North Somerset Levels Internal Drainage Board

Oldbridge River
Water Level Management Plan

Review Nov 2012
(amended August 2014)



Oldbridge River at Goosey Drove, Puxton

North Somerset Levels Internal Drainage Board

Engineer

The Cider House
The Grange Business Park
Hewish
Weston-super-Mare
North Somerset. BS24 6RR
Tel: 01934 833388

WATER LEVEL MANAGEMENT PLAN: REVIEW SIGN-OFF SHEET	
GENERAL DETAILS	
Site Name:	**Biddle Street, Puxton Moor and Yanal Bog SSSIs**
Operating Authority:	**North Somerset Levels Internal Drainage Board**
Engineer:	**Matt Bajowski**

NATURAL ENGLAND & THE NORTH SOMERSET LEVELS INTERNAL DRAINAGE BOARD AGREEMENT TO REVIEWED WATER LEVEL MANAGEMENT PLAN

"I confirm that I agree with the findings and recommendations of this reviewed Water Level Management Plan. I confirm that I believe that the actions set out would achieve the water level management appropriate for securing the favourable condition of the affected units of the SSSI"

Position	Name	Signature	Date
Natural England **Area Manager**	J Diamond		
Chairman of the Board	B. Gray		

Contents

		Page Number
	List of Tables	
	List of Figures	
	Executive Summary	1
1.	**Purpose of the Plan**	
1.1	Purpose of Water Level Management Plans	2
1.2	Responsibility for Plan Preparation and Implementation	2
1.3	Plan Review	2
1.4	Methodology	2
2.	**Plan Area**	
2.1	Context	3
2.2	General Description	4
3.	**Watercourses in The Plan Area**	
3.1	Main Rivers	6
3.2	IDB Maintained Watercourses ('In View' Rhynes)	7
3.3	Privately Maintained Ditches	7
4.	**Nature Conservation**	
4.1	Conservation Interest	8
4.2	Biodiversity	9
4.3	Conservation Aims	9
4.4	Conservation Management	10
5.	**Other Land Use**	
5.1	Land within the SSSIs	11
5.2	Land adjacent to the SSSIs	12
5.3	Other Land and Infrastructure Interests	12
6.	**Hydrology**	
6.1	Soils	13
6.2	Current Hydrological Regime within SSSI	13
6.3	Current Site Conditions within SSSI	14
7.	**Water Quality**	16
8.	**Water Level Management Objectives**	
8.1	Principal and Secondary Objectives	16
8.2	Relationship with North & Mid Somerset Catchment Flood Management Plan	16
8.3	Water Level Management Practices	17
8.4	Sites of Special Scientific Interest	19
9.	**Constraints and Impacts on Adjacent Interests**	23
10.	**Alterations to Infrastructure and Procedures**	
10.1	Watercourses	24
10.2	Structures	24
10.3	Procedures	24
10.4	Monitoring Arrangements	24
11.	**Other Proposed Actions**	**25**
12.	**Contingency Measures**	**25**
13.	**Unresolved Issues**	**25**
14.	**Other Matters**	**25**

15. Consultation **25**

Glossary of Terms 26

List of Abbreviations 27

References 28

Appendices 30 on

Appendix A - SSSI Citations

Appendix B - North & Mid Somerset Catchment Flood Management Plan

Appendix C - Management Scheme for the Severn Estuary European Marine Site

Appendix D - Illustrative Photographs

Appendix E - General Plan of Lowland Catchment showing Watercourses and Water Control Structures

Appendix F - Water Control Structures and Target Water Levels

List of Tables

Table 1	Wildlife Sites and Local Nature Reserves	Page 9
Table 2	Natural England SSSI Condition Assessments	Page 11
Table 3	Extract from North and Mid Somerset Catchment Flood Management Plan Preferred Policies affecting the Oldbridge River WLMP	Appendix B

List of Figures

Figure 1	Oldbridge River Catchment Plan	Page 4
Figure 2	Main Rivers and IDB Watercourses in WLMP Area	Page 6
Figure 3	Biddle Street, Puxton Moor and Yanal Bog SSSI Locations Plan	Page 8
Figure 4	North & Mid Somerset Catchment Flood Management Plan Policy Units	Page 17
Figure 5	Biddle Street SSSI Works completed and Proposals 2012	Page 19
Figure 5	Puxton Moor Enhancement Scheme – Completed Works General Plan	Page 21

EXECUTIVE SUMMARY

This Water Level Management Plan (WLMP) has been prepared in accordance with guidance published by Defra, the Environment Agency and Natural England, and is set out in accordance with the presentational template agreed by the Environment Agency and Natural England.

This document is an update of that which was produced in 2007. Much of the original document has been retained so that this version can be read on its own and still contain the relevant descriptive background. However, new or updated sections are enclosed in boxes to enable the update to be followed more easily. All administrative references to "West Mendip IDB" have been changed to "North Somerset Levels IDB", to reflect the amalgamation of the West Mendip IDB with The North Somerset(2005) IDB in 2011.

The Oldbridge River catchment is an area of some 40.4km^2, of which 16.2km^2 is a permeable 'upland' catchment, outside the Board's Drainage District, with the remaining 'lowland' catchment (24.2km^2) comprised of inland moors and coastal levels of estuarine alluvial clays, with a slightly higher elevation than that of the inland moors.

The drainage of the Plan area is exclusively to the network of minor rhynes and ditches which feed into the strategic arterial watercourse system maintained by the Board. The outfall for the whole system discharges into the tidal reach of the river Congresbury Yeo 'main river' at Sampson's Sluice. There are no other outfalls to the 'main river' system and the 'main river' system does not provide any means of drainage within the catchment.

Within the lowland catchment there are three Sites of Special Scientific Interest, the Biddle Street SSSI (part), Puxton Moor SSSI and Yanal Bog SSSI. Biddle Street and Puxton Moor SSSIs are important wet grassland areas, whilst Yanal Bog SSSI is a scarce example of a calcicolous lowland mire. Water levels in the lowland catchment are artificially controlled by 'penning' for much of the year and this has created the environmental and geomorphological conditions needed to support the aquatic flora and fauna, and invertebrate populations, which are the primary reasons for the designation of the Biddle Street and Puxton Moor SSSIs.

The Principal Objective of this WLMP is to develop and maintain a more sustainable and functional water level management system that helps secure 'favourable condition' for Puxton Moor SSSI, maintains (and where practical improves) existing conditions for Biddle Street SSSI, enables farming operations and diversification to continue, and appropriately manages flood risk throughout the lowland catchment area. The WLMP also sets out the Board's Conservation Aims for the Oldbridge River catchment, which are:

- To manage water levels to minimise the risk of low flows that may damage nature conservation interests (particularly during the winter months) throughout the plan area
- To restore and/or maintain favourable conservation status on wetland SSSIs within the plan area in partnership with Natural England and other conservation organisations
- Where possible work with partners to enhance nature conservation interests through management of water levels (e.g. Environmental Stewardship Schemes involving raised water levels)
- To maintain and, where possible, enhance aquatic and bankside habitats for wildlife including invertebrates, birds, water voles and otters throughout the plan area
- To maintain and enhance the conservation interest of land adjoining SSSIs

A number of changes suggested in the last plan have now been made to the water control of Puxton Moor and Biddle Street. These have resulted in the retention of a minimum of 300mm of water in the IDB watercourses supplying and draining these SSSI all year round. Previously, in winter many watercourses could run dry or contain very little water, which resulted in damage to the aquatic interest of the SSSI. Since the installation of the new water control structures most of Puxton Moor, and the part of Biddle Street in the Oldbridge River catchment, are now deemed by Natural England to be in a favourable and recovering condition. Those parts of the SSSI which are failing are doing so for reasons beyond the IDB's control. No major changes to IDB structures or operations are required and recorded/noted in this version of the WLMP. However, some minor improvements to water control on private channels could be carried out and would require the IDB's approval.

1. Introduction

1.1 Purpose of Water Level Management Plans

Water Level Management Plans (WLMPs) provide a means by which the differing water level requirements for a range of activities in a particular area, including flood defence and land drainage, conservation, environmental bio-diversification, agriculture, amenity and recreation, and water resources can be formalised and, where possible, integrated for the benefit of all participants.

1.2 Responsibility for Plan Preparation and Implementation

The responsibility for the preparation, implementation and review of a WLMP rests with the appropriate flood defence 'operating authority', depending on the relative influence their respective activities have on the water level regime within the particular Plan area. In this instance Environment Agency 'main rivers' have no influence on the water level regime within the Plan area and the responsibility for the Oldbridge River WLMP therefore rests with the North Somerset Levels IDB.

Through this Plan the Board will seek to assist the statutory conservation authorities in meeting the Government's targets for the SSSIs in its Drainage District, whilst also seeking to achieve a reasonable and sustainable balance between the differing water level requirements of other interested parties.

1.3 Plan Review

This Plan is a review of previous WLMPs prepared by the West Mendip IDB, covering:

Churchill Rhyne and Sandmead Rhyne	Prepared 1997
Oldbridge River and Liddy Yeo Catchment	Prepared 1997
Hurst Pool Rhyne Catchment	Prepared 1998
The Oldbridge River WLMP	Prepared 2007

1.4 Methodology

The previously prepared plans, on which there had been full public consultation, have been taken as the basis for this Water Level Management Plan for the Oldbridge River Catchment.

The current management objectives and maintenance regimes of the various watercourse systems within the Plan area have been carefully reviewed, particularly in the light of the designation of the Puxton Moor SSSI as a 'Priority' site for return to favourable condition. Proposals are made for water level management and operational maintenance changes to support the 'favourable condition' designation and to enable the Board to meet environmental objectives.

2. The Plan Area

2.1 Context

This plan only refers to those SSSIs occurring within the Oldbridge River catchment. This means that only the eastern part of the Biddle Street SSSI is covered. The western part and other SSSIs within the NSLIDB district are dealt with in separate WLMPs.

The North Somerset Levels Internal Drainage Board has an operational area covering some 12,000hectares of low-lying land extending from the coast at Uphill, south of Weston-super-Mare, inland through Hutton and Banwell, to Sandford, Churchill, Congresbury, Yatton and Nailsea then back to the coast at Clevedon, and the Gordano Valley between Portishead and Clapton-in-Gordano to Portbury Docks.

Within the plan area, the Board is the 'operating authority' with responsibility for all land drainage functions (other than those affecting 'main river') and directly controls and maintains 187km of Viewed Rhynes and associated water control and related structures.

These water control structures are used to manage water levels in the arterial drainage system, particularly during summer months, when there is a need to maintain an adequate water supply for dairy, livestock and arable farming purposes, for 'wet fences' and for wet grassland conservation. Within the Board's Drainage District there are several self-contained catchment areas, one of which, the Oldbridge River catchment, is the subject of this WLMP.

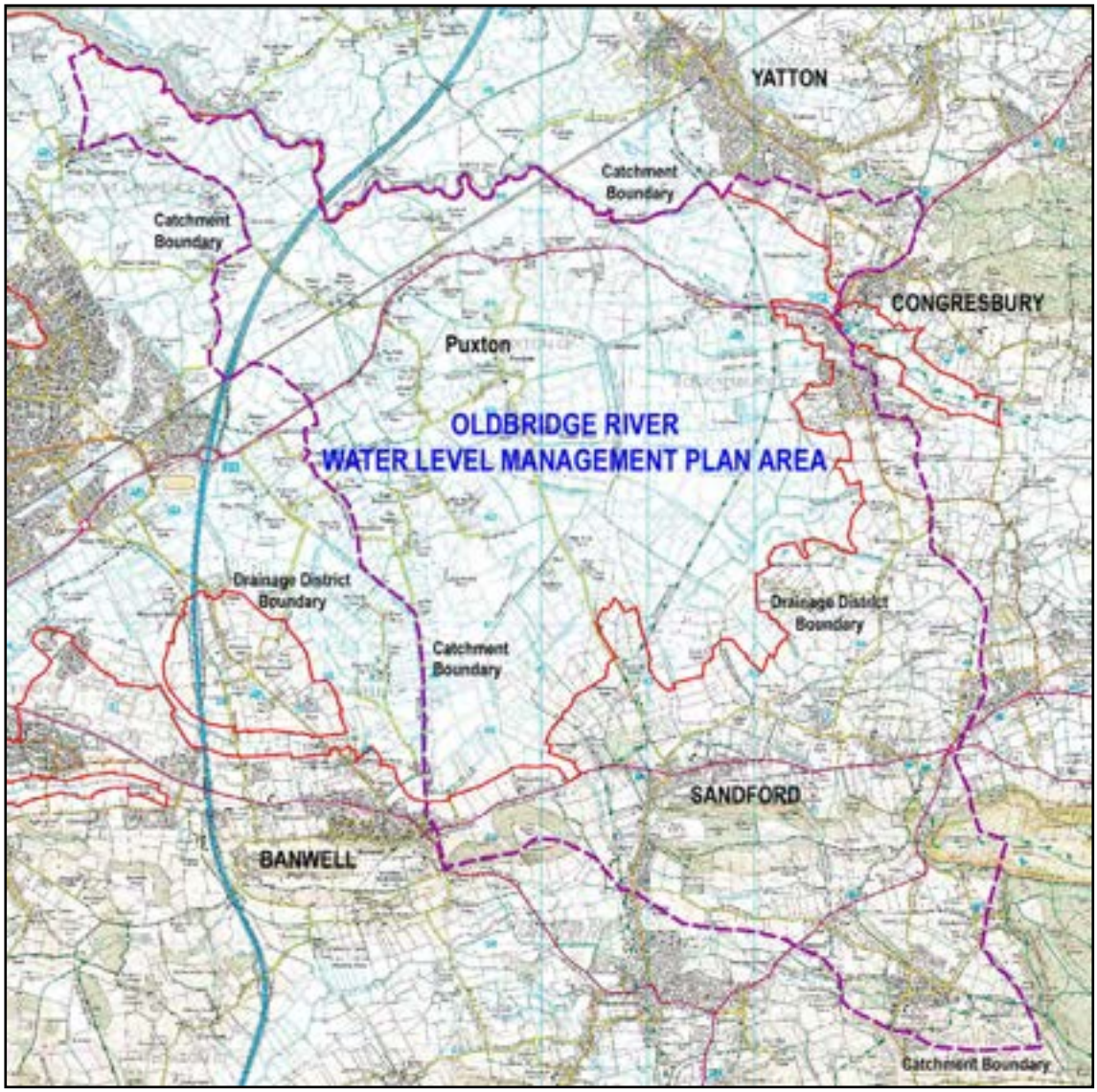


Figure 1 - Oldbridge River Catchment Plan

The Oldbridge River catchment includes 3 Sites of Special Scientific Interest, namely: Biddle Street SSSI; Puxton Moor SSSI; and Yanal Bog SSSI. Of these, Puxton Moor SSSI had in 2007 been designated as a 'Priority Site' for return to 'favourable condition'.

