment Agency will continue to monitor water levels and water quality at various sites throughout the area.

REVIEW ARRRANGEMENTS

This plan will be reviewed after five years, or earlier by agreement between the parties should this prove necessary in the light of changed circumstances.

APPENDIX 1 – REFERENCES & SOURCES OF INFORMATION

MAPS/DRAWINGS

M1. Somerset Local Land Drainage District Maps to accompany Land Drainage Survey Report (1 : 50 000)
Water Act 1973 Section 24 (5)

M2. Wessex Water Authority Statutory Main River Maps
Land Drainage Act 1976
1 : 25 000

M3. Somerset River Board - Register of General Liabilities

M4. Somerset River Board - Drainage Districts
Scale 6 inches to 1 mile

M5. Flood Defences Drawing Register

NA/0	North Somerset DB
NA/1	Middle Yeo Dredging Scheme
K/1	Sea Walls - New Blind Yeo Stage 2
1100/3	New Blind Yeo Outfall
113/	Black Ditch
116/	River Kenn
117/	Land Yeo
119/	Yearling Ditch
121/	Clevedon Boundary Rhyne & Tickenham Boundary Rhyne
165/0	New Blind Yeo
165/1	New Blind Yeo, Stage 2

DATABASES/REGISTERS ETC

D1. Somerset Area Water Level Specification for Main River Control Structures
National Rivers Authority (NRA). Revision 009 (02 March 1993).

D2. National Rivers Authority Register of Main Rivers for North Wessex
inc. listing by Catchment, Schedule of Main Rivers and River Map Index - July 1993.

D3. NRA (North Wessex Region) Gauge Board Database
Revision 003 (24 February 1993).

D4 Environment Agency, North Wessex (Somerset Area)
Weedcutting & Flail Service Level Agreement (Revision 4 - January 1998)

D5. Environment Agency Somerset Area Operations - Telemetry Alarm Responses
Blind Yeo Sluice - Revision 004 (15 December 1997)

D6. NRA Somerset Local Flood Procedures (Avon Catchment)
Version SA2 (Blind Yeo, Land Yeo, Kenn & Channels), October 1994

D7. Somerset River Authority - Schedule of Sluices, Flaps and Clyces owned by the Authority. Sheet 4 - Northern District, March 1973 (File LD/230/1).

REPORTS

R1 Flood Defence Asset Survey (Somerset)
Volume 3, Catchment 23, North Somerset Rivers
Currie & Brown (March 1998)

R2 Weirs, Sluices & Hatches Survey of Fluvial Main River (Somerset) -
River Kenn (Feb 1992), Land Yeo (Jan 1992) - Environment Agency.

R3 Local Environment Agency Plan (LEAP) - North Somerset Rivers
Consultation Report (December 1997) - Environment Agency.

R4 An Outline of the River Kenn Scheme
E. L Kelting (Somerset River Board) - May 1953.

R5 Technical report on the effect of M5 Motorway on the draining of the Land Yeo, Blind Yeo Basin. April 1968
E. L. Kelting (Somerset River Authority) and C H Dobbie & Partners.

R6 Blind Yeo Sluice - Report on Inspection of South Eye
J. Barlow (Mechanical & Electrical Engineer, Environment Agency) - 28 Dec 1995.

OTHER (all at Agency)

O1. Gauge Board Readings (Avon area)

O2. Catchment Boxes - Land Yeo/Kenn (1 No.)

O3. Telemetry SCOPE & Screen Dumps (Archive)
For Blind Yeo Sluice

O4. Telemetry Working File
For Blind Yeo Sluice

O5. Enforcement Database - Public Register Maps (Abstraction Licence)

O6. Photographs - Blind Yeo, Land Yeo & River Kenn (1 No. file)
Environment Agency (various dates)

FILES (all at Agency)

F1.	General	
	200/34	Water Level Management Plans - General
	205/14/1	North Somerset DB
F2.	Main River	
	210/9	Black Ditch
	210/10	Blind Yeo
	210/19	Clevedon Boundary Rhyne (CBR)
	210/41	Kenn River
	210/45	Land Yeo
	210/77	Tickenham Boundary Rhyne (TBR)
	210/93	Yearling Ditch
F3.	Structures	
	230/1	General
	230/4	Blind Yeo Outfall
	230/5	Cook's Clyse
	230/13	Land Yeo Outfall
F4.	Moors & Levels	
	400/12/1	Water Level Management Plans - General
	405/13/0	North Somerset DB - General
	405/13/1	North Somerset DB - Water Level Management Plan
	405/13/2	North Somerset DB - Raised Water Level Areas

GENERAL INTEREST

G1. Water Level Management Plans - A procedural guide for operating authorities
Ministry of Agriculture, Fisheries and Food - June 1994.

G2. The Draining of the Somerset Levels - Cambridge University Press
Michael Williams (1970)

G3. National Rivers Authority, Somerset Levels & Moors Water Level Management & Nature Conservation Strategy - 1991
NB. Strategy Review Consultation Report, January 1997, Environment Agency.

G4. Safeguarding the Somerset Levels and Moors (Environment Agency leaflet)

G5. The Somerset River Board/Authority Annual Reports (& Abstract of Accounts)
SRB 15 No. 1950 - 1965 :
SRA 9 No. 1st April 1965 to 31st March 1974.

G6. Aquatic Weed Control , Best Practice Guidelines -
Environment Agency / Centre for Aquatic Plant Management.

G7. The Wet Grassland Guide -
Managing Floodplain and Coastal Wet Grasslands for Wildlife.
Royal Society for the Protection of Birds. 1997

G8. Planning Policy Guidance Note 25: Development & Flood Risk. DTLR July 2001.

APPENDIX 2 – NORTH SOMERSET INTERNAL DRAINAGE BOARD

Officials

Chairman	Mr Bernard Gray
Vice Chairman	Mr T Bush
Clerk	Mrs Gill Harris
Viewer	Mr David Crossman
Consultant Engineer	Mr Dan Alsop CEng

Water Level Management Plan Sub-Committee

Mr Bernard Gray (Chairman)
Mr R Triggol
Mr T Bush
Cllr Mrs I Cummings
Mr D Crossman
Mrs G Harris

North Somerset Water Level Management Group of Major Interests

Drainage Board:	Mr Bernard Gray, Mrs Gill Harris, Mr David Crossman Cllr Mrs I Cummings, Mr Dan Alsop
English Nature:	Ms Karen Pollock
Environment Agency:	Mr Simon Foyle, Miss Emma Baker, Mr Ed Davies
North Somerset Council:	Mr Noel Edwards
Avon Wildlife Trust:	Ms Elaine Weller

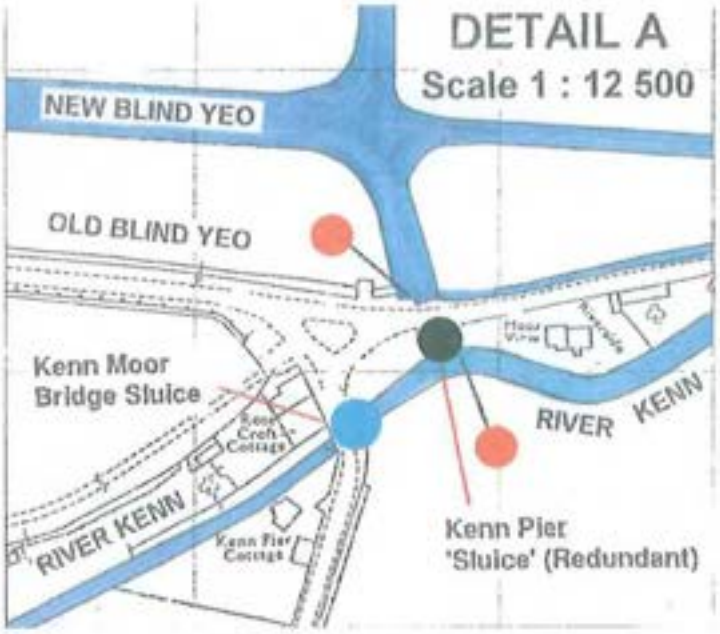
Statistics

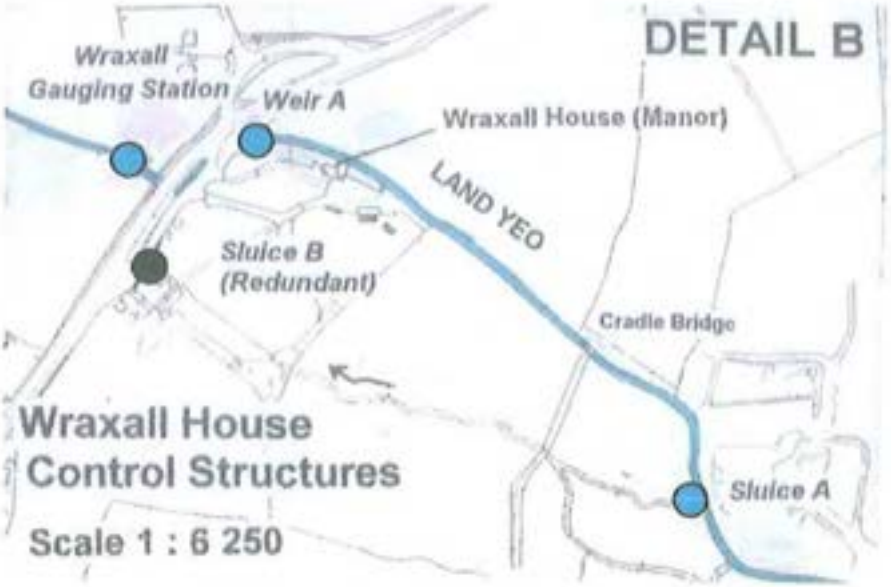
Area of Drainage District	4856 hectares
Catchment area	10132 hectares
Area of rated agricultural land	3204 hectares
Number of agricultural assessments	218
Proportion of income raised by special levy	87.5%
Number of SSSIs in District	3
Length of viewed rhyne	81595 metres (51 miles)
Mean annual rainfall for the catchment	1093mm (43")

APPENDIX 3 - MAPS

MAP 1	1:50 000 Location Map & Key to 1:10 000 Detail Plans
MAP 2	General details Sheet 1 of 2 – 1:25 000
MAP 3	General details Sheet 2 of 2 – 1:25 000
MAP 4	Watercourse Details Sheet 1 of 9 – 1:10 000
MAP 5	Watercourse Details Sheet 2 of 9 – 1:10 000
MAP 6	Watercourse Details Sheet 3 of 9 – 1:10 000
MAP 7	Watercourse Details Sheet 4 of 9 – 1:10 000
MAP 8	Watercourse Details Sheet 5 of 9 – 1:10 000
MAP 9	Watercourse Details Sheet 6 of 9 – 1:10 000
MAP 10	Watercourse Details Sheet 7 of 9 – 1:10 000
MAP 11	Watercourse Details Sheet 8 of 9 – 1:10 000
MAP 12	Watercourse Details Sheet 9 of 9 – 1: 10 000

DETAILS A, B & C


DETAIL A
Scale 1 : 12 500
NEW BLIND YEO
OLD BLIND YEO
Kenn Moor
Bridge Sluice
RIVER KENN
RIVER KENN
Kenn Pier
'Sluice' (Redundant)


DETAIL B
Wraxall
Gauging Station
Weir A
Wraxall House (Manor)
LAND YEO
Sluice B
(Redundant)
Cradle Bridge
Sluice A
Wraxall House
Control Structures
Scale 1 : 6 250


DETAIL C
Water Wheel
(Intake Sluice)
S4
(Overflow Weir)
S3
Watercress Farm
(Weir & Sluice)
S2
LAND YEO
(Penning Boards & Weir)
S1
Watercress Farm Control Structures
Scale 1 : 12 500

SEVERN ESTUARY SSI

(RAMSAR SITE AND SPA)

TICKENHAM NAILSEA AND KENN MOORS SSI

BIDDLE STREET SSI

CLEVEDON

CLEVEDON CP

KINGSTON SEYMOUR CP

KENN CP

YATTON CP

WICK ST LAWRENCE CP

PUXTON

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River
- Site of Specific Scientific Interest (SSSI)
- County Site of Nature Conservation Interest (CSNCI)
- Scheduled Ancient Monument
- Motorway Drainage Outfall
- GPSS Oil Pipeline
- Transco Gas Pipeline

MAP 2

GENERAL DETAILS SHEET 1 OF 2

SCALE 1:25 000

TICKENHAM NAILSEA AND KENN MOORS SSSI

NORTH SOMERSET

TICKENHAM CP

NAILSEA

WRAXALL AND F

BROCKLEY CP

BACKWELL CP

CLEEVE CP

YATTON CP

Tickenham Moor

Nailsea Moor

Kenn Moor

Wraxall

Backwell

Downside

Cleeve

Claverham

Yatton

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River
- Site of Specific Scientific Interest (SSSI)
- County Site of Nature Conservation Interest (CSNCI)
- Scheduled Ancient Monument
- Motorway Drainage Outfall
- GPSS Oil Pipeline
- Transco Gas Pipeline

MAP 3

GENERAL DETAILS SHEET 2 OF 2

SCALE 1 : 25 000

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Drainage
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Motorway Drainage Outfall
- Summer Feed

COLERIDGE VALE

LAND YEO

East Clevedon

CLEVEDON

TRIANGLE

MOTORWAY DRAINAGE OUTFALLS

COOKS CLYSE

MIDDLE YEO

COOKS LANE

HATCH

YEARLING DITCH

LAND YEO OUTFALL

BLIND YEO OUTFALL

STRODE RD

STRODE RD BRIDGE

WEIR Q

WEIR R

WEIR P

NEW BLIND YEO

KENN MOOR BRIDGE SLUICE

DOWLAIS DITCH

LOWER STRODE ROAD

MILL FARM DITCH

KENN RIVER

MAP 4

WATERCOURSE DETAILS
SHEET 1 OF 9

SCALE 1: 10 000

MAP 5

WATERCOURSE DETAILS
SHEET 2 OF 9

SCALE 1: 10 000

TICKENHAM CP

MOOREND SPOUT WEIR

VALVE

Tickenham

TICKENHAM MILL

LAND YEO

MIDDLE YEO

TRIGGOLS CUT

CAUSEWAY BOARDS

TICKENHAM BOUNDARY RHYNE

PARISH BROOK

CAUSEWAY BRIDGE

NAILSEA STORWATER DISCHARGE

Tickenham Moor

Nailsea Moor

COOKS CLYSE

COOKS LANE

CLEVEDON

DRAINAGE

YEARLING DITCH

CLEVEDON BOUNDARY RHYNE

See Detail A

Clevedon Moor

BLIND YEO

BLACK DITCH SLUICE

BLACK DITCH

RIVER KENN

TEN FEET RHYNE

BROADMEAD

NAILSEA

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Drainage
- Summer Feed
- Motorway Drainage Outfall

MAP 6

WATERCOURSE DETAILS
SHEET 3 OF 9

SCALE 1: 10 000

See Detail B

See Detail C

MOOREND SPOUT

JACKLANDS BRIDGE

LAND YEO

JACKLANDS HATCH

KENN RIVER

BACKWELL LAKE (STORMWATER STORAGE)

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Drainage
- Summer Feed
- Motorway Drainage Outfall

MAP 7

WATERCOURSE DETAILS
SHEET 4 OF 9

SCALE 1: 10 000

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Drainage
- Summer Feed
- Motorway Drainage Outfall

KENN OUTFALL FLAP

TREBLEHOUSE SLUICE

KENN OUTFALL SLUICE

RIVER KENN

RUST HATCH

THIRTEEN ACRE HATCH

RUST RHYNE

BROADSTONE RHYNE

MIDDLE LANE RHYNE

HAM RHYNE

LAMPLEY HATCH

Main High Water

Main Low Water

Kingston

Hook's Ear

Treble House Farm

Sea Wall Farm

Riverside Farm

Poplar Farm

Broadstone Farm

Middle Lane Farm

Laurel Farm

Rookery Farm

Bullock Farm

Elmleigh Farm

Wharf Farm

Lower Farm

Hayes Farm

Dowlais Farm

Dorset Farm

Dowlais Cottage Farm

Southfield Farm

Mill Farm

Sewage Works

Nursery

Greyfriars

New House Farm

Ham Farm

Broadstone Cleve

Corner Paddocks

Hellars

Camping Site

Bridge

The Orchards

Drains

Track

Culvert

Sluice

Subway

Hall

PW

CG

Kingford Drain

Laurel Farm Drain

Broadstone Rhyne

Lamplay Rhyne

Lamplay Bow

Lampl Farm

+3m

+5m

+6m

+7m

+8m

+9m

+10m

85

MAP 8

WATERCOURSE DETAILS
SHEET 5 OF 9

SCALE 1: 10 000

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Drainage
- Summer Feed
- Motorway Drainage Outfall

KENN RIVER
BLACK DITCH SLUICE
KENN STREET RHYNE
SPENCERS SLUICE RHYNE
SPENCERS SLUICE
EASTERN DRAINAGE
Kenn Moor
MAWKINS BRIDGE HATCH
MAWKINS RHYNE
BLACK DITCH ROAD BRIDGE
KENN MOOR GAUGING STATION
THIRTEEN ACRE RHYNE
TYNEVER GOUT RHYNE
MEADMOOR RHYNE
SAYS RHYNE
LITTLE RIVER
MEADOW MOOR HATCH
HAM BOW HATCH
CLAVERHAM DROVE RHYNE
TANNERY DITCH
SPRINGWELL
CLAVERHAM COURT RHYNE
JASMINE RHYNE
JASMINE RHYNE HATCH
North End
STOWEY RHYNE
MIDDLE RHYNE
WESTMEAD RHYNE

BACKWELL LAKE (STORMWATER STORAGE)

NAILSEA CP

KENN RIVER

KENN RIVER

KENN RIVER

GROVE FARM DITCH
WESSEX WATER MAINTAINED EVERY 5th YEAR

MAP 9

WATERCOURSE DETAILS SHEET 6 OF 9

SCALE 1: 10 000

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Drainage
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Motorway Drainage Outfall
- Summer Feed

KINGSTON SEYMOUR CP

MIDDLE LANE RHYNE

BROADSTONE RHYNE

LAMPLEY RHYNE

MENDIP VIEW HATCH

MILLEAZE HATCH

HAM RHYNE

MILL LEAZE RHYNE

CRANMORE RHYNE

MILLEAZE CLYSE

YEO BANK HATCH

PAIGES

CROSSMAN HATCH

YATTON LITTLE RIVER

WEMBERHAM LANE RHYNE

BIDDLE STREET BOARDS

TUTSHILL OUTLET

LITTLE RIVER OUTLET

PAIGES HATCH

CONGRESBURY INLET

Kingston Seymour

Broadstone Farm
Wharf Farm
Ham Farm
New House Farm
Rose Cottage
Gout Farm
Moorside Farm
Fairfield Farm
Hope Farm
Yewtree Farm
Bilmon's Farm
Cherry Tree Farm
Laurel Farm
Rockery Farm
Greyfriars
Yeo Bank Farm
Milltop View Farm
Yeo Bank Farms
Roman Villa (site of)

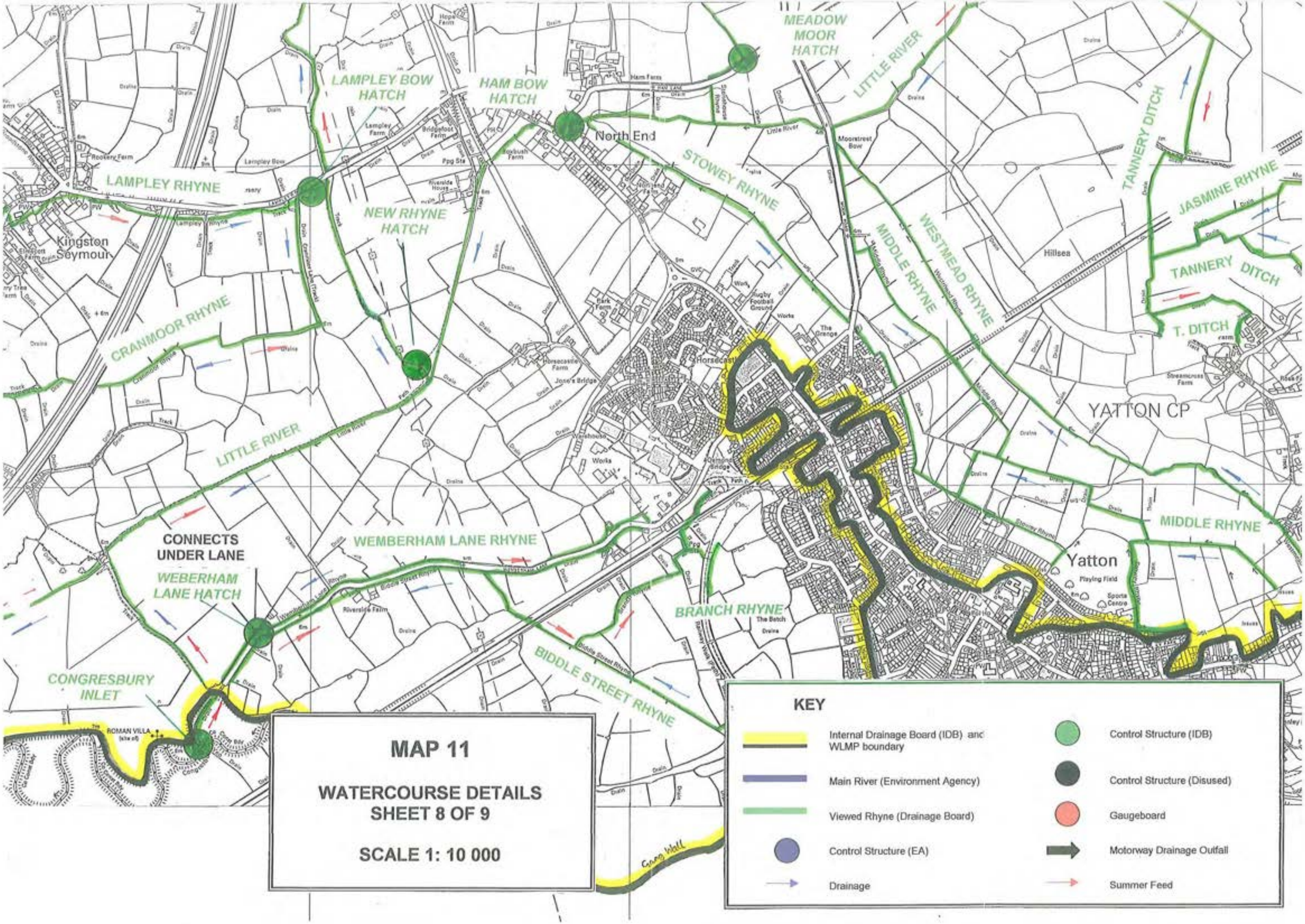
KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Drainage
- Summer Feed
- Motorway Drainage Outfall

MAP 10

WATERCOURSE DETAILS SHEET 7 OF 9

SCALE 1: 10 000



MAP 11

WATERCOURSE DETAILS SHEET 8 OF 9

SCALE 1: 10 000

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Drainage
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Motorway Drainage Outfall
- Summer Feed

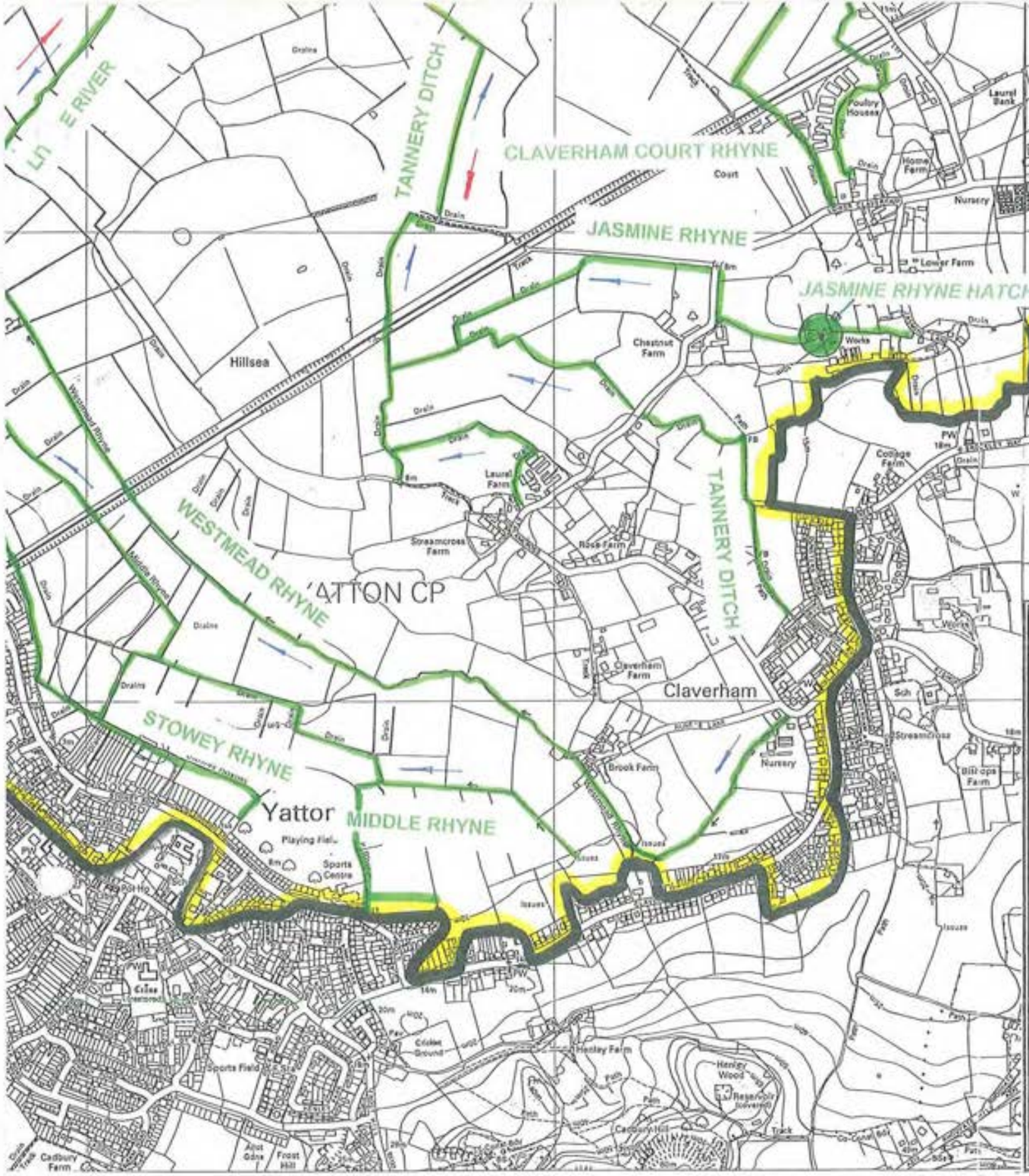
MAP 12

WATERCOURSE DETAILS
SHEET 9 OF 9

SCALE 1: 10 000

KEY

- Internal Drainage Board (IDB) and WLMP boundary
- Main River (Environment Agency)
- Viewed Rhyne (Drainage Board)
- Control Structure (EA)
- Control Structure (IDB)
- Control Structure (Disused)
- Gaugeboard
- Drainage
- Summer Feed
- Motorway Drainage Outfall



APPENDIX 4 –NATURE CONSERVATION

Designated Sites
Verbatim Responses from Consultees
Citation Documents for SSSIs

Designated Sites

The conservation sites in the Plan Area are indicated on Maps 2 and 3 and fall into one or more of the following designations.