2.2 General Description

2.2.1 Topography

The Oldbridge River system drains a catchment area of some 40.4km^2, of which 16.2km^2 is a permeable 'upland' catchment, outside the Board's Drainage District. This 'upland' catchment, composed of sandstones, limestones and mudstones forms the north-facing slopes of the Mendip Hills. Surface waters draining from these hill slopes flow into the Drainage District via Towerhead Brook, a watercourse that rises near Shipham at an elevation of some 140mAOD, and via Eastmead Rhyne, Hardmead Rhyne, Sandmead Rhyne, Churchill Rhyne, Crookwell Rhyne and Carditch Rhyne, all of which are spring-fed from minor streams rising outside the Drainage District, generally at around the 25-35mAOD contour.

North of the Congresbury Yeo, the land drains into the Hurst Pool Rhyne, which is also spring fed from the hills to the east.

The 'lowland' catchment comprises in inland moors and, in part, the coastal strip. The inland moors are an extensive area of low-lying wet grassland, formerly reclaimed marshland, consisting of blue-grey estuarine alluvial

clays with peat layers, criss-crossed by a network of rhynes and ditches, whilst the coastal strip - also consisting of blue-grey estuarine alluvial clays, but without the peat layers - forms land with a slightly higher elevation, of between 0.5 and 1.0m above that of the inland moors.

2.2.2 Drainage

The drainage of the Plan area is exclusively to the network of minor rhynes and ditches, and the strategic arterial watercourse system maintained by the Board, with an outfall into the tidal reach of the river Congresbury Yeo, at Sampson's Sluice. There are no other outfalls to the 'main river' system and the 'main river' system does not provide any means of drainage within the catchment area. As there is no outfall or drainage into the main river system above Sampson's Sluice, the water carried by Hurst Pool Rhyne is conveyed by a syphon under the Congresbury Yeo to discharge into the Oldbridge River further downstream.

2.2.3 Summer Water Supply

Summer water supply for dairy, livestock and arable farming purposes where sufficient mains water is not readily available, for 'wet fences' and for wet grassland conservation is provided by 'summer penning' on the main rhyne system to hold back the natural flow of water.

The dates upon which these changes in water level are implemented each year are normally 1 April for summer levels and 1 December for winter levels. In practice, however, the seasonal water levels are usually phased in two weeks either side of these 'normal operating dates', depending on the prevailing weather conditions at the time. This system has come about through custom and practice and generally works well. From time to time, depending on the prevailing weather conditions, requests may be received by the IDB to advance or delay these seasonal operations. Should these requests require operations to be advanced or delayed by more than the two weeks either side of the 'normal operating dates', then the IDB will seek the views of Natural England on this proposal.

Summer penning is brought into operation by the lowering (closing) of the primary outfall at Sampson's Sluice and the closure of the 12No. penning hatches within the Oldbridge River catchment. The water feed is then seasonally managed through the operation of 2No. inlet valves on the Balls Yeo and Hurst Pool Rhynes and an inlet penstock on Balls Yeo Rhyne

2.2.4 Flooding

The strategic arterial rhyne system also serves to safely convey floodwater throughout the year and the Board's operation of the system must constantly balance the conflicting demands of providing sufficient, but not excessive, water for agricultural, conservation and other purposes, with the needs for appropriate flood risk management.

Because the Oldbridge River system is largely either spring-fed or receives direct runoff from the northern slopes of the Mendip Hills (principally via Towerhead Brook, Hardmead Rhyne, Sandmead Rhyne, Churchill Rhyne, Crookwell Rhyne and Carditch Rhyne), there is a need to provide channel storage within the system and to allow the safe, but speedy, evacuation of excess flows in times of storm. Such flows may result from prolonged winter rainfall or sudden summer storms on the upland catchment. The locations of specific penning hatches are the result of operational experience gained over more than 70years in managing the strategic arterial rhyne system to adequately cope with both situations and there have been only very few occasions when this has not been successfully achieved.

3. Watercourses in the Plan Area

3.1 Main Rivers

The river Congresbury Yeo is the only 'main river' maintained by the Environment Agency, within the WLMP area and is, throughout, an artificially raised, embanked, 'highland carrier' watercourse.

The Congresbury Yeo does not drain any part of the Plan area, although its left bank protects land within the Plan area against flooding up to a 2% Annual Exceedence Probability (equivalent to a 1-year in 50 flood event). Land on the right bank of the river, between Congresbury Bridge and Pilhay Bridge, forms part of the natural flood plain to the river and should this flood plain be activated as a result of excess flows overtopping the right bank, its only means of relief is via Hurst Pool Rhyne to the Oldbridge River, and not back to the Congresbury Yeo itself. From Pilhay Bridge downstream to the tidal estuary, the raised left bank of the Congresbury Yeo forms the WLMP area boundary.

The tidal reach of the Congresbury Yeo is within the Severn Estuary SSSI, which is also designated as a Special Protection Area (SPA), RAMSAR Site, Wildlife Site and is a proposed Special Area of Conservation (pSAC). This reach, together with the Severn Estuary SSSI itself, is outside the WLMP area.

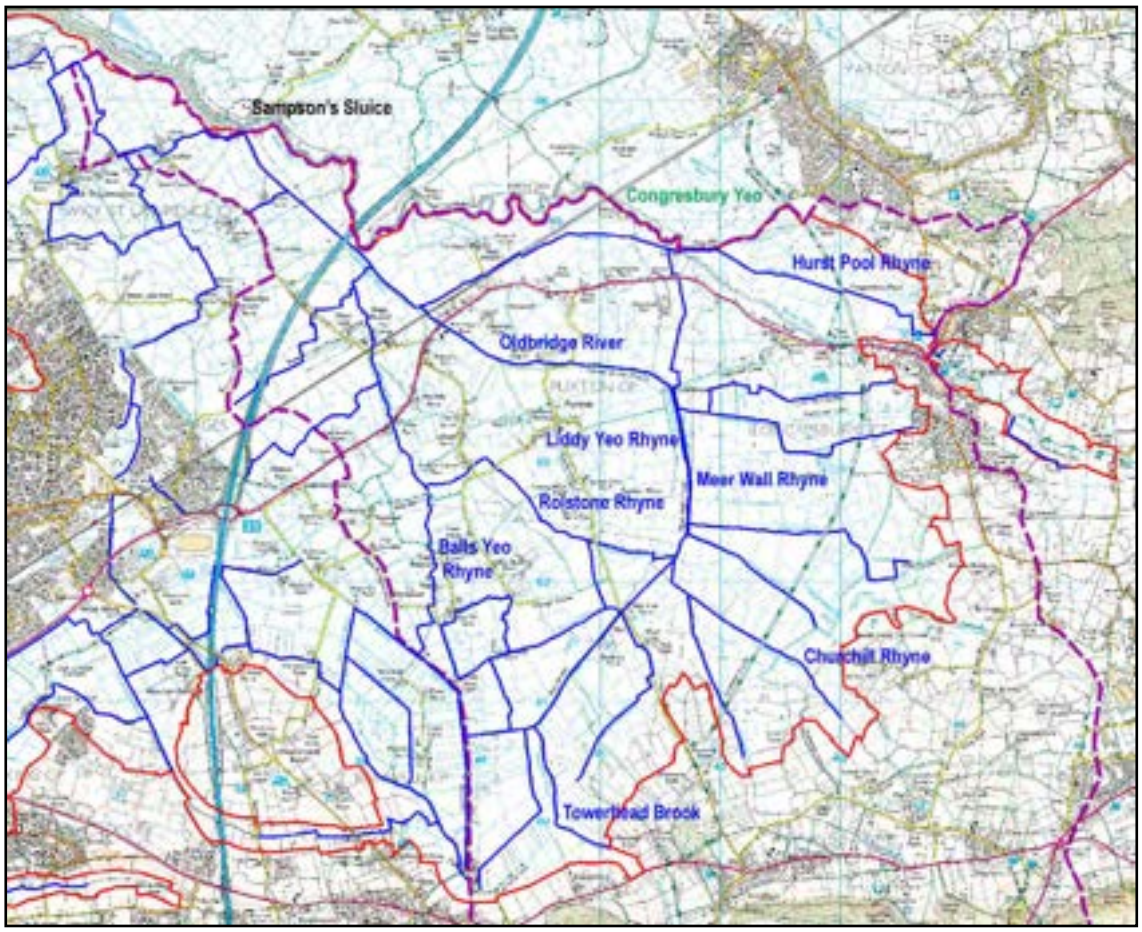


Figure 2 - Main Rivers and IDB Watercourses in WLMP Area

3.2 IDB Maintained Watercourses ('In View' Rhynes)

The North Somerset Levels IDB maintains 46km of strategic arterial watercourses, known as 'Viewed Rhynes', within the Plan area and to control water levels the Board operates and maintains one outfall structure (Sampson's Sluice), 14 No. water level control structures and 3No. water-feed structures. (Two new water control structures were added in 2009/10; arising from the 2007 Oldbridge River WLMP.)

See appended "NSIDB Standard Requirements for Weed-cutting on Watercourses" and specimen "Provisional Keeching Schedule" for details of watercourse management. .

The principal watercourses are the Oldbridge River, Hurst Pool Rhyne and Liddy Yeo Rhyne, all of which heavily-modified and largely man-made watercourses constructed as a result of the Congresbury Drainage Award 1819, an Act which allowed for the effective drainage of the inland moors around Congresbury and Puxton. The Oldbridge River discharges to the tidal reach of the river Congresbury Yeo, via the Sampson's Sluice Outfall and the two Rhynes form its major tributaries.

The remaining IDB maintained rhynes within the catchment are also either entirely man-made as a result of draining schemes carried out following the Enclosure Acts of the early 19th Century or are natural watercourses that have been heavily modified to serve land drainage, flood alleviation and water supply functions.

3.3 Privately Maintained Ditches

Throughout the Plan area there is an extensive network of privately owned ditches and minor watercourses. The maintenance of these ditches and minor watercourses is the responsibility of the owner of the land adjacent to the ditch or watercourse concerned, known as the 'riparian owner'.

In common law, riparian owners have both rights and responsibilities in relation to watercourses.

A riparian owners rights are:

- To receive water flow in its natural state, without unnatural interference with quantity or quality.
- To discharge uncontaminated run-off from their land to the watercourse, even if this increases the flow due to improved drainage of the (undeveloped) land, although they may not direct from elsewhere, a flow not naturally draining to the watercourse.
- To protect their property from flooding and their land from erosion, providing such work does not affect the rights of other riparian owners, although such work may require consent from the Internal Drainage Board or Environment Agency.
- To fish the watercourse by legal methods, and with an Environment Agency rod licence.

A riparian owners responsibilities are:

- To pass on downstream the flows received without obstruction, pollution or diversion affecting the rights of others.
- To maintain the bed and banks of the watercourse, including trees and shrubs growing on the banks, and to remove any debris, natural or otherwise, including litter and animal carcasses, even if these did not originate from their land.

- To accept flood flows to their land, even if these are caused by inadequate capacity downstream, as there is no common law duty on any riparian owner to improve a watercourse.
- Not to cause any obstruction to the free passage of fish.

4. Nature Conservation

4.1 Conservation Interest

The Biddle Street (part), Puxton Moor and Yanal Bog SSSIs lie within the Plan area. Biddle Street and Puxton Moor SSSIs are important wet grassland areas and their designation as SSSIs was based primarily upon the presence of important, diverse aquatic plant and invertebrate assemblages within the rhynes and ditches. Water level management, water quality and watercourse maintenance regimes will be significant factors influencing these assemblages. Appropriate land management is also essential to sustain the wildlife and landscape interest and features of the area.

Yanal Bog SSSI is a scarce example of a calcicolous lowland mire. The mire is a well-defined, domed feature caused by upwelling of base-rich water originating from subsurface drainage through the underlying gravels and clay alluvium.

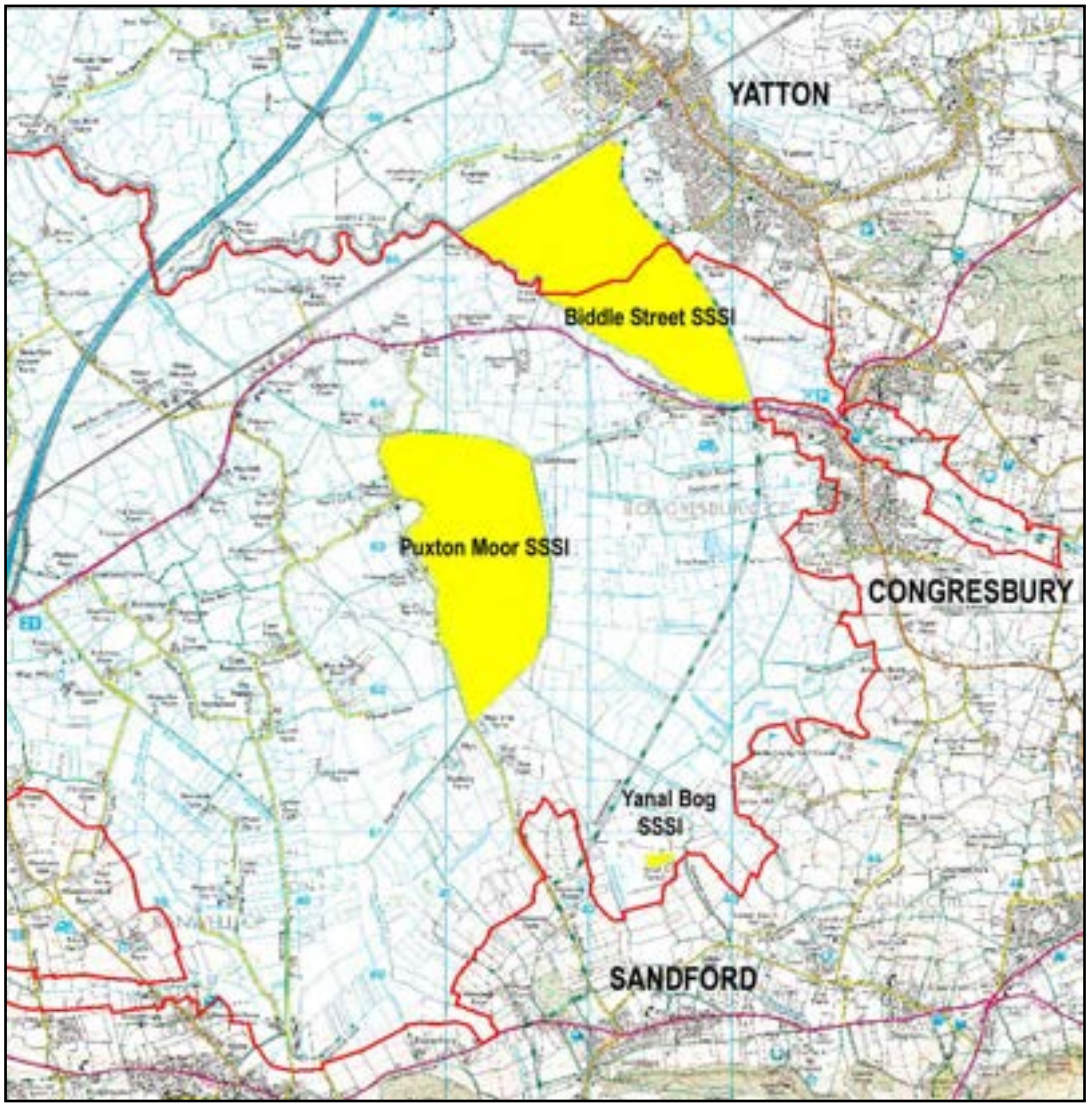


Figure 3 - Biddle Street, Puxton Moor and Yanal Bog SSSI Locations Plan

Details of each SSSI, together with the relevant Citations, are given in Appendix A.

It should also be noted that, as described above, the Oldbridge River discharges into the tidal reach of the river Congresbury Yeo, a part of the Severn Estuary SSSI. The estuary is also designated as a Special Protection Area

(SPA), RAMSAR Site (Wetland Site of International Importance), Wildlife Site and a pSAC (proposed Special Area of Conservation).

4.1.2 Wildlife Sites and Local Nature Reserves

The following Wildlife Sites and Local Nature Reserves are included within this Plan:

Site Description	NGR	Principal Watercourses
Wildlife Sites		
Rhynes south of Dolemoor Lane, Puxton	ST 419 635	Liddy Yeo Rhyne
Congresbury Yeo, adjacent lands and rhynes	ST 428 640	Hurst Pool Rhyne
Puxton Moor SSSI	ST 409 628	Liddy Yeo and Blackstones Rhynes
Towerhead Brook (part) and adjacent land, Sandford	ST 408 598	Towerhead Brook
Yanal Bog	ST 424 607	Sandmead Rhyne
Local Nature Reserves		
Cheddar Valley Railway Walk (also known as Strawberry Line Heritage Trail)	ST 427 621	Littlewall Rhyne Brandeer Rhyne Carditch Rhyne Crookwell Rhyne

Note: Wildlife Sites [local sites as defined in Defra guidance] were formerly known as CSNCI (County Site of Nature Conservation Interest)

4.2. Biodiversity Action Plan

The Coastal and Floodplain Grazing Marshes, Lowland Fens, and Purple Moor Grass and Rush Pastures found within the North Somerset Levels IDB drainage district are considered priority habitats in the UK Biodiversity Action Plan (1996). Furthermore, the 263km of Main Rivers and Viewed Rhynes in the Plan area, and the associated network of ditches and ponds, are biodiversity rich habitats that between them support populations of UK BAP priority species such as water voles, otters and water shrews.

The North Somerset Levels IDB has conducted a biodiversity audit of all BAP species and habitats in its drainage district and used this information to prepare a Biodiversity Action Plan relevant to IDB activities and interests. The introduction of the North Somerset Levels IDB BAP is intended to help the Board to maximise the biodiversity benefits from its activities and demonstrate its contribution to conserving biodiversity.

The BAP identifies objectives for the conservation and enhancement of biodiversity within the drainage district and describes targets and actions for the delivery of these objectives.

4.3 Conservation Aims

The Conservation aims of the Plan are:

- To manage water levels to minimise the risk of low flows that may damage nature conservation interests (particularly during the winter months) throughout the plan area
- To restore and/or maintain favourable conservation status on wetland SSSIs within the plan area in partnership with Natural England and other conservation organisations
- Where possible work with partners to enhance nature conservation interests through management of water levels (e.g. Environmental Stewardship Schemes involving raised water levels)
- To maintain and, where possible, enhance aquatic and bankside habitats for wildlife including invertebrates, birds, water voles and otters throughout the plan area
- To maintain and enhance the conservation interest of land adjoining SSSIs

4.4 Conservation Management

The 2010 Government Public Service Agreement with Defra, now superseded by the DEFRA Biodiversity 2020 Strategy and Targets, requires that 95% of all nationally important wildlife sites (SSSIs) are in a favourable (or unfavourable recovering) condition by 2020.

Puxton Moor SSSI was identified in the 2007 WLMP as a 'Priority Site' for return to favourable condition and the Board, as operating authority with responsibility for implementing the enhancement works required to meet the then PSA (now Biodiversity 2020) target, secured grant-aid funding to carry out an Enhancement Scheme aimed at providing better management of winter water levels and the retention of appropriate minimum water depths in field ditches during winter months.

Water levels are artificially controlled by 'penning' for much of the year and this has created the environmental and geomorphological conditions needed to support the aquatic flora and fauna, and invertebrate populations, which are the primary reasons for the designation of the Biddle Street and Puxton Moor SSSIs. Seasonal maintenance of the watercourse system by the IDB (rhynes) and landowners (ditches) is required to manage aquatic and emergent plant growth, provide a range of habitats across the areas and maintain the hydraulic connectivity of the system.

Water level management and land-use management outside of designated SSSI areas can have direct impacts upon the favourable status of SSSIs and watercourses outside these areas will have intrinsic conservation value. Priority and protected species present or likely to be present within the plan area include otters, water shrew and nesting wildfowl. There are no recent records of water voles within the plan area, but their presence remains a possibility.

5. Other Land Use

5.1 Land within the SSSIs

Land within the Biddle Street, Puxton Moor and Yanal Bog SSSIs is either owned and managed by conservation groups (Yatton and Congresbury Wildlife Action Group at Biddle Street and Avon Wildlife Trust at Puxton Moor) or is in agricultural pasture, grazing and equestrian use by private landowners.

Parts of both the Biddle Street and Puxton Moor SSSIs are also designated as Wildlife Sites. Part of the Biddle Street SSSI, together with other low-lying land to the west of Smallway, Congresbury is within the active floodplain of the river Congresbury Yeo ('main' river).

The SSSI Condition Assessments published by Natural England are given in the table below. The last Condition assessment was made in 2012 and these show the improvement in the condition of the SSSI since the last plan was written in 2007. The improvements proposed in the 2007 plan and subsequently enacted have provided significant contributions to this reversal in condition.

Biddle Street: Total Area 44.80 ha — Area this catchment c17.60 ha

	% Area meeting PSA target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed
1/7/2007	82.39	46.41	35.98	0.00	6.80	10.81
2012 Oldbridge catchment only	**88.58**	**38.98**	**49.60**	**0.00**	**11.42**	
2012 Whole SSSI	**52.58**	**16.42**	**36.26**	**0.00**	**47.42**	**0.00**

Puxton Moor: 31.07 ha

	% Area meeting PSA target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed
1/7/2007	35.33	35.33	0.00	9.36	55.15	0.16
2012	**93.88**	**93.88**	**0.00**	**0.00**	**6.12**	**0.00**

Yanal Bog: 1.60 ha

	% Area meeting PSA target	% Area favourable	% Area unfavourable recovering	% Area unfavourable no change	% Area unfavourable declining	% Area destroyed / part destroyed
1/7/2007	0.00	0.00	0.00	0.00	100.00	0.00
01/9/2010	**100.00**	**100.00**	**0.00**	**0.00**	**0.00**	**0.00**

The area of Biddle Street SSSI that is not in favourable condition is not within the catchment of the Oldbridge River and cannot be influenced by changes in this water level management plan.

Natural England has prepared statements setting out their views regarding the management of these sites ['Views About Management' (VAM)] and these are available on the Natural England website.

The Severn Estuary SSSI, which is also designated as a Ramsar Site, Wildlife Site, a Special Protection Area (SPA) and a proposed Special Area of Conservation (pSAC) adjoins the Oldbridge River Catchment, but is hydrologically separate and outside the area covered by this WLMP.

5.2 Land adjacent to the SSSIs

The land adjacent to the Biddle Street, Puxton Moor and Yanal Bog SSSIs is all within the 'lowland' catchment of the Oldbridge River and is almost entirely in agricultural use, being principally devoted to permanent pasture for dairy farming, beef production and sheep grazing. Arable farming and root crop production accounts for only a very small percentage of land use.

Whilst occupying only a small fraction of the lowland area, livery stabling and horse grazing is becoming increasingly widespread.

5.3 Other Land and Infrastructure Interests

Away from the immediate SSSI areas, there are small centres of population at Wick St Lawrence, Hewish, Puxton, Rolstone and Riverside, and in addition, a significant number of single residential properties, a number of mobile homes and a permanent travellers' site near Puxton. Apart from farming, commercial interests include a 'country park / working farm' visitor attraction, several farm-based small business centres, a large caravan retail / distribution centre, a private golf course, a private fishery, and a number of small-scale commercial / light industrial premises.

There is a small junior school at Hewish with a population of 150 pupils (age range 4-11) and 25 staff.

The upland catchment, outside the Board's Drainage District, comprises mixed farmland, woodlands and substantial areas of development at Banwell, Sandford, Churchill and Congresbury. There is a large comprehensive school at Churchill and a number of commercial / light industrial premises.
The Plan area is crossed by the main Bristol to Exeter main railway, the M5 motorway, the A370 (Bristol to Weston-super-Mare) and A371 (Weston-super-Mare to Bath and Wells) roads. There is also an extensive network of secondary roads, public footpaths and public bridleways. The Yatton to Sandford section of the former Cheddar Valley Railway is a well-used walk known as 'The Strawberry Line Heritage Trail', parts of which are designated as a Local Nature Reserve.

Essential infrastructure crossing the Plan includes several high voltage power transmission lines, several high pressure gas transmission pipelines and several high pressure water mains.

6. Hydrology

6.1 Soils

The Biddle Street and Puxton Moor SSSIs cover some of the lowest-lying land in the Board's Drainage District. These areas are, primarily, reclaimed salt marshland comprising seasonally waterlogged, soft blue-grey estuarine alluvial clays with lenses of peat, criss-crossed with a network of rhynes and ditches. The watercourses in these areas are almost entirely man-made as a result of drainage schemes carried out following the Enclosure Acts of the early 19th Century or heavily modified natural channels significantly altered for land drainage, flood alleviation, summer water supply and other agricultural needs.

The adjoining land, at a very slightly higher elevation and including Yanal Bog SSSI is predominantly heavy marl-clays with pockets of silty and/or peaty soils, which are in places seasonally water-logged. Rates of surface water runoff from these areas can be high.

The higher parts of the natural catchment area, but outside the WLMP area, mostly consist of shallow silty or loamy soils over limestones, sandstones and mudstones. Runoff from these soils may be seasonally low, but intense storms on the Mendip Hills can result in a rapid increase in stream flows from springs and direct surface runoff.

Soils do not generally have a high potential for erosion by water and soil erosion does not significantly affect watercourse flows. However occasional de-silting is necessary in watercourses throughout the WLMP area, in order to maintain channel capacity.

6.2 Current Hydrological Regime with SSSI

Biddle Street SSSI: Biddle Street SSSI has a designated area of 44.8hectares and covers watercourses in two entirely separate catchments - the western section between Gang Wall and the Railway line is within the old North Somerset (2005) Internal Drainage Board District, whilst the eastern part of the SSSI is within the old West Mendip Internal Drainage Board District. All Biddle Street SSSI, now lies within North Somerset Levels IDB.

As the two catchments are hydrologically separate, this WLMP covers only the eastern section and extends to approximately 35% of the designated SSSI area.

The Biddle Street SSSI comprises part of the river Congresbury Yeo, part of Hurst Pool Rhyne and all private watercourses within and forming the boundary of the site, together with the land within 6metres of the banks of these watercourses. The boundary of the SSSI extends to 6metres beyond the top of the far bank to all boundary watercourses. A penning hatch at the syphon controls summer water level in Hurst Pool Rhyne upstream of the syphon and this is normally held at a level of 5.06mAOD.