County Wildlife Sites
Local Nature Reserves
Ramsar Sites
Sites of Special Scientific Interest
Special Protection Areas
Sites of Special Scientific Interest

Verbatim Responses from Consultees

English Nature
The Wildlife Trust (Formerly Avon Wildlife Trust)

ENGLISH NATURE

Somerset Team
Roughmoor
Bishop's Hull, Taunton, Somerset TA1 5AA
Telephone (01823) 283211 Fax (01823) 272978

Mrs G Harris
Clerk to North Somerset IDB
Mendip View Farm
KINGSTON SEYMOUR
North Somerset
BS21 6XH

BG/CVS

24 March 1999

Dear Gill

North Somerset IDB - Water Level Management Plan

Thank you for consulting English Nature on the above water level management plan.

English Nature fully supports the development of such a plan and we look forward to working with you to secure the maintenance and enhancement of the area's considerable wildlife interest. Please accept the following initial comments:

1. The plan area contains the Biddle Street, Yatton Site of Special Scientific Interest and the Tickenham, Nailsea and Kenn Moors Site of Special Scientific Interest (I enclose maps and citation sheets). These Sites of Special Scientific Interest support aquatic plant communities of great nature conservation interest, together with a diverse invertebrate fauna. It is of critical importance to the continuation of this conservation resource that the water regime, water quality and vegetation are appropriately managed.

   In pursuit of this English Nature have put into effect a Wildlife Enhancement Scheme (WES) which encourages farmers to adopt appropriate management practices. I enclose an information sheet on this which outlines the interest of the 'Avon' Levels and the objectives and management guidelines for the scheme. I am hopeful that your Drainage Board will be supportive of such a scheme within your area and am aware that your board have ben supportive of such nature conservation measures in the past.

2. In addition the Severn Estuary Site of Special Scientific Interest lies adjacent to the Water Level Management Plan area (I enclose a citation sheet and map for this site). Indeed some of the fields within the SSSI also appear to be within the Plan area. The Severn Estuary has also been designated a Special Protection Area and Ramsar site. This indicates that it is of European and international interest for birds and as a wetland (further details on this are enclosed, including a map).

100%

3. Over and above the minimum requirements for the maintenance of the existing nature conservation interest English Nature supports further measures to enhance the interest of the area. Some suggestions have been outlined by the Wildlife Trust in their response and English Nature fully supports this positive approach. We are hopeful that you can adopt some elements of these proposals within the Water Level Management Plan for this area.

English Nature looks forward to entering into a positive dialogue with the Board over the above matters. Should you wish to discuss any of the above please do not hesitate to contact me.

Yours sincerely

[redacted]

Basil Greenwood
Conservation Officer

Encs

Wildlife *enhancement* scheme

North Somerset Levels and Moors

Why are the North Somerset Levels and Moors important for nature conservation?

The traditional farming practices of this area encouraged the development of a network of ditches and rhynes. The ditches support a wide range of plants including Britain's smallest flowering plant, the rootless duckweed and greater bladderwort, one of Britain's few carnivorous plants.

The watercourses also contain many beetles, snails, dragonflies and damselflies. Over 50 species of water beetle have been found, including the great silver water beetle, Britain's largest beetle. The wide variety of dragonflies and damselflies includes two nationally rare species - the hairy dragonfly and the variable damselfly.

Sympathetic management of the watercourses is needed to ensure that conditions remain suitable for this wildlife. English Nature's Wildlife Enhancement Scheme aims to help farmers maintain or restore the management on which this wildlife depends.

Objectives of the Wildlife Enhancement Scheme for the North Somerset Levels and Moors

- Encourage the ditches to be managed so that a variety of wildlife habitats are established from open water through to overgrown ditches.
- Encourage the sympathetic management of bankside vegetation of all watercourses to sustain a range of wildlife.
- Help to maintain the water quality in the ditches and rhynes.

The management required under this scheme only applies to the land and ditches within or adjacent to the following Sites of Special Scientific Interest: Biddle Street (Yatton), Tickenham, Nailsea and Kenn Moors, and Puxton Moor.

ENGLISH NATURE

Wildlife *enhancement* scheme



Ditch management

Agree with English Nature:

- A programme of ditch management for ditches under your control.
- Water levels where the water level management lies within your control.

Buffer zone management

Manage a 6 metre (20 feet) wide strip as a buffer zone adjacent to the ditches as follows:

- Do not plough, level, reseed, or carry out any cultivations.
- Do not apply fertilisers, pesticides, herbicides, slurry, or farmyard manure. If noxious weeds are a problem within the buffer zone, advice on their control and management must be sought from English Nature.
- Any hay or silage crop must be taken after 1 July.
- Do not fence the watercourses, except where land is grazed by sheep.
- Graze with sheep, cattle or horses.
- Allow access at all reasonable times to English Nature staff.

Annual management payments

	Buffer zone on one side of ditch/rhyne only	**Buffer zone on both sides of ditch/rhyne**
Ditch within your management control	£30 per 100 metres	£50 per 100 metres
Ditch/rhyne outside your management control	£20 per 100 metres	£40 per 100 metres

Works payments

Standard payments are available for capital works that will either enable the management above to be carried out or increase the wildlife interest of the land. These are:

• Removal of existing fences	£1 per metre
• Ditch reinstatement	£2 per metre
• Creation of berms (shelves)	£1.50 per metre
• Scrub removal (along ditches)	£2 per metre
• Provision of timber sluices	£150 each
• Provision of drinking points	£40 each
• Re-pollarding of existing trees	£25 each
• Provision of brick, stone or concrete sluices	£400 each

Special Projects

If you have any ideas for further works or management operations to promote the objectives of this Scheme, please discuss them with English Nature as payments may be available to support the extra work. For example, special projects could include additional management or works to encourage otters, water voles, barn owls or breeding waders.

For further information, please contact Stephen Parker or Basil Greenwood at

c/o Avon Wildlife Trust
32 Jacobs Wells Road
Bristol BS8 1DR
Tel 0117 917 7278
Fax 0117 929 7273
e-mail nslmp@avonwildlifetrust.org.uk
www.avonwildlifetrust.org.uk

North Somerset and Moors Levels Project

Ref: WLMP\NSIDB\letter1.doc

12th July 2002

Gill Harris
Clerk to the Board
North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
North Somerset
BS21 6XH

Dear Gill

North Somerset Internal Water Level Management Plan

Thank you for your phone call to Tim McGrath last week and I apologise for the inconvenience that the lateness of the Trusts response may have caused.

I can confirm that the Trust has had an opportunity to look at the plan and the revisions following the Liaison Group meeting in November 2000. The Trust has no formal response to this and looks forward to working in partnership with the Board in safeguarding the unique wildlife interest of this area.

Yours sincerely

[redacted]

Elaine Weller
North Somerset Levels and Moor Biodiversity Officer

Limited Company No. 1495109. Registered in England and Wales. Registered Office: 17 Rodney Place, Clifton, Bristol BS8 4HR. VAT Registration No. 527 5214 19

The Wildlife Trust
32 Jacobs Wells Road
Bristol BS8 1DR
Tel 0117 926 8018/926 5490
Fax 0117 929 7273

e-mail avonwt@cix.compulink.co.uk

Ref: NSLP\WLMP\NSIDB.let

3rd June 1998

Mrs G Harris
Clerk to North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
North Somerset
BS21 6XH

Dear Gill

North Somerset Internal Drainage Board - Water Level Management Plan

Thank you for inviting the Avon Wildlife Trust to comment on the consultation stage of the North Somerset IDB Water Level Management Plan (WLMP). I must apologise for the extreme delay in replying and I hope that this has not caused too much inconvenience.

The following comments from the Trust are common for all WLMP's that have been drawn up across the area of North Somerset. This response contains ideal management prescriptions that will directly benefit the nature conservation interest of this inherently wetland area.

It must however be stated that the Trust is aware that a number of these operations are being currently undertaken by the Board and that the Board should be commended for already implementing such positive management in line with their duties.

It would be of extreme interest to the Trust to enter into positive dialogue with the North Somerset Internal Drainage Board and look for further opportunities to enhance the nature conservation values of the catchment and would welcome invitation onto the 'Group of Major Interests' which could look for ways to take this management further.

Yours sincerely

[redacted]

Tim McGrath
North Somerset Levels and Moors Officer

cc A Baines, Environment Agency
B Greenwood, English Nature
M Oxford, North Somerset Council

Avon Wildlife Trust operates under the name The Wildlife Trust.
Limited Company No. 1495108 Registered in England and Wales Registered Office 17 Berkeley Square, Clifton, Bristol BS8 1HB Registered Charity No. 280422 VAT Registration No. 567 5614 10

Water Level Management Plan - North Somerset Internal Drainage Board Area

With reference to the above Water Level Management Plan, the Avon Wildlife Trust believes that the following points should be considered if further nature conservation enhancement of the catchment is to take place:

1. The North Somerset Levels and Moors is a very historic landscape with many features of ecological and archaeological interest. Further to this it must be emphasised that this habitat (lowland floodplain grassland) is of both national and international importance. With respect to this we urge the Board to give a ***full and comprehensive statement*** **on how it undertakes its duties that enhance the areas nature conservation value.**

2. Whilst it is understood that this catchment contains part of the Biddle Street Triangle and all of Tickenham Nailsea and Kenn Sites of Special Scientific Interest (SSSI) together with part of the Severn Estuary SSSI/Special Protection Area, protection and necessary enhancement to the other sites of wildlife interest (eg Sites of Nature Conservation Interest - SNCI's) should also be considered in line with the Board's statutory duty to further and enhance nature conservation. Hence any opportunity to further the conservation value of such locally, regionally and nationally important sites should be pursued, and the compilation of this WLMP gives an excellent opportunity to further this interest whilst *balancing* it with the need for agriculture and flood defence.

3. The nature conservation interest value of all of the SSSI's within the Boards catchment must be maintained and if necessary, appropriate management employed to enhance these features of interest. Necessary consultation with English Nature must be undertaken with regard to any management that may directly or indirectly effect the ecological balance of these sites. The Wildlife Trust will support comments made by English Nature that ensure full protection of these nationally recognised sites.

4. The management of all SNCI's as identified in Policy NE/4 of the Woodspring Local Plan (Deposit Version 1994) should be carried out in a way that is beneficial to their ecological interest. The opportunity for enhancement of these sites should be explored and considered during the compilation of the plan. The importance of these sites and SSSI's as ecological reservoirs cannot be emphasised too greatly as they give an opportunity for flora and fauna to recolonise areas where such biodiversity is currently poor through lack of, or intensive management.

5. Rhyne and ditch bed exposure should be avoided during the winter months. The damaging effect of this on the nature conservation value of the watercourse is well documented and methods for enhancement are being investigated by the Environment Agency elsewhere within the region. In order to maintain and enhance the nature conservation interest, it is fundamental to retain a depth of water within the ditches of the SSSI. Similar opportunities within the catchments of the SNCI's should also be investigated.

6. The take up of grant-aid to achieve further wildlife enhancement aims should be encouraged. For example, where necessary 'buffer-zones' or field headlands could be incorporated into agricultural management. On permanent pasture and arable land such areas have great benefit to wildlife conservation/enhancement and can reduce the need for regular rhyne management by removing chemicals and silt from ground and surface water before entering the channel, hence preventing hypertrophication. The planting of native trees and shrubs in small copses, the planting of native willows adjacent to rhyne banks and the construction of log pile otter holts from repollarded trees should be encouraged where it does not conflict with current wildlife value or existing management access.

Opportunities for raised water level management within isolated hydrological units could also be considered during this process where it does not conflict with adjacent land management.

7. Whilst understanding that flood defence measures need to be considered, it has been shown elsewhere that simple management such as that outlined below allows wildlife enhancement to occur whilst not compromising the conveyance of the channel. As such, the current aquatic and bank-side vegetation management regimes for the catchment could be assessed to determine whether there could be a greater wildlife conservation benefit, possibly resulting in reducing hypertrophication and the need for regular management. It would be admirable if the Board undertook an obligation to investigate such opportunities within its management area. For instance,

a) opportunities for conservation enhancement could be considered when cutting and/or desilting/dredging. Also the presence of regionally or nationally rare flora or fauna must favour management prescriptions that are sympathetic to their needs. The opportunity for leaving 'refuges' from where species can recolonise other areas should also be considered.

b) With the permission of the riparian owner the creation of 'submerged berms' and of 'pools' within the rhyne bed could also be considered, the former having the advantage of increasing conveyance during flood conditions and enabling the opportunity for increasing rhyne water-levels.

c) the timing, frequency and pattern of existing bank cutting operations should be reviewed to assess its nature conservation benefit. For example strips adjacent to the water level could be left uncut for one or two years, being managed on rotation providing some vegetation cover.

Whilst acknowledging the national significance of the SPA, SSSI's and adjacent rhynes of Site of Nature Conservation Interest value, it is critical that opportunity for enhancing the nature conservation value of the rest of the catchment is actively sought. As a result the Wildlife Trust recognises that there is exceptional potential to work in together in partnership with the North Somerset Internal Drainage Board and other interested parties to make a positive contribution towards enhancing and sustaining the nature conservation interest of the catchment. The Trust would therefore welcome the opportunity to discuss this potential further.

Citation Documents for SSSIs

Copies of the citations for the following SSSIs in the District are reproduced hereunder.

Tickenham, Nailsea and Kenn Moors - Avon
Biddle Street, Yatton
Severn Estuary (including SPA and RAMSAR citations)

Site Notified to the Secretary of State on 24 March 1995

CITATION SHEET

COUNTY: AVON

SITE NAME: TICKENHAM, NAILSEA AND KENN MOORS

DISTRICT: WOODSPRING

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

Local Planning Authority: AVON COUNTY COUNCIL, WOODSPRING DISTRICT COUNCIL

National Grid Reference: ST 440700 Area: 129.4 (ha) 319.7 (ac)

Ordnance Survey Sheet 1:50,000: 172 1:10,000: ST 46 NW/ST 47 SW

Date Notified (Under 1949 Act): - Date of Last Revision: -

Date Notified (Under 1981 Act): 1995 Date of Last Revision: -

Other Information: A new site

Description and Reasons for Notification:

Tickenham, Nailsea and Kenn Moors form part of the Avon Levels and Moors, an extensive area of low-lying agricultural land situated to the north of the Mendip Hills. The soils of the area vary considerably. In the west clays of the Allerton and Wentloog Series occur, whereas to the east peat soils of the Sedgemoor and Godney Series predominate. The peat soils, however, are very shallow and in some areas have become mixed with underlying clays largely as a consequence of past cultivation.

The Moors are drained by a network of large rhynes and smaller field ditches. These act as wet fences and are important for watering the livestock, largely cattle, which graze the area during the summer months.

The variety of soil types, together with the past and present management practices, has resulted in a wide range of rhyne and ditch types.

Many of the Internal Drainage Board maintained and regularly managed field ditches support exceptionally rich plant communities. Open water species include Common and Thread-leaved water-crowfoot (*Ranunculus aquatilis* and *R. trichophyllus*), Frogbit (*Hydrocharis morsus-ranae*), Horned Pondweed (*Zannichellia palustris*), Unbranched Bur-reed (*Sparganium emersum*) and Small Pondweed (*Potamogeton berchtoldii*). Locally uncommon species, such as Water-violet (*Hottonia palustris*), Greater Bladderwort (*Utricularia vulgaris*) and the liverwort (*Riccia fluitans*) are frequent and the nationally scarce Hairlike and Fen Pondweeds (*Potamogeton trichoides* and *P. coloratus*) and Whorled Water-milfoil (*Myriophyllum verticillatum*) also occur.

Many emergent species are also present and Branched Bur-reed (*Sparganium erectum*), Water Dock (*Rumex hydrolapthum*), Tubular Water-dropwort (*Oenanthe fistulosa*), Arrowhead (*Sagittaria sagittifolia*) are all common and the prominent Flowering rush (*Butomus umbellatus*) is also present. In some places Sea Club-rush (*Scirpus maritimus*) and Grey Club-rush (*Schoenoplectus tabernaemontani*) also occur and this may indicate a residual brackish influence from past inundation by the sea.

Some of the less frequently dredged field ditches are dominated by a single emergent species and Reed Sweet-grass (*Glyceria maxima*) and Common Reed (*Phragmites australis*) both form extensive stands.

Many of the ditch and rhyne banks also support a rich bank flora with Ragged Robin (*Lychinis flos-cuculi*), Brookweed (*Samolus valerandi*), Creeping-Jenny (*Lysimachia nummularia*), Skullcap (*Scutellaria galericulata*) and Blunt-flowered Rush (*Juncus subnodulosus*) all being present.

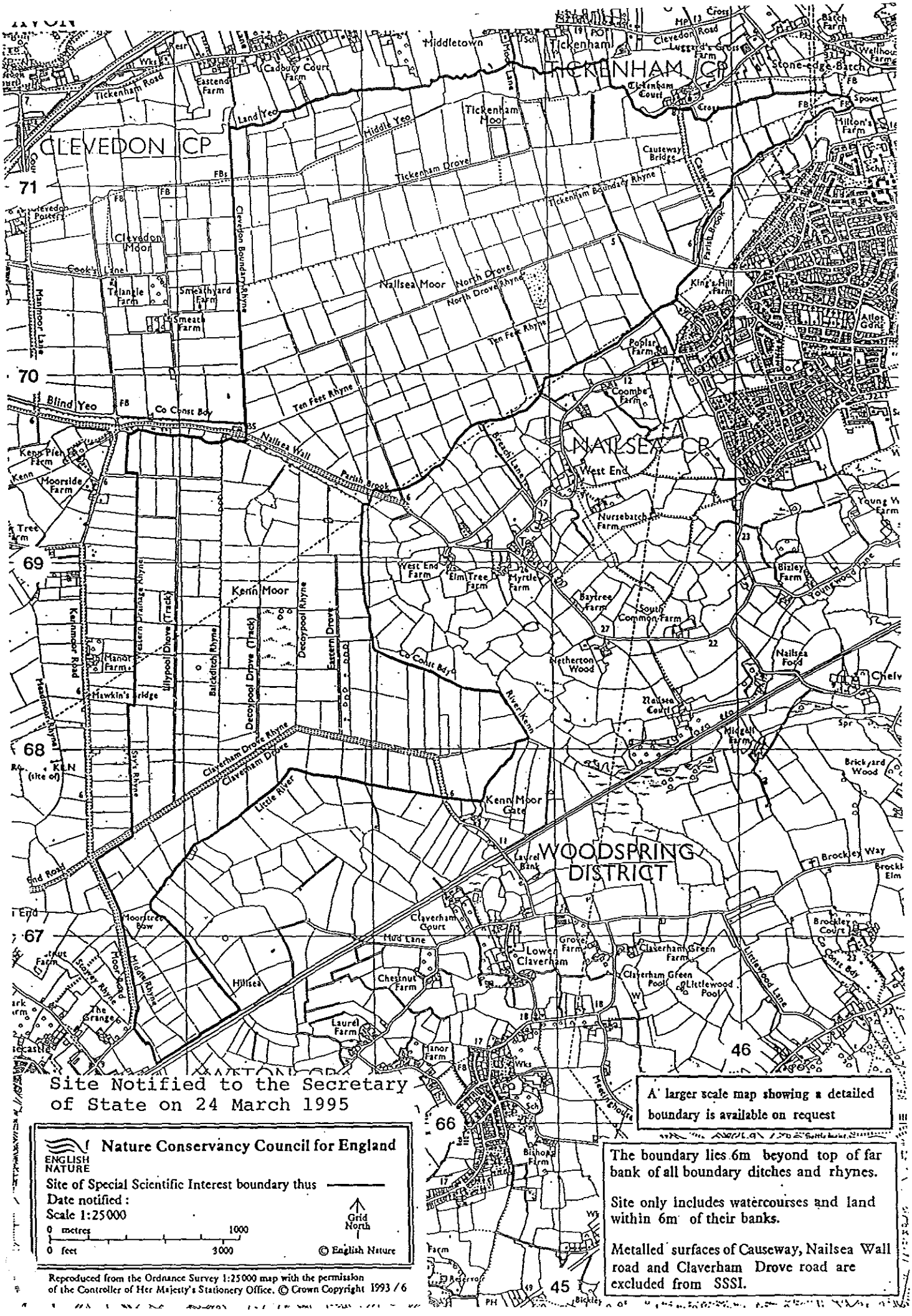
Associated with these rich plant communities is an equally diverse invertebrate fauna, and the rhynes and ditches are known to support large numbers of aquatic Coleoptera, Molluscs and Odonata.

Exceptional populations of Coleoptera occur with at least 12 nationally scarce species and two nationally rare (RDB3*) species. These include Britain's largest water beetle the Great Silver Water Beetle (*Hydrophilus piceus*) a species largely confined to the grazing marshes of southern England.

Good populations of Odonata also occur and the nationally scarce Hairy Dragonfly (*Brachytron pratense*) and Variable Damselfly (*Coenagrion pulchellum*) both breed on the Moors.

ess conspicuous invertebrates are also well represented. To date over thirty species of Molluscs have been recorded, including the nationally rare (RDB3) pea mussel, *Pisidium pseudosphaerium*. The nationally scarce soldier fly, *Odontomyia ornata*, has also been recorded from a number of ditches.

*RDB3: species listed as RARE in British Red Data Book 2 (Insects).