Biddle Street SSSI and Congresbury Moor both form part of the floodplain to the river Congresbury Yeo. As described in Section 3.1 above, the right flood bank of the river is overtopped at the 2% AEP event and, under this condition, the Hurst Pool Rhyne syphon then provides the only means of draining the moors and enabling these floodwaters to be discharged to the sea.

Puxton Moor SSSI: Puxton Moor SSSI has a designated area extending to 31.07 hectares and comprises the rhynes [Oldbridge River (part), Liddy Yeo Rhyne (part) and Blackstones Rhyne (part)] and all private watercourses within and forming the boundary of the site, together with the land within 6metres of the banks of these watercourses. The boundary of the SSSI extends to 6metres beyond the top of the far bank to all boundary watercourses.

Water levels in the Oldbridge River, Liddy Yeo Rhyne system and Meer Wall Rhyne system are all controlled by the raising and lowering of a single 3.3metre x 2.3metre penstock at the tidal outfall - Sampson's Sluice, some 6km downstream of the SSSI. The minimum target summer water level at Sampson's Sluice is 3.83 metres AOD. Two adjustable top flights are incorporated in the penstock and can provide levels of 3.53 metres AOD and 4.36 metres AOD respectively.

The Sampson's Sluice penstock is normally closed between early April and mid-November each year in order to 'pen' water, providing both 'water fences' between fields and a water supply for agricultural needs. From mid-November to early April the penstock is fully raised, releasing the 'penned' water and providing for flood management during winter months. Summer penning generally provides a retained water level of 4.00mAOD at Puxton Bow and 4.02mAOD at Nye Bow.

Sea water ingress into the Oldbridge River system is prevented by 4No. 1.05m square tidal flaps, mounted on the seaward side of Sampson's Sluice.

Before implementation of the water control improvements proposed in the 2007 WLMP, the release of water in the Oldbridge River to attain winter penning levels meant that winter water levels in the Puxton Moor SSSI dropped to unacceptably low levels for the maintenance of the site's ecological interest. The installation of a new tilting weir on the Liddy Yeo Rhyne at its junction with the Oldbridge River in 2009 meant that the winter penning level against the eastern boundary of the SSSI could be kept high enough to preserve satisfactory winter levels, while still allowing The Oldbridge River to be drawn down for winter flood risk management purposes.

Blackstones Rhyne is a 'link' watercourse between the Liddy Yeo Rhyne and the Rolstone Rhyne / Rockers Rhyne system to the west, and provides a means of water distribution to the south of Puxton village. Blackstones Rhyne can also provide a supplementary water feed to Puxton Moor SSSI and may, depending on external water level management actions, also drain parts of the Moor close to the Nye Road.

Penning Hatches on Heathgate Rhyne, Churchill Rhyne, Blackstones Rhyne and Rocker's Rhyne provide for local water level management control and water distribution during the summer months. Blackstones Rhyne penning hatch, to the west of Nye Road, holds a summer water level of 4.48mAOD, whilst Rockers Rhyne penning hatch at Nye holds a summer penning level of 4.25mAOD.

Yanal Bog SSSI: Yanal Bog SSSI lies within the Churchill Rhyne sub-catchment, although there are no Board-maintained watercourses in the immediate vicinity of the SSSI. The locally high water table that maintains the mire is caused by upwelling from subsurface drainage through the underlying gravels and clay alluvium fed from the lower north-facing slopes of the Mendip Hills.

The Churchill Rhyne sub-catchment, which includes Sandmead Rhyne, has a lowland area within the Drainage District of some 144hectares, plus an upland catchment outside the Drainage District of some 440hectares on the lower north-facing slopes of the Mendip Hills. Churchill and Sandmead Rhynes also provide a supplementary water feed to Puxton Moor SSSI, via a penning hatch just down stream of the rhyne confluence, which holds a summer water level of 4.30mAOD.

6.3 Current Site Conditions within SSSI

The lowland catchment of the Oldbridge River, the subject of this WLMP, has been transformed, over time, from a salt marshland into the productive agricultural landscape seen today due, in part, to the construction of sea defences and a largely artificial watercourse system originally intended for land drainage and flood alleviation. As stock grazing became more widespread, this system was further adapted to provide retained summer water levels for wet fencing and water supply.

The current agricultural, environmental and recreational features in the WLMP area and beyond now rely heavily on this system and its continued management. The options for managing water levels are governed by the topography of the area; sea, river and watercourse levels; prevailing hydrological conditions; ecological and conservation interests; and landowner's interests. Endeavouring to maintain appropriate water levels to suit agriculture and the environment can be complicated due to these differing interests and sometime conflicting views, and may be further complicated by the need to provide an effective system of flood water management in times of storm.

During summer months water levels are maintained relatively high to provide wet fences, stock watering supplies, support nature conservation and preserve water quality. In general, this works successfully, although in periods of low flow, dissolved oxygen levels can become depleted, leading to a reduction in water quality.

During the winter months, when the system is un-penned, water levels can be very variable with periods of heavy rainfall leading to short-term high water levels and dry periods leading to extremely low flows. Water levels of 3.00mAOD and 3.20mAOD were routinely recorded at Puxton Bow and Nye Bow respectively, under 'low-flow' dry weather conditions. When this occurred there was often insufficient water depth to support the aquatic flora and fauna, and invertebrate populations, which are the primary reasons for the designation of the SSSIs. This has been changed by the improvement of the water control structures around Puxton Moor.

7. Water Quality

Water quality in the principal watercourses, many of which are spring-fed, is generally satisfactory but, as outlined above, during periods of low flow, dissolved oxygen levels can become depleted leading to a reduction in quality.

Although at present the only sampling is done by the EA and only of the main rivers. However, Natural England are planning to fund a project to test water quality in Biddle Street and Puxton Moor SSSIs.

There are very few incidents of farm or other effluent discharges resulting in the pollution of watercourses within the WLMP area or within the Biddle Street and Puxton Moor SSSIs.

8. Water Level Management Objectives

8.1 Principal Objectives:

To develop and maintain a sustainable and functional water level management system that helps secure 'favourable condition' for Puxton Moor SSSI, maintains (and where practical improves) existing conditions for Biddle Street SSSI, enables farming operations and diversification to continue, and appropriately manages flood risk throughout the lowland catchment area.

Secondary Objectives:

Balance of Interests - The Board will ensure, firstly, that its obligations and responsibilities are met and secondly, that an appropriate balance of interests is achieved, by managing water levels in ways that reflect the local hydrology and topography, and which best serve the landowners and farmers of the majority of land within the WLMP area.

Agriculture - The Board will seek to maintain seasonal water levels that provide wet fences, stock watering and land drainage appropriate for the principal land management and farming practices within the WLMP area.

Biodiversity - The Board will seek to maintain and, when suitable and reasonably practical opportunities arise, enhance the rhynes and wider wetland habitats throughout the WLMP area, with particular regard being given to 'Priority Sites' and to those habitats protected by law or other designation.

Favourable Condition - The Board has implemented a programme of enhancement works aimed at ensuring that water level management affecting the Puxton Moor SSSI helped to secure the site's favourable condition by 2010. Within SSSIs the water level target shall be to retain a minimum 200mm water depth over 90% of ditches throughout the winter months.

Archaeology - The Board will, where practical, seek to maintain a stable, year round, groundwater table that reduces the potential for desiccation and oxidation of peat soils.

Maintenance Operations - The Board will seek to ensure that its watercourse maintenance operations are undertaken in a sympathetic manner, in accordance with best practice and conservation objectives.

8.2 Relationship with North & Mid Somerset Catchment Flood Management Plan

Water Level Management Plans are one of the means by which the Policy Objectives of the emergent Environment Agency North & Mid Somerset Catchment Flood Management Plan (CFMP) may be implemented. Within, or immediately adjacent, and potentially effecting the Oldbridge River WLMP catchment there are 5 CFMP Policy Units (PU Nos. 2a, 3b, 5a, 6b and 12) .

The relevant generic CFMP Policies applied to these Units are set out in Appendix B, but reference should be made to the Catchment Flood Management Plan, for a full understanding of the Policy context and implementation.

Figure 4 (below) shows the North & Mid Somerset Catchment Flood Management Plan Policy Units in Plan Area and is reproduced from Figure E1 of the Catchment Flood Management Plan - Consultation Draft. October 2006.

In agreeing the respective CFMP Policy Options and broadly supporting the resulting intended actions, the West Mendip IDB will play its full part in the CFMP implementation process. This WLMP therefore takes account of the emerging CFMP policies and the actions intended.

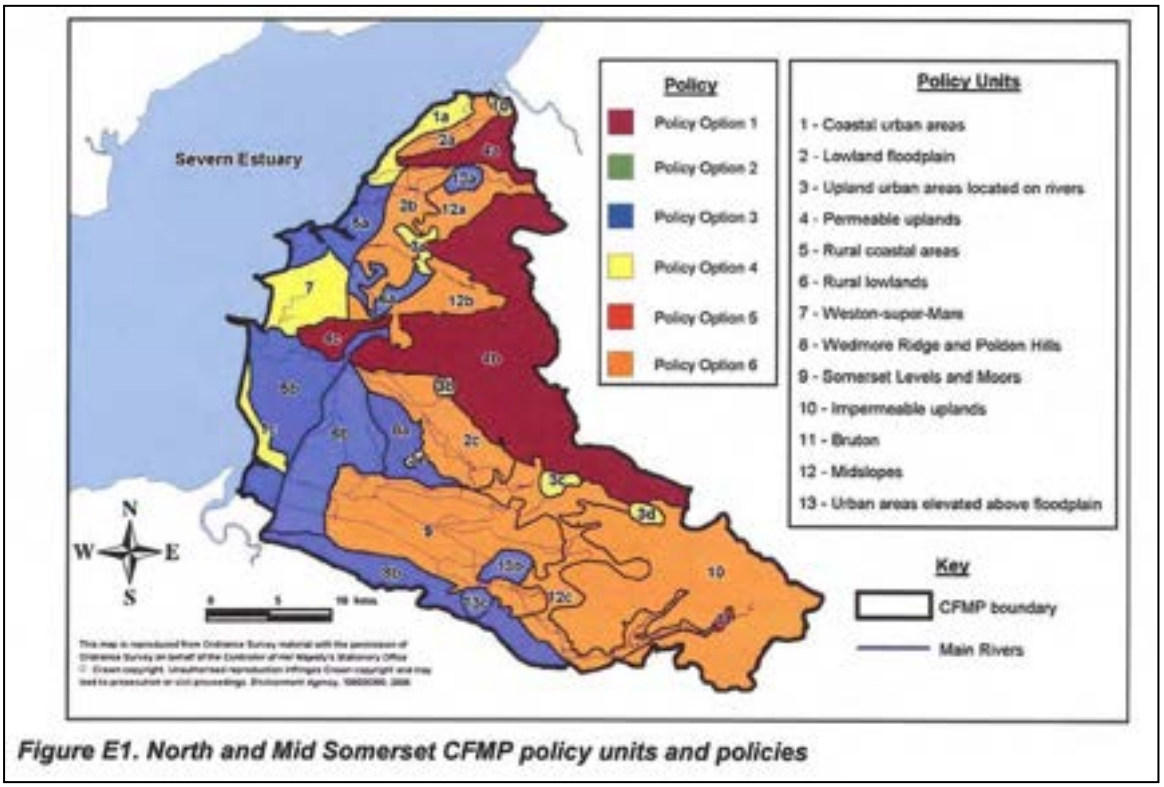


Figure 4 - North & Mid Somerset Catchment Flood Management Plan Policy Units in WLMP Area

8.3 Water Level Management Practices

The North Somerset Levels IDB operates a policy of 'sympathetic maintenance' on all the watercourses under its control, to meet the duty placed on Drainage Boards under the provisions of the Land Drainage Act 1994 and other relevant legislation. This legislation requires that Drainage Boards should undertake watercourse management in a way that is compatible with nature conservation interests.

The Board recognises the need to positively demonstrate that its watercourse management and maintenance operations, whilst essential for flood defence and the effective drainage of the District, are undertaken in a manner that safeguards nature conservation interests and, where possible, make a positive contribution to the enhancement of the natural environment.

Operational Objectives

The Board's operational objectives are:

i. To maintain the strategic arterial watercourse system of named Rhynes to an appropriate standard, in accordance with Best Practice, in order to provide an effective drainage system and minimise the risk of flooding to land, highways and properties, and to facilitate the agricultural and other use of land;

ii. By appropriate water level management consistent with the management of flood risk, to ensure that sufficient water is retained in the Board-maintained Rhynes during the summer months for agricultural purposes (wet fencing and water supply) and to safeguard wildlife interests;

iii. To ensure, consistent with the management of flood risk, that during the winter months a target minimum 200mm water depth is retained in the Board-maintained Rhynes, as agreed between the Board and Natural England, for the benefit of nature conservation and special environment interests;

iv. To maintain within the Biddle Street and Puxton Moor SSSIs, and consistent with the management of flood risk, controlled winter water level regimes that retain a minimum 200mm water depth over 90% of ditches throughout the winter months for the benefit nature conservation and safeguard special wildlife interests;

v. To facilitate private landowners wishing to participate in Environmental Stewardship Schemes involving raised water levels and rhyne management options, in appropriate locations and provided the overall capacity of the strategic arterial watercourse system to deal with storm runoff is not impaired;

vi. To ensure that the management regime of the strategic arterial watercourse system does not have a detrimental effect on Sites of Special Scientific Interest, Wildlife Sites, Local Nature Reserves and other areas of conservation or environmental interest;

vii. To work in partnership with the Environment Agency, and others as appropriate, to enable the emerging Policy Objectives of the North and Mid Somerset CFMP to be implemented within the WLMP area;

viii. To seek opportunities to work in partnership with the North Somerset Levels and Moors Project and other conversation groups, to introduce further nature conservation enhancement measures, consistent with the Board's statutory duties.