Site Notified to the Secretary of State on 24 March 1995

Nature Conservancy Council for England

ENGLISH NATURE

Site of Special Scientific Interest boundary thus ——

Date notified :

Scale 1:25000

0 metres 1000

0 feet 3000

Grid North

© English Nature

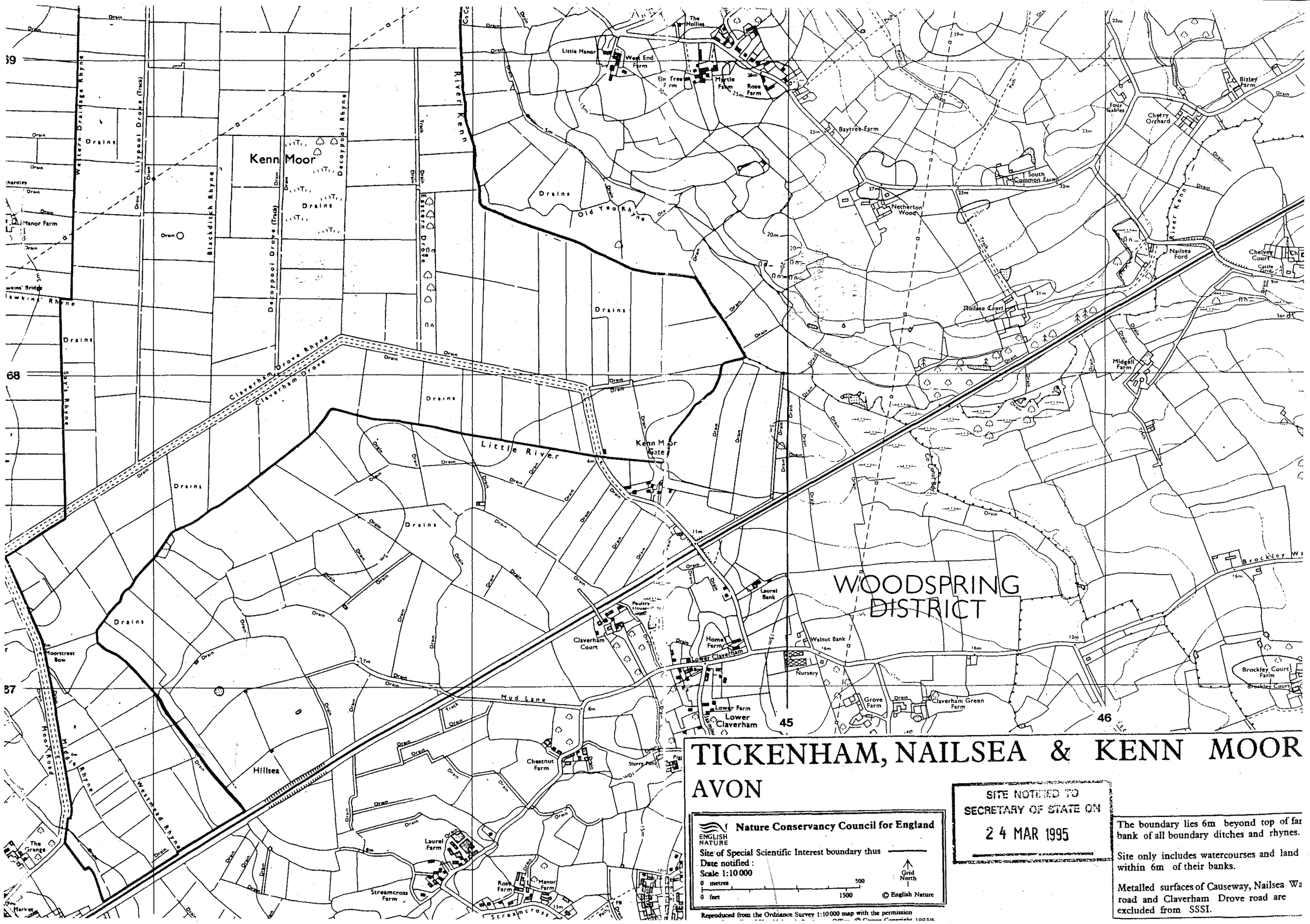
A larger scale map showing a detailed boundary is available on request

The boundary lies 6m beyond top of far bank of all boundary ditches and rhynes.

Site only includes watercourses and land within 6m of their banks.

Metalled surfaces of Causeway, Nailsea Wall road and Claverham Drove road are excluded from SSSI.

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TICKENHAM, NAILSEA & KENN MOOR

AVON

Nature Conservancy Council for England

ENGLISH NATURE

Site of Special Scientific Interest boundary thus

Date notified :

Scale 1:10 000

0 metres 500

0 feet 1500

Grid North

© English Nature

Reproduced from the Ordnance Survey 1:10000 map with the permission

SITE NOTIFIED TO SECRETARY OF STATE ON

24 MAR 1995

The boundary lies 6m beyond top of far bank of all boundary ditches and rhynes.

Site only includes watercourses and land within 6m of their banks.

Metalled surfaces of Causeway, Nailsea Wa road and Claverham Drove road are excluded from SSSI.

TICKENHAM CP

NAILSEA CP

Middletown

Tickenham

Middle Yeo

Land Yeo

Tickenham Moor

Drains

Clevedon Moor

Nailsea Moor

Tickenham Drove

Tickenham Boundary Rhyne

North Drove

North Drove Rhyne

Ten Feet Rhyne

Clevedon Boundary Rhyne

Nailsea Wall

Parish Brook

Yeatling Ditch

Moor Lane

Church Lane

Washing Pound Lane

Causeway

Causeway Bridge

Tickenham Road

Clevedon Road

Hill Lane

Cook's Lane

Tickenham Court

Stone-edge Batch

Heath Farm

King's Hill

Abattoir

Depot

Warehouses

Warehouse

Poplar Farm

Coombe Farm

Tower House Farm

West End

Batch Farm

Nursepatch Farm

Triangle Farm

Smeathyard Farm

Smeath Farm

Eastend Farm

Cadbury Court Farm

Nursery

Barrow Court Farm

Brown's Rock Farm

Barn Farm

Page's Farm

Luggard's Cross

Luggard's Cross Farm

Stone-edge Farm

Queen Anne Cottage

Pippins

Works

Depot

Caravan Site

Quarry

Garage

PO

PH

Ppg Sta

Pipe Line

Gas Governor

Club

Schbol

Nursery

Batch Farm

Track

Path

Drain

Drains

FB

Ch

PO

Wks

Wksp

Sch

Cemy

Recr Ground

Playing Fields

Sewage Works

Castle Grid

Cattle Grid

Ref Reservoir (covered)

Ref Reservoir

Cottage

House

Bridge

Ford

Dis

Sta

Gdns

Allotments

Orchard

Rise

Road

Lane

Avenue

Close

Drive

Way

Park

Terrace

Crescent

Gardens

Grove

Hill

Vale

Valley

Meadow

Meadows

Fields

Mill

Mills

Farm

Farms

Court

Cottages

Buildings

Hall

Church

Chapel

Vicarage

Rectory

Manor

Castle

Tower

Monument

Cross

Pond

Lake

Reservoir

Tank

Tanks

Pumping Station

Electricity Sub Station

Telephone

Post Office

Public House

Inn

Hotel

Restaurant

Cafe

Shop

Shops

Garage

Garages

Workshop

Workshops

Factory

Factories

Depot

Warehouse

Warehouses

Abattoir

Slaughterhouse

Cemetery

Crematorium

Recreation Ground

Playing Fields

Sports Ground

Golf Course

Golf Links

Bowling Green

Tennis Court

Swimming Pool

Baths

Library

School

College

Hospital

Clinic

Surgery

Dispensary

Police Station

Fire Station

Ambulance Station

Coastguard Station

Lifeboat Station

Boathouse

Slipway

Jetty

Pier

Quay

Wharf

Harbour

Dock

Docks

Basin

Basins

Lock

Locks

Weir

Sluice

Culvert

Bridge

Viaduct

Aqueduct

Footbridge

Ford

Causeway

Embankment

Cutting

Tunnel

Level Crossing

Station

Halt

Goods Station

Signal Box

Turntable

Engine Shed

Sidings

Yard

Depot

Wharf

Quay

Jetty

Pier

Harbour

Dock

Docks

Basin

Basins

Lock

Locks

Weir

Sluice

Culvert

Bridge

Viaduct

Aqueduct

Footbridge

Ford

Causeway

Embankment

Cutting

Tunnel

Level Crossing

Station

Halt

Goods Station

Signal Box

Turntable

Engine Shed

Sidings

Yard

Depot

State on 6 September 1994

CITATION SHEET

COUNTY: AVON SITE NAME: BIDDLE STREET, YATTON

DISTRICT: WOODSPRING

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

Local Planning Authority: AVON COUNTY COUNCIL, WOODSPRING DISTRICT COUNCIL
National Grid Reference: ST423648 Area: 44.8 (ha) 110.7 (ac)

Ordnance Survey Sheet 1:50,000: 172 1:10,000: ST46NW/SW
Date Notified (Under 1949 Act): Date of Last Revision:
Date Notified (Under 1981 Act): 1994 Date of Last Revision:

Other Information: A new site

Description and Reasons for Notification:

Situated to the west of Yatton, Biddle Street forms part of the Avon Levels and Moors, an extensive area of low lying agricultural land found to the north of the Mendip Hills.

The area lies mainly on the silty clays of the Wentlloog series, although to the south and east soils of the Compton Series are found. The latter are variably calcareous and are characterised by the presence of peat in the lower layers.

In common with other parts of the Levels and Moors, Biddle Street is drained by a network of rhynes and ditches. In many areas these act as 'wet fences' and provide water for the livestock that graze over the area during the summer months.

The combination of past/present management practices and the variation in the soils has resulted in the watercourses supporting a wide range of aquatic plant communities, many of which are of considerable nature conservation interest.

Where open water occurs plants such as Common Water-starwort *Callitriche stagnalis*, Frogbit *Hydrocharis morsus-ranae*, Fan-leaved Water-crowfoot *Ranunculus circinatus*, Nuttall's Waterweed *Elodea nuttallii*, Lesser Pondweed *Potamogeton pusillus*, Whorled Water-milfoil *Myriophyllum verticillatum* and Stonewort *Chara sp* are found, the latter two species indicative of the calcareous influence of the underlying Compton soils. Also present are the nationally scarce Rootless Duckweed *Wolffia arrhiza* and Hairlike Pondweed *Potamogeton trichoides*.

Many of the field ditches also support a high diversity of emergent species. Branched Bur-reed *Sparganium erectum*, Lesser Water-parsnip *Berula erecta*, Water Horsetail *Equisetum fluviatile*, Tubular Water-dropwort *Oenanthe fistulosa* and Water-plantain *Alisma plantago-aquatica* are all common. Reed Sweet-grass *Glyceria maxima*, Reed Canary-grass *Phalaris arundinacea* and Common Reed *Phragmites australis* also occur and dominate some of the less frequently managed field ditches.

A number of ditches support a diverse bank flora. Ragged-Robin *Lychnis flos-cuculi*, Brookweed *Samolus valerandi*, Brooklime *Veronica beccabunga*, Water Mint *Mentha aquatica*, Marsh Bedstraw *Galium palustre* and Meadowsweet *Filipendula ulmaria* have all been recorded.

A rich invertebrate fauna is also associated with the rhynes and ditches.
Good numbers of aquatic beetles (*Coleoptera*) are present including populations of two nationally rare species, *Hydacticus transversalis* and Britain's largest water beetle, the Great Silver Water Beetle *Hydrophilus piceus*, the latter being largely confined to grazing marshes of Southern Britain.

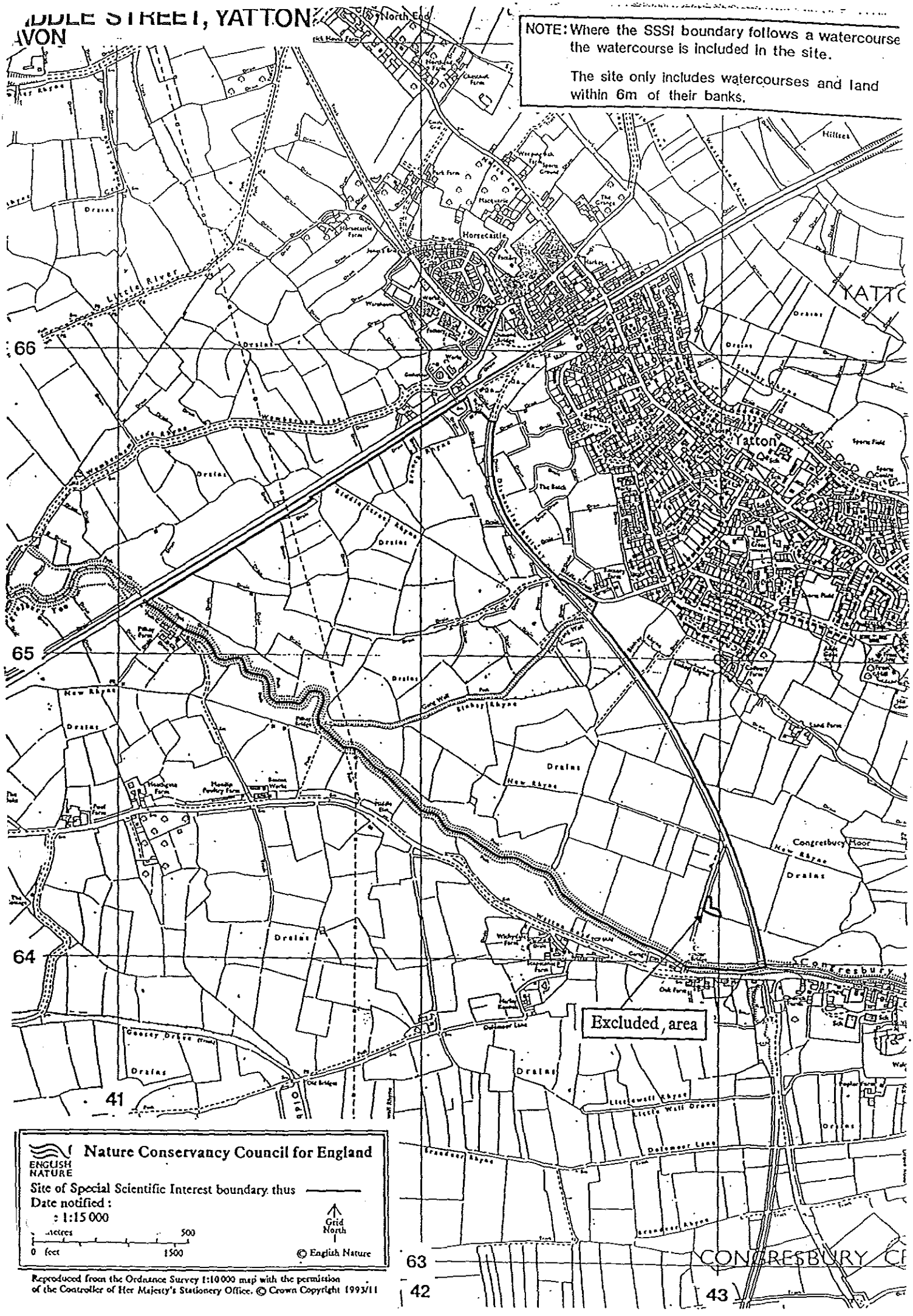
A number of dragonflies and damselflies are known to breed in the watercourses including Southern Hawker *Aeshna cyanea*, Blue-tailed Damselfly *Ischnura elegans* and the nationally scarce Variable Damselfly *Coenagrion pulchellum*.

Aquatic molluscs are also well-represented. Strong populations of the Common Freshwater Mussel occur as does the nationally rare Pea Mussel *Pisidium pseudosphaerium*.

IDDLE STREET, YATTON
AVON

NOTE: Where the SSSI boundary follows a watercourse the watercourse is included in the site.

The site only includes watercourses and land within 6m of their banks.



Nature Conservancy Council for England

ENGLISH NATURE

Site of Special Scientific Interest boundary thus ——

Date notified :

: 1:15 000

metres 500

0 feet 1500

Grid North

© English Nature

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Description and Reasons for Notification:

The Severn Estuary lies on the south west coast of Britain at the mouth of four major rivers (the Severn, Wye, Usk and Avon) and many lesser rivers. The immense tidal range (the second highest in the world) and classic funnel shape make the Severn Estuary unique in Britain and very rare worldwide. The intertidal zone of mudflats, sand banks, rocky platforms and saltmarsh is one of the largest and most important in Britain. The estuarine fauna includes: internationally important populations of waterfowl; invertebrate populations of considerable interest; and large populations of migratory fish, including the nationally rare and endangered Allis Shad (Alosa alosa). The SSSI forms the major part of a larger area of estuarine habitat, which includes the Upper Severn Estuary, the Taf/Ely Estuary and Bridgwater Bay.

The estuary has a diverse geological setting and a wide range of geomorphological features, especially sediment deposits. It is important for the interpretation of coastline dynamics and land-forms, and also past changes, in sea level, sediment supply, climate and river flow. The estuary's overall interest depends on its large size, and on the processes and inter-relationships between the intertidal and marine habitats and its fauna.

Beds of eel-grass (Zostera spp) occur on the more sheltered mud and sand banks. The estuary fringes have large areas of saltmarsh. These are generally grazed by sheep and/or cattle, a significant factor determining the plant communities. A range of saltmarsh types is present, with both gradual and stepped transitions between bare mudflat and upper marsh. Glassworts (Salicornia spp) and Annual Sea-blite (Suaeda maritima) colonise bare mud on the lower saltmarshes, and disturbed areas at higher levels. Common Cord-grass (Spartina anglica) is abundant on the seaward fringes of marshes, where it occurs as dense monocultures, or with other species, such as Sea Aster (Aster tripolium), Greater Sea-spurrey (Spergularia media) and Common Saltmarsh-grass (Puccinellia maritima). The middle marsh is mainly dominated by Common Saltmarsh-grass, and frequent associates include Sea-milkwort (Glaux maritima), English Scurvygrass (Cochlearia anglica) and Sea Arrowgrass (Triglochin maritima), together with two nationally scarce plants Bulbous Foxtail (Alopecurus bulbosus) and Slender Hare's-ear (Bupleurum tenuissimum). There are a few localities for an uncommon middle marsh community, which is characterised by Sea-lavender (Limonium vulgare) and Thrift (Armeria maritima). Prominent species on the upper marsh are Red Fescue (Festuca rubra) and Saltmarsh Rush (Juncus gerardi). Nationally scarce species occurring on the upper marshes include Sea Clover (Trifolium squamosum) and Sea Barley (Hordeum marinum). Highly saline drying pans on the upper marsh support a community with abundant Reflexed Saltmarsh-grass (Puccinellia distans) and Lesser Sea-spurrey (Spergularia marina). The highest saltmarsh around the driftline is usually dominated by Sea Couch (Elymus pycnanthus), with Spear-leaved Orache (Atriplex prostrata). Some brackish pools and depressions on the upper marshes have small stands of Common Reed (Phragmites australis) or Sea Club-rush (Scirpus maritimus). Corn Parsley (Petroselinum segetum), a European rarity, occurs within the site.

The fluctuating salinity and highly mobile sediments with consequent high turbity limits the benthic invertebrates to relatively few species. Those which are tolerant of such conditions occur in very high densities on the more stable mudflats. The most prominent species are ragworm (Nereis spp), Lugworm (Arenicola marina), Baltic Tellin (Macoma balthica) and the spire shell (Hydrobia ulvae). A greater variety of invertebrates tend to occur on the intertidal rock platforms, a more stable habitat with rock pools and a relatively high cover of seaweeds.

Seven species of migratory fish move through the Estuary between the sea and rivers. There are particularly large numbers of Atlantic Salmon (Salmo salar) and Common Eel (Anguilla anguilla). The other species are Allis Shad, the nationally rare Twaite Shad (Alosa fallax), the Sea Trout (Salmo trutta), Sea Lamprey (Petromyzon marinus) and the Lampern or River Lamprey (Lampetra fluviatilis).

The SSSI is of international importance for wintering and passage wading birds, with total winter populations averaging about 44,000 birds. Numbers can be considerably higher during severe winters when, owing to its mild climate, the Severn supports wader populations that move in from the colder coasts of Britain. The SSSI holds most of the estuary's internationally important Curlew (Numenius arquata) and Redshank (Tringa totanus) populations, and most of its nationally important Ringed Plover (Charadrius hiaticula) and Grey Plover (Pluvialis squatarola) populations. Other waders which occur in significant numbers within the SSSI are Common Snipe (Gallinago gallinago), Knot (Calidris canutus), Whimbrel (Numenius phaeopus) and Turnstone (Arenaria interpres).

The SSSI is internationally important for Dunlin (Calidris alpina) and supports about 7.5% of the British wintering population of this species. The estuary as a whole supports about 10.5% of the British wintering population and is the single most important wintering ground of Dunlin in Britain.

In late winter and early spring the SSSI supports nationally important numbers of Shelduck (Tadorna tadorna), following the partial dispersal from their moulting grounds in Bridgwater Bay. There are also significant numbers of Wigeon (Anas penelope).



Downstream of lines AB & CD (refer to map at 1:100,000 scale) the notification applies only to land which is both above Mean Low Water mark, which is liable to change, and within local planning authority jurisdiction.

Date notified: 2 FEB 1989

SEVERN ESTUARY

MAP 6

NATURE CONSERVANCY COUNCIL

Site boundary thus

Scale 1:25 000

0 Metres 500 1,000

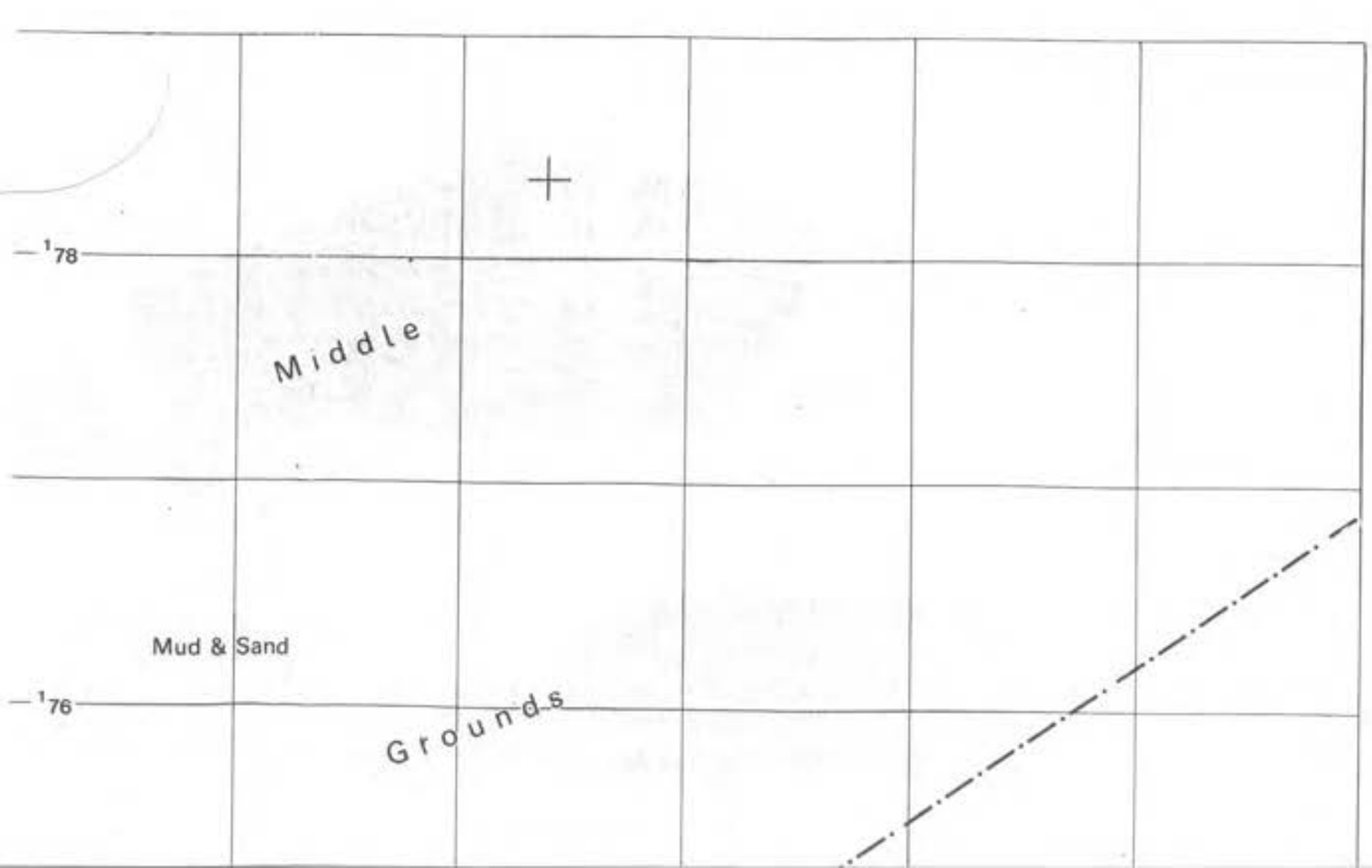
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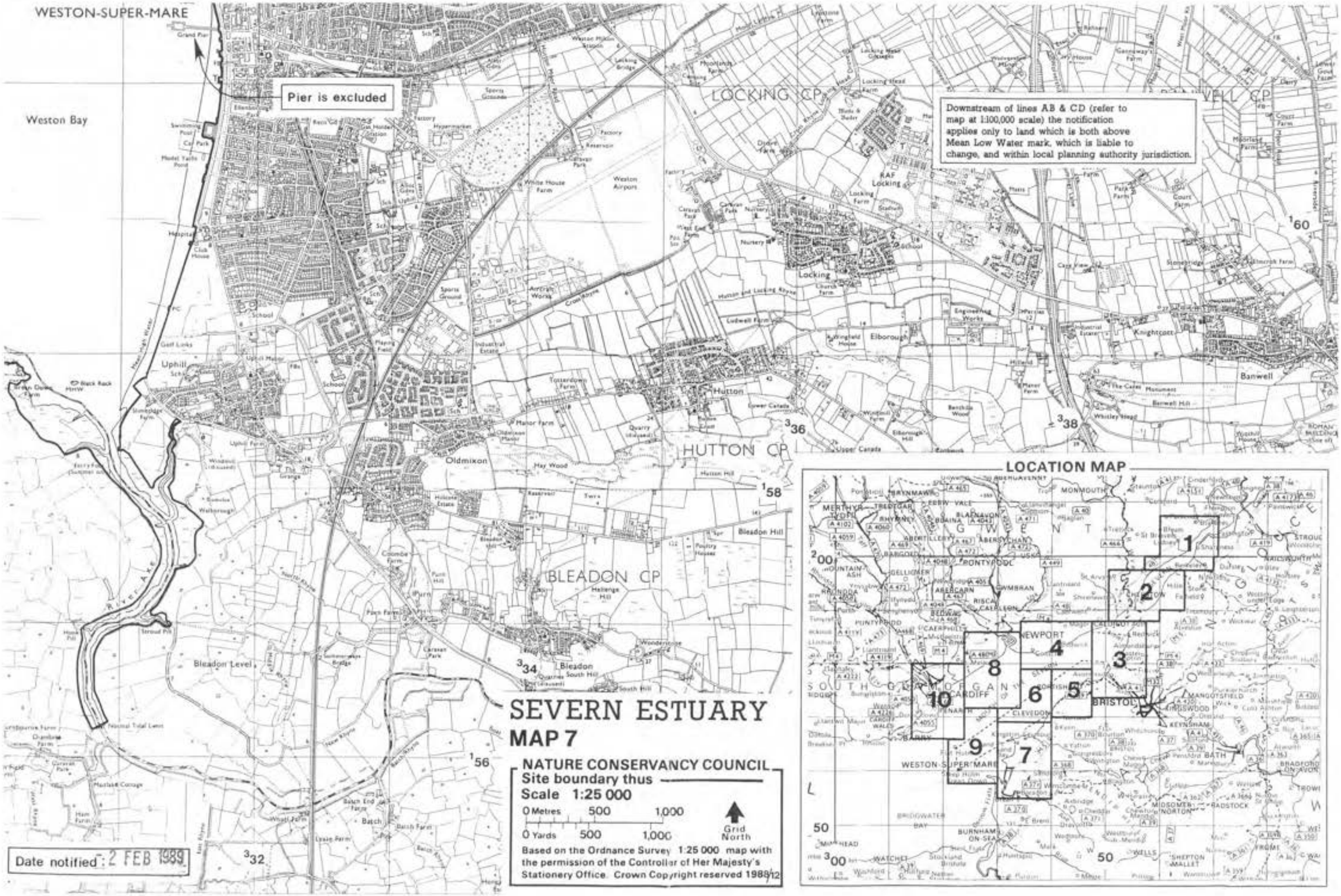
Grid North