Operating Procedures

In accordance with its Conservation Policy, the Board's operating procedures are:

i. The control of water levels in the strategic arterial watercourse system in order to provide effective drainage that minimises the risk of flooding to land, highways and properties, and facilitates the agricultural and other use of land;

ii. To operate the strategic arterial watercourse system in an appropriate and timely manner for the safe release of floodwaters, particularly those arising from the overtopping of flood defences on the river Congresbury Yeo, to sea via Hurst Pool Rhyne, the Oldbridge River and Sampson's Sluice;

iii. To maintain the strategic arterial watercourse system of named Rhynes in accordance with Environmental Best Practice and to appropriate standards, in order to provide an effective drainage system that minimises the risk of flooding to land, highways and properties, and facilitates the agricultural and other use of land;

iv. To 'pen' water in the strategic arterial watercourse system during the summer months by appropriate water level management methods, consistent with the management of flood risk, to ensure that sufficient water is retained in the Board-maintained Rhynes for agricultural purposes and to safeguard wildlife interests;

v. By appropriate water level control consistent, with the management of flood risk, to ensure that during the winter months a target minimum 200mm water depth is retained in the Board-maintained Rhynes, as agreed between the Board and Natural England, for the benefit of nature conservation and special environment interests;

vi. To operate within the Biddle Street and Puxton Moor SSSIs, and consistent with the management of flood risk, controlled winter water level regimes that retain a minimum 200mm water depth over 90% of ditches throughout the winter months for the benefit nature conservation and safeguard special wildlife interests;

vii. To have regard for the requirements of protected species and apply for appropriate licences, as required, for all water level management and watercourse maintenance;

viii. To administer procedures for the grant of Land Drainage Act Consent - that provide for the alteration or modification of watercourses or the construction of structures - with full regard for the environmental impact of such works and, where appropriate, to seek environmental mitigation for any loss of habitat that may unavoidably arise.

Operating procedures also take account of the requirements of the Management Scheme for the Severn Estuary European Marine Site. These are set out in Appendix C.

8.4 Sites of Special Scientific Interest

Biddle Street SSSI: Two sheet piling fixed weirs were installed in the bed of Hurst Pool Rhyne, in 2010. The top of each weir is set approximately 300mm above the bed of the watercourse. The lower weir is currently retaining a head of 300mm max, which affects the water levels upstream as far as the second weir. The second weir, however, is only retaining a head of c.25mm, (Nov 2012), so is having relatively little effect on the system upstream of it. This second weir might benefit from being raised by up to 150mm. However, the overall effect, particularly from the lower weir, is enabling the retention of a minimum satisfactory water level within the system all year round. Previously the watercourses had sometimes been reduced to a small flow down the centre of the channel

The penning hatch at the Congresbury siphon is scheduled to be replaced with a tilting weir in 2014/15. Once accomplished this could be used to replace the effect of the lower sheet pile weir. However trials would need to be undertaken to ascertain whether this is workable or advisable.

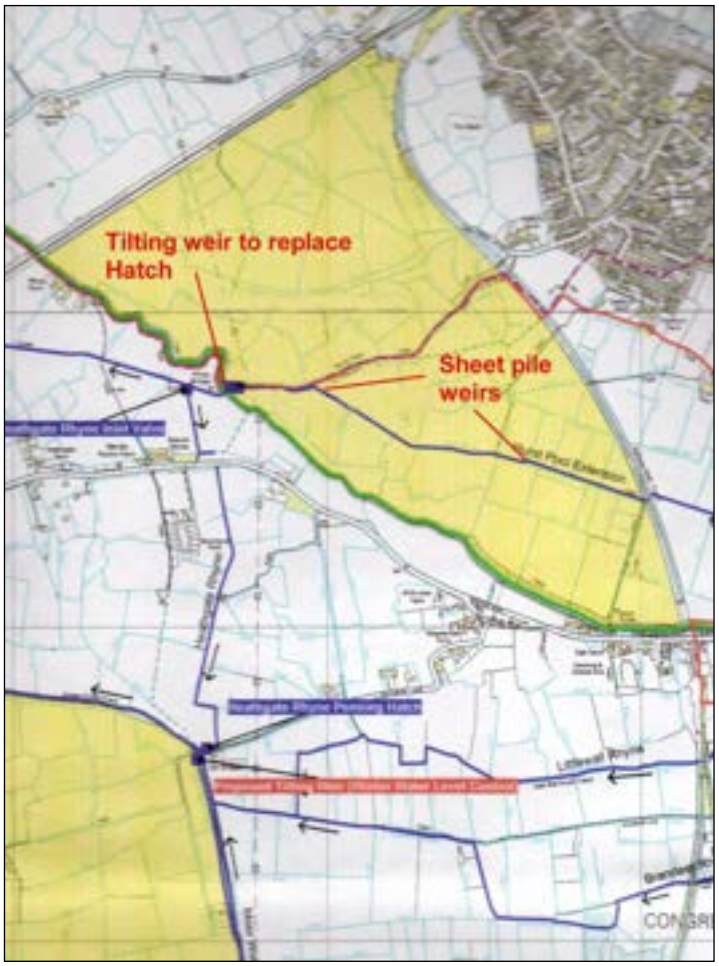


Fig 5. Biddle Street Works completed and proposals 2012

Puxton Moor SSSI: In 2007 the Puxton Moor SSSI was designated as a Priority Site where the 'unfavourable condition' should be addressed, to meet the Government PSA target for return to favourable condition by 2010.

To assist in the attainment of this target the Board prepared an Enhancement Scheme for Puxton Moor and, through the Environment Agency, secured Grant-Aid funding for its implementation.

Unfavourable condition used to arise because low winter water levels left side ditches too dry to support wetland wildlife throughout the winter months. In cold weather where soil is exposed on the bottom of a rhyne or ditch and there is only a small depth of water present, the mud may freeze, killing insects and their larvae sheltering in the mud.

Low water levels reduce the amount of oxygen available for invertebrates, especially along the exposed sides of the channel, which are normally covered by water in the summer, as a result of summer penning of the rhyne system.

The shelter provided by emergent plants, and the leaf litter associated with them, provides little protection as their roots are exposed and the litter dries out, and the plants themselves are also adversely affected by drying and freezing of their roots. In extreme cases, the normally submerged aquatic plants, which root in the ditch bottom, may die off.

When water levels are low in the winter months, the mud surface is exposed and varying water levels and a higher rate of flow causes more erosion of the banks, particularly just below normal summer penning level.

To address these issues the Board's 2007 WLMP suggested constructing a tilting weir on Liddy Yeo Rhyne at Dolemoor Lane and fixed height weir on Liddy Yeo / Meer Wall Rhyne Link Channel, together with the conversion of Blackstones Rhyne and Churchill Rhyne penning hatches to tilting weirs, and the installation of a flap valve on a culvert that discharged from the northern end of Puxton Moor directly into the Oldbridge River. All this work was accomplished in 2009/2010 with funding from the Environment Agency.

The tilting weir on Liddy Yeo Rhyne at Dolemoor Lane enables the safe adjustment of water levels in the Liddy Yeo to maintain adequate winter water levels on the SSSI, without increasing flood risk, whilst the fixed height weir on the Liddy Yeo / Meer Wall Rhyne link channel provides for the separation of the Liddy Yeo and Meer Wall Rhyne systems. Consequently watercourses to the east of Puxton Moor SSSI will be unaffected by the changed winter water levels.

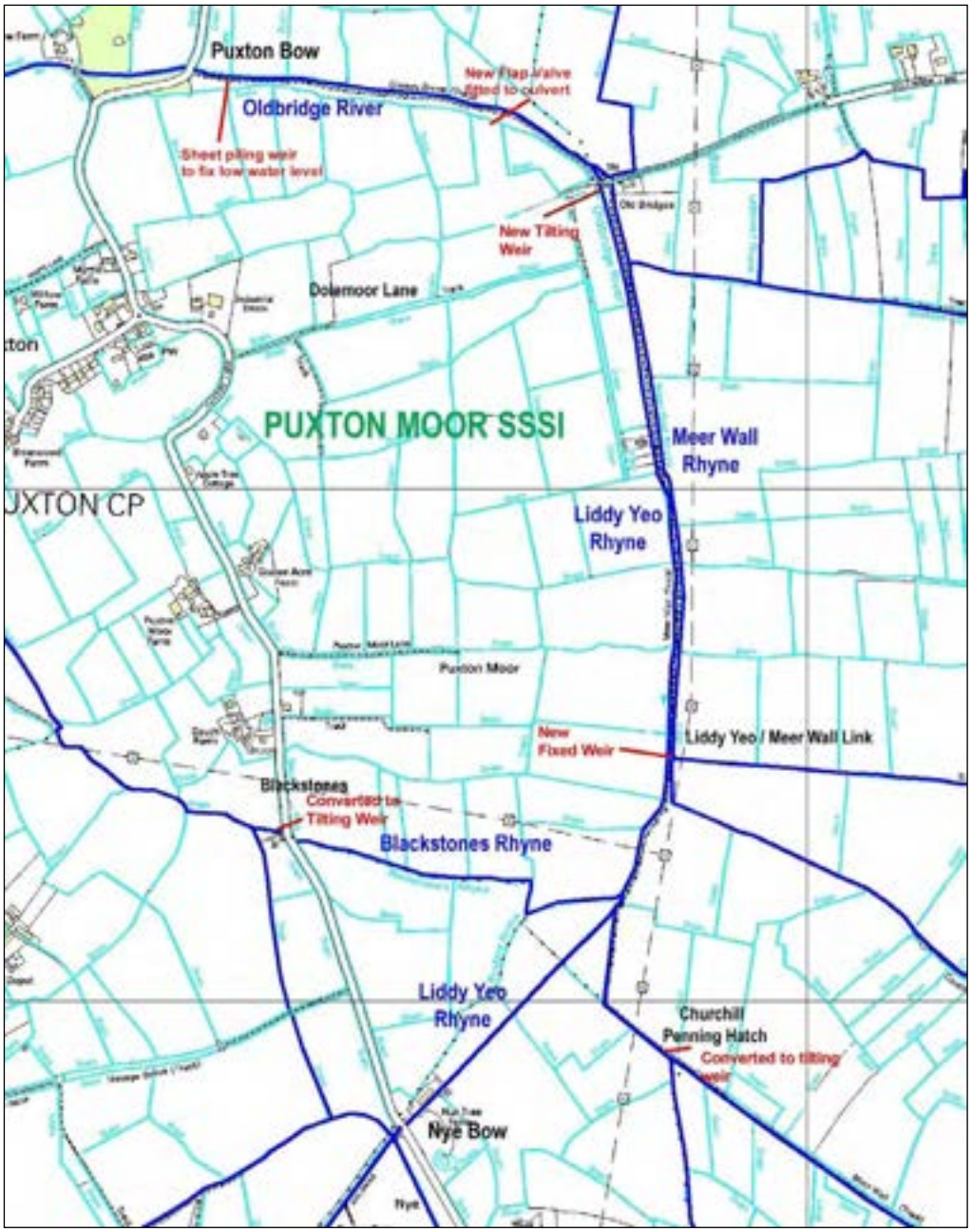


Figure 6 - Puxton Moor Enhancement Scheme - Completed Works General Plan

A flap valve fitted to the culvert between the Northern part of Puxton Moor SSSI and the Odlbridge River now prevents water draining from that part of the SSSI into the Oldbridge River when the river is drawn down to winter levels. But it allows water to flow in from the river when river levels are high enough. Further downstream a sheet pile weir has been constructed across the entrance of an old, now unused stop-log sluice draining Northern part into the Oldbridge River. This weir is retaining a minimum level of 300mm of water in the ditches of the northern section of the SSSI.

The Enhancement Scheme provided the higher winter water levels required by Natural England in order to achieve 'favourable condition' within Puxton Moor SSSI in October 2010, in accordance with the government's PSA target for Priority SSSIs current at that time. It provides a variable winter water level within a range of 3.25mAOD - 3.75mAOD at the Dolemoor Lane tilting weir.

Futher improvements to Puxton Moor

The Puxton Moor system could be further improved by the addition of stop-log sluices to the 2 private ditches connecting to the Liddy Yeo upstream of the new tilting weir. These would allow water to be retained at higher levels on the moor than Liddy Yeo at times when the Yeo has to be dropped for flood management reasons. At the moment the water levels on Puxton Moor follow those of the Yeo. Similarly, the reinstatement of the old stoplog sluice that debouches into the Oldbridige River just upstream of Puxton Bow would allow slightly higher water levels to be maintained on the northern section, above the level of the fixed weir.
The installation of these sluices would be the responsibility of the Site Owner, Avon Wildlife Trust, but operational limits may have to be set in order to protect adjoining landowners.

The northern section of Puxton Moor at present has no other source of water than the Oldbridge River. This means that, once winter penning levels are achieved on the river, the northern section's water level is reliant on rainfall. The idea has been mooted of connecting the northern to the southern parts of the moor through Dolemoor Lane. At present the different water levels on either side of the lane clearly show that two parts of the moor are separate hydrological units. Making a gravity supply from the southern to northern section by culverting under Dolemoor Lane would risk creating uncontrollable leaks through the earthworks around any culvert and water control system. In addition, the maximum water level achievable in the northern section by any gravity flow from the southern would be dependent on the water level in the southern section, which is largely dependent on that of Liddy Yeo. The fact that the northern section has lower ditch levels than the southern may imply leaks through the bank between the moor and the Oldbridge River and a permanent linking of the two parts may put at risk water levels on the larger southern section. A safer option would be to use portable pumps to pump water either from the southern section, if there is enough spare water or, if insufficient, from the Liddy Yeo above the new tilting weir.