Based on the Ordnance Survey 1:25 000 map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved 1988/12

LOCATION MAP






WESTON-SUPER-MARE
Grand Pier
Pier is excluded
Weston Bay
LOCKING CP
VELL CP
Downstream of lines AB & CD (refer to map at 1:100,000 scale) the notification applies only to land which is both above Mean Low Water mark, which is liable to change, and within local planning authority jurisdiction.
RAF Locking
Weston Airports
Locking
Hutton
Elborough
Banwell
Knightcott
Uphill
Oldmixon
HUTTON CP
BLEADON CP
Bleadon Hill
Bleadon Level
RIVER AXE
Bleadon
Batch
Date notified: 2 FEB 1989
LOCATION MAP
MONMOUTH
NEWPORT
CARDIFF
BRISTOL
WESTON-SUPER-MARE
BATH
SEVERN ESTUARY
MAP 7
NATURE CONSERVANCY COUNCIL
Site boundary thus
Scale 1:25 000
0 Metres 500 1,000
0 Yards 500 1,000
Grid North
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KINGSTON SEYMOUR CP
WICK ST LAWRENCE CP
KEWSTOKE CP
PUXTON CP
Pier is excluded
Pier is excluded
Sand Bay
Woodspring Bay
Middle Hope
St Thomas's Head
Langford Grounds
Mud and Sand
Worlebury
Kewstoke
Wick St Lawrence
Icelton
Ebdon
Bourton
St Georges
Worle
Milton
Rolstone
West Hewish
Congresbury Yeo
River Banwell
Wick Warth
Birnbeck Island
Anchor Head
168
166
164
162

EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Area

SEVERN ESTUARY (GLOUCESTERSHIRE, AVON, SOMERSET, SOUTH GLAMORGAN, MID GLAMORGAN, GWENT)

The Severn Estuary is one of the largest estuaries in Britain and it has the second largest tidal range in the world. Its classic funnel shape and south-west orientation makes it susceptible to extreme weather conditions in the east Atlantic. There are large urban developments on the estuary including the cities of Bristol and Cardiff.

The Severn Estuary qualifies under Article 4.1 of the Birds Directive by regularly supporting an internationally important wintering population of Bewick's swan *Cygnus columbianus bewickii*, an Annex 1 species. During the period 1988/89 to 1992/93 a mean peak of 289 birds (1.7% of the north-west European population, 4.1% of the British wintering population) used the estuary.

The Severn Estuary qualifies under Article 4.2 as a wetland of international importance by regularly supporting in winter over 20,000 waterfowl. In the five year period 1988/89 to 1992/93 the average peak count was 68,026 waterfowl comprising 17,502 wildfowl and 50,524 waders.

The Severn Estuary also qualifies under Article 4.2 by regularly supporting in winter internationally important numbers of the following 5 species of migratory waterfowl (average peak means for the period 1988/89 to 1992/93): 3,002 European white-fronted goose *Anser albifrons albifrons* (1.0% NW European, 50.0% British), 2,892 shelduck *Tadorna tadorna* (1.2% NW European, 3.9% British), 330 gadwall *Anas strepera* (2.8% NW European, 5.5% British), 41,683 dunlin *Calidris alpina* (2.9% east Atlantic flyway (EAF), 9.6% British) and 2,013 redshank *Tringa totanus* (1.3% EAF, 2.6% British).

The Severn Estuary also supports nationally important wintering populations of a further 10 species: 3,977 wigeon *Anas penelope* (1.6% British), 1,998 teal *Anas crecca* (2.0% British), 523 pintail *Anas acuta* (2.1% British), 1,686 pochard *Aythya ferina* (3.8% British), 913 tufted duck *Aythya fuligula* (1.5% British), 227 ringed plover *Charadrius hiaticula* (1.0% British), 781 grey plover *Pluvialis squatarola* (3.7% British), 3,096 curlew *Numenius arquata* (3.4% British), 246 whimbrel N. phaeopus (4.9% British total) and 3 spotted redshank *Tringa erythropus* (1.5% British).

In addition, during passage periods, the estuary supports nationally important numbers of ringed plover (spring migration: 442 birds (1.4% British passage), autumn migration: 1,573 birds (5.2% British passage)), dunlin (spring: 3,510 birds (1.7% British passage), autumn: 5,500 birds (2.7% British passage)), whimbrel *Numenius phaeopus* (spring: 246 birds (4.9% British passage), autumn: 66 birds (1.3% British passage)) and redshank (autumn: 2,456 birds (2% British passage)).

The Severn Estuary also supports a nationally important breeding population of a migratory species. In 1993 2040 pairs of lesser black-backed gulls *Larus fuscus* bred on the islands of Steep Holm and Flat Holm within the estuary. This represents 2.5% of the British total.

SPA Citation
CAR
December 1993

Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat

SEVERN ESTUARY (GLOUCESTERSHIRE, AVON, SOMERSET, SOUTH GLAMORGAN, MID GLAMORGAN, GWENT)

The Severn Estuary is one of the largest estuaries in Britain and it has the second largest tidal range in the world. Its classic funnel shape and south-west orientation makes it susceptible to extreme weather conditions in the east Atlantic. There are large urban developments on the estuary including the cities of Bristol and Cardiff.

The Severn Estuary qualifies under Criterion 1 of the Ramsar convention due to its immense tidal range exceeded only by that occurring in the Bay of Fundy, Canada. This tidal regime affects both the physical environment and the biological communities present in the estuary.

The Severn Estuary qualifies under Criterion 2b due to its unusual estuarine communities, reduced species diversity and high productivity. The high tidal range leads to strong tidal streams and high turbidity, producing communities characteristic of the extreme physical conditions of liquid mud and tide-swept sand and rock.

The estuary qualifies under Criterion 2c, as it is particularly important for the run of migratory fish between the sea and rivers via the estuary. Species using the estuary include salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax* and eel *Anguilla anguilla*. The population of the sea lamprey and twaite shad are considered to be larger than in any other UK estuary. The rare and endangered allis shad is now only an occasional visitor although formerly a substantial spawning population was present.

The estuary also qualifies under Criterion 2c as it is particularly important for migratory birds during passage periods in spring and autumn. These large bird populations are supported by the rich food resources available in the tidal flats and nearby freshwater wetlands. During the five year period 1987/88 to 1991/92 the estuary supported nationally important numbers of ringed plover *Charadrius hiaticula* (spring migration: 442 birds (1.4% British passage), autumn migration: 1,573 birds (5.2% British passage)), dunlin *Calidris alpina* (spring: 3,510 birds (1.7% British passage), autumn: 5,500 birds (2.7% British passage)), whimbrel *Numenius phaeopus* (spring: 246 birds (4.9% British passage), autumn: 66 birds (1.3% British passage)) and redshank *Tringa totanus* (autumn: 2,456 birds (2% British passage)).

The Severn Estuary qualifies under Criterion 3a by regularly supporting in winter over 20,000 waterfowl. In the five year period 1988/89 to 1992/93 the average peak count was 68,026 waterfowl comprising 17,502 wildfowl and 50,524 waders.

The Severn Estuary qualifies under Criterion 3c by regularly supporting, during the same period, internationally important populations of five species of waterfowl. During the period the following average peak counts were recorded: 3,002 European white-fronted goose *Anser albifrons albifrons* (1.0% north-west European, 50.0% British wintering population), 2,892 shelduck *Tadorna tadorna* (1.2% NW European, 3.9% British), 330 gadwall *Anas strepera* (2.8% NW European, 5.5% British), 41,683 dunlin *Calidris alpina* (2.9% east Atlantic flyway (EAF), 9.6% British) and 2,013 redshank *Tringa totanus* (1.3% EAF, 2.6% British).

Notable also are nationally important wintering populations of wigeon *Anas penelope*, teal *Anas crecca*, pintail *Anas acuta*, pochard *Aythya ferina*, tufted duck *Aythya fuligula*, ringed plover, grey plover *Pluvialis squatarola*, curlew *Numenius arquata* and spotted redshank *Tringa erythropus*. Lesser black-backed gulls *Larus fuscus* breed within the proposed Ramsar site in nationally important numbers.

Ramsar citation (Montreux 1990 Criteria)
CAR
December 1993

WESTON-SUPER-MARE

Weston Bay

Pier is excluded

LOCKING CP

HUTTON CP

BANWELL CP

Uphill

Oldmixon

Hutton

Locking

Elborough

Banwell

Knightcott

Bleadon Level

Weston Airport

RAF Locking

Hutton Moor Road

Locking Bridge

Weston Milton Station

Hypermarket

Gas Holder Station

Caravan Park

Reservoir

Factory

Aircraft Works

Industrial Estate

Engineering Works

Sports Ground

Golf Links

Playing Field

Swimming Pool

Car Park

Model Yacht Pond

Clarence Park

Hospital

Club House

School

Uphill Manor

Uphill Farm

Windmill (disused)

The Grange

Oldmixon Manor

Manor Farm

Totterdown Farm

Quarry (disused)

Hutton Court

Lower Canada

Upper Canada

Windmill Farm

Elborough Hill

Benthills Wood

Earthwork

Christon Hill

Christon Plantation

Hutton Hill

Bay Wood

Wingfield House

Church Farm

Ludwell Farm

Locking Farm

Locking Head Farm

Locking Head Garages

Moorlands Farm

Camping Site

Sports Grounds

Allotments

Ellenborough Park

Recn Gd

Pipe Line

Ivy Cottage

Lyncombe Lane

Westacres Farm

Wolvershill Manor

Ivy House Farm

Gannaway's Farm

Refinery

Laurel Farm

Moor Dairy

Lower Gout Farm

Court Farm

Moorland Farm

Woolvers Hill

Pool Farm

Woolvershill Batch

Park Farm

Court Farm

Stonebridge

Elmcroft Farm

Cave View

Golling

Pennies

Hillend

Manor Farm

The Caves Monument

Banwell Hill

Whitley Head

Winthill House

Winthill Farm

ROMAN BUILDING (site of)

Yarberry

Yarberry Farm

Keeper's Cottage

Barleycombe Lodge

Quarry (disused)

Manor Farm

Brean Down Farm

Black Rock MHW

Ferry Foot (Summer only)

Slimeridge Farm

Mean High Water

Normal Tidal Limit

Cumulus

Walborough

Hillcote Estate

Bleadon Hill

Coombe Farm

Purn Hill

Purn

Purn Farm

PH

Caravan Park

Summerways Bridge

Hook Pill

Stroud Pill

Diamond Farm

Caravan Park

Maitland Cottage

Ham Farm

Wharf Farm

Batch End Farm

Batch

Batch Farm

Leaze Farm

Yellow Hayes Farm

Honeymeade Farm

River Axe

North Rhyne

New Rhyne

Boat Rhyne

Batch Rhyne

East Rhyne

West Rhyne

Cross Rhyne

Hutton and Locking Rhyne

Locking Head Rhyne

Grumbleditch Rhyne

Wolvershill Rhyne

West Moor Rhyne

Middle Moor Rhyne

River Banwell

Silver Moor Lane

Riverside

Lumber Lane

Broadway

Mill Lane

Mill Rhyne

Moor Lane

Eagle Lane

Molte & Bailey

Drove Farm

Masts

Caravan Park

Nursery

West End Farm

Ppg Sta

Nursery

School

Sprs

Industrial Estate

Golf Links

Uphill

Sch

Hutton

Locking

Elborough

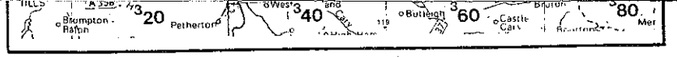
Banwell

Knightcott

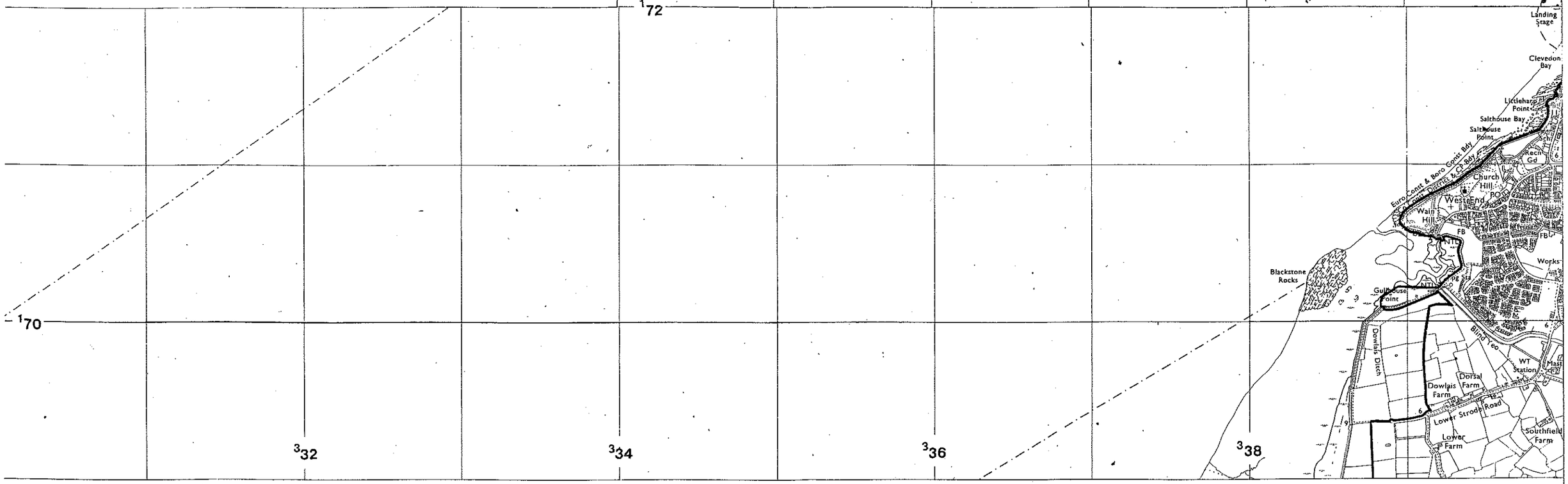
Hillend

Yarberry

Mud and Sand
MLW
Mud and Sand
Langford Grounds
Mud and Sand
MLW
Mean Low Water
Kingston Pill
Mean High Water
Hook & Axe
Sea Wall Farm
River Kenn
Back Lane
Treble House Farm
To Const Bdy
Poplar Farm
Riverside Farm
Sewage Works
168
KINGSTON SEYMOUR CP
Channel View
Middle Lane Farm
Broadstone Rhyne
Broadstone
Middle Lane
Ham Lane
Wharf Farm
Laurel Farm
Ham Lane
Ham Farm
New House Farm
Pool Farm
Britton's Farm
Ham Rhyne
Hope Farm
Moorside Farm
Yewtree Farm
Mendip View Farm
Mill Leaze Rhyne
NTL
St Thomas's Head
Pier
Woodspring Bay
Field System
Remains of St Thomas à Becket's Priory (Augustinian)
Woodspring Priory
NTL
Middle Hope
Wick Warth
Sewage Works
Mound
Tumulus
Woodspring
Swallow Cliff
Sand Point
Car Park
Pier is excluded
Collum Farm
Sandpoint Farm
Sandbay Farm
Caravan Park
Beach Huts
Dunes
Kewstoke Rhyne
Culm Farm
Lower Wick Farm
River Banwell
Muddy Lane
Wick Warth Lane
Appleton Farm
East-town Rhyne
East-town Farm
Icelton Farm
Icelton
Cedar Farm
Cypress Farm
Wick St Lawrence
Rose Court Farm
Tutshill Ear
Jetty
NTL
Yeo Bank Farm
Congresbury Yeo
Little River
Phipp's Bridge
Sluice Farm
KEWSTOKE CP
WICK ST LAWRENCE CP
Woodcroft Rhyne
Elmsley Lane
Redcroft Rhyne
Cross Lane
Collum Lane
Banfield Farm
Ebdon Farm
Ebdon
Hippisley's Farm
Bourton
The Elms
Oldbridge River
Manor Farm
Court Farm
Bourton Willow Farm
New Rhyne
Nursery
Sand Farm
Caravan Park
Sand Road
Elmsley
Holiday Camp
Kewstoke
Lynchmead Farm
Diamond Rhyne
Ebdon Road
Manor Farm
Crematorium
Cemy
Myrtle Farm
Norton Farm
Rose Tree Farm
Holme Farm
Norton
Caravan Parks
Sewage Works
Ppg Sta
Madam Bridge
West Hewish
The Grange
Manor Farm
Waterman's Row
New Ear Lane (Track)
164
PUXTON CP
Palmer's Elm
Slipway
Kewstoke Road
Castle Batch
Brimbleworth Farm
Brimblewarth Ha
River Banwell
Bourton Lane
Grumbleyhill Rhyne
Mean Low Water
Convalescent Home
Hatley Rocks
Worlebury Golf Course
Milton Hill CH
The Observatory
Worle Hill
Worlebury Hill Road
Quarry (dis)
Toll
Works
School
Grove Farm
Grape Vine Farm
St Mayfield
May's Green
Villa Farm
Grange Farm
The Round Pond
The Lawns
Puxton Court Farm
Black Rock Mean High Water
Bathing Cove
Pier is excluded
Worlebury
Worlebury Hill Road
Spring Cove
LB & IRB Sta
Woods
Quarry (dis)
Ashcombe Wood
Quarries (dis)
Anchor Head
Ashcombe Park
Milton
Worle
Recn Gd
Caravan Park
Bristol Road Bridge
PO
St Georges
Harbow Farm
Doubleton Farm
Stuntree Farm
Rolstone
Rolstone Court
Balls Bard Ln
Land Farm
The Laurels
Poplar Farm
Rolstone Farm
East Rolstone
Puxton Road
Banwell Road Bridge
Blind Yeo Rhyne
Apple Farm
Plum Tree Farm
Camping Site
Way Wick



Downstream of lines AB & CD (refer to map at 1:100,000 scale) the designations apply only to land which is both above Mean Low Water mark, which is liable to change, and within local planning authority jurisdiction.



Nature Conservancy Council for England

ENGLISH NATURE

COUNTRYSIDE COUNCIL FOR WALES
CYNGOR CEFN GWLAD CYMRU

Special Protection Area and Ramsar Site

Severn Estuary

Incorporating Bridgwater Bay, Flat Holm, Steep Holm, Sully Island, and part of Upper Severn Estuary.

SPA and Ramsar Site boundary ———

Map 7

Scale 1: 25 000

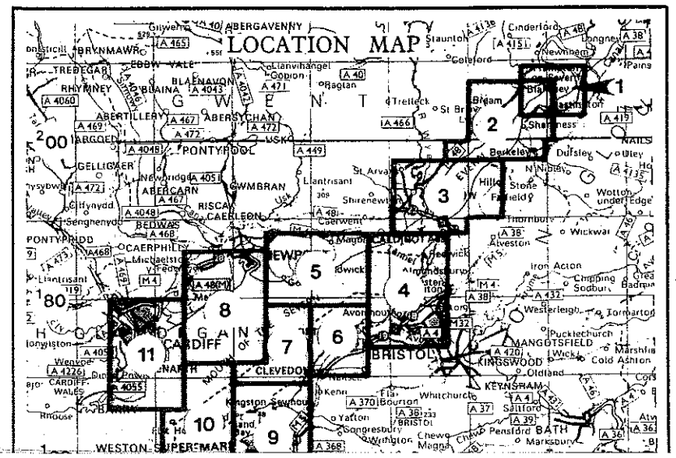
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0 feet 3000

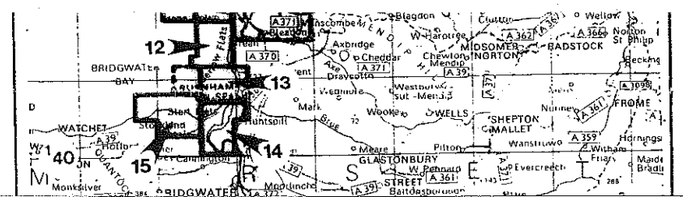
Grid North

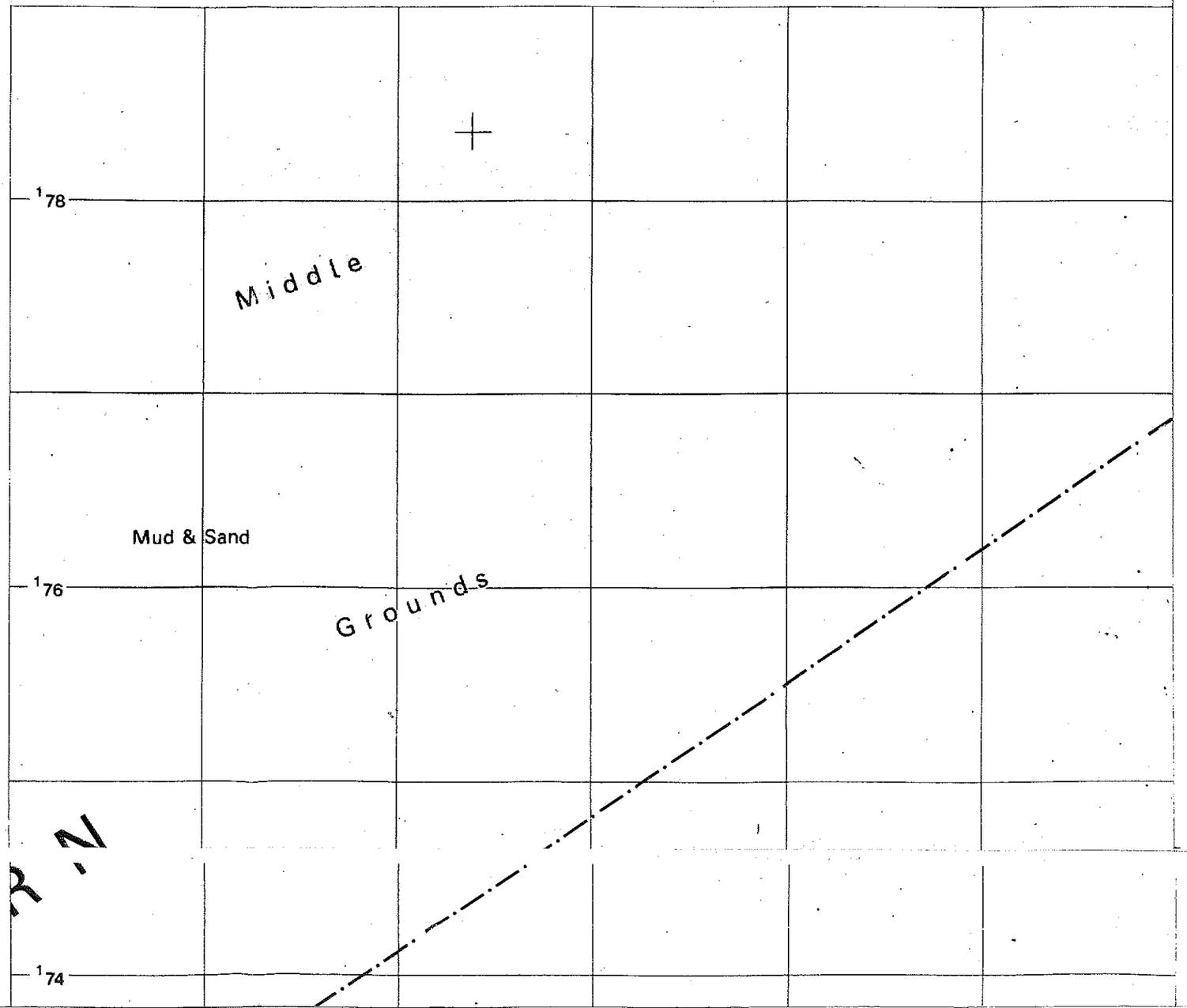
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Prepared by Geographic Information Unit, English Nature

Designation date: 13.7.95







APPENDIX 5 – ENVIRONMENT AGENCY

CONSERVATION AND RECREATION

Conservation Resource

The Environment Agency together with other drainage authorities has statutory duties to the conservation of important wildlife, habitats and landscape geomorphology, historical and archaeological features for all coastal and inland waters and land associated with them through it's water management activities.

This Water Level Management Plan covers an area of lowland agricultural land with an extensive rhyne and ditch system of high nature conservation value which includes Tickenham, Nailsea & Kenn Moor SSSI (Site of Special Scientific Interest), parts of the Severn Estuary SSSI, SPA (Special Protection Area), pSAC (proposed Special Area for Conservation) & RAMSAR and the Biddle Street SSSI. These rhynes and ditches support an exceptional diversity of wetland flora and fauna. However, much of this interest extends beyond these sites designated as SSSI's or CWS (County Wildlife Site) and often include maintained Main Rivers, rhynes and ditches.

The WLMP also falls within the North Somerset Levels and Moors Project area. The Project is a partnership between North Somerset Council, English Nature, The Wildlife Trust and the Environment Agency. The Agency is committed to working with this partnership group and any other interested groups in North Somerset to achieve a greater understanding of the needs of these important wetland sites.

The Environment Agency and the Internal Drainage Board have responsibilities to protect those features of interest from damage and where appropriate seek opportunities to promote the enhancement of all maintained rhynes and ditches within the plan area through capital works and through non-routine discussions with landowners and conservation bodies.

The Environment Agency owns substantial lengths of river and riparian land in North Somerset. This includes land on the Blind Yeo where North Somerset Council manage part of the land holding as public open space. The Agency is currently producing a conservation and recreation management plan for the Blind Yeo to improve habitat and amenity.

Conservation Objectives

The biodiversity of the rhynes and ditches in this catchment should be maintained and where appropriate enhanced through a sensitive management programme. In channel vegetation cutting should be reviewed regularly to ensure that cutting is necessary. Where possible vegetation should be retained along the edges of watercourses to provide a refuge for aquatic animals and a reservoir of plants for recolonisation. Bankside flailing should be kept to a minimum and should only be carried out at an appropriate time of year, preferably late summer.

The dredging and reprofiling of ditches also offer opportunities for enhancement. It may be possible to create low berms and bays in the banks which can then be planted with aquatic plants and to provide a refuge for aquatic animals and a reservoir of plants for recolonisation. These features do not form part of the maintained channel and so can be retained and allowed to develop into mature habitats.

The management of winter water levels in the rhyne and ditch system is also crucial for the maintenance of aquatic flora and fauna. The exposure to the air or damaging frosts can lead to unacceptable losses and should be avoided. Ideally a depth of 200-500 mm of water should be kept within the rhyne and ditch system.

Within parts of the catchment there are opportunities to enhance the conservation value of areas of agricultural land through the use of raised water levels. Where this is appropriate the Environment Agency shall seek opportunities with the IDB and landowners for raised water level areas to ensure the maximum benefits for wildlife can be achieved without affecting the adjacent land. Ground conditions suitable for wading birds are produced when winter ground water levels are at the surface of the land and during the summer levels are within 200 mm of the surface.

Conservation Issues

The are a number of specific issues within the catchment which require further investigations and possible modifications to the management of water levels. The Land Yeo through Clevedon requires a considered management restoration plan to address water quality, amenity and low flow problems. The Blind Yeo winter water level does have an impact on the marginal plant communities leaving plants susceptible to winter frost damage.

The River Kenn also suffers from water level problems. Upstream of Kenn Pier the river suffers similar winter low water levels in connection with levels on the Blind Yeo. Downstream of Kenn Pier the River Kenn is penned higher than the river upstream causing the river to flow inland for most of its length.

FISHERIES

General Resource

The Environment Agency has a duty to maintain freshwater fisheries and eel fisheries both of which are represented within the plan area. The Agency's fisheries section can provide advice to ensure that fisheries are safeguarded and that the Agency's duty to fisheries is not prejudiced.

The man made New Blind Yeo, together with the River Kenn upstream of Kenn Pier and the lower reaches of the Land Yeo (including TBR, CBR ,Yearling Ditch & Black Ditch) form a complex network which supports an important fishery with good numbers of roach, bream, carp, tench, pike and eels. The main waters used for angling are the New Blind Yeo, TBR, CBR and the short sections of the River Kenn and the Black Ditch Rhyne near Nailsea Wall.

There are a number of still waters in the catchment where angling takes place. These include the coarse fishing sites at Plantation Lake, Bullocks Farm & Kenn Pond near Kingston Seymour, Backwell Lake between Backwell and Nailsea and the game fishing site at Jacklands above Jacklands Bridge.

No fishery surveys have been carried out on the watercourses in the WLMP area.

Fishery Issues

From a fisheries point of view most complaints received involve the River Kenn, the gradient of which is very shallow and in summer the water becomes very stagnant resulting in duckweed problems etc. The water levels here are critical and the impact of any (small) changes can be significant.

Research commissioned by the Agency and its predecessors has highlighted the significance of obstructions to elver and eel migration caused by water control structures. The Agency is reviewing the impact of key structures on eel migration and investigating ways of alleviating any problems identified.

The existing water level management results in significant habitat change with the watercourses penned in summer and free flowing in winter. Low water depth can reduce the numbers of species and the impact is more severe in cold weather. This does not normally cause problems provided fish have access to deeper areas under critical conditions.

In many watercourses excessive growth of duckweed is a constant summer problem which can result in deoxygenation. Removal of this duckweed is difficult and is only effectively controlled by floating booms across the watercourse.

Water control structures and their operation pose special problems for fisheries. Substantial sluices can generate high water velocities when raised, resulting in the fish being stranded or swept downstream and unable to return. Tilting weirs may pose problems for elvers migrating upstream as a result of the overhanging face.

The watercourses in the catchment area are regularly dredged and weedcut for flood defence purposes. Dredging is unlikely to remove fish spawning sites but weedcutting could disturb spawning fish or remove spawn and will reduce the cover for fry. The timing of both dredging and weedcutting is carefully considered.

If works are planned to improve water level management there may be opportunities to incorporate fisheries improvements in addition to any benefit ensuing from the raised water level.

The fisheries are an important component of the wildlife interest especially eels which are widely distributed and are the favourite food of otters and a staple food of fish eating birds.

DEVELOPMENT CONTROL

General

The Agency require persons intending to carry out any alterations or new works within an 8 metre strip on either side of Main Rivers, or within the channel itself, to apply for a Land Drainage Consent. Where consent is applied for on land which forms part of an SSSI the applicant is obliged to consult English Nature and the Agency will only grant consent on the condition that this is done. This condition will also apply to developments which might affect an SSSI although they lie outside the boundaries of the site. (In other cases the Agency's

Conservation Officer will comment on the conservation implications of applications as necessary).

The Environment Agency also gives advice to Local Planning Authorities in the form of comments on planning applications and Development Plans. The Agency is a statutory consultee on Development Plans and planning applications that affect the water environment. Local Planning Authorities however have independent powers to decide on planning application proposals, and the Agency has no powers to direct. Particular attention is paid where development is proposed on a flood plain or wash land or in an area which has been identified as subject to drainage problems or be susceptible to inundation by the sea or to tidal flooding

Specific Issues

Within the catchment area there are a number of development proposals around Nailsea, the details of which are contained in the Woodspring Local Plan Deposit, Version 1994. Most of the proposed development is outside the floodplain. Where it occurs inside the floodplain mitigation measures will be adopted to attenuate the flow e.g. a balancing tank to store flood flows that are later discharged when the flood has passed. Thus these proposed developments should have no detrimental affect on the water level management of the area.

The principal development areas have been briefly described below along with their receiving watercourses ;

a.) Elm Farm development - north east of Nailsea and directly south of the Wraxall House (Land Yeo),

b.) North West Nailsea - south of Heath Farm adjacent the Causeway (Tickenham Boundary Rhyne),

c.) Coombe Grange - between Nailsea and Backwell (River Kenn).

WATER RESOURCES

General

Apart from those issue already discussed in the preceding sections there are no other on going Water Resource issues which directly influence or are influenced by water level management.

Abstraction Licences

Under the Water Resources Act 1991 certain water abstractions require a licence from the Environment Agency. The abstraction of up to 20 cubic metres per day (approximately 4,400 gallons/day) from a surface water source for general agriculture and domestic use is permitted (i.e. is exempt). Larger abstractions require a licence. However all abstractions from a ground water source (borehole) require a licence irrespective of amount with the exception of up to 20 cubic metres per day for domestic purposes.

The Agency has powers to give a one off consent for up to 20 cubic metres for uses other than agriculture. In addition abstractions of up to 5 cubic metres as a one off abstraction (which

does not form part of a continuous operation or series of operations) do not require a licence or consent from the Agency.

The Agency consults the appropriate Drainage Board and English Nature in its consideration of any application for an Abstraction Licence. Applications for Abstraction Licences (especially within the SSSI) within the plan area will be examined particularly critically.

In the North Somerset DB catchment water is abstracted for public water supply and for private water use from both ground water and surface water sources which are licensed by the Agency. A brief list of these Abstraction Licences are given below, listed in size order and separately for ground water and surface water sources :

Ground Water Abstractions

a.) Chelvey Well - Licence No. 165215/G/018 at ST 474 679 at Chelvey to the south west of Backwell. A Bristol Water public water supply abstraction which has limits of 27.28 Ml (Mega Litres) per day and 5000 Ml per annum. The abstraction here is linked to the flow conditions at Kenn Moor Gauging Station.

b.) Clevedon - Licence No. 165215/G/017 at ST 429 716 close to where the Land Yeo goes under the M5 Motorway. A Bristol Water public water supply abstraction which has limits of 4.55 Ml/day and 1200 Ml/annum.

c.) Watercress Farm - Licence 165215/G/009 at ST 502 707 between Wraxall and Fax Bourton. Abstraction of up to 0.173 Ml/day from a borehole and a spring for a private water supply.

d.) Claverham - Licence No. 165215/G/002 at ST 448 663 immediately to the east of Claverham. Abstraction of up to 0.091 Ml/day from a borehole for industrial use.

e.) Tickenham Court - Licence No. 165215/G/029 at ST 456 715 immediately west of Tickenham Court at Tickenham. Abstraction of up to 0.016 Ml/day from a spring for general agricultural use.

f.) Ham Farm - Licence No. 165215/G/007 at ST 418 672 adjacent the Little River between Yatton and Kingston Seymour. Abstraction of up to 0.009 Ml/day from two wells for general agricultural use.

g.) Green Farm - Licence No. 165215/G/036 at ST 454 666 adjacent Green Farm off Brockley Way, north east of Claverham. Abstraction of up to 0.008 Ml/day from a well for general agricultural use.

h.) Newhouse Farm - Licence No. 165215/G/032 at ST 420 704 adjacent the Clevedon M5 Motorway junction. Abstraction of up to 0.008 Ml/day from a borehole for leisure use.

i.) Mawkin's Bridge - Licence No. 165215/G/030 at ST 426 679 immediately south of Mawkin's Bridge on Kenn Moor. Abstraction of up to 0.007 Ml/day for general agricultural use.

Surface Water Abstractions

a.) Jackland's Fish Farm (1) - Licence No. 165215/S/035 at ST 471 716 upstream of Jackland's Bridge. Abstraction of up to 2.16 Ml/day from a tributary of the Land Yeo for fish farming.

b.) Tickenham - Licence No. 165215/S/001 at ST 455 719. Abstraction of up to 0.500 Ml/day from the Land Yeo for agriculture and spray irrigation.

c.) Jackland's Fish Farm (2) - Licence No. 165215/S/039 at ST 472 717. Abstraction of up to 0.432 Ml/day from a spring fed stream for fish farming.

d.) Wraxall - Licence No. 165215/S/033 at ST 489 713 upstream of Wraxall House. Abstraction of up to 0.25 Ml/day from the Land Yeo for general agriculture and spray irrigation.

e.) Middle Lane Farm - Licence No. 165215/S/040 at ST 393 672 to the west of Kingston Seymour. Abstraction of up to 0.108 Ml/day from Broadstone Rhyne for fish farming.

f.) Strode Road - Licence No. 165215/S/031 at ST 394 700 from the Blind Yeo downstream of Strode Road. Abstraction of up to 0.091 Ml/day for spray irrigation.

g.) Black Ditch Rhyne - Licence No. 165215/S/041 at ST 431 675 at the upstream extent of the Black Ditch Rhyne. Abstraction of up to 0.009 Ml/day from the Black Ditch Rhyne for commercial purposes.

Bristol Water Agreements

Extract from Register of Liabilities:

Blagdon Lake
Reservoir built 1902
Surface Area 450 acres
Catchment Area 5000 acres
Max depth 35'
Capacity 1700mg
Reliable yield 6mgd
See reference in agreement of 23-09-1938 to reduction in compensation water (see also 12/1), also in agreement of 24-06-1939.
The Bristol Waterworks Act of 1939 fixed the compensation water at 1.9mgd (15th May to 30th Nov) and 0.5mgd (1st Dec to 14th May). The agreement of 24-06-1939 (incorporated in the Act) provided for the reduction of summer compensation water to 1.4mgd if the works for distributing it were agreed as satifactory. No agreement was reached, however, and the position is that the compensation water is 1.9mgd but that it is reduced below that figure on occasion by informal arrangement between the Company and the SRB.

WATER QUALITY

General

There are no significant or specific water quality issues within this catchment area which directly affect or are affected by water level management.

In general terms the summer penning of ditches and rhynes may result in the downgrading of the receiving classified watercourses due to the build up of algae. The Agency's Environment Protection department are currently undertaking limited chemical sampling at strategic points on most moor systems in North Wessex. However more intensive surveys are required to achieve a better understanding of where and why the main problems are occurring.

In addition the sudden flushing out of poor quality water at the end of the summer may cause problems and would require careful management to ensure against river declassification. This however has not been examined in detail.

Weedcutting activities also cause significant drops in Dissolved Oxygen (DO) levels on most of the watercourses monitored. Most fish kills are observed in smaller, low flow rhyne systems whilst the main drains are largely unaffected. This is presumably because aquatic life could move from the larger watercourses to unaffected areas more easily. Improved communication between the Agency's Environment Protection Staff and the weedcutting operators/supervisors help to prevent fish kills and unnecessary damage to the aquatic environment.

Discharge Consents

It is illegal to discharge sewage or trade effluent to any controlled watercourse without a consent to discharge. Such consent must be sought from the Environment Agency Discharge Consent Officer.

Within the North Somerset DB catchment there are two Wessex Water Services Ltd sewage treatment works (STW), viz. Clevedon Beach Outfall and Kingston Seymour which are both based on the coast. The Kingston Seymour STW will be providing secondary treatment by early 1999 and using ultraviolet disinfection by the end of the same year. Whilst the Clevedon Beach Outfall still has a valid consent, discharges are no longer made at this point and the Agency are pursuing a revocation.

There is one other notable consented discharge (trade) that being at Jackland's Bridge Fish Farm.

WASTE REGULATION

General

Under the Waste Management Licensing Regulations 1994 all keeping, disposing or treating of "Directive waste" on land is subject to a waste Management Licence unless the activity complies with the conditions of an exemption from waste management licensing. A Waste Management Licence cannot be issued without the benefit of Planning Permission. The technical and financial competence of the applicant is required to be assessed before a Waste Management Licence can be issued.

Relevant exemptions include the spreading of waste on land to improve the quality of the land (without harm to flora and fauna), deposit of inert waste on land for reclamation purposes, deposit of waste on land for construction purposes and the deposit of dredgings on the banks of a water course.

Waste Management Sites

There are no operational landfill sites within the WLMP area. There are however some closed landfill sites which are listed below :

a.) Stileway Farm (three sites) near Clevedon
b.) North Drove, Nailsea
c.) Chelvey Court
d.) Woolley's Farm, Backwell

In addition there is a closed Household Waste Amenity Site at Clevedon. These sites are however unlikely to have an effect on current and future water level management.

ENVIRONMENT AGENCY WATER LEVEL MANAGEMENT AND NATURE CONSERVATION STRATEGY

In 1991 the Environment Agency (acting as the National Rivers Authority at the time) launched the Somerset Levels and Moors Water Level Management and Nature Conservation Strategy. This recognises the outstanding nature conservation interest of the Somerset Levels and Moors that this is in decline.

The Strategy promotes a review of flood defence practices, particularly within SSSIs. In these areas a presumption in favour of positive water level management for nature conservation is adopted through agreement.

The aim of the Strategy is, through prudent water level management, to safeguard and enhance the ecological value of the area whilst at the same time supporting other traditional land use practices. It is recognised that the success of this Strategy depends upon the joint action of those bodies that have an active involvement in the area.

This Strategy has not been formally adopted for the North Somerset Levels, however the Agency have adopted many of it's recommendations in principle for this area.

A review of this Strategy for the Somerset Levels and Moors is currently being undertaken and is programmed to be completed in April 1999. Once this is complete a separate review of the water level management and nature conservation for the North Somerset Levels will be considered. However it is possible that proposals of the Strategy review for the Somerset Levels and Moors may be taken on board for North Somerset and incorporated where appropriate as future Agency objectives for this WLMP.

ENVIRONMENT AGENCY NORTH SOMERSET DRAINAGE SCHEMES

INTRODUCTION

Below is a basic outline of the major drainage improvements schemes in the North Somerset area.

RIVER KENN SCHEME

This scheme which was started in April 1949 and was in effective operation in May 1953 provided relief from flooding of 2,100 acres of moorland between Clevedon, Tickenham and Yatton.

This involved the excavation of 2.5 miles of new outfall channel (the New Blind Yeo) and the deepening and widening of 6 miles of existing watercourses. In addition several new structures were constructed including a new outfall structure, three new road bridges, five accommodation bridges and one railway bridge.

One of these road bridges was the Kenn Pier Culvert which had the important function of diverting the River Kenn into the Blind Yeo.

Further work was undertaken beyond 1953 as part of this scheme including constructing a concrete structure at the end of the Black Ditch Rhyne and the dredging of the River Kenn.

RIVER KENN WATER CONTROL SCHEME

Background Information

After the New Blind Yeo came into operation in May 1953, conditions in the moors were so much improved that there was a general demand for a lower water level, particularly in summer, than had been originally allowed for. This meant that little or no water could be fed into the Old River Kenn, and that channel from Kenn Pier Sluice to the outfall at Hook's Ear, had to depend upon the very limited local drainage. In consequence it became stagnant and frequently polluted with salt which came in from the outfall on most tides, and there were many complaints from householders who used the water for domestic and farm purposes.

A scheme for remedying the trouble was thus put in place in the late 1950's referred to as the ' River Kenn Water Control Scheme '.

The Scheme

The scheme comprised the lowering of the bed of the Old River Kenn by an average of 450 mm for a distance of 1.5 miles, penning doors at Treblehouse Farm and at Kenn Moor Bridge, improvements at the outfall, modification of Kenn Pier Sluice to give closer control over penning levels and a new sluice at the end of the Black Ditch Rhyne.

The principal dates for various aspects of the scheme have been summarised below:

August 1956	Tidal flap at outfall replaced
March 1957	Install penning doors at Treblehouse Farm and Kenn Moor Bridge
April 1957	Complete dredging of Old River Kenn (Kenn Pier to Outfall)
1957	Kenn Pier Sluice - penning modifications
March 1958	New penning sluice (Black Ditch Sluice)

M5 MOTORWAY LAND YEO/BLIND YEO SCHEME

This scheme in the early 1970's came about from the construction of the M5 motorway through the area. In principal it involved the diversion of flood flows from the Land Yeo through Clevedon into the Blind Yeo system.

This involved a new connecting channel along the line of the Yearling Ditch, the enlargement of the New Blind Yeo, a supplementary outfall for the Blind Yeo, a double penning sluice at the junction of the Yearling Ditch and the Middle Yeo (Cook's Clyse) and the modification of several bridges across the relevant channels.

APPENDIX 6 – OTHER RESPONSES

This section includes verbatim copies of the responses received from the following organisations:

BT

Avon Farming & Wildlife Group

CLA

CPRE

Drainage Board Agricultural Group

English Heritage

Farming & Wildlife Advisory Group (Avon)

Forestry Commission (West Country Conservancy)

MAFF (Regional Engineer Taunton)

National Grid

National Power plc

NFU (South West Region)

North Somerset Council

Railtrack

Ramblers' Association

Serco Gulf Engineering Ltd (Government Oil Pipeline and Storage System)

SWEB

Bristol Planning Office
1st Floor
Telephone Exchange
Grange Court Road
Westbury on Trym
Bristol
BS9 4DP

Tel: 01179620894
Fax: 01179620897

Mrs G. V. Harris
North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon
North Somerset
BS21 6XH

Our Ref: A\1998N\03177
Your Ref:

05 March 1998

Dear Sir or Madam,

North Somerset IDB - Water Level Management Plan

Thank you for your letter and plans dated 24 February 98 requesting the location of BT apparatus in the vicinity of your proposed works.

I am returning one copy of our drawing marked up to show the approximate position of BT apparatus. Precise location should be determined on site by a BT Engineer specially equipped for this work.

I would be grateful if you could contact our Plant Protection Officer well in advance of your start date by dialling 100 and asking for FREEFONE 'DIAL BEFORE YOU DIG'. This will provide you with free on site advice and check on the location of BT apparatus.

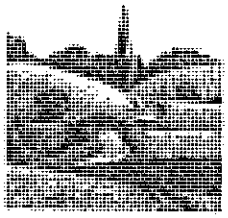
Yours faithfully

Roger Andrews.

Road Works Planning Manager

British Telecommunications plc, Registered Office, 81 Newgate Street, LONDON EC1A 7AJ. Registered in England no. 1800000

CPRE



Your countryside
Your voice

Warwick House
25 Buckingham Palace Road
London SW1W OPP

Telephone 0171-976 6433
Fax 0171-976 6373

24/5/98

As from :-
JAYRISE,
BUTCOMBE,
NR BRISTOL,
BS40 7UT.

Dear Mrs Harris,

NORTH SOMERSET IDB – WATER LEVEL MANAGEMENT PLAN

Further to our brief telephone conversation last month, I enclose CPRE North Somerset's comments on the preparation of the WLMP.

(1) CPRE North Somerset would like to be involved in the consultation process – I would be grateful if you would correspond with me at the Bristol address above.

(2) CPRE North Somerset is concerned with protecting the countryside from all forms of degration – especially in an area of high development pressure such as this area.

Patron
Her Majesty The Queen

President
Jonathan Dimbleby

Chairman
Lord Marlesford

Director
Fiona Reynolds

CPRE - The Council for the Protection of Rural England - is a registered charity (Reg. No. 233179), that helps people to protect their local countryside from threat and to keep it beautiful, productive and enjoyable for everyone.

Recycled Paper

(3) I strongly agree with item 2 - 'Purpose' in your interim statement. Finding a "sustainable balance between the special nature conservation interest and the agricultural viability of the area" is one of the key challenges of North Somerset in particular and Britain generally. I would only add to this "landscape interests".

(4) The WLMP should reflect and compliment the appropriate sentiments and strategies arising from the Environment Agency's North Somerset Rivers LOCAL ENVIRONMENT AGENCY PLAN (LEAP) currently in consultation and preparation.

(5) I believe that one of the keys to finding the "sustainable balance" mentioned above is to support the lobbying process for the NSIDB area to become an Environmentally Sensitive Area (ESA

(6) A key case study for the WLMP is the River Kenn, which is suffering degradation downstream from Kenn Weir as a result of the success of the Blind Yeo diversion. One has to ask whether measures taken in the past to facilitate the agricultural intensification previously encouraged from farmers are still appropriate today. This is particularly so when MAFF and other concerned agricultural bodies are retreating from the intensification even to a more harmonious balance of agricultural production with nature conservation landscape concerns. What was suitable in the past may no longer be appropriate.

Yours sincerely. Justin Millward.

J.A.G. MILLWARD for Councillor North Somerset (PRE Cllrs)

DRAINAGE BOARD AGRICULTURAL GROUP

AGRICULTURE

General Considerations.

Historically the area was drained to meet the needs of agriculture.
Today the agriculture is mainly improved permanent pasture, with a small amount of arable including forage maize and is best suited to dairying and stock rearing.

The present water level management regime has been arrived at over very many years by trial and error, and is felt to offer a balance between the interests of agriculture and those of nature conservation. It should be recognised that the historic maintenance and water level regime have created the conditions favourable to the special interest: farmers believe that these should be continued with as little variation as possible.

During the summer months the water level is deliberately penned at a high level in the interests of stock watering, irrigation and wet fencing. A balance has to be struck between a level which is high enough to meet these needs, yet low enough to prevent flooding in times of heavy rain, and to permit access to the land to enable grazing to take place without poaching, and to allow silaging and haymaking to proceed at the appropriate times.