Yanal Bog SSSI: No changes to the existing water level management regime operated on Churchill and Sandmead Rhynes are proposed under this WLMP and the Board will continue summer penning on Churchill Rhyne in accordance with established practice. There will, therefore, be no effect on the Yanal Bog SSSI as a result of implementing this WLMP.

9. Constraints and Impacts on Adjacent Interests

As described above, the options for managing water levels are governed by the topography of the area; sea, river and watercourse levels; prevailing hydrological conditions; ecological and conservation interests; and landowner's interests. The constraints imposed by these factors require the Board to endeavour to maintain appropriate water levels to suit agriculture and the environment, whilst balancing the conflicting demands of landowner's differing water needs and interests. This situation may be further complicated by the need to provide an effective system of flood water management in times of storm for the protection of the wider community and infrastructure.

Puxton Moor SSSI: The constraints imposed in responding to the need to undertake construction works to aid the achievement of 'favourable condition' within the Puxton Moor SSSI relate primarily to winter working within the SSSI designated area, the need to effectively manage flood water through the working areas during times of storm and public rights of way and access.

The design of the Enhancement Scheme works, and in particular the provision of a fixed height weir on the link channel between the Liddy Yeo and Meer Wall Rhynes, ensured that watercourses to the east of Puxton Moor SSSI remain unaffected by the changed winter water levels within the SSSI.

Because the Enhancement Scheme allowed future winter water levels to be controlled within a range of 3.25mAOD - 3.75mAOD at the Dolemoor Lane tilting weir, the upstream water level measured at Nye Bow need be no higher than that experienced during normal summer penning. Consequently, there should be no adverse impact on adjacent interests resulting from the Enhancement Scheme works.

Yanal Bog SSSI: As no changes to the existing water level management regime in the vicinity of Yanal Bog are proposed under this WLMP, there will be no impact on adjacent interests.

10. Alterations to Infrastructure and Procedures

10.1 Watercourses

No new watercourses, or major alterations to existing watercourses, are proposed in this WLMP.

10.2 Structures

Biddle Street SSSI

Following investigation of the effects of 'low level' winter penning on Hurst Pool Rhyne, the Board is planning to replace the Congresbury Moor penning hatch with a tilting weir in 2014/15. When operating, this weir may make the existing lower sheet-piling weir redundant. If so, the existing sheet pile weirs could be moved upstream to increase the length of watercourse benefitting from their effect

Puxton Moor SSSI

The following proposals for new water level control structures made by private owners on Puxton Moor could be considered sympathetically by the IDB as helping to improve further the condition of the SSSI:

Construction of two stoplog sluices on the private ditches linking to Liddy Yeo to the southern section of the moor to help retain water after winter penning levels have been set on Liddy Yeo each year.

The reinstatement of the sluice above Puxton Bow to allow slight increases of winter level above the minimum allowed by the fixed sheet-pile weir currently determining minimum level here

10.3 Procedures

An operating procedure has been drawn up for the 'low level' tilting weir on Liddy Yeo Rhyne at Dolemoor Lane. No other changes to operating procedures are proposed under this WLMP. Operating procedures are, however, subject to regular review in the light of changing circumstances and this will continue to be the case.

10.4 Monitoring Arrangements

Water level gaugeboards have been installed at strategic locations on the Oldbridge River, on Balls Yeo and Liddy Yeo Rhynes, and at Churchill Rhyne penning hatch, and the Board will continue to monitor water levels as and when conditions so require.

The Board does not propose to undertake formal monitoring of environmental conditions within the three SSSI areas, preferring to leave this to Natural England, the Avon Wildlife Trust and YACWAG. The Board will, however, continue informal discussions on appropriate water level management and sympathetic watercourse maintenance operations with Natural England and other interested parties, as and when needed.

11. Other Proposed Actions

No other actions are proposed in this Water Level Management Plan.

12. Contingency Measures

No contingency measures are thought to be necessary in respect of the proposals brought forward in this Water Level Management Plan.

13. Unresolved Issues

The Board is not aware of any unresolved issues arising from the adoption and implementation of this Water Level Management Plan.

14. Other Matters

Review Arrangements

This Water Level Management Plan will be further reviewed in five years, or earlier by agreement between the principal parties, should this prove necessary in the light of changing circumstances. In particular, the emerging policies of the North & Mid Somerset CFMP will be further assessed and addressed, as may be needed.

15. Consultation

Initial consultation on the preparation of this Plan has been with Natural England, the Environment Agency (in respect of the Puxton Moor SSSI Enhancement Scheme) and the Avon Wildlife Trust.

The Board recognises the importance of gaining the support of land managers and local communities when considering water level management practices and any proposals for change, as their co-operation and agreement will be essential to achieving and sustaining WLMP objectives. Further consultation with landowners, land managers and other interested parties will take place, as implementation of the Plan is taken forward.

Glossary of Terms

Annual exceedance probability (AEP)
: The percentage chance that a storm event of a particular magnitude will occur in any given year.

Catchment Area
: The total area draining into a watercourse system.

Catchment Flood Management Plan (CFMP)
: An Environment Agency large-scale strategic planning framework for managing flood risk to people and the developed and natural environment in a sustainable way.

Defra
: Department for Environment, Food and Rural Affairs. The department of central Government responsible for flood management policy in England.

Defra High Level Targets
: High-level targets prepared by Defra to help meet its flood risk management and coastal defence aims and objectives.

Environment Agency
: The non-departmental public body responsible for implementing government policy relating to the environment and flood risk management in England.

Flood defence
: A structure or a system of structures for reducing flooding from rivers, watercourses or the sea.

Floodplain
: Any area of land over which water flows, or would flow, if there were no flood defences. Additionally, any area where water is naturally or artificially stored during a flood event.

Flood risk
: The frequency or likelihood of a flood event, together with the consequences of such an event, measured in terms of loss, damage, harm, distress and disruption.

Flood risk management
: Actions or measures taken to modifying the frequency or consequences of flooding to an appropriate level and subsequent monitoring to ensure that flood risks remain at the intended level. These actions should take account of other water level management requirements, and opportunities and constraints.

Groundwater
: Water occurring below ground in natural formations (typically rocks, gravels, soils and sands).

Internal Drainage Board (IDB)
: An independent public authority that manages land drainage in areas that need special drainage. There are some 200 Boards in England, concentrated in the lowland areas of East Anglia, Somerset, Yorkshire and Lincolnshire. Each Board operates within a defined area (Drainage District) where, amongst other matters, it has permissive powers under the Land Drainage Act 1991 to carry out works, including routine maintenance, on watercourses that are not designated as “main rivers”.

IDB Membership
: The elected members (representing the owners and occupiers of land within the Drainage District) and nominated members (nominated by the local authority to represent other interests) of an Internal Drainage Board.

IDB watercourses
: The named and other watercourses managed by an IDB that may be within or form the boundary of the internal Drainage District.

Main River

Watercourses defined on a 'main river map' designated by Defra. The Environment Agency has permissive powers to carry out flood defence works, maintenance and operational activities for main rivers only.

Natural England

The government agency formed by bringing together English Nature, the landscape, access and recreation elements of the Countryside Agency and the environmental land management functions of the Rural Development Service. Natural England works to enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas.

Probability of occurrence

The probability of a flood event being met or exceeded in any one year. For example a probability of one in 100 corresponds to a one per cent or 100:1 chance of an event occurring in any one year.

Public Service Agreement

The Government has set Public Service Agreement Targets (PSAs) for service delivery objectives in the public sector. One of these targets is to achieve 95% of Sites of Special Scientific Interest (SSSIs) in favourable condition by 2010.

Site of Special Scientific Interest (SSSI)

Sites of Special Scientific Interest (SSSI) are notified under the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way (CRoW) Act 2000 for their flora, fauna, geological or physiographical features. Notification of a SSSI includes a list of operations that may be harmful to the special interest of the site. All cSACs, SPAs and Ramsar sites are designated as SSSI.

Special Area of Conservation (SAC), candidate Special Area of Conservation (cSAC)

An internationally important site for habitats and/or species, designated as required under the EC Habitats Directive. A cSAC is a candidate site, but has the same status as a confirmed site. SACs are protected for their internationally important habitat and non-bird species.

Water Level Management Plan (WLMP)

A document setting out water level management requirements in a defined floodplain area, usually a SSSI (or in the case of this WLMP a group of SSSIs), which is designed to meet different conservation, land drainage and flood defence needs.

List of Abbreviations

A AEP - Annual Exceedance Probability
AOD - Above Ordnance Datum
AWT - Avon Wildlife Trust

C CFMP - Catchment Flood Management Plan

D Defra - Department for Environment, Food and Rural Affairs

E EA - Environment Agency
EN - English Nature (now Natural England)

F FRM - Flood Risk Management

I IDB - Internal Drainage Board

N NE – Natural England

P PSA - Public Service Agreement

S SAC - Special Area of Conservation
SPA - Special Protection Area
SSSI - Site of Special Scientific Interest

W WLMP - Water Level Management Plan

Y YACWAG - Yatton and Congresbury Wildlife Action Group

References

References and sources of information used in the preparation of this Plan or relevant to its implementation

Publications by MAFF and Defra

Biodiversity 2020
A strategy for England's Wildlife and Ecosystem Services
Water Level Management Plans: A procedural guide for operating authorities. MAFF. June 1994
The EC Habitats Directive: Implications for Flood and Coastal Defence. MAFF. May 1995
Code of Practice on Environmental Procedures for Flood Defence Operating Authorities. MAFF. December 1996
Water Level Management Plans: Additional Guidance Notes for Operating Authorities.
Prepared by the Water Level Management Plan Advisory Group MAFF. October 1999
Guidance on Preparing Plans for Review and Implementation of Water Level Management Plans.
MAFF. January 2001.
Sites of Special Scientific Interest: Encouraging positive partnerships. Code of guidance. Defra. April 2003
Revised High Level Targets for Flood and Coastal Erosion Risk Management. Defra. April 2005
[Target 4: Biodiversity]

Other Government Departments

The Habitats Directive: How it will apply in Great Britain. DoE. 1995 (Reprinted 1997)
Planning Policy Statement Note 25: Development and Flood Risk.
Department for Communities and Local Government. December 2006

Parliamentary Acts and Statutory Instruments

Wildlife and Countryside Act 1981. HMSO
Land Drainage Act 1991. HMSO
Land Drainage Act 1994. HMSO
The Conservation (Natural Habitats, &c.) Regulations 1994. HMSO
The Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999
Countryside and Rights of Way Act 2000. HMSO
The Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2005
The Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2006
The Natural Environment and Rural Communities Act 2006. HMSO

West Mendip Internal Drainage Board

Churchill Rhyne and Sandmead Rhyne: Water Level Management Plan. January 1997
Oldbridge River and Liddy Yeo Rhyne Catchment: Water Level Management Plan. September 1997
Hurst Pool Rhyne Catchment: Water Level Management Plan. April 1998
[Note: The above WLMPs will become superseded on the adoption of this Plan]

Standard Requirements for Weed-Cutting on Watercourses. December 2003
Conservation Policy. August 2004
Best Practice Guide. June 2005
Policy Delivery Statement. September 2005
Puxton Moor SSSI - Action Plan. March 2007
Puxton Moor SSSI Enhancement Scheme

English Nature (Now Natural England)

Nature conservation and the management of drainage channels. NCC / ADA 1989
Wildlife and fresh water: An agenda for sustainable management. March 1997
Water level requirements of selected plants and animals. May 1997
The Somerset Levels & Moors Natural Area. November 1997
Water Vole Conservation Handbook. English Nature / Environment Agency 1998
Managing floodplains to reduce flood risk and enhance biodiversity. March 2001

Sites of Special Scientific Interest. March 2002
North Somerset Levels and Moors and Severn Estuary Coast - Wildlife Enhancement Scheme. March 2002

Environment Agency

Rivers and Wetlands: Best practice guidelines
Aquatic Weed Control Operation - Best Practice Guidelines 1998
Disposal of Cut Vegetation - Best Practice Guidelines 1999
North and Mid Somerset Catchment Flood Management Plan - Consultation Draft. October 2006
Guidance on review and implementation of priority Water Level Management Plans (WLMPs) May 2007
WLMP review template June 2007

North Somerset Council

Action for Nature - North Somerset Biodiversity Action Plan. 2004

North Somerset Levels Internal Drainage Board

Biodiverstiy Action Plan. 2010

North Somerset Levels and Moor Project

The North Somerset Levels and Moors - A Celebration

Other Publications

The Wet Grassland Guide: Managing Floodplain and Coastal Wet Grasslands for Wildlife. RSPB 1997
The Wetland Restoration Manual - The Wildlife Trusts 2001
Severn Estuary Marine Site: Management Scheme Executive Summary
Association of Severn Estuary Relevant Authorities - September 2004

Boggie Meares & Queachy Fennes - A Study in Landscape Archaeology by Keith S Gardner
Nailsea & District Local History Society 2000

Appendix A - SSSI Citations

Biddle Street SSSI Citation

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: ST 423648 Area: 44.8 (ha.) 110.7 (ac.)

Ordnance Survey Sheet 1:50,000: 172 1:10,000: ST 46 NW/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 morsusranae*, 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*.

Puxton Moor SSSI Citation

COUNTY: AVON SITE NAME: PUXTON MOOR

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 412630 Area: 31.07 (ha.) 76.77 (ac.)

Ordnance Survey Sheet 1:50,000: 172 1:10,000: ST 46 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:
Puxton Moor forms part of the Avon Levels and Moors, an extensive area of low-lying largely agricultural land, situated to the north of the Mendip Hills. The moor lies entirely on the silty clays of the Wentlloog series.