The long-standing practice of reducing the water level in the winter is considered essential for the following reasons:-

(1) To provide water storage in the event of heavy rain (both in the rhyne system and in the absorbency of the ground), in order to reduce the risk and severity of flooding
(2) To encourage growth of the grass and other crops in the spring
(3) To encourage deeper root growth in the grass and other crops
(4) To facilitate maintenance of watercourses
(5) To enable access to the land throughout the winter for normal farming operations

Flood Prevention Obligations

Water levels are lowered in winter to reduce flood risk and allow adequate storage capacity of run-off from commercial and residential developments. Where flooding occurs there is a high risk of pollution to waterways from the industrial and urban population.

Agriculture recognises the move towards conservation.
Where occupiers or groups of occupiers seek voluntarily to raise water levels within coherent blocks of land under their control, this should be supported provided that the raised levels can be obtained without detriment to adjoining occupiers not wishing to raise levels on their land. However, no occupier should be forced tinto a high water level regime against his or her will. The voluntary principle should be paramount.

Raised water level schemes require careful monitoring as they will reduce the capacity of the land to absorb rainfall and may increase the flood risk to the catchment area. Investment may be required in additional water level control structures.

The North Somerset Internal Drainage Board believe that the present arrangements best meet the needs of agriculture and the rural community and the increasing demands that the urban community impose upon it.

Conservation Adviser:
Edward Gallia
Block III
Government Buildings
Burghill Road
stbury on Trym
BRISTOL BS10 6NJ
Tel: 0117 959 1000 X 598

FWAG

Secretary:

Sue Rankine
2 Bowden Hill
Chilcompton
BATH BA3 4EN
Tel: 01761 2332

Avon Farming and Wildlife Advisory Group

Serving South Gloucestershire, Bath and North East Somerset, North Somerset and City of Bristol

Mrs G. V. Harris,
Mendip View Farm,
Kingston Seymour,
Clevedon
N. Somerset
BS21 6XH

2nd March, 1998

Dear Mrs Harris,

North Somerset IDB - Water Level Management Plan

I received your preliminary contact for the consultation process of the above plan which was forwarded to me from our Somerset group.

The Farming and Wildlife Advisory Group, FWAG, is a farmer led and orientated independent charitable organisation working with farmers and landowners to care for the countryside by identifying, improving and creating wildlife habitats and landscape features within a profitable (one wishes !) farming system. This is achieved by having a network of advisers providing such advice operating on a county basis. We still work to the boundaries of the former county of Avon (now 4 Unitary Authorities).

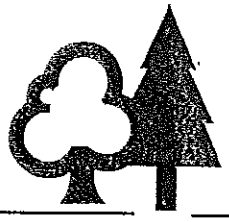
Our interest in the area that you have identified is, therefore, the conservation of wildlife and landscape on farms within the area and the promotion of "environmentally responsible farming". The habitats of interest are not only recognised "priority habitats", but also those areas on farms which contribute to the wildlife and landscape value, but are less recognised as doing so. Hence whilst raised water level schemes such as those promoted by the Wildlife Trust's North Somerset Levels and Moors project officer are welcomed and encouraged, we also look at the more mundane issues of habitat provision and environmentally responsible farming on all farms in the area identified.

Yours sincerely,

[redacted]

Edward Gallia
[Farm Conservation Adviser for "Avon" (as was)]

Forestry Commission
The Forestry Authority



West Country Conservancy
Mamhead Castle
Mamhead
Exeter
Devon
EX6 8HD

Tel: 01626 890666
Fax: 01626 891118

Conservator
Ken Buswell

Our Ref; PRA2/8/2

16th March 1998

Mrs G V Harris
Mendip View Farm
Kingston Seymour
CLEVEDON
BS21 6XH

Dear Mrs Harris

North Somerset IDB : Waterland Management Plan

Thank you for the opportunity to comment on this plan.

In fact, my area of responsibility stops at the current Somerset County Boundary, so I have passed it on to my colleague who covers this area. This is Bill Heslegrave, Severn Wye & Avon Conservancy, Crown Offices, Bank Street, Coleford, Glos, GL16 8BA, telephone number 01594 810983.

Yours sincerely

[redacted]

Ken Buswell
Conservator
The West Country

Copy: Bill Heslegrave, plus encs.

Ministry of Agriculture, Fisheries and Food
Regional Engineer
Quantock House, Paul Street, Taunton, Somerset TA1 3NX
Telephone: Taunton (01823) 330099 GTN: 1379
Fax: Taunton (01823) 351567

Mrs G V Harris
Clerk - North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
CLEVEDON
North Somerset
BS21 6XH

Your reference

Our reference TRE 97

Date 6. March 1998

Dear Mrs Harris

NORTH SOMERSET IDB - WATER LEVEL MANAGEMENT PLAN

I am writing to thank you for your letter of 24 February 1998 informing me of the programme for the development of the above plan and to acknowledge receipt of the interim statement dated January 1998.

I can confirm that I have no specific water management issues for you to consider but enclose herewith the copy of the procedural guide for water level management plans prepared by MAFF. You may already have a copy of this document but you may find a further copy useful.

Yours sincerely

[redacted]

D J Ayers
Regional Engineer

6-3-DJA/mel

Date 17 March 1998

Our Ref

Your Ref

Mrs GV Harris
Clerk
North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon
N Somerset BS216XH

The National Grid Company plc

South West Area Office
Power Services Divisio
Great Park Road
Bradley Stoke
Bristol
BS12 4QR

Tel 01454 200200
Fax 01454 200266
CTN 320 0 (Enquiry Nc

Dear Mrs Harris

North Somerset IDB - Water Level Management Plan

Thank you for your letter dated 24 February 1998 concerning the above plan which has been passed to this office.

National Grid has no apparatus in the area of the IDB and therefore has no comments to make on the proposal.

If you have any queries please contact me again.

Yours sincerely

[redacted]

H.A. Landers (Miss)
Wayleaves

SOUTH WEST REGION
Agriculture House
Pynes Hill-Rydon Lane
Exeter EX2 5ST

Telephone: 01392 440700
Fax: 01392 440701

Mrs G V Harris
Clerk
North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon
NORTH SOMERSET BS21 6XH

Our Ref: MJE/SEW/BR11/6

Date: 1 May 1998

Dear Mrs Harris

NORTH SOMERSET IDB - WATER LEVEL MANAGEMENT PLAN

I apologise for this last minute response to your consultation on the above.

Whilst the NFU represent farmers in this area, this is a function also exercised of course by the farming members of the Internal Drainage Board and therefore specific issues should be addressed at the local level.

Having said that, in general terms the management plan should primarily describe the existing water levels and how these are being managed and then go on to determine the management required to maintain these levels.

There may be some areas that will, or could be, identified by some interests as having potential for ecological improvement. It is important that any such proposal fully investigate the consequences for neighbouring land and that consensus is reached before the proposals are implemented.

There is obviously a very fine balance between maintaining enhanced water levels that satisfy conservation interests and avoiding prolonged flooding, as well as (as your interim statement identifies) striking a balance between maintaining an adequate water supply in higher parts of the area without waterlogging lower parts.

Yours sincerely

[redacted]

MIKE ELLINGHAM
Senior Technical Adviser

[f:sew2449d.doc]

Date: 22 September 2000
My Ref: p&e/alsop22091
Your Ref:

Contact: Celia Dring
Direct dial: 01275 888 546

North Somerset COUNCIL

CHIEF EXECUTIVE
Paul May
PO Box 137
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Weston-super-Mare
Somerset BS23 1DY
DX: 8111 Weston-super-Mare
Tel: 01934 888 888
Fax: 01934 888 822
www.n-somerset.gov.uk

Mr D Alsop
10 Angel Crescent
Bridgwater
Somerset
TA6 3 EW

Dear Mr Alsop

NORTH SOMERSET INTERNAL DRAINAGE BOARD
NORTH SOMERSET WATER LEVEL MANAGEMENT PLAN
NORTH SOMERSET COUNCIL CONTRIBUTION

Thank you for the opportunity to comment on and add to the North Somerset water level management plan

Should you require any additional information please do not hesitate to contact me, however I hope the following comments are useful:-

Nature conservation and environment

A work programme which details the timing and nature of work on watercourses would be useful. Consultation on such a programme could help all involved to advise on measures that could maximise and safeguard the nature conservation values of each watercourse.

Such measures should be considered for all watercourses within the North Somerset Levels and Moors area and not just the stretches of watercourses in designated sites.

Tim McGrath of the Avon wildlife Trust put forward some good comments in his letter of the 3rd June 1998. I am not sure that all of the issues raised in his letter have been covered and I would recommend that you refer back to this letter to perhaps add to some of the issues you have listed.

Commerce and industry

The North Somerset Local Plan allocates land for development up until the year 2001. The main allocated employment sites within North Somerset are at Portishead; Royal Portbury Dock; South Clevedon; Locking Castle, Weston Airfield, Winterstoke Road, and West Wick at Weston-super-Mare.

A review of this plan has commenced which will allocate the necessary land for development up until the year 2011. The review will need to follow the advice of the Replacement Structure Plan which broadly directs development in the county that used to be Avon up until 2011.

Employment sites on the North Fringe of Bristol have been rapidly taken up in contrast with sites elsewhere which have had a relatively slow take-up. This in turn has lead to traffic congestion around the North Fringe. The replacement structure plan therefore emphasises the need for further employment development to be directed away from this area towards Weston-super-Mare. It will be necessary to reassess the housing and employment allocations to ensure that appropriate employment sites in attractive locations are identified.

Housing

The main housing sites allocated in the North Somerset Local Plan are at Portishead, Locking Castle and St Georges at Weston-super-Mare, North West Nailsea, Elborough at Hutton, Woodborough Farm at Winscombe. The Council resisted pressure from developers, during the preparation of this plan for large areas of land to the south of Clevedon to be allocated for housing development.

The implications for North Somerset of the Secretary of State's direction to increase revised Replacement Structure Plan housing numbers up to the year 2011 have yet to be worked through. Once agreed, investigation into any additional sites that North Somerset needs to find will take place (in conjunction with the relevant consultees) as part of the local plan review process.

Recreation

Provision for sport and recreation is increasingly recognised as a significant factor in enhancing quality of life and the demand for recreation and leisure opportunities has been rising steadily over the last two decades. An important function of the planning system is therefore to ensure that adequate land and water resources are available, both for organised sport and for informal recreation in the countryside. The North Somerset local plan addresses deficiencies in provision where these are known and the forthcoming review of the local plan will need to address provision up to the year 2011.

Transport

I would broadly agree with the comments you have already made here. However if you need details of particular roads liable to flooding then perhaps you could contact me again.

I hope these comments will be useful, however if you need any additional information please do hesitate to contact me,

[redacted]

Paul May
Chief Executive

INTERNAL MEMORANDUM

North Somerset COUNCIL

To:	Mrs G V Harris	From:	Samantha Jarvis
Cc	Mike Oxford		
		Tel Ext:	8551

Date: 26 March 1999

NORTH SOMERSET IDB – WATER LEVEL MANAGEMENT PLAN

Dear Mrs Harris,

Thank you for your recent copy of the interim statement for the North Somerset IDB Water Level Management Plan, (WLMP). I am sorry that you have not had an earlier response from myself or Mike Oxford. North Somerset Council is very keen to work with the IDB's to protect and enhance the ecological value of the North Somerset Levels.

I would like to refer to Tim McGraths letter to you, dated 3rd June 1998 regarding this Plan and stress that we fully support the points that Tim raised within that letter. I am uncertain as to the final format of the WLMP, but would find it very helpful if it included a detailed work programme, which clearly stated which lengths of watercourse will be worked on, with the timing and nature of the work. Consultation on such a programme would help us to advise on simple measures that could be incorporated to maximise and safeguard the nature conservation value of each watercourse. Such measures could include working from alternate banks in different years, leaving one bank uncut, leaving clumps of marginal vegetation and possibly reducing the amount of maintenance where feasible. Sites within SSSI's, SPA's and SNCI's are obviously our richest sites which need protection but such measures should also be considered to benefit all watercourses within the North Somerset Levels and Moors area.

In making the above comments, I do recognise that North Somerset IDB already implements sensitive management of many watercourses and that the primary reason for such management is flood defence. I look forward to working with you to build on this past success and would welcome invitation onto the 'Group of Major Interests' to do this.

Yours Sincerely

[redacted]

Samantha Jarvis
Ecologist & Countryside Officer

C:\My Documents\NSIDBWLMPRESPONSE.doc

North Somerset Council

Environment Group
Vince Russett, Archaeological Officer

Tel: 01275-888523
Fax: 01275-888502
E-mail: environment.group@n-somerset.gov.uk

MEMORANDUM

TO: Mrs G V Harris, Clerk to North Somerset IDB

DATE: 08 March 1999 TIME: 9:40 AM

SUBJECT: Water Level Management Plan

Dear Mrs Harris,

Thank you for your recent copy of the consultation on the Water Level Management Plan, and my apologies for the extraordinarily protracted time it has taken to reply. My authority is very keen to work with the IDBs on matters concerning the management and enhancement of the cultural resource (both above and below ground) in the North Somerset Levels.

The 'Levels' (here defined as 'all that area of North Somerset lying below the 8m contour, on geology usually of alluvial origin') has not traditionally been valued as an area likely to contain important historic or archaeological sites and landscapes, and this has coloured approaches to the management of the area in the past.

Increasingly, however, the results of archaeological research (by Exeter and Bristol Universities), and of archaeological investigations carried out in advance of development, are showing that not only is the archaeology of the Levels very extensive indeed, it is also extremely important, because the continuous waterlogging of the alluvium and peat has preserved organic materials that do not survive on traditional 'dry-land' sites, such as plant materials, wood, leather, seeds and other materials.

You will understand from the above that the management of the water level within the IDB area is a critical matter for the archaeological resource.

It is therefore imperative that the sympathetic management of archaeological sites, structures and landscapes in the IDB area be integral to the functions and policies of the Board (under the duties laid out in the Land Drainage Act 1994, Part IV a Duties with respect to the Environment and Recreation 61A Clause 1b and 2b)

North Somerset Council has adopted an Archaeological Guidance Note *Archaeology and Development in the North Somerset Levels* (1997), which commits the authority to the use of the planning system to better manage the wetland resource of the North Somerset Levels, both cultural and biological. I have included a copy with this letter.

In practical terms, the following would greatly enhance the ability of the Councils archaeological service to assist in the management of the resource by the Board.

- More regular communications between the Archaeological Officer and the Board, to offer advice on specific issues

- A formal archaeological management plan for the IDB

- Advice from the IDB to the Archaeological Officer on the rhyne management programme and times of specific pieces of work, in order to promote better archaeological monitoring, possibly in partnership with the Universities.

It is suggested that movement towards this would best be achieved through representation for archaeology in the Group of Major Interests, and I would be very happy to help with this.

[redacted]

Vince Russett
Archaeological Officer

ARCHAEOLOGICAL GUIDANCE NOTE 3

ARCHAEOLOGY AND DEVELOPMENT IN THE NORTH SOMERSET LEVELS

> Those impacts on the environment which may be irreversible or difficult to undo, should be treated with particular care...future generations may value the lost resource more than the development that replaced it
>
> *PPG12 Development Plans and Regional Planning Guidance (1992) 6.8*

SUMMARY

The North Somerset Levels, a low lying group of mostly coastal plains, present unusually difficult archaeological problems in the planning and implementation of new development, as although it is very clear that many potentially important buried archaeological sites and landscapes exist there, it is extremely difficult to identify them without archaeological evaluation. Because of this, and of the sensitivity of the buried archaeology in this area, PPG16, Structure Plan Policy BE4A and Woodspring Local Plan Policy ARCH3 indicate that, unless there is good evidence of the absence of archaeological deposits and structures at the site, all groundbreaking developments in the area of the levels, and those proposing major changes to drainage regimes, will require archaeological assessment prior to determination of applications. The provision of a framework for archaeological studies in the area, for use by all archaeological interests, will ensure maximum benefit from the resources invested in archaeological study of all kinds in the area.

THE NORTH SOMERSET LEVELS AND THE ARCHAEOLOGICAL RESOURCE

Introduction

The North Somerset Levels are a group of low lying areas in the authority area, mainly coastal, but including some inliers behind coastal hill-ridges, such as the Gordano Valley east of Portishead.

They are flat in appearance, usually with networks of surface waterways or rhynes, straightened rivers, sets of drainage features within the fields, and few large settlements. Geologically, they are largely very recent, comprising clays, peats and occasional alluvial gravel fans, with areas of blown sand in Kewstoke and Weston-super-Mare.

Geographic areas

The Levels include the following geographically distinct areas:

i) Land in Bleadon and Weston-super-Mare parishes to the south of Bleadon Hill and to the north of the river Axe.

ii) Land in Loxton, Banwell and Winscombe parishes, in the lower valley of the Lox Yeo.

iii) The North Somerset Levels, in the parishes of Banwell, Puxton, Congresbury, Yatton, Weston-super-Mare, Locking, Kewstoke, Wick St Lawrence, Kingston Seymour, Kenn, Clevedon, Nailsea and Tickenham, a geologically more complex zone, with clay, peat and gravel in different areas.

iv) The Gordano Valley, in the parishes of Clapton-, Walton-, Easton- and Weston-in-Gordano, Portbury and Portishead.

The areas of the Levels at the coast are marginally higher than those inland (see Appendix 2). The slightly higher areas tend to be sand dunes (as at Weston-super-Mare), gravel or bedrock islands (Kenn), or clay (Kingston Seymour), whereas the inner Levels are of deeply deposited peat (Kenn Moor). The Levels are not completely flat, however, and subtle changes in relief, due to factors such as underlying geology can be observed in most of the coastal belt. The slightly raised areas are very often settled from an early period, and are also responsible for the difficulty in modelling water movements in surface drainage.

This lack of relief means that the Levels and the coast are extremely vulnerable to changes in sea level. The difficulty of drainage, in particular of the lower-lying peat moors, through the coastal zone has led to general high water tables and waterlogging throughout the area, with profound implications for the wildlife and cultural resources of the area.

Archaeology

The archaeology of the North Somerset Levels presents considerable difficulties of access and interpretation. This is because much of the visible landscape is of medieval (from the tenth century AD and later) date and is primarily under pasture, with the exception of the industrial / retail areas to the south and west of Weston-super-Mare, and the heavily built up area of Worle and Weston-super-Mare. Increasingly, however, landscape elements of Saxon or even Roman date are being recognised, and current work at Banwell, for example, is beginning to show the existence of Roman landscape elements that have continued to influence development patterns down to present time. This appears, though, to be the earliest date at which a recognisable levels landscape existed: sea water penetrated far enough inland at Puxton for active salt-making to be undertaken there in the pre-Roman Iron Age.

The archaeological evidence of pre medieval human activity on the English side of the Severn Levels is attested by sites recorded in excavation for clay (e.g. at Banwell brickworks in the 19th century), by recent archaeological examination of several major civil engineering projects such as the Second Severn Crossing approach roads and the Weston-super-Mare Primary Distributor Road, and through the work of the North Somerset Archaeological Project, which has been carrying out archaeological survey and recording in the coastal zone. Surviving landscapes of Roman and later date have been identified in the Levels by the work of Stephen Rippon of Exeter University at Banwell, Puxton and Kenn.

The high water levels are also responsible for the higher than average occurrence of water management features surviving as archaeological sites, such as straightened rivers, fishponds, decoy pools, flood prevention earthworks and the like.

The zone immediately along the edge of the Levels is also of high archaeological potential, being a favoured zone for occupation throughout history, as can be seen from the siting of churches and villages at Congresbury or Weston-in-Gordano, or the prehistoric burial area at Bleadon.

Special features of the Levels archaeology

The earlier archaeology of the Levels is often buried by later deposition of alluvial clay, but the standard archaeological prospecting techniques which would reveal prehistoric and Romano-British sites in arable areas (the aerial photography of crop marks and the field observation of surface scatters of pottery or other artefacts) are usually not available where this is the case.

Some progress is being made with remote sensing techniques, such as resistivity survey, which may in time aid in the understanding of the three dimensional structure of the Levels. Although earlier work, from examining borehole and geotechnical pitting results, seemed to indicate that the model of the structure of the Levels was fairly simple and predictable, more data is making the picture far less clear, and the structure of specific areas, or even the existence of (say) peat deposits at a site, cannot be predicted with present knowledge. Neither are upstanding earthworks or structures of the earlier landscapes often visible, except when they are very large, such as some relict river courses.

It is further the case that archaeological sites on the Levels are potentially of more than usual importance because they are likely to be waterlogged or form part of the various peat strata of the area. Evidence which does not survive on "normally" dry archaeological sites (organic materials, such as wood, leather, fabrics and even animal tissue) illuminates whole areas of past human activity which are not usually represented in the archaeological record. This evidence is nationally rare, and therefore where it survives, it is of great significance.

The palaeoenvironmental evidence preserved in these waterlogged deposits (such as the peats, where macrofossils, such as 'bog oaks' and other wood, leaves, pollen, beetle and other materials survive) is critical for the understanding of the natural environment and the effects of human activities upon it, from the end of the Ice Age about 12,000 years ago up to the present, and forms the background against which current changes in climate, wildlife and other natural environmental features can be properly assessed. This palaeoenvironmental resource is in fact the only source of direct positive information on the past environment obtainable, and thus has an importance beyond its archaeological value.

In the areas of alluvial gravel fans and riverine gravel terraces, although the archaeology is usually at or near the current ground surface, it has usually not been studied in detail. The sequence of gravel deposition, which has usually happened within the last half a million years (and often within the past 12,000 years), is well

within the known span of human occupation of North Somerset, but is not well understood. The northern end of the Gordano valley / Avon valley contains part of the internationally important Lower Avon gravel deposits, of lower Palaeolithic date, and containing huge numbers of flint tools of the date.

The buried landscapes that comprise the archaeology of the levels usually do not end at the sea walls, but are exposed at various distances out from the shore by tidal erosion / deposition cycles, and the archaeology of the two areas should be considered to be a seamless continuum for the purposes of development control.

All archaeological studies carried out in the area have indicated that a far larger number of archaeological sites exist in the buried landscape than had been previously thought; and they also indicate that it is also difficult to predict, in the light of present knowledge of the archaeology of the area, just where, and how deeply buried, they will be.

In general, the recent geological sequences of the levels are also extremely varied and difficult to model, the current flat appearance simply reflecting the most recent episode of deposition of clays, whereas the buried landscapes are far more varied in topography, with localised gravel and bedrock islands often protruding to within a few centimetres of the surface.

Specific reference to the importance of the North Somerset Levels as an archaeological resource is made in the Woodspring Local Plan, Chapter 6.12-13, which also refers to the predecessor of this paper, AGN1: *Archaeology and development in the Avon Levels.*

APPROACHES TO ARCHAEOLOGICAL ASSESSMENT IN THE NORTH SOMERSET LEVELS

Current Policy and procedures

It is now standard policy guidance that in cases where there may be an effect on the archaeological resource, applicants may reasonably be required to provide an archaeological assessment of the impact of their proposals, as laid down in Planning Policy Guidance Note 16 (1990).

The same PPG lays down guidelines setting out the importance of preservation of the archaeological resource *in situ* where possible, and where not, the sequence of archaeological assessment and subsequent procedure to be followed. The procedure is explained more fully in the Explanatory Memorandum to the Third Alteration of the Structure Plan.

The other relevant PPG, No. 20 (Coastal Planning), also applies to areas of land inshore from the sea walls, as well as estuarine areas and shorelines. This invokes PPG16 for archaeological purposes and also clearly emphasises the importance of conservation of natural and heritage features in planning decisions concerning the coastal zone. The inland boundary to the coastal zone is delineated in the proposed amendments to the Woodspring Local Plan (August 1995).

Geotechnical trial pitting and other site investigation works such as bore holes should *not* occur without prior approach to the appropriate local authority for consultation regarding the archaeological implications: the trial pitting may need to be resited to avoid known areas of archaeological sensitivity; frequently, the archaeological recording of such pitting will form part of the necessary archaeological evaluation.

Assessment

Modern construction practices tend to be far more destructive than any previously known, involving larger structures, deeper foundations, more extensive service trenching, and increasingly, large scale landscaping and changes in drainage regime, thus posing a far greater threat to the archaeological resource in the Levels, than at any previous time. In the Levels, the effects of piling may also be critical in affecting the waterlogged status of buried sites, especially in cases where there are perched water tables with dryer elements below, separated by impervious bands of clay until piled through.

In addition, the perception of the Levels as a flat and uniform area of little worth other than as land dividing more interesting and valued upland areas, and only fit to be the subject of development or 'regeneration' has not yet disappeared, and applications for extracting clay and / or peat on a large scale (for whatever reason) will undoubtedly continue to be made.

On the North Somerset Levels and Severn shore, for reasons laid out above, any groundbreaking development above a minimal size, should be subject to archaeological assessment before the determination of any planning application, as this is the only realistic way that information regarding the effect of the proposals can be obtained.

Role of the SMR

The local authority SMR (as referred to members at P, H & T of July 1996), is both the first source of archaeological information concerning the North Somerset Levels, and the appropriate repository for new information from archaeological assessment and other sources. Where geotechnical investigation is carried out (for example), permission for associated development in the Levels should carry requirements (by condition) for the deposition of trial pit and borehole logs with the SMR, where the gradually developing database will eventually become an invaluable tool for the study and understanding of the Levels. Where permitted development (such as the construction of pipelines) takes place, the developers should equally be encouraged to deposit such information with the SMR.

Strategic approach

The archaeological investigation of sites and monuments, whether for the purposes of academic research, or in pursuit of detail to inform planning decisions, is frequently carried out on an ad hoc basis, with ill-defined agendas. For a nationally important area such as the Levels, it is important that a comprehensive research agenda be developed so that a coherent planned approach to their proper conservation can be carried out.

As a result of the lack of such a framework in the Levels, the archaeological service within the Environment Group has, in consultation with the Universities of Bristol and Exeter (who both have currently active research programmes in the North Somerset Levels), drawn up such a framework. It is anticipated that this programme of research will be directly related to and driven by, the local authority Sites and Monuments Record, which will in turn become a vital element in the carrying out of archaeological works within the Levels.

Opportunities

The coinciding requirements of wildlife, landscape and archaeology in the levels offer an opportunity to take a holistic approach to the protection and management of this fragile and nationally rare landscape. All rely on the existence of a high water table, a traditional landscape with most field boundaries comprised of ditches, and the existence of many ancient hedges composed of shallow rooting wetland shrubs and trees.

In particular, schemes to enhance wildlife by raising water levels are to welcomed and encouraged, as these frequently enhance the preservation of the archaeological remains in the area by ensuring that desiccation does not occur (or at least, is less frequent). Such schemes (for example, the Cadbury Farm scheme at Yatton, initiated through the North Somerset Levels and Moors Project) might well be initiated for the purpose of management of the cultural resource, as well as for the purposes of enhancement of wildlife.

The incorporation of archaeological advice into management plans for wildlife sites, such as the Tickenham Moor SSSI will help to manage the resource, and research partnerships, such as the North Somerset Archaeology Project, to help define it.

Educational activities, such as guided walks, will help to increase public perception of the value of the Levels as an important landscape in its own right, leading to more sympathetic attitudes towards the conservation of the landscape of the Levels during development taking place there, or immediately adjacent.

Contacts: Vince Russett (Archaeological Officer) Planning and Environment Directorate.

18 February 1998

DoE 1990 — Department of the Environment, *Archaeology and Planning*, Planning Policy Guidance number 16 November 1990

DoE 1992 — Department of the Environment, *Coastal Planning*, Planning Policy Guidance Note 20

DoE 1997 — Department of the Environment, *General Policy and Principles*, Planning Policy Guidance Note 1

RAILTRACK

Great Western

North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon
North Somerset
BS21 6XH

Area Liability Manager
Railtrack GW
Room 303
Bristol & Exeter House
Temple Meads
Bristol BS1 6QF

Tel No. : 0117-9348817
Fax No. : 0117-9348839

Your Ref.
My Ref :ALM/98/984/RJC

Date: 17th March 1998

Dear Mrs Harris,

NORTH SOMERSET IDB - WATER LEVEL MANAGEMENT PLAN

I thank you for your letter with attachments, dated 24th February 1998, the contents of which are noted.

Railtrack has obvious property interests through this area and in particular if any drainage concerns occur then please contact me on my telephone number above. Similarly if I have issues which require your advice/consultation then I shall contact your offices on the number and address shown on your letterhead.

I thank you for the information sent and please contact me on my telephone number above if you wish to discuss any particular matter further.

Yours sincerely,

[redacted]

Richard Cole
Area Liability Manager

The Ramblers' Association
Working for Walkers

The Ramblers

Clevedon Group
Val Norman. Secretary
3 Princes Road
Clevedon
North Somerset
BS21 7SY Tel. 01275 874124

Somerset Area
Groups:
Clevedon • Mendip
Sedgemoor • South Somerset
Taunton Deane • West Somerset
Woodsprings

06 March 1998

Mrs G V Harris
Clerk to the North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon

Dear Mrs Harris,

NORTH SOMERSET IDB - WATER LEVEL MANAGEMENT PLAN

Thank you for the information about the above.
I am now the Secretary of the Clevedon Ramblers Group, having succeeded Mr Abbott, who passed your letter on to me.

The co-ordinator of Footpath issues for the Ramblers in North Somerset is
Mr J Dyer, 3 Harmony Drive
Portishead BS20 8DH.
You may already have his name.

The particular interests of our group are preservation of the footpaths in the area, though we are also interested, as are most groups who take their recreation in the countryside, in the protection of the countryside itself.

I am sure that the North Somerset IDB will do nothing to interfere with either of these objectives.

Best Wishes,

[redacted]

Mrs Val Norman, Secretary Ramblers' Association Clevedon Group.

Registered charity number 306089

Serco Gulf Engineering Limited | Tel 01865 378352 | Fax 01865 371401
Islip Depot | Bletchingdon Road | Islip | Oxon OX5 2TQ

Our Ref: AN/TPA/98/030/RBFB

Date: 10 March 1998

To: Mrs G V Harris
North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon
North Somerset, BS21 6XH

Dear Sirs

We refer to your letter dated 24 February 1998 reference _____

and as Operator for the Government Pipeline and Storage System (GPSS) we would advise you that there is a Government Oil Pipeline which may be affected by your Works at
Clevedon, Tickenham, Nailsea, Cleeve

Government Oil Pipelines are protected under the Land Powers (Defence) Act 1958 and in particular under Section 16 which normally requests that consent is given prior to any works taking place which affect the pipeline. Certain agreements must be obtained and conditions met before a consent can be granted.

The granting of a consent and the supervision of the works by the operator are free of charge for up to 3 site visits.

Please contact us at least 6 weeks prior to commencement of works in order to avoid delays to your work programme.

We enclose:-

a) your plans duly marked ☐

b) plans showing the approximate location of the pipeline ☑

c) a copy of Special Requirements for Safe Working in Close Proximity to High Pressure Pipelines ☑

d) a copy of the Serco Gulf Engineering Ltd Site Supervision Agreement for your signature ☐

Yours faithfully
SERCO GULF ENGINEERING LIMITED

[redacted]

ALAN NOBLE
Technical Assistant

Encl:

INT2/6.8.97.

SWEB

Avonbank Office
Feeder Road
Bristol
BS2 OTB

Telephone 0117 971 8905
Fax 0117 972 1397

Mrs G.V. Harris
Clerk to North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon
BS21 6XH

MJP

Date

21 April 1998

Dear Mrs Harris

Thank you for your letter dated 24th February 1998 regarding the development and management plan for the parishes of Clevedon, Tickenham, Nailsea, Cleeve, Yatton, Kenn and Kingston Seymour.

Please find enclosed 1: 10,000 scale plans of the areas indicating the location of our plant and equipment. Please note that solid lines indicate overhead cables (of all voltages), dotted lines indicate underground cables (of all voltages), circles are pole mounted transformer substations and squares indicate ground mounted transformer substations. Voltage levels are indicated by the thickness of the lines, code letters and numbers.

Our concerns at present are mainly in three areas. Firstly, any raising of the water table could lead to difficulties with us gaining access to our equipment across water logged land. This could cause major problems during fault conditions and delay restoration of customers' supply. This could also lead to a faster deterioration of our equipment, e.g. increase risk of rot in wooden poles.

Secondly, we would like to be consulted if an area in close proximity to our equipment is being designated as a wildlife sanctuary. This is because bird strikes on our overhead lines can sometimes cause supply interruptions of short duration. Another problem, and a danger, can be caused by the equipment used by fishermen around lakes and waterways coming in contact with our overhead lines.

My third point of concern is if a new water course is to be constructed it may cause problems with our equipment and we may need to carry out alterations or remedial work before your works can proceed.

If any of these issues are planned in the future please contact us to discuss individual issues. Please contact either the Planners for this area, Barry Mansfield on 0117 9718994 or Jeremy Smith on 0117 9718996, or the Distribution Manager for West Mendip Mark Shaw on 0117 9718979, or his local Manager Phil Thorne on 0345 448968.

Yours sincerely

[redacted]

Mark Phillips
Distribution Manager
West Bristol

Transco

Our Ref:- NRSWA/W6/23442
Your Ref:-

P. O. Box 502
Malago House
Bedminster Road
Bedminster
Bristol
BS99 5RS

Telephone 0117 953 5444

Mrs G V Harris
North Somerset Internal Drainage Board
Mendip View Farm
Kingston Seymour
Clevedon
BS21 6XH

06 March 1998

Dear Sir/Madam,

WATER LEVEL MANAGEMENT PLAN

We acknowledge receipt of your inquiry on the 05/03/98, and return herewith one copy of our drawing which we have indicated the approximate position of existing gas mains and would request that care is exercised when working in the vicinity of these mains.

In this respect our schedule is also attached which indicates the minimum requirements for the protection of our underground plant, and your attention is also drawn to the liability clause stamped on the plan.

We do not show service pipes on our drawing but their presence should be anticipated. Where the site is indicated as being fed by another Private Gas Transporter (PGT) you should contact that company for details of their mains as we do not hold these on file.

Will you please inform us of your actual date of commencement as soon as possible. If necessary arrangements can be made for our staff to inspect our plant on site as work progresses.

Should you require any further details or information regarding our mains and services please contact Network Records at the District Office, Telephone No. 0117 953 6842.

Yours Faithfully

[redacted]

Andrew Read
Network Assistant
Transco W6 District

Transco operates in the UK
and is part of BG plc

BG plc
Registered in England No. 2006000
Registered Office
100 Thames Valley Park Drive
Reading, Berkshire RG6 1PT

APPENDIX 7 – GLOSSARY

AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
CTC	Clevedon Town Council
CPRE	Council for the Preservation of Rural England
CWS	County Wildlife Site
DEFRA	Department for Environment Food & Rural Affairs
EA	Environment Agency
ESA	Environmentally Sensitive Area
FRCA	Farming & Rural Conservation Agency
FWAG	Farming & Wildlife Advisory Group
IDB	Internal Drainage Board
LNR	Local Nature Reserve
GMI	Group of Major Interests
GPSS	Government Pipeline & Storage Network (oil)
MAFF	Ministry of Agriculture Fisheries and Food (now DEFRA)
NNR	National Nature Reserve
NSIDB	North Somerset Internal Drainage Board
ODN	Ordnance datum Newlyn
Ramsar	(EC – wetland)
RDS	Rural Development Service (DEFRA)
RWLA	Raised Water Level Area
SAC	Special Area for Conservation (EC)
SCC	Somerset county Council
SERC	Somerset Environmental Records Centre
SGE	Serco Gulf Engineering (maintenance contractor for GPSS)
SMR	Sites and Monuments Record (County archeological database)
SNCI	Site of Nature Conservation Interest
SPA	Special Protection Area (EC - birds)
SSSI	Site of Special Scientific Interest
WES	Wildlife Enhancement Scheme (EN)

APPENDIX 8
TIMETABLE FOR COMPLETING THE NORTH SOMERSET WLMP

NO	ITEM	TARGET DATE FOR COMPLETION
	Re-draft and re-issue Summary Table of Objectives to Group of Major Interests for comment	22nd April 2002
	Return responses to Summary Table of Objectives	17th May 2002
	Assess responses to amended Summary Table of Objectives	31st May 2002
	Finalise Summary Table of Objectives as required and formally issue WLMP to EN for approval	7th June 2002
	Obtain EN approval ("signing off")	14th June 2002
	Issue agreed WLMP to Group of Major Interests Inform DEFRA that issue has taken place Inform original consultees that issue has taken place	30th June 2002

TIMETABLE FOR PREPARING THE PROGRAMME FOR IMPLEMENTING AND REVIEWING THE NORTH SOMERSET WLMP

NO	ITEM	TARGET DATE FOR COMPLETION
	Group of Major Interests meets to begin Implementation & Review process Draft Implementation Plan produced. Aspects needing co-ordination identified. Organisations identified in the WLMP as being involved in implementation (IOs) reminded of their respective commitments	Late July 2002
	IOs consider in detail the implications of carrying out their respective commitments, and report back to the Group of Major Interests (GMI) with their own detailed programmes	30th September 2002
	GMI considers reports from the IOs and produces agreed Implementation Programme	30th November 2002
	GMI reviews needs and progress and amends Implementation Programme as necessary	Annually

APPENDIX 9 – PHOTOGRAPHS OF DRAINAGE BOARD CONTROL STRUCTURES

(PRESENTED IN ALPHABETICAL ORDER)



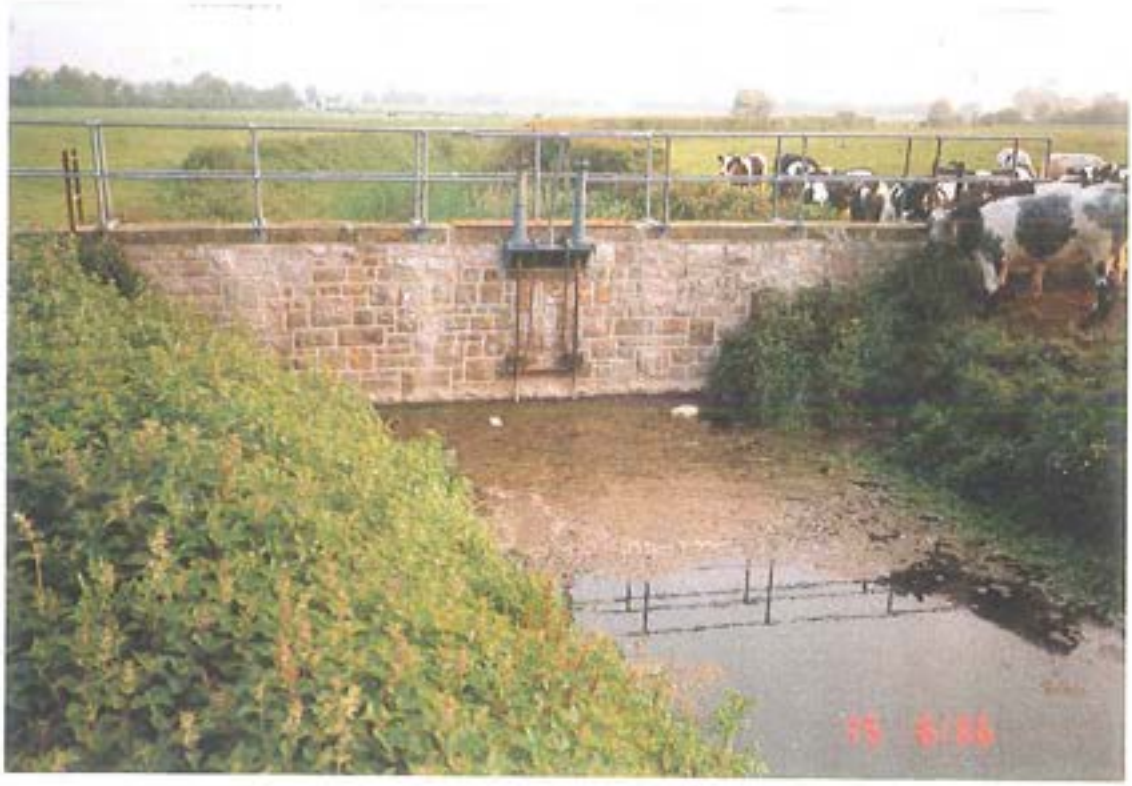
CAUSEWAY (BOARDS)



CLEVEDON BOUNDARY



CLEVEDON DRAINAGE



CONGRESBURY INLET (HATCH)



COOK'S LANE (HATCH)



CROSSMAN'S HATCH



CROSSMAN'S HATCH



HAM BOW HATCH



JACKLANDS (BOARDS)



LAMPLEY BOW HATCH



MAWKINS (BOARDS)



MEADMOOR HATCH



MENDIP VIEW HATCH



MILL LEAZE HATCH



NEW RHYNE HATCH



PAIGES HATCH



RUST HATCH



SPENCERS SLUICE (BOARDS)



THIRTEEN ACRE HATCH



TRIGGOLS CUT HATCH



WEMBERHAM LANE HATCH



YEO BANK HATCH

NORTH SOMERSET INTERNAL DRAINAGE BOARD

WATER LEVEL MANAGEMENT PLAN

APPENDIX 10

PROGRAMME FOR IMPLEMENTATION & REVIEW

APRIL 2003

Introduction

Defra High Level Target No 10 requires relevant operating authorities "---to have in place a detailed programme for implementing and reviewing WLMPs for SSSIs for other (ie non- European and Ramsar) sites by 1st April 2003".

This document is issued in recognition of this target. It is formatted as an appendix to the Water Level Management Plan, published in September 2002 and should be read in conjunction with that document.

Consultations

This programme has been prepared and agreed by the Group of Major Interests which comprises representatives from the North Somerset IDB, English Nature, the Environment Agency, North Somerset Council and the Avon Wildlife Trust. The Conservation Officer of the South Western Branch of the Association of Drainage Authorities attends Group meetings in an advisory capacity.

Progress to Date

ITEM	DATE
WLMP	
Interim Statement to MAFF	Feb 1998
External consultations commenced	May 1998
Preparation of Plan commenced	June 1998
Draft issued to Group of Major Interests (GMI)	Oct 2000
First meeting of GMI	Nov 2000
Revised draft	April 2002
Timetable for completion to Defra	April 2002
Adoption by IDB	Oct 2002
Signing off by EN	Nov 2002
Formal issue	Dec 2002
IMPLEMENTATION & REVIEW	
Timetable for preparation of review programme to Defra	April 2002
First review meeting	Jan 2003
Second review meeting	Mar 2003
Implementation & Review programme issued	July 2003

Implementation & Review Programme

This is based on the Summary Table of Objectives – see WLMP page 15.

Where activities are described as "ongoing" it is considered that the agreed objective will be achieved as a result of the Board pursuing its normal policies, in liaison with relevant consultees.

Abbreviations used in table:

AWT	Avon Wildlife Trust
Defra	Department for Environment Food and Rural Affairs
EA	Environment Agency
EN	English Nature
GMI	Group of Major Interests
IDB	North Somerset Internal Drainage Board
n/a	Not available
NSC	North Somerset Council
SWADA	South Western Branch of the Association of Drainage Authorities
SSSI	Site of Special Scientific Interest
WLMP	(North Somerset) Water Level Management Plan

REF	AGREED OBJECTIVE	PRIORITY	COMMENTS / ACTIONS	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION	TIMING	COST
1	Achieve and maintain appropriate water levels for the continuation of viable agricultural activities.	High	This objective will be achieved by the normal pursuit of the established policies of the IDB and EA. For instance any change of water level proposed by a third party would be subject to formal consent, when a scrutiny of the implications for all interested parties would form part of the determination process. The specific problem concerning the penning levels at Cooks Clyse on the Yearling Ditch is being addressed in association with proposals for amenity enhancement in Clevedon (see item 9). A working group has been convened by the EA to consider proposals for remedial measures. Relevant organisations are represented.	EA / IDB EA + others	Ongoing 2003/04	£0 £n/a
2	Encourage the extension of agri-environmental schemes within the Plan area	High	DEFRA is planning to introduce new agri-environment schemes. All parties are consultees in this process and are committed to ensure that their respective responses contain appropriate recommendations.	All members of GMI	2003/04	£0
3	Maintain appropriate water levels to safeguard existing man-made assets and infrastructure	High	This objective will be achieved by the normal pursuit of the established policies of the IDB and EA. For instance any change of water level proposed by a third party would be subject to formal consent, when a scrutiny of the implications for all interested parties would form part of the determination process.	EA / IDB	Ongoing	£0

REF	AGREED OBJECTIVE	PRIORITY	COMMENTS / ACTIONS	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION	TIMING	COST
4	Minimise watercourse bed exposure during winter months	High	Problems on IDB rhynes are restricted to Claverham Drove Rhyne and Middle Rhyne. Remedial measures to be identified and costed for inclusion in future IDB works programme. Other problems are known to exist on private ditches. Those in SSSI areas are priority. In these cases IDB and AWT have agreed to note any problem ditches they come across. If these are in a SSSI zone EN to be informed and will action, resources permitting. If outside SSSIs AWT will action, resources permitting.	IDB IDB / AWT / EN	Late 2003 Ongoing	
5	Encourage the development of raised water level / water level management schemes	Med	Suitable areas to be identified within the SSSIs. Requisite water level management changes and issue of consents.	EN IDB	Ongoing As requd.	
6	Improve water quality generally in the systems	Med	Problems to be investigated by ad-hoc working groups. Known problems exist at Nailsea (contaminated storm water discharges to Tickenham Moor), River Kenn d/s Kenn Pier, M5 drainage outfall and Land Yeo in Clevedon. Only last named has an established working group (see item 9). Criteria for target water quality to be identified. All parties to check their respective involvement to date. Working groups to be established where needed.	 EA / EN All members GMI EA	 2003 2003 Ongoing	

REF	AGREED OBJECTIVE	PRIORITY	COMMENTS / ACTIONS	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION	TIMING	COST
7	Ensure new development is sustainable with respect to water level management in the Plan Area	High	This item is intended to encourage Group members to regard new development as a catalyst to bring about general improvements to the watercourse systems, rather than simply to avoid adverse effects, in order that other WLMP objectives should be achieved. All parties to consider this when responding to planning consultations, and liaise as necessary.	All members GMI	Ongoing	£0
8	Achieve and maintain appropriate water level management and flood protection for new and existing urban development		Already national (PPG 25) and published IDB policy. Compliance should occur automatically as a result of routine development control activities.	EA / IDB / NSC	Ongoing	£0
9	Carry out general amenity enhancements at appropriate locations		Requisite action generally requires partnership approach. Land Yeo in Clevedon under way – lead partner EA. Identification of other sites and partnership leadership required.	EA + partners NSC	Ongoing Ongoing	£n/a £0
10	Seek opportunities to develop water level management and rhyne maintenance practices to protect habitats and encourage biodiversity	High	Draft SWADA and existing EA and EN channel maintenance guidelines to be reconciled. IDB to consider replacement of their existing guidelines with new unified guidelines when available. Review existing NSIDB spec and practices Appropriate staff and contractors to be encouraged to attend Defra training event for maintenance contractors.	SWADA, EA, EN IDB SWADA, IDB SWADA, IDB	2003 2003 2003 2003	

REF	AGREED OBJECTIVE	PRIORITY	COMMENTS / ACTIONS	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION	TIMING	COST
11	Improve consultation between IDB and other relevant agencies and organisations		Already addressed by issue of WLMP. Annual meeting of GMI will continue this process. IDB Policy Statement to be circulated to GMI members	IDB IDB	Annually 2003	
12	Maintain and where necessary improve to appropriate standards sea and tidal defences and water control infrastructure		Continue annual EA / IDB "Flood Defence" liaison meetings at which outstanding problems can be reviewed.	EA / IDB	Ongoing	
13	Optimise fish and eel populations	Low	Specific actions required need to be identified. (Fish passes may feature.)	EA	2003	£n/a
14	Improve water level monitoring arrangements	High	EA network and recording generally satisfactory but improvements are in hand. Further telemetry is planned for the area. The IDB has no formal recording system and few monitoring stations related to OS datum. IDB to prepare proposals for a water level monitoring study to include the installation of 8-10 gauge boards during 2004/05 at approx gross cost of £4000. Grant aid bid for study to support above work to be made to Defra	EA IDB SWADA	2003/04 2003 May 2003	£n/a £500 £0

Undertaking
The North Somerset Internal Drainage Board confirms that it will seek to complete this agreed programme and where appropriate will seek Defra grant aid for capital works to help meet its costs in implementing it.

Cost Implications
Further negotiations and the preparation of detailed proposals are required before the full cost implications of this Implementation Plan can be identified.

Signed on behalf of the North Somerset Internal Drainage Board:

..... [redacted] .....**B. W. Gray, Chairman**

NORTH SOMERSET (2005) INTERNAL DRAINAGE BOARD
WATER LEVEL MANAGEMENT PLAN

APPENDIX 11
PROGRAMME FOR IMPLEMENTATION
2nd REVIEW & CAPITAL ACTION PLAN

JANUARY 2008

Introduction

The North Somerset Water Level Management Plan (WLMP) was formally issued in December 2002 in response to the High Level Targets issued by Defra in November 1999. These also required the Board to have in place a detailed programme for implementing and reviewing the plan by 1st April 2003. The implementation plan was duly prepared and issued as Appendix 10 but periodic review is also required. Accordingly two subsequent meetings of the Group of Major Interests have been held to consider what changes or additions are required. As before this report is issued as an appendix to the WLMP and should be read in conjunction with that document.

This Second Review reflects the discussions held at the GMI meetings as well as taking account of subsequent information received and administrative developments.

On 1st April 2005 revised targets were issued by Defra, see page 3. Those which apply to the Board are shown in red.

Biodiversity Action Plans are now referred to - targets 4A and 4D(ii). BAPs aim to protect and enhance various important wildlife habitats and species. The local BAP is administered by North Somerset Council and covers the whole of the WLMP area. Boards are required to ensure that their operations (including the granting of consents) cause no net loss of BAP habitat, to report any losses and gains to the EA annually and to seek opportunities for environmental enhancements.

The North Somerset WLMP covers the whole of the Board's area and Table 2 of this report includes all identified actions required to achieve the WLMP objectives.

Specifically in respect of priority SSSIs High Level Target 4B requires Boards, in consultation with Natural England, to review WLMPs and submit costed action plans to the EA by April 2007 identifying any changes to their operations or system necessary to achieve favourable condition[1] by 2010. Within the plan area only the Tickenham Nailsea & Kenn SSSI is a priority site and the EA proforma costed action plan (CAP) for the TNK SSSI follows Table 2.