Drained by a network of rhynes and ditches the area supports aquatic plant communities of great nature conservation interest.

Regularly maintained water courses (including some IDB* rhynes) are particularly species-rich. It is not uncommon for a short length of ditch to contain as many as 15 species and in some areas up to 30 species have been recorded. Open water species such as Canadian and Nuttall's Waterweed *Elodea canadensis* and *E. nuttallii,* Frogbit *Hydrocharis morsus-ranae,* Small and Lesser Pondweed *Potamogeton berchtoldii* and *P. pusillus*, Common Water-crowfoot *Ranunculus aquatilis* and the locally uncommon Opposite-leaved Pondweed *Groenlandia densa* are all present. Also occurring are the nationally scarce Rootless Duckweed *Wolffia arrhiza* and the Soft Hornwort *Ceratophyllum submersum*, the latter dominating a number of ditches.

Emergent species are also well-represented and Branched Bur-reed *Sparganium erectum,* Tubular water-dropwort *Oenanthe fistulosa,* Water Plantain *Alisma plantago-aquatica,* Water Horsetail *Equisetum fluviatile* are all common. Also present are Flowering-rush *Butomus umbellatus* and Cyperus Sedge *Carex pseudocyperus* both of which are declining in south west England.

Many of the less frequently maintained field ditches are dominated by emergent species. Reed Sweet-grass *Glyceria maxima*, Common Reed *Phragmites australis*, Yellow Iris *Iris pseudacorus* and Soft and Hard Rushes *Juncus effusus* and *J. inflexus* are abundant in some areas.

Preliminary investigations have shown that a diverse invertebrate fauna is also associated with the rhynes and ditches. Molluscs, Coleoptera and Hydracarina (water mites) are all well-represented and breeding populations of several odonata including the Ruddy Darter *Sympetrum sanguineum* and locally uncommon white-legged Damselfly *Platycnemis pennipes* are also present.

*IDB Ð Internal Drainage Board.

Yanal Bog SSSI Citation

COUNTY: AVON SITE NAME: YANAL BOG

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 424607 Area: 1.6 (ha.) 4.0 (ac.)

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

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

Date Notified (Under 1981 Act): 1988 Date of Last Revision: -

Other Information:
A new site.

Description and Reasons for Notification:
Yanal Bog is a calcicolous lowland mire. The plant communities associated with the peat surface are nationally rare.

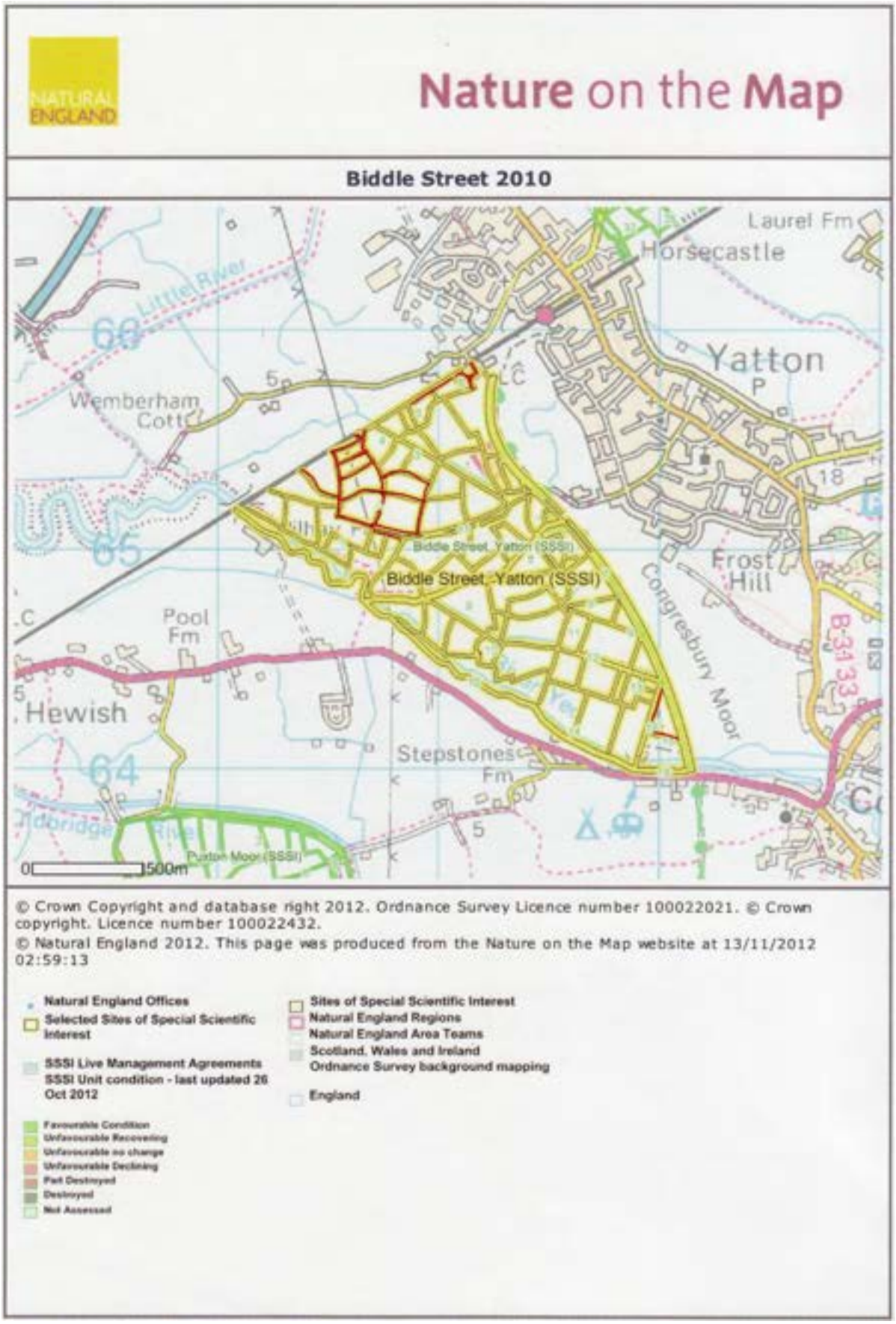
The mire is a well defined, domed feature in which the high water table resulting in the development of the peat is caused by upwelling of base-rich water originating from subsurface drainage through the underlying gravels and clay alluvium. The site lies at about l0m OD. The only other comparable site within Avon is that of Max Bog, to the south west.

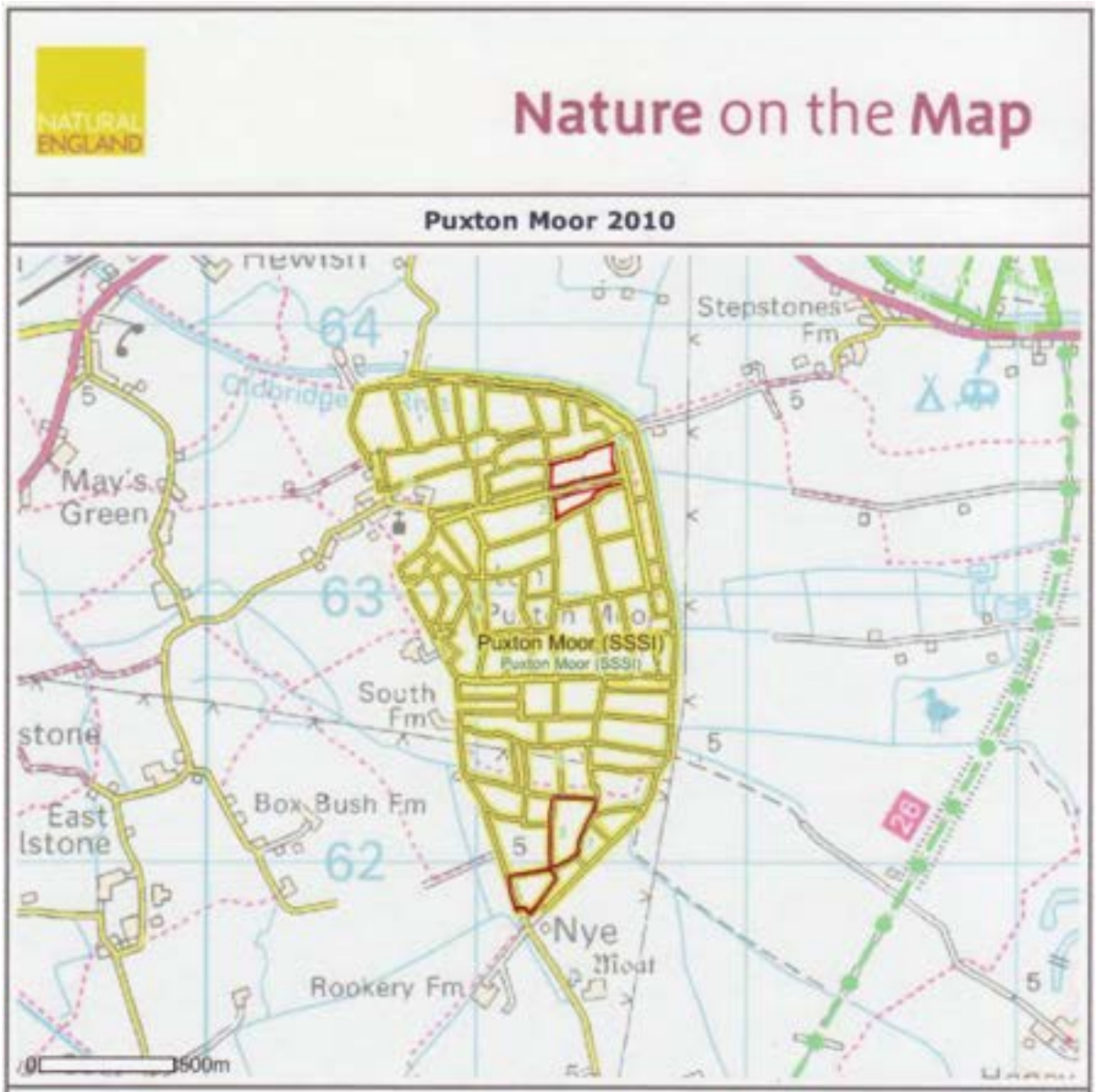
The western part of the mire supports a community with abundant Blunt-flowered Rush *Juncus subnodulosus*, Purple Moor-grass *Molinea caerulea* and Carnation Sedge *Carex panicea*. A number of plants which favour base-rich conditions occur in the community including Flea Sedge *Carex pulicaris*, Glaucous Sedge *Carex flacca*, Quaking-grass *Briza media*, Saw-wort *Serratula tinctoria* and Cowslip *Primula veris*; Black Bog-rush *Schoenus nigricans* is locally abundant along the wetter drainage ditch. Both Black Bog-rush and Blunt-flowered Rush have restricted distributions in south-west England. Other noteworthy species include Meadow Thistle *Cirsium dissectum*, Marsh Valerian *Valeriana dioica*, Dyer's Greenweed *Genista tinctoria*, Marsh Arrowgrass *Triglochin palustris*, Southern Marsh-orchid *Dactylorhiza praetermissa*, Common Spotted-orchid *Dactylorhiza fuchsii*, Fen Bedstraw *Galium uliginosum*, Meadowsweet *Filipendula ulmaria*, Devil's-bit Scabious *Succisa pratensis* and Tawny Sedge *Carex hostiana*.

The eastern part of the mire supports abundant Lesser Pond-sedge *Carex acutiformis*, Purple Moor-grass, Greater Pond-sedge *Carex riparia* and Blunt-flowered Rush, with frequent Common Reed *Phragmites australis* and Marsh Horsetail *Equisetum palustre*. The species occurring within this community indicate more neutral conditions and the calcicolous element is poorly developed. Of particular interest is the occurrence of the locally rare Tufted-sedge *Carex elata*. Other species adding to the diversity of the community include Meadowsweet, Ragged-Robin *Lychnis flos-cuculi*, Fen Bedstraw, Meadow Vetchling *Lathyrus pratensis*, Water Mint *Mentha aquatica* and Purple-loosestrife *Lythrum salicaria*.

The area surrounding the raised dome of the mire is dominated by grasses including Common Bent-grass *Agrostis capillaris*, Sweet Vernal-grass *Anthoxanthum odoratum*, Red Fescue *Festuca rubra*, Yorkshire Fog *Holcus lanatus* and Timothy *Phleum pratensis*. Herb species such as Meadowsweet, Agrimony *Agrimonia eupatoria* and Hemp-agrimony *Eupatorium cannabinum* occur occasionally throughout.