4D(i) requires Boards to report what contribution they have made to achieving Defra's own (PSA) target of "bringing into favourable condition, by 2010, 95% of all nationally important wildlife sites".

Funding

Partly as a consequence of pressure from drainage boards Defra announced in January 2005 increased funding for implementation work and associated studies. The current position is that 100% grants should be available for priority sites and 50% grants for non priority sites. However limitations on the total funding available and a priority scoring system mean that obtaining grant aid is by no means certain.

The Wessex Regional Flood Defence Committee has independently allocated part of its local precept income towards achieving favourable condition in Somerset SSSIs where the IDB is the operating authority. However the North Somerset Board was unsuccessful in its bid to secure a share of this funding.

Consultations

This document has been prepared and agreed by the Group of Major Interests which comprises representatives from the North Somerset IDB, Natural England, the Environment Agency, North Somerset Council and the Avon Wildlife Trust. The Conservation Officer of the South Western Branch of the Association of Drainage Authorities attends Group meetings in an advisory capacity.

Undertaking

The North Somerset (2005) Internal Drainage Board confirms that as Water Level Management Plan Operating Authority and subject to the availability of adequate funding it will seek to undertake this implementation programme.

Signed [redacted] ***B. W. Gray, Chairman*** ***Date*** 23/1/08

Natural England

Natural England agrees with the findings and recommendations of this reviewed Water Level Management Plan. The actions set out should achieve the water level management appropriate for securing the favourable condition of the affected units of the Tickenham, Nailsea and Kenn and Biddle Street SSSIs.

Signed [redacted] ***Date*** 21st January 2008

1. Assessment of the condition of SSSIs is made by Natural England. Factors of relevance to IDBs which can contribute to unfavourable condition include excessive drainage or flooding, watercourse bed exposure, poor water quality and unsympathetic watercourse maintenance.

Progress to Date

ITEM	DATE
WLMP	
Interim Statement to MAFF	Feb 1998
External consultations commenced	May 1998
Preparation of Plan commenced	June 1998
Draft issued to Group of Major Interests (GMI)	Oct 2000
First meeting of GMI	Nov 2000
Revised draft	April 2002
Timetable for completion to Defra	April 2002
Adoption by IDB	Oct 2002
Signing off by NE	Nov 2002
Formal issue	Dec 2002
IMPLEMENTATION & REVIEW	
Timetable for preparation of review programme to Defra	April 2002
First review meeting	Jan 2003
Second review meeting	Mar 2003
Programme for Implementation & Review approved by IDB and issued as Appendix 10	July 2003
Third review meeting	Nov 2004
Fourth review meeting	June 2005
Second Review & Programme for Implementation issued as Appendix 11	Dec 2007

Abbreviations Used in The Document:

AWT	Avon Wildlife Trust
BAP	Biodiversity Action Plan
CAP	Capital Action Plan
Defra	Department for Environment Food and Rural Affairs
EA	Environment Agency
GMI	Group of Major Interests
IDB	North Somerset (2005) Internal Drainage Board
n/a	Not available
NE	Natural England
NSC	North Somerset Council
SWADA	South Western Branch of the Association of Drainage Authorities
SSSI	Site of Special Scientific Interest
TBR	Tickenham Boundary Rhyne
TNK	Tickenham Nailsea & Kenn
WLMP	Water Level Management Plan

Defra High Level Target 4 - Biodiversity

Items of relevance to NSIDB in red

Target 4 - Biodiversity	By When	By Whom
A. Ensure no net loss to habitats covered by Biodiversity Action Plans and seek opportunities for environmental enhancements	Continuous	All operating authorities
B. In consultation with Natural England, review Water Level Management Plans for all priority[1] SSSIs that are in unfavourable condition, and submit to the Environment Agency a costed action plan of flood management measures to achieve favourable condition	1 April 2007	All relevant operating authorities
C. In consultation with Natural England, assess the ***flood management measures*** necessary to achieve the PSA target for SSSIs not covered by WLMPs[2] and submit to the Environment Agency a costed action plan of flood management measures to achieve favourable condition	1 April 2006	All relevant operating authorities
D. Report to the Environment Agency (i) flood and coastal erosion risk management measures taken that contributed to PSA target for SSSIs (ii) all losses and gains of habitats covered by UK Biodiversity Action Plans resulting from flood and erosion risk management operations	Annually by 1 April	All operating authorities
E. Environment Agency to report to Defra on the collated information from B, C and D above	Annually by 1 July	Environment Agency
F. Create at least 200 hectares of new Biodiversity habitat per annum as a result of flood management activities, of which at least 100 ha should be saltmarsh or mudflat[3]	Annually	Environment Agency

[1]Priority sites are those as identified in *Achieving the PSA Targets for SSSI: A review of the contribution of Water Level Management Plans*, Defra & English Nature, September, 2004.

[2]Including creating new habitat to offset the effects of coastal squeeze where that is the reason sites are in unfavourable condition.

[3]This target has been agreed as a key target and performance measure in the Environment Agency Corporate Plan. It is included here for clarity to indicate a minimum contribution to environmental targets that Defra expects the Agency to deliver annually in relation to its flood risk management programme funded by Defra Flood Defence Grant in Aid.

TABLE 1 - GENERAL OBJECTIVES

The list of identified objectives follows the general format of the original WLMP. However in response to changing national guidelines specific items referring to the achievement of "favourable condition" in the SSSIs and supporting BAP objectives have been introduced.

For ease of reference the specific actions required to achieve the objectives, together with estimated costs, have been separated and are now set out in Table 2.

REF NO IN WLMP	AGREED WLMP OBJECTIVE	COMMENTS / ISSUES / REMEDIES	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION
1	Assist in achieving "favourable condition" in all SSSIs and in priority sites by 2010.	Defra High Level Biodiversity Target 4B (see p3) requires (in co-operation with Natural England) the review of the WLMP in respect of the Tickenham Nailsea and Kenn SSSI and the submission by 1st April 2007 of a costed action plan of the flood management measures necessary to bring it into favorable condition. The Tickenham Nailsea & Kenn SSSI is a priority site but the Biddle Street SSSI is not. Features in the TNK SSSI contributing to unfavourable condition comprise: • Poor summer level control (inadequate network of control structures) • Winter bed exposure which threatens populations of fish, aquatic invertebrates and plants. • Vulnerability to pollution incidents (storm sewage overflows from Nailsea, vulnerable main feed sluice at Jacklands). • Sub-optimal IDBwatercourse maintenance practices Features in the Biddle Street SSSI contributing to unfavourable condition comprise: • Poor summer level control (inadequate network of control structures) • Winter bed exposure (inadequate network of control structures, poor ditch maintenance) • Sub-optimal IDB watercourse maintenance practices Planned remedies are: • Provision of new and refurbished penning and inlet structures • Re-assessment of (particularly winter) maintained water levels • Liaison with land managers to encourage optimal farm practices • Periodic re-assessment of maintenance practices on EA, IDB & private watercourses	IDB in consultation with NE EA / IDB IDB NE EA / IDB / NE / landowners / others

REF NO IN WLMP	AGREED WLMP OBJECTIVE	COMMENTS / ISSUES / REMEDIES	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION
2	Achieve and maintain appropriate water levels for the continuation of viable agricultural activities.	Requires an adequate water supply for wet fencing to maintain the health and hydrology of the peat soils and the avoidance of deep and prolonged flooding. This objective will be achieved by the normal pursuit of the established policies of the IDB and EA. Requests by land managers for changes in water levels are directed to the IDB and/or the EA as appropriate. Any change of water level proposed by a third party (eg raised water level zone) would be subject to formal consent, when a scrutiny of the implications for all interested parties would form part of the determination process.	EA / IDB EA / IDB / others
3	Co-operate with the development of agri-environmental schemes within the Plan area	Defra introduced the new Environmental Stewardship schemes in 2005. Where GMI members are consultees in this process they have agreed to ensure that their respective responses refer to any associated WLMP issues.	All members of GMI
4	Maintain appropriate water levels to safeguard existing man-made assets and infrastructure (buildings, roads, services, etc)	This objective will be achieved by the normal pursuit of the established policies of the IDB and EA. For instance where a change of water level management is proposed by a third party the proposal would be subject to the IDB's and/or EA's formal consent procedures, when a scrutiny of the implications for all interested parties would form part of the determination process.	IDB /EA
5	Minimise watercourse bed exposure during winter months	Problems on IDB rhynes are identified and costed for inclusion in future IDB works programme. NE has agreed to asssist with identifying problem locations. Other problems are known to exist on private ditches. The IDB and AWT have agreed to note any problem ditches they come across. Where these fall within an SSSI, NE will be informed and will action, resources permitting. If outside SSSIs, AWT will action, resources permitting.	IDB / NE IDB / NE IDB/NE/AWT
6	Co-operate with the development of raised water level / water level management schemes	Suitable areas will be identified within or outside the SSSIs. For third party schemes the IDB will co-operate by introducing appropriate water level management changes and by the issue of consents.	NE IDB

REF NO IN WLMP	AGREED WLMP OBJECTIVE	COMMENTS / ISSUES / REMEDIES	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION
7	Improve water quality generally but particularly within the SSSIs	Problems to be identified and ad-hoc working groups established to devise and implement solutions.	All members GMI
8	Ensure new development is sustainable with respect to water level management in the Plan Area	This item is intended to encourage Group members to regard new development as a catalyst to bring about general improvements to the watercourse systems, rather than simply to avoid adverse effects, in order that other WLMP objectives should be achieved. All parties will consider this when responding to planning consultations, and liaise as necessary.	All members GMI
9	Achieve and maintain appropriate water level management and flood protection for new and existing urban development	Already national (PPG 25) and published IDB policy. Compliance should occur automatically as a result of routine development control activities.	EA / IDB / NSC
10	Co-operate with general amenity enhancements at appropriate locations (where water level management issues are relevant).	Solutions generally require ad hoc partnership approach, eg Land Yeo in Clevedon where the established working group contains representatives from all of the GMI organisations.	All members of GMI
11	Seek opportunities to develop water level management and rhyne maintenance practices to protect habitats and encourage biodiversity	Sympathetic management of watercourses is required to provide a mosaic of habitat types, whilst preserving the appropriate drainage and water supply capacity within viewed rhynes and main rivers. Bankside vegetation can stabilize banks, preventing erosion, over widening and siltation problems. Two stage channels incorporating wet berms can reduce bed exposure and siltation problems during low flows and provide extra in-channel capacity during high flows. Draft SWADA and existing EA and NE channel maintenance guidelines to be reconciled. IDB to consider replacement of their existing guidelines with new unified guidelines when available. Review existing NSIDB spec and practices Appropriate staff and contractors to be encouraged to attend training event on practicalities of watercourse maintenance.	IDB, SWADA, EA, NE IDB IDB SWADA, IDB IDB

REF NO IN WLMP	AGREED WLMP OBJECTIVE	COMMENTS / ISSUES / REMEDIES	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION
12	Improve consultation between IDB and other relevant agencies and organisations	Already addressed by issue of WLMP. Regular meetings of GMI will continue this process. IDB Policy Statements to be circulated to GMI members and other appropriate organisations. Reinstate periodic "Technical Liaison" meetings between EA, IDB and council technical staff.	IDB IDB EA
13	Maintain and where necessary improve to appropriate standards sea and tidal defences and Main River water control infrastructure	The viability of the IDB system and the achievement of appropriate conditions in the SSSIs is wholly dependant on the protection and control provided by the Environment Agency's infrastructure. Regular liaison meetings between the EA and the IDB are held and should continue.	EA / IDB
14	Optimise fish and eel populations	The WLMP identified that specific actions are required to bring fish and eel populations to acceptable levels.	EA
15	Improve water level monitoring arrangements	The EA hydrometric network and recording system is comprehensive and generally satisfactory but some improvements are in hand, including an extension of the telemetry system. The IDB currently has few monitoring stations and no formal recording system, data archive or reporting system. A scheme to remedy this deficiency is required. In particular water levels unfavourable to wildlife should be reported to GMI.	EA IDB

REF NO IN WLMP	AGREED WLMP OBJECTIVE	COMMENTS / ISSUES / REMEDIES	ORGANISATION RESPONSIBLE FOR IMPLEMENTATION
16	Assist in achieving BAP objectives	Biodiversity Action Plans cover both habitats and species. The UK BAPs have been produced by Defra. Local BAPs have been produced by NSC and Avon CC. All "competent authorities" (EA, councils, IDBs, etc) are required to ensure that their operations assist in meeting BAP objectives. Those BAPs of significant relevance from a water level management viewpoint are: Coastal & floodplain grazing marsh Rivers & streams Fen marsh & swamp Standing open water Otter Water vole Water shrew Several IDB activities relate closely to these BAPs. The IDB is required to review its activities against the relevant BAP objectives and to make an annual report. The relevance of IDB activities is not currently reflected in the North Somerset BAP Action Plan.	All "competent authorities" (includes IDBs)

TABLE 2 - IDENTIFIED ACTIONS REQUIRED TO ACHIEVE THE WLMP OBJECTIVES

NOTES Figures show approximate capital costs. Costs of survey, design & special investigations are included where appropriate. Ongoing (revenue) costs are excluded.

Red items are of direct relevance to the Tickenham Nailsea & Kenn Priority SSSI

Items underlined have been completed since the last review (July 2003).

The EA proforma Costed Action Plan (CAP) in respect of the Tickenham Nailsea & Kenn SSSI follows

RELEVANT OBJECTIVES (TABLE 1)	AGREED ACTION(S)	DETAILS & IDENTIFIED ACTIONS	LEAD PARTNER	TIMING	ESTIMATED COST (INC FEES) Q1/07PRICES
1 2 4 5 9	Water Level Control Improvements.	Water levels in almost the whole of the TNK SSSI are currently controlled by the EA Blind Yeo outfall sluice which is not only remote from the SSSI but also subject to the sometimes conflicting operational requirements of urban and motorway drainage. Bed exposure is prevalent in the SSSI during the winter when no penning is undertaken. This action includes an assessment of existing winter water levels and identification of revised requirements (see Table 3), provision of new control structures where necessary (see below), adoption of revised water level practices and amendment of the WLMP. This action needs to be implemented in association with Action 15, the proposed gaugeboard network.			
		Tickenham Boundary Rhyne (TNK SSSI) A1 Replace derelict bayboard sluice at Causeway Bridge with a tilting weir type structure to allow independent control at East end of moor	IDB	2008/09	£15,500
		Tickenham and Nailsea Moors (TNK SSSI) A2 & A3 Provide new structures to allow independent control of water levels in Tickenham and Nailsea Moors	EA / IDB	2009/11	£47,400
		Black Ditch (TNK SSSI) A4 Replace existing disused vertical lift gate at Black Ditch Sluice with tilting weir to allow independent control in Kenn Moor	EA	2007/08	£27,000
		Mawkins Rhyne, Says Rhyne (TNK SSSI) A5 Install timber bayboard structures to provide enhanced summer levels	IDB	Completed 2005	£1,700
		Biddle Street Rhyne (Biddle Street SSSI) A6 Provide tilting weir type sluice in Wemberham Rhyne to allow improved water level control in Biddle Street SSSI and Yatton urban fringe	IDB	Completed 2007	£17,000
		Other Locations A7 Other problems arise from time to time and an annual allowance for minor bayboard structures is proposed. Priority to be given to SSSI locations.	IDB	2009/10 - 2011/12	£1,700 pa

RELEVANT OBJECTIVES (TABLE 1)	AGREED ACTION(S)	DETAILS & IDENTIFIED ACTIONS	LEAD PARTNER	TIMING	ESTIMATED COST (INC FEES) Q1/07PRICES
7	Water Quality Improvements	Nailsea Storm Discharges (TNK SSSI) Contaminated storm water intermittently discharges to Tickenham Moor within the SSSI. A8 Establish background and previous actions. A9 Set up working group to devise solution.	EA / NE EA / NE / WW / NSC / IDB	2006/07 2007/08	N/A N/A
		Jacklands Inlet (TNK SSSI) Main feedwater inlet for the Tickenham Moor. The existing sluice cannot prevent water from entering the SSSI when the Land Yeo is in flood, thus exposing the SSSI to the risk of pollution. A10 Renew sluice.	IDB	2008/09	£10,000
		Main feed channel from inlet at Jacklands to Moor End Spout. Currently privately & irregularly maintained, threatening feed to SSSI. A 11 IDB to adopt.	IDB	Completed 2006/07	£0
		River Kenn d/s Kenn Pier A12 Check problem history and establish water quality criteria. A13 Establish working group	EA EA	2007/08 2007/08	N/A N/A
		M5 Drainage Outfalls A14 Check problem histories and establish water quality criteria.	EA	2007/08	N/A
11	Ditch and Rhyne Maintenance	A15 Review existing NSIDB spec and practices	IDB	Complete 2004	
		A 16 Review existing NSIDB practices with NE	IDB	Complete Sep 06	
		A17 Supervisory staff, plant operators and contractors to attend training event	IDB	Completed 2006	

RELEVANT OBJECTIVES (TABLE 1)	AGREED ACTION(S)	DETAILS & IDENTIFIED ACTIONS	LEAD PARTNER	TIMING	ESTIMATED COST (INC FEES) Q1/07PRICES
8	Development Control	Revised Government & EA guidelines on flood risk assessment for new developments have recently been issued. Councils, EA & IDBs need to liaise to review their respective roles in the planning and consenting processes. A18 Hold "technical liaison" meeting when new documentation is issued. Identify opportunities and negotiate enhancements via planning and consent procedures. Opportunities for development-related enhancement within plan area are anticipated at the following sites: A19 Kenn West (trading estate) Clevedon A20 Stowell Concrete (yard extension) Yatton A21 Smart Systems (Stage 2 factory extension) Yatton	EA IDB plus other members of GMI	2007/08 Ongoing	£0
10	Amenity Enhancements	Progress Land Yeo Improvements in Clevedon – see Objective 11	EA	Ongoing	£n/a
12	Improve Consultation	Hold further meeting of GMI to review WLMP implementation progress. Prepare and issue IDB Information leaflet Exchange policy and information between GMI members & other relevant organisations	IDB IDB All	Summer 2007 Completed 2006 Ongoing	

RELEVANT OBJECTIVES (TABLE 1)	AGREED ACTION(S)	DETAILS & IDENTIFIED ACTIONS	LEAD PARTNER	TIMING	ESTIMATED COST (INC FEES) Q1/07PRICES
13	Maintain and where necessary improve to appropriate standards sea and tidal defences and Main River water control infrastructure	Annual EA / IDB "Flood Defence" liaison meetings are held and give the opportunity for local input to the EA capital and maintenance work programmes.	EA	Ongoing	
14	Improve currently sub-optimal fish and eel populations	Assess situation and identify practical measures required Install elver pass at proposed Black Ditch Sluice Ensure appropriate elver/fish passes for new tilting weirs	EA EA EA / IDB	Ongoing 2007/08 2007 / 2011	£n/a Inc Inc
15	Improve water level monitoring arrangements	EA NETWORK Network and recording generally satisfactory. New telemetry has been installed at Kenn Pier and Cooks Clyse IDB NETWORK The IDB has no formal recording system and very few monitoring stations are related to OS datum. Plan network, undertake survey work, establish recording & monitoring systems Install gauge board network	EA IDB IDB	Completed 2005/06 2006/8 2007/08 2008/09	£n/a £1,500 £5,000 £5,000

TABLE 3 - PROVISIONAL REVISED WINTER WATER LEVEL REQUIREMENTS TICKENHAM NAILSEA & KENN SSSI BIDDLE STREET SSSI

NOTES

The winter bed exposure requirement for favourable condition is 90% by length of all SSSI watercourses with at least 150mm depth of water across the base during the winter. This includes private ditches so in certain locations greater winter water depths would be expected in IDB Rhynes and EA Main River.

Apart from the zone East of Moor End Spout and a few locations where small fixed bayboard type structures have been installed, winter water levels in this area are closely related to those prevailing in the associated EA Main River system (Blind Yeo, Land Yeo, Kenn, Yearling Ditch, Clevedon Boundary Rhyne and Tickenham Boundary Rhyne) and this table has accordingly been based on the EA water level data in the WLMP (page 31).

These target figures should be regarded as provisional and subject to review not only as detailed survey information and records become available but also subsequently in the light of operational experience.

SSSI ZONE	ASSOCIATED MAIN RIVER / IDB WATERCOURSES	SUMMER WL (m AOD)	EXISTING WINTER WL (m AOD)	PROVISIONAL TARGET WINTER WATER LEVEL (m AOD)
Tickenham Moor (North)	Middle Yeo	Not less than 4.25 (Cooks Clyse)	Unpenned, estimated 3.75	3.85
Tickenham Moor (South)	Clevedon Boundary Rhyne Tickenham Boundary Rhyne	Not less than 3.66 (Blind Yeo Outfall)	Not less than 2.65 (Blind Yeo Outfall)	3.06
Nailsea Moor (North)	Clevedon Boundary Rhyne Tickenham Boundary Rhyne	Not less than 3.66 (Blind Yeo Outfall)	Not less than 2.65 (Blind Yeo Outfall)	3.06
Nailsea Moor (South)	Ten Feet Rhyne	Not less than 3.66 (Blind Yeo Outfall)	Not less than 2.65 (Blind Yeo Outfall)	3.26
Kenn Moor	R Kenn & Black Ditch	Not less than 3.66 (Blind Yeo Outfall)	Not less than 2.65 (Blind Yeo Outfall)	3.26
Biddle Street	Biddlestreet Rhyne Branch Rhyne	4.65	4.15	4.25

COSTED ACTION PLAN FOR PRIORITY SSSI WATER LEVEL MANAGEMENT PLAN

GENERAL DETAILS

SSSI Name	Tickenham Nailsea & Kenn
Lead Operating Authority for the site	North Somerset (2005) IDB
Region/Area	Wessex
Project Manager	Dan Alsop
Date of EN sign-off of WLMP	Nov-02
Date of completion of Costed Action Plan	Apr-07

SECTION 1: PROGRAMME AND COSTS FOR WLMP REVIEW AND FEASIBILITY

NB. This should only include activities and costs incurred from 1st April 2005

Review: Activity Description	Responsibility	Cost £k	Start Date	End date
Review of WLMP and issue of update	IDB	3.4	01-Mar-05	31-Aug-07
	Total	3.400		

Feasibility: Activity Description	Responsibility	Cost £k	Start Date	End date
Feasibility study for WLMP implementation scheme	IDB	2.5	01-Jul-07	31-Mar-08
	Total	2.500		

SUMMARY OF OVERALL REVIEW AND FEASIBILITY COSTS AND PROGRAMME FOR DEFRA PURPOSES

Cost £k	Start Date	End date
5.900		

Total review and feasibility costs incurred from 1st April 2005

SECTION 2: PROGRAMME AND COSTS FOR DESIGN OF WLMP ACTIONS

Activity description	Responsibility	Cost £k	Start Date	End date
Brief description of design activities. Cross reference to Actions referred to in Section 3				
Design, contract preparation and supervision of WLMP Implementation	IDB	24	06-Jun-07	31-Mar-11
	Total	24.000		

SECTION 3: PROGRAMME AND COSTS FOR CONSTRUCTION / IMPLEMENTATION OF WLMP ACTIONS

Action Reference	Action description	Responsibility	Cost £k	Start Date	End date
	Outline description of each action listed in WLMP				
A1	Replacement sluice at Tickenham causeway	IDB	14	01-May-08	30-Sep-08
A2	New sluice W end Tickenham system	IDB	18.5	01-May-09	30-Sep-09
A3	New sluice Parish Brook / Ten Foot Rhyne	IDB	18.5	01-May-10	30-Sep-10
A4	Replacement sluice on Black Ditch	EA	27	01-Jun-07	30-Sep-07
A5	Retention structures Mawkins Rhyne / Says Rhyne	IDB	1.7	01-Jun-05	30-Jun-05
A7	Retention structures various locations	IDB	5.1	01-May-08	30-Sep-11
14	Install gaugeboard network	IDB	10	01-May-08	30-Sep-09
	Other Costs to be incurred (if not already included in above) e.g. staff costs	**Responsibility**	**Cost £k**	**Start Date**	**End date**
	Brief description of cost				
	Ongoing technical supervision of WLMP	IDB	7	01-Apr-05	31-Mar-11
		Total	**101.800**		

SECTION 4: ON-GOING MONITORING

Action Reference	Description of Monitoring	Responsibility	Cost £k	Start Date	End date
	Outline description of monitoring. Indicate which are actions listed in the WLMP.				
		Total	**0.000**		

SECTION 5: ACTIONS FOR WHICH OTHER ORGANISATIONS OR INDIVIDUALS (NOT AN OPERATING AUTHORITY) ARE RESPONSIBLE

Action Reference	Action Description	Responsibility	Start Date	End date
	Outline description of each action listed in WLMP.	*e.g. EN, landowner*		
6	Nailsea Storm Mitigation	Various		
6	River Kenn in Clevedon control improvements	Various		

SUMMARY: TOTAL COSTS (£k) 132

SUMMARY OF ANNUAL EXPENDITURE

Financial Year	2005/2006
Actual Expenditure (£k)	5.4

Financial Year	2006/2007	2007/2008	2008/2009	2009/2010
Forecast Expenditure (£k)	4.7	32.5	39.4	27.8

TOTAL (£k) 109.8