SSSI Condition Assessment Maps 2010


Nature on the Map
Biddle Street 2010
Laurel Fm
Horsecastle
Little River
Yatton
Wemberham
Biddle Street, Yatton (SSSI)
Frost Hill
Congresbury Moor
B3133
Pool Fm
Hewish
Stepstones Fm
Purton Moor (SSSI)
0
500m
© Crown Copyright and database right 2012. Ordnance Survey Licence number 100022021. © Crown copyright. Licence number 100022432.
© Natural England 2012. This page was produced from the Nature on the Map website at 13/11/2012 02:59:13
Natural England Offices
Selected Sites of Special Scientific Interest
SSSI Live Management Agreements
SSSI Unit condition - last updated 26 Oct 2012
Favourable Condition
Unfavourable Recovering
Unfavourable no change
Unfavourable Declining
Part Destroyed
Destroyed
Not Assessed
Sites of Special Scientific Interest
Natural England Regions
Natural England Area Teams
Scotland, Wales and Ireland
Ordnance Survey background mapping
England



© Crown Copyright and database right 2012. Ordnance Survey Licence number 100022021. © Crown copyright. Licence number 100022432.
© Natural England 2012. This page was produced from the Nature on the Map website at 13/11/2012 02:50:36

Natural England Offices
Selected Sites of Special Scientific Interest
SSSI Live Management Agreements
SSSI Unit condition - last updated 26 Oct 2012
Favourable Condition
Unfavourable Recovering
Unfavourable no change
Unfavourable Declining
Part Destroyed
Destroyed
Not Assessed
Sites of Special Scientific Interest
Natural England Regions
Natural England Area Teams
Scotland, Wales and Ireland
Ordnance Survey background mapping
England

Appendix B - North & Mid Somerset Catchment Flood Management Plan

Extract from North and Mid Somerset Catchment Flood Management Plan - Public Consultation Draft
Preferred Policies affecting the Oldbridge River Water Level Management Plan

Appendix C - Management Scheme for the Severn Estuary European Marine Site

Operations identified as interfacing with the Management Scheme for the Severn Estuary European Marine Site are set out below:

Activities:	Operation of Barrage or Sluice (Sampson's Sluice) [Potential Impacts - Release of water; Noise; Visual presence]	Assessment Code F2
	Water Channel Maintenance (Weed-cutting) [Potential Impacts - Noise; Visual presence. A further mechanism for impact is via outflow, with changes in sediment patterns]	Assessment Code F2
Plans/Projects:	Maintenance Dredging (Major works undertaken infrequently) [Potential Impacts - Disturbance of sediment (possible cause of contamination); Disturbance to habitats; Possible erosion of banks; Machinery noise; Visual presence of people and machinery]	Assessment Code F1
	Outfall Maintenance (Major repairs or refurbishment) [Potential Impacts - Abrasion; Noise; Visual presence; Disturbance to habitats from trampling and disturbance to feeding and roosting birds in winter/passage]	Assessment Code F1
	Excavation Works (Cutting of New Watercourses) [Potential Impacts - Noise; Visual presence; Changes in turbidity and habitat/species disturbance]	Assessment Code F1

The normal operational water level management activities set out in this WLMP have been assessed by English Nature (now Natural England) as Code F2 works. Natural England (English Nature) considers that these activities will have no impact on the Severn Estuary European Marine Site.

This WLMP does not propose any works classified as Plans or Projects. Should any such works be proposed in the future, Natural England (English Nature) considers that these should be assessed as Code F1 works as they may have an impact, albeit slight, on the Severn Estuary European Marine Site.

Appendix D - Photographs

Appendix D - Illustrative Photographs

Oldbridge River



Upstream View from Sampson's Sluice



Junction with Hurst Pool Rhyne



Downstream View at Watermans Bow



Upstream View at Watermans Bow



Upstream View towards Puxton Bow



Upstream View from Puxton Bow



Downstream View at Goosey Drove



Upstream View towards Two Bridges, Dolemoor Lane

Hurst Pool Rhyne



Upstream View from Hurst Pool Penning Hatch



Upstream View near Railway Crossing



Downstream View from Syphon Outlet



Upstream View towards Syphon Outlet (Right Channel)



Gang Wall Upstream from River Yeo Penning Hatch



Upstream View on Congresbury Moor



Downstream View at Moor Drove



Upstream View towards Smallway, Congresbury

Liddy Yeo Rhyne



Upstream View from Two Bridges, Dolemoor Lane



Downstream View from Puxton Moor



At Junction with Blackstones Rhyne



Winter Water Level at Blackstones Rhyne



At Junction with Churchill Rhyne



Downstream View near Nye



Upstream View at Rookery Farm Drove



Upstream View towards Riverside, Banwell

Various Rhynes



Balls Yeo Rhyne - Downstream from River Banwell Inlet



Balls Yeo Rhyne - Downstream View near Rolstone



Blackstones Rhyne - Downstream from Nye Road



Carditch Rhyne - Upstream from Meer Wall Drove



Churchill Rhyne - Upstream of Penning Hatch



Crookwell Rhyne - Upstream from Meer Wall Rhyne



Hardmead Rhyne - Upstream from Liddy Yeo Rhyne



Hardmead Rhyne - At Sandford Road, Nye

Various Rhynes - Continued



Heathgate Rhyne - Upstream of Weston Road (A370)



Heathgate Rhyne - Upstream from Dolemoor Lane



Meer Wall Rhyne - Upstream View at Meer Wall Drove
(Liddy Yeo Rhyne on Right)



Meer Wall Rhyne – Downstream View at Junction with Crookwell Rhyne

Water Control Structures



Sampson's Sluice - General View
(Oldbridge River)



Sampson's Sluice - Close-up View of Penstock
(Oldbridge River)



Hurst Pool Rhyne Tilting Weir



River Yeo Penning Hatch (Hurst Pool Rhyne)



Balls Yeo Rhyne Tilting Weir
(After Health & Safety Improvements)



Blackstone Rhyne Tilting Weir



Churchill Rhyne Tilting Weir



Heathgate Rhyne Inlet Valve



Heathgate Rhyne Tilting Weir



Rockers Rhyne Penning Hatch

Other Structures



Hurst Pool Rhyne Syphon - Inlet
(Under Congresbury Yeo)



Hurst Pool Rhyne Syphon - Internal View
(Under Congresbury Yeo)

Bridges and Culverts



M5 Motorway Culvert
(Oldbridge River)



Hewish Railway Culvert
(Oldbridge River)



Watermans Bow (A370 - Bristol Road)
(Oldbridge River)



Puxton Bow
(Oldbridge River)

Bridges and Culverts - Continued



Two Bridges - Dolemoor Lane
(Liddy Yeo Rhyne)



Two Bridges - Dolemoor Lane
(Meer Wall Rhyne)



Nye Bow - Sandford Road
(Liddy Yeo Rhyne)



Bristol Road Bridge (A370)
(Balls Yeo Rhyne)

Typical Maintenance Operations



Bank Flailing on Liddy Yeo Rhyne



Weed-cutting on East Town Rhyne

Puxton Moor SSSI



Upstream View from Two Bridges, Dolemoor Lane
Before installation of tilting weir.



New Tilting weir on Liddy Yeo Rhyne from Dolemoor Lane
Note raised winter levels above weir to supply SSSI



New tilting weir replacing Blackstone Rhyne
Penning hatch



Winter water levels on Blackstone Rhyne below



Sheet pile weir holding back minimum 300mm on northern part of SSSI in winter 2012



Lower sheet pile weir on Hurst Pool Rhyne retaining water on SSSI in winter (Nov 2012)

Biddle Street



Winter water level upstream of where proposed tilting weir Is to be built on Hurst Pool Rhyne

Appendix E - General Plan of Lowland Catchment showing Watercourses and Water Control Structures

Appendix F - Water Control Structures and Target Water Levels

Existing Water Control Structures

Name	Function	Description	
Sampson's Sluice	Primary Outfall Structure	Summer Penning Level Winter Water Level	3.83mAOD Not Penned
Hurst Pool Rhyne Tilting Weir	Summer Water Level Control	Summer Penning Level Winter Water Level	4.68mAOD Not Penned
River Yeo Penning Hatch [To be converted to tilting weir]	Summer Water Level Control	Summer Penning Level Winter Water Level	5.06mAOD Not Penned
Balls Yeo Rhyne Tilting Weir	Summer Water Level Control	Summer Penning Level Winter Water Level	4.40mAOD Not Penned
Rolstone Rhyne Penning Hatch	Summer Water Level Control	Sub-Catchment Separation Point - Normally Closed	
Blackstones Rhyne Tilting Weir	Summer Water Level Control	Summer Penning Level Proposed Winter Water Level	4.48mAOD 3.55 - 3.80mAOD
Churchill Rhyne Tilting Weir	Summer Water Level Control	Summer Penning Level Proposed Winter Water Level	4.30mAOD 3.55 - 3.80mAOD
Heathgate Rhyne Tilting Weir	Summer Water Level Control	Summer Penning Level Winter Water Level	4.28mAOD Not Penned
Rockers Rhyne Penning Hatch	Summer Water Level Control	Summer Penning Level Winter Water Level	4.25mAOD Not Penned
East Mead Tilting Weir	Summer Water Level Control	Summer Penning Level Winter Water Level	4.50mAOD Not Penned
East Town Rhyne Tilting Weir	Summer Water Level Control	Summer Penning Level Winter Water Level	4.95mAOD Not Penned
Heathgate Rhyne Inlet Valve	Water Feed from Hurst Pool Rhyne	Cut-Off Wall with 450mm dia Disk Valve	
Balls Yeo Rhyne Inlet Valve	Water Feed from River Banwell	550mm Inlet Penstock	
Hewish New Rhyne Inlet Valve	Water Feed from Balls Yeo Rhyne	Cut-Off Wall with 450mm dia Disk Valve	
West Rolstone Inlet Valve [Was Rockers Rhyne Inlet Valve]	Water Feed from Balls Yeo Rhyne	150mm dia Gate Valve	
Congresbury Yeo Syphon	Water Conveyance under Congresbury Yeo (Main River) 30inch (750mm) wrought iron pipe to convey water in Hurst Pool Rhyne under bed of Congresbury Yeo		
Liddy Yeo Rhyne Tilting Weir	Winter Water Level Control	Adjustable weir to manage winter water levels in SSSI ditches. Target Winter Penning Level 3.50mAOD	
Liddy Yeo / Meer Wall Rhynes Weir	Winter Flow Separation	Fixed weir to permit winter penning on Liddy Yeo Rhyne	

Note: mAOD refers to Water level measured in metres Above Ordnance Datum

Target Water Levels in Rhyne System

Watercourse	Existing Water Level Management		Suggested Water Level Management	
	Summer Water Level	Winter Water Level	Summer Water Level	Winter Water Level
Oldbridge River	4.02mAOD at Puxton Bow	Not penned at Sampson's Sluice	No Change 4.020mAOD at Puxton Bow	No Change Not penned at Sampson's Sluice
East Town Rhyne	4.95mAOD	Not penned	4.95mAOD	No Change - Not penned
Sluice Rhyne	As Oldbridge River	Not penned	As Oldbridge River	No Change - Not penned
Balls Yeo Rhyne	4.40mAOD	Not penned	4.40mAOD	No Change - Not penned
Greenstreet Rhyne	As Balls Yeo Rhyne	Not penned	As Balls Yeo Rhyne	No Change - Not penned
Hewish New Rhyne	As Balls Yeo Rhyne	Not penned	As Balls Yeo Rhyne	No Change - Not penned
Rockers Rhyne (incl. Extensions)	4.25m u/s of Nye Penning Hatch	Not penned	4.25m u/s of Nye Penning Hatch	No Change - Not penned
Rolstone Rhyne	As Rockers Rhyne	Not penned	As Rockers Rhyne	No Change - Not penned
Hurst Pool Rhyne i. d/s Hewish P Hatch	As Oldbridge River	Not penned	As Oldbridge River	No Change - Not penned
ii. Hewish P Hatch to River Yeo P Hatch	4.68mAOD	Not penned	4.68mAOD	No Change - Not penned
iii. u/s River Yeo PH	5.06mAOD	Not penned	5.06mAOD	No Change - Not penned [Possible Review]
Liddy Yeo Rhyne	4.03mAOD at Dolemoor Lane 4.05m at Nye Bow	Not penned	4.02mAOD at Dolemoor Lane 4.05mAOD at Nye Bow	3.50 - 3.75mAOD at Dolemoor Lane 3.65 - 3.90mAOD at Nye Bow
Blackstones Rhyne	Blackstones Rhyne	d/s as Liddy Yeo Rhyne 4.30mAOD u/s of Penning Hatch	Not penned	d/s as Liddy Yeo Rhyne 4.30mAOD u/s of Penning Hatch
Churchill Rhyne	4.30mAOD u/s of Penning Hatch	Not penned	4.30mAOD u/s of Penning Hatch	3.55 - 3.80mAOD at Penning Hatch
Sandmead Rhyne	4.30mAOD u/s of Penning Hatch	Not penned	4.30mAOD u/s of Penning Hatch	3.55 - 3.80mAOD at Penning Hatch
Hardmead Rhyne	As Liddy Yeo Rhyne	Not penned	As Liddy Yeo Rhyne	3.65 - 3.90mAOD at Nye Bow
Towerhead Brook		Not penned		No Change - Not penned
East Mead Rhyne		Not penned		No Change - Not penned

Appendix F - Water Control Structures and Target Water Levels (Continued)

Target Water Levels in Rhyne System (Continued)

Watercourse	Existing Water Level Management		Suggested Water Level Management	
	Summer Water Level	Winter Water Level	Summer Water Level	Winter Water Level
Heathgate Rhyne	4.31mAOD	Not penned	4.31mAOD	No Change - Not penned
Meer Wall Rhyne	4.03mAOD at Dolemoor Lane	Not penned	4.03mAOD at Dolemoor Lane	No Change - Not penned
Brandeer Rhyne	As Meer Wall Rhyne	Not penned	As Meer Wall Rhyne	No Change - Not penned
Littlewall Rhyne	As Brandeer Rhyne	Not penned	As Brandeer Rhyne	No Change - Not penned
Crookwell Rhyne	As Meer Wall Rhyne	Not penned	As Meer Wall Rhyne	No Change - Not penned
Carditch Rhyne	As Meer Wall Rhyne	Not penned	As Meer Wall Rhyne	No Change - Not penned

North Somerset Levels Internal Drainage Board

Water Level Management Plan

Oldbridge River

Giles Oliver
Engineer to the Board

The Cider House, The Grange Business Park,
Hewish, Weston-super-Mare. BS24 6RR

Tel.No. 01934 833388

Drawing No: 150/D/02 Rev D	Date: August 2014	Checked: GO
Scale: 1 : 12,500	Drawn: DC Micros	Approved: GO

Viewed Rhyne
EA Main River
NSLIDB Boundry
Oldbridge River Catchment Area
Control Structure
Proposed Control Structure
SSSI

Reproduced from Ordnance Survey mapping by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown Copyright. All rights reserved. Licence Number: 0100052